RMOL

0.25.3

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Contents

1 RMOL Documentation

1.1 Getting Started

- Main features

- Installation

- Linking with RMOL

- Users Guide

- Tutorials

- Copyright and License

- Make a Difference

- Make a new release

- People

1.2   RMOL at SourceForge

- Project page

- Download RMOL

- Open a ticket for a bug or feature

- Mailing lists

- Forums

    - Discuss about Development issues
    - Ask for Help
    - Discuss RMOL

1.3   RMOL Development

- Git Repository (Subversion is deprecated)

- Coding Rules

- Documentation Rules

- Test Rules

1.4   External Libraries

- Boost (C++ STL extensions)

- Python

- MySQL client

- SOCI (C++ DB API)

1.5   Support RMOL

1.6   About RMOL

RMOL is a C++ library of revenue management and optimisation classes and functions. RMOL mainly targets simulation purposes. N

RMOL makes an extensive use of existing open-source libraries for increased functionality, speed and accuracy. In particular GSL (*GNU Scientific Library*) and Boost (*C++ Standard Extensions*) libraries are used.

The RMOL library originates from the department of Operational Research and Innovation at Amadeus, Sophia Antipolis, France. RMOL is released under the terms of the GNU Lesser General Public License (LG-PLv2.1) for you to enjoy.

RMOL should work on GNU/Linux, Sun Solaris, Microsoft Windows (with Cygwin, MinGW/MSYS, or Microsoft Visual C++ .NET) and Mac OS X operating systems.

Note

(N) - The RMOL library is **NOT** intended, in any way, to be used by airlines for production systems. If you want to report issue, bug or feature request, or if you just want to give feedback, have a look on the right-hand side of this page for the preferred reporting methods. In any case, please do not contact Amadeus directly for any matter related to RMOL.

2 People

2.1 Project Admins

- Denis Arnaud denis_arnaud@users.sourceforge.net (N)
- Anh Quan Nguyen quannaus@users.sourceforge.net (N)

2.2 Developers

- Anh Quan Nguyen quannaus@users.sourceforge.net (N)
- Denis Arnaud denis_arnaud@users.sourceforge.net (N)
- Nicolas Bondoux nbondoux@users.sourceforge.net (N)

2.3 Retired Developers

- Patrick Grandjean pgrandjean@users.sourceforge.net (N)
- Benoit Lardeux benlardeux@users.sourceforge.net (N)
- Karim Duval duvalkarim@users.sourceforge.net (N)
- Ngoc-Thach Hoang hoangngocthach@users.sourceforge.net (N)
- Son Nguyen Kim snguyenkim@users.sourceforge.net (N)

2.4 Contributors

- Emmanuel Bastien ebastien@users.sourceforge.net (N)
- Christophe Lacombe ddtof@users.sourceforge.net (N)

2.5 Distribution Maintainers

- Fedora/RedHat: Denis Arnaud denis_arnaud@users.sourceforge.net (N)
- Debian: Emmanuel Bastien ebastien@users.sourceforge.net (N)

Note

(N) - Amadeus employees.

3 Coding Rules

In the following sections we describe the naming conventions which are used for files, classes, structures, local variables, and global variables.

3.1 Default Naming Rules for Variables

Variables names follow Java naming conventions. Examples:

- lNumberOfPassengers
- lSeatAvailability

3.2   Default Naming Rules for Functions

Function names follow Java naming conventions. Example:

- `int myFunctionName (const int& a, int b)`

3.3   Default Naming Rules for Classes and Structures

Each new word in a class or structure name should always start with a capital letter and the words should be separated with an under-score. Abbreviations are written with capital letters. Examples:

- `MyClassName`

- `MyStructName`

3.4   Default Naming Rules for Files

Files are named after the C++ class names.

Source files are named using `.cpp` suffix, whereas header files end with `.hpp` extension. Examples:

- `FlightDate.hpp`

- `SegmentDate.cpp`

3.5   Default Functionality of Classes

All classes that are configured by input parameters should include:

- default empty constructor

- one or more additional constructor(s) that takes input parameters and initializes the class instance

- setup function, preferably named 'setup' or 'set_parameters'

Explicit destructor functions are not required, unless they are needed. It shall not be possible to use any of the other member functions unless the class has been properly initiated with the input parameters.

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4.1.1   Version 2.1, February 1999

```
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as the successor of the GNU Library Public License, version 2, hence
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```

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```
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root function must still compute square roots.)
```

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```
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c) Accompany the work with a written offer, valid for at
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```

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   ```
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   b) Give prominent notice with the combined library of the fact
   that part of it is a work based on the Library, and explaining
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   ```

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4.3.2 END OF TERMS AND CONDITIONS

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>  <name of author>

This library is free software; you can redistribute it and/or
modify it under the terms of the GNU Lesser General Public
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License along with this library; if not, write to the Free Software
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```

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
library 'Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
```

That's all there is to it!

Source

5 Documentation Rules

5.1 General Rules

All classes in RMOL should be properly documented with Doxygen comments in include (`.hpp`) files. Source (`.cpp`) files should be documented according to a normal standard for well documented C++ code.

An example of how the interface of a class shall be documented in RMOL is shown here:

```cpp
/*!
 * \brief Brief description of MyClass here
 *
 * Detailed description of MyClass here. With example code if needed.
 */
class MyClass {
public:
  //! Default constructor
  MyClass(void) { setup_done = false; }

  /*!
   * \brief Constructor that initializes the class with parameters
   *
   * Detailed description of the constructor here if needed
   *
   * \param[in] param1 Description of \a param1 here
   * \param[in] param2 Description of \a param2 here
   */
  MyClass(TYPE1 param1, TYPE2 param2) { setup(param1, param2); }

  /*!
   * \brief Setup function for MyClass
   *
   * Detailed description of the setup function here if needed
   *
   * \param[in] param1 Description of \a param1 here
   * \param[in] param2 Description of \a param2 here
   */
  void setup(TYPE1 param1, TYPE2 param2);

  /*!
   * \brief Brief description of memberFunction1
   *
   * Detailed description of memberFunction1 here if needed
   *
   * \param[in]     param1 Description of \a param1 here
   * \param[in]     param2 Description of \a param2 here
   * \param[in,out] param3 Description of \a param3 here
   * \return Description of the return value here
   */
  TYPE4 memberFunction1(TYPE1 param1, TYPE2 param2, TYPE3 &param3);

private:

  bool _setupDone;         /*!< Variable that checks if the class is properly
                                initialized with parameters */
  TYPE1 _privateVariable1; //!< Short description of _privateVariable1 here
  TYPE2 _privateVariable2; //!< Short description of _privateVariable2 here
};
```

5.2 File Header

All files should start with the following header, which include Doxygen's \file, \brief and \author tags, $Date$ and $Revisions$ CVS tags, and a common copyright note:

```cpp
/*!
 * \file
 * \brief Brief description of the file here
 * \author Names of the authors who contributed to this code
 * \date Date
 *
 * Detailed description of the file here if needed.
```

```
 *
 * --------------------------------------------------------------------
 *
 * RMOL - C++ Revenue Management Object Library
 *
 * Copyright (C) 2007-2010  (\see authors file for a list of contributors)
 *
 * \see copyright file for license information
 *
 * --------------------------------------------------------------------
 */
```

5.3 Grouping Various Parts

All functions must be added to a Doxygen group in order to appear in the documentation. The following code example defines the group 'my_group':

```
/*!
 * \defgroup my_group Brief description of the group here
 *
 * Detailed description of the group here
 */
```

The following example shows how to document the function `myFunction` and how to add it to the group `my_-group`:

```
/*!
 * \brief Brief description of myFunction here
 * \ingroup my_group
 *
 * Detailed description of myFunction here
 *
 * \param[in] param1 Description of \a param1 here
 * \param[in] param2 Description of \a param2 here
 * \return Description of the return value here
 */
TYPE3 myFunction(TYPE1 param1, TYPE2 &param2);
```

6 Main features

A short list of the main features of RMOL is given below sorted in different categories. Many more features and functions exist and for these we refer to the reference documentation.

6.1 Optimisation features

- Dynamic Programming (DP)

- EMSRa and EMSRb

- Network optimisation with Linear Programming (LP)

6.2 Unconstraining

- Inventory censorflag and guillotine

- E-M (Expectation Maximisation)

6.3   Forecasting features

- Exponential Smoothing

- Moving Average

6.4   Overbooking features

- Cancellations and No-Shows

- Cost-based optimisation

- Service-based optimisation

6.5   Other features

- CSV input file parsing

7   Make a Difference

Do not ask what RMOL can do for you. Ask what you can do for RMOL.

You can help us to develop the RMOL library. There are always a lot of things you can do:

- Start using RMOL

- Tell your friends about RMOL and help them to get started using it

- If you find a bug, report it to us. Without your help we can never hope to produce a bug free code.

- Help us to improve the documentation by providing information about documentation bugs

- Answer support requests in the RMOL discussion forums on SourceForge. If you know the answer to a question, help others to overcome their RMOL problems.

- Help us to improve our algorithms. If you know of a better way (e.g. that is faster or requires less memory) to implement some of our algorithms, then let us know.

- Help us to port RMOL to new platforms. If you manage to compile RMOL on a new platform, then tell us how you did it.

- Send us your code. If you have a good RMOL compatible code, which you can release under the LGPL, and you think it should be included in RMOL, then send it to us.

- Become an RMOL developer. Send us an e-mail and tell what you can do for RMOL.

8   Make a new release

8.1   Introduction

This document describes briefly the recommended procedure of releasing a new version of RMOL using a Linux development machine and the SourceForge project site.

The following steps are required to make a release of the distribution package.

- Initialisation

- Release branch maintenance

- Commit and publish the release branch

- Create source packages (tar-balls)

- Upload the HTML documentation to SourceForge

- Generate the RPM packages

- Update distributed change log

- Create the binary package, including the documentation

- Upload the files to SourceForge

- Make a new post

- Send an email on the announcement mailing-list

8.2 Initialisation

Clone locally the full `Git project`:

```
cd ~
mkdir -p dev/sim
cd ~/dev/sim
git clone git://rmol.git.sourceforge.net/gitroot/rmol/rmol rmolgit
cd rmolgit
git checkout trunk
```

8.3 Release branch maintenance

Switch to the release branch, on your local clone, and merge the latest updates from the trunk. Decide about the new version to be released.

```
cd ~/dev/sim/rmolgit
git checkout releases
git merge trunk
```

Update the version in the various build system files, replacing the old version numbers by the correct ones:

```
vi CMakeLists.txt
vi autogen.sh
vi README
```

Update the version, add some news in the `NEWS` file, add a change-log in the `ChangeLog` file and in the RPM specification files:

```
vi NEWS
vi ChangeLog
vi rmol.spec
```

8.4 Commit and publish the release branch

Commit the new release:

```
cd ~/dev/sim/rmolgit
git add -A
git commit -m "[Release 0.5.0] Release of the 0.5.0 version of RMOL."
git push
```

8.5   Create source packages (tar-balls)

Create the distribution packages using the following command:

```
cd ~/dev/sim/rmolgit
git checkout releases
rm -rf build && mkdir -p build
cd build
export INSTALL_BASEDIR=/home/user/dev/deliveries
export LIBSUFFIX_4_CMAKE="-DLIB_SUFFIX=64"
cmake -DCMAKE_INSTALL_PREFIX=${INSTALL_BASEDIR}/rmol-0.5.0 \
 -DWITH_STDAIR_PREFIX=${INSTALL_BASEDIR}/stdair-stable \
 -DWITH_AIRRAC_PREFIX=${INSTALL_BASEDIR}/airsched-stable \
 -DWITH_AIRRAC_PREFIX=${INSTALL_BASEDIR}/airrac-stable \
 -DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/rmol-stable \
 -DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/airinv-stable \
 -DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/simfqt-stable \
 -DCMAKE_BUILD_TYPE:STRING=Debug -DINSTALL_DOC:BOOL=ON \
 ${LIBSUFFIX_4_CMAKE} ..
make check && make dist
make install
```

This will configure, compile and check the package. The output packages will be named, for instance, `rmol-0.-5.0.tar.gz` and `rmol-0.5.0.tar.bz2`.

8.6   Upload the HTML documentation to SourceForge

In order to update the Web site files, either:

- synchronise them with rsync and SSH: Upload the just generated HTML (and PDF) documentation onto the SourceForge Web site.

  ```
  cd ~/dev/sim/rmolgit/build
  git checkout releases
  rsync -aiv ${INSTALL_BASEDIR}/rmol-0.5.0/share/doc/rmol-0.5.0/html/ \
   your_sf_user,rmol@web.sourceforge.net:htdocs/
  ```

  where `-aiv` options mean:

  - `-a`: archive/mirror mode; equals `-rlptgoD` (no `-H`, `-A`, `-X`)
  - `-v`: increase verbosity
  - `-i`: output a change-summary for all updates
  - Note the trailing slashes (/) at the end of both the source and target directories. It means that the content of the source directory (`doc/html`), rather than the directory itself, has to be copied into the content of the target directory.

- or use the SourceForge Shell service.

8.7   Generate the RPM packages

Optionally, generate the RPM package (for instance, for Fedora/RedHat):

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make dist
```

To perform this step, rpm-build, rpmlint and rpmdevtools have to be available on the system.

```
cp ../rmol.spec ~/dev/packages/SPECS \
  && cp rmol-0.5.0.tar.bz2 ~/dev/packages/SOURCES
cd ~/dev/packages/SPECS
rpmbuild -ba rmol.spec
cd ~/dev/packages
rpmlint -i SPECS/rmol.spec SRPMS/rmol-0.5.0-1.fc16.src.rpm \
  RPMS/noarch/rmol-* RPMS/i686/rmol-*
```

8.8   Update distributed change log

Update the `NEWS` and `ChangeLog` files with appropriate information, including what has changed since the previ-
ous release. Then commit and push the changes into the `RMOL's Git repository`.

8.9   Create the binary package, including the documentation

Create the binary package, which includes HTML and PDF documentation, using the following command:

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make package
```

The output binary package will be named, for instance, `rmol-0.5.0-Linux.tar.bz2`. That package contains
both the HTML and PDF documentation. The binary package contains also the executables and shared libraries,
as well as C++ header files, but all of those do not interest us for now.

8.10   Upload the files to SourceForge

Upload the distribution and documentation packages to the SourceForge server. Check `SourceForge help
page on uploading software`.

8.11   Make a new post

- submit a new entry in the `SourceForge project-related news feed`

- make a new post on the `SourceForge hosted WordPress blog`

- and update, if necessary, `Trac tickets`.

8.12   Send an email on the announcement mailing-list

Finally, you should send an announcement to `rmol-announce@lists.sourceforge.net` (see `https-
://lists.sourceforge.net/lists/listinfo/rmol-announce` for the archives)

9   Installation

9.1   Table of Contents

- Fedora/RedHat Linux distributions

- RMOL Requirements

- Basic Installation

- Compilers and Options

- Compiling For Multiple Architectures

- Installation Names

- Optional Features

- Particular systems

- Specifying the System Type

9.2 Fedora/RedHat Linux distributions

Note that on `Fedora`/`RedHat` Linux distributions, RPM packages are available and can be installed with your usual package manager. For instance:

```
yum -y install rmol-devel rmol-doc
```

RPM packages can also be available on the `SourceForge download site`.

9.3 RMOL Requirements

RMOL should compile without errors or warnings on most GNU/Linux systems, on UNIX systems like Solaris SunO-S, and on POSIX based environments for Microsoft Windows like Cygwin or MinGW with MSYS. It can be also built on Microsoft Windows NT/2000/XP/Vista/7 using Microsoft's Visual C++ .NET, but our support for this compiler is limited. For GNU/Linux, SunOS, Cygwin and MinGW we assume that you have at least the following GNU software installed on your computer:

- GNU Autotools:

    - `autoconf`,

    - `automake`,

    - `libtool`,

    - `make`, version 3.72.1 or later (check version with `make --version`)

- `GCC` - GNU C++ Compiler (g++), version 4.3.x or later (check version with `gcc --version`)

- `Boost` - C++ STL extensions, version 1.35 or later (check version with `grep "define BOOST_LIB_VERS-ION" /usr/include/boost/version.hpp`)

- `MySQL` - Database client libraries, version 5.0 or later (check version with `mysql --version`)

- `SOCI` - C++ database client library wrapper, version 3.0.0 or later (check version with `soci-config --version`)

Optionally, you might need a few additional programs: `Doxygen`, `LaTeX`, `Dvips` and `Ghostscript`, to generate the HTML and PDF documentation.

We strongly recommend that you use recent stable releases of the GCC, if possible. We do not actively work on supporting older versions of the GCC, and they may therefore (without prior notice) become unsupported in future releases of RMOL.

9.4 Basic Installation

Briefly, the shell commands `./cmake ..  && make install` should configure, build and install this package. The following more-detailed instructions are generic; see the `README` file for instructions specific to this package. Some packages provide this `INSTALL` file but do not implement all of the features documented below. The lack of an optional feature in a given package is not necessarily a bug. More recommendations for GNU packages can be found in the info page corresponding to "Makefile Conventions: (standards)Makefile Conventions".

The `cmake` shell script attempts to guess correct values for various system-dependent variables used during compilation. It uses those values to create a `Makefile` in each directory of the package. It may also create one or more `.h` files containing system-dependent definitions. Finally, it creates a `CMakeCache.txt` cache file that

you can refer to in the future to recreate the current configuration, and files 'CMakeFiles' containing compiler output (useful mainly for debugging 'cmake').

It can also use an optional file (typically called 'config.cache' and enabled with '--cache-file=config.-cache' or simply '-C') that saves the results of its tests to speed up reconfiguring. Caching is disabled by default to prevent problems with accidental use of stale cache files.

If you need to do unusual things to compile the package, please try to figure out how 'configure' could check whether to do them, and mail diffs or instructions to the address given in the 'README' so they can be considered for the next release. If you are using the cache, and at some point 'config.cache' contains results you don't want to keep, you may remove or edit it.

The file 'CMakeLists.txt' is used to create the 'Makefile' files.

The simplest way to compile this package is:

1. 'cd' to the directory containing the package's source code and type './cmake ..' to configure the package for your system. Running 'cmake' is generally fast. While running, it prints some messages telling which features it is checking for.

2. Type 'make' to compile the package.

3. Optionally, type 'make check' to run any self-tests that come with the package, generally using the just-built uninstalled binaries.

4. Type 'make install' to install the programs and any data files and documentation. When installing into a prefix owned by root, it is recommended that the package be configured and built as a regular user, and only the 'make install' phase executed with root privileges.

5. You can remove the program binaries and object files from the source code directory by typing 'make clean'. To also remove the files that 'configure' created (so you can compile the package for a different kind of computer), type 'make distclean'. There is also a 'make maintainer-clean' target, but that is intended mainly for the package's developers. If you use it, you may have to get all sorts of other programs in order to regenerate files that came with the distribution.

6. Often, you can also type 'make uninstall' to remove the installed files again. In practice, not all packages have tested that uninstallation works correctly, even though it is required by the GNU Coding Standards.

9.5 Compilers and Options

Some systems require unusual options for compilation or linking that the 'cmake' script does not know about. Run './cmake --help' for details on some of the pertinent environment variables.

You can give 'cmake' initial values for configuration parameters by setting variables in the command line or in the environment. Here is an example:

./cmake CC=c99 CFLAGS=-g LIBS=-lposix

See also

    Defining Variables for more details.

9.6 Compiling For Multiple Architectures

You can compile the package for more than one kind of computer at the same time, by placing the object files for each architecture in their own directory.

To do this, you can use GNU 'make'. 'cd' to the directory where you want
the object files and executables to go and run the 'configure' script. 'configure'
automatically checks for the source code in the directory that 'configure'
is in and in '..'. This is known as a "VPATH" build.

With a non-GNU 'make', it is safer to compile the package for one architecture
at a time in the source code directory. After you have installed the package
for one architecture, use 'make distclean' before reconfiguring for another
architecture.

On MacOS X 10.5 and later systems, you can create libraries and executables
that work on multiple system types--known as "fat" or "universal" binaries--by
specifying multiple '-arch' options to the compiler but only a single '-arch'
option to the preprocessor. Like this:

```
./configure CC="gcc -arch i386 -arch x86_64 -arch ppc -arch ppc64" \
            CXX="g++ -arch i386 -arch x86_64 -arch ppc -arch ppc64" \
            CPP="gcc -E" CXXCPP="g++ -E"
```

This is not guaranteed to produce working output in all cases, you may have
to build one architecture at a time and combine the results using the 'lipo'
tool if you have problems.

9.7 Installation Names

By default, 'make install' installs the package's commands under '/usr/local/bin',
include files under '/usr/local/include', etc. You can specify an installation
prefix other than '/usr/local' by giving 'configure' the option '--prefix=P-
REFIX', where PREFIX must be an absolute file name.

You can specify separate installation prefixes for architecture-specific
files and architecture-independent files. If you pass the option '--exec-prefix=P-
REFIX' to 'configure', the package uses PREFIX as the prefix for installing
programs and libraries. Documentation and other data files still use the
regular prefix.

In addition, if you use an unusual directory layout you can give options
like '--bindir=DIR' to specify different values for particular kinds of
files. Run 'configure --help' for a list of the directories you can set
and what kinds of files go in them. In general, the default for these options
is expressed in terms of '${prefix}', so that specifying just '--prefix'
will affect all of the other directory specifications that were not explicitly
provided.

The most portable way to affect installation locations is to pass the correct
locations to 'configure'; however, many packages provide one or both of the
following shortcuts of passing variable assignments to the 'make install'
command line to change installation locations without having to reconfigure
or recompile.

The first method involves providing an override variable for each affected
directory. For example, 'make install prefix=/alternate/directory' will
choose an alternate location for all directory configuration variables that
were expressed in terms of '${prefix}'. Any directories that were specified
during 'configure', but not in terms of '${prefix}', must each be overridden
at install time for the entire installation to be relocated. The approach
of makefile variable overrides for each directory variable is required by
the GNU Coding Standards, and ideally causes no recompilation. However,
some platforms have known limitations with the semantics of shared libraries
that end up requiring recompilation when using this method, particularly
noticeable in packages that use GNU Libtool.

The second method involves providing the 'DESTDIR' variable. For example, 'make install DESTDIR=/alternate/directory' will prepend '/alternate/directory' before all installation names. The approach of 'DESTDIR' overrides is not required by the GNU Coding Standards, and does not work on platforms that have drive letters. On the other hand, it does better at avoiding recompilation issues, and works well even when some directory options were not specified in terms of '${prefix}' at 'configure' time.

9.8 Optional Features

If the package supports it, you can cause programs to be installed with an extra prefix or suffix on their names by giving 'cmake' the option '--program-prefix=PREFIX' or '--program-suffix=SUFFIX'.

Some packages pay attention to '--enable-FEATURE' options to 'configure', where FEATURE indicates an optional part of the package. They may also pay attention to '--with-PACKAGE' options, where PACKAGE is something like 'gnu-as' or 'x' (for the X Window System). The 'README' should mention any '--enable-' and '--with-' options that the package recognizes.

For packages that use the X Window System, 'configure' can usually find the X include and library files automatically, but if it doesn't, you can use the 'configure' options '--x-includes=DIR' and '--x-libraries=DIR' to specify their locations.

Some packages offer the ability to configure how verbose the execution of 'make' will be. For these packages, running './configure --enable-silent-rules' sets the default to minimal output, which can be overridden with 'make V=1'; while running './configure --disable-silent-rules' sets the default to verbose, which can be overridden with 'make V=0'.

9.9 Particular systems

On HP-UX, the default C compiler is not ANSI C compatible. If GNU CC is not installed, it is recommended to use the following options in order to use an ANSI C compiler:

```
./configure CC="cc -Ae -D_XOPEN_SOURCE=500"
```

and if that doesn't work, install pre-built binaries of GCC for HP-UX.

On OSF/1 a.k.a. Tru64, some versions of the default C compiler cannot parse its '<wchar.h>' header file. The option '-nodtk' can be used as a workaround. If GNU CC is not installed, it is therefore recommended to try

```
./configure CC="cc"
```

and if that doesn't work, try

```
./configure CC="cc -nodtk"
```

On Solaris, don't put '/usr/ucb' early in your 'PATH'. This directory contains several dysfunctional programs; working variants of these programs are available in '/usr/bin'. So, if you need '/usr/ucb' in your 'PATH', put it *after* '/usr/bin'.

On Haiku, software installed for all users goes in '/boot/common', not '/usr/local'. It is recommended to use the following options:

```
./cmake -DCMAKE_INSTALL_PREFIX=/boot/common
```

9.10 Specifying the System Type

There may be some features 'configure' cannot figure out automatically, but
needs to determine by the type of machine the package will run on. Usually,
assuming the package is built to be run on the *same* architectures, 'configure'
can figure that out, but if it prints a message saying it cannot guess the
machine type, give it the '--build=TYPE' option. TYPE can either be a short
name for the system type, such as 'sun4', or a canonical name which has the
form CPU-COMPANY-SYSTEM

where SYSTEM can have one of these forms:

  - OS

  - KERNEL-OS

    See the file 'config.sub' for the possible values of each field. If
    'config.sub' isn't included in this package, then this package doesn't
    need to know the machine type.

    If you are *building* compiler tools for cross-compiling, you should use
    the option '--target=TYPE' to select the type of system they will produce
    code for.

    If you want to *use* a cross compiler, that generates code for a platform
    different from the build platform, you should specify the "host" platform
    (i.e., that on which the generated programs will eventually be run)
    with '--host=TYPE'.

9.11 Sharing Defaults

If you want to set default values for 'configure' scripts to share, you can
create a site shell script called 'config.site' that gives default values
for variables like 'CC', 'cache_file', and 'prefix'. 'configure' looks for
'PREFIX/share/config.site' if it exists, then 'PREFIX/etc/config.site' if
it exists. Or, you can set the 'CONFIG_SITE' environment variable to the
location of the site script. A warning: not all 'configure' scripts look
for a site script.

9.12 Defining Variables

Variables not defined in a site shell script can be set in the environment
passed to 'configure'. However, some packages may run configure again during
the build, and the customized values of these variables may be lost. In
order to avoid this problem, you should set them in the 'configure' command
line, using 'VAR=value'. For example:

./configure CC=/usr/local2/bin/gcc

causes the specified 'gcc' to be used as the C compiler (unless it is overridden
in the site shell script).

Unfortunately, this technique does not work for 'CONFIG_SHELL' due to an
Autoconf bug. Until the bug is fixed you can use this workaround:

CONFIG_SHELL=/bin/bash /bin/bash ./configure CONFIG_SHELL=/bin/bash

9.13 'cmake' Invocation

'cmake' recognizes the following options to control how it operates.

- '--help', '-h' print a summary of all of the options to 'configure',
  and exit.

- '--help=short', '--help=recursive' print a summary of the options unique
  to this package's 'configure', and exit. The 'short' variant lists
  options used only in the top level, while the 'recursive' variant lists
  options also present in any nested packages.

- '--version', '-V' print the version of Autoconf used to generate the
  'configure' script, and exit.

- '--cache-file=FILE' enable the cache: use and save the results of the
  tests in FILE, traditionally 'config.cache'. FILE defaults to '/dev/null'
  to disable caching.

- '--config-cache', '-C' alias for '--cache-file=config.cache'.

- '--quiet', '--silent', '-q' do not print messages saying which checks
  are being made. To suppress all normal output, redirect it to '/dev/null'
  (any error messages will still be shown).

- '--srcdir=DIR' look for the package's source code in directory DIR.
  Usually 'configure' can determine that directory automatically.

- '--prefix=DIR' use DIR as the installation prefix.

  See also

  > [Installation Names](#) for more details, including other options available
  > for fine-tuning the installation locations.

- '--no-create', '-n' run the configure checks, but stop before creating
  any output files.

'cmake' also accepts some other, not widely useful, options. Run 'cmake
--help' for more details.

The 'cmake' script produces an ouput like this:

```
cmake -DCMAKE_INSTALL_PREFIX=/home/user/dev/deliveries/rmol-99.99.99 -DLIB_SUFFIX=64 -DCMAKE_BUILD_TYPE:STRING
-- The C compiler identification is GNU
-- The CXX compiler identification is GNU
-- Check for working C compiler: /usr/lib64/ccache/gcc
-- Check for working C compiler: /usr/lib64/ccache/gcc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working CXX compiler: /usr/lib64/ccache/c++
-- Check for working CXX compiler: /usr/lib64/ccache/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Requires Git without specifying any version
-- Current Git revision name: 56c6c98cf2cfb4008a0acd35d08075cf5f79e693 trunk
-- Requires Boost-1.41
-- Boost version: 1.46.0
-- Found the following Boost libraries:
--    program_options
--    date_time
--    iostreams
--    serialization
--    filesystem
--    unit_test_framework
--    python
-- Found Boost version: 1.46.0
-- Found BoostWrapper: /usr/include (Required is at least version "1.41")
-- Requires MySQL without specifying any version
-- Using mysql-config: /usr/bin/mysql_config
-- Found MySQL: /usr/lib64/mysql/libmysqlclient.so
-- Found MySQL version: 5.5.14
```

```
-- Requires SOCI-3.0
-- Using soci-config: /usr/bin/soci-config
-- SOCI headers are buried
-- Found SOCI: /usr/lib64/libsoci_core.so (Required is at least version "3.0")
-- Found SOCIMySQL: /usr/lib64/libsoci_mysql.so (Required is at least version "3.0")
-- Found SOCI with MySQL back-end support version: 3.0.0
-- Requires StdAir-0.35
-- Found StdAir version: 0.37.1
-- Requires Doxygen without specifying any version
-- Found Doxygen: /usr/bin/doxygen
-- Found DoxygenWrapper: /usr/bin/doxygen
-- Found Doxygen version: 1.7.4
-- Had to set the linker language for 'airraclib' to CXX
-- Had to set the linker language for 'rmollib' to CXX
-- Test 'UnconstrainerTest' to be built with 'UnconstrainerTestSuite.cpp'
-- Test 'ForecasterTest' to be built with 'ForecasterTestSuite.cpp'
-- Test 'OptimiseTest' to be built with 'OptimiseTestSuite.cpp'
-- Test 'BOMsForForecasterTest' to be built with 'bomsforforecaster.cpp'
--
-- ============================================================
-- --------------------------------
-- ---     Project Information    ---
-- --------------------------------
-- PROJECT_NAME ................... : rmol
-- PACKAGE_PRETTY_NAME ............ : RMOL
-- PACKAGE ........................ : rmol
-- PACKAGE_NAME ................... : RMOL
-- PACKAGE_BRIEF .................. : C++ library of Revenue Management and Optimisation classes and functions
-- PACKAGE_VERSION ................ : 99.99.99
-- GENERIC_LIB_VERSION ............ : 99.99.99
-- GENERIC_LIB_SOVERSION .......... : 99.99
--
-- --------------------------------
-- ---     Build Configuration    ---
-- --------------------------------
-- Modules to build ............... : airrac;rmol
-- Libraries to build/install ..... : airraclib;rmollib
-- Binaries to build/install ...... : airrac;rmol
-- Modules to test ................ : rmol
-- Binaries to test ............... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;Unconstraine
--
-- * Module ....................... : airrac
--   + Layers to build ............ : .;basic;bom;factory;command;service
--   + Dependencies on other layers :
--   + Libraries to build/install . : airraclib
--   + Executables to build/install : airrac
--   + Tests to perform ........... :
-- * Module ....................... : rmol
--   + Layers to build ............ : .;basic;bom;factory;command;service
--   + Dependencies on other layers : airraclib
--   + Libraries to build/install . : rmollib
--   + Executables to build/install : rmol
--   + Tests to perform ........... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;Unconstraine
--
-- BUILD_SHARED_LIBS .............. : ON
-- CMAKE_BUILD_TYPE ............... : Debug
--  * CMAKE_C_FLAGS ............... :
--  * CMAKE_CXX_FLAGS ............. : -Wall -Werror
--  * BUILD_FLAGS ................. :
--  * COMPILE_FLAGS ............... :
-- CMAKE_MODULE_PATH .............. : /home/user/dev/sim/rmol/rmolgithub/config/
-- CMAKE_INSTALL_PREFIX ........... : /home/user/dev/deliveries/rmol-99.99.99
--
-- * Doxygen:
--   - DOXYGEN_VERSION ............. : 1.7.4
--   - DOXYGEN_EXECUTABLE .......... : /usr/bin/doxygen
--   - DOXYGEN_DOT_EXECUTABLE ....... : /usr/bin/dot
--   - DOXYGEN_DOT_PATH ............ : /usr/bin
--
-- --------------------------------
-- --- Installation Configuration ---
-- --------------------------------
-- INSTALL_LIB_DIR ................ : /home/user/dev/deliveries/rmol-99.99.99/lib64
```

```
-- INSTALL_BIN_DIR ................ : /home/user/dev/deliveries/rmol-99.99.99/bin
-- INSTALL_INCLUDE_DIR ............ : /home/user/dev/deliveries/rmol-99.99.99/include
-- INSTALL_DATA_DIR ............... : /home/user/dev/deliveries/rmol-99.99.99/share
-- INSTALL_SAMPLE_DIR ............. : /home/user/dev/deliveries/rmol-99.99.99/share/rmol/samples
-- INSTALL_DOC ................... : ON
--
-- --------------------------------
-- ---   Packaging Configuration  ---
-- --------------------------------
-- CPACK_PACKAGE_CONTACT ......... : Denis Arnaud <denis_arnaud – at – users dot sourceforge dot net>
-- CPACK_PACKAGE_VENDOR .......... : Denis Arnaud
-- CPACK_PACKAGE_VERSION ......... : 99.99.99
-- CPACK_PACKAGE_DESCRIPTION_FILE . : /home/user/dev/sim/rmol/rmolgithub/README
-- CPACK_RESOURCE_FILE_LICENSE .... : /home/user/dev/sim/rmol/rmolgithub/COPYING
-- CPACK_GENERATOR ............... : TBZ2
-- CPACK_DEBIAN_PACKAGE_DEPENDS ... :
-- CPACK_SOURCE_GENERATOR ........ : TBZ2;TGZ
-- CPACK_SOURCE_PACKAGE_FILE_NAME . : rmol-99.99.99
--
-- -------------------------------
-- ---     External libraries    ---
-- -------------------------------
--
-- * Boost:
--    - Boost_VERSION .............. : 104600
--    - Boost_LIB_VERSION .......... : 1_46
--    - Boost_HUMAN_VERSION ........ : 1.46.0
--    - Boost_INCLUDE_DIRS ......... : /usr/include
--    - Boost required components .. : program_options;date_time;iostreams;serialization;filesystem;unit_test_f
--    - Boost required libraries ... : optimized;/usr/lib64/libboost_iostreams-mt.so;debug;/usr/lib64/libboost_
--
-- * MySQL:
--    - MYSQL_VERSION .............. : 5.5.14
--    - MYSQL_INCLUDE_DIR .......... : /usr/include/mysql
--    - MYSQL_LIBRARIES ............ : /usr/lib64/mysql/libmysqlclient.so
--
-- * SOCI:
--    - SOCI_VERSION ............... : 3.0.0
--    - SOCI_INCLUDE_DIR ........... : /usr/include/soci
--    - SOCIMYSQL_INCLUDE_DIR ...... : /usr/include/soci
--    - SOCI_LIBRARIES ............. : /usr/lib64/libsoci_core.so
--    - SOCIMYSQL_LIBRARIES ........ : /usr/lib64/libsoci_mysql.so
--
-- * StdAir:
--    - STDAIR_VERSION ............. : 0.37.1
--    - STDAIR_BINARY_DIRS ......... : /home/user/dev/deliveries/stdair-0.37.1/bin
--    - STDAIR_EXECUTABLES ......... : stdair
--    - STDAIR_LIBRARY_DIRS ........ : /home/user/dev/deliveries/stdair-0.37.1/lib64
--    - STDAIR_LIBRARIES ........... : stdairlib;stdairuicllib
--    - STDAIR_INCLUDE_DIRS ........ : /home/user/dev/deliveries/stdair-0.37.1/include
--    - STDAIR_SAMPLE_DIR .......... : /home/user/dev/deliveries/stdair-0.37.1/share/stdair/samples
--
-- Change a value with: cmake –D<Variable>=<Value>
-- ============================================================
--
-- Configuring done
-- Generating done
-- Build files have been written to: /home/user/dev/sim/rmol/rmolgithub/build
```

It is recommended that you check if your library has been compiled and linked
properly and works as expected. To do so, you should execute the testing
process 'make check'. As a result, you should obtain a similar report:

```
[  0%] Built target hdr_cfg_rmol
[  0%] Built target hdr_cfg_airrac
[ 30%] Built target airraclib
[ 86%] Built target rmollib
[ 90%] Built target BOMsForForecasterTesttst
[ 93%] Built target UnconstrainerTesttst
[ 96%] Built target ForecasterTesttst
[100%] Built target OptimiseTesttst
Scanning dependencies of target check_rmoltst
Test project /home/user/dev/sim/rmol/rmolgithub/build/test/rmol
```

```
    Start 1: UnconstrainerTesttst
1/4 Test #1: UnconstrainerTesttst .............   Passed    0.04 sec
    Start 2: ForecasterTesttst
2/4 Test #2: ForecasterTesttst ...............   Passed    0.04 sec
    Start 3: OptimiseTesttst
3/4 Test #3: OptimiseTesttst .................   Passed    0.44 sec
    Start 4: BOMsForForecasterTesttst
4/4 Test #4: BOMsForForecasterTesttst .........   Passed    0.02 sec

100% tests passed, 0 tests failed out of 4

Total Test time (real) =   0.78 sec
[100%] Built target check_rmoltst
Scanning dependencies of target check
[100%] Built target check
```

Check if all the executed tests PASSED. If not, please contact us by filling a bug-report.

Finally, you should install the compiled and linked library, include files and (optionally) HTML and PDF documentation by typing:

```
make install
```

Depending on the PREFIX settings during configuration, you might need the root (administrator) access to perform this step.

Eventually, you might invoke the following command

```
make clean
```

to remove all files created during compilation process, or even

```
cd ~/dev/sim/rmolgit
rm -rf build && mkdir build
cd build
```

to remove everything.

10 Linking with RMOL

10.1 Table of Contents

- Introdution
- Using the pkg-config command
- Using the rmol-config script
- M4 macro for the GNU Autotools
- Using RMOL with dynamic linking

10.2 Introdution

There are two convenient methods of linking your programs with the RMOL library. The first one employs the 'pkg-config' command (see http://pkgconfig.freedesktop.org/), whereas the second one uses 'rmol-config' script. These methods are shortly described below.

10.3 Using the pkg-config command

`pkg-config` is a helper tool used when compiling applications and libraries. It helps you insert the correct compiler and linker options. The syntax of the `pkg-config` is as follows:

```
pkg-config <options> <library_name>
```

For instance, assuming that you need to compile an RMOL based program `my_prog.cpp`, you should use the following command:

```
g++ `pkg-config --cflags rmol` -o my_prog my_prog.cpp `pkg-config --libs rmol`
```

For more information see the `pkg-config` man pages.

10.4 Using the rmol-config script

RMOL provides a shell script called `rmol-config`, which is installed by default in `$prefix/bin` (`/usr/local/bin`) directory. It can be used to simplify compilation and linking of RMOL based programs. The usage of this script is quite similar to the usage of the `pkg-config` command.

Assuming that you need to compile the program `my_prog`.cpp' you can now do that with the following command:

```
g++ `rmol-config --cflags` -o my_prog_opt my_prog.cpp `rmol-config --libs`
```

A list of `rmol-config` options can be obtained by typing:

```
rmol-config --help
```

If the `rmol-config` command is not found by your shell, you should add its location `$prefix/bin` to the PATH environment variable, e.g.:

```
export PATH=/usr/local/bin:$PATH
```

10.5 M4 macro for the GNU Autotools

A M4 macro file is delivered with RMOL, namely 'rmol.m4', which can be found in, e.g., '/usr/share/aclocal'. When used by a 'configure' script, thanks to he `AM_PATH_RMOL` macro (specified in the M4 macro file), the following Makefile variables are then defined:

- `RMOL_VERSION` (e.g., defined to 0.23.0)

- `RMOL_CFLAGS` (e.g., defined to `-I${prefix}/include`)

- `RMOL_LIBS` (e.g., defined to `-L${prefix}/lib -lrmol`)

10.6 Using RMOL with dynamic linking

When using static linking some of the library routines in RMOL are copied into your executable program. This can lead to unnecessary large executables. To avoid having too large executable files you may use dynamic linking instead. Dynamic linking means that the actual linking is performed when the program is executed. This requires that the system is able to locate the shared RMOL library file during your program execution. If you install the RMOL library using a non-standard prefix, the `LD_LIBRARY_PATH` environment variable might be used to inform the linker of the dynamic library location, e.g.:

```
export LD_LIBRARY_PATH=<RMOL installation prefix>/lib:$LD_LIBRARY_PATH
```

11 Test Rules

This section describes rules how the functionality of the IT++ library should be verified. In the 'tests' subdirectory test files are provided. All functionality should be tested using these test files.

11.1 The Test File

Each new IT++ module/class should be accompanied with a test file. The test file is an implementation in C++ that tests the functionality of a function/class or a group of functions/classes called modules. The test file should test relevant parameter settings and input/output relations to guarantee correct functionality of the corresponding classes/functions. The test files should be maintained using version control and updated whenever new functionality is added to the IT++ library.

The test file should print relevant data to a standard output that can be used to verify the functionality. All relevant parameter settings should be tested.

The test file should be placed in the 'tests' subdirectory and should have a name ending with '_test.cpp'.

11.2 The Reference File

Consider a test file named 'module_test.cpp'. A reference file named 'module_test.ref' should accompany the test file. The reference file contains a reference printout of the standard output generated when running the test program. The reference file should be maintained using version control and updated according to the test file.

11.3 Testing IT++ Library

One can compile and execute all test programs from 'tests' subdirectory by typing

```
% make check
```

after successful compilation of the IT++ library.

12 Users Guide

12.1 Table of Contents

- Introduction
- Get Started
    - Get the RMOL library
    - Build the RMOL project
    - Build and Run the Tests
    - Install the RMOL Project (Binaries, Documentation)
- Exploring the Predefined BOM Tree
    - Forecaster BOM Tree
    - Optimiser BOM Tree
- Extending the BOM Tree

12.2 Introduction

The RMOL library contains classes for revenue management. This document does not cover all the aspects of the RMOL library. It does however explain the most important things you need to know in order to start using RMOL.

12.3 Get Started

12.3.1 Get the RMOL library

12.3.2 Build the RMOL project

To run the configuration script the first time, go to the top directory (where the RMOL package has been un-packed), and issue the following command:

- `mkdir -p build && cd build && cmake ..`
- `make`

Note

> The RMOL project can either be cloned from the `Git Repository` or downloaded as a tar-ball package from the `Sourceforge Web site`.

12.3.3 Build and Run the Tests

12.3.4 Install the RMOL Project (Binaries, Documentation)

12.4 Exploring the Predefined BOM Tree

RMOL predefines a BOM (Business Object Model) tree specific to the airline IT arena.

12.4.1 Forecaster BOM Tree

- `RMOL::EMDetruncator`
- `RMOL::Detruncator`
- `RMOL::Forecaster`

12.4.2 Optimiser BOM Tree

- `RMOL::DPOptimiser`
- `RMOL::MCOptimiser`
- `RMOL::Optimiser`

12.5 Extending the BOM Tree

13 Supported Systems

13.1 Table of Contents

- Introdution

13.2 Introdution

This page is intended to provide a list of RMOL supported systems, i.e. the systems on which configuration, installation and testing process of the RMOL library has been sucessful. Results are grouped based on minor release number. Therefore, only the latest tests for bug-fix releases are included. Besides, the information on this page is divided into sections dependent on the operating system.

Where necessary, some extra information is given for each tested configuration, e.g. external libraries installed, configuration commands used, etc.

If you manage to compile, install and test the RMOL library on a system not mentioned below, please let us know, so we could update this database.

13.3 RMOL 0.23.x

13.3.1 Linux Systems

13.3.1.1 Fedora Core 4 with ATLAS

- **Platform**: Intel Pentium 4

- **Operating System**: Fedora Core 4 (x86)

- **Compiler**: g++ (GCC) 4.0.2 20051125

- **RMOL release**: 0.23.0

- **External Libraries**: From FC4 distribution:

    - `fftw3.i386-3.0.1-3`

- **–** `fftw3-devel.i386-3.0.1-3`

- **–** `atlas-sse2.i386-3.6.0-8.fc4`

- **–** `atlas-sse2-devel.i386-3.6.0-8.fc4`

- **–** `blas.i386-3.0-35.fc4`

- **–** `lapack.i386-3.0-35.fc4`

- **Tests Status**: All tests PASSED

- **Comments**: RMOL configured with:

```
% CXXFLAGS="-O3 -pipe -march=pentium4" ./configure
```

- **Date**: March 7, 2006

- **Tester**: Tony Ottosson

13.3.1.2   Gentoo Linux with ACML

- **Platform**: AMD Sempron 3000+

- **Operating System**: Gentoo Linux 2006.0 (x86 arch)

- **Compiler(s)**: g++ (GCC) 3.4.5

- **RMOL release**: 0.23.1

- **External Libraries**: Compiled and installed from portage tree:

  - **–** `sci-libs/acml-3.0.0`

- **Tests Status**: All tests PASSED

- **Comments**: BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ACML
% eselect lapack set ACML
```

  RMOL configured with:

```
% export CPPFLAGS="-I/usr/include/acml"
% ./configure --with-blas="-lblas"
```

- **Date**: March 31, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.1.3   Gentoo Linux with ATLAS

- **Platform**: Intel Pentium M Centrino

- **Operating System**: Gentoo Linux 2006.0 (x86)

- **Compiler**: g++ (GCC) 3.4.5

- **RMOL release**: 0.23.1

- **External Libraries**: Compiled and installed from portage tree:

  - **–** `sci-libs/fftw-3.1`

  - **–** `sci-libs/blas-atlas-3.6.0-r1`

  - **–** `sci-libs/lapack-atlas-3.6.0`

- **Tests Status**: All tests PASSED

- **Comments**: BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ATLAS
% eselect lapack set ATLAS
```

RMOL configured with:

```
% ./configure --with-blas="-lblas"
```

- **Date**: March 31, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.1.4   Gentoo Linux with MKL

- **Platform**: Intel Pentium M Centrino

- **Operating System**: Gentoo Linux 2006.0 (x86 arch)

- **Compiler**: g++ (GCC) 3.4.5

- **RMOL release**: 0.23.0

- **External Libraries**: Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: `/opt/intel/mkl/8.0.1`

- **Tests Status**: All tests PASSED

- **Comments**: RMOL configured using the following commands:

```
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/32"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```

- **Date**: February 28, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.1.5   Gentoo Linux with NetLib's BLAS and LAPACK

- **Platform**: Intel Pentium M Centrino

- **Operating System**: Gentoo Linux 2006.0 (x86)

- **Compiler**: g++ (GCC) 3.4.5

- **RMOL release**: 0.23.1

- **External Libraries**: Compiled and installed from portage tree:

    - `sci-libs/fftw-3.1`
    - `sci-libs/blas-reference-19940131-r2`
    - `sci-libs/cblas-reference-20030223`
    - `sci-libs/lapack-reference-3.0-r2`

- **Tests Status**: All tests PASSED

- **Comments**: BLAS and LAPACK libs set by using the following system commands:

```
% blas-config reference
% lapack-config reference
```

RMOL configured with:

```
% ./configure --with-blas="-lblas"
```

- **Date**: March 31, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.1.6 Red Hat Enterprise Linux with RMOL External

- **Platform**: Intel Pentium 4

- **Operating System**: Red Hat Enterprise Linux AS release 4 (Nahant Update 2)

- **Compiler**: g++ (GCC) 3.4.4 20050721 (Red Hat 3.4.4-2)

- **RMOL release**: 0.23.0

- **External Libraries**: BLAS, CBLAS, LAPACK and FFTW libraries from RMOL External 2.1.1 package

- **Tests Status**: All tests PASSED

- **Date**: March 7, 2006

- **Tester**: Erik G. Larsson

13.3.1.7 SUSE Linux 10.0 with NetLib's BLAS and LAPACK

- **Platform**: Intel Pentium 4 CPU 3.20GHz (64-bit)

- **Operating System**: SUSE Linux 10.0 (x86_64)

- **Compiler(s)**: g++ (GCC) 4.0.2

- **RMOL release**: 0.23.0

- **External Libraries**: BLAS, LAPACK and FFTW libraries installed from OpenSuse 10.0 RPM repository:

    - `blas-3.0-926`
    - `lapack-3.0-926`
    - `fftw3-3.0.1-114`
    - `fftw3-threads-3.0.1-114`
    - `fftw3-devel-3.0.1-114`

- **Tests Status**: All tests PASSED

- **Comments**: RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% ./configure --with-lapack="/usr/lib64/liblapack.so.3"
```

- **Date**: March 1, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.1.8 SUSE Linux 10.0 with MKL

- **Platform**: Intel Pentium 4 CPU 3.20GHz (64-bit)

- **Operating System**: SUSE Linux 10.0 (x86_64)

- **Compiler(s)**: g++ (GCC) 4.0.2

- **RMOL release**: 0.23.0

- **External Libraries**: Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: `/opt/intel/mkl/8.0.1`

- **Tests Status**: All tests PASSED

- **Comments**: RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/em64t"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```

- **Date**: March 1, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2   Windows Systems

13.3.2.1   Microsoft Windows XP with Cygwin

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2, Cygwin 1.5.19-4

- **Compiler(s)**: g++ (GCC) 3.4.4 (cygming special)

- **RMOL release**: 0.23.1

- **External Libraries**: Installed from Cygwin's repository:

    - `fftw-3.0.1-2`
    - `fftw-dev-3.0.1-1`
    - `lapack-3.0-4`

- **Tests Status**: All tests PASSED

- **Comments**: Only static library can be built. RMOL configured with:

```
% ./configure
```

- **Date**: March 31, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2.2   Microsoft Windows XP with Cygwin and ATLAS

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2, Cygwin 1.5.19-4

- **Compiler(s)**: g++ (GCC) 3.4.4 (cygming special)

- **RMOL release**: 0.23.1

- **External Libraries**: Installed from Cygwin's repository:

    - `fftw-3.0.1-2`
    - `fftw-dev-3.0.1-1`

    ATLAS BLAS and LAPACK libraries from RMOL External 2.1.1 package configured using:

```
% ./configure --enable-atlas --disable-fftw
```

- **Tests Status**: All tests PASSED

- **Comments**: Only static library can be built. RMOL configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% ./configure
```

- **Date**: March 31, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2.3 Microsoft Windows XP with Cygwin and ACML

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2, Cygwin 1.5.19-4

- **Compiler(s)**: g++ (GCC) 3.4.4 (cygming special)

- **RMOL release**: 0.23.2

- **External Libraries**: ACML version 3.1.0 (`acml3.1.0-32-win32-g77.exe`) installed into a default directory, i.e. `"c:\Program Files\AMD\acml3.1.0"`

- **Tests Status**: All tests PASSED

- **Comments**: Only static library can be built. RMOL configured with:

```
% export LDFLAGS="-L/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```

- **Date**: May 15, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2.4 Microsoft Windows XP with MinGW, MSYS and ACML

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10

- **Compiler(s)**: g++ (GCC) 3.4.4 (mingw special)

- **RMOL release**: 0.23.2

- **External Libraries**: ACML version 3.1.0 (`acml3.1.0-32-win32-g77.exe`) installed into a default directory, i.e. `"c:\Program Files\AMD\acml3.1.0"`

- **Tests Status**: All tests PASSED

- **Comments**: Only static library can be built. RMOL configured with:

```
% export LDFLAGS="-L/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```

- **Date**: May 15, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2.5 Microsoft Windows XP with MinGW, MSYS and RMOL External

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10

- **Compiler(s)**: g++ (GCC) 3.4.4 (mingw special)

- **RMOL release**: 0.23.5

- **External Libraries**: BLAS, CBLAS, LAPACK and FFTW libraries from RMOL External 2.2.0 package

- **Tests Status**: All tests PASSED

- **Comments**: Only static library can be built. RMOL configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% export CPPFLAGS="-I/usr/local/include"
% export CXXFLAGS="-Wall -O3 -march=athlon-tbird -pipe"
% ./configure --disable-html-doc
```

- **Date**: August 11, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.2.6   Microsoft Windows XP with MS Visual C++ and Intel MKL

- **Platform**: AMD Sempron 3000+

- **Operating System**: Microsoft Windows XP SP2

- **Compiler(s)**: Microsoft Visual C++ 2005 .NET

- **RMOL release**: 0.23.5

- **External Libraries**: Intel Math Kernel Library (MKL) 8.1 installed manually in the following directory: `"C:\- Program Files\Intel\MKL\8.1"`

- **Tests Status**: Not fully tested. Some RMOL based programs compiled and run with success.

- **Comments**: Only static library can be built. RMOL built by opening the `"win32\rmol.vcproj"` project file in MSVC++ and executing `"Build -> Build Solution"` command from menu.

- **Date**: August 11, 2006

- **Tester**: Adam Piatyszek (ediap)

13.3.3   Unix Systems

13.3.3.1   SunOS 5.9 with RMOL External

- **Platform**: SUNW, Sun-Blade-100 (SPARC)

- **Operating System**: SunOS 5.9 Generic_112233-10

- **Compiler(s)**: g++ (GCC) 3.4.5

- **RMOL release**: 0.23.2

- **External Libraries**: BLAS, CBLAS, LAPACK and FFTW libraries from RMOL External 2.1.1 package. The following configuration command has been used:

```
% export CFLAGS="-mcpu=ultrasparc -O2 -pipe -funroll-all-loops"
% ./configure
```

- **Tests Status**: All tests PASSED

- **Comments**: RMOL configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% export CPPFLAGS="-I/usr/local/include"
% export CXXFLAGS="-mcpu=ultrasparc -O2 -pipe"
% ./configure --enable-debug
```

- **Date**: May 15, 2006

- **Tester**: Adam Piatyszek (ediap)

14   RMOL Supported Systems (Previous Releases)

14.1   RMOL 3.9.1

14.2   RMOL 3.9.0

14.3   RMOL 3.8.1

15 Tutorials

15.1 Table of Contents

15.2 Introduction

This page contains some tutorial examples that will help you getting started using StdAir. Most examples show how to construct some simple business objects, i.e., instances of the so-named Business Object Model (BOM).

15.2.1 Preparing the StdAir Project for Development

The source code for these examples can be found in the `batches` and `test/stdair` directories. They are compiled along with the rest of the `StdAir` project. See the User Guide (Users Guide) for more details on how to build the `StdAir` project.

15.3 Build a Predefined BOM Tree

A few steps:

- Instanciate the BOM Root Object

- Instanciate the (Airline) Inventory Object

- Link the Inventory Object with the BOM Root

15.3.1 Instanciate the BOM Root Object

First, a BOM root object (i.e., a root for all the classes in the project) is instantiated by the `stdair::STD-AIR_ServiceContext` context object, when the `stdair::STDAIR_Service` is itself instantiated. The corresponding `StdAir` type (class) is `stdair::BomRoot`.

In the following sample, that object is named `ioBomRoot`, and is given as input/output parameter of the `stdair::CmdBomManager::buildSampleBom()` method:

15.3.2   Instanciate the (Airline) Inventory Object

An airline inventory object can then be instantiated. Let us give it the "BA" airline code (corresponding to `British Airways`) as the object key. That is, an object (let us name it `lBAKey`) of type (class) `stdair::Inventory-Key` has first to be instantiated.

Thanks to that key, an airline inventory object, i.e. of type (class) `stdair::Inventory`, can be instantiated. Let us name that airline inventory object `lBAInv`.

15.3.3   Link the Inventory Object with the BOM Root

Then, both objects have to be linked: the airline inventory object (`stdair::Inventory`) has to be linked with the root of the BOM tree (`stdair::BomRoot`). That operation is as simple as using the `stdair::FacBom-Manager::addToListAndMap()` method:

15.3.4   Build Another Airline Inventory

Another airline inventory object, corresponding to the Air France (`Air France`) company, is instantiated the same way:

See the corresponding full program (cmd_bom_manager_cpp) for more details.

15.3.5   Dump The BOM Tree Content

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

See the corresponding full program (bom_display_cpp) for more details.

15.3.6   Result of the Tutorial Program

When the `stdair.cpp` program is run (with the `-b` option), the output should look like:

```
[D]../../batches/stdair.cpp:243: Welcome to stdair
[D]../../../stdair/command/CmdBomManager.cpp:41: StdAir will build the BOM tree
    from built-in specifications.
[D]../../batches/stdair.cpp:286:
=============================================================
BomRoot:  -- ROOT --
=============================================================
+++++++++++++++++++++++++++++++++++++++++++++++++
Inventory: BA
+++++++++++++++++++++++++++++++++++++++++++++++++
*******************************************
```

```
FlightDate: BA9, 2011-Jun-10
*******************************************
*******************************************
Leg-Dates:
----------
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset,
      Elapsed, Distance, Capacity,
BA9 2011-Jun-10, LHR-BKK, 2011-Jun-10, 21:45:00, 2011-Jun-11, 15:40:00, 11:05:
      00, 1, 06:50:00, 9900, 0,
BA9 2011-Jun-10, BKK-SYD, 2011-Jun-11, 17:05:00, 2011-Jun-12, 15:40:00, 09:05:
      00, 1, 13:30:00, 8100, 0,
*******************************************
*******************************************
LegCabins:
----------
Flight, Leg, Cabin, OffedCAP, PhyCAP, RgdADJ, AU, UPR, SS, Staff, WL, Group,
      CommSpace, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0,
      0, 3.52965e-319, 0, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0,
      0, 0, 0, 0,
*******************************************
*******************************************
Buckets:
--------
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*******************************************
*******************************************
SegmentCabins:
--------------
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*******************************************
*******************************************
Subclasses:
-----------
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs,
      GrpBks (pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0, 0 (0),
      0, 0, 0, 0, 0, 0,
+++++++++++++++++++++++++++++++++++++++++++++++++
Inventory: AF
+++++++++++++++++++++++++++++++++++++++++++++++++
*******************************************
FlightDate: AF84, 2011-Mar-20
*******************************************
*******************************************
Leg-Dates:
----------
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset,
      Elapsed, Distance, Capacity,
AF84 2011-Mar-20, CDG-SFO, 2011-Mar-20, 10:40:00, 2011-Mar-20, 12:50:00, 11:10:
      00, 0, -09:00:00, 9900, 0,
*******************************************
*******************************************
LegCabins:
----------
Flight, Leg, Cabin, OffedCAP, PhyCAP, RgdADJ, AU, UPR, SS, Staff, WL, Group,
      CommSpace, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0
      , 0, 0, 0, 0,
*******************************************
*******************************************
Buckets:
--------
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*******************************************
*******************************************
SegmentCabins:
--------------
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*******************************************
*******************************************
Subclasses:
-----------
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs,
      GrpBks (pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0, 0 (0)
      , 0, 0, 0, 0, 0, 0,
```

See the corresponding full program (batch_stdair_cpp) for more details.

15.4 Extend the Pre-Defined BOM Tree

Now that we master how to instantiate the pre-defined StdAir classes, let us see how to extend that BOM.

15.4.1 Extend an Airline Inventory Object

For instance, let us assume that some (IT) provider (e.g., you) would like to have a specific implementation of the `Inventory` object. The corresponding class has just to extend the `stdair::Inventory` class:

The STL containers have to be defined accordingly too:

See the full class definition (test_archi_inv_hpp) and implementation (test_archi_inv_cpp) for more details.

15.4.2 Build the Specific BOM Objects

The BOM root object (`stdair::BomRoot`) is instantiated the classical way:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) can be instantiated the same way as a standard Inventory (`stdair::Inventory`) would be:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) is linked to the root of the BOM tree (`stdair::BomRoot`) the same way as the standard Inventory (`stdair::Inventory`) would be:

Another specific airline inventory object is instantiated the same way:

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of specific airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

15.4.3 Result of the Tutorial Program

When this program is run, the output should look like:

```
Inventory: BA
Inventory: AF
```

See the corresponding full program (StandardAirlineITTestSuite_cpp) for more details.

16 Command-Line Test to Demonstrate How To Test the RMOL Project

```
 */
// //////////////////////////////////////////////////////////////////
// Import section
// //////////////////////////////////////////////////////////////////
// STL
#include <cassert>
#include <limits>
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");

struct UnitTestConfig {
  UnitTestConfig() {
    boost_utf::unit_test_log.set_stream (utfReportStream);
    boost_utf::unit_test_log.set_format (boost_utf::XML);
    boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
    //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
  }

  ~UnitTestConfig() {
  }
};

namespace RMOL {

  struct BookingClassData {

    // Attributes
    double _bookingCount;
    double _fare;
    double _sellupFactor;
    bool _censorshipFlag;

    // Constructer
    BookingClassData (const double iBookingCount, const double iFare,
                      const double iSellupFactor, const bool iCensorshipFlag)
      : _bookingCount(iBookingCount), _fare(iFare),
        _sellupFactor(iSellupFactor), _censorshipFlag(iCensorshipFlag) {
    }

    // Getters
    double getFare () const {
      return _fare;
    }

    bool getCensorshipFlag () const {
      return _censorshipFlag;
    }

    // Display
    std::string toString() const {
      std::ostringstream oStr;
      oStr <<  std::endl
           << "[Booking class data information]" << std::endl
           << "Booking counter: " << _bookingCount << std::endl
           << "Fare: " << _fare << std::endl
           << "Sell-up Factor: " << _sellupFactor << std::endl
           << "censorshipFlag: " << _censorshipFlag << std::endl;
      return oStr.str();
    }

  };

  struct BookingClassDataSet {

    typedef std::vector<BookingClassData*> BookingClassDataList_T;
```

```cpp
// Attributes
int _numberOfClass;
double _minimumFare;
bool _censorshipFlag; // true if any of the classes is censored
BookingClassDataList_T _bookingClassDataList;

// Constructor
BookingClassDataSet ()
  : _numberOfClass(0), _minimumFare(0),
    _censorshipFlag(false) {
}

// Add BookingClassData
void addBookingClassData (BookingClassData& ioBookingClassData) {
  _bookingClassDataList.push_back (&ioBookingClassData);
}

// Getters
unsigned int getNumberOfClass () const {
  return _bookingClassDataList.size();
}

double getMinimumFare () const {
  return _minimumFare;
}

bool getCensorshipFlag () const {
  return _censorshipFlag;
}

// Setters
void setMinimumFare (const double iMinFare) {
  _minimumFare = iMinFare;
}

void setCensorshipFlag (const bool iCensorshipFlag) {
  _censorshipFlag = iCensorshipFlag;
}

// compute minimum fare
void updateMinimumFare() {
  double minFare = std::numeric_limits<double>::max();
  BookingClassDataList_T::iterator itBookingClassDataList;
  for (itBookingClassDataList = _bookingClassDataList.begin();
       itBookingClassDataList != _bookingClassDataList.end();
       ++itBookingClassDataList) {
    BookingClassData* lBookingClassData = *itBookingClassDataList;
    assert (lBookingClassData != NULL);

    const double lFare = lBookingClassData->getFare();
    if (lFare < minFare) {
      minFare = lFare;
    }
  }
  //
  setMinimumFare(minFare);
}

// compute censorship flag for the data set
void updateCensorshipFlag () {
  bool censorshipFlag = false;
  BookingClassDataList_T::iterator itBookingClassDataList;
  for (itBookingClassDataList = _bookingClassDataList.begin();
       itBookingClassDataList != _bookingClassDataList.end();
       ++itBookingClassDataList) {
    BookingClassData* lBookingClassData = *itBookingClassDataList;
    assert (lBookingClassData != NULL);

    const bool lCensorshipFlagOfAClass =
      lBookingClassData->getCensorshipFlag();
    if (lCensorshipFlagOfAClass) {
      censorshipFlag = true;
      break;
    }
  }
  //
  setCensorshipFlag(censorshipFlag);
}

// Display
std::string toString() const {
  std::ostringstream oStr;
  oStr << std::endl
       << "[Booking class data set information]" << std::endl
       << "Number of classes: " << _numberOfClass << std::endl
       << "Minimum fare: " << _minimumFare << std::endl
```

```cpp
                << "The data of the class set are sensored: " << _censorshipFlag
                << std::endl;
        return oStr.str();
    }

  };

  // /**-------------- BOM : Q-Forecaster ---------------------- */
  // struct QForecaster {

  //   // Function focused BOM

  //   // 1. calculate sell up probability for Q-eq

  //   // 2. calculate Q-Equivalent Booking
  //   double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
  //     double lQEqBooking = 0.0;
  //     double lMinFare = iBookingClassDataSet.getMinimumFare();


  //     return lQEqBooking;
  //   }

  //   /* Calculate Q-equivalent demand
  //      [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
  //   */


  //   // 3. Partition to each class

  //   //

  // };

}

// /////////////// Main: Unit Test Suite ///////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)


BOOST_AUTO_TEST_CASE (rmol_forecaster) {

  // Output log File
  std::string lLogFilename ("bomsforforecaster.log");
  std::ofstream logOutputFile;

  // Open and clean the log outputfile
  logOutputFile.open (lLogFilename.c_str());
  logOutputFile.clear();

  // Initialise the RMOL service
  const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);

  // Initialise the RMOL service
  RMOL::RMOL_Service rmolService (lLogParams);

  // Build a sample BOM tree
  rmolService.buildSampleBom();

  // Register BCDataSet
  RMOL::BookingClassDataSet lBookingClassDataSet;

  // Register BookingClassData
  RMOL::BookingClassData QClassData (10, 100, 1, false);
  RMOL::BookingClassData MClassData (5, 150, 0.8, true);
  RMOL::BookingClassData BClassData (0, 200, 0.6, false);
  RMOL::BookingClassData YClassData (0, 300, 0.3, false);

  // Display
  STDAIR_LOG_DEBUG (QClassData.toString());
  STDAIR_LOG_DEBUG (MClassData.toString());
  STDAIR_LOG_DEBUG (BClassData.toString());
  STDAIR_LOG_DEBUG (YClassData.toString());

  // Add BookingClassData into the BCDataSet
  lBookingClassDataSet.addBookingClassData (QClassData);
  lBookingClassDataSet.addBookingClassData (MClassData);
  lBookingClassDataSet.addBookingClassData (BClassData);
  lBookingClassDataSet.addBookingClassData (YClassData);

  // DEBUG
  STDAIR_LOG_DEBUG (lBookingClassDataSet.toString());
```

```
  // Number of classes
  const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();

  // DEBUG
  STDAIR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);

  // Minimum fare
  BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
  const double lMinFare = lBookingClassDataSet.getMinimumFare();

  // DEBUG
  STDAIR_LOG_DEBUG ("Minimum fare: " << lMinFare);

  // Censorship flag
  BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
  const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();

  // DEBUG
  STDAIR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);

  // Close the log output file
  logOutputFile.close();
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

17   Command-Line Test to Demonstrate How To Test the RMOL Project

```
 */
// //////////////////////////////////////////////////////////////////
// Import section
// //////////////////////////////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
#include <vector>
#include <cmath>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE ForecasterTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");

struct UnitTestConfig {
  UnitTestConfig() {
    boost_utf::unit_test_log.set_stream (utfReportStream);
    boost_utf::unit_test_log.set_format (boost_utf::XML);
    boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
    //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
  }

  ~UnitTestConfig() {
  }
};


// /////////////// Main: Unit Test Suite ///////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)


BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
  const bool lTestFlag = true; //testForecasterHelper(0);
```

```
    BOOST_CHECK_EQUAL (lTestFlag, true);
    BOOST_CHECK_MESSAGE (lTestFlag == true,
                         "The test has failed. Please see the log file for "
                         << "more details");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

18 Command-Line Test to Demonstrate How To Test the RMOL Project

```
 */
// //////////////////////////////////////////////////////////////////////
// Import section
// //////////////////////////////////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");

struct UnitTestConfig {
  UnitTestConfig() {
    boost_utf::unit_test_log.set_stream (utfReportStream);
    boost_utf::unit_test_log.set_format (boost_utf::XML);
    boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
    //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
  }

  ~UnitTestConfig() {
  }
};


// //////////////////////////////////////////////////////////////////////
int testOptimiseHelper (const unsigned short optimisationMethodFlag,
                        const bool isBuiltin) {

  // Return value
  int oExpectedBookingLimit = 0;

  // Output log File
  std::ostringstream oStr;
  oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
  const stdair::Filename_T lLogFilename (oStr.str());

  // Number of random draws to be generated (best if greater than 100)
  const int K = 100000;

  // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
  // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
  const unsigned short METHOD_FLAG = optimisationMethodFlag;

  // Cabin Capacity (it must be greater then 100 here)
  const double cabinCapacity = 100.0;

  // Set the log parameters
  std::ofstream logOutputFile;
  // Open and clean the log outputfile
  logOutputFile.open (lLogFilename.c_str());
  logOutputFile.clear();

  // Initialise the RMOL service
```

```cpp
  const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
  RMOL::RMOL_Service rmolService (lLogParams);

  // Check wether or not a (CSV) input file should be read
  if (isBuiltin == true) {

    // Build the default sample BOM tree and build a dummy BOM tree.
    rmolService.buildSampleBom();

  } else {

    // Parse the optimisation data and build a dummy BOM tree
    const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
    rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);
  }

  switch (METHOD_FLAG) {
  case 0: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");

    // Calculate the optimal protections by the Monte Carlo
    // Integration approach
    rmolService.optimalOptimisationByMCIntegration (K);
    break;
  }

  case 1: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");

    // Calculate the optimal protections by DP.
    rmolService.optimalOptimisationByDP ();
    break;
  }

  case 2: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");

    // Calculate the Bid-Price Vector by EMSR
    rmolService.heuristicOptimisationByEmsr ();
    break;
  }

  case 3: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");

    // Calculate the protections by EMSR-a
    // Test the EMSR-a algorithm implementation
    rmolService.heuristicOptimisationByEmsrA ();

    // Return a cumulated booking limit value to test
    // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
    break;
  }

  case 4: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");

    // Calculate the protections by EMSR-b
    rmolService.heuristicOptimisationByEmsrB ();
    break;
  }

  default: rmolService.optimalOptimisationByMCIntegration (K);
  }

  // Close the log file
  logOutputFile.close();

  return oExpectedBookingLimit;
}


// /////////////// Main: Unit Test Suite ///////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

// ////////////////////////////////////////////////////////////////////
// Tests are based on the following input values
// price; mean; standard deviation;
// 1050; 17.3; 5.8;
// 567; 45.1; 15.0;
```

```
// 534; 39.6; 13.2;
// 520; 34.0; 11.3;
// //////////////////////////////////////////////////////////////////

BOOST_AUTO_TEST_SUITE (master_test_suite)


BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = false;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = false;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = false;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = false;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin););
  // const int lBookingLimit = testOptimiseHelper(3);
  // const int lExpectedBookingLimit = 61;
  // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
  // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,
  //                      "The booking limit is " << lBookingLimit
  //                      << ", but it is expected to be "
  //                      << lExpectedBookingLimit);
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = false;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = true;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = true;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = true;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {

  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = true;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin););
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {
```

```
  // State whether the BOM tree should be built-in or parsed from an input file
  const bool isBuiltin = true;

  BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin););
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

19 Command-Line Test to Demonstrate How To Test the RMOL Project

```
 */
// //////////////////////////////////////////////////////////////////
// Import section
// //////////////////////////////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE UnconstrainerTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");

struct UnitTestConfig {
  UnitTestConfig() {
    boost_utf::unit_test_log.set_stream (utfReportStream);
    boost_utf::unit_test_log.set_format (boost_utf::XML);
    boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
    //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
  }

  ~UnitTestConfig() {
  }
};


// /////////////// Main: Unit Test Suite //////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)


BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
  const bool lTestFlag = true;// testUnconstrainerHelper(0);
  BOOST_CHECK_EQUAL (lTestFlag, true);
  BOOST_CHECK_MESSAGE (lTestFlag == true,
                       "The test has failed. Please see the log file for "
                       << "more details");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

20 Directory Hierarchy

20.1   Directories

This directory hierarchy is sorted roughly, but not completely, alphabetically:

21   Namespace Index

21.1   Namespace List

Here is a list of all namespaces with brief descriptions:

22   Class Index

22.1   Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

```
std::basic_fstream< char >
std::basic_fstream< wchar_t >
std::basic_ifstream< char >
std::basic_ifstream< wchar_t >
std::basic_ios< char >
std::basic_ios< wchar_t >
std::basic_iostream< char >
std::basic_iostream< wchar_t >
std::basic_istream< char >
std::basic_istream< wchar_t >
std::basic_istringstream< char >
std::basic_istringstream< wchar_t >
std::basic_ofstream< char >
std::basic_ofstream< wchar_t >
std::basic_ostream< char >
```

std::basic_ostream< wchar_t >
std::basic_ostringstream< char >
std::basic_ostringstream< wchar_t >
std::basic_string< char >
std::basic_string< wchar_t >
std::basic_stringstream< char >
std::basic_stringstream< wchar_t >

23 Class Index

23.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

24 File Index

24.1 File List

Here is a list of all files with brief descriptions:

25 Directory Documentation

25.1 rmol/basic/ Directory Reference

Files

- file BasConst.cpp
- file BasConst_Curves.hpp
- file BasConst_General.hpp
- file BasConst_RMOL_Service.hpp

25.2 rmol/batches/ Directory Reference

Files

- file rmol.cpp

25.3 rmol/bom/ Directory Reference

Directories

- directory old

Files

- file BucketHolderTypes.hpp
- file DistributionParameterList.hpp
- file DPOptimiser.cpp
- file DPOptimiser.hpp
- file EMDetruncator.cpp
- file EMDetruncator.hpp
- file Emsr.cpp
- file Emsr.hpp
- file EmsrUtils.cpp
- file EmsrUtils.hpp
- file GuillotineBlockHelper.cpp
- file GuillotineBlockHelper.hpp
- file HistoricalBooking.cpp
- file HistoricalBooking.hpp
- file HistoricalBookingHolder.cpp
- file HistoricalBookingHolder.hpp
- file MCOptimiser.cpp
- file MCOptimiser.hpp
- file Utilities.cpp
- file Utilities.hpp

25.4 rmol/command/ Directory Reference

Files

- file [Detruncator.cpp](#)
- file [Detruncator.hpp](#)
- file [Forecaster.cpp](#)
- file [Forecaster.hpp](#)
- file [InventoryParser.cpp](#)
- file [InventoryParser.hpp](#)
- file [Optimiser.cpp](#)
- file [Optimiser.hpp](#)

25.5 rmol/config/ Directory Reference

Files

- file [rmol-paths.hpp](#)

25.6 rmol/factory/ Directory Reference

Files

- file [FacRmolServiceContext.cpp](#)
- file [FacRmolServiceContext.hpp](#)

25.7 rmol/bom/old/ Directory Reference

Files

- file [DemandGeneratorList.cpp](#)
- file [DemandGeneratorList.hpp](#)

25.8 test/rmol/ Directory Reference

Files

- file [bomsforforecaster.cpp](#)
- file [ForecasterTestSuite.cpp](#)
- file [ForecasterTestSuite.hpp](#)
- file [OptimiseTestSuite.cpp](#)
- file [OptimiseTestSuite.hpp](#)
- file [UnconstrainerTestSuite.cpp](#)
- file [UnconstrainerTestSuite.hpp](#)

25.9 rmol/ Directory Reference

Directories

- directory [basic](#)
- directory [batches](#)
- directory [bom](#)
- directory [command](#)

- directory config
- directory factory
- directory service

Files

- file RMOL_Service.hpp
- file RMOL_Types.hpp

25.10   rmol/service/ Directory Reference

Files

- file RMOL_Service.cpp
- file RMOL_ServiceContext.cpp
- file RMOL_ServiceContext.hpp

25.11   test/ Directory Reference

Directories

- directory rmol

26   Namespace Documentation

26.1   RMOL Namespace Reference

Classes

- struct DefaultMap
- struct DefaultDCPList
- class DPOptimiser
- class EMDetruncator
- class Emsr
- class EmsrUtils
- class GuillotineBlockHelper
- struct HistoricalBooking

    Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.
- struct HistoricalBookingHolder
- class MCOptimiser
- class DemandGeneratorList
- class Utilities
- class Detruncator
- class Forecaster
- class InventoryParser

    Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.
- class Optimiser
- class FacRmolServiceContext

    Factory for the service context.
- class RMOL_Service

    Interface for the RMOL Services.

- class OverbookingException

    Overbooking-related exception.

- class UnconstrainingException

    Unconstraining-related exception.

- class ForecastException

    Forecast-related exception.

- class OptimisationException

    Optimisation-related exception.

- class RMOL_ServiceContext

    Inner class holding the context for the RMOL Service object.

Typedefs

- typedef std::list< BucketHolder ∗ > BucketHolderList_T
- typedef std::list
  < FldDistributionParameters > DistributionParameterList_T
- typedef std::vector
  < HistoricalBooking > HistoricalBookingVector_T
- typedef boost::shared_ptr
  < RMOL_Service > RMOL_ServicePtr_T
- typedef std::vector
  < stdair::NbOfRequests_T > UnconstrainedDemandVector_T
- typedef std::vector
  < stdair::NbOfBookings_T > BookingVector_T
- typedef std::vector
  < stdair::Flag_T > FlagVector_T
- typedef std::map
  < stdair::BookingClass
  ∗, UnconstrainedDemandVector_T > BookingClassUnconstrainedDemandVectorMap_T
- typedef std::map
  < stdair::BookingClass
  ∗, stdair::NbOfRequests_T > BookingClassUnconstrainedDemandMap_T
- typedef std::map< const
  stdair::DTD_T, double > FRAT5Curve_T

Variables

- const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA"
- const double DEFAULT_RMOL_SERVICE_CAPACITY = 1.0
- const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000
- const int DEFAULT_PRECISION = 10
- const double DEFAULT_EPSILON = 0.0001
- const double DEFAULT_STOPPING_CRITERION = 0.01
- const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0
- const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE
- const stdair::DCPList_T DEFAULT_DCP_LIST = DefaultDCPList::init()

26.1.1   Typedef Documentation

26.1.1.1   typedef std::list<BucketHolder∗> RMOL::BucketHolderList_T

Define a vector (ordered list) of N bucket/classe holders.

Definition at line 16 of file BucketHolderTypes.hpp.

26.1.1.2   typedef std::list<FldDistributionParameters> RMOL::DistributionParameterList_T

Define the set of parameters, each of one wrapping a pair of distribution parameters (i.e., mean and standard deviation).

Definition at line 16 of file DistributionParameterList.hpp.

26.1.1.3   typedef std::vector<HistoricalBooking> RMOL::HistoricalBookingVector_T

Define a vector (ordered list) of N HistoricalBookings.

Definition at line 16 of file HistoricalBookingHolder.hpp.

26.1.1.4   typedef boost::shared_ptr<RMOL_Service> RMOL::RMOL_ServicePtr_T

Pointer on the RMOL Service handler.

Definition at line 73 of file RMOL_Types.hpp.

26.1.1.5   typedef std::vector<stdair::NbOfRequests_T> RMOL::UnconstrainedDemandVector_T

Define the vector of historical unconstrained demand.

Definition at line 76 of file RMOL_Types.hpp.

26.1.1.6   typedef std::vector<stdair::NbOfBookings_T> RMOL::BookingVector_T

Define the vector of historical bookings.

Definition at line 79 of file RMOL_Types.hpp.

26.1.1.7   typedef std::vector<stdair::Flag_T> RMOL::FlagVector_T

Define the vector of censorship flags.

Definition at line 82 of file RMOL_Types.hpp.

26.1.1.8   typedef std::map<stdair::BookingClass∗, UnconstrainedDemandVector_T> RMOL::BookingClassUnconstrainedDemandVectorMap_T

Define the map betweent the booking class and it's corresponding unconstrained demand vector.

Definition at line 86 of file RMOL_Types.hpp.

26.1.1.9   typedef std::map<stdair::BookingClass∗, stdair::NbOfRequests_T> RMOL::BookingClassUnconstrained-DemandMap_T

Define the map betweent the booking class and it's corresponding unconstrained demand.

Definition at line 90 of file RMOL_Types.hpp.

26.1.1.10   typedef std::map<const stdair::DTD_T, double> RMOL::FRAT5Curve_T

Define the FRAT5 curve.

Definition at line 93 of file RMOL_Types.hpp.

26.1.2   Variable Documentation

26.1.2.1   const stdair::AirlineCode_T RMOL::DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA"

Default airline code for the RMOL_Service.

Definition at line 11 of file BasConst.cpp.

26.1.2.2 const double RMOL::DEFAULT_RMOL_SERVICE_CAPACITY = 1.0

Default capacity for the RMOL_Service.

Definition at line 14 of file BasConst.cpp.

26.1.2.3 const int RMOL::DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000

Default value for the number of draws within the Monte-Carlo Integration algorithm.

Definition at line 18 of file BasConst.cpp.

26.1.2.4 const int RMOL::DEFAULT_PRECISION = 10

Default value for the precision of the integral computation in the Dynamic Programming algorithm (100 means that the precision will be 0.01).

Default value for the precision of the integral computation in the Dynamic Programming algorithm.

Definition at line 23 of file BasConst.cpp.

26.1.2.5 const double RMOL::DEFAULT_EPSILON = 0.0001

Default epsilon value to qualify a denominator

Definition at line 26 of file BasConst.cpp.

26.1.2.6 const double RMOL::DEFAULT_STOPPING_CRITERION = 0.01

Default stopping value for an iterative algorithm.

Definition at line 29 of file BasConst.cpp.

26.1.2.7 const double RMOL::DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0

Default negative value used to initialze a double variable.

Definition at line 32 of file BasConst.cpp.

26.1.2.8 const FRAT5Curve_T RMOL::DEFAULT_CUMULATIVE_FRAT5_CURVE

Initial value:

```
DefaultMap::createCumulativeFRAT5Curve()
```

Default cumulative[for the remaining period] FRAT5 curve for forecasting and optimisation.

Default cumulative (for the remaining period) FRAT5 curve for forecasting and optimisation.

Definition at line 36 of file BasConst.cpp.

26.1.2.9 const stdair::DCPList_T RMOL::DEFAULT_DCP_LIST = DefaultDCPList::init()

Defaut data collection point list.

Definition at line 69 of file BasConst.cpp.

Referenced by RMOL::Utilities::buildRemainingDCPList(), RMOL::Utilities::buildRemainingDCPList2(), RMOL::RM-OL_Service::forecastOnD(), RMOL::RMOL_Service::optimiseOnD(), RMOL::RMOL_Service::optimiseOnDUsing-AdvancedRMCooperation(), RMOL::RMOL_Service::optimiseOnDUsingRMCooperation(), RMOL::RMOL_Service-::projectAggregatedDemandOnLegCabins(), RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingD-A(), RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(), RMOL::RMOL_Service::projectOnD-DemandOnLegCabinsUsingYP(), RMOL::RMOL_Service::resetDemandInformation(), and RMOL::RMOL_Service-::updateBidPrice().

26.2 stdair Namespace Reference

26.2.1 Detailed Description

Forward declarations.

27 Class Documentation

27.1 CmdAbstract Class Reference

Inheritance diagram for CmdAbstract:
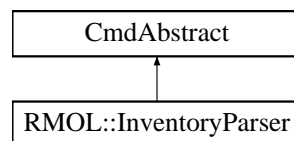
The documentation for this class was generated from the following file:

- rmol/command/InventoryParser.hpp

27.2 RMOL::DefaultDCPList Struct Reference

```
#include <rmol/basic/BasConst_General.hpp>
```

Static Public Member Functions

- static stdair::DCPList_T init ()

27.2.1 Detailed Description

Definition at line 31 of file BasConst_General.hpp.

27.2.2 Member Function Documentation

27.2.2.1 stdair::DCPList_T RMOL::DefaultDCPList::init ( ) `[static]`

Definition at line 70 of file BasConst.cpp.

The documentation for this struct was generated from the following files:

- rmol/basic/BasConst_General.hpp
- rmol/basic/BasConst.cpp

27.3 RMOL::DefaultMap Struct Reference

```
#include <rmol/basic/BasConst_Curves.hpp>
```

Static Public Member Functions

- static FRAT5Curve_T createCumulativeFRAT5Curve ()

27.3.1 Detailed Description

Default PoS probability mass.

Definition at line 17 of file BasConst_Curves.hpp.

27.3.2 Member Function Documentation

27.3.2.1 FRAT5Curve_T RMOL::DefaultMap::createCumulativeFRAT5Curve ( ) `[static]`

Definition at line 38 of file BasConst.cpp.

The documentation for this struct was generated from the following files:

- rmol/basic/BasConst_Curves.hpp
- rmol/basic/BasConst.cpp

27.4 RMOL::DemandGeneratorList Class Reference

```
#include <rmol/bom/old/DemandGeneratorList.hpp>
```

Public Member Functions

- DemandGeneratorList ()
- DemandGeneratorList (const DemandGeneratorList &)
- DemandGeneratorList (const DistributionParameterList_T &)
- virtual ∼DemandGeneratorList ()
- void generateVariateList (VariateList_T &) const

Protected Types

- typedef std::list< Gaussian > DemandGeneratorList_T

27.4.1 Detailed Description

Wrapper around a set of Gaussian Random Generators.

Definition at line 17 of file DemandGeneratorList.hpp.

27.4.2 Member Typedef Documentation

27.4.2.1 typedef std::list<Gaussian> RMOL::DemandGeneratorList::DemandGeneratorList_T `[protected]`

Define a (ordered) set of Gaussian Random Generators.

Definition at line 20 of file DemandGeneratorList.hpp.

27.4.3 Constructor & Destructor Documentation

27.4.3.1 RMOL::DemandGeneratorList::DemandGeneratorList ( )

Constructors.

Definition at line 10 of file DemandGeneratorList.cpp.

27.4.3.2   RMOL::DemandGeneratorList::DemandGeneratorList (const DemandGeneratorList &
             iDemandGeneratorList **)**

Definition at line 17 of file DemandGeneratorList.cpp.

27.4.3.3   RMOL::DemandGeneratorList::DemandGeneratorList (const DistributionParameterList_T &
             iDistributionParameterList **)**

List of distribution parameters (mean, standard deviation).

Definition at line 25 of file DemandGeneratorList.cpp.

27.4.3.4   RMOL::DemandGeneratorList::∼DemandGeneratorList ( ) `[virtual]`

Destructors.

Definition at line 30 of file DemandGeneratorList.cpp.

27.4.4   Member Function Documentation

27.4.4.1   void RMOL::DemandGeneratorList::generateVariateList (VariateList_T & *ioVariateList* **) const**

Definition at line 50 of file DemandGeneratorList.cpp.

The documentation for this class was generated from the following files:

  • rmol/bom/old/DemandGeneratorList.hpp
  • rmol/bom/old/DemandGeneratorList.cpp

27.5   RMOL::Detruncator Class Reference

```
#include <rmol/command/Detruncator.hpp>
```

Static Public Member Functions

  • static void unconstrainUsingAdditivePickUp (const stdair::SegmentCabin &, BookingClassUnconstrained-
    DemandVectorMap_T &, UnconstrainedDemandVector_T &, const stdair::DCP_T &, const stdair::DCP_T &,
    const stdair::Date_T &)
  • static void unconstrainUsingMultiplicativePickUp (const stdair::SegmentCabin &, BookingClassUnconstrained-
    DemandVectorMap_T &, UnconstrainedDemandVector_T &, const stdair::DCP_T &, const stdair::DCP_T &,
    const stdair::Date_T &, const stdair::NbOfSegments_T &)
  • static void retrieveUnconstrainedDemandForFirstDCP (const stdair::SegmentCabin &, BookingClass-
    UnconstrainedDemandVectorMap_T &, UnconstrainedDemandVector_T &, const stdair::DCP_T &, const
    stdair::NbOfSegments_T &, const stdair::NbOfSegments_T &)
  • static void unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder &)

27.5.1   Detailed Description

Class wrapping the principal unconstraining algorithms and some accessory algorithms.

Definition at line 24 of file Detruncator.hpp.

27.5.2   Member Function Documentation

27.5.2.1   void RMOL::Detruncator::unconstrainUsingAdditivePickUp (const stdair::SegmentCabin &
iSegmentCabin, BookingClassUnconstrainedDemandVectorMap_T & _ioBkgClassUncDemMap,_
UnconstrainedDemandVector_T & _ioQEquivalentDemandVector,_ const stdair::DCP_T & _iDCPBegin,_ const
stdair::DCP_T & _iDCPEnd,_ const stdair::Date_T & _iCurrentDate_) `[static]`

Unconstrain booking figures between two DCP's.

Definition at line 25 of file Detruncator.cpp.

References RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD().

27.5.2.2   void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp (const stdair::SegmentCabin
& _iSegmentCabin,_ BookingClassUnconstrainedDemandVectorMap_T & _ioBkgClassUncDemMap,_
UnconstrainedDemandVector_T & _ioQEquivalentDemandVector,_ const stdair::DCP_T & _iDCPBegin,_
const stdair::DCP_T & _iDCPEnd,_ const stdair::Date_T & _iCurrentDate,_ const stdair::NbOfSegments_T &
iNbOfDepartedSegments) `[static]`

Unconstrain booking figures between two DCP's.

Definition at line 317 of file Detruncator.cpp.

References RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD().

27.5.2.3   void RMOL::Detruncator::retrieveUnconstrainedDemandForFirstDCP (const stdair::SegmentCabin
& _iSegmentCabin,_ BookingClassUnconstrainedDemandVectorMap_T & _ioBkgClassUncDemVectorMap,_
UnconstrainedDemandVector_T & _ioQEquivalentDemandVector,_ const stdair::DCP_T & _iFirstDCP,_ const
stdair::NbOfSegments_T & _iNbOfSegments,_ const stdair::NbOfSegments_T & _iNbOfUsedSegments_) `[static]`

Retrieve unconstrained demand figures for the first DCP.

Definition at line 239 of file Detruncator.cpp.

27.5.2.4   void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder &
ioHBHolder) `[static]`

Unconstrain the product-oriented booking figures for a given class ou Q-equivalent class.

Definition at line 558 of file Detruncator.cpp.

References RMOL::HistoricalBookingHolder::getCensorshipFlag(), RMOL::HistoricalBookingHolder::getHistorical-
Booking(), RMOL::HistoricalBookingHolder::getNbOfFlights(), RMOL::HistoricalBookingHolder::getNbOfUncensored-
Data(), and RMOL::HistoricalBookingHolder::setUnconstrainedDemand().

The documentation for this class was generated from the following files:

- rmol/command/Detruncator.hpp
- rmol/command/Detruncator.cpp

27.6   RMOL::DPOptimiser Class Reference

```
#include <rmol/bom/DPOptimiser.hpp>
```

Static Public Member Functions

- static void optimalOptimisationByDP (stdair::LegCabin &)
- static double cdfGaussianQ (const double, const double)

27.6.1   Detailed Description

Utility methods for the Dynamic Programming algorithms.

Definition at line 17 of file DPOptimiser.hpp.

27.6.2 Member Function Documentation

27.6.2.1 void RMOL::DPOptimiser::optimalOptimisationByDP (stdair::LegCabin & *ioLegCabin*) `[static]`

Dynamic Programming to compute the cumulative protection levels and booking limits (described in the book Revenue Management - Talluri & Van Ryzin, p.41-42).

Definition at line 22 of file DPOptimiser.cpp.

27.6.2.2 static double RMOL::DPOptimiser::cdfGaussianQ (const double , const double) `[static]`

Compute the cdf_Q of a gaussian.

The documentation for this class was generated from the following files:

- rmol/bom/DPOptimiser.hpp
- rmol/bom/DPOptimiser.cpp

27.7 RMOL::EMDetruncator Class Reference

```
#include <rmol/bom/EMDetruncator.hpp>
```

Static Public Member Functions

- static void unconstrainUsingEMMethod (HistoricalBookingHolder &)

27.7.1 Detailed Description

Utility for the Expectation-Maximisation algorithm.

Definition at line 12 of file EMDetruncator.hpp.

27.7.2 Member Function Documentation

27.7.2.1 void RMOL::EMDetruncator::unconstrainUsingEMMethod (HistoricalBookingHolder & *ioHistoricalBookingHolder*) `[static]`

Unconstrain the censored booking data using the Expection-Maximisation algorithm.

Definition at line 20 of file EMDetruncator.cpp.

References RMOL::HistoricalBookingHolder::getDemandMean(), RMOL::HistoricalBookingHolder::getListOfToBe-UnconstrainedFlags(), RMOL::HistoricalBookingHolder::getNbOfFlights(), RMOL::HistoricalBookingHolder::getNb-OfUncensoredBookings(), RMOL::HistoricalBookingHolder::getNbOfUncensoredData(), RMOL::HistoricalBooking-Holder::getStandardDeviation(), RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation(), RMOL::-HistoricalBookingHolder::getUnconstrainedDemand(), and RMOL::HistoricalBookingHolder::setUnconstrained-Demand().

The documentation for this class was generated from the following files:

- rmol/bom/EMDetruncator.hpp
- rmol/bom/EMDetruncator.cpp

27.8 RMOL::Emsr Class Reference

```
#include <rmol/bom/Emsr.hpp>
```

Static Public Member Functions

- static void heuristicOptimisationByEmsr (stdair::LegCabin &)
- static void heuristicOptimisationByEmsrA (stdair::LegCabin &)
- static void heuristicOptimisationByEmsrB (stdair::LegCabin &)

27.8.1 Detailed Description

Class Implementing the EMSR algorithm for Bid-Price Vector computing.

Definition at line 18 of file Emsr.hpp.

27.8.2 Member Function Documentation

27.8.2.1 void RMOL::Emsr::heuristicOptimisationByEmsr (stdair::LegCabin & *ioLegCabin*) `[static]`

Compute the Bid-Price Vector using the EMSR algorithm. Then compute the protection levels and booking limits by using the BPV.

For each class/bucket j with yield pj and demand Dj, compute pj∗Pr(Dj>=x) with x the capacity index. This value is called the EMSR (Expected Marginal Seat Revenue) of the class/bucket j with the remaining capacity of x. Thus, we have for each class/bucket a list of EMSR values. We merge all these lists and sort the values from high to low in order to obtain the BPV.

Definition at line 108 of file Emsr.cpp.

References RMOL::EmsrUtils::computeEmsrValue().

27.8.2.2 void RMOL::Emsr::heuristicOptimisationByEmsrA (stdair::LegCabin & *ioLegCabin*) `[static]`

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

Definition at line 21 of file Emsr.cpp.

References RMOL::EmsrUtils::computeProtectionLevel().

27.8.2.3 void RMOL::Emsr::heuristicOptimisationByEmsrB (stdair::LegCabin & *ioLegCabin*) `[static]`

Complute the protection levels and booking limites by using the EMSR-b algorithm.

Definition at line 64 of file Emsr.cpp.

References RMOL::EmsrUtils::computeAggregatedVirtualClass(), and RMOL::EmsrUtils::computeProtection-Level().

The documentation for this class was generated from the following files:

- rmol/bom/Emsr.hpp
- rmol/bom/Emsr.cpp

27.9 RMOL::EmsrUtils Class Reference

```
#include <rmol/bom/EmsrUtils.hpp>
```

Static Public Member Functions

- static void computeAggregatedVirtualClass (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)
- static const
  stdair::ProtectionLevel_T computeProtectionLevel (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)
- static const double computeEmsrValue (double, stdair::VirtualClassStruct &)

27.9.1   Detailed Description

Forward declarations.

Definition at line 19 of file EmsrUtils.hpp.

27.9.2   Member Function Documentation

**27.9.2.1   void RMOL::EmsrUtils::computeAggregatedVirtualClass (stdair::VirtualClassStruct &
ioAggregatedVirtualClass, stdair::VirtualClassStruct & *ioCurrentVirtualClass*)** `[static]`

Compute the aggregated class/bucket of classes/buckets 1,..,j for EMSR-b algorithm.

Definition at line 19 of file EmsrUtils.cpp.

Referenced by RMOL::Emsr::heuristicOptimisationByEmsrB().

**27.9.2.2   const stdair::ProtectionLevel_T RMOL::EmsrUtils::computeProtectionLevel (stdair::VirtualClassStruct &
ioAggregatedVirtualClass, stdair::VirtualClassStruct & *ioNextVirtualClass*)** `[static]`

Compute the protection level using the Little-Wood formular.

Definition at line 53 of file EmsrUtils.cpp.

Referenced by RMOL::Emsr::heuristicOptimisationByEmsrA(), and RMOL::Emsr::heuristicOptimisationByEmsrB().

**27.9.2.3   const double RMOL::EmsrUtils::computeEmsrValue (double *iCapacity,* stdair::VirtualClassStruct &
ioVirtualClass)** `[static]`

Compute the EMSR value of a class/bucket.

Definition at line 80 of file EmsrUtils.cpp.

Referenced by RMOL::Emsr::heuristicOptimisationByEmsr().

The documentation for this class was generated from the following files:

- rmol/bom/EmsrUtils.hpp
- rmol/bom/EmsrUtils.cpp

27.10   RMOL::FacRmolServiceContext Class Reference

Factory for the service context.

```
#include <rmol/factory/FacRmolServiceContext.hpp>
```

Inheritance diagram for RMOL::FacRmolServiceContext:

```
┌─────────────────────────────┐
│      FacServiceAbstract      │
└─────────────────────────────┘
              ▲
┌─────────────────────────────┐
│  RMOL::FacRmolServiceContext │
└─────────────────────────────┘
```
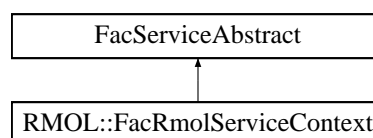
Public Member Functions

- ∼FacRmolServiceContext ()
- RMOL_ServiceContext & create ()

Static Public Member Functions

- static FacRmolServiceContext & instance ()

Protected Member Functions

- FacRmolServiceContext ()

27.10.1   Detailed Description

Factory for the service context.

Definition at line 22 of file FacRmolServiceContext.hpp.

27.10.2   Constructor & Destructor Documentation

27.10.2.1   RMOL::FacRmolServiceContext::∼FacRmolServiceContext ( )

Destructor.

The Destruction put the _instance to NULL in order to be clean for the next FacSimfqtServiceContext::instance().

Definition at line 17 of file FacRmolServiceContext.cpp.

27.10.2.2   RMOL::FacRmolServiceContext::FacRmolServiceContext ( )   `[inline, protected]`

Default Constructor.

This constructor is protected in order to ensure the singleton pattern.

Definition at line 57 of file FacRmolServiceContext.hpp.

Referenced by instance().

27.10.3   Member Function Documentation

27.10.3.1   FacRmolServiceContext & RMOL::FacRmolServiceContext::instance ( )   `[static]`

Provide the unique instance.

The singleton is instantiated when first used.

Returns

> FacServiceContext&

Definition at line 22 of file FacRmolServiceContext.cpp.

References FacRmolServiceContext().

27.10.3.2   RMOL_ServiceContext & RMOL::FacRmolServiceContext::create ( )

Create a new ServiceContext object.

This new object is added to the list of instantiated objects.

Returns

> ServiceContext& The newly created object.

Definition at line 34 of file FacRmolServiceContext.cpp.

The documentation for this class was generated from the following files:

- rmol/factory/FacRmolServiceContext.hpp
- rmol/factory/FacRmolServiceContext.cpp

27.11 FacServiceAbstract Class Reference

Inheritance diagram for FacServiceAbstract:

```
┌─────────────────────────────┐
│     FacServiceAbstract       │
└─────────────────────────────┘
               ▲
               │
┌─────────────────────────────┐
│ RMOL::FacRmolServiceContext  │
└─────────────────────────────┘
```
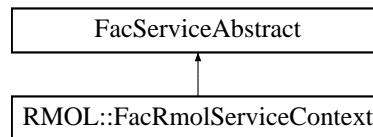
The documentation for this class was generated from the following file:

- rmol/factory/FacRmolServiceContext.hpp

27.12 RMOL::Forecaster Class Reference

```
#include <rmol/command/Forecaster.hpp>
```

Static Public Member Functions

- static bool forecastUsingAdditivePickUp (stdair::FlightDate &, const stdair::DateTime_T &)
- static bool forecastUsingMultiplicativePickUp (stdair::FlightDate &, const stdair::DateTime_T &)

27.12.1 Detailed Description

Class wrapping the optimisation algorithms.

Definition at line 23 of file Forecaster.hpp.

27.12.2 Member Function Documentation

27.12.2.1 bool RMOL::Forecaster::forecastUsingAdditivePickUp (stdair::FlightDate & *ioFlightDate,* const stdair::DateTime_T & *iEventTime*) [static]

Forecast demand for a flight-date using additive pick-up method.

Definition at line 35 of file Forecaster.cpp.

References RMOL::Utilities::buildRemainingDCPList(), and RMOL::Utilities::buildRemainingDCPList2().

Referenced by RMOL::RMOL_Service::optimise().

27.12.2.2 bool RMOL::Forecaster::forecastUsingMultiplicativePickUp (stdair::FlightDate & *ioFlightDate,* const stdair::DateTime_T & *iEventTime*) [static]

Forecast demand for a flight-date using multiplicative pick-up method.

Definition at line 276 of file Forecaster.cpp.

Referenced by RMOL::RMOL_Service::optimise().

The documentation for this class was generated from the following files:

- rmol/command/Forecaster.hpp
- rmol/command/Forecaster.cpp

27.13 ForecasterTestSuite Class Reference

`#include <test/rmol/ForecasterTestSuite.hpp>`

Inheritance diagram for ForecasterTestSuite:

```
┌─────────────────┐
│   TestFixture   │
└─────────────────┘
        ▲
┌─────────────────┐
│ForecasterTestSuite│
└─────────────────┘
```
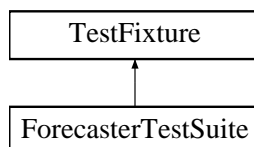
Public Member Functions

- void testQForecaster ()
- ForecasterTestSuite ()

Protected Attributes

- std::stringstream _describeKey

27.13.1 Detailed Description

Definition at line 6 of file ForecasterTestSuite.hpp.

27.13.2 Constructor & Destructor Documentation

27.13.2.1 ForecasterTestSuite::ForecasterTestSuite ( )

Constructor.

27.13.3 Member Function Documentation

27.13.3.1 void ForecasterTestSuite::testQForecaster ( )

Test Q-forecaster.

27.13.4 Member Data Documentation

27.13.4.1 std::stringstream ForecasterTestSuite::_describeKey `[protected]`

Definition at line 19 of file ForecasterTestSuite.hpp.

The documentation for this class was generated from the following file:

- test/rmol/ForecasterTestSuite.hpp

27.14 RMOL::ForecastException Class Reference

Forecast-related exception.

`#include <rmol/RMOL_Types.hpp>`

Inheritance diagram for RMOL::ForecastException:

```
          ┌─────────────────────────┐
          │      RootException      │
          └─────────────────────────┘
                       ▲
                       │
          ┌─────────────────────────┐
          │  RMOL::ForecastException │
          └─────────────────────────┘
```
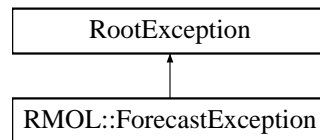
Public Member Functions

- [ForecastException](const std::string &iWhat)

27.14.1   Detailed Description

Forecast-related exception.

Definition at line 51 of file RMOL_Types.hpp.

27.14.2   Constructor & Destructor Documentation

27.14.2.1   RMOL::ForecastException::ForecastException (const std::string & *iWhat*) `[inline]`

Constructor.

Definition at line 54 of file RMOL_Types.hpp.

The documentation for this class was generated from the following file:

- rmol/RMOL_Types.hpp

27.15   RMOL::GuillotineBlockHelper Class Reference

```
#include <rmol/bom/GuillotineBlockHelper.hpp>
```

Static Public Member Functions

- static stdair::NbOfSegments_T getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock &, const stdair::DTD_T &, const stdair::Date_T &)
- static bool hasPassedThisDTD (const stdair::SegmentCabin &, const stdair::DTD_T &, const stdair::Date_T &)

27.15.1   Detailed Description

Class representing the actual business functions for an airline guillotine block.

Definition at line 23 of file GuillotineBlockHelper.hpp.

27.15.2   Member Function Documentation

27.15.2.1   stdair::NbOfSegments_T RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock & *iGB,* const stdair::DTD_T & *iDTD,* const stdair::Date_T & *iCurrentDate*) `[static]`

Retrieve the number of similar segments which already passed the given DTD.

Definition at line 20 of file GuillotineBlockHelper.cpp.

References hasPassedThisDTD().

Referenced by   RMOL::Utilities::getNbOfDepartedSimilarSegments(),   RMOL::Detruncator::unconstrainUsing-
AdditivePickUp(), and RMOL::Detruncator::unconstrainUsingMultiplicativePickUp().

**27.15.2.2   bool RMOL::GuillotineBlockHelper::hasPassedThisDTD (const stdair::SegmentCabin & *iSegmentCabin,*
const stdair::DTD_T & *iDTD,* const stdair::Date_T & *iCurrentDate*)** `[static]`

Check if the given segment has passed the given DTD.

Definition at line 42 of file GuillotineBlockHelper.cpp.

Referenced by getNbOfSegmentAlreadyPassedThisDTD().

The documentation for this class was generated from the following files:

- rmol/bom/GuillotineBlockHelper.hpp
- rmol/bom/GuillotineBlockHelper.cpp

27.16   RMOL::HistoricalBooking Struct Reference

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

```
#include <rmol/bom/HistoricalBooking.hpp>
```

Inheritance diagram for RMOL::HistoricalBooking:
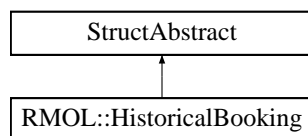
Public Member Functions

- const stdair::NbOfBookings_T & getNbOfBookings () const
- const stdair::NbOfBookings_T & getUnconstrainedDemand () const
- const stdair::Flag_T & getFlag () const
- void setUnconstrainedDemand (const stdair::NbOfBookings_T &iDemand)
- void setParameters (const stdair::NbOfBookings_T, const stdair::Flag_T)
- void toStream (std::ostream &ioOut) const
- const std::string describe () const
- void display () const
- HistoricalBooking (const stdair::NbOfBookings_T, const stdair::Flag_T)
- HistoricalBooking ()
- HistoricalBooking (const HistoricalBooking &)
- virtual ∼HistoricalBooking ()

27.16.1   Detailed Description

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

Definition at line 17 of file HistoricalBooking.hpp.

27.16.2 Constructor & Destructor Documentation

27.16.2.1 RMOL::HistoricalBooking::HistoricalBooking (const stdair::NbOfBookings␣T *iNbOfBookings,* const stdair::Flag␣T *iFlag*)

Main constructor.

Definition at line 21 of file HistoricalBooking.cpp.

27.16.2.2 RMOL::HistoricalBooking::HistoricalBooking ( )

Default constructor.

Definition at line 15 of file HistoricalBooking.cpp.

27.16.2.3 RMOL::HistoricalBooking::HistoricalBooking (const HistoricalBooking & *iHistoricalBooking*)

Copy constructor.

Definition at line 29 of file HistoricalBooking.cpp.

27.16.2.4 RMOL::HistoricalBooking::∼HistoricalBooking ( ) `[virtual]`

Destructor.

Definition at line 36 of file HistoricalBooking.cpp.

27.16.3 Member Function Documentation

27.16.3.1 const stdair::NbOfBookings␣T& RMOL::HistoricalBooking::getNbOfBookings ( ) const `[inline]`

Getter for the booking.

Definition at line 22 of file HistoricalBooking.hpp.

Referenced by RMOL::HistoricalBookingHolder::calculateExpectedDemand(), RMOL::HistoricalBookingHolder-::getHistoricalBooking(), RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings(), RMOL::Historical-BookingHolder::getUncensoredStandardDeviation(), toStream(), and RMOL::HistoricalBookingHolder::toStream().

27.16.3.2 const stdair::NbOfBookings␣T& RMOL::HistoricalBooking::getUnconstrainedDemand ( ) const `[inline]`

Getter for the unconstrained bookings.

Definition at line 26 of file HistoricalBooking.hpp.

Referenced by RMOL::HistoricalBookingHolder::getDemandMean(), RMOL::HistoricalBookingHolder::get-StandardDeviation(), RMOL::HistoricalBookingHolder::getUnconstrainedDemand(), toStream(), and RMOL::-HistoricalBookingHolder::toStream().

27.16.3.3 const stdair::Flag␣T& RMOL::HistoricalBooking::getFlag ( ) const `[inline]`

Getter for the flag of censorship: "false" means that the bookings are not censored.

Definition at line 31 of file HistoricalBooking.hpp.

Referenced by RMOL::HistoricalBookingHolder::getCensorshipFlag(), RMOL::HistoricalBookingHolder::getListOf-ToBeUnconstrainedFlags(), RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings(), toStream(), and RM-OL::HistoricalBookingHolder::toStream().

27.16.3.4 void RMOL::HistoricalBooking::setUnconstrainedDemand (const stdair::NbOfBookings␣T & *iDemand*) `[inline]`

Setter for the unconstraining demand.

Definition at line 38 of file HistoricalBooking.hpp.

27.16.3.5 void RMOL::HistoricalBooking::setParameters (const stdair::NbOfBookings_T *iNbOfBookings,* const stdair::Flag_T *iFlag*)

Setter for all parameters.

Definition at line 41 of file HistoricalBooking.cpp.

27.16.3.6 void RMOL::HistoricalBooking::toStream (std::ostream & *ioOut*) const

Dump a Business Object into an output stream.

Parameters

ostream&	the output stream

Returns

ostream& the output stream.

Definition at line 57 of file HistoricalBooking.cpp.

References getFlag(), getNbOfBookings(), and getUnconstrainedDemand().

Referenced by display().

27.16.3.7 const std::string RMOL::HistoricalBooking::describe ( ) const

Give a description of the structure (for display purposes).

Definition at line 48 of file HistoricalBooking.cpp.

27.16.3.8 void RMOL::HistoricalBooking::display ( ) const

Display on standard output.

Definition at line 66 of file HistoricalBooking.cpp.

References toStream().

The documentation for this struct was generated from the following files:

- rmol/bom/HistoricalBooking.hpp
- rmol/bom/HistoricalBooking.cpp

27.17 RMOL::HistoricalBookingHolder Struct Reference

```
#include <rmol/bom/HistoricalBookingHolder.hpp>
```

Inheritance diagram for RMOL::HistoricalBookingHolder:
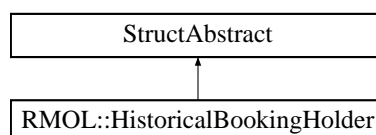
Public Member Functions

- const short getNbOfFlights () const

- const short getNbOfUncensoredData () const
- const stdair::NbOfBookings_T getNbOfUncensoredBookings () const
- const double getUncensoredStandardDeviation (const double &iMeanOfUncensoredBookings, const short iNbOfUncensoredData) const
- const double getDemandMean () const
- const double getStandardDeviation (const double) const
- const std::vector< bool > getListOfToBeUnconstrainedFlags () const
- const stdair::NbOfBookings_T & getHistoricalBooking (const short i) const
- const stdair::NbOfBookings_T & getUnconstrainedDemand (const short i) const
- const stdair::Flag_T & getCensorshipFlag (const short i) const
- const stdair::NbOfBookings_T & getUnconstrainedDemandOnFirstElement () const
- const stdair::NbOfBookings_T calculateExpectedDemand (const double, const double, const short, const stdair::NbOfBookings_T) const
- void setUnconstrainedDemand (const stdair::NbOfBookings_T &iExpectedDemand, const short i)
- void addHistoricalBooking (const HistoricalBooking &iHistoricalBooking)
- void toStream (std::ostream &ioOut) const
- const std::string describe () const
- void display () const
- virtual ∼HistoricalBookingHolder ()
- HistoricalBookingHolder ()

27.17.1   Detailed Description

Holder of a HistoricalBookingList object (for memory allocation and recollection purposes).

Definition at line 23 of file HistoricalBookingHolder.hpp.

27.17.2   Constructor & Destructor Documentation

27.17.2.1   RMOL::HistoricalBookingHolder::∼HistoricalBookingHolder ( )   `[virtual]`

Destructor.

Definition at line 23 of file HistoricalBookingHolder.cpp.

27.17.2.2   RMOL::HistoricalBookingHolder::HistoricalBookingHolder ( )

Constructor.

Protected to force the use of the Factory.

Definition at line 19 of file HistoricalBookingHolder.cpp.

27.17.3   Member Function Documentation

27.17.3.1   const short RMOL::HistoricalBookingHolder::getNbOfFlights ( ) const

Get number of flights.

Definition at line 28 of file HistoricalBookingHolder.cpp.

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod(), and RMOL::Detruncator::unconstrainUsing-MultiplicativePickUp().

27.17.3.2   const short RMOL::HistoricalBookingHolder::getNbOfUncensoredData (   ) const

Get number of uncensored booking data.

Definition at line 33 of file HistoricalBookingHolder.cpp.

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod(), and RMOL::Detruncator::unconstrainUsing-
MultiplicativePickUp().

**27.17.3.3   const stdair::NbOfBookings_T RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings (   )
const**

Get number of uncensored bookings.

Definition at line 49 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getFlag(), and RMOL::HistoricalBooking::getNbOfBookings().

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod().

**27.17.3.4   const double RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation (const double &
iMeanOfUncensoredBookings, const short *iNbOfUncensoredData*) const**

Get standard deviation of uncensored bookings.

Definition at line 69 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getNbOfBookings().

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod().

27.17.3.5   const double RMOL::HistoricalBookingHolder::getDemandMean (   ) const

Get mean of historical demand.

Definition at line 95 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getUnconstrainedDemand().

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod().

**27.17.3.6   const double RMOL::HistoricalBookingHolder::getStandardDeviation (const double *iDemandMean*)
const**

Get standard deviation of demand.

Definition at line 116 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getUnconstrainedDemand().

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod().

**27.17.3.7   const std::vector< bool > RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags (   )
const**

Get the list of flags of need to be unconstrained.

Definition at line 140 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getFlag().

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod().

**27.17.3.8   const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getHistoricalBooking (const short *i*)
const**

Get the historical booking of the (i+1)-th flight.

Definition at line 161 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getNbOfBookings().

Referenced by RMOL::Detruncator::unconstrainUsingMultiplicativePickUp().

27.17.3.9   const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getUnconstrainedDemand (const short *i*) const

Get the unconstraining demand of the (i+1)-th flight.

Definition at line 169 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getUnconstrainedDemand().

Referenced by getUnconstrainedDemandOnFirstElement(), and RMOL::EMDetruncator::unconstrainUsingEM-Method().

27.17.3.10   const stdair::Flag_T & RMOL::HistoricalBookingHolder::getCensorshipFlag (const short *i*) const

Get the flag of the (i+1)-th flight.

Definition at line 177 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getFlag().

Referenced by RMOL::Detruncator::unconstrainUsingMultiplicativePickUp().

27.17.3.11   const stdair::NbOfBookings_T& RMOL::HistoricalBookingHolder::getUnconstrainedDemandOnFirst-Element ( ) const ` [inline]`

Get the unconstraining demand of the first flight.

Definition at line 60 of file HistoricalBookingHolder.hpp.

References getUnconstrainedDemand().

27.17.3.12   const stdair::NbOfBookings_T RMOL::HistoricalBookingHolder::calculateExpectedDemand (const double *iMean,* const double *iSD,* const short *i,* const stdair::NbOfBookings_T *iDemand*) const

Calculate the expected demand.

Definition at line 191 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getNbOfBookings().

27.17.3.13   void RMOL::HistoricalBookingHolder::setUnconstrainedDemand (const stdair::NbOfBookings_T & *iExpectedDemand,* const short *i*)

Set the expected historical demand of the (i+1)-th flight.

Definition at line 185 of file HistoricalBookingHolder.cpp.

Referenced by RMOL::EMDetruncator::unconstrainUsingEMMethod(), and RMOL::Detruncator::unconstrainUsing-MultiplicativePickUp().

27.17.3.14   void RMOL::HistoricalBookingHolder::addHistoricalBooking (const HistoricalBooking & *iHistoricalBooking*)

Add a HistoricalBooking object to the holder.

Definition at line 236 of file HistoricalBookingHolder.cpp.

27.17.3.15   void RMOL::HistoricalBookingHolder::toStream (std::ostream & *ioOut*) const

Dump a Business Object into an output stream.

Parameters

ostream&	the output stream

Returns

> ostream& the output stream.

Definition at line 241 of file HistoricalBookingHolder.cpp.

References RMOL::HistoricalBooking::getFlag(), RMOL::HistoricalBooking::getNbOfBookings(), and RMOL::-HistoricalBooking::getUnconstrainedDemand().

Referenced by display().

27.17.3.16   const std::string RMOL::HistoricalBookingHolder::describe (   ) const

Give a description of the structure (for display purposes).

Definition at line 265 of file HistoricalBookingHolder.cpp.

27.17.3.17   void RMOL::HistoricalBookingHolder::display (   ) const

Display on standard output.

Definition at line 273 of file HistoricalBookingHolder.cpp.

References toStream().

The documentation for this struct was generated from the following files:

- rmol/bom/HistoricalBookingHolder.hpp
- rmol/bom/HistoricalBookingHolder.cpp

27.18   RMOL::InventoryParser Class Reference

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

```
#include <rmol/command/InventoryParser.hpp>
```

Inheritance diagram for RMOL::InventoryParser:
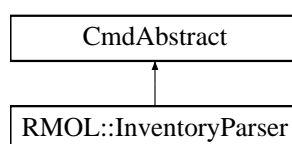
Static Public Member Functions

- static bool parseInputFileAndBuildBom (const std::string &iInputFileName, stdair::BomRoot &)

27.18.1   Detailed Description

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

Definition at line 25 of file InventoryParser.hpp.

27.18.2   Member Function Documentation

27.18.2.1   bool RMOL::InventoryParser::parseInputFileAndBuildBom (const std::string & *iInputFileName,* stdair::BomRoot & *ioBomRoot*) `[static]`

Parse the input values from a CSV-formatted inventory file.

Parameters

const	std::string& iInputFileName Inventory file to be parsed.
stdair::Bom- *Root&*	The BOM tree.

Returns

> bool Whether or not the parsing was successful.

Definition at line 36 of file InventoryParser.cpp.

Referenced by RMOL::RMOL_Service::parseAndLoad().

The documentation for this class was generated from the following files:

- rmol/command/InventoryParser.hpp
- rmol/command/InventoryParser.cpp

27.19   RMOL::MCOptimiser Class Reference

```
#include <rmol/bom/MCOptimiser.hpp>
```

Static Public Member Functions

- static void optimalOptimisationByMCIntegration (stdair::LegCabin &)
- static
  stdair::GeneratedDemandVector_T generateDemandVector (const stdair::MeanValue_T &, const stdair::Std-DevValue_T &, const unsigned int &)
- static void optimisationByMCIntegration (stdair::LegCabin &)

27.19.1   Detailed Description

Utility methods for the Monte-Carlo algorithms.

Definition at line 19 of file MCOptimiser.hpp.

27.19.2   Member Function Documentation

27.19.2.1   void RMOL::MCOptimiser::optimalOptimisationByMCIntegration (stdair::LegCabin & *ioLegCabin*) `[static]`

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used.

Definition at line 28 of file MCOptimiser.cpp.

27.19.2.2   stdair::GeneratedDemandVector␣T RMOL::MCOptimiser::generateDemandVector (const stdair::MeanValue␣T & *iMean,* **const stdair::StdDevValue␣T &** *iStdDev,* **const unsigned int &** *K* **)** `[static]`

Monte-Carlo

Definition at line 154 of file MCOptimiser.cpp.

Referenced by optimisationByMCIntegration().

27.19.2.3   void RMOL::MCOptimiser::optimisationByMCIntegration (stdair::LegCabin & *ioLegCabin* **)** `[static]`

Definition at line 175 of file MCOptimiser.cpp.

References generateDemandVector().

Referenced by RMOL::Optimiser::optimiseUsingOnDForecast().

The documentation for this class was generated from the following files:

- rmol/bom/MCOptimiser.hpp
- rmol/bom/MCOptimiser.cpp

27.20   RMOL::OptimisationException Class Reference

Optimisation-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::OptimisationException:
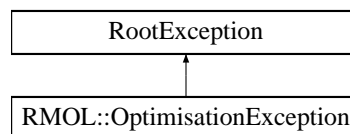
Public Member Functions

- OptimisationException (const std::string &iWhat)

27.20.1   Detailed Description

Optimisation-related exception.

Definition at line 61 of file RMOL_Types.hpp.

27.20.2   Constructor & Destructor Documentation

27.20.2.1   RMOL::OptimisationException::OptimisationException (const std::string & *iWhat* **)** `[inline]`

Constructor.

Definition at line 64 of file RMOL_Types.hpp.

The documentation for this class was generated from the following file:

- rmol/RMOL_Types.hpp

27.21 RMOL::Optimiser Class Reference

`#include <rmol/command/Optimiser.hpp>`

Static Public Member Functions

- static void optimalOptimisationByMCIntegration (const int K, stdair::LegCabin &)
- static void optimalOptimisationByDP (stdair::LegCabin &)
- static void heuristicOptimisationByEmsr (stdair::LegCabin &)
- static void heuristicOptimisationByEmsrA (stdair::LegCabin &)
- static void heuristicOptimisationByEmsrB (stdair::LegCabin &)
- static void optimise (stdair::FlightDate &)
- static void buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin &)
- static double optimiseUsingOnDForecast (stdair::FlightDate &, const bool &iReduceFluctuations=false)

27.21.1 Detailed Description

Class wrapping the optimisation algorithms.

Definition at line 18 of file Optimiser.hpp.

27.21.2 Member Function Documentation

27.21.2.1 void RMOL::Optimiser::optimalOptimisationByMCIntegration (const int *K,* stdair::LegCabin & *ioLegCabin*) `[static]`

Monte Carlo Integration algorithm.

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used. Hence, K is the number of random draws to perform. 100 is a minimum for K, as statistics must be drawn from those random generations.

Definition at line 29 of file Optimiser.cpp.

Referenced by optimise().

27.21.2.2 void RMOL::Optimiser::optimalOptimisationByDP (stdair::LegCabin & *ioLegCabin*) `[static]`

Dynamic Programming.

Definition at line 63 of file Optimiser.cpp.

27.21.2.3 void RMOL::Optimiser::heuristicOptimisationByEmsr (stdair::LegCabin & *ioLegCabin*) `[static]`

EMRS algorithm.

Definition at line 68 of file Optimiser.cpp.

27.21.2.4 void RMOL::Optimiser::heuristicOptimisationByEmsrA (stdair::LegCabin & *ioLegCabin*) `[static]`

EMRS-a algorithm.

Definition at line 73 of file Optimiser.cpp.

27.21.2.5 void RMOL::Optimiser::heuristicOptimisationByEmsrB (stdair::LegCabin & *ioLegCabin*) `[static]`

EMRS-b algorithm.

Definition at line 78 of file Optimiser.cpp.

27.21.2.6 void RMOL::Optimiser::optimise (stdair::FlightDate & *ioFlightDate* **)** `[static]`

Optimise a flight-date using leg-based Monte Carlo Integration.

Definition at line 83 of file Optimiser.cpp.

References buildVirtualClassListForLegBasedOptimisation(), and optimalOptimisationByMCIntegration().

27.21.2.7 void RMOL::Optimiser::buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin & *ioLegCabin* **)** `[static]`

Build the virtual class list for the given leg-cabin.

Definition at line 112 of file Optimiser.cpp.

Referenced by optimise().

27.21.2.8 double RMOL::Optimiser::optimiseUsingOnDForecast (stdair::FlightDate & *ioFlightDate,* **const bool &** *iReduceFluctuations =* `false` **)** `[static]`

Optimiser

Definition at line 156 of file Optimiser.cpp.

References RMOL::MCOptimiser::optimisationByMCIntegration().

Referenced by RMOL::RMOL_Service::optimiseOnD(), RMOL::RMOL_Service::optimiseOnDUsingAdvancedRM-Cooperation(), and RMOL::RMOL_Service::optimiseOnDUsingRMCooperation().

The documentation for this class was generated from the following files:

- rmol/command/Optimiser.hpp
- rmol/command/Optimiser.cpp

27.22 OptimiseTestSuite Class Reference

```
#include <test/rmol/OptimiseTestSuite.hpp>
```

Inheritance diagram for OptimiseTestSuite:

```
┌─────────────────┐
│   TestFixture   │
└─────────────────┘
         ▲
         │
┌─────────────────┐
│ OptimiseTestSuite │
└─────────────────┘
```
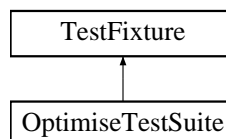
Public Member Functions

- void testOptimiseMC ()
- void testOptimiseDP ()
- void testOptimiseEMSR ()
- void testOptimiseEMSRa ()
- void testOptimiseEMSRb ()
- OptimiseTestSuite ()

Protected Attributes

- std::stringstream _describeKey

27.22.1   Detailed Description

Definition at line 6 of file OptimiseTestSuite.hpp.

27.22.2   Constructor & Destructor Documentation

27.22.2.1   OptimiseTestSuite::OptimiseTestSuite ( )

Test some error detection functionalities. Constructor.

27.22.3   Member Function Documentation

27.22.3.1   void OptimiseTestSuite::testOptimiseMC ( )

Test the Monte-Carlo (MC) Optimisation functionality.

27.22.3.2   void OptimiseTestSuite::testOptimiseDP ( )

Test the Dynamic Programming (DP) Optimisation functionality.

27.22.3.3   void OptimiseTestSuite::testOptimiseEMSR ( )

Test the Expected Marginal Seat Revenue (EMSR) Optimisation functionality.

27.22.3.4   void OptimiseTestSuite::testOptimiseEMSRa ( )

Test the Expected Marginal Seat Revenue, variant a (EMSR-a), Optimisation functionality.

27.22.3.5   void OptimiseTestSuite::testOptimiseEMSRb ( )

Test the Expected Marginal Seat Revenue, variant b (EMSR-b), Optimisation functionality.

27.22.4   Member Data Documentation

27.22.4.1   std::stringstream OptimiseTestSuite::_describeKey `[protected]`

Definition at line 43 of file OptimiseTestSuite.hpp.

The documentation for this class was generated from the following file:

  • test/rmol/OptimiseTestSuite.hpp

27.23   RMOL::OverbookingException Class Reference

Overbooking-related exception.

`#include <rmol/RMOL_Types.hpp>`

Inheritance diagram for RMOL::OverbookingException:
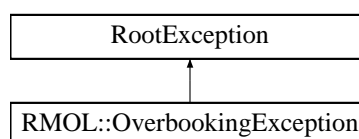
Public Member Functions

- [OverbookingException](const std::string &iWhat)

27.23.1   Detailed Description

Overbooking-related exception.

Definition at line 31 of file RMOL_Types.hpp.

27.23.2   Constructor & Destructor Documentation

27.23.2.1   **RMOL::OverbookingException::OverbookingException (const std::string &** *iWhat* **)**   `[inline]`

Constructor.

Definition at line 34 of file RMOL_Types.hpp.

The documentation for this class was generated from the following file:

- rmol/RMOL_Types.hpp

27.24   RMOL::RMOL_Service Class Reference

Interface for the RMOL Services.

```
#include <rmol/RMOL_Service.hpp>
```

Public Member Functions

- RMOL_Service (const stdair::BasLogParams &, const stdair::BasDBParams &)
- RMOL_Service (const stdair::BasLogParams &)
- RMOL_Service (stdair::STDAIR_ServicePtr_T)
- void parseAndLoad (const stdair::CabinCapacity_T &iCabinCapacity, const stdair::Filename_T &iDemand-AndClassDataFile)
- void setUpStudyStatManager ()
- ∼RMOL_Service ()
- void buildSampleBom ()
- void optimalOptimisationByMCIntegration (const int K)
- void optimalOptimisationByDP ()
- void heuristicOptimisationByEmsr ()
- void heuristicOptimisationByEmsrA ()
- void heuristicOptimisationByEmsrB ()
- bool optimise (stdair::FlightDate &, const stdair::DateTime_T &, const stdair::ForecastingMethod &, const stdair::PartnershipTechnique &)
- void forecastOnD (const stdair::DateTime_T &)
- stdair::YieldFeatures ∗ getYieldFeatures (const stdair::OnDDate &, const stdair::CabinCode_T &, stdair::-BomRoot &)
- void forecastOnD (const stdair::YieldFeatures &, stdair::OnDDate &, const stdair::CabinCode_T &, const stdair::DTD_T &, stdair::BomRoot &)
- void setOnDForecast (const stdair::AirlineClassList &, const stdair::MeanValue_T &, const stdair::StdDev-Value_T &, stdair::OnDDate &, const stdair::CabinCode_T &, stdair::BomRoot &)
- void setOnDForecast (const stdair::AirlineCode_T &, const stdair::Date_T &, const stdair::AirportCode_T &, const stdair::AirportCode_T &, const stdair::CabinCode_T &, const stdair::ClassCode_T &, const stdair::-MeanValue_T &, const stdair::StdDevValue_T &, const stdair::Yield_T &, stdair::BomRoot &)

- void setOnDForecast (const stdair::AirlineCodeList_T &, const stdair::AirlineCode_T &, const stdair::Date_T &, const stdair::AirportCode_T &, const stdair::AirportCode_T &, const stdair::CabinCode_T &, const stdair-::ClassCodeList_T &, const stdair::MeanValue_T &, const stdair::StdDevValue_T &, const stdair::Yield_T &, stdair::BomRoot &)
- void resetDemandInformation (const stdair::DateTime_T &)
- void resetDemandInformation (const stdair::DateTime_T &, const stdair::Inventory &)
- void projectAggregatedDemandOnLegCabins (const stdair::DateTime_T &)
- void projectOnDDemandOnLegCabinsUsingYP (const stdair::DateTime_T &)
- void projectOnDDemandOnLegCabinsUsingDA (const stdair::DateTime_T &)
- void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T &)
- void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T &, const stdair::Inventory &)
- void optimiseOnD (const stdair::DateTime_T &)
- void optimiseOnDUsingRMCooperation (const stdair::DateTime_T &)
- void optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTime_T &)
- void updateBidPrice (const stdair::DateTime_T &)
- void updateBidPrice (const stdair::FlightDate &, stdair::BomRoot &)
- std::string jsonExport (const stdair::AirlineCode_T &, const stdair::FlightNumber_T &, const stdair::Date_T &iDepartureDate) const
- std::string csvDisplay () const

27.24.1   Detailed Description

Interface for the RMOL Services.

Definition at line 39 of file RMOL_Service.hpp.

27.24.2   Constructor & Destructor Documentation

27.24.2.1   RMOL::RMOL_Service::RMOL_Service (const stdair::BasLogParams & *iLogParams,* const stdair::BasDBParams & *iDBParams*)

Constructor.

The initRmolService() method is called; see the corresponding documentation for more details.

A reference on an output stream is given, so that log outputs can be directed onto that stream.

Moreover, database connection parameters are given, so that a session can be created on the corresponding database.

Parameters

const	stdair::BasLogParams& Parameters for the output log stream.
const	stdair::BasDBParams& Parameters for the database access.

Definition at line 84 of file RMOL_Service.cpp.

27.24.2.2   RMOL::RMOL_Service::RMOL_Service (const stdair::BasLogParams & *iLogParams*)

Constructor.

The initRmolService() method is called; see the corresponding documentation for more details.

Moreover, a reference on an output stream is given, so that log outputs can be directed onto that stream.

Parameters

const	stdair::BasLogParams& Parameters for the output log stream.

Definition at line 63 of file RMOL_Service.cpp.

27.24.2.3   RMOL::RMOL_Service::RMOL_Service (stdair::STDAIR˷ServicePtr˷T *ioSTDAIRServicePtr*)

Constructor.

The initRmolService() method is called; see the corresponding documentation for more details.

Moreover, as no reference on any output stream is given, it is assumed that the StdAir log service has already been initialised with the proper log output stream by some other methods in the calling chain (for instance, when the RMOL_Service is itself being initialised by another library service such as AIRINV_Service).

Parameters

STDAIR˷- ServicePtr_T	the shared pointer of stdair service.

Definition at line 106 of file RMOL_Service.cpp.

27.24.2.4   RMOL::RMOL_Service::∼RMOL_Service ( )

Destructor.

Definition at line 123 of file RMOL_Service.cpp.

27.24.3   Member Function Documentation

27.24.3.1   void RMOL::RMOL_Service::parseAndLoad (const stdair::CabinCapacity˷T & *iCabinCapacity,* const stdair::Filename˷T & *iDemandAndClassDataFile*)

Parse the optimisation-related data and load them into memory.

First, the STDAIR_Service::buildDummyInventory() method is called, for RMOL and with the given cabin capacity, in order to build the miminun required flight-date structure in order to perform an optimisation on a leg-cabin.

The CSV input file describes the problem to be optimised, i.e.:

- the demand specifications for all the booking classes (mean and standard deviations for the demand distribution); the yields corresponding to those booking classes.

That CSV file is parsed and instantiated in memory accordingly. The leg-cabin capacity has been set at the initialisation of the (RMOL) service.

Parameters

const	stdair::CabinCapacity& Capacity of the leg-cabin to be optimised.
const	stdair::Filename_T& (CSV) input file.

Definition at line 200 of file RMOL_Service.cpp.

References RMOL::InventoryParser::parseInputFileAndBuildBom().

Referenced by main().

27.24.3.2   void RMOL::RMOL_Service::setUpStudyStatManager ( )

Set up the StudyStatManager.

27.24.3.3   void RMOL::RMOL_Service::buildSampleBom ( )

Build a sample BOM tree, and attach it to the BomRoot instance.

See also

stdair::CmdBomManager::buildSampleBom() for more details.

Definition at line 224 of file RMOL_Service.cpp.

Referenced by main().

27.24.3.4   void RMOL::RMOL_Service::optimalOptimisationByMCIntegration (const int *K*)

Single resource optimization using the Monte Carlo algorithm.

Definition at line 272 of file RMOL_Service.cpp.

Referenced by optimise().

27.24.3.5   void RMOL::RMOL_Service::optimalOptimisationByDP ( )

Single resource optimization using dynamic programming.

Definition at line 312 of file RMOL_Service.cpp.

Referenced by optimise().

27.24.3.6   void RMOL::RMOL_Service::heuristicOptimisationByEmsr ( )

Single resource optimization using EMSR heuristic.

Definition at line 316 of file RMOL_Service.cpp.

Referenced by optimise().

27.24.3.7   void RMOL::RMOL_Service::heuristicOptimisationByEmsrA ( )

Single resource optimization using EMSR-a heuristic.

Definition at line 357 of file RMOL_Service.cpp.

Referenced by optimise().

27.24.3.8   void RMOL::RMOL_Service::heuristicOptimisationByEmsrB ( )

Single resource optimization using EMSR-b heuristic.

Definition at line 378 of file RMOL_Service.cpp.

Referenced by optimise().

27.24.3.9   bool RMOL::RMOL_Service::optimise (stdair::FlightDate & *ioFlightDate,* const stdair::DateTime_T & *iRMEventTime,* const stdair::ForecastingMethod & *iForecastingMethod,* const stdair::PartnershipTechnique & *iPartnershipTechnique*)

Optimise (revenue management) an flight-date/network-date

Definition at line 399 of file RMOL_Service.cpp.

References forecastOnD(), RMOL::Forecaster::forecastUsingAdditivePickUp(), RMOL::Forecaster::forecastUsingMultiplicativePickUp(), optimiseOnD(), optimiseOnDUsingAdvancedRMCooperation(), optimiseOnDUsingRMCooperation(), projectAggregatedDemandOnLegCabins(), projectOnDDemandOnLegCabinsUsingDYP(), projectOnDDemandOnLegCabinsUsingYP(), resetDemandInformation(), and updateBidPrice().

27.24.3.10   void RMOL::RMOL_Service::forecastOnD (const stdair::DateTime_T & *iRMEventTime*)

Forecaster

Definition at line 500 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST, and getYieldFeatures().

Referenced by optimise().

27.24.3.11   stdair::YieldFeatures ∗ RMOL::RMOL_Service::getYieldFeatures (const stdair::OnDDate & *iOnDDate,* const stdair::CabinCode_T & *iCabinCode,* stdair::BomRoot & *iBomRoot*)

Definition at line 573 of file RMOL_Service.cpp.

Referenced by forecastOnD().

27.24.3.12   void RMOL::RMOL_Service::forecastOnD (const stdair::YieldFeatures & *iYieldFeatures,* stdair::OnDDate & *iOnDDate,* const stdair::CabinCode_T & *iCabinCode,* const stdair::DTD_T & *iDTD,* stdair::BomRoot & *iBomRoot*)

Definition at line 646 of file RMOL_Service.cpp.

References setOnDForecast().

27.24.3.13   void RMOL::RMOL_Service::setOnDForecast (const stdair::AirlineClassList & *iAirlineClassList,* const stdair::MeanValue_T & *iMeanValue,* const stdair::StdDevValue_T & *iStdDevValue,* stdair::OnDDate & *iOnDDate,* const stdair::CabinCode_T & *iCabinCode,* stdair::BomRoot & *iBomRoot*)

Definition at line 761 of file RMOL_Service.cpp.

Referenced by forecastOnD().

27.24.3.14   void RMOL::RMOL_Service::setOnDForecast (const stdair::AirlineCode_T & *iAirlineCode,* const stdair::Date_T & *iDepartureDate,* const stdair::AirportCode_T & *iOrigin,* const stdair::AirportCode_T & *iDestination,* const stdair::CabinCode_T & *iCabinCode,* const stdair::ClassCode_T & *iClassCode,* const stdair::MeanValue_T & *iMeanValue,* const stdair::StdDevValue_T & *iStdDevValue,* const stdair::Yield_T & *iYield,* stdair::BomRoot & *iBomRoot*)

Definition at line 820 of file RMOL_Service.cpp.

27.24.3.15   void RMOL::RMOL_Service::setOnDForecast (const stdair::AirlineCodeList_T & *iAirlineCodeList,* const stdair::AirlineCode_T & *iAirlineCode,* const stdair::Date_T & *iDepartureDate,* const stdair::AirportCode_T & *iOrigin,* const stdair::AirportCode_T & *iDestination,* const stdair::CabinCode_T & *iCabinCode,* const stdair::ClassCodeList_T & *iClassCodeList,* const stdair::MeanValue_T & *iMeanValue,* const stdair::StdDevValue_T & *iStdDevValue,* const stdair::Yield_T & *iYield,* stdair::BomRoot & *iBomRoot*)

Definition at line 882 of file RMOL_Service.cpp.

27.24.3.16   void RMOL::RMOL_Service::resetDemandInformation (const stdair::DateTime_T & *iRMEventTime*)

Definition at line 997 of file RMOL_Service.cpp.

Referenced by optimise(), optimiseOnDUsingAdvancedRMCooperation(), and optimiseOnDUsingRMCooperation().

27.24.3.17   void RMOL::RMOL_Service::resetDemandInformation (const stdair::DateTime_T & *iRMEventTime,* const stdair::Inventory & *iInventory*)

Definition at line 1023 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

27.24.3.18   void RMOL::RMOL_Service::projectAggregatedDemandOnLegCabins (const stdair::DateTime_T & *iRMEventTime*)

Definition at line 1071 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

Referenced by optimise().

27.24.3.19   void RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingYP (const stdair::DateTime_T & *iRMEventTime* **)**

Definition at line 1176 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

Referenced by optimise().

27.24.3.20   void RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingDA (const stdair::DateTime_T & *iRMEventTime* **)**

Definition at line 1451 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

27.24.3.21   void RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T & *iRMEventTime* **)**

Definition at line 1607 of file RMOL_Service.cpp.

Referenced by optimise(), optimiseOnDUsingAdvancedRMCooperation(), and optimiseOnDUsingRMCooperation().

27.24.3.22   void RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T & *iRMEventTime,* **const stdair::Inventory &** *iInventory* **)**

Definition at line 1633 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

27.24.3.23   void RMOL::RMOL_Service::optimiseOnD (const stdair::DateTime_T & *iRMEventTime* **)**

Optimiser

Definition at line 1275 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST, and RMOL::Optimiser::optimiseUsingOnDForecast().

Referenced by optimise().

27.24.3.24   void RMOL::RMOL_Service::optimiseOnDUsingRMCooperation (const stdair::DateTime_T & *iRMEventTime* **)**

Definition at line 1749 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST, RMOL::Optimiser::optimiseUsingOnDForecast(), projectOnDDemand-OnLegCabinsUsingDYP(), and resetDemandInformation().

Referenced by optimise().

27.24.3.25   void RMOL::RMOL_Service::optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTime_T & *iRMEventTime*)

Definition at line 1809 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST, RMOL::Optimiser::optimiseUsingOnDForecast(), projectOnDDemand-OnLegCabinsUsingDYP(), resetDemandInformation(), and updateBidPrice().

Referenced by optimise().

27.24.3.26   void RMOL::RMOL_Service::updateBidPrice (const stdair::DateTime_T & *iRMEventTime*)

Definition at line 1324 of file RMOL_Service.cpp.

References RMOL::DEFAULT_DCP_LIST.

Referenced by optimise(), and optimiseOnDUsingAdvancedRMCooperation().

27.24.3.27   void RMOL::RMOL_Service::updateBidPrice (const stdair::FlightDate & *iFlightDate,* stdair::BomRoot &
            iBomRoot **)**

Definition at line 1372 of file RMOL_Service.cpp.

27.24.3.28   std::string RMOL::RMOL_Service::jsonExport (const stdair::AirlineCode_T & *,* const stdair::FlightNumber_T
            & *,* const stdair::Date_T & *iDepartureDate*) const

Recursively dump, in the returned string and in JSON format, the flight-date corresponding to the parameters given
as input.

Parameters

const	stdair::AirlineCode_T& Airline code of the flight to dump.
const	stdair::FlightNumber_T& Flight number of the flight to dump.
const	stdair::Date_T& Departure date of a flight to dump.

Returns

> std::string Output string in which the BOM tree is JSON-ified.

27.24.3.29   std::string RMOL::RMOL_Service::csvDisplay (   ) const

Recursively display (dump in the returned string) the objects of the BOM tree.

Returns

> std::string Output string in which the BOM tree is logged/dumped.

The documentation for this class was generated from the following files:

- rmol/RMOL_Service.hpp
- rmol/service/RMOL_Service.cpp

27.25   RMOL::RMOL_ServiceContext Class Reference

Inner class holding the context for the RMOL Service object.

`#include <rmol/service/RMOL_ServiceContext.hpp>`

Inheritance diagram for RMOL::RMOL_ServiceContext:
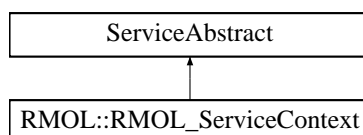
Friends

> - class RMOL_Service
> - class FacRmolServiceContext

27.25.1   Detailed Description

Inner class holding the context for the RMOL Service object.

Definition at line 29 of file RMOL_ServiceContext.hpp.

27.25.2   Friends And Related Function Documentation

27.25.2.1   friend class RMOL_Service `[friend]`

The RMOL_Service class should be the sole class to get access to ServiceContext content: general users do not want to bother with a context interface.

Definition at line 35 of file RMOL_ServiceContext.hpp.

27.25.2.2   friend class FacRmolServiceContext `[friend]`

Definition at line 36 of file RMOL_ServiceContext.hpp.

The documentation for this class was generated from the following files:

- rmol/service/RMOL_ServiceContext.hpp
- rmol/service/RMOL_ServiceContext.cpp

27.26   RootException Class Reference

Inheritance diagram for RootException:
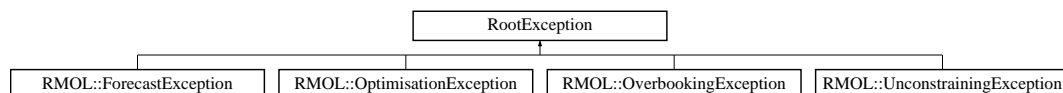
The documentation for this class was generated from the following file:

- rmol/RMOL_Types.hpp

27.27   ServiceAbstract Class Reference

Inheritance diagram for ServiceAbstract:
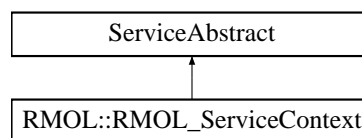
The documentation for this class was generated from the following file:

- rmol/service/RMOL_ServiceContext.hpp

27.28   StructAbstract Class Reference

Inheritance diagram for StructAbstract:
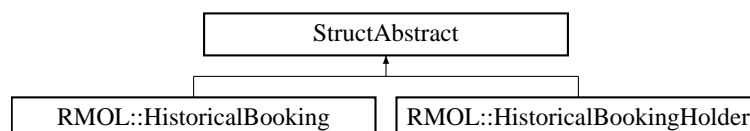
The documentation for this class was generated from the following file:

- rmol/bom/HistoricalBooking.hpp

27.29   TestFixture Class Reference

Inheritance diagram for TestFixture:
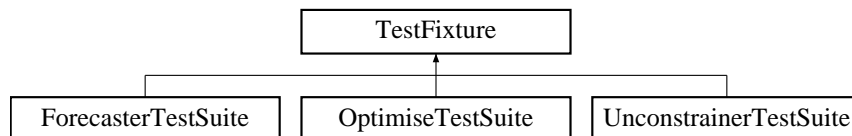
```
                    ┌─────────────┐
                    │ TestFixture │
                    └─────────────┘
                          ▲
        ┌─────────────────┼──────────────────┐
┌────────────────────┐ ┌──────────────────┐ ┌───────────────────────┐
│ ForecasterTestSuite │ │ OptimiseTestSuite │ │ UnconstrainerTestSuite │
└────────────────────┘ └──────────────────┘ └───────────────────────┘
```

The documentation for this class was generated from the following file:

- test/rmol/OptimiseTestSuite.hpp

27.30   UnconstrainerTestSuite Class Reference

`#include <test/rmol/UnconstrainerTestSuite.hpp>`

Inheritance diagram for UnconstrainerTestSuite:

```
        ┌─────────────┐
        │ TestFixture │
        └─────────────┘
              ▲
┌────────────────────────┐
│ UnconstrainerTestSuite │
└────────────────────────┘
```
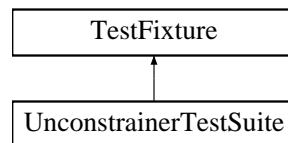
Public Member Functions

- void testUnconstrainingByEM ()
- UnconstrainerTestSuite ()

Protected Attributes

- std::stringstream _describeKey

27.30.1   Detailed Description

Definition at line 6 of file UnconstrainerTestSuite.hpp.

27.30.2   Constructor & Destructor Documentation

27.30.2.1   UnconstrainerTestSuite::UnconstrainerTestSuite ( )

Constructor.

27.30.3   Member Function Documentation

27.30.3.1   void UnconstrainerTestSuite::testUnconstrainingByEM ( )

Test data unconstraining by Expectation Maximization.

27.30.4   Member Data Documentation

27.30.4.1   std::stringstream UnconstrainerTestSuite::_describeKey `[protected]`

Definition at line 19 of file UnconstrainerTestSuite.hpp.

The documentation for this class was generated from the following file:

- test/rmol/UnconstrainerTestSuite.hpp

27.31   RMOL::UnconstrainingException Class Reference

Unconstraining-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::UnconstrainingException:
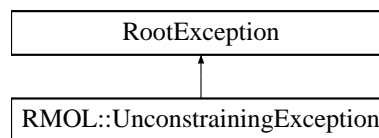
Public Member Functions

- UnconstrainingException (const std::string &iWhat)

27.31.1   Detailed Description

Unconstraining-related exception.

Definition at line 41 of file RMOL_Types.hpp.

27.31.2   Constructor & Destructor Documentation

27.31.2.1   RMOL::UnconstrainingException::UnconstrainingException (const std::string & *iWhat*) `[inline]`

Constructor.

Definition at line 44 of file RMOL_Types.hpp.

The documentation for this class was generated from the following file:

- rmol/RMOL_Types.hpp

27.32   RMOL::Utilities Class Reference

```
#include <rmol/bom/Utilities.hpp>
```

Static Public Member Functions

- static void computeDistributionParameters (const UnconstrainedDemandVector_T &, double &, double &)
- static stdair::DCPList_T buildRemainingDCPList (const stdair::DTD_T &)
- static stdair::DCPList_T buildRemainingDCPList2 (const stdair::DTD_T &)
- static stdair::NbOfSegments_T getNbOfDepartedSimilarSegments (const stdair::SegmentCabin &, const stdair::Date_T &)

27.32.1 Detailed Description

Class holding helper methods.

Definition at line 19 of file Utilities.hpp.

27.32.2 Member Function Documentation

27.32.2.1 void RMOL::Utilities::computeDistributionParameters (const UnconstrainedDemandVector_T & iVector, double & ioMean, double & ioStdDev) `[static]`

Compute the mean and the standard deviation from a set of samples.

Definition at line 24 of file Utilities.cpp.

27.32.2.2 stdair::DCPList_T RMOL::Utilities::buildRemainingDCPList (const stdair::DTD_T & iDTD) `[static]`

Build the list of remaining DCP's for the segment-date.

Definition at line 55 of file Utilities.cpp.

References RMOL::DEFAULT_DCP_LIST.

Referenced by RMOL::Forecaster::forecastUsingAdditivePickUp().

27.32.2.3 stdair::DCPList_T RMOL::Utilities::buildRemainingDCPList2 (const stdair::DTD_T & iDTD) `[static]`

Definition at line 80 of file Utilities.cpp.

References RMOL::DEFAULT_DCP_LIST.

Referenced by RMOL::Forecaster::forecastUsingAdditivePickUp().

27.32.2.4 stdair::NbOfSegments_T RMOL::Utilities::getNbOfDepartedSimilarSegments (const stdair::SegmentCabin & iSegmentCabin, const stdair::Date_T & iEventDate) `[static]`

Retrieve the number of departed similar segments.

Definition at line 105 of file Utilities.cpp.

References RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD().

The documentation for this class was generated from the following files:

- rmol/bom/Utilities.hpp
- rmol/bom/Utilities.cpp

28 File Documentation

28.1 doc/local/authors.doc File Reference

28.2 doc/local/codingrules.doc File Reference

28.3   doc/local/copyright.doc File Reference

28.4   doc/local/documentation.doc File Reference

28.5   doc/local/features.doc File Reference

28.6   doc/local/help‗wanted.doc File Reference

28.7   doc/local/howto‗release.doc File Reference

28.8   doc/local/index.doc File Reference

28.9   doc/local/installation.doc File Reference

28.10   doc/local/linking.doc File Reference

28.11   doc/local/test.doc File Reference

28.12   doc/local/users‗guide.doc File Reference

28.13   doc/local/verification.doc File Reference

28.14   doc/tutorial/tutorial.doc File Reference

28.15   rmol/basic/BasConst.cpp File Reference

```
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/basic/BasConst_Curves.hpp>
#include <rmol/basic/BasConst_RMOL_Service.hpp>
```

Namespaces

- namespace RMOL

Variables

- const stdair::AirlineCode_T RMOL::DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA"
- const double RMOL::DEFAULT_RMOL_SERVICE_CAPACITY = 1.0
- const int RMOL::DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000
- const int RMOL::DEFAULT_PRECISION = 10
- const double RMOL::DEFAULT_EPSILON = 0.0001
- const double RMOL::DEFAULT_STOPPING_CRITERION = 0.01
- const double RMOL::DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0
- const FRAT5Curve_T RMOL::DEFAULT_CUMULATIVE_FRAT5_CURVE
- const stdair::DCPList_T RMOL::DEFAULT_DCP_LIST = DefaultDCPList::init()

28.16   BasConst.cpp

```
00001 // //////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////
00004 #include <rmol/basic/BasConst_General.hpp>
00005 #include <rmol/basic/BasConst_Curves.hpp>
00006 #include <rmol/basic/BasConst_RMOL_Service.hpp>
```

```
00007
00008 namespace RMOL {
00009
00011   const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA";
00012
00014   const double DEFAULT_RMOL_SERVICE_CAPACITY = 1.0;
00015
00018   const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000;
00019
00023   const int DEFAULT_PRECISION = 10;
00024
00026   const double DEFAULT_EPSILON = 0.0001;
00027
00029   const double DEFAULT_STOPPING_CRITERION = 0.01;
00030
00032   const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0;
00033
00036   const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE =
00037     DefaultMap::createCumulativeFRAT5Curve();
00038   FRAT5Curve_T DefaultMap::createCumulativeFRAT5Curve() {
00039     FRAT5Curve_T oCurve;
00040     // oCurve[63] = 1.4;  oCurve[56] = 1.45;
00041     // oCurve[49] = 1.5;  oCurve[42] = 1.55;  oCurve[35] = 1.6;
00042     // oCurve[31] = 1.7;  oCurve[27] = 1.8;   oCurve[23] = 2.0;
00043     // oCurve[19] = 2.3;  oCurve[16] = 2.6;   oCurve[13] = 3.0;
00044     // oCurve[10] = 3.3;  oCurve[7]  = 3.4;   oCurve[5]  = 3.44;
00045     // oCurve[3] = 3.47;  oCurve[1]  = 3.5;
00046     oCurve[63] = 1.1;   oCurve[56] = 1.11;
00047     oCurve[49] = 1.17;  oCurve[42] = 1.27;
00048     oCurve[35] = 1.28;  oCurve[31] = 1.28; oCurve[27] = 1.28;
00049     oCurve[23] = 1.37;  oCurve[19] = 1.37;
00050     oCurve[16] = 1.6;   oCurve[13] = 1.6;
00051     oCurve[10] = 1.8;   oCurve[7]  = 1.8;
00052     oCurve[5]  = 2.23;  oCurve[3] = 2.23;
00053     oCurve[1]  = 2.5;
00054     // oCurve[63] = 1.05;  oCurve[56] = 1.07;
00055     // oCurve[49] = 1.09;  oCurve[42] = 1.11; oCurve[35] = 1.14;
00056     // oCurve[31] = 1.16;  oCurve[27] = 1.18;  oCurve[23] = 1.21;
00057     // oCurve[19] = 1.24;  oCurve[16] = 1.27;  oCurve[13] = 1.3;
00058     // oCurve[10] = 1.33;  oCurve[7]  = 1.37;  oCurve[5]  = 1.4;
00059     // oCurve[3] = 1.45;   oCurve[1]  = 1.5;
00060     // oCurve[63] = 1.4;
00061     // oCurve[49] = 1.5;   oCurve[35] = 1.6;
00062     // oCurve[23] = 2.0;   oCurve[16] = 2.6;
00063     // oCurve[10] = 3.3;   oCurve[5]  = 3.44;
00064     // oCurve[1]  = 3.5;
00065     return oCurve;
00066   };
00067
00069   const stdair::DCPList_T DEFAULT_DCP_LIST = DefaultDCPList::init();
00070   stdair::DCPList_T DefaultDCPList::init() {
00071     stdair::DCPList_T oDCPList;
00072     oDCPList.push_back (63); oDCPList.push_back (49);
00073     oDCPList.push_back (35); oDCPList.push_back (23);
00074     oDCPList.push_back (16); oDCPList.push_back (10);
00075     oDCPList.push_back (5);  oDCPList.push_back (1);
00076     oDCPList.push_back (0);
00077     return oDCPList;
00078   }
00079
00080 }
```

28.17 rmol/basic/BasConst‗Curves.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

Classes

- struct RMOL::DefaultMap

Namespaces

- namespace RMOL

28.18 BasConst_Curves.hpp

```
00001 #ifndef __RMOL_BAS_BASCONST_CURVES_HPP
00002 #define __RMOL_BAS_BASCONST_CURVES_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 namespace RMOL {
00011
00014   extern const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE;
00015
00017   struct DefaultMap {
00018     static FRAT5Curve_T createCumulativeFRAT5Curve();
00019   };
00020 }
00021 #endif // __RMOL_BAS_BASCONST_CURVES_HPP
```

28.19 rmol/basic/BasConst_General.hpp File Reference

```
#include <stdair/stdair_types.hpp>
```

Classes

- struct RMOL::DefaultDCPList

Namespaces

- namespace RMOL

28.20 BasConst_General.hpp

```
00001 #ifndef __RMOL_BAS_BASCONST_GENERAL_HPP
00002 #define __RMOL_BAS_BASCONST_GENERAL_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_types.hpp>
00009
00010 namespace RMOL {
00011
00014   extern const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION;
00015
00018   extern const int DEFAULT_PRECISION;
00019
00021   extern const double DEFAULT_EPSILON;
00022
00024   extern const double DEFAULT_STOPPING_CRITERION;
00025
00027   extern const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE;
00028
00030   extern const stdair::DCPList_T DEFAULT_DCP_LIST;
00031   struct DefaultDCPList { static stdair::DCPList_T init(); };
00032 }
00033 #endif // __RMOL_BAS_BASCONST_GENERAL_HPP
```

28.21 rmol/basic/BasConst_RMOL_Service.hpp File Reference

```
#include <vector>
#include <stdair/stdair_basic_types.hpp>
#include <rmol/RMOL_Types.hpp>
```

Namespaces

- namespace RMOL

28.22   BasConst_RMOL_Service.hpp

```
00001 #ifndef __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00002 #define __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <vector>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 namespace RMOL {
00015
00017   extern const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE;
00018
00020   extern const double DEFAULT_RMOL_SERVICE_CAPACITY;
00021
00022 }
00023 #endif // __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
```

28.23   rmol/batches/rmol.cpp File Reference

```
#include <cassert>
#include <iostream>
#include <sstream>
#include <fstream>
#include <string>
#include <boost/date_time/posix_time/posix_time.hpp>
#include <boost/date_time/gregorian/gregorian.hpp>
#include <boost/program_options.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>
```

Functions

- const std::string K_RMOL_DEFAULT_LOG_FILENAME ("rmol.log")
- const std::string K_RMOL_DEFAULT_INPUT_FILENAME (STDAIR_SAMPLE_DIR"/rm01.csv")
- template<class T >
  std::ostream & operator<< (std::ostream &os, const std::vector< T > &v)
- int readConfiguration (int argc, char ∗argv[], int &ioRandomDraws, double &ioCapacity, short &ioMethod, bool &ioIsBuiltin, std::string &ioInputFilename, std::string &ioLogFilename)
- void optimise (RMOL::RMOL_Service &rmolService, const short &iMethod, const int &iRandomDraws)
- int main (int argc, char ∗argv[])

Variables

- const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false
- const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000
- const double K_RMOL_DEFAULT_CAPACITY = 500.0
- const short K_RMOL_DEFAULT_METHOD = 0
- const int K_RMOL_EARLY_RETURN_STATUS = 99

28.23.1 Function Documentation

28.23.1.1 const std::string K_RMOL_DEFAULT_LOG_FILENAME ("rmol.log")

Default name and location for the log file.

Referenced by readConfiguration().

28.23.1.2 const std::string K_RMOL_DEFAULT_INPUT_FILENAME (STDAIR_SAMPLE_DIR"/rm01.csv")

Default name and location for the (CSV) input file.

Referenced by readConfiguration().

28.23.1.3 template<class T > std::ostream& operator<< (std::ostream & os, const std::vector< T > & v)

Definition at line 47 of file rmol.cpp.

28.23.1.4 int readConfiguration (int argc, char ∗ argv[], int & ioRandomDraws, double & ioCapacity, short & ioMethod, bool & ioIsBuiltin, std::string & ioInputFilename, std::string & ioLogFilename)

Read and parse the command line options.

Definition at line 57 of file rmol.cpp.

References K_RMOL_DEFAULT_BUILT_IN_INPUT, K_RMOL_DEFAULT_CAPACITY, K_RMOL_DEFAULT_INP-UT_FILENAME(), K_RMOL_DEFAULT_LOG_FILENAME(), K_RMOL_DEFAULT_METHOD, K_RMOL_DEFAUL-T_RANDOM_DRAWS, K_RMOL_EARLY_RETURN_STATUS, PACKAGE_NAME, PACKAGE_VERSION, and P-REFIXDIR.

Referenced by main().

28.23.1.5 void optimise (RMOL::RMOL_Service & rmolService, const short & iMethod, const int & iRandomDraws)

Definition at line 167 of file rmol.cpp.

References RMOL::RMOL_Service::heuristicOptimisationByEmsr(), RMOL::RMOL_Service::heuristicOptimisation-ByEmsrA(), RMOL::RMOL_Service::heuristicOptimisationByEmsrB(), RMOL::RMOL_Service::optimalOptimisation-ByDP(), and RMOL::RMOL_Service::optimalOptimisationByMCIntegration().

Referenced by main().

28.23.1.6 int main (int argc, char ∗ argv[])

Definition at line 204 of file rmol.cpp.

References RMOL::RMOL_Service::buildSampleBom(), K_RMOL_EARLY_RETURN_STATUS, optimise(), RMO-L::RMOL_Service::parseAndLoad(), and readConfiguration().

28.23.2 Variable Documentation

28.23.2.1 const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false

Default for the input type. It can be either built-in or provided by an input file. That latter must then be given with the -i/--input option.

Definition at line 23 of file rmol.cpp.

Referenced by readConfiguration().

28.23.2.2 const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000

Default number of random draws to be generated (best if over 100).

Definition at line 29 of file rmol.cpp.

Referenced by readConfiguration().

28.23.2.3 const double K_RMOL_DEFAULT_CAPACITY = 500.0

Default value for the capacity of the resource (e.g., a flight cabin).

Definition at line 32 of file rmol.cpp.

Referenced by readConfiguration().

28.23.2.4 const short K_RMOL_DEFAULT_METHOD = 0

Default name and location for the Revenue Management method to be used.

- 0 = Monte-Carlo

- 1 = Dynamic Programming

- 2 = EMSR

- 3 = EMSR-a

- 4 = EMSR-b

Definition at line 43 of file rmol.cpp.

Referenced by readConfiguration().

28.23.2.5 const int K_RMOL_EARLY_RETURN_STATUS = 99

Early return status (so that it can be differentiated from an error).

Definition at line 54 of file rmol.cpp.

Referenced by main(), and readConfiguration().

28.24 rmol.cpp

```
00001 // STL
00002 #include <cassert>
00003 #include <iostream>
00004 #include <sstream>
00005 #include <fstream>
00006 #include <string>
00007 // Boost (Extended STL)
00008 #include <boost/date_time/posix_time/posix_time.hpp>
00009 #include <boost/date_time/gregorian/gregorian.hpp>
00010 #include <boost/program_options.hpp>
00011 // StdAir
00012 #include <stdair/service/Logger.hpp>
00013 // RMOL
00014 #include <rmol/RMOL_Service.hpp>
00015 #include <rmol/config/rmol-paths.hpp>
00016
00017 // //////// Constants //////
00019 const std::string K_RMOL_DEFAULT_LOG_FILENAME ("rmol.log");
00020
00023 const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false;
00024
00026 const std::string K_RMOL_DEFAULT_INPUT_FILENAME (STDAIR_SAMPLE_DIR "/rm01.csv")
      ;
00027
00029 const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000;
00030
00032 const double K_RMOL_DEFAULT_CAPACITY = 500.0;
00033
00043 const short K_RMOL_DEFAULT_METHOD = 0;
00044
00045 // ///////// Parsing of Options & Configuration /////////
00046 // A helper function to simplify the main part.
00047 template<class T> std::ostream& operator<< (std::ostream& os,
00048                                             const std::vector<T>& v) {
00049   std::copy (v.begin(), v.end(), std::ostream_iterator<T> (std::cout, " "));
00050   return os;
```

```
00051 }
00052
00054 const int K_RMOL_EARLY_RETURN_STATUS = 99;
00055
00057 int readConfiguration(int argc, char* argv[],
00058                       int& ioRandomDraws, double& ioCapacity,
00059                       short& ioMethod, bool& ioIsBuiltin,
00060                       std::string& ioInputFilename, std::string& ioLogFilename)
00061 {
00062   // Default for the built-in input
00063   ioIsBuiltin = K_RMOL_DEFAULT_BUILT_IN_INPUT;
00064
00065   // Declare a group of options that will be allowed only on command line
00066   boost::program_options::options_description generic ("Generic options");
00067   generic.add_options()
00068     ("prefix", "print installation prefix")
00069     ("version,v", "print version string")
00070     ("help,h", "produce help message");
00071
00072   // Declare a group of options that will be allowed both on command
00073   // line and in config file
00074   boost::program_options::options_description config ("Configuration");
00075   config.add_options()
00076     ("draws,d",
00077      boost::program_options::value<int>(&ioRandomDraws)->default_value(
00077 K_RMOL_DEFAULT_RANDOM_DRAWS),
00078      "Number of to-be-generated random draws")
00079     ("capacity,c",
00080      boost::program_options::value<double>(&ioCapacity)->default_value(
00080 K_RMOL_DEFAULT_CAPACITY),
00081      "Resource capacity (e.g., for a flight leg)")
00082     ("method,m",
00083      boost::program_options::value<short>(&ioMethod)->default_value(
00083 K_RMOL_DEFAULT_METHOD),
00084      "Revenue Management method to be used (0 = Monte-Carlo, 1 = Dynamic
00084  Programming, 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)")
00085     ("builtin,b",
00086      "The cabin set up can be either built-in or parsed from an input file.
00086  That latter must then be given with the -i/--input option")
00087     ("input,i",
00088      boost::program_options::value< std::string >(&ioInputFilename)->
00088 default_value(K_RMOL_DEFAULT_INPUT_FILENAME),
00089      "(CSV) input file for the demand distribution parameters and resource
00089  (leg-cabin) capacities")
00090     ("log,l",
00091      boost::program_options::value< std::string >(&ioLogFilename)->
00091 default_value(K_RMOL_DEFAULT_LOG_FILENAME),
00092      "Filename for the logs")
00093     ;
00094
00095   // Hidden options, will be allowed both on command line and
00096   // in config file, but will not be shown to the user.
00097   boost::program_options::options_description hidden ("Hidden options");
00098   hidden.add_options()
00099     ("copyright",
00100      boost::program_options::value< std::vector<std::string> >(),
00101      "Show the copyright (license)");
00102
00103   boost::program_options::options_description cmdline_options;
00104   cmdline_options.add(generic).add(config).add(hidden);
00105
00106   boost::program_options::options_description config_file_options;
00107   config_file_options.add(config).add(hidden);
00108
00109   boost::program_options::options_description visible ("Allowed options");
00110   visible.add(generic).add(config);
00111
00112   boost::program_options::positional_options_description p;
00113   p.add ("copyright", -1);
00114
00115   boost::program_options::variables_map vm;
00116   boost::program_options::
00117     store (boost::program_options::command_line_parser (argc, argv).
00118            options (cmdline_options).positional(p).run(), vm);
00119
00120   std::ifstream ifs ("rmol.cfg");
00121   boost::program_options::store (parse_config_file (ifs, config_file_options),
00122                                  vm);
00123   boost::program_options::notify (vm);
00124
00125   if (vm.count ("help")) {
00126     std::cout << visible << std::endl;
00127     return K_RMOL_EARLY_RETURN_STATUS;
00128   }
00129
00130   if (vm.count ("version")) {
```

```
00131      std::cout << PACKAGE_NAME << ", version " << PACKAGE_VERSION << std::endl;
00132      return K_RMOL_EARLY_RETURN_STATUS;
00133    }
00134
00135    if (vm.count ("prefix")) {
00136      std::cout << "Installation prefix: " << PREFIXDIR << std::endl;
00137      return K_RMOL_EARLY_RETURN_STATUS;
00138    }
00139
00140    if (vm.count ("builtin")) {
00141      ioIsBuiltin = true;
00142    }
00143    const std::string isBuiltinStr = (ioIsBuiltin == true)?"yes":"no";
00144    std::cout << "The BOM should be built-in? " << isBuiltinStr << std::endl;
00145
00146    if (ioIsBuiltin == false) {
00147      if (vm.count ("input")) {
00148        ioInputFilename = vm["input"].as< std::string >();
00149        std::cout << "Input filename is: " << ioInputFilename << std::endl;
00150      }
00151    }
00152
00153    if (vm.count ("log")) {
00154      ioLogFilename = vm["log"].as< std::string >();
00155      std::cout << "Log filename is: " << ioLogFilename << std::endl;
00156    }
00157
00158    std::cout << "The number of random draws is: " << ioRandomDraws << std::endl;
00159    std::cout << "The resource capacity is: " << ioCapacity << std::endl;
00160    std::cout << "The optimisation method is: " << ioMethod << std::endl;
00161    std::cout << std::endl;
00162
00163    return 0;
00164 }
00165
00166 // //////////////////////////////////////////////////////
00167 void optimise (RMOL::RMOL_Service& rmolService,
00168                const short& iMethod, const int& iRandomDraws) {
00169
00170    switch (iMethod) {
00171    case 0: {
00172      // Calculate the optimal protections by the Monte Carlo
00173      // Integration approach
00174      rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00175      break;
00176    }
00177    case 1: {
00178      // Calculate the optimal protections by DP.
00179      rmolService.optimalOptimisationByDP ();
00180      break;
00181    }
00182    case 2: {
00183      // Calculate the Bid-Price Vector by EMSR
00184      rmolService.heuristicOptimisationByEmsr ();
00185      break;
00186    }
00187    case 3: {
00188      // Calculate the protections by EMSR-a
00189      rmolService.heuristicOptimisationByEmsrA ();
00190      break;
00191    }
00192    case 4: {
00193      // Calculate the protections by EMSR-b
00194      rmolService.heuristicOptimisationByEmsrB ();
00195      break;
00196    }
00197    default: {
00198      rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00199    }
00200    }
00201 }
00202
00203 // ///////// M A I N ////////////
00204 int main (int argc, char* argv[]) {
00205
00206    // Number of random draws to be generated (best if greater than 100)
00207    int lRandomDraws = 0;
00208
00209    // Cabin Capacity (it must be greater then 100 here)
00210    double lCapacity = 0.0;
00211
00212    // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00213    // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)
00214    short lMethod = 0;
00215
00216    // Built-in
00217    bool isBuiltin;
```

```
00218
00219    // Input file name
00220    std::string lInputFilename;
00221
00222    // Output log File
00223    std::string lLogFilename;
00224
00225    // Call the command-line option parser
00226    const int lOptionParserStatus =
00227       readConfiguration (argc, argv, lRandomDraws, lCapacity, lMethod,
00228                          isBuiltin, lInputFilename, lLogFilename);
00229
00230    if (lOptionParserStatus == K_RMOL_EARLY_RETURN_STATUS) {
00231      return 0;
00232    }
00233
00234    // Set the log parameters
00235    std::ofstream logOutputFile;
00236    // Open and clean the log outputfile
00237    logOutputFile.open (lLogFilename.c_str());
00238    logOutputFile.clear();
00239
00240    // Initialise the log stream
00241    const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00242
00243    // Initialise the RMOL service
00244    RMOL::RMOL_Service rmolService (lLogParams);
00245
00246    if (isBuiltin == true) {
00247      // DEBUG
00248      STDAIR_LOG_DEBUG ("No input file has been given."
00249                       "A sample BOM tree will therefore be built.");
00250
00251      // Build a sample BOM tree
00252      rmolService.buildSampleBom();
00253
00254    } else {
00255      // DEBUG
00256      STDAIR_LOG_DEBUG ("RMOL will parse " << lInputFilename
00257                       << " and build the corresponding BOM tree.");
00258
00259      //
00260      rmolService.parseAndLoad (lCapacity, lInputFilename);
00261    }
00262
00263    // Launch the optimisation
00264    optimise (rmolService, lMethod, lRandomDraws);
00265
00266    //
00267    logOutputFile.close();
00268
00269    return 0;
00270 }
```

28.25   rmol/bom/BucketHolderTypes.hpp File Reference

```
#include <list>
#include <map>
#include <stdair/stdair_basic_types.hpp>
```

Namespaces

- namespace RMOL

Typedefs

- typedef std::list< BucketHolder ∗ > RMOL::BucketHolderList_T

28.26   BucketHolderTypes.hpp

```
00001 #ifndef __RMOL_BUCKETHOLDERTYPES_HPP
00002 #define __RMOL_BUCKETHOLDERTYPES_HPP
```

```
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <list>
00009 #include <map>
00010 // STDAIR
00011 #include <stdair/stdair_basic_types.hpp>
00012
00013 namespace RMOL {
00014
00016   class BucketHolder;
00017
00019   typedef std::list<BucketHolder*> BucketHolderList_T;
00020
00023   typedef std::map<const stdair::MapKey_T, BucketHolder*>;
00024 }
00025 #endif // __RMOL_BUCKETHOLDERTYPES_HPP
```

28.27 rmol/bom/DistributionParameterList.hpp File Reference

```
#include <list>
#include <rmol/field/FldDistributionParameters.hpp>
```

Namespaces

- namespace RMOL

Typedefs

- typedef std::list
  < FldDistributionParameters > RMOL::DistributionParameterList_T

28.28 DistributionParameterList.hpp

```
00001 #ifndef __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00002 #define __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/field/FldDistributionParameters.hpp>
00011
00012 namespace RMOL {
00013
00016   typedef std::list<FldDistributionParameters> DistributionParameterList_T;
00017
00018 }
00019 #endif // __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
```

28.29 rmol/bom/DPOptimiser.cpp File Reference

```
#include <cassert>
```

```
#include <sstream>
#include <vector>
#include <cmath>
#include <boost/math/distributions/normal.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/bom/DPOptimiser.hpp>
```

Namespaces

- namespace RMOL

28.30 DPOptimiser.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <vector>
00008 #include <cmath>
00009 // Boost Math
00010 #include <boost/math/distributions/normal.hpp>
00011 // StdAir
00012 #include <stdair/bom/LegCabin.hpp>
00013 #include <stdair/bom/VirtualClassStruct.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/basic/BasConst_General.hpp>
00017 #include <rmol/bom/DPOptimiser.hpp>
00018
00019 namespace RMOL {
00020
00021   // //////////////////////////////////////////////////////////////////////
00022   void DPOptimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00023     // // Number of classes/buckets: n
00024     // const short nbOfClasses = ioBucketHolder.getSize();
00025
00026     // // Number of values of x to compute for each Vj(x).
00027     // const int maxValue = static_cast<int> (iCabinCapacity *
         DEFAULT_PRECISION);
00028
00029     // // Vector of the Expected Maximal Revenue (Vj).
00030     // std::vector< std::vector<double> > MERVectorHolder;
00031
00032     // // Vector of V_0(x).
00033     // std::vector<double> initialMERVector (maxValue+1, 0.0);
00034     // MERVectorHolder.push_back (initialMERVector);
00035
00036     // // Current cumulative protection level (y_j * DEFAULT_PRECISION).
00037     // // Initialise with y_0 = 0.
00038     // int currentProtection = 0;
00039
00040     // int currentBucketIndex = 1;
00041     // ioBucketHolder.begin();
00042
00043     // while (currentProtection < maxValue && currentBucketIndex < nbOfClasses)
         {
00044     // //while (currentBucketIndex == 1) {
00045     //   bool protectionChanged = false;
00046     //   double nextProtection = 0.0;
00047     //   std::vector<double> currentMERVector;
00048     //   // double testGradient = 10000;
00049
00050     //   Bucket& currentBucket = ioBucketHolder.getCurrentBucket();
00051     //   const double meanDemand = currentBucket.getMean();
00052     //   const double SDDemand = currentBucket.getStandardDeviation();
00053     //   const double currentYield = currentBucket.getAverageYield();
00054     //   const double errorFactor = 1.0;
00055
00056     //   Bucket& nextBucket = ioBucketHolder.getNextBucket();
00057     //   const double nextYield = nextBucket.getAverageYield();
00058
```

```
00059      //    // For x <= currentProtection (y_(j-1)), V_j(x) = V_(j-1)(x).
00060      //    for (int x = 0; x <= currentProtection; ++x) {
00061      //      const double MERValue =
          MERVectorHolder.at(currentBucketIndex-1).at(x);
00062      //      currentMERVector.push_back (MERValue);
00063      //    }
00064
00065      //    //
00066      //    boost::math::normal lNormalDistribution (meanDemand, SDDemand);
00067
00068      //    // Vector of gaussian pdf values.
00069      //    std::vector<double> pdfVector;
00070      //    for (int s = 0; s <= maxValue - currentProtection; ++s) {
00071      //      const double pdfValue =
00072      //        boost::math::pdf (lNormalDistribution, s/DEFAULT_PRECISION);
00073      //      pdfVector.push_back (pdfValue);
00074      //    }
00075
00076      //    // Vector of gaussian cdf values.
00077      //    std::vector<double> cdfVector;
00078      //    for (int s = 0; s <= maxValue - currentProtection; ++s) {
00079      //      const double cdfValue =
00080      //        boost::math::cdf (boost::math::complement (lNormalDistribution,
00081      //                                              s/DEFAULT_PRECISION));
00082      //      cdfVector.push_back (cdfValue);
00083      //    }
00084
00085      //    // Compute V_j(x) for x > currentProtection (y_(j-1)).
00086      //    for (int x = currentProtection + 1; x <= maxValue; ++x) {
00087      //      const double lowerBound = static_cast<double> (x -
          currentProtection);
00088
00089      //      // Compute the first integral in the V_j(x) formulation (see
00090      //      // the memo of Jerome Contant).
00091      //      const double power1 =
00092      //        - 0.5 * meanDemand * meanDemand / (SDDemand * SDDemand);
00093      //      const double e1 = std::exp (power1);
00094      //      const double power2 =
00095      //        - 0.5 * (lowerBound / DEFAULT_PRECISION - meanDemand)
00096      //        * (lowerBound / DEFAULT_PRECISION - meanDemand)
00097      //        / (SDDemand * SDDemand);
00098      //      const double e2 = std::exp (power2);
00099
00100      //      const double cdfValue0 =
00101      //        boost::math::cdf (boost::math::complement (lNormalDistribution,
00102      //                                              0.0));
00103      //      const double cdfValue1 =
00104      //        boost::math::cdf(boost::math::complement(lNormalDistribution,
00105      //
          lowerBound/DEFAULT_PRECISION));
00106      //      const double integralResult1 = currentYield
00107      //        * ((e1 - e2) * SDDemand / sqrt (2 * 3.14159265)
00108      //          + meanDemand * (cdfValue0 - cdfValue1));
00109
00110      //      double integralResult2 = 0.0;
00111
00112      //      for (int s = 0; s < lowerBound; ++s) {
00113      //        const double partialResult =
00114      //          2 * MERVectorHolder.at(currentBucketIndex-1).at(x-s)
00115      //          * pdfVector.at(s);
00116
00117      //        integralResult2 += partialResult;
00118      //      }
00119      //      integralResult2 -= MERVectorHolder.at(currentBucketIndex-1).at(x) *
00120      //        pdfVector.at(0);
00121
00122      //      const int intLowerBound = static_cast<int>(lowerBound);
00123      //      integralResult2 +=
00124      //        MERVectorHolder.at(currentBucketIndex-1).at(x - intLowerBound) *
00125      //        pdfVector.at(intLowerBound);
00126
00127      //      integralResult2 /= 2 * DEFAULT_PRECISION;
00128      //      /*
00129      //      for (int s = 0; s < lowerBound; ++s) {
00130      //        const double partialResult =
00131      //          (MERVectorHolder.at(currentBucketIndex-1).at(x-s) +
00132      //           MERVectorHolder.at(currentBucketIndex-1).at(x-s-1)) *
00133      //          (cdfVector.at(s+1) - cdfVector.at(s)) / 2;
00134      //        integralResult2 += partialResult;
00135      //      }
00136      //      */
00137      //      const double firstElement = integralResult1 + integralResult2;
00138
00139      //      // Compute the second integral in the V_j(x) formulation (see
00140      //      // the memo of Jerome Contant).
00141      //      const double constCoefOfSecondElement =
00142      //        currentYield * lowerBound / DEFAULT_PRECISION
```

```
00143    //          + MERVectorHolder.at(currentBucketIndex-1).at(currentProtection);
00144
00145    //       const double secondElement = constCoefOfSecondElement
00146    //         * boost::math::cdf(boost::math::complement(lNormalDistribution,
00147    //
         lowerBound/DEFAULT_PRECISION));
00148
00149    //       const double MERValue = (firstElement + secondElement) /
         errorFactor;
00150
00151
00152    //       assert (currentMERVector.size() > 0);
00153    //       const double lastMERValue = currentMERVector.back();
00154
00155    //       const double currentGradient =
00156    //         (MERValue - lastMERValue) * DEFAULT_PRECISION;
00157
00158    //       //assert (currentGradient >= 0);
00159    //       if (currentGradient < -0) {
00160    //         std::ostringstream ostr;
00161    //         ostr << currentGradient  << std::endl
00162    //              << "x = " << x << std::endl
00163    //              << "class: " << currentBucketIndex << std::endl;
00164    //         STDAIR_LOG_DEBUG (ostr.str());
00165    //       }
00166
00167    //       /*
00168    //       assert (currentGradient <= testGradient);
00169    //       testGradient = currentGradient;
00170    //       */
00171    //       if (protectionChanged == false && currentGradient <= nextYield) {
00172    //         nextProtection = x - 1;
00173    //         protectionChanged = true;
00174    //       }
00175
00176    //        if (protectionChanged == true && currentGradient > nextYield) {
00177    //         protectionChanged = false;
00178    //       }
00179
00180    //       if (protectionChanged == false && x == maxValue) {
00181    //         nextProtection = maxValue;
00182    //       }
00183
00184    //       currentMERVector.push_back (MERValue);
00185    //     }
00186
00187    //     // DEBUG
00188    //     STDAIR_LOG_DEBUG ("Vmaxindex = " << currentMERVector.back());
00189
00190    //     MERVectorHolder.push_back (currentMERVector);
00191
00192    //     const double realProtection = nextProtection / DEFAULT_PRECISION;
00193    //     const double bookingLimit = iCabinCapacity - realProtection;
00194
00195    //     currentBucket.setCumulatedProtection (realProtection);
00196    //     nextBucket.setCumulatedBookingLimit (bookingLimit);
00197
00198    //     currentProtection = static_cast<int> (std::floor (nextProtection));
00199
00200    //     ioBucketHolder.iterate();
00201    //     ++currentBucketIndex;
00202    // }
00203  }
00204
00205 }
```

28.31 rmol/bom/DPOptimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::DPOptimiser

Namespaces

- namespace stdair

- namespace RMOL

28.32 DPOptimiser.hpp

```
00001 #ifndef __RMOL_BOM_DPOPTIMISER_HPP
00002 #define __RMOL_BOM_DPOPTIMISER_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00011 namespace stdair {
00012    class LegCabin;
00013 }
00014
00015 namespace RMOL {
00017    class DPOptimiser {
00018    public:
00019
00025      static void optimalOptimisationByDP (stdair::LegCabin&);
00026
00030      static double cdfGaussianQ (const double, const double);
00031    };
00032 }
00033 #endif // __RMOL_BOM_DPOPTIMISER_HPP
```

28.33 rmol/bom/EMDetruncator.cpp File Reference

```
#include <iostream>
#include <cmath>
#include <vector>
#include <cassert>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/EMDetruncator.hpp>
```

Namespaces

- namespace RMOL

28.34 EMDetruncator.cpp

```
00001 // //////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <iostream>
00006 #include <cmath>
00007 #include <vector>
00008 #include <cassert>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBookingHolder.hpp>
00014 #include <rmol/bom/EMDetruncator.hpp>
00015
00016 namespace RMOL {
00017
00018    // //////////////////////////////////////////////////////////////
00019    void EMDetruncator::unconstrainUsingEMMethod
00020    (HistoricalBookingHolder& ioHistoricalBookingHolder) {
00021
00022      // Number of flights.
00023      const short lNbOfFlights =
00024        ioHistoricalBookingHolder.getNbOfFlights();
00025
```

```
00026      // Number of uncensored booking data.
00027      const short lNbOfUncensoredData =
00028        ioHistoricalBookingHolder.getNbOfUncensoredData();
00029
00030      if (lNbOfUncensoredData > 1) {
00031        // Number of uncensored bookings.
00032        const stdair::NbOfBookings_T lNbOfUncensoredBookings =
00033          ioHistoricalBookingHolder.getNbOfUncensoredBookings();
00034
00035        const double lMeanOfUncensoredBookings =
00036          static_cast<double>(lNbOfUncensoredBookings/lNbOfUncensoredData);
00037
00038        const double lStdDevOfUncensoredBookings =
00039          ioHistoricalBookingHolder.getUncensoredStandardDeviation
00040          (lMeanOfUncensoredBookings, lNbOfUncensoredData);
00041
00042        std::vector<bool> toBeUnconstrained =
00043          ioHistoricalBookingHolder.getListOfToBeUnconstrainedFlags();
00044
00045        double lDemandMean = lMeanOfUncensoredBookings;
00046        double lStdDev = lStdDevOfUncensoredBookings;
00047
00048        // DEBUG
00049        STDAIR_LOG_DEBUG ("mean: " << lDemandMean << ", std: " << lStdDev);
00050
00051        if (lStdDev != 0) {
00052          bool stopUnconstraining = false;
00053          while (stopUnconstraining == false) {
00054            stopUnconstraining = true;
00055
00056            for (short i = 0; i < lNbOfFlights; ++i) {
00057              if (toBeUnconstrained.at(i) == true) {
00058                // Get the unconstrained demand of the (i+1)-th flight.
00059                const stdair::NbOfBookings_T demand =
00060                  ioHistoricalBookingHolder.getUnconstrainedDemand (i);
00061                //STDAIR_LOG_DEBUG ("demand: " << demand);
00062
00063                // Execute the Expectation step.
00064                const stdair::NbOfBookings_T expectedDemand =
00065                  ioHistoricalBookingHolder.
00066                  calculateExpectedDemand (lDemandMean, lStdDev, i, demand);
00067                //STDAIR_LOG_DEBUG ("expected: " << expectedDemand);
00068                assert (expectedDemand >= 0 || expectedDemand < 0);
00069
00070                double absDiff =
00071                  static_cast<double>(expectedDemand - demand);
00072
00073                if (absDiff < 0) {
00074                  absDiff = - absDiff;
00075                }
00076                if (absDiff < 0.001) {
00077                  toBeUnconstrained.at (i) = false;
00078                }
00079                else {
00080                  stopUnconstraining = false;
00081                }
00082
00083                ioHistoricalBookingHolder.setUnconstrainedDemand (expectedDemand,
00084                                                                  i);
00085              }
00086            }
00087
00088            if (stopUnconstraining == false) {
00089              lDemandMean = ioHistoricalBookingHolder.getDemandMean();
00090              lStdDev =
00091                ioHistoricalBookingHolder.getStandardDeviation (lDemandMean);
00092            }
00093          }
00094        }
00095      }
00096
00097    }
00098 }
```

28.35 rmol/bom/EMDetruncator.hpp File Reference

Classes

- class RMOL::EMDetruncator

Namespaces

- namespace RMOL

28.36 EMDetruncator.hpp

```
00001 #ifndef __RMOL_BOM_EMDETRUNCATOR_HPP
00002 #define __RMOL_BOM_EMDETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 namespace RMOL {
00008   // Forward declarations.
00009   struct HistoricalBookingHolder;
00010
00012   class EMDetruncator {
00013   public:
00016     static void unconstrainUsingEMMethod (HistoricalBookingHolder&);
00017   };
00018 }
00019 #endif // __RMOL_BOM_EMDETRUNCATOR_HPP
```

28.37 rmol/bom/Emsr.cpp File Reference

```
#include <assert.h>
#include <iostream>
#include <cmath>
#include <list>
#include <algorithm>
#include <stdair/stdair_rm_types.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <rmol/bom/Emsr.hpp>
#include <rmol/bom/EmsrUtils.hpp>
```

Namespaces

- namespace RMOL

28.38 Emsr.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // C
00005 #include <assert.h>
00006 // STL
00007 #include <iostream>
00008 #include <cmath>
00009 #include <list>
00010 #include <algorithm>
00011 // StdAir
00012 #include <stdair/stdair_rm_types.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/VirtualClassStruct.hpp>
00015 // RMOL
00016 #include <rmol/bom/Emsr.hpp>
00017 #include <rmol/bom/EmsrUtils.hpp>
00018
00019 namespace RMOL {
00020   // //////////////////////////////////////////////////////////////////////
00021   void Emsr::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00022     stdair::VirtualClassList_T& lVirtualClassList =
00023       ioLegCabin.getVirtualClassList ();
00024     const stdair::CabinCapacity_T& lCabinCapacity =
00025       ioLegCabin.getOfferedCapacity();
00026
```

```
00032      stdair::VirtualClassList_T::iterator itVC =lVirtualClassList.begin();
00033      assert (itVC != lVirtualClassList.end());
00034
00035      stdair::VirtualClassStruct& lFirstVC = *itVC;
00036      lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00037      ++itVC;
00038      for (; itVC != lVirtualClassList.end(); ++itVC) {
00039        stdair::VirtualClassStruct& lNextVC = *itVC;
00040
00041        // Initialise the protection for class/bucket j.
00042        stdair::ProtectionLevel_T lProtectionLevel = 0.0;
00043
00044        for(stdair::VirtualClassList_T::iterator itHigherVC =
00045            lVirtualClassList.begin(); itHigherVC != itVC; ++itHigherVC) {
00046          stdair::VirtualClassStruct& lHigherVC = *itHigherVC;
00047          const double lPartialProtectionLevel =
00048            EmsrUtils::computeProtectionLevel (lHigherVC, lNextVC);
00049          lProtectionLevel += lPartialProtectionLevel;
00050        }
00051        stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00052        stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00053        lCurrentVC.setCumulatedProtection (lProtectionLevel);
00054
00055        // Compute the booking limit for the class/bucket j+1 (can be negative).
00056        const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00057
00058        // Set the booking limit for class/bucket j+1.
00059        lNextVC.setCumulatedBookingLimit (lBookingLimit);
00060      }
00061    }
00062
00063    // //////////////////////////////////////////////////////////////////////
00064    void Emsr::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00065      stdair::VirtualClassList_T& lVirtualClassList =
00066        ioLegCabin.getVirtualClassList ();
00067      const stdair::CabinCapacity_T& lCabinCapacity =
00068        ioLegCabin.getOfferedCapacity();
00069
00075      stdair::VirtualClassList_T::iterator itVC =lVirtualClassList.begin();
00076      assert (itVC != lVirtualClassList.end());
00077
00078      stdair::VirtualClassStruct& lFirstVC = *itVC;
00079      lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00080      ++itVC;
00081      stdair::VirtualClassStruct lAggregatedVC = lFirstVC;
00082      for (; itVC != lVirtualClassList.end(); ++itVC) {
00083        stdair::VirtualClassStruct& lNextVC = *itVC;
00084
00085        // Compute the protection level for the aggregated class/bucket
00086        // using the Little-Wood formular.
00087        const stdair::ProtectionLevel_T lProtectionLevel =
00088          EmsrUtils::computeProtectionLevel (lAggregatedVC, lNextVC);
00089
00090        // Set the protection level for class/bucket j.
00091        stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00092        stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00093        lCurrentVC.setCumulatedProtection (lProtectionLevel);
00094
00095        // Compute the booking limit for class/bucket j+1 (can be negative).
00096        const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00097
00098        // Set the booking limit for class/bucket j+1.
00099        lNextVC.setCumulatedBookingLimit (lBookingLimit);
00100
00101        // Compute the aggregated class/bucket of classes/buckets 1,..,j.
00102        EmsrUtils::computeAggregatedVirtualClass (lAggregatedVC, lNextVC);
00103
00104      }
00105    }
00106
00107    // //////////////////////////////////////////////////////////////////////
00108    void Emsr::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00109      stdair::VirtualClassList_T& lVirtualClassList =
00110        ioLegCabin.getVirtualClassList ();
00111      const stdair::CabinCapacity_T& lCapacity = ioLegCabin.getOfferedCapacity();
00112      ioLegCabin.emptyBidPriceVector();
00113      stdair::BidPriceVector_T& lBidPriceVector =
00114        ioLegCabin.getBidPriceVector();
00115
00116      // Cabin capacity in integer.
00117      const int lCabinCapacity = static_cast<const int> (lCapacity);
00118
00119      // List of all EMSR values.
00120      stdair::EmsrValueList_T lEmsrValueList;
00121
00127      for (stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00128           itVC != lVirtualClassList.end(); ++itVC) {
```

```
00129          stdair::VirtualClassStruct& lCurrentVC = *itVC;
00130          for (int k = 1; k <= lCabinCapacity; ++k) {
00131            const double emsrValue = EmsrUtils::computeEmsrValue (k, lCurrentVC);
00132            lEmsrValueList.push_back(emsrValue);
00133          }
00134        }
00135
00136        // Sort the EMSR values from high to low.
00137        std::sort(lEmsrValueList.rbegin(), lEmsrValueList.rend());
00138
00139        // Sanity check
00140        const int lEmsrValueListSize = lEmsrValueList.size();
00141        assert (lEmsrValueListSize >= lCabinCapacity);
00142
00143        // Copy the EMSR sorted values to the BPV.
00144        stdair::EmsrValueList_T::const_iterator itCurrentValue =
00145          lEmsrValueList.begin();
00146        for (int j = 0; j < lCabinCapacity; ++j, ++itCurrentValue) {
00147          const double lBidPrice = *itCurrentValue;
00148          lBidPriceVector.push_back (lBidPrice);
00149        }
00150        lEmsrValueList.clear();
00151
00152        // Build the protection levels and booking limits.
00153        if (lVirtualClassList.size() > 1) {
00154          int lCapacityIndex = 0;
00155          for (stdair::VirtualClassList_T::iterator itVC =lVirtualClassList.begin()
    ;
00156               itVC != lVirtualClassList.end();) {
00157            stdair::VirtualClassStruct& lCurrentVC = *itVC;
00158            if (itVC != lVirtualClassList.end()) {
00159              ++itVC;
00160            }
00161            stdair::VirtualClassStruct& lNextVC = *itVC;
00162            const stdair::Yield_T lNextYield = lNextVC.getYield();
00163            while ((lCapacityIndex < lCabinCapacity)
00164                   && (lBidPriceVector.at(lCapacityIndex) > lNextYield)) {
00165              ++lCapacityIndex;
00166            }
00167            lCurrentVC.setCumulatedProtection (lCapacityIndex);
00168            lNextVC.setCumulatedBookingLimit (lCapacity - lCapacityIndex);
00169          }
00170        }
00171      }
00172
00173 }
```

28.39   rmol/bom/Emsr.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::Emsr

Namespaces

- namespace stdair
- namespace RMOL

28.40   Emsr.hpp

```
00001 #ifndef __RMOL_EMSR_HPP
00002 #define __RMOL_EMSR_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00011 namespace stdair {
00012   class LegCabin;
```

```
00013 }
00014
00015 namespace RMOL {
00016
00018   class Emsr {
00019   public:
00031     static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00032
00037     static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00038
00043     static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00044
00045   };
00046 }
00047 #endif // __RMOL_EMSR_HPP
```

28.41 rmol/bom/EmsrUtils.cpp File Reference

```
#include <cassert>
#include <cmath>
#include <boost/math/distributions/normal.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <rmol/bom/EmsrUtils.hpp>
#include <rmol/basic/BasConst_General.hpp>
```

Namespaces

- namespace RMOL

28.42 EmsrUtils.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <cmath>
00007 // Boost Math
00008 #include <boost/math/distributions/normal.hpp>
00009 // StdAir
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/bom/VirtualClassStruct.hpp>
00012 // RMOL
00013 #include <rmol/bom/EmsrUtils.hpp>
00014 #include <rmol/basic/BasConst_General.hpp>
00015
00016 namespace RMOL {
00017   // //////////////////////////////////////////////////////////////////////
00018   void EmsrUtils::computeAggregatedVirtualClass
00019   (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00020   stdair::VirtualClassStruct& ioCurrentVirtualClass) {
00021     // Retrieve the demand mean, demand standard deviation and average
00022     // yield of the classes/buckets.
00023     const stdair::MeanValue_T lAggregatedMean =
00024       ioAggregatedVirtualClass.getMean();
00025     const stdair::MeanValue_T lCurrentMean = ioCurrentVirtualClass.getMean();
00026     const stdair::StdDevValue_T lAggregatedSD =
00027       ioAggregatedVirtualClass.getStdDev();
00028     const stdair::StdDevValue_T lCurrentSD = ioCurrentVirtualClass.getStdDev();
00029     const stdair::Yield_T lAggregatedYield =
00030       ioAggregatedVirtualClass.getYield();
00031     const stdair::Yield_T lCurrentYield = ioCurrentVirtualClass.getYield();
00032
00033     // Compute the new demand mean, new demand standard deviation and
00034     // new average yield for the new aggregated class/bucket.
00035     const stdair::MeanValue_T lNewMean = lAggregatedMean + lCurrentMean;
00036     const stdair::StdDevValue_T lNewSD =
00037       sqrt (lAggregatedSD*lAggregatedSD + lCurrentSD*lCurrentSD);
00038     stdair::Yield_T lNewYield = lCurrentYield;
00039     if (lNewMean > 0) {
00040       lNewYield = (lAggregatedYield*lAggregatedMean +
00041                    lCurrentYield*lCurrentMean) / lNewMean;
```

```
00042     }
00043     // Set the new yield range for the new aggregated class/bucket.
00044     ioAggregatedVirtualClass.setYield(lNewYield);
00045
00046     // Set the new demand for the new aggregated class/bucket.
00047     ioAggregatedVirtualClass.setMean (lNewMean);
00048     ioAggregatedVirtualClass.setStdDev (lNewSD);
00049     }
00050
00051     // //////////////////////////////////////////////////////////////////
00052     const stdair::ProtectionLevel_T EmsrUtils::
00053     computeProtectionLevel (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00054                             stdair::VirtualClassStruct& ioNextVirtualClass) {
00055     // Retrive the mean & standard deviation of the aggregated
00056     // class/bucket and the average yield of all the two
00057     // classes/buckets.
00058     const stdair::MeanValue_T lMean = ioAggregatedVirtualClass.getMean();
00059     const stdair::StdDevValue_T lSD = ioAggregatedVirtualClass.getStdDev();
00060     const stdair::Yield_T lAggreatedYield = ioAggregatedVirtualClass.getYield()
    ;
00061     const stdair::Yield_T lNextYield = ioNextVirtualClass.getYield();
00062     assert (lAggreatedYield != 0);
00063
00064     // Compute the yield ratio between the higher bucket and the current one
00065     const double lYieldRatio = lNextYield / lAggreatedYield;
00066
00070     boost::math::normal lNormalDistribution (lMean, lSD);
00071     const stdair::ProtectionLevel_T lProtection =
00072       boost::math::quantile (boost::math::complement (lNormalDistribution,
00073                                                        lYieldRatio));
00074
00075     return lProtection;
00076     }
00077
00078     // //////////////////////////////////////////////////////////////////
00079     const double EmsrUtils::
00080     computeEmsrValue (double iCapacity,
00081                       stdair::VirtualClassStruct& ioVirtualClass){
00082     // Retrieve the average yield, mean and standard deviation of the
00083     // demand of the class/bucket.
00084     const stdair::MeanValue_T lMean = ioVirtualClass.getMean();
00085     const stdair::StdDevValue_T lSD = ioVirtualClass.getStdDev();
00086     const stdair::Yield_T lYield = ioVirtualClass.getYield();
00087
00088     // Compute the EMSR value = lYield * Pr (demand >= iCapacity).
00089     boost::math::normal lNormalDistribution (lMean, lSD);
00090     const double emsrValue =
00091       lYield * boost::math::cdf (boost::math::complement (lNormalDistribution,
00092                                                           iCapacity));
00093
00094     return emsrValue;
00095     }
00096 }
```

28.43 rmol/bom/EmsrUtils.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
```

Classes

- class RMOL::EmsrUtils

Namespaces

- namespace stdair
- namespace RMOL

28.44 EmsrUtils.hpp

```
00001 #ifndef __RMOL_EMSRUTILS_HPP
00002 #define __RMOL_EMSRUTILS_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
```

```
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009
00010 // Forward declarations.
00011 namespace stdair {
00012   struct VirtualClassStruct;
00013 }
00014
00015 namespace RMOL {
00016
00019   class EmsrUtils {
00020   public:
00023     static void computeAggregatedVirtualClass (stdair::VirtualClassStruct&,
00024                                                stdair::VirtualClassStruct&);
00025
00027     static const stdair::ProtectionLevel_T computeProtectionLevel (
00      stdair::VirtualClassStruct&, stdair::VirtualClassStruct&);
00028
00030     static const double computeEmsrValue (double, stdair::VirtualClassStruct&);
00031   };
00032 }
00033 #endif // __RMOL_EMSRUTILS_HPP
```

28.45   rmol/bom/GuillotineBlockHelper.cpp File Reference

```
#include <cassert>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
```

Namespaces

- namespace RMOL

28.46   GuillotineBlockHelper.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/BomManager.hpp>
00009 #include <stdair/bom/SegmentDate.hpp>
00010 #include <stdair/bom/SegmentCabin.hpp>
00011 #include <stdair/bom/BookingClass.hpp>
00012 #include <stdair/bom/GuillotineBlock.hpp>
00013 #include <stdair/service/Logger.hpp>
00014 // RMOL
00015 #include <rmol/bom/GuillotineBlockHelper.hpp>
00016
00017 namespace RMOL {
00018   // //////////////////////////////////////////////////////////////////////
00019   stdair::NbOfSegments_T GuillotineBlockHelper::
00020   getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock& iGB,
00021                                      const stdair::DTD_T& iDTD,
00022                                      const stdair::Date_T& iCurrentDate) {
00023     stdair::NbOfSegments_T oNbOfSegments = 0;
00024
00025     // Browse the list of segments and check if it has passed the given DTD.
00026     const stdair::SegmentCabinIndexMap_T& lSCMap=iGB.getSegmentCabinIndexMap();
00027     for (stdair::SegmentCabinIndexMap_T::const_iterator itSC = lSCMap.begin();
00028          itSC != lSCMap.end(); ++itSC) {
00029       const stdair::SegmentCabin* lSC_ptr = itSC->first;
```

```
00030        assert (lSC_ptr != NULL);
00031
00032        if (hasPassedThisDTD (*lSC_ptr, iDTD, iCurrentDate) == true) {
00033          ++oNbOfSegments;
00034        }
00035      }
00036
00037      return oNbOfSegments;
00038    }
00039
00040    // ////////////////////////////////////////////////////////////////////
00041    bool GuillotineBlockHelper::
00042    hasPassedThisDTD (const stdair::SegmentCabin& iSegmentCabin,
00043                      const stdair::DTD_T& iDTD,
00044                      const stdair::Date_T& iCurrentDate) {
00045      // Retrieve the boarding date.
00046      const stdair::SegmentDate& lSegmentDate =
00047        stdair::BomManager::getParent<stdair::SegmentDate> (iSegmentCabin);
00048      const stdair::Date_T& lBoardingDate = lSegmentDate.getBoardingDate();
00049
00050      // Compare the date offset between the boarding date and the current date
00051      // to the DTD.
00052      stdair::DateOffset_T lDateOffset = lBoardingDate - iCurrentDate;
00053      stdair::DTD_T lDateOffsetInDays = lDateOffset.days();
00054      if (iDTD < lDateOffsetInDays) {
00055        return false;
00056      } else {
00057        return true;
00058      }
00059    }
00060  }
```

28.47   rmol/bom/GuillotineBlockHelper.hpp File Reference

```
#include <string>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_date_time_types.hpp>
```

Classes

- class RMOL::GuillotineBlockHelper

Namespaces

- namespace stdair
- namespace RMOL

28.48   GuillotineBlockHelper.hpp

```
00001 #ifndef __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00002 #define __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00003
00004 // ////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // ////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 #include <stdair/stdair_date_time_types.hpp>
00012
00013 // Forward declarations
00014 namespace stdair {
00015   class GuillotineBlock;
00016   class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00023   class GuillotineBlockHelper {
00024   public:
00025      // ////////// Business Methods /////////
```

```
00030      static stdair::NbOfSegments_T getNbOfSegmentAlreadyPassedThisDTD (const
      stdair::GuillotineBlock&, const stdair::DTD_T&, const stdair::Date_T&);
00031
00035      static bool hasPassedThisDTD (const stdair::SegmentCabin&,
00036                                    const stdair::DTD_T&, const stdair::Date_T&);
00037   };
00038
00039 }
00040 #endif // __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
```

28.49   rmol/bom/HistoricalBooking.cpp File Reference

```
#include <sstream>
#include <cassert>
#include <iomanip>
#include <iostream>
#include <rmol/bom/HistoricalBooking.hpp>
```

Namespaces

- namespace RMOL

28.50   HistoricalBooking.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <cassert>
00007 #include <iomanip>
00008 #include <iostream>
00009 // RMOL
00010 #include <rmol/bom/HistoricalBooking.hpp>
00011
00012 namespace RMOL {
00013
00014   // //////////////////////////////////////////////////////////////////////
00015   HistoricalBooking::HistoricalBooking () :
00016     _numberOfBookings (0.0),_unconstrainedDemand (0.0), _flag (false) {
00017   }
00018
00019   // //////////////////////////////////////////////////////////////////////
00020   HistoricalBooking::
00021   HistoricalBooking (const stdair::NbOfBookings_T iNbOfBookings,
00022                      const stdair::Flag_T iFlag)
00023    : _numberOfBookings (iNbOfBookings),
00024      _unconstrainedDemand (iNbOfBookings), _flag (iFlag) {
00025   }
00026
00027   // //////////////////////////////////////////////////////////////////////
00028   HistoricalBooking::HistoricalBooking
00029   (const HistoricalBooking& iHistoricalBooking) :
00030     _numberOfBookings (iHistoricalBooking.getNbOfBookings()),
00031     _unconstrainedDemand (iHistoricalBooking.getUnconstrainedDemand()),
00032     _flag (iHistoricalBooking.getFlag()) {
00033   }
00034
00035   // //////////////////////////////////////////////////////////////////////
00036   HistoricalBooking::~HistoricalBooking() {
00037   }
00038
00039   // //////////////////////////////////////////////////////////////////////
00040   void HistoricalBooking::setParameters
00041   (const stdair::NbOfBookings_T iNbOfBookings, const stdair::Flag_T iFlag) {
00042     _numberOfBookings = iNbOfBookings;
00043     _unconstrainedDemand = iNbOfBookings;
00044     _flag = iFlag;
00045   }
00046
00047   // //////////////////////////////////////////////////////////////////////
00048   const std::string HistoricalBooking::describe() const {
00049     std::ostringstream ostr;
00050     ostr << "Struct of hitorical booking, unconstrained demand and flag of "
```

```
00051          << "censorship for a FlightDate/Class.";
00052
00053     return ostr.str();
00054   }
00055
00056   // //////////////////////////////////////////////////////////////////////
00057   void HistoricalBooking::toStream (std::ostream& ioOut) const {
00058     const stdair::NbOfBookings_T bj = getNbOfBookings();
00059     const stdair::NbOfBookings_T uj = getUnconstrainedDemand();
00060     const stdair::Flag_T fj = getFlag();
00061     ioOut << std::fixed << std::setprecision (2)
00062          << bj << "; " << uj << "; " << fj << std::endl;
00063   }
00064
00065   // //////////////////////////////////////////////////////////////////////
00066   void HistoricalBooking::display () const {
00067     toStream (std::cout);
00068   }
00069 }
```

28.51   rmol/bom/HistoricalBooking.hpp File Reference

```
#include <stdair/stdair_basic_types.hpp>
#include <stdair/basic/StructAbstract.hpp>
```

Classes

- struct RMOL::HistoricalBooking

    Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

Namespaces

- namespace RMOL

28.52   HistoricalBooking.hpp

```
00001 #ifndef __RMOL_BOM_HISTORICALBOOKING_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKING_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_basic_types.hpp>
00009 #include <stdair/basic/StructAbstract.hpp>
00010
00011 namespace RMOL {
00012
00017   struct HistoricalBooking : public stdair::StructAbstract {
00018
00019   public:
00020     // /////////////////// Getters ////////////////////////
00022     const stdair::NbOfBookings_T& getNbOfBookings() const {
00023       return _numberOfBookings;
00024     }
00026     const stdair::NbOfBookings_T& getUnconstrainedDemand() const {
00027       return _unconstrainedDemand;
00028     }
00031     const stdair::Flag_T& getFlag() const {
00032       return _flag;
00033     }
00034
00035   public:
00036     // /////////////////// Setters ////////////////////////
00038     void setUnconstrainedDemand (const stdair::NbOfBookings_T& iDemand) {
00039       _unconstrainedDemand = iDemand;
00040     }
00041
00043     void setParameters (const stdair::NbOfBookings_T, const stdair::Flag_T);
00044
00045   public:
00046     // ///////// Display Methods //////////
```

```
00052     void toStream (std::ostream& ioOut) const;
00053
00057     const std::string describe() const;
00058
00062     void display () const;
00063
00064   public:
00065     // /////////// Constructors and destructor. ////////////
00069     HistoricalBooking (const stdair::NbOfBookings_T, const stdair::Flag_T);
00073     HistoricalBooking();
00077     HistoricalBooking (const HistoricalBooking&);
00078
00082     virtual ~HistoricalBooking();
00083
00084   private:
00085     // //////////// Attributes ////////////
00089     stdair::NbOfBookings_T _numberOfBookings;
00090
00094     stdair::NbOfBookings_T _unconstrainedDemand;
00095
00099     stdair::Flag_T _flag;
00100   };
00101 }
00102 #endif // __RMOL_BOM_HISTORICALBOOKING_HPP
```

28.53 rmol/bom/HistoricalBookingHolder.cpp File Reference

```
#include <sstream>
#include <iostream>
#include <iomanip>
#include <cmath>
#include <cassert>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
```

Namespaces

- namespace RMOL

28.54 HistoricalBookingHolder.cpp

```
00001 // //////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <iostream>
00007 #include <iomanip>
00008 #include <cmath>
00009 #include <cassert>
00010 // StdAir
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBooking.hpp>
00014 #include <rmol/bom/HistoricalBookingHolder.hpp>
00015
00016 namespace RMOL {
00017
00018   // //////////////////////////////////////////////////////////////////
00019   HistoricalBookingHolder::HistoricalBookingHolder () {
00020   }
00021
00022   // //////////////////////////////////////////////////////////////////
00023   HistoricalBookingHolder::~HistoricalBookingHolder () {
00024     _historicalBookingVector.clear();
00025   }
00026
00027   // //////////////////////////////////////////////////////////////////
00028   const short HistoricalBookingHolder::getNbOfFlights () const {
00029     return _historicalBookingVector.size();
00030   }
00031
```

```
00032    // //////////////////////////////////////////////////////////////////
00033    const short HistoricalBookingHolder::getNbOfUncensoredData () const {
00034      short lResult = 0;
00035      const short lSize = _historicalBookingVector.size();
00036
00037      for (short ite = 0; ite < lSize; ++ite) {
00038        const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00039        if (lFlag == false) {
00040          ++ lResult;
00041        }
00042      }
00043
00044      return lResult;
00045    }
00046
00047    // //////////////////////////////////////////////////////////////////
00048    const stdair::NbOfBookings_T HistoricalBookingHolder::
00049    getNbOfUncensoredBookings () const {
00050      stdair::NbOfBookings_T lResult = 0;
00051      const short lSize = _historicalBookingVector.size();
00052
00053      for (short ite = 0; ite < lSize; ++ite) {
00054        const HistoricalBooking& lHistorialBooking =
00055          _historicalBookingVector.at (ite);
00056        const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00057        if (lFlag == false) {
00058          const stdair::NbOfBookings_T& lBooking =
00059            lHistorialBooking.getNbOfBookings ();
00060          lResult += lBooking;
00061        }
00062      }
00063
00064      return lResult;
00065    }
00066
00067    // //////////////////////////////////////////////////////////////////
00068    const double HistoricalBookingHolder::
00069    getUncensoredStandardDeviation (const double& iMeanOfUncensoredBookings,
00070                                    const short iNbOfUncensoredData) const {
00071
00072      double lResult = 0;
00073      const short lSize = _historicalBookingVector.size();
00074
00075      for (short ite = 0; ite < lSize; ++ite) {
00076        const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00077        if (lFlag == false) {
00078          const HistoricalBooking& lHistorialBooking =
00079            _historicalBookingVector.at (ite);
00080
00081          const stdair::NbOfBookings_T& lBooking =
00082            lHistorialBooking.getNbOfBookings ();
00083
00084          lResult += (lBooking - iMeanOfUncensoredBookings)
00085            * (lBooking - iMeanOfUncensoredBookings);
00086        }
00087      }
00088      lResult /= (iNbOfUncensoredData - 1);
00089      lResult = sqrt (lResult);
00090
00091      return lResult;
00092    }
00093
00094    // //////////////////////////////////////////////////////////////////
00095    const double HistoricalBookingHolder::getDemandMean () const {
00096      double lResult = 0;
00097      const short lSize = _historicalBookingVector.size();
00098
00099      for (short ite = 0; ite < lSize; ++ite) {
00100        const HistoricalBooking& lHistorialBooking =
00101          _historicalBookingVector.at(ite);
00102
00103        const stdair::NbOfBookings_T& lDemand =
00104          lHistorialBooking.getUnconstrainedDemand ();
00105
00106        lResult += static_cast<double>(lDemand);
00107      }
00108
00109      lResult /= lSize;
00110
00111      return lResult;
00112    }
00113
00114    // //////////////////////////////////////////////////////////////////
00115    const double HistoricalBookingHolder::getStandardDeviation
00116    (const double iDemandMean) const {
00117      double lResult = 0;
00118      const short lSize = _historicalBookingVector.size();
```

```
00119
00120      for (short ite = 0; ite < lSize; ++ite) {
00121        const HistoricalBooking& lHistorialBooking =
00122          _historicalBookingVector.at(ite);
00123
00124        const stdair::NbOfBookings_T& lDemand =
00125          lHistorialBooking.getUnconstrainedDemand ();
00126
00127        const double lDoubleDemand = static_cast<double> (lDemand);
00128        lResult += (lDoubleDemand - iDemandMean) * (lDoubleDemand - iDemandMean);
00129      }
00130
00131      lResult /= (lSize - 1);
00132
00133      lResult = sqrt (lResult);
00134
00135      return lResult;
00136    }
00137
00138    // //////////////////////////////////////////////////////////////////
00139    const std::vector<bool> HistoricalBookingHolder::
00140    getListOfToBeUnconstrainedFlags () const {
00141      std::vector<bool> lResult;
00142      const short lSize = _historicalBookingVector.size();
00143
00144      for (short ite = 0; ite < lSize; ++ite) {
00145        const HistoricalBooking& lHistorialBooking =
00146          _historicalBookingVector.at(ite);
00147        const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00148        if (lFlag == true) {
00149          lResult.push_back(true);
00150        }
00151        else {
00152          lResult.push_back(false);
00153        }
00154      }
00155
00156      return lResult;
00157    }
00158
00159    // //////////////////////////////////////////////////////////////////
00160    const stdair::NbOfBookings_T& HistoricalBookingHolder::
00161    getHistoricalBooking (const short i) const {
00162      const HistoricalBooking& lHistorialBooking =
00163        _historicalBookingVector.at(i);
00164      return lHistorialBooking.getNbOfBookings();
00165    }
00166
00167    // //////////////////////////////////////////////////////////////////
00168    const stdair::NbOfBookings_T& HistoricalBookingHolder::
00169    getUnconstrainedDemand (const short i) const {
00170      const HistoricalBooking& lHistorialBooking =
00171        _historicalBookingVector.at(i);
00172      return lHistorialBooking.getUnconstrainedDemand();
00173    }
00174
00175    // //////////////////////////////////////////////////////////////////
00176    const stdair::Flag_T& HistoricalBookingHolder::
00177    getCensorshipFlag (const short i) const {
00178      const HistoricalBooking& lHistorialBooking =
00179        _historicalBookingVector.at(i);
00180      return lHistorialBooking.getFlag();
00181    }
00182
00183    // //////////////////////////////////////////////////////////////////
00184    void HistoricalBookingHolder::setUnconstrainedDemand
00185    (const stdair::NbOfBookings_T& iExpectedDemand, const short i) {
00186      _historicalBookingVector.at(i).setUnconstrainedDemand(iExpectedDemand);
00187    }
00188
00189    // //////////////////////////////////////////////////////////////////
00190    const stdair::NbOfBookings_T HistoricalBookingHolder::calculateExpectedDemand
00191    (const double iMean, const double iSD,
00192     const short i, const stdair::NbOfBookings_T iDemand) const {
00193
00194      const HistoricalBooking lHistorialBooking =
00195        _historicalBookingVector.at(i);
00196      const double lBooking =
00197        static_cast <double> (lHistorialBooking.getNbOfBookings());
00198      double e, d1, d2;
00199
00200      e = - (lBooking - iMean) * (lBooking - iMean) * 0.625 / (iSD * iSD);
00201      //STDAIR_LOG_DEBUG ("e: " << e);
00202      e = exp (e);
00203      //STDAIR_LOG_DEBUG ("e: " << e);
00204
00205      double s = sqrt (1 - e);
```

```
00206     //STDAIR_LOG_DEBUG ("s: " << s);
00207
00208     if (lBooking >= iMean) {
00209       if (e < 0.01) {
00210         return iDemand;
00211       }
00212       d1 = 0.5 * (1 - s);
00213     }
00214     else {
00215       d1 = 0.5 * (1 + s);
00216     }
00217     //STDAIR_LOG_DEBUG ("d1: " << d1);
00218
00219     e = - (lBooking - iMean) * (lBooking - iMean) * 0.5 / (iSD * iSD);
00220     e = exp (e);
00221     d2 = e * iSD / sqrt(2 * 3.14159265);
00222     //STDAIR_LOG_DEBUG ("d2: " << d2);
00223
00224     if (d1 == 0) {
00225       return iDemand;
00226     }
00227
00228     const stdair::NbOfBookings_T lDemand =
00229       static_cast<stdair::NbOfBookings_T> (iMean + d2/d1);
00230
00231     return lDemand;
00232   }
00233
00234   // //////////////////////////////////////////////////////////////////
00235   void HistoricalBookingHolder::addHistoricalBooking
00236   (const HistoricalBooking& iHistoricalBooking) {
00237     _historicalBookingVector.push_back(iHistoricalBooking);
00238   }
00239
00240   // //////////////////////////////////////////////////////////////////
00241   void HistoricalBookingHolder::toStream (std::ostream& ioOut) const {
00242     const short lSize = _historicalBookingVector.size();
00243
00244     ioOut << "Historical Booking; Unconstrained Demand; Flag" << std::endl;
00245
00246     for (short ite = 0; ite < lSize; ++ite) {
00247       const HistoricalBooking& lHistorialBooking =
00248         _historicalBookingVector.at(ite);
00249
00250       const stdair::NbOfBookings_T& lBooking =
00251         lHistorialBooking.getNbOfBookings();
00252
00253       const stdair::NbOfBookings_T& lDemand =
00254         lHistorialBooking.getUnconstrainedDemand();
00255
00256       const stdair::Flag_T lFlag = lHistorialBooking.getFlag();
00257
00258       ioOut << lBooking << "     "
00259             << lDemand << "     "
00260             << lFlag << std::endl;
00261     }
00262   }
00263
00264   // //////////////////////////////////////////////////////////////////
00265   const std::string HistoricalBookingHolder::describe() const {
00266     std::ostringstream ostr;
00267     ostr << "Holder of HistoricalBooking structs.";
00268
00269     return ostr.str();
00270   }
00271
00272   // //////////////////////////////////////////////////////////////////
00273   void HistoricalBookingHolder::display() const {
00274     toStream (std::cout);
00275   }
00276 }
```

28.55   rmol/bom/HistoricalBookingHolder.hpp File Reference

```
#include <iostream>
#include <vector>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/basic/StructAbstract.hpp>
```

Classes

- struct RMOL::HistoricalBookingHolder

Namespaces

- namespace RMOL

Typedefs

- typedef std::vector
  < HistoricalBooking > RMOL::HistoricalBookingVector_T

28.56 HistoricalBookingHolder.hpp

```
00001 #ifndef __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <iostream>
00009 #include <vector>
00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/basic/StructAbstract.hpp>
00013
00014 namespace RMOL {
00016   struct HistoricalBooking;
00017
00019   typedef std::vector<HistoricalBooking> HistoricalBookingVector_T;
00020
00023   struct HistoricalBookingHolder : public stdair::StructAbstract {
00024
00025   public:
00026     // ////// Getters //////
00028     const short getNbOfFlights () const;
00029
00031     const short getNbOfUncensoredData () const;
00032
00034     const stdair::NbOfBookings_T getNbOfUncensoredBookings () const;
00035
00037     const double getUncensoredStandardDeviation
00038     (const double& iMeanOfUncensoredBookings,
00039      const short iNbOfUncensoredData) const;
00040
00042     const double getDemandMean () const;
00043
00045     const double getStandardDeviation (const double) const;
00046
00048     const std::vector<bool> getListOfToBeUnconstrainedFlags() const;
00049
00051     const stdair::NbOfBookings_T& getHistoricalBooking (const short i) const;
00052
00054     const stdair::NbOfBookings_T& getUnconstrainedDemand (const short i) const;
00055
00057     const stdair::Flag_T& getCensorshipFlag (const short i) const;
00058
00060     const stdair::NbOfBookings_T& getUnconstrainedDemandOnFirstElement() const
00061       return getUnconstrainedDemand (0);
00062     }
00063
00065     const stdair::NbOfBookings_T calculateExpectedDemand (const double,
00066                                                           const double,
00067                                                           const short,
00068                                                 const stdair::NbOfBookings_T) const
      ;
00069
00071     void setUnconstrainedDemand (const stdair::NbOfBookings_T& iExpectedDemand,
00072                                  const short i);
00073
00075     void addHistoricalBooking (const HistoricalBooking& iHistoricalBooking);
00076
00080     void toStream (std::ostream& ioOut) const;
00081
```

```
00082    // ///////// Display Methods //////////
00084    const std::string describe() const;
00085
00087    void display () const;
00088
00090    virtual ~HistoricalBookingHolder();
00091
00092  public:
00095    HistoricalBookingHolder ();
00096
00097  private:
00099    HistoricalBookingVector_T _historicalBookingVector;
00100
00101  protected:
00102    };
00103 }
00104 #endif // __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00105
```

28.57   rmol/bom/MCOptimiser.cpp File Reference

```
#include <cassert>
#include <string>
#include <sstream>
#include <algorithm>
#include <cmath>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/service/Logger.hpp>
#include <stdair/basic/RandomGeneration.hpp>
#include <stdair/basic/BasConst_General.hpp>
#include <rmol/bom/MCOptimiser.hpp>
```

Namespaces

- namespace RMOL

28.58   MCOptimiser.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <string>
00007 #include <sstream>
00008 #include <algorithm>
00009 #include <cmath>
00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/bom/BookingClass.hpp>
00016 #include <stdair/bom/VirtualClassStruct.hpp>
00017 #include <stdair/service/Logger.hpp>
00018
00019 #include <stdair/basic/RandomGeneration.hpp>
00020 #include <stdair/basic/BasConst_General.hpp>
00021 // RMOL
00022 #include <rmol/bom/MCOptimiser.hpp>
00023
00024 namespace RMOL {
00025
00026    // // //////////////////////////////////////////////////////////////////////
```

```
00027    void MCOptimiser::
00028    optimalOptimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00029      // Retrieve the segment-cabin
00030      const stdair::SegmentCabinList_T lSegmentCabinList =
00031        stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00032      stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin()
      ;
00033      assert (itSC != lSegmentCabinList.end());
00034      const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00035      assert (lSegmentCabin_ptr != NULL);
00036
00037      // Retrieve the class list.
00038      const stdair::BookingClassList_T lBookingClassList =
00039        stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00040
00041      // Retrieve the remaining cabin capacity.
00042      const stdair::Availability_T& lCap = ioLegCabin.getAvailabilityPool();
00043      const int lCapacity = static_cast<const int> (lCap);
00044      const stdair::UnsignedIndex_T lCapacityIndex =
00045        static_cast<const stdair::UnsignedIndex_T> ((lCapacity+abs(lCapacity))/2)
      ;
00046
00047      // Retrieve the virtual class list.
00048      stdair::VirtualClassList_T& lVCList = ioLegCabin.getVirtualClassList();
00049
00050      // Parse the virtual class list and compute the protection levels.
00051      stdair::VirtualClassList_T::iterator itCurrentVC = lVCList.begin();
00052      assert (itCurrentVC != lVCList.end());
00053      stdair::VirtualClassList_T::iterator itNextVC = itCurrentVC; ++itNextVC;
00054
00055      // Initialise  the partial sum holder with the demand sample of the first
00056      // virtual class.
00057      stdair::VirtualClassStruct& lFirstVC = *itCurrentVC;
00058      stdair::GeneratedDemandVector_T lPartialSumHolder =
00059        lFirstVC.getGeneratedDemandVector();
00060
00061      // Initialise the booking limit for the first class, which is equal to
00062      // the remaining capacity.
00063      lFirstVC.setCumulatedBookingLimit (lCap);
00064
00065      // Initialise bid price vector with the first element (index 0) equal to
00066      // the highest yield.
00067      ioLegCabin.emptyBidPriceVector();
00068      stdair::BidPriceVector_T& lBPV = ioLegCabin.getBidPriceVector();
00069      //const stdair::Yield_T& y1 = lFirstVC.getYield ();
00070      //lBPV.push_back (y1);
00071      stdair::UnsignedIndex_T idx = 1;
00072
00073      for (; itNextVC != lVCList.end(); ++itCurrentVC, ++itNextVC) {
00074        // Get the yields of the two classes.
00075        stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00076        stdair::VirtualClassStruct& lNextVC = *itNextVC;
00077        const stdair::Yield_T& yj = lCurrentVC.getYield ();
00078        const stdair::Yield_T& yj1 = lNextVC.getYield ();
00079
00080        // Consistency check: the yield/price of a higher class/bucket
00081        // (with the j index lower) must be higher.
00082        assert (yj > yj1);
00083
00084        // Sort the partial sum holder.
00085        std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00086        const stdair::UnsignedIndex_T K = lPartialSumHolder.size ();
00087
00088        // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00089        const double ljdouble = std::floor (K * (yj - yj1) / yj);
00090        stdair::UnsignedIndex_T lj =
00091          static_cast<stdair::UnsignedIndex_T> (ljdouble);
00092
00093        // Consistency check.
00094        assert (lj >= 1 && lj < K);
00095
00096        //  The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00097        const double sjl = lPartialSumHolder.at (lj - 1);
00098        const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00099        const double pj = (sjl + sjlp1) / 2;
00100
00101        // Set the cumulated protection level for the current class.
00102        lCurrentVC.setCumulatedProtection (pj);
00103        // Set the cumulated booking limit for the next class.
00104        lNextVC.setCumulatedBookingLimit (lCap - pj);
00105
00110        const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00111        stdair::GeneratedDemandVector_T::iterator itLowerBound =
00112          lPartialSumHolder.begin();
00113        for (; idx <= pjint && idx <= lCapacityIndex; ++idx) {
00114          itLowerBound =
00115            std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
```

```
00116              const stdair::UnsignedIndex_T pos =
00117                itLowerBound - lPartialSumHolder.begin();
00118
00119              const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00120              lBPV.push_back (lBP);
00121            }
00122
00123            // Update the partial sum holder.
00124            const stdair::GeneratedDemandVector_T& lNextPSH =
00125              lNextVC.getGeneratedDemandVector();
00126            assert (K <= lNextPSH.size());
00127            for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00128              lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextPSH.at(i)
     ;
00129            }
00130            lPartialSumHolder.resize (K - lj);
00131          }
00132
00137          stdair::VirtualClassStruct& lLastVC = *itCurrentVC;
00138          const stdair::Yield_T& yn = lLastVC.getYield();
00139          stdair::GeneratedDemandVector_T::iterator itLowerBound =
00140            lPartialSumHolder.begin();
00141          for (; idx <= lCapacityIndex; ++idx) {
00142            itLowerBound =
00143              std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00144            const stdair::UnsignedIndex_T pos =
00145              itLowerBound - lPartialSumHolder.begin();
00146            const stdair::UnsignedIndex_T K = lPartialSumHolder.size();
00147            const stdair::BidPrice_T lBP = yn * (K - pos) / K;
00148            lBPV.push_back (lBP);
00149          }
00150        }
00151
00152        // ////////////////////////////////////////////////////////////////////
00153        stdair::GeneratedDemandVector_T MCOptimiser::
00154        generateDemandVector (const stdair::MeanValue_T& iMean,
00155                              const stdair::StdDevValue_T& iStdDev,
00156                              const unsigned int& K) {
00157          stdair::GeneratedDemandVector_T oDemandVector;
00158          if (iStdDev > 0) {
00159            stdair::RandomGeneration lGenerator (stdair::DEFAULT_RANDOM_SEED);
00160            for (unsigned int i = 0; i < K; ++i) {
00161              stdair::RealNumber_T lDemandSample =
00162                lGenerator.generateNormal (iMean, iStdDev);
00163              oDemandVector.push_back (lDemandSample);
00164            }
00165          } else {
00166            for (unsigned int i = 0; i < K; ++i) {
00167              oDemandVector.push_back (iMean);
00168            }
00169          }
00170          return oDemandVector;
00171        }
00172
00173        // ////////////////////////////////////////////////////////////////////////
00174        void MCOptimiser::
00175        optimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00176          // Number of MC samples
00177          unsigned int K = 100000;
00178
00179          const stdair::YieldLevelDemandMap_T& lYieldDemandMap =
00180            ioLegCabin.getYieldLevelDemandMap();
00181          assert (!lYieldDemandMap.empty());
00182
00183          std::ostringstream oStr;
00184          oStr << "Yield list ";
00185          for (stdair::YieldLevelDemandMap_T::const_iterator itYD =
00186                 lYieldDemandMap.begin();
00187               itYD != lYieldDemandMap.end(); ++itYD) {
00188            const stdair::Yield_T& y = itYD->first;
00189            oStr << y << " ";
00190          }
00191
00192          STDAIR_LOG_DEBUG (oStr.str());
00193          ioLegCabin.emptyBidPriceVector();
00194          stdair::BidPriceVector_T& lBidPriceVector =
00195            ioLegCabin.getBidPriceVector();
00196          const stdair::Availability_T& lAvailabilityPool =
00197            ioLegCabin.getAvailabilityPool();
00198          // Initialise the minimal bid price to 1.0 (just to avoid problems
00199          // of division by zero).
00200          const stdair::BidPrice_T& lMinBP = 1.0;
00201
00202          stdair::YieldLevelDemandMap_T::const_reverse_iterator itCurrentYD =
00203            lYieldDemandMap.rbegin();
00204          stdair::YieldLevelDemandMap_T::const_reverse_iterator itNextYD =
     itCurrentYD;
```

```
00205       ++itNextYD;
00206
00207       // Initialise the partial sum holder
00208       stdair::MeanStdDevPair_T lMeanStdDevPair = itCurrentYD->second;
00209       stdair::GeneratedDemandVector_T lPartialSumHolder =
00210         generateDemandVector(lMeanStdDevPair.first, lMeanStdDevPair.second, K);
00211
00212       stdair::UnsignedIndex_T idx = 1;
00213       for (; itNextYD!=lYieldDemandMap.rend(); ++itCurrentYD, ++itNextYD) {
00214         const stdair::Yield_T& yj = itCurrentYD->first;
00215         const stdair::Yield_T& yj1 = itNextYD->first;
00216         // Consistency check: the yield/price of a higher class/bucket
00217         // (with the j index lower) must be higher.
00218         assert (yj > yj1);
00219         // Sort the partial sum holder.
00220         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00221         // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00222         //                    << " min = " << lPartialSumHolder.front());
00223         K = lPartialSumHolder.size ();
00224         // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00225         const double ljdouble = std::floor (K * (yj - yj1) / yj);
00226         stdair::UnsignedIndex_T lj =
00227           static_cast<stdair::UnsignedIndex_T> (ljdouble);
00228         // Consistency check.
00229         assert (lj >= 1 && lj < K);
00230         //  The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00231         const double sjl = lPartialSumHolder.at (lj - 1);
00232         const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00233         const double pj = (sjl + sjlp1) / 2;
00238         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00239         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00240           lPartialSumHolder.begin();
00241         for (; idx <= pjint && idx <= lAvailabilityPool; ++idx) {
00242           itLowerBound =
00243             std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00244           const stdair::UnsignedIndex_T pos =
00245             itLowerBound - lPartialSumHolder.begin();
00246
00247           const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00248           lBidPriceVector.push_back (lBP);
00249         }
00250         // Update the partial sum holder.
00251         lMeanStdDevPair = itNextYD->second;
00252         const stdair::GeneratedDemandVector_T& lNextDV =
00253           generateDemandVector (lMeanStdDevPair.first,
00254                                 lMeanStdDevPair.second, K - lj);
00255         for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00256           lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextDV.at(i);
00257         }
00258         lPartialSumHolder.resize (K - lj);
00259       }
00268       // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00269       //                    << " min = " << lPartialSumHolder.front());
00270
00271       std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00272       const stdair::Yield_T& yn = itCurrentYD->first;
00273       stdair::GeneratedDemandVector_T::iterator itLowerBound =
00274         lPartialSumHolder.begin();
00275       K = lPartialSumHolder.size();
00276
00277       bool lMinBPReached = false;
00278       for (; idx <= lAvailabilityPool; ++idx) {
00279         itLowerBound =
00280           std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00281
00282         if (!lMinBPReached) {
00283           const stdair::UnsignedIndex_T pos =
00284             itLowerBound - lPartialSumHolder.begin();
00285           stdair::BidPrice_T lBP = yn * (K - pos) / K;
00286
00287           if (lBP < lMinBP) {
00288             lBP = lMinBP; lMinBPReached = true;
00289           }
00290
00291           lBidPriceVector.push_back (lBP);
00292
00293         } else {
00294           lBidPriceVector.push_back (lMinBP);
00295         }
00296
00297       }
00298
00299       // Updating the bid price values
00300       ioLegCabin.updatePreviousBidPrice();
00301       ioLegCabin.setCurrentBidPrice (lBidPriceVector.back());
00302
00303       // Compute and display the bid price variation after optimisation
```

```
00304      const stdair::BidPrice_T lPreviousBP = ioLegCabin.getPreviousBidPrice();
00305      stdair::BidPrice_T lNewBP = ioLegCabin.getCurrentBidPrice();
00306      // Check
00307      assert (lPreviousBP != 0);
00308      stdair::BidPrice_T lBidPriceDelta = lNewBP - lPreviousBP;
00309
00310      double lBidPriceVariation = 100*lBidPriceDelta/lPreviousBP;
00311
00312      STDAIR_LOG_DEBUG ("Bid price: previous value " << lPreviousBP
00313                        << ", new value " << lNewBP
00314                        << ", variation " << lBidPriceVariation << " %"
00315                        <<", BPV size " << lBidPriceVector.size());
00316    }
00317
00318 }
```

28.59 rmol/bom/MCOptimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_rm_types.hpp>
```

Classes

- class RMOL::MCOptimiser

Namespaces

- namespace stdair
- namespace RMOL

28.60 MCOptimiser.hpp

```
00001 #ifndef __RMOL_BOM_MCUTILS_HPP
00002 #define __RMOL_BOM_MCUTILS_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009 #include <stdair/stdair_maths_types.hpp>
00010 #include <stdair/stdair_rm_types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014   class LegCabin;
00015 }
00016
00017 namespace RMOL {
00019   class MCOptimiser {
00020   public:
00021
00030     static void optimalOptimisationByMCIntegration (stdair::LegCabin&);
00031
00035     static stdair::GeneratedDemandVector_T
00036     generateDemandVector (const stdair::MeanValue_T&,
00037                           const stdair::StdDevValue_T&, const unsigned int&);
00038
00039     static void optimisationByMCIntegration (stdair::LegCabin&);
00040
00041   };
00042 }
00043 #endif // __RMOL_BOM_MCUTILS_HPP
```

28.61 rmol/bom/old/DemandGeneratorList.cpp File Reference

```
#include <rmol/bom/DemandGeneratorList.hpp>
```

Namespaces

- namespace RMOL

28.62 DemandGeneratorList.cpp

```
00001 // //////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////
00004 // RMOL
00005 #include <rmol/bom/DemandGeneratorList.hpp>
00006
00007 namespace RMOL {
00008
00009   // //////////////////////////////////////////////////////////////////
00010   DemandGeneratorList::DemandGeneratorList () {
00011     const DistributionParameterList_T aDistributionParameterList;
00012     init (aDistributionParameterList);
00013   }
00014
00015   // //////////////////////////////////////////////////////////////////
00016   DemandGeneratorList::
00017   DemandGeneratorList (const DemandGeneratorList& iDemandGeneratorList) {
00018     // TODO: copy the distribution parameters of the input generator list
00019     const DistributionParameterList_T aDistributionParameterList;
00020     init (aDistributionParameterList);
00021   }
00022
00023   // //////////////////////////////////////////////////////////////////
00024   DemandGeneratorList::
00025   DemandGeneratorList (const DistributionParameterList_T&
00026   iDistributionParameterList) {
00026     init (iDistributionParameterList);
00027   }
00028
00029   // //////////////////////////////////////////////////////////////////
00030   DemandGeneratorList::~DemandGeneratorList () {
00031   }
00032
00033   // //////////////////////////////////////////////////////////////////
00034   void DemandGeneratorList::
00035   init (const DistributionParameterList_T& iDistributionParameterList) {
00036
00037     DistributionParameterList_T::const_iterator itParams =
00038       iDistributionParameterList.begin();
00039     for ( ; itParams != iDistributionParameterList.end(); itParams++) {
00040       const FldDistributionParameters& aParams = *itParams;
00041
00042       const Gaussian gaussianGenerator (aParams);
00043
00044       _demandGeneratorList.push_back (gaussianGenerator);
00045     }
00046   }
00047
00048   // //////////////////////////////////////////////////////////////////
00049   void DemandGeneratorList::
00050   generateVariateList (VariateList_T& ioVariateList) const {
00051
00052     // Iterate on the (number of) classes/buckets, n
00053     DemandGeneratorList_T::const_iterator itGenerator =
00054       _demandGeneratorList.begin();
00055     for ( ; itGenerator != _demandGeneratorList.end(); itGenerator++) {
00056       const Gaussian& gaussianGenerator = *itGenerator;
00057
00058       // Generate a random variate following the Gaussian distribution
00059       const double generatedVariate = gaussianGenerator.generateVariate ();
00060       ioVariateList.push_back (generatedVariate);
00061     }
00062   }
00063
00064 }
```

28.63 rmol/bom/old/DemandGeneratorList.hpp File Reference

```
#include <list>
#include <rmol/bom/VariateList.hpp>
#include <rmol/bom/DistributionParameterList.hpp>
#include <rmol/bom/Gaussian.hpp>
```

Classes

- class RMOL::DemandGeneratorList

Namespaces

- namespace RMOL

28.64 DemandGeneratorList.hpp

```
00001 #ifndef __RMOL_DEMANDGENERATORLIST_HPP
00002 #define __RMOL_DEMANDGENERATORLIST_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/bom/VariateList.hpp>
00011 #include <rmol/bom/DistributionParameterList.hpp>
00012 #include <rmol/bom/Gaussian.hpp>
00013
00014 namespace RMOL {
00015
00017   class DemandGeneratorList {
00018   protected:
00020     typedef std::list<Gaussian> DemandGeneratorList_T;
00021
00022   public:
00024     DemandGeneratorList ();
00025     DemandGeneratorList (const DemandGeneratorList&);
00027     DemandGeneratorList (const DistributionParameterList_T&);
00028
00030     virtual ~DemandGeneratorList();
00031
00033     void generateVariateList (VariateList_T&) const;
00034
00035   private:
00036     DemandGeneratorList_T _demandGeneratorList;
00037
00039     void init (const DistributionParameterList_T&);
00040
00041   };
00042 }
00043 #endif // __RMOL_DEMANDGENERATORLIST_HPP
```

28.65 rmol/bom/Utilities.cpp File Reference

```
#include <cassert>
#include <string>
#include <numeric>
#include <algorithm>
#include <cmath>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/bom/Utilities.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
```

Namespaces

- namespace RMOL

28.66 Utilities.cpp

```
00001
00002 // //////////////////////////////////////////////////////////////////
00003 // Import section
00004 // //////////////////////////////////////////////////////////////////
00005 // STL
00006 #include <cassert>
00007 #include <string>
00008 #include <numeric>
00009 #include <algorithm>
00010 #include <cmath>
00011 // StdAir
00012 #include <stdair/basic/BasConst_Inventory.hpp>
00013 #include <stdair/bom/BomManager.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/service/Logger.hpp>
00016 // RMOL
00017 #include <rmol/basic/BasConst_General.hpp>
00018 #include <rmol/bom/Utilities.hpp>
00019 #include <rmol/bom/GuillotineBlockHelper.hpp>
00020
00021 namespace RMOL {
00022   // //////////////////////////////////////////////////////////////////
00023   void Utilities::
00024   computeDistributionParameters (const UnconstrainedDemandVector_T& iVector,
00025                                  double& ioMean, double& ioStdDev) {
00026     ioMean = 0.0; ioStdDev = 0.0;
00027     unsigned int lNbOfSamples = iVector.size();
00028     assert (lNbOfSamples > 1);
00029
00030     // Compute the mean
00031     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin()
    ;
00032          itSample != iVector.end(); ++itSample) {
00033       //STDAIR_LOG_NOTIFICATION (*itSample);
00034       ioMean += *itSample;
00035     }
00036     ioMean /= lNbOfSamples;
00037
00038     // Compute the standard deviation
00039     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin()
    ;
00040          itSample != iVector.end(); ++itSample) {
00041       const double& lSample = *itSample;
00042       ioStdDev += ((lSample - ioMean) * (lSample - ioMean));
00043     }
00044     ioStdDev /= (lNbOfSamples - 1);
00045     ioStdDev = sqrt (ioStdDev);
00046
00047     // Sanity check
00048     if (ioStdDev == 0) {
00049       ioStdDev = 0.1;
00050     }
00051   }
00052
00053   // //////////////////////////////////////////////////////////////////
00054   stdair::DCPList_T Utilities::
00055   buildRemainingDCPList (const stdair::DTD_T& iDTD) {
00056     stdair::DCPList_T oDCPList;
00057
00058     const stdair::DCPList_T lWholeDCPList = stdair::DEFAULT_DCP_LIST;
00059     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00060     while (itDCP != lWholeDCPList.end()) {
00061       const stdair::DCP_T& lDCP = *itDCP;
00062       if (iDTD >= lDCP) {
00063         break;
00064       }
00065       ++itDCP;
00066     }
00067     assert (itDCP != lWholeDCPList.end());
00068
00069     oDCPList.push_back (iDTD);
00070     ++itDCP;
00071     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00072       oDCPList.push_back (*itDCP);
00073     }
00074
00075     return oDCPList;
```

```
00076   }
00077
00078   // //////////////////////////////////////////////////////////////////////
00079   stdair::DCPList_T Utilities::
00080   buildRemainingDCPList2 (const stdair::DTD_T& iDTD) {
00081     stdair::DCPList_T oDCPList;
00082
00083     const stdair::DCPList_T lWholeDCPList = RMOL::DEFAULT_DCP_LIST;
00084     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00085     while (itDCP != lWholeDCPList.end()) {
00086       const stdair::DCP_T& lDCP = *itDCP;
00087       if (iDTD >= lDCP) {
00088         break;
00089       }
00090       ++itDCP;
00091     }
00092     assert (itDCP != lWholeDCPList.end());
00093
00094     oDCPList.push_back (iDTD);
00095     ++itDCP;
00096     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00097       oDCPList.push_back (*itDCP);
00098     }
00099
00100     return oDCPList;
00101   }
00102
00103   // //////////////////////////////////////////////////////////////////////
00104   stdair::NbOfSegments_T Utilities::
00105   getNbOfDepartedSimilarSegments (const stdair::SegmentCabin& iSegmentCabin,
00106                                   const stdair::Date_T& iEventDate) {
00107     stdair::DTD_T lDTD = 0;
00108     // Retrieve the guillotine block.
00109     const stdair::GuillotineBlock& lGuillotineBlock =
00110       iSegmentCabin.getGuillotineBlock();
00111     return GuillotineBlockHelper::
00112       getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lDTD, iEventDate);
00113   }
00114
00115 }
```

28.67   rmol/bom/Utilities.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::Utilities

Namespaces

- namespace stdair
- namespace RMOL

28.68   Utilities.hpp

```
00001 #ifndef __RMOL_BOM_UTILITIES_HPP
00002 #define __RMOL_BOM_UTILITIES_HPP
00003 // //////////////////////////////////////////////////////////////////////
00004 // Import section
00005 // //////////////////////////////////////////////////////////////////////
00006 // StdAir
00007 #include <stdair/stdair_inventory_types.hpp>
00008 // RMOL
00009 #include <rmol/RMOL_Types.hpp>
00010
00011 // Forward declarations
00012 namespace stdair {
00013   class SegmentCabin;
00014 }
00015
```

```
00016 namespace RMOL {
00017
00019   class Utilities {
00020   public:
00022     static void computeDistributionParameters (const UnconstrainedDemandVector_T
       &, double&, double&);
00023
00027     static stdair::DCPList_T buildRemainingDCPList (const stdair::DTD_T&);
00028     static stdair::DCPList_T buildRemainingDCPList2 (const stdair::DTD_T&);
00029
00033     static stdair::NbOfSegments_T getNbOfDepartedSimilarSegments (const
       stdair::SegmentCabin&, const stdair::Date_T&);
00034
00035   };
00036
00037 }
00038
00039 #endif // __RMOL_BOM_UTILITIES_HPP
```

28.69   rmol/command/Detruncator.cpp File Reference

```
#include <cassert>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/EMDetruncator.hpp>
#include <rmol/command/Detruncator.hpp>
```

Namespaces

- namespace RMOL

28.70   Detruncator.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/GuillotineBlock.hpp>
00009 #include <stdair/bom/BomManager.hpp>
00010 #include <stdair/bom/FlightDate.hpp>
00011 #include <stdair/bom/SegmentDate.hpp>
00012 #include <stdair/bom/SegmentCabin.hpp>
00013 #include <stdair/bom/BookingClass.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/bom/GuillotineBlockHelper.hpp>
00017 #include <rmol/bom/HistoricalBookingHolder.hpp>
00018 #include <rmol/bom/HistoricalBooking.hpp>
00019 #include <rmol/bom/EMDetruncator.hpp>
00020 #include <rmol/command/Detruncator.hpp>
00021
00022 namespace RMOL {
00023   // //////////////////////////////////////////////////////////////////////
00024   void Detruncator::
00025   unconstrainUsingAdditivePickUp (const stdair::SegmentCabin& iSegmentCabin,
00026                  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00027                  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00028                  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
```

```
00029                    const stdair::Date_T& iCurrentDate) {
00030
00031      // Retrieve the guillotine block.
00032      const stdair::GuillotineBlock& lGuillotineBlock =
00033        iSegmentCabin.getGuillotineBlock();
00034
00035      // Build the historical booking holders for the product-oriented bookings
00036      // of the casses and the Q-equivalent (price-oriented) bookings of the
       cabin
00037      const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00038        getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00039                                            iCurrentDate);
00040
00041      // Parse the booking class list and unconstrain historical bookings.
00042      for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00043           ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00044          ++itBCUDV) {
00045        stdair::BookingClass* lBC_ptr = itBCUDV->first;
00046        assert (lBC_ptr != NULL);
00047        const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00048        const stdair::BlockIndex_T& lBlockIdx =
00049          lGuillotineBlock.getBlockIndex (lBCKey);
00050        UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00051
00052        STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey)
       ;
00053        // STDAIR_LOG_NOTIFICATION (lBCKey << ";" << iDCPBegin
00054        //                          << ";" << iDCPEnd);
00055        unconstrainUsingAdditivePickUp (lGuillotineBlock, lUncDemVector,
00056                                        iDCPBegin, iDCPEnd,
00057                                        lNbOfUsableSegments, lBlockIdx);
00058      }
00059
00060      // Unconstrain the Q-equivalent bookings.
00061      // Retrieve the block index of the segment-cabin.
00062      std::ostringstream lSCMapKey;
00063      lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00064                << iSegmentCabin.describeKey();
00065      const stdair::BlockIndex_T& lCabinIdx =
00066        lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00067
00068      STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00069      //STDAIR_LOG_NOTIFICATION (iDCPBegin << ";" << iDCPEnd);
00070      unconstrainUsingAdditivePickUp (lGuillotineBlock, ioQEquivalentDemandVector
       ,
00071                                      iDCPBegin, iDCPEnd, lNbOfUsableSegments,
00072                                      lCabinIdx, iSegmentCabin, iCurrentDate);
00073    }
00074
00075    // //////////////////////////////////////////////////////////////////////
00076    void Detruncator::unconstrainUsingAdditivePickUp
00077    (const stdair::GuillotineBlock& iGuillotineBlock,
00078     UnconstrainedDemandVector_T& ioUncDemVector,
00079     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00080     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00081     const stdair::BlockIndex_T& iBlockIdx) {
00082      // TODO:
00083      stdair::NbOfSegments_T lSegBegin = 0;
00084      if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00085      // Retrieve the gross daily booking and availability snapshots.
00086      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00087        iGuillotineBlock.
       getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCP
00088      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00089        iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
       lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00090
00091      // Browse the list of segments and build the historical booking holder.
00092      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00093        iGuillotineBlock.getValueTypeIndexMap();
00094      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00095      HistoricalBookingHolder lHBHolder;
00096      for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00097        stdair::Flag_T lCensorshipFlag = false;
00098        stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00099        const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00100
00101        // Parse the DTDs during the period
00102        for (short j = 0; j < lNbOfDTDs; ++j) {
00103          // Check if the data has been censored during this day.
00104          // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00105          //                  << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00106          if (lCensorshipFlag == false) {
00107            if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00108              lCensorshipFlag = true;
00109            }
00110          }
```

```
00111
00112          // Get the bookings of the day.
00113          //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
       lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00114            lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00115          }
00116
00117        HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00118        lHBHolder.addHistoricalBooking (lHistoricalBkg);
00119
00120        // DEBUG
00121        STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00122                          << ", censored: " << lCensorshipFlag);
00123        // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
00124        //                          << ";" << lCensorshipFlag);
00125      }
00126
00127      // DEBUG
00128      STDAIR_LOG_DEBUG ("Unconstrain by EM");
00129
00130      // Unconstrain the booking figures
00131      EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00132
00133      // Add the unconstrained demand of the period to the unconstrained demand
00134      // vector.
00135      short idx = 0;
00136      for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00137           itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00138        *itUD += lHBHolder.getUnconstrainedDemand (idx);
00139        //STDAIR_LOG_NOTIFICATION (lHBHolder.getUnconstrainedDemand (idx));
00140      }
00141    }
00142
00143    // //////////////////////////////////////////////////////////////////////
00144    void Detruncator::unconstrainUsingAdditivePickUp
00145    (const stdair::GuillotineBlock& iGuillotineBlock,
00146     UnconstrainedDemandVector_T& ioUncDemVector,
00147     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00148     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00149     const stdair::BlockIndex_T& iBlockIdx,
00150     const stdair::SegmentCabin& iSegmentCabin,
00151     const stdair::Date_T& iCurrentDate) {
00152      // TODO
00153      stdair::NbOfSegments_T lSegBegin = 0;
00154      if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00155      // Retrieve the gross daily booking and availability snapshots.
00156      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00157        iGuillotineBlock.
       getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCP
00158      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00159        iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
       lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00160
00161      // Browse the list of segments and build the historical booking holder.
00162      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00163        iGuillotineBlock.getValueTypeIndexMap();
00164      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00165      HistoricalBookingHolder lHBHolder;
00166      for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00167        stdair::Flag_T lCensorshipFlag = false;
00168        stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00169        const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00170
00171        // Parse the DTDs during the period
00172        for (short j = 0; j < lNbOfDTDs; ++j) {
00173          // Check if the data has been censored during this day.
00174          // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00175          //                   << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00176          if (lCensorshipFlag == false) {
00177            if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00178              lCensorshipFlag = true;
00179            }
00180          }
00181
00182          // Get the bookings of the day.
00183          //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
       lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00184            lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00185        }
00186
00187        HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00188        lHBHolder.addHistoricalBooking (lHistoricalBkg);
00189
00190        // DEBUG
00191        STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00192                          << ", censored: " << lCensorshipFlag);
00193        // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
```

```
00194        //                              << ";" << lCensorshipFlag);
00195      }
00196
00197      // DEBUG
00198      STDAIR_LOG_DEBUG ("Unconstrain by EM");
00199
00200      // Unconstrain the booking figures
00201      EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00202
00203      // Add the unconstrained demand of the period to the unconstrained demand
00204      // vector.
00205      // LOG
00206      const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00207        getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00208      const stdair::FlightDate& lFlightDate = stdair::BomManager::
00209        getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00210      const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00211      const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00212      const long lDTD = lDD.days();
00213      stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00214
00215      short idx = 0;
00216      for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00217           itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00218        *itUD += lHBHolder.getUnconstrainedDemand (idx);
00219        if (lDepDate > lRefDate) {
00220          const stdair::DateOffset_T lDateOffset (7 *(52 - idx) + 420);
00221          const stdair::Date_T lHDate = lDepDate - lDateOffset;
00222          STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00223                                   << ";" << lDTD << ";" << iDCPBegin << ";"
00224                                   << iDCPEnd << ";"
00225                                   << boost::gregorian::to_iso_string (lHDate)
00226                                   <<";"<<lHBHolder.getUnconstrainedDemand (idx))
;
00227
00228          STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00229                                   << ";" << lDTD << ";" << iDCPBegin << ";"
00230                                   << iDCPEnd << ";"
00231                                   << boost::gregorian::to_iso_string (lHDate)
00232                                   <<";"<<lHBHolder.getHistoricalBooking (idx));
00233        }
00234      }
00235    }
00236
00237    // //////////////////////////////////////////////////////////////////////
00238    void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00239    (const stdair::SegmentCabin& iSegmentCabin,
00240     BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemVectorMap,
00241     UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00242     const stdair::DCP_T& iFirstDCP, const stdair::NbOfSegments_T& iNbOfSegments,
00243     const stdair::NbOfSegments_T& iNbOfUsedSegments){
00244
00245      // Retrieve the guillotine block.
00246      const stdair::GuillotineBlock& lGuillotineBlock =
00247        iSegmentCabin.getGuillotineBlock();
00248
00249      // Parse the booking class list and unconstrain historical bookings.
00250      for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00251           ioBkgClassUncDemVectorMap.begin();
00252           itBCUDV != ioBkgClassUncDemVectorMap.end(); ++itBCUDV) {
00253        stdair::BookingClass* lBC_ptr = itBCUDV->first;
00254        assert (lBC_ptr != NULL);
00255        const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00256        const stdair::BlockIndex_T& lBlockIdx =
00257          lGuillotineBlock.getBlockIndex (lBCKey);
00258        UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00259
00260        STDAIR_LOG_DEBUG("Retrieve the unconstrained product-oriented demand for
"
00261                         << lBCKey);
00262        retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock, lUncDemVector,
00263                                                iFirstDCP, lBlockIdx,
00264                                                iNbOfSegments, iNbOfUsedSegments)
;
00265      }
00266
00267      // Unconstrain the Q-equivalent bookings.
00268      // Retrieve the block index of the segment-cabin.
00269      std::ostringstream lSCMapKey;
00270      lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00271                << iSegmentCabin.describeKey();
00272      const stdair::BlockIndex_T& lCabinValueIdx =
00273        lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00274
00275      STDAIR_LOG_DEBUG ("Retrieve the unconstrained price-oriented demand");
00276      retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock,
00277                                              ioQEquivalentDemandVector,iFirstDCP
```

```
                  ,
00278                                              lCabinValueIdx, iNbOfSegments,
00279                                              iNbOfUsedSegments);
00280    }
00281
00282    // //////////////////////////////////////////////////////////////////
00283    void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00284    (const stdair::GuillotineBlock& iGuillotineBlock,
00285     UnconstrainedDemandVector_T& ioUnconstrainedDemandVector,
00286     const stdair::DCP_T& iFirstDCP, const stdair::BlockIndex_T& iValueIdx,
00287     const stdair::NbOfSegments_T& iNbOfSegments,
00288     const stdair::NbOfSegments_T& iNbOfUsedSegments) {
00289
00290      //TODO
00291      stdair::NbOfSegments_T lSegBegin = iNbOfSegments - iNbOfUsedSegments;
00292
00293      // Retrieve the snapshots of the corresponding booking value from the
00294      // first DTD (usually 365) till the given iFirstDCP.
00295      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lRangeBookingView =
00296        iGuillotineBlock.
      getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfSegments -1, iFirstDCP, stdair:
      ;
00297
00298      // Sum the bookings from the first day till the given iFirstDCP in order to
00299      // get the supposing unconstrained demand for this period.
00300      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00301        iGuillotineBlock.getValueTypeIndexMap();
00302      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00303      for (int itSegment = 0; itSegment < iNbOfSegments-lSegBegin; ++itSegment) {
00304        for (int i = iFirstDCP; i <= stdair::DEFAULT_MAX_DTD; ++i) {
00305          stdair::NbOfRequests_T& lUncDemand =
00306            ioUnconstrainedDemandVector.at(itSegment);
00307          lUncDemand +=
00308            lRangeBookingView[iValueIdx + itSegment*lNbOfValueTypes][i-iFirstDCP]
      ;
00309        }
00310        // STDAIR_LOG_NOTIFICATION (ioUnconstrainedDemandVector.at(itSegment)
00311        //                      << ";" << itSegment);
00312      }
00313    }
00314
00315    // //////////////////////////////////////////////////////////////////
00316    void Detruncator::unconstrainUsingMultiplicativePickUp
00317    (const stdair::SegmentCabin& iSegmentCabin,
00318     BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00319     UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00320     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00321     const stdair::Date_T& iCurrentDate,
00322     const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00323
00324      // Retrieve the guillotine block.
00325      const stdair::GuillotineBlock& lGuillotineBlock =
00326        iSegmentCabin.getGuillotineBlock();
00327
00328      // Build the historical booking holders for the product-oriented bookings
00329      // of the casses and the Q-equivalent (price-oriented) bookings of the
      cabin
00330      const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00331        getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00332                                            iCurrentDate);
00333
00334      // Parse the booking class list and unconstrain historical bookings.
00335      for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00336           ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00337           ++itBCUDV) {
00338        stdair::BookingClass* lBC_ptr = itBCUDV->first;
00339        assert (lBC_ptr != NULL);
00340        const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00341        const stdair::BlockIndex_T& lBlockIdx =
00342          lGuillotineBlock.getBlockIndex (lBCKey);
00343        UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00344
00345        STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey)
      ;
00346        unconstrainUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00347                                              iDCPBegin, iDCPEnd,
00348                                              lNbOfUsableSegments, lBlockIdx,
00349                                              iNbOfDepartedSegments);
00350      }
00351
00352      // Unconstrain the Q-equivalent bookings.
00353      // Retrieve the block index of the segment-cabin.
00354      std::ostringstream lSCMapKey;
00355      lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00356                << iSegmentCabin.describeKey();
00357      const stdair::BlockIndex_T& lCabinIdx =
00358        lGuillotineBlock.getBlockIndex (lSCMapKey.str());
```

```
00359
00360    STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00361    unconstrainUsingMultiplicativePickUp (lGuillotineBlock,
00362                                          ioQEquivalentDemandVector,
00363                                          iDCPBegin, iDCPEnd,
00364                                          lNbOfUsableSegments, lCabinIdx,
00365                                          iNbOfDepartedSegments,
00366                                          iSegmentCabin, iCurrentDate);
00367  }
00368
00369  // //////////////////////////////////////////////////////////////////
00370  void Detruncator::unconstrainUsingMultiplicativePickUp
00371  (const stdair::GuillotineBlock& iGuillotineBlock,
00372   UnconstrainedDemandVector_T& ioUncDemVector,
00373   const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00374   const stdair::NbOfSegments_T& iNbOfUsableSegments,
00375   const stdair::BlockIndex_T& iBlockIdx,
00376   const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00377    // TODO:
00378    stdair::NbOfSegments_T lSegBegin = 0;
00379    if (iNbOfDepartedSegments > 52) {
00380      lSegBegin = iNbOfDepartedSegments - 52;
00381    }
00382
00383    // Retrieve the gross daily booking and availability snapshots.
00384    stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00385      iGuillotineBlock.
00386  getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCP
00386    stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00387      iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00387  lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00388
00389    // Browse the list of segments and build the historical booking holder.
00390    const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00391      iGuillotineBlock.getValueTypeIndexMap();
00392    const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00393    HistoricalBookingHolder lHBHolder;
00394    std::vector<short> lDataIndexList;
00395    for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00396      stdair::Flag_T lCensorshipFlag = false;
00397      stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00398      const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00399
00400      // Parse the DTDs during the period
00401      for (short j = 0; j < lNbOfDTDs; ++j) {
00402        // Check if the data has been censored during this day.
00403        // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00404        //                  << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00405        if (lCensorshipFlag == false) {
00406          if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00407            lCensorshipFlag = true;
00408          }
00409        }
00410
00411        // Get the bookings of the day.
00412        //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00412  lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00413        lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00414      }
00415
00416      // If there is no booking till now for this class and for this segment,
00417      // there will be no unconstraining process.
00418      stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00419      if (lUncDemand < 1.0) {
00420        lUncDemand += lNbOfHistoricalBkgs;
00421      } else {
00422        double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00423        HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00424        lHBHolder.addHistoricalBooking (lHistoricalBkg);
00425        lDataIndexList.push_back (i);
00426      }
00427
00428      // DEBUG
00429      STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00430                        << ", censored: " << lCensorshipFlag);
00431    }
00432
00433    // DEBUG
00434    STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00435
00436    // Unconstrain the booking figures
00437    unconstrainUsingMultiplicativePickUp (lHBHolder);
00438
00439    // Update the unconstrained demand vector.
00440    short i = 0;
00441    for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00442         itIdx != lDataIndexList.end(); ++itIdx, ++i) {
```

```
00443        short lIdx = *itIdx;
00444        stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00445        const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00446          lHBHolder.getUnconstrainedDemand (i);
00447        lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00448      }
00449    }
00450
00451    // //////////////////////////////////////////////////////////////////////
00452    void Detruncator::unconstrainUsingMultiplicativePickUp
00453    (const stdair::GuillotineBlock& iGuillotineBlock,
00454     UnconstrainedDemandVector_T& ioUncDemVector,
00455     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00456     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00457     const stdair::BlockIndex_T& iBlockIdx,
00458     const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00459     const stdair::SegmentCabin& iSegmentCabin,
00460     const stdair::Date_T& iCurrentDate) {
00461      // TODO:
00462      stdair::NbOfSegments_T lSegBegin = 0;
00463      if (iNbOfDepartedSegments > 52) {
00464        lSegBegin = iNbOfDepartedSegments - 52;
00465      }
00466
00467      // Retrieve the gross daily booking and availability snapshots.
00468      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00469        iGuillotineBlock.
00470    getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCP
00470      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00471        iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00471    lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00472
00473      // Browse the list of segments and build the historical booking holder.
00474      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00475        iGuillotineBlock.getValueTypeIndexMap();
00476      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00477      HistoricalBookingHolder lHBHolder;
00478      std::vector<short> lDataIndexList;
00479      for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00480        stdair::Flag_T lCensorshipFlag = false;
00481        stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00482        const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00483
00484        // Parse the DTDs during the period
00485        for (short j = 0; j < lNbOfDTDs; ++j) {
00486          // Check if the data has been censored during this day.
00487          // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00488          //                 << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00489          if (lCensorshipFlag == false) {
00490            if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00491              lCensorshipFlag = true;
00492            }
00493          }
00494
00495          // Get the bookings of the day.
00496          //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00496    lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00497          lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00498        }
00499
00500        // If there is no booking till now for this class and for this segment,
00501        // there will be no unconstraining process.
00502        stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00503        if (lUncDemand < 1.0) {
00504          lUncDemand += lNbOfHistoricalBkgs;
00505        } else {
00506          double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00507          HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00508          lHBHolder.addHistoricalBooking (lHistoricalBkg);
00509          lDataIndexList.push_back (i);
00510        }
00511
00512        // DEBUG
00513        STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00514                          << ", censored: " << lCensorshipFlag);
00515      }
00516
00517      // DEBUG
00518      STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up");
00519
00520      // Unconstrain the booking figures
00521      unconstrainUsingMultiplicativePickUp (lHBHolder);
00522
00523      // Update the unconstrained demand vector.
00524      // LOG
00525      const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00526        getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
```

```
00527        const stdair::FlightDate& lFlightDate = stdair::BomManager::
00528          getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00529        const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00530        const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00531        const long lDTD = lDD.days();
00532        stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00533
00534        short i = 0;
00535        for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00536             itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00537          short lIdx = *itIdx;
00538          stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00539          const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00540            lHBHolder.getUnconstrainedDemand (i);
00541          const double lUncDemThisPeriod =
00542            lPastDemand * lUncDemandFactorOfThisPeriod;
00543          lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00544          if (lDepDate > lRefDate) {
00545            const stdair::DateOffset_T lDateOffset (7 *(53 - lIdx) + 420);
00546            const stdair::Date_T lHDate = lDepDate - lDateOffset;
00547            STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00548                                  << ";" << lDTD << ";" << iDCPBegin << ";"
00549                                  << iDCPEnd << ";"
00550                                  << boost::gregorian::to_iso_string (lHDate)
00551                                  << ";" << lUncDemThisPeriod);
00552          }
00553        }
00554      }
00555
00556      // //////////////////////////////////////////////////////////////////
00557      void Detruncator::
00558      unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder& ioHBHolder) {
00559        // We use two loops in this algorithm. The first one is for calculating the
00560        // average of unconstrained data. The second one is fore calculating the
00561        // average of unconstrained data and the constrained data which are higher
00562        // than the first average.
00563        short lNbOfUsedData = ioHBHolder.getNbOfUncensoredData();
00564        if (lNbOfUsedData > 0) {
00565          double lSumOfValues = 0.0;
00566          const short lNbOfData = ioHBHolder.getNbOfFlights();
00567
00568          // First loop
00569          for (short i = 0; i < lNbOfData; ++i) {
00570            if (ioHBHolder.getCensorshipFlag (i) == false) {
00571              lSumOfValues += ioHBHolder.getHistoricalBooking (i);
00572            }
00573          }
00574          double lFirstAverage = lSumOfValues / lNbOfUsedData;
00575
00576          // Second loop
00577          for (short i = 0; i < lNbOfData; ++i) {
00578            if (ioHBHolder.getCensorshipFlag (i) == true) {
00579              const stdair::NbOfBookings_T& lBkgs =
00580                ioHBHolder.getHistoricalBooking (i);
00581              if (lBkgs >= lFirstAverage) {
00582                lSumOfValues += lBkgs;
00583                ++lNbOfUsedData;
00584              }
00585            }
00586          }
00587          double lSecondAverage = lSumOfValues / lNbOfUsedData;
00588
00589          // Last loop for updating the demand.
00590          for (short i = 0; i < lNbOfData; ++i) {
00591            if (ioHBHolder.getCensorshipFlag (i) == true) {
00592              const stdair::NbOfBookings_T& lBkgs =
00593                ioHBHolder.getHistoricalBooking (i);
00594              if (lBkgs < lSecondAverage) {
00595                ioHBHolder.setUnconstrainedDemand (lSecondAverage, i);
00596              }
00597            }
00598          }
00599        }
00600      }
00601 }
00602
```

28.71 rmol/command/Detruncator.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::Detruncator

Namespaces

- namespace stdair
- namespace RMOL

28.72   Detruncator.hpp

```
00001 #ifndef __RMOL_COMMAND_DETRUNCATOR_HPP
00002 #define __RMOL_COMMAND_DETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009 // RMOL
00010 #include <rmol/RMOL_Types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014    class GuillotineBlock;
00015    class SegmentCabin;
00016 }
00017
00018 namespace RMOL {
00019    // Forward declarations.
00020    struct HistoricalBookingHolder;
00021
00024    class Detruncator {
00025    public:
00029       static void unconstrainUsingAdditivePickUp (const stdair::SegmentCabin&,
00030                                    BookingClassUnconstrainedDemandVectorMap_T&,
00031                                    UnconstrainedDemandVector_T&,
00032                                    const stdair::DCP_T&, const stdair::DCP_T&,
00033                                    const stdair::Date_T&);
00034
00038       static void unconstrainUsingMultiplicativePickUp
00039       (const stdair::SegmentCabin&, BookingClassUnconstrainedDemandVectorMap_T&,
00040        UnconstrainedDemandVector_T&, const stdair::DCP_T&, const stdair::DCP_T&,
00041        const stdair::Date_T&, const stdair::NbOfSegments_T&);
00042
00046       static void retrieveUnconstrainedDemandForFirstDCP
00047       (const stdair::SegmentCabin&,
00048        BookingClassUnconstrainedDemandVectorMap_T&,
00049        UnconstrainedDemandVector_T&, const stdair::DCP_T&,
00050        const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00051
00055       static void unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder&)
00056    ;
00057    private:
00061       static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00062                                                   UnconstrainedDemandVector_T&,
00063                                                   const stdair::DCP_T&,
00064                                                   const stdair::DCP_T&,
00065                                                   const stdair::NbOfSegments_T&,
00066                                                   const stdair::BlockIndex_T&);
00070       static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00071                                                   UnconstrainedDemandVector_T&,
00072                                                   const stdair::DCP_T&,
00073                                                   const stdair::DCP_T&,
00074                                                   const stdair::NbOfSegments_T&,
00075                                                   const stdair::BlockIndex_T&,
00076                                                   const stdair::SegmentCabin&,
00077                                                   const stdair::Date_T&);
00078
00082       static void unconstrainUsingMultiplicativePickUp
00083       (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00084        const stdair::DCP_T&, const stdair::DCP_T&,
00085        const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00086        const stdair::NbOfSegments_T&);
00087
00091       static void unconstrainUsingMultiplicativePickUp
00092       (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00093        const stdair::DCP_T&, const stdair::DCP_T&,
00094        const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
```

```
00095       const stdair::NbOfSegments_T&,
00096       const stdair::SegmentCabin&, const stdair::Date_T&);
00097
00101     static void retrieveUnconstrainedDemandForFirstDCP
00102    (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00103     const stdair::DCP_T&, const stdair::BlockIndex_T&,
00104     const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00105   };
00106 }
00107 #endif // __RMOL_COMMAND_DETRUNCATOR_HPP
00108
00109
```

28.73   rmol/command/Forecaster.cpp File Reference

```
#include <cassert>
#include <sstream>
#include <cmath>
#include <stdair/basic/BasConst_General.hpp>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/basic/RandomGeneration.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_Curves.hpp>
#include <rmol/bom/Utilities.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/EMDetruncator.hpp>
#include <rmol/command/Forecaster.hpp>
#include <rmol/command/Detruncator.hpp>
```

Namespaces

- namespace RMOL

28.74   Forecaster.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <cmath>
00008 // StdAir
00009 #include <stdair/basic/BasConst_General.hpp>
00010 #include <stdair/basic/BasConst_Inventory.hpp>
00011 #include <stdair/basic/RandomGeneration.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/FlightDate.hpp>
00014 #include <stdair/bom/LegDate.hpp>
00015 #include <stdair/bom/SegmentDate.hpp>
00016 #include <stdair/bom/LegCabin.hpp>
00017 #include <stdair/bom/SegmentCabin.hpp>
00018 #include <stdair/bom/GuillotineBlock.hpp>
00019 #include <stdair/bom/BookingClass.hpp>
00020 #include <stdair/service/Logger.hpp>
```

```
00021 // RMOL
00022 #include <rmol/basic/BasConst_Curves.hpp>
00023 #include <rmol/bom/Utilities.hpp>
00024 #include <rmol/bom/GuillotineBlockHelper.hpp>
00025 #include <rmol/bom/HistoricalBookingHolder.hpp>
00026 #include <rmol/bom/HistoricalBooking.hpp>
00027 #include <rmol/bom/EMDetruncator.hpp>
00028 #include <rmol/command/Forecaster.hpp>
00029 #include <rmol/command/Detruncator.hpp>
00030
00031 namespace RMOL {
00032
00033   // //////////////////////////////////////////////////////////////////////
00034   bool Forecaster::
00035   forecastUsingAdditivePickUp (stdair::FlightDate& ioFlightDate,
00036                                const stdair::DateTime_T& iEventTime) {
00037     // Build the offset dates.
00038     const stdair::Date_T& lEventDate = iEventTime.date();
00039     stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00040
00041     //
00042     bool isSucceeded = true;
00043     const stdair::SegmentDateList_T& lSDList =
00044       stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00045     for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00046          itSD != lSDList.end(); ++itSD) {
00047       stdair::SegmentDate* lSD_ptr = *itSD;
00048       assert (lSD_ptr != NULL);
00049
00050       const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00051       const stdair::DateOffset_T lSegmentDateOffset =
00052         lBoardingDate - lEventDate;
00053       const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00054
00055       // Build remaining DCP's for the segment-date.
00056       // TODO: treat the case where the segment departure is not the
00057       // same as the flight-date departure.
00058       stdair::DCPList_T lDCPList;
00059
00060       if (lEventDate < lRefDate) {
00061         lDCPList = Utilities::buildRemainingDCPList (lSegmentDTD);
00062       } else {
00063         lDCPList = Utilities::buildRemainingDCPList2 (lSegmentDTD);
00064       }
00065
00066       //
00067       const stdair::SegmentCabinList_T& lSCList =
00068         stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00069       for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00070            itSC != lSCList.end(); ++itSC) {
00071         stdair::SegmentCabin* lSC_ptr = *itSC;
00072         assert (lSC_ptr != NULL);
00073
00074         //
00075         // STDAIR_LOG_NOTIFICATION (ioFlightDate.getDepartureDate()
00076         //                          << ";" << lSegmentDTD);
00077         bool isForecasted = forecastUsingAdditivePickUp (*lSC_ptr, lDCPList,
00078                                                          lEventDate);
00079         if (isForecasted == false) {
00080           isSucceeded = false;
00081         }
00082       }
00083     }
00084
00085     return isSucceeded;
00086   }
00087
00088   // //////////////////////////////////////////////////////////////////////
00089   bool Forecaster::
00090   forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00091                                const stdair::DCPList_T& iDCPList,
00092                                const stdair::Date_T& iEventDate) {
00093     // Retrieve the number of departed similar segments.
00094     stdair::NbOfSegments_T lNbOfDepartedSegments =
00095       Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);
00096     // TODO
00097     if (lNbOfDepartedSegments > 52) lNbOfDepartedSegments = 52;
00098
00099     // DEBUG
00100     STDAIR_LOG_DEBUG ("Nb of similar departed segments: "
00101                       << lNbOfDepartedSegments);
00102
00103     // If the DCP list includes only DTD0 or the number of departed
00104     // segments are less than two, remaining demand for all classes
00105     // will be set to zero.
00106     stdair::DCPList_T::const_iterator itDCP = iDCPList.begin();
00107     assert (itDCP != iDCPList.end());
```

```
00108      const stdair::DCP_T& lCurrentDTD = *itDCP;
00109      if (iDCPList.size() == 1 || lNbOfDepartedSegments < 2) {
00110        setRemainingDemandForecastToZero (ioSegmentCabin);
00111        return false;
00112      } else {
00113        // Initialise a holder for the unconstrained demand.
00114        UnconstrainedDemandVector_T lQEquivalentDemandVector (
      lNbOfDepartedSegments, 0.0);
00115        BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemMap;
00116        const stdair::BookingClassList_T& lBCList =
00117          stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00118        for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00119             itBC != lBCList.end(); ++itBC) {
00120          stdair::BookingClass* lBC_ptr = *itBC;
00121          assert (lBC_ptr != NULL);
00122          std::vector<stdair::NbOfRequests_T> lUncDemandVector (
      lNbOfDepartedSegments, 0.0);
00123          bool insertionSucceeded = lBkgClassUncDemMap.insert
00124            (BookingClassUnconstrainedDemandVectorMap_T::
00125            value_type (lBC_ptr, lUncDemandVector)).second;
00126          assert (insertionSucceeded == true);
00127        }
00128
00129        // Build the DCP intervals and unconstrain censored booking figures for
00130        // each interval.
00131        stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00132        for (; itNextDCP != iDCPList.end(); ++itDCP, ++itNextDCP) {
00133          const stdair::DCP_T& lCurrentDCP = *itDCP;
00134          const stdair::DCP_T& lNextDCP = *itNextDCP;
00135
00136          // DEBUG
00137          STDAIR_LOG_DEBUG ("Unconstrain demand for "
00138                            << ioSegmentCabin.describeKey()
00139                            << " and the DCP's " << lCurrentDCP << ", "
00140                            << lNextDCP);
00141          Detruncator::unconstrainUsingAdditivePickUp (ioSegmentCabin,
00142                                                       lBkgClassUncDemMap,
00143                                                       lQEquivalentDemandVector,
00144                                                       lCurrentDCP-1, lNextDCP,
00145                                                       iEventDate);
00146          STDAIR_LOG_DEBUG ("Detrucation successful");
00147        }
00148
00149        // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00150        FRAT5Curve_T::const_iterator itFRAT5 =
00151          DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00152        assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00153        const double lFRAT5Coef = itFRAT5->second;
00154        const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00155
00156        forecastUsingAdditivePickUp (ioSegmentCabin, lBkgClassUncDemMap,
00157                                     lQEquivalentDemandVector, lSellUpCoef);
00158        return true;
00159      }
00160    }
00161
00162    // //////////////////////////////////////////////////////////////////
00163    void Forecaster::
00164    forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00165                                 const BookingClassUnconstrainedDemandVectorMap_T
      & iClassUncDemMap,
00166                                 const UnconstrainedDemandVector_T& iUncDemVector
      ,
00167                                 const double& iSellUpFactor) {
00168      double lPriceOriMean; double lPriceOriStdDev;
00169      Utilities::computeDistributionParameters (iUncDemVector, lPriceOriMean,
00170                                                lPriceOriStdDev);
00171
00172      // DEBUG
00173      //STDAIR_LOG_NOTIFICATION (lPriceOriMean << ";" << lPriceOriStdDev);
00174
00175      // Retrieve the classes from low to high and compute the distributions of
00176      // product-oriented and price-oriented demand.
00177      // Retrieve the lowest class.
00178      const stdair::BookingClassList_T& lBCList =
00179        stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00180      stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00181        lBCList.rbegin();
00182      assert (itCurrentClass != lBCList.rend());
00183      stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00184        itCurrentClass;
00185      ++itNextClass;
00186      // If there is only one class in the cabin, the demand distribution of this
00187      // class is equal to the price-oriented demand distribution of the cabin.
00188      if (itNextClass == lBCList.rend()) {
00189        stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00190        lLowestBC_ptr->setMean (lPriceOriMean);
```

```
00191          lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00192        } else {
00193          // Compute the demand for higher class using the formula
00194          // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00195          for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00196            stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00197            assert (lCurrentBC_ptr != NULL);
00198            const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00199            stdair::BookingClass* lNextBC_ptr = *itNextClass;
00200            assert (lNextBC_ptr != NULL);
00201            const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00202
00203            // Compute the part of price-oriented demand distributed to the
00204            // current class.
00205            const double lSellUp =
00206              exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00207            const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00208            const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp)
     ;
00209
00210            // Compute the product-oriented demand distribution for the
00211            // current class.
00212            BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00213              iClassUncDemMap.find (lCurrentBC_ptr);
00214            assert (itBCUD != iClassUncDemMap.end());
00215            const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00216            double lMean; double lStdDev;
00217            Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev)
     ;
00218
00219            // Compute the demand distribution for the current class;
00220            lMean += lPriceOriDemMeanFrac;
00221            lStdDev = sqrt (lStdDev * lStdDev +
00222                            lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00223            lCurrentBC_ptr->setMean (lMean);
00224            lCurrentBC_ptr->setStdDev (lStdDev);
00225
00226            // DEBUG
00227            // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00228            //                          << ", mean = " << lMean
00229            //                          << ", stddev = " << lStdDev);
00230
00231            // Update the price-oriented demand
00232            lPriceOriMean *= lSellUp;
00233            lPriceOriStdDev *= lSellUp;
00234          }
00235
00236          // Compute the demand distribution for the highest class (which is the
00237          // "current class")
00238          stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00239          assert (lCurrentBC_ptr != NULL);
00240          BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00241            iClassUncDemMap.find (lCurrentBC_ptr);
00242          assert (itBCUD != iClassUncDemMap.end());
00243          const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00244          double lMean; double lStdDev;
00245          Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev);
00246
00247          // Compute the demand distribution for the current class;
00248          lMean += lPriceOriMean;
00249          lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00250          lCurrentBC_ptr->setMean (lMean);
00251          lCurrentBC_ptr->setStdDev (lStdDev);
00252
00253          // DEBUG
00254          // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00255          //                          << ", mean = " << lMean
00256          //                          << ", stddev = " << lStdDev);
00257        }
00258      }
00259
00260      // //////////////////////////////////////////////////////////////////////
00261      void Forecaster::
00262      setRemainingDemandForecastToZero (const stdair::SegmentCabin& iSegmentCabin)
      {
00263        // Set the demand forecast for all classes to zero.
00264        const stdair::BookingClassList_T& lBCList =
00265          stdair::BomManager::getList<stdair::BookingClass> (iSegmentCabin);
00266        for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00267             itBC != lBCList.end(); ++itBC) {
00268          stdair::BookingClass* lBC_ptr = *itBC;
00269          assert (lBC_ptr != NULL);
00270          lBC_ptr->setMean (0.0);
00271        }
00272      }
00273
00274      // //////////////////////////////////////////////////////////////////////
```

```
00275   bool Forecaster::
00276   forecastUsingMultiplicativePickUp (stdair::FlightDate& ioFlightDate,
00277                                      const stdair::DateTime_T& iEventTime) {
00278     // Build the offset dates.
00279     const stdair::Date_T& lEventDate = iEventTime.date();
00280
00281     //
00282     bool isSucceeded = true;
00283     const stdair::SegmentDateList_T& lSDList =
00284       stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00285     for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00286          itSD != lSDList.end(); ++itSD) {
00287       stdair::SegmentDate* lSD_ptr = *itSD;
00288       assert (lSD_ptr != NULL);
00289
00290       const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00291       const stdair::DateOffset_T lSegmentDateOffset =
00292         lBoardingDate - lEventDate;
00293       const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00294
00295       //
00296       const stdair::SegmentCabinList_T& lSCList =
00297         stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00298       for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00299            itSC != lSCList.end(); ++itSC) {
00300         stdair::SegmentCabin* lSC_ptr = *itSC;
00301         assert (lSC_ptr != NULL);
00302
00303         bool isForecasted = forecastUsingMultiplicativePickUp (*lSC_ptr,
00304                                                                lEventDate,
00305                                                                lSegmentDTD);
00306         if (isForecasted == false) {
00307           isSucceeded = false;
00308         }
00309       }
00310     }
00311     return isSucceeded;
00312   }
00313
00314   // //////////////////////////////////////////////////////////////////////
00315   bool Forecaster::
00316   forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00317                                      const stdair::Date_T& iEventDate,
00318                                      const stdair::DTD_T& iSegmentDTD) {
00319     // Retrieving the number of anterior similar segments.
00320     const stdair::GuillotineBlock& lGuillotineBlock =
00321       ioSegmentCabin.getGuillotineBlock();
00322     stdair::NbOfSegments_T lNbOfAnteriorSimilarSegments =
00323       GuillotineBlockHelper::
00324       getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iSegmentDTD,
00325                                           iEventDate) - 1;
00326     // Retrieve the number of departed similar segments.
00327     stdair::NbOfSegments_T lNbOfDepartedSegments =
00328       Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);
00329     // TODO:
00330     if (lNbOfDepartedSegments > 52) {
00331       lNbOfAnteriorSimilarSegments =
00332         lNbOfAnteriorSimilarSegments  - lNbOfDepartedSegments + 52;
00333     }
00334
00335     // DEBUG
00336     STDAIR_LOG_DEBUG ("Nb of anterior similar segments: "
00337                       << lNbOfAnteriorSimilarSegments);
00338
00339     // If the iSegmentDTD is the last DCP or there is no anterior similar
00340     // segment, remaining demand for all classes will be set to zero
00341     stdair::DCPList_T::const_reverse_iterator itLastDCP =
00342       stdair::DEFAULT_DCP_LIST.rbegin();
00343     assert (itLastDCP != stdair::DEFAULT_DCP_LIST.rend());
00344     const stdair::DCP_T& lLastDCP = *itLastDCP;
00345     if (lNbOfAnteriorSimilarSegments < 1.0 || iSegmentDTD <= lLastDCP) {
00346       setRemainingDemandForecastToZero (ioSegmentCabin);
00347       return false;
00348     } else {
00349       // Retrieve the booking figures of the first DCP and consider them
00350       // as unconstrained demand figures.
00351       stdair::DCPList_T::const_iterator itDCP =stdair::DEFAULT_DCP_LIST.begin()
   ;
00352       assert (itDCP != stdair::DEFAULT_DCP_LIST.end());
00353       const stdair::DCP_T& lFirstDCP = *itDCP;
00354
00355       // Initialise the unconstrained demand for classes.
00356       stdair::NbOfSegments_T lNbOfUsableSegments =
00357         GuillotineBlockHelper::
00358         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lFirstDCP,
00359                                             iEventDate);
00360       // TODO
```

```
00361          unsigned short lSize = lNbOfUsableSegments;
00362          if (lNbOfDepartedSegments > 52) {
00363            lSize = lNbOfUsableSegments - lNbOfDepartedSegments + 52;
00364          }
00365
00366          STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00367                            << lNbOfUsableSegments);
00368
00369          UnconstrainedDemandVector_T lQEquivalentDemandVector (lSize, 0.0);
00370          stdair::NbOfBookings_T lCurrentSegmentQEquivalentDemand = 0.0;
00371          BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemVectorMap;
00372          BookingClassUnconstrainedDemandMap_T lCurrentSegmentBkgClassDemMap;
00373          const stdair::BookingClassList_T& lBCList =
00374            stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00375          for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00376               itBC != lBCList.end(); ++itBC) {
00377            stdair::BookingClass* lBC_ptr = *itBC;
00378            assert (lBC_ptr != NULL);
00379
00380            UnconstrainedDemandVector_T lUncDemandVector (lSize, 0.0);
00381            bool insertionSucceeded = lBkgClassUncDemVectorMap.
00382              insert (BookingClassUnconstrainedDemandVectorMap_T::
00383                      value_type (lBC_ptr, lUncDemandVector)).second;
00384            assert (insertionSucceeded == true);
00385            insertionSucceeded =
00386              lCurrentSegmentBkgClassDemMap.
00387              insert (BookingClassUnconstrainedDemandMap_T::
00388                      value_type (lBC_ptr, 0.0)).second;
00389            assert (insertionSucceeded == true);
00390          }
00391          Detruncator::
00392            retrieveUnconstrainedDemandForFirstDCP (ioSegmentCabin,
00393                                                    lBkgClassUncDemVectorMap,
00394                                                    lQEquivalentDemandVector,
00395                                                    lFirstDCP, lNbOfUsableSegments,
00396                                                    lSize);
00397
00398          // Unconstrain the booking figures.
00399          stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00400          while (itNextDCP != stdair::DEFAULT_DCP_LIST.end()) {
00401            const stdair::DCP_T& lCurrentDCP = *itDCP;
00402            const stdair::DCP_T& lNextDCP = *itNextDCP;
00403            if (lCurrentDCP <= iSegmentDTD) {
00404              break;
00405            }
00406            Detruncator::
00407              unconstrainUsingMultiplicativePickUp (ioSegmentCabin,
00408                                                    lBkgClassUncDemVectorMap,
00409                                                    lQEquivalentDemandVector,
00410                                                    lCurrentDCP-1, lNextDCP,
00411                                                    iEventDate,
00412                                                    lNbOfDepartedSegments);
00413            ++itNextDCP; ++itDCP;
00414          }
00415
00416          // Update the unconstrained demand for all the classes of the current
00417          // segment.
00418          lCurrentSegmentQEquivalentDemand =
00419            lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments);
00420          BookingClassUnconstrainedDemandMap_T::iterator itBCUD =
00421            lCurrentSegmentBkgClassDemMap.begin();
00422          for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00423                 lBkgClassUncDemVectorMap.begin();
00424               itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {
00425            assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00426            assert (itBCUD->first == itBCUDV->first);
00427            stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00428            UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00429            lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments);
00430          }
00431
00432          // Forecast the remaining demand for all classes
00433          const stdair::DCP_T& lCurrentDTD = *itDCP;
00434          for (; itNextDCP != stdair::DEFAULT_DCP_LIST.end(); ++itNextDCP, ++itDCP)
        {
00435            const stdair::DCP_T& lCurrentDCP = *itDCP;
00436            const stdair::DCP_T& lNextDCP = *itNextDCP;
00437            forecastUsingMultiplicativePickUp (ioSegmentCabin,
00438                                               lBkgClassUncDemVectorMap,
00439                                               lQEquivalentDemandVector,
00440                                               lCurrentDCP-1, lNextDCP, iEventDate,
00441                                               lNbOfAnteriorSimilarSegments,
00442                                               lNbOfDepartedSegments);
00443          }
00444
00445          // Update the remaining demand for all classes
00446          lCurrentSegmentQEquivalentDemand =
```

```
00447            lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments)
00448            - lCurrentSegmentQEquivalentDemand;
00449          itBCUD = lCurrentSegmentBkgClassDemMap.begin();
00450          for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00451               lBkgClassUncDemVectorMap.begin();
00452            itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {
00453          assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00454          assert (itBCUD->first == itBCUDV->first);
00455          stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00456          UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00457          lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments) - lUncDem;
00458          }
00459
00460          // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00461          FRAT5Curve_T::const_iterator itFRAT5 =
00462            DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00463          assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00464          const double lFRAT5Coef = itFRAT5->second;
00465          const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00466
00467          return forecastUsingMultiplicativePickUp(ioSegmentCabin,
00468                                                   lCurrentSegmentBkgClassDemMap,
00469                                                   lCurrentSegmentQEquivalentDemand
      ,
00470                                                   lSellUpCoef);
00471
00472      }
00473    }
00474
00475    // //////////////////////////////////////////////////////////////////////
00476    void Forecaster::forecastUsingMultiplicativePickUp
00477    (const stdair::SegmentCabin& iSegmentCabin,
00478     BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00479     UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00480     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00481     const stdair::Date_T& iCurrentDate,
00482     const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00483     const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00484
00485      // Retrieve the guillotine block.
00486      const stdair::GuillotineBlock& lGuillotineBlock =
00487        iSegmentCabin.getGuillotineBlock();
00488
00489      // Build the historical booking holders for the product-oriented bookings
00490      // of the casses and the Q-equivalent (price-oriented) bookings of the
      cabin
00491      const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00492        getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00493                                            iCurrentDate);
00494
00495      STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00496                       << lNbOfUsableSegments);
00497
00498      if (lNbOfUsableSegments > 0) {
00499
00500        // Parse the booking class list and unconstrain historical bookings.
00501        for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00502             ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00503           ++itBCUDV) {
00504          stdair::BookingClass* lBC_ptr = itBCUDV->first;
00505          assert (lBC_ptr != NULL);
00506          const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00507          const stdair::BlockIndex_T& lBlockIdx =
00508            lGuillotineBlock.getBlockIndex (lBCKey);
00509          UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00510
00511          STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for "<<lBCKey)
      ;
00512          forecastUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00513                                             iDCPBegin, iDCPEnd,
00514                                             lNbOfUsableSegments, lBlockIdx,
00515                                             iNbOfAnteriorSimilarSegments,
00516                                             iNbOfDepartedSegments);
00517        }
00518
00519        // Unconstrain the Q-equivalent bookings.
00520        // Retrieve the block index of the segment-cabin.
00521        std::ostringstream lSCMapKey;
00522        lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00523                  << iSegmentCabin.describeKey();
00524        const stdair::BlockIndex_T& lCabinIdx =
00525          lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00526
00527        STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00528        forecastUsingMultiplicativePickUp (lGuillotineBlock,
00529                                           ioQEquivalentDemandVector,
00530                                           iDCPBegin, iDCPEnd,
```

```
00531                                                 lNbOfUsableSegments, lCabinIdx,
00532                                                 iNbOfAnteriorSimilarSegments,
00533                                                 iNbOfDepartedSegments,
00534                                                 iSegmentCabin, iCurrentDate);
00535      }
00536    }
00537
00538    // /////////////////////////////////////////////////////////////////
00539    void Forecaster::forecastUsingMultiplicativePickUp
00540    (const stdair::GuillotineBlock& iGuillotineBlock,
00541    UnconstrainedDemandVector_T& ioUncDemVector,
00542    const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00543    const stdair::NbOfSegments_T& iNbOfUsableSegments,
00544    const stdair::BlockIndex_T& iBlockIdx,
00545    const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00546    const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00547      // TODO
00548      stdair::NbOfSegments_T lSegBegin = 0;
00549      if (iNbOfDepartedSegments > 52) {
00550        lSegBegin = iNbOfDepartedSegments - 52;
00551      }
00552      // Retrieve the gross daily booking and availability snapshots.
00553      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00554        iGuillotineBlock.
00555    getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCP
00556        stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00556        iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00557    lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00557
00558      // Browse the list of segments and build the historical booking holder.
00559      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00560        iGuillotineBlock.getValueTypeIndexMap();
00561      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00562      HistoricalBookingHolder lHBHolder;
00563      std::vector<short> lDataIndexList;
00564      for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00565        stdair::Flag_T lCensorshipFlag = false;
00566        stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00567        const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00568
00569        // Parse the DTDs during the period
00570        for (short j = 0; j < lNbOfDTDs; ++j) {
00571          // Check if the data has been censored during this day.
00572          // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00573          //                 << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00574          if (lCensorshipFlag == false) {
00575            if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00576              lCensorshipFlag = true;
00577            }
00578          }
00579
00580          // Get the bookings of the day.
00581          // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00582    lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00582          lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00583        }
00584
00585        // If there is no booking till now for this class and for this segment,
00586        // there will be no unconstraining process.
00587        stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00588        if (lUncDemand < 1.0) {
00589          lUncDemand += lNbOfHistoricalBkgs;
00590        } else {
00591          double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00592          HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00593          lHBHolder.addHistoricalBooking (lHistoricalBkg);
00594          lDataIndexList.push_back (i);
00595        }
00596
00597        // DEBUG
00598        STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00599                          << ", censored: " << lCensorshipFlag);
00600      }
00601
00602      // DEBUG
00603      STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00604
00605      // Unconstrain the booking figures
00606      Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00607
00608      // Update the unconstrained demand vector.
00609      short i = 0;
00610      for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00611           itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00612        short lIdx = *itIdx;
00613        stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00614        const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
```

```
00615            lHBHolder.getUnconstrainedDemand (i);
00616          lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00617        }
00618
00619      // Update the unconstrained demand for the current segment.
00620      if (lHBHolder.getNbOfFlights() > 0) {
00621        const stdair::NbOfRequests_T& lUncDemandFactorMean =
00622          lHBHolder.getDemandMean();
00623        stdair::NbOfRequests_T& lPastDemand =
00624          ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00625        lPastDemand *= (1+lUncDemandFactorMean);
00626      }
00627    }
00628
00629    // //////////////////////////////////////////////////////////////////
00630    void Forecaster::forecastUsingMultiplicativePickUp
00631    (const stdair::GuillotineBlock& iGuillotineBlock,
00632     UnconstrainedDemandVector_T& ioUncDemVector,
00633     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00634     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00635     const stdair::BlockIndex_T& iBlockIdx,
00636     const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00637     const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00638     const stdair::SegmentCabin& iSegmentCabin,
00639     const stdair::Date_T& iCurrentDate) {
00640      // TODO
00641      stdair::NbOfSegments_T lSegBegin = 0;
00642      if (iNbOfDepartedSegments > 52) {
00643        lSegBegin = iNbOfDepartedSegments - 52;
00644      }
00645      // Retrieve the gross daily booking and availability snapshots.
00646      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00647        iGuillotineBlock.
    getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00648      stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00649        iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
    lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00650
00651      // Browse the list of segments and build the historical booking holder.
00652      const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00653        iGuillotineBlock.getValueTypeIndexMap();
00654      const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00655      HistoricalBookingHolder lHBHolder;
00656      std::vector<short> lDataIndexList;
00657      for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00658        stdair::Flag_T lCensorshipFlag = false;
00659        stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00660        const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00661
00662        // Parse the DTDs during the period
00663        for (short j = 0; j < lNbOfDTDs; ++j) {
00664          // Check if the data has been censored during this day.
00665          // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00666          //                     << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00667          if (lCensorshipFlag == false) {
00668            if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00669              lCensorshipFlag = true;
00670            }
00671          }
00672
00673          // Get the bookings of the day.
00674          // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
    lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00675          lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00676        }
00677
00678        // If there is no booking till now for this class and for this segment,
00679        // there will be no unconstraining process.
00680        stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00681        if (lUncDemand < 1.0) {
00682          lUncDemand += lNbOfHistoricalBkgs;
00683        } else {
00684          double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00685          HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00686          lHBHolder.addHistoricalBooking (lHistoricalBkg);
00687          lDataIndexList.push_back (i);
00688        }
00689
00690        // DEBUG
00691        STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00692                          << ", censored: " << lCensorshipFlag);
00693      }
00694
00695      // DEBUG
00696      STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00697
00698      // Unconstrain the booking figures
```

```
00699        Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00700
00701        // Update the unconstrained demand vector.
00702        // LOG
00703        const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00704          getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00705        const stdair::FlightDate& lFlightDate = stdair::BomManager::
00706          getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00707        const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00708        const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00709        const long lDTD = lDD.days();
00710        stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00711        short i = 0;
00712        for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00713             itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00714          short lIdx = *itIdx;
00715          stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00716          const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00717            lHBHolder.getUnconstrainedDemand (i);
00718          const double lUncDemThisPeriod =
00719            lPastDemand * lUncDemandFactorOfThisPeriod;
00720          const double lQEBkgThisPeriod =
00721            lPastDemand * lHBHolder.getHistoricalBooking (i);
00722          lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00723          if (lDepDate > lRefDate) {
00724            const stdair::DateOffset_T lDateOffset (7 *(52 - i) + 420);
00725            const stdair::Date_T lHDate = lDepDate - lDateOffset;
00726            STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00727                                    << ";" << lDTD << ";" << iDCPBegin << ";"
00728                                    << iDCPEnd << ";"
00729                                    << boost::gregorian::to_iso_string (lHDate)
00730                                    << ";" << lUncDemThisPeriod);
00731            STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00732                                    << ";" << lDTD << ";" << iDCPBegin << ";"
00733                                    << iDCPEnd << ";"
00734                                    << boost::gregorian::to_iso_string (lHDate)
00735                                    << ";" << lQEBkgThisPeriod);
00736          }
00737        }
00738
00739        // Update the unconstrained demand for the current segment.
00740        if (lHBHolder.getNbOfFlights() > 0) {
00741          const stdair::NbOfRequests_T& lUncDemandFactorMean =
00742            lHBHolder.getDemandMean();
00743          stdair::NbOfRequests_T& lPastDemand =
00744            ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00745          lPastDemand *= (1+lUncDemandFactorMean);
00746        }
00747    }
00748
00749    // //////////////////////////////////////////////////////////////////////
00750    bool Forecaster::
00751    forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00752                                       const BookingClassUnconstrainedDemandMap_T
      & iClassUncDemMap,
00753                                       const stdair::NbOfRequests_T& iUncDem,
00754                                       const double& iSellUpFactor) {
00755        double lPriceOriMean = iUncDem;
00756        double lPriceOriStdDev = sqrt (iUncDem);
00757
00758        // DEBUG
00759        STDAIR_LOG_DEBUG ("Price-oriented demand: mean = " << lPriceOriMean
00760                          << ", stddev = " << lPriceOriStdDev);
00761
00762        // Retrieve the classes from low to high and compute the distributions of
00763        // product-oriented and price-oriented demand.
00764        // Retrieve the lowest class.
00765        const stdair::BookingClassList_T& lBCList =
00766          stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00767        stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00768          lBCList.rbegin();
00769        assert (itCurrentClass != lBCList.rend());
00770        stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00771          itCurrentClass;
00772        ++itNextClass;
00773        // If there is only one class in the cabin, the demand distribution of this
00774        // class is equal to the price-oriented demand distribution of the cabin.
00775        if (itNextClass == lBCList.rend()) {
00776          stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00777          lLowestBC_ptr->setMean (lPriceOriMean);
00778          lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00779          if (lPriceOriMean > 0) {
00780            return true;
00781          } else {
00782            return false;
00783          }
00784        } else {
```

```
00785         bool isSucceeded = false;
00786         // Compute the demand for higher class using the formula
00787         // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00788         for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00789           stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00790           assert (lCurrentBC_ptr != NULL);
00791           const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00792           stdair::BookingClass* lNextBC_ptr = *itNextClass;
00793           assert (lNextBC_ptr != NULL);
00794           const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00795
00796           // Compute the part of price-oriented demand distributed to the
00797           // current class.
00798           const double lSellUp =
00799             exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00800           const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00801           const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp)
      ;
00802
00803           // Compute the product-oriented demand distribution for the
00804           // current class.
00805           BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00806             iClassUncDemMap.find (lCurrentBC_ptr);
00807           assert (itBCUD != iClassUncDemMap.end());
00808           double lMean = itBCUD->second;
00809           double lStdDev = sqrt (lMean);
00810
00811           // Compute the demand distribution for the current class;
00812           lMean += lPriceOriDemMeanFrac;
00813           lStdDev = sqrt (lStdDev * lStdDev +
00814                          lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00815           lCurrentBC_ptr->setMean (lMean);
00816           lCurrentBC_ptr->setStdDev (lStdDev);
00817
00818           if (lMean > 0) {
00819             isSucceeded = true;
00820           }
00821
00822           // DEBUG
00823           STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00824                             << ", mean = " << lMean
00825                             << ", stddev = " << lStdDev);
00826
00827           // Update the price-oriented demand
00828           lPriceOriMean *= lSellUp;
00829           lPriceOriStdDev *= lSellUp;
00830         }
00831
00832         // Compute the demand distribution for the highest class (which is the
00833         // "current class")
00834         stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00835         assert (lCurrentBC_ptr != NULL);
00836         BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00837           iClassUncDemMap.find (lCurrentBC_ptr);
00838         assert (itBCUD != iClassUncDemMap.end());
00839         double lMean = itBCUD->second;
00840         double lStdDev = sqrt (lMean);
00841
00842         // Compute the demand distribution for the current class;
00843         lMean += lPriceOriMean;
00844         lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00845         lCurrentBC_ptr->setMean (lMean);
00846         lCurrentBC_ptr->setStdDev (lStdDev);
00847
00848         if (lMean > 0) {
00849           isSucceeded = true;
00850         }
00851
00852         // DEBUG
00853         STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00854                           << ", mean = " << lMean
00855                           << ", stddev = " << lStdDev);
00856         return isSucceeded;
00857       }
00858   }
00859
00860 }
```

28.75 rmol/command/Forecaster.hpp File Reference

```
#include <map>
#include <stdair/stdair_inventory_types.hpp>
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::Forecaster

Namespaces

- namespace stdair
- namespace RMOL

28.76 Forecaster.hpp

```
00001 #ifndef __RMOL_COMMAND_FORECASTER_HPP
00002 #define __RMOL_COMMAND_FORECASTER_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <map>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 // Forward declarations
00015 namespace stdair {
00016   class FlightDate;
00017   class SegmentCabin;
00018   class GuillotineBlock;
00019 }
00020
00021 namespace RMOL {
00023   class Forecaster {
00024   public:
00028     static bool forecastUsingAdditivePickUp (stdair::FlightDate&,
00029                                              const stdair::DateTime_T&);
00030
00034     static bool forecastUsingMultiplicativePickUp (stdair::FlightDate&,
00035                                                    const stdair::DateTime_T&);
00036
00037
00038   private:
00042     static bool forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00043                                              const stdair::DCPList_T&,
00044                                              const stdair::Date_T&);
00045
00050     static void forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00051                                              const
    BookingClassUnconstrainedDemandVectorMap_T&, const UnconstrainedDemandVector_T&
    , const double&);
00052
00056     static bool forecastUsingMultiplicativePickUp (stdair::SegmentCabin&,
00057                                                    const stdair::Date_T&,
00058                                                    const stdair::DTD_T&);
00062     static void forecastUsingMultiplicativePickUp(const stdair::SegmentCabin&,
00063
    BookingClassUnconstrainedDemandVectorMap_T&,
00064                                                  UnconstrainedDemandVector_T&,
00065                                                  const stdair::DCP_T&,
00066                                                  const stdair::DCP_T&,
00067                                                  const stdair::Date_T&,
00068                                                  const stdair::NbOfSegments_T&
    ,
00069                                                  const stdair::NbOfSegments_T&
    );
00070
00074     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
    &,
00075                                                  UnconstrainedDemandVector_T&,
00076                                                  const stdair::DCP_T&,
00077                                                  const stdair::DCP_T&,
00078                                                  const stdair::NbOfSegments_T&
    ,
00079                                                  const stdair::BlockIndex_T&,
00080                                                  const stdair::NbOfSegments_T&
    ,
```

```
00081                                                          const stdair::NbOfSegments_T&
       );
00082
00086     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
       &,
00087                                                    UnconstrainedDemandVector_T&,
00088                                                    const stdair::DCP_T&,
00089                                                    const stdair::DCP_T&,
00090                                                    const stdair::NbOfSegments_T&
       ,
00091                                                    const stdair::BlockIndex_T&,
00092                                                    const stdair::NbOfSegments_T&
       ,
00093                                                    const stdair::NbOfSegments_T&
       ,
00094                                                    const stdair::SegmentCabin&,
00095                                                    const stdair::Date_T&);
00096
00101     static bool forecastUsingMultiplicativePickUp(stdair::SegmentCabin&,
00102                                                   const
       BookingClassUnconstrainedDemandMap_T&,
00103                                                   const stdair::NbOfRequests_T&
       ,
00104                                                   const double&);
00105
00109     static void setRemainingDemandForecastToZero (const stdair::SegmentCabin&);
00110   };
00111 }
00112 #endif // __RMOL_COMMAND_FORECASTER_HPP
```

28.77 rmol/command/InventoryParser.cpp File Reference

```
#include <sstream>
#include <fstream>
#include <cassert>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_exceptions.hpp>
#include <stdair/basic/BasConst_DefaultObject.hpp>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/bom/BomRetriever.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/BomRoot.hpp>
#include <stdair/bom/Inventory.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/factory/FacBom.hpp>
#include <stdair/factory/FacBomManager.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/command/InventoryParser.hpp>
```

Namespaces

- namespace RMOL

28.78 InventoryParser.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
```

```
00003 // //////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <fstream>
00007 #include <cassert>
00008 // StdAir
00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/stdair_exceptions.hpp>
00012 #include <stdair/basic/BasConst_DefaultObject.hpp>
00013 #include <stdair/basic/BasConst_Inventory.hpp>
00014 #include <stdair/basic/BasFileMgr.hpp>
00015 #include <stdair/bom/BomRetriever.hpp>
00016 #include <stdair/bom/BomManager.hpp>
00017 #include <stdair/bom/BomRoot.hpp>
00018 #include <stdair/bom/Inventory.hpp>
00019 #include <stdair/bom/FlightDate.hpp>
00020 #include <stdair/bom/SegmentDate.hpp>
00021 #include <stdair/bom/SegmentCabin.hpp>
00022 #include <stdair/bom/LegDate.hpp>
00023 #include <stdair/bom/LegCabin.hpp>
00024 #include <stdair/bom/BookingClass.hpp>
00025 #include <stdair/bom/VirtualClassStruct.hpp>
00026 #include <stdair/factory/FacBom.hpp>
00027 #include <stdair/factory/FacBomManager.hpp>
00028 #include <stdair/service/Logger.hpp>
00029 // RMOL
00030 #include <rmol/command/InventoryParser.hpp>
00031
00032 namespace RMOL {
00033
00034   // //////////////////////////////////////////////////////////////////
00035   bool InventoryParser::
00036   parseInputFileAndBuildBom (const std::string& iInputFileName,
00037                              stdair::BomRoot& ioBomRoot) {
00038     bool hasReadBeenSuccessful = false;
00039
00040     // Check that the file path given as input corresponds to an actual file
00041     const bool doesExistAndIsReadable =
00042       stdair::BasFileMgr::doesExistAndIsReadable (iInputFileName);
00043     if (doesExistAndIsReadable == false) {
00044       std::ostringstream oMessage;
00045       oMessage << "The input file, '" << iInputFileName
00046                << "', can not be retrieved on the file-system";
00047       throw stdair::FileNotFoundException (oMessage.str());
00048     }
00049
00050     // Retrieve the (sample) leg-cabin
00051     stdair::LegCabin& lLegCabin =
00052       stdair::BomRetriever::retrieveDummyLegCabin (ioBomRoot);
00053
00054     // Retrieve the (sample) segment-cabin
00055     stdair::SegmentCabin& lSegmentCabin =
00056       stdair::BomRetriever::retrieveDummySegmentCabin (ioBomRoot);
00057
00058     // Open the input file
00059     std::ifstream inputFile (iInputFileName.c_str());
00060     if (! inputFile) {
00061       STDAIR_LOG_ERROR ("Can not open input file '" << iInputFileName << "'");
00062       throw new stdair::FileNotFoundException ("Can not open input file '"
00063                                                + iInputFileName + "'");
00064     }
00065
00066     char buffer[80];
00067     double dval;
00068     short i = 1;
00069     bool hasAllPArams = true;
00070     stdair::Yield_T lYield;
00071     stdair::MeanValue_T lMean;
00072     stdair::StdDevValue_T lStdDev;
00073     stdair::BookingClassKey lBCKey (stdair::DEFAULT_CLASS_CODE);
00074
00075     while (inputFile.getline (buffer, sizeof (buffer), ';')) {
00076       std::istringstream iStringStr (buffer);
00077
00078       if (i == 1) {
00079         hasAllPArams = true;
00080       }
00081
00082       if (iStringStr >> dval) {
00083         if (i == 1) {
00084           lYield = dval;
00085           // std::cout << "Yield[" << i << "] = '" << dval << "'" << std::endl;
00086
00087         } else if (i == 2) {
00088           lMean = dval;
00089           // std::cout << "Mean[" << i << "] = '" << dval << "'" << std::endl;
```

```
00090
00091          } else if (i == 3) {
00092            lStdDev = dval;
00093            //std::cout << "stdDev[" << i << "] = '" << dval << "'" << std::endl;
00094            i = 0;
00095          }
00096          i++;
00097
00098        } else {
00099          hasAllPArams = false;
00100        }
00101
00102        if (hasAllPArams && i == 1) {
00103          stdair::BookingClass& lBookingClass =
00104            stdair::FacBom<stdair::BookingClass>::instance().create (lBCKey);
00105          stdair::FacBomManager::addToList (lSegmentCabin, lBookingClass);
00106          lBookingClass.setYield (lYield);
00107          lBookingClass.setMean (lMean);
00108          lBookingClass.setStdDev (lStdDev);
00109
00110          stdair::VirtualClassStruct lVirtualClass (lBookingClass);
00111          lVirtualClass.setYield (lYield);
00112          lVirtualClass.setMean (lMean);
00113          lVirtualClass.setStdDev (lStdDev);
00114          lLegCabin.addVirtualClass (lVirtualClass);
00115        }
00116      }
00117
00118      //
00119      if (!inputFile.eof()) {
00120        STDAIR_LOG_ERROR ("Problem when reading input file '" << iInputFileName
00121                          << "'");
00122        return hasReadBeenSuccessful;
00123      }
00124
00125      //
00126      hasReadBeenSuccessful = true;
00127      return hasReadBeenSuccessful;
00128    }
00129
00130 }
```

28.79 rmol/command/InventoryParser.hpp File Reference

```
#include <string>
#include <stdair/command/CmdAbstract.hpp>
```

Classes

- class RMOL::InventoryParser

    Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

Namespaces

- namespace stdair
- namespace RMOL

28.80 InventoryParser.hpp

```
00001 #ifndef __RMOL_CMD_INVENTORYPARSER_HPP
00002 #define __RMOL_CMD_INVENTORYPARSER_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/command/CmdAbstract.hpp>
00011
00013 namespace stdair {
```

```
00014   class BomRoot;
00015   class LegCabin;
00016   class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00025   class InventoryParser : public stdair::CmdAbstract {
00026   public:
00027
00035     static bool parseInputFileAndBuildBom (const std::string& iInputFileName,
00036                                            stdair::BomRoot&);
00037   };
00038 }
00039 #endif // __RMOL_CMD_INVENTORYPARSER_HPP
```

28.81   rmol/command/Optimiser.cpp File Reference

```
#include <cassert>
#include <sstream>
#include <stdair/basic/BasConst_General.hpp>
#include <stdair/basic/RandomGeneration.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/FareFamily.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/MCOptimiser.hpp>
#include <rmol/bom/Emsr.hpp>
#include <rmol/bom/DPOptimiser.hpp>
#include <rmol/command/Optimiser.hpp>
```

Namespaces

- namespace RMOL

28.82   Optimiser.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/basic/BasConst_General.hpp>
00009 #include <stdair/basic/RandomGeneration.hpp>
00010 #include <stdair/bom/BomManager.hpp>
00011 #include <stdair/bom/FlightDate.hpp>
00012 #include <stdair/bom/LegDate.hpp>
00013 #include <stdair/bom/SegmentDate.hpp>
00014 #include <stdair/bom/LegCabin.hpp>
00015 #include <stdair/bom/SegmentCabin.hpp>
00016 #include <stdair/bom/FareFamily.hpp>
00017 #include <stdair/bom/BookingClass.hpp>
00018 #include <stdair/service/Logger.hpp>
00019 // RMOL
00020 #include <rmol/bom/MCOptimiser.hpp>
00021 #include <rmol/bom/Emsr.hpp>
00022 #include <rmol/bom/DPOptimiser.hpp>
00023 #include <rmol/command/Optimiser.hpp>
00024
00025 namespace RMOL {
00026
```

```
00027    // ////////////////////////////////////////////////////////////////////
00028    void Optimiser::
00029    optimalOptimisationByMCIntegration (const int K,
00030                                        stdair::LegCabin& ioLegCabin) {
00031      // Retrieve the segment-cabin
00032      const stdair::SegmentCabinList_T lSegmentCabinList =
00033        stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00034      stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin()
;
00035      assert (itSC != lSegmentCabinList.end());
00036      const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00037      assert (lSegmentCabin_ptr != NULL);
00038
00039      // Retrieve the class list.
00040      const stdair::BookingClassList_T lBookingClassList =
00041        stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00042      stdair::RandomGeneration lSeedGenerator (stdair::DEFAULT_RANDOM_SEED);
00043
00044      // Generate the demand samples for the booking classes.
00045      for (stdair::BookingClassList_T::const_iterator itBC =
00046             lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
   {
00047        stdair::RandomSeed_T lRandomSeed =
00048          lSeedGenerator.generateUniform01 () * 1e9;
00049        stdair::BookingClass* lBookingClass_ptr = *itBC;
00050        assert (lBookingClass_ptr != NULL);
00051        lBookingClass_ptr->generateDemandSamples (K, lRandomSeed);
00052
00053        // DEBUG
00054        //STDAIR_LOG_DEBUG ("Generating " << K << " demand samples for the class
   "
00055        //                    << lBookingClass_ptr->describeKey());
00056      }
00057
00058      // Call the class performing the actual algorithm
00059      MCOptimiser::optimalOptimisationByMCIntegration (ioLegCabin);
00060    }
00061
00062    // ////////////////////////////////////////////////////////////////////
00063    void Optimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00064      DPOptimiser::optimalOptimisationByDP (ioLegCabin);
00065    }
00066
00067    // ////////////////////////////////////////////////////////////////////
00068    void Optimiser::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00069      Emsr::heuristicOptimisationByEmsr (ioLegCabin);
00070    }
00071
00072    // ////////////////////////////////////////////////////////////////////
00073    void Optimiser::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00074      Emsr::heuristicOptimisationByEmsrA (ioLegCabin);
00075    }
00076
00077    // ////////////////////////////////////////////////////////////////////
00078    void Optimiser::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00079      Emsr::heuristicOptimisationByEmsrB (ioLegCabin);
00080    }
00081
00082    // ////////////////////////////////////////////////////////////////////
00083    void Optimiser::optimise (stdair::FlightDate& ioFlightDate) {
00084      // Browse the leg-cabin list and build the virtual class list for
00085      // each cabin.
00086      const stdair::LegDateList_T& lLDList =
00087        stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00088      for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00089           itLD != lLDList.end(); ++itLD) {
00090        stdair::LegDate* lLD_ptr = *itLD;
00091        assert (lLD_ptr != NULL);
00092
00093        //
00094        const stdair::LegCabinList_T& lLCList =
00095          stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00096        for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00097             itLC != lLCList.end(); ++itLC) {
00098          stdair::LegCabin* lLC_ptr = *itLC;
00099          assert (lLC_ptr != NULL);
00100
00101          // Build the virtual class list.
00102          buildVirtualClassListForLegBasedOptimisation (*lLC_ptr);
00103
00104          // Optimise using Monte-Carlo Integration method.
00105          optimalOptimisationByMCIntegration (10000, *lLC_ptr);
00106        }
00107      }
00108    }
00109
00110    // ////////////////////////////////////////////////////////////////////
```

```
00111   void Optimiser::
00112   buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin& ioLegCabin) {
00113     // The map holding all virtual classes to be created.
00114     stdair::VirtualClassMap_T lVirtualClassMap;
00115
00116     // Retrieve the segment-cabin
00117     const stdair::SegmentCabinList_T lSegmentCabinList =
00118       stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00119     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin()
      ;
00120     assert (itSC != lSegmentCabinList.end());
00121     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00122     assert (lSegmentCabin_ptr != NULL);
00123
00124     // Retrieve the class list.
00125     const stdair::BookingClassList_T lBookingClassList =
00126       stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00127
00128     // Generate the demand samples for the booking classes.
00129     for (stdair::BookingClassList_T::const_iterator itBC =
00130           lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
      {
00131       stdair::BookingClass* lBookingClass_ptr = *itBC;
00132       assert (lBookingClass_ptr != NULL);
00133
00134       const stdair::Yield_T& lYield = lBookingClass_ptr->getYield();
00135       stdair::VirtualClassStruct lVirtualClass (*lBookingClass_ptr);
00136       lVirtualClass.setYield (lYield);
00137       lVirtualClass.setMean (lBookingClass_ptr->getMean());
00138       lVirtualClass.setStdDev (lBookingClass_ptr->getStdDev());
00139
00140       lVirtualClassMap.insert (stdair::VirtualClassMap_T::
00141                               value_type (lYield, lVirtualClass));
00142     }
00143
00144     // Browse the virtual class map from high to low yield.
00145     ioLegCabin.emptyVirtualClassList();
00146     for (stdair::VirtualClassMap_T::reverse_iterator itVC =
00147           lVirtualClassMap.rbegin(); itVC != lVirtualClassMap.rend(); ++itVC)
      {
00148       stdair::VirtualClassStruct& lVC = itVC->second;
00149
00150       ioLegCabin.addVirtualClass (lVC);
00151     }
00152   }
00153
00154   // //////////////////////////////////////////////////////////////////////
00155   double Optimiser::
00156   optimiseUsingOnDForecast (stdair::FlightDate& ioFlightDate,
00157                             const bool& iReduceFluctuations) {
00158     double lMaxBPVariation = 0.0;
00159     // Check if the flight date holds a list of leg dates.
00160     // If so, retieve it and optimise the cabins.
00161     if (stdair::BomManager::hasList<stdair::LegDate> (ioFlightDate)) {
00162       STDAIR_LOG_DEBUG ("Optimisation for the flight date: "
00163                         << ioFlightDate.toString());
00164       const stdair::LegDateList_T& lLDList =
00165         stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00166       for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00167           itLD != lLDList.end(); ++itLD) {
00168         stdair::LegDate* lLD_ptr = *itLD;
00169         assert (lLD_ptr != NULL);
00170
00171         //
00172         const stdair::LegCabinList_T& lLCList =
00173           stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00174         for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00175             itLC != lLCList.end(); ++itLC) {
00176           stdair::LegCabin* lLC_ptr = *itLC;
00177           assert (lLC_ptr != NULL);
00178           MCOptimiser::optimisationByMCIntegration (*lLC_ptr);
00179           const stdair::BidPrice_T& lCurrentBidPrice =
00180             lLC_ptr->getCurrentBidPrice();
00181           const stdair::BidPrice_T& lPreviousBidPrice =
00182             lLC_ptr->getPreviousBidPrice();
00183           assert (lPreviousBidPrice != 0);
00184           const double lBPVariation =
00185             std::abs((lCurrentBidPrice - lPreviousBidPrice)/lPreviousBidPrice);
00186           lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
00187         }
00188       }
00189     }
00190     return lMaxBPVariation;
00191   }
00192
00193 }
```

28.83   rmol/command/Optimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::Optimiser

Namespaces

- namespace stdair
- namespace RMOL

28.84   Optimiser.hpp

```
00001 #ifndef __RMOL_COMMAND_OPTIMISER_HPP
00002 #define __RMOL_COMMAND_OPTIMISER_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 // Forward declarations
00011 namespace stdair {
00012   class FlightDate;
00013   class LegCabin;
00014 }
00015
00016 namespace RMOL {
00018   class Optimiser {
00019   public:
00020
00032     static void optimalOptimisationByMCIntegration (const int K,
00033                                                     stdair::LegCabin&);
00034
00038     static void optimalOptimisationByDP (stdair::LegCabin&);
00039
00043     static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00044
00048     static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00049
00053     static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00054
00058     static void optimise (stdair::FlightDate&);
00059
00063     static void buildVirtualClassListForLegBasedOptimisation(stdair::LegCabin&)
    ;
00064
00066     static double optimiseUsingOnDForecast (stdair::FlightDate&,
00067                                             const bool& iReduceFluctuations =
    false);
00068
00069   };
00070 }
00071 #endif // __RMOL_COMMAND_OPTIMISER_HPP
```

28.85   rmol/config/rmol-paths.hpp File Reference

Defines

- #define PACKAGE "rmol"
- #define PACKAGE_NAME "RMOL"
- #define PACKAGE_VERSION "0.25.3"
- #define PREFIXDIR "/usr"
- #define EXEC_PREFIX "/usr"
- #define BINDIR "/usr/bin"

- #define LIBDIR "/usr/lib"
- #define LIBEXECDIR "/usr/libexec"
- #define SBINDIR "/usr/sbin"
- #define SYSCONFDIR "/usr/etc"
- #define INCLUDEDIR "/usr/include"
- #define DATAROOTDIR "/usr/share"
- #define DATADIR "/usr/share"
- #define DOCDIR "/usr/share/doc/rmol-0.25.3"
- #define MANDIR "/usr/share/man"
- #define INFODIR "/usr/share/info"
- #define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"
- #define PDFDIR "/usr/share/doc/rmol-0.25.3/html"
- #define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"

28.85.1   Define Documentation

28.85.1.1   #define PACKAGE "rmol"

Definition at line 4 of file rmol-paths.hpp.

28.85.1.2   #define PACKAGE_NAME "RMOL"

Definition at line 5 of file rmol-paths.hpp.

Referenced by readConfiguration().

28.85.1.3   #define PACKAGE_VERSION "0.25.3"

Definition at line 6 of file rmol-paths.hpp.

Referenced by readConfiguration().

28.85.1.4   #define PREFIXDIR "/usr"

Definition at line 7 of file rmol-paths.hpp.

Referenced by readConfiguration().

28.85.1.5   #define EXEC_PREFIX "/usr"

Definition at line 8 of file rmol-paths.hpp.

28.85.1.6   #define BINDIR "/usr/bin"

Definition at line 9 of file rmol-paths.hpp.

28.85.1.7   #define LIBDIR "/usr/lib"

Definition at line 10 of file rmol-paths.hpp.

28.85.1.8   #define LIBEXECDIR "/usr/libexec"

Definition at line 11 of file rmol-paths.hpp.

28.85.1.9   #define SBINDIR "/usr/sbin"

Definition at line 12 of file rmol-paths.hpp.

28.85.1.10   #define SYSCONFDIR "/usr/etc"

Definition at line 13 of file rmol-paths.hpp.

28.85.1.11   #define INCLUDEDIR "/usr/include"

Definition at line 14 of file rmol-paths.hpp.

28.85.1.12   #define DATAROOTDIR "/usr/share"

Definition at line 15 of file rmol-paths.hpp.

28.85.1.13   #define DATADIR "/usr/share"

Definition at line 16 of file rmol-paths.hpp.

28.85.1.14   #define DOCDIR "/usr/share/doc/rmol-0.25.3"

Definition at line 17 of file rmol-paths.hpp.

28.85.1.15   #define MANDIR "/usr/share/man"

Definition at line 18 of file rmol-paths.hpp.

28.85.1.16   #define INFODIR "/usr/share/info"

Definition at line 19 of file rmol-paths.hpp.

28.85.1.17   #define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"

Definition at line 20 of file rmol-paths.hpp.

28.85.1.18   #define PDFDIR "/usr/share/doc/rmol-0.25.3/html"

Definition at line 21 of file rmol-paths.hpp.

28.85.1.19   #define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"

Definition at line 22 of file rmol-paths.hpp.

28.86   rmol-paths.hpp

```
00001 #ifndef __RMOL_PATHS_HPP__
00002 #define __RMOL_PATHS_HPP__
00003
00004 #define PACKAGE "rmol"
00005 #define PACKAGE_NAME "RMOL"
00006 #define PACKAGE_VERSION "0.25.3"
00007 #define PREFIXDIR "/usr"
00008 #define EXEC_PREFIX "/usr"
00009 #define BINDIR "/usr/bin"
00010 #define LIBDIR "/usr/lib"
00011 #define LIBEXECDIR "/usr/libexec"
00012 #define SBINDIR "/usr/sbin"
00013 #define SYSCONFDIR "/usr/etc"
00014 #define INCLUDEDIR "/usr/include"
00015 #define DATAROOTDIR "/usr/share"
00016 #define DATADIR "/usr/share"
00017 #define DOCDIR "/usr/share/doc/rmol-0.25.3"
00018 #define MANDIR "/usr/share/man"
00019 #define INFODIR "/usr/share/info"
00020 #define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"
00021 #define PDFDIR "/usr/share/doc/rmol-0.25.3/html"
00022 #define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"
00023
00024 #endif // __RMOL_PATHS_HPP__
```

28.87   rmol/factory/FacRmolServiceContext.cpp File Reference

```
#include <cassert>
#include <stdair/service/FacSupervisor.hpp>
#include <rmol/factory/FacRmolServiceContext.hpp>
#include <rmol/service/RMOL_ServiceContext.hpp>
```

Namespaces

- namespace RMOL

28.88   FacRmolServiceContext.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/service/FacSupervisor.hpp>
00008 // RMOL
00009 #include <rmol/factory/FacRmolServiceContext.hpp>
00010 #include <rmol/service/RMOL_ServiceContext.hpp>
00011
00012 namespace RMOL {
00013
00014   FacRmolServiceContext* FacRmolServiceContext::_instance = NULL;
00015
00016   // //////////////////////////////////////////////////////////////////////
00017   FacRmolServiceContext::~FacRmolServiceContext() {
00018     _instance = NULL;
00019   }
00020
00021   // //////////////////////////////////////////////////////////////////////
00022   FacRmolServiceContext& FacRmolServiceContext::instance() {
00023
00024     if (_instance == NULL) {
00025       _instance = new FacRmolServiceContext();
00026       assert (_instance != NULL);
00027
00028       stdair::FacSupervisor::instance().registerServiceFactory (_instance);
00029     }
00030     return *_instance;
00031   }
00032
00033   // //////////////////////////////////////////////////////////////////////
00034   RMOL_ServiceContext& FacRmolServiceContext::create() {
00035     RMOL_ServiceContext* aServiceContext_ptr = NULL;
00036
00037     aServiceContext_ptr = new RMOL_ServiceContext();
00038     assert (aServiceContext_ptr != NULL);
00039
00040     // The new object is added to the Bom pool
00041     _pool.push_back (aServiceContext_ptr);
00042
00043     return *aServiceContext_ptr;
00044   }
00045
00046 }
```

28.89   rmol/factory/FacRmolServiceContext.hpp File Reference

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/service/FacServiceAbstract.hpp>
```

Classes

- class RMOL::FacRmolServiceContext

Factory for the service context.

Namespaces

- namespace RMOL

28.90 FacRmolServiceContext.hpp

```
00001 #ifndef __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00002 #define __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/FacServiceAbstract.hpp>
00012
00013 namespace RMOL {
00014
00016   class RMOL_ServiceContext;
00017
00018
00022   class FacRmolServiceContext : public stdair::FacServiceAbstract {
00023   public:
00024
00031     static FacRmolServiceContext& instance();
00032
00039     ~FacRmolServiceContext();
00040
00048     RMOL_ServiceContext& create();
00049
00050
00051   protected:
00057     FacRmolServiceContext() {}
00058
00059
00060   private:
00064     static FacRmolServiceContext* _instance;
00065   };
00066
00067 }
00068 #endif // __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
```

28.91 rmol/RMOL_Service.hpp File Reference

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_service_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/basic/ForecastingMethod.hpp>
#include <stdair/basic/PartnershipTechnique.hpp>
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::RMOL_Service

    Interface for the RMOL Services.

Namespaces

- namespace stdair
- namespace RMOL

28.92   RMOL_Service.hpp

```
00001 #ifndef __RMOL_SVC_RMOL_SERVICE_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_HPP
00003
00004 // //////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_service_types.hpp>
00013 #include <stdair/stdair_maths_types.hpp>
00014 #include <stdair/basic/ForecastingMethod.hpp>
00015 #include <stdair/basic/PartnershipTechnique.hpp>
00016 // RMOL
00017 #include <rmol/RMOL_Types.hpp>
00018
00019 namespace stdair {
00021     class FlightDate;
00022     struct BasLogParams;
00023     struct BasDBParams;
00024     class BomRoot;
00025     class AirlineClassList;
00026     class YieldFeatures;
00027     class Inventory;
00028     class OnDDate;
00029 }
00030
00031 namespace RMOL {
00032
00034     class RMOL_ServiceContext;
00035
00039     class RMOL_Service {
00040     public:
00041         // ////////// Constructors and destructors //////////
00057         RMOL_Service (const stdair::BasLogParams&, const stdair::BasDBParams&);
00058
00070         RMOL_Service (const stdair::BasLogParams&);
00071
00087         RMOL_Service (stdair::STDAIR_ServicePtr_T);
00088
00112         void parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00113                            const stdair::Filename_T& iDemandAndClassDataFile);
00114
00118         void setUpStudyStatManager();
00119
00123         ~RMOL_Service();
00124
00125
00126     public:
00127         // /////////////// Business Methods ////////////////
00133         void buildSampleBom();
00134
00138         void optimalOptimisationByMCIntegration (const int K);
00139
00143         void optimalOptimisationByDP();
00144
00148         void heuristicOptimisationByEmsr();
00149
00153         void heuristicOptimisationByEmsrA();
00154
00158         void heuristicOptimisationByEmsrB();
00159
00163         bool optimise (stdair::FlightDate&, const stdair::DateTime_T&,
00164                        const stdair::ForecastingMethod&, const
     stdair::PartnershipTechnique&);
00165
00170         // O&D based forecast
00171         void forecastOnD (const stdair::DateTime_T&);
00172
00173         stdair::YieldFeatures* getYieldFeatures(const stdair::OnDDate&, const
     stdair::CabinCode_T&,
00174                                                stdair::BomRoot&);
00175
00176         void forecastOnD (const stdair::YieldFeatures&, stdair::OnDDate&,
00177                           const stdair::CabinCode_T&, const stdair::DTD_T&,
00178                           stdair::BomRoot&);
00179
00180         void setOnDForecast (const stdair::AirlineClassList&, const
     stdair::MeanValue_T&,
00181                              const stdair::StdDevValue_T&, stdair::OnDDate&, const
     stdair::CabinCode_T&,
00182                              stdair::BomRoot&);
00183
```

```
00184      // Single segment O&D
00185      void setOnDForecast (const stdair::AirlineCode_T&, const stdair::Date_T&,
      const stdair::AirportCode_T&,
00186                           const stdair::AirportCode_T&, const
      stdair::CabinCode_T&, const stdair::ClassCode_T&,
00187                           const stdair::MeanValue_T&, const
      stdair::StdDevValue_T&, const stdair::Yield_T&, stdair::BomRoot&);
00188
00189      // Multiple segment O&D
00190      void setOnDForecast (const stdair::AirlineCodeList_T&, const
      stdair::AirlineCode_T&,const stdair::Date_T&,
00191                           const stdair::AirportCode_T&, const
      stdair::AirportCode_T&, const stdair::CabinCode_T&,
00192                           const stdair::ClassCodeList_T&, const
      stdair::MeanValue_T&, const stdair::StdDevValue_T&,
00193                           const stdair::Yield_T&, stdair::BomRoot&);
00194
00195      // Initialise (or re-initialise) the demand projections in all leg cabins
00196      void resetDemandInformation (const stdair::DateTime_T&);
00197
00198      void resetDemandInformation (const stdair::DateTime_T&, const
      stdair::Inventory&);
00199
00200      /* Projection of demand */
00201
00202      // Aggregated demand at booking class level.
00203      void projectAggregatedDemandOnLegCabins(const stdair::DateTime_T&);
00204
00205      // Static rule prorated yield
00206      void projectOnDDemandOnLegCabinsUsingYP(const stdair::DateTime_T&);
00207
00208      // Displacement-adjusted yield
00209      void projectOnDDemandOnLegCabinsUsingDA(const stdair::DateTime_T&);
00210
00211      // Dynamic yield proration (PF = BP_i/BP_{total}, where BP_{total} =
      sum(BP_i))
00212      void projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateTime_T&);
00213
00214      void projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateTime_T&, const
      stdair::Inventory&);
00215
00217      // O&D-based optimisation (using demand aggregation or demand aggregation).
00218      void optimiseOnD (const stdair::DateTime_T&);
00219
00220      // O&D-based optimisation using displacement-adjusted yield.
00221      void optimiseOnDUsingRMCooperation (const stdair::DateTime_T&);
00222
00223      // Advanced version of O&D-based optimisation using displacement-adjusted
      yield.
00224      // Network optimisation instead of separate inventory optimisation.
00225      void optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTime_T&);
00226
00227      // Update bid priceand send to partners
00228      void updateBidPrice (const stdair::DateTime_T&);
00229      void updateBidPrice (const stdair::FlightDate&, stdair::BomRoot&);
00230
00231  public:
00232      // //////////////// Export support methods //////////////////
00243      std::string jsonExport (const stdair::AirlineCode_T&,
00244                              const stdair::FlightNumber_T&,
00245                              const stdair::Date_T& iDepartureDate) const;
00246
00247
00248  public:
00249      // //////////////// Display support methods //////////////////
00257      std::string csvDisplay() const;
00258
00259
00260  private:
00261      // //////// Construction and Destruction helper methods ////////
00265      RMOL_Service();
00266
00270      RMOL_Service (const RMOL_Service&);
00271
00281      stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&,
00282                                                     const stdair::BasDBParams&);
00283
00292      stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&)
      ;
00293
00302      void addStdAirService (stdair::STDAIR_ServicePtr_T,
00303                             const bool iOwnStdairService);
00304
00309      void initServiceContext();
00310
00317      void initRmolService();
00318
```

```
00322     void finalise();
00323
00324
00325   private:
00326     // ////////// Service Context //////////
00330     RMOL_ServiceContext* _rmolServiceContext;
00331
00333     stdair::Date_T _previousForecastDate;
00334   };
00335 }
00336 #endif // __RMOL_SVC_RMOL_SERVICE_HPP
```

28.93 rmol/RMOL_Types.hpp File Reference

```
#include <map>
#include <vector>
#include <boost/shared_ptr.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_exceptions.hpp>
```

Classes

- class RMOL::OverbookingException

    Overbooking-related exception.

- class RMOL::UnconstrainingException

    Unconstraining-related exception.

- class RMOL::ForecastException

    Forecast-related exception.

- class RMOL::OptimisationException

    Optimisation-related exception.

Namespaces

- namespace stdair
- namespace RMOL

Typedefs

- typedef boost::shared_ptr
  < RMOL_Service > RMOL::RMOL_ServicePtr_T
- typedef std::vector
  < stdair::NbOfRequests_T > RMOL::UnconstrainedDemandVector_T
- typedef std::vector
  < stdair::NbOfBookings_T > RMOL::BookingVector_T
- typedef std::vector
  < stdair::Flag_T > RMOL::FlagVector_T
- typedef std::map
  < stdair::BookingClass
  ∗, UnconstrainedDemandVector_T > RMOL::BookingClassUnconstrainedDemandVectorMap_T
- typedef std::map
  < stdair::BookingClass
  ∗, stdair::NbOfRequests_T > RMOL::BookingClassUnconstrainedDemandMap_T
- typedef std::map< const
  stdair::DTD_T, double > RMOL::FRAT5Curve_T

28.94 RMOL␣Types.hpp

```
00001 #ifndef __RMOL_RMOL_TYPES_HPP
00002 #define __RMOL_RMOL_TYPES_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <map>
00009 #include <vector>
00010 // Boost
00011 #include <boost/shared_ptr.hpp>
00012 // StdAir
00013 #include <stdair/stdair_inventory_types.hpp>
00014 #include <stdair/stdair_exceptions.hpp>
00015
00016 // Forward declarations.
00017 namespace stdair {
00018   class BookingClass;
00019 }
00020
00021
00022 namespace RMOL {
00023
00024   // Forward declarations
00025   class RMOL_Service;
00026
00027   // ////////// Exceptions ///////////
00031   class OverbookingException : public stdair::RootException {
00032   public:
00034     OverbookingException (const std::string& iWhat)
00035       : stdair::RootException (iWhat) {}
00036   };
00037
00041   class UnconstrainingException : public stdair::RootException {
00042   public:
00044     UnconstrainingException (const std::string& iWhat)
00045       : stdair::RootException (iWhat) {}
00046   };
00047
00051   class ForecastException : public stdair::RootException {
00052   public:
00054     ForecastException (const std::string& iWhat)
00055       : stdair::RootException (iWhat) {}
00056   };
00057
00058
00061   class OptimisationException : public stdair::RootException {
00062   public:
00064     OptimisationException (const std::string& iWhat)
00065      : stdair::RootException (iWhat) {}
00066   };
00067
00068
00069   // //////// Type definitions /////////
00073   typedef boost::shared_ptr<RMOL_Service> RMOL_ServicePtr_T;
00074
00076   typedef std::vector<stdair::NbOfRequests_T> UnconstrainedDemandVector_T;
00077
00079   typedef std::vector<stdair::NbOfBookings_T> BookingVector_T;
00080
00082   typedef std::vector<stdair::Flag_T> FlagVector_T;
00083
00086   typedef std::map<stdair::BookingClass*, UnconstrainedDemandVector_T>
00087   BookingClassUnconstrainedDemandVectorMap_T;
00087
00090   typedef std::map<stdair::BookingClass*, stdair::NbOfRequests_T>
00091   BookingClassUnconstrainedDemandMap_T;
00091
00093   typedef std::map<const stdair::DTD_T, double> FRAT5Curve_T;
00094
00095 }
00096 #endif // __RMOL_RMOL_TYPES_HPP
```

28.95   rmol/service/RMOL_Service.cpp File Reference

```
#include <cassert>
#include <boost/make_shared.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/basic/BasChronometer.hpp>
#include <stdair/basic/ContinuousAttributeLite.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/BomRetriever.hpp>
#include <stdair/bom/BomRoot.hpp>
#include <stdair/bom/Inventory.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/YieldFeatures.hpp>
#include <stdair/bom/AirportPair.hpp>
#include <stdair/bom/PosChannel.hpp>
#include <stdair/bom/DatePeriod.hpp>
#include <stdair/bom/TimePeriod.hpp>
#include <stdair/bom/AirlineClassList.hpp>
#include <stdair/basic/BasConst_Request.hpp>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/OnDDate.hpp>
#include <stdair/bom/OnDDateTypes.hpp>
#include <stdair/command/CmdBomManager.hpp>
#include <stdair/service/Logger.hpp>
#include <stdair/STDAIR_Service.hpp>
#include <rmol/basic/BasConst_RMOL_Service.hpp>
#include <rmol/factory/FacRmolServiceContext.hpp>
#include <rmol/command/InventoryParser.hpp>
#include <rmol/command/Optimiser.hpp>
#include <rmol/command/Forecaster.hpp>
#include <rmol/service/RMOL_ServiceContext.hpp>
#include <rmol/RMOL_Service.hpp>
```

Namespaces

- namespace RMOL

28.96   RMOL_Service.cpp

```
00001 // ////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // ////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // Boost
00007 #include <boost/make_shared.hpp>
00008 // StdAir
00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/basic/BasChronometer.hpp>
00011 #include <stdair/basic/ContinuousAttributeLite.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/BomRetriever.hpp>
00014 #include <stdair/bom/BomRoot.hpp>
00015 #include <stdair/bom/Inventory.hpp>
00016 #include <stdair/bom/FlightDate.hpp>
00017 #include <stdair/bom/LegCabin.hpp>
00018 #include <stdair/bom/LegDate.hpp>
```

```
00019 #include <stdair/bom/YieldFeatures.hpp>
00020 #include <stdair/bom/AirportPair.hpp>
00021 #include <stdair/bom/PosChannel.hpp>
00022 #include <stdair/bom/DatePeriod.hpp>
00023 #include <stdair/bom/TimePeriod.hpp>
00024 #include <stdair/bom/AirlineClassList.hpp>
00025 #include <stdair/basic/BasConst_Request.hpp>
00026 #include <stdair/basic/BasConst_Inventory.hpp>
00027 #include <stdair/bom/Inventory.hpp>
00028 #include <stdair/bom/FlightDate.hpp>
00029 #include <stdair/bom/SegmentDate.hpp>
00030 #include <stdair/bom/SegmentCabin.hpp>
00031 #include <stdair/bom/BookingClass.hpp>
00032 #include <stdair/bom/OnDDate.hpp>
00033 #include <stdair/bom/OnDDateTypes.hpp>
00034 #include <stdair/command/CmdBomManager.hpp>
00035 #include <stdair/service/Logger.hpp>
00036 #include <stdair/STDAIR_Service.hpp>
00037 // RMOL
00038 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00039 #include <rmol/factory/FacRmolServiceContext.hpp>
00040 #include <rmol/command/InventoryParser.hpp>
00041 #include <rmol/command/Optimiser.hpp>
00042 #include <rmol/command/Forecaster.hpp>
00043 #include <rmol/service/RMOL_ServiceContext.hpp>
00044 #include <rmol/RMOL_Service.hpp>
00045
00046 namespace RMOL {
00047
00048   // //////////////////////////////////////////////////////////////////////
00049   RMOL_Service::RMOL_Service()
00050   : _rmolServiceContext (NULL),
00051     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00052     assert (false);
00053   }
00054
00055   // //////////////////////////////////////////////////////////////////////
00056   RMOL_Service::RMOL_Service (const RMOL_Service& iService) :
00057     _rmolServiceContext (NULL),
00058     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00059     assert (false);
00060   }
00061
00062   // //////////////////////////////////////////////////////////////////////
00063   RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams) :
00064     _rmolServiceContext (NULL),
00065     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00066
00067     // Initialise the STDAIR service handler
00068     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00069       initStdAirService (iLogParams);
00070
00071     // Initialise the service context
00072     initServiceContext();
00073
00074     // Add the StdAir service context to the RMOL service context
00075     // \note RMOL owns the STDAIR service resources here.
00076     const bool ownStdairService = true;
00077     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00078
00079     // Initialise the (remaining of the) context
00080     initRmolService();
00081   }
00082
00083   // //////////////////////////////////////////////////////////////////////
00084   RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams,
00085                               const stdair::BasDBParams& iDBParams) :
00086     _rmolServiceContext (NULL),
00087     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00088
00089     // Initialise the STDAIR service handler
00090     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00091       initStdAirService (iLogParams, iDBParams);
00092
00093     // Initialise the service context
00094     initServiceContext();
00095
00096     // Add the StdAir service context to the RMOL service context
00097     // \note RMOL owns the STDAIR service resources here.
00098     const bool ownStdairService = true;
00099     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00100
00101     // Initialise the (remaining of the) context
00102     initRmolService();
00103   }
00104
00105   // //////////////////////////////////////////////////////////////////////
```

```
00106    RMOL_Service::RMOL_Service (stdair::STDAIR_ServicePtr_T ioSTDAIRServicePtr)
00107      : _rmolServiceContext (NULL),
00108        _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00109
00110      // Initialise the context
00111      initServiceContext();
00112
00113      // Add the StdAir service context to the RMOL service context.
00114      // \note RMOL does not own the STDAIR service resources here.
00115      const bool doesNotOwnStdairService = false;
00116      addStdAirService (ioSTDAIRServicePtr, doesNotOwnStdairService);
00117
00118      // Initialise the (remaining of the) context
00119      initRmolService();
00120    }
00121
00122    // //////////////////////////////////////////////////////////////////
00123    RMOL_Service::~RMOL_Service() {
00124      // Delete/Clean all the objects from memory
00125      finalise();
00126    }
00127
00128    // //////////////////////////////////////////////////////////////////
00129    void RMOL_Service::finalise() {
00130      assert (_rmolServiceContext != NULL);
00131      // Reset the (Boost.)Smart pointer pointing on the STDAIR_Service object.
00132      _rmolServiceContext->reset();
00133    }
00134
00135    // //////////////////////////////////////////////////////////////////
00136    void RMOL_Service::initServiceContext() {
00137      // Initialise the service context
00138      RMOL_ServiceContext& lRMOL_ServiceContext =
00139        FacRmolServiceContext::instance().create();
00140      _rmolServiceContext = &lRMOL_ServiceContext;
00141    }
00142
00143    // //////////////////////////////////////////////////////////////////
00144    void RMOL_Service::
00145    addStdAirService (stdair::STDAIR_ServicePtr_T ioSTDAIR_Service_ptr,
00146                      const bool iOwnStdairService) {
00147
00148      // Retrieve the RMOL service context
00149      assert (_rmolServiceContext != NULL);
00150      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00151
00152      // Store the STDAIR service object within the (AIRINV) service context
00153      lRMOL_ServiceContext.setSTDAIR_Service (ioSTDAIR_Service_ptr,
00154                                              iOwnStdairService);
00155    }
00156
00157    // //////////////////////////////////////////////////////////////////
00158    stdair::STDAIR_ServicePtr_T RMOL_Service::
00159    initStdAirService (const stdair::BasLogParams& iLogParams) {
00160
00168      stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00169        boost::make_shared<stdair::STDAIR_Service> (iLogParams);
00170
00171      return lSTDAIR_Service_ptr;
00172    }
00173
00174    // //////////////////////////////////////////////////////////////////
00175    stdair::STDAIR_ServicePtr_T RMOL_Service::
00176    initStdAirService (const stdair::BasLogParams& iLogParams,
00177                       const stdair::BasDBParams& iDBParams) {
00178
00186      stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00187        boost::make_shared<stdair::STDAIR_Service> (iLogParams, iDBParams);
00188
00189      return lSTDAIR_Service_ptr;
00190    }
00191
00192    // //////////////////////////////////////////////////////////////////
00193    void RMOL_Service::initRmolService() {
00194      // Do nothing at this stage. A sample BOM tree may be built by
00195      // calling the buildSampleBom() method
00196    }
00197
00198    // //////////////////////////////////////////////////////////////////
00199    void RMOL_Service::
00200    parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00201                  const stdair::Filename_T& iInputFileName) {
00202
00203      // Retrieve the RMOL service context
00204      if (_rmolServiceContext == NULL) {
00205        throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00206                                                      " been initialised");
```

```
00207       }
00208       assert (_rmolServiceContext != NULL);
00209       RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00210
00211       // Retrieve the StdAir service object from the (RMOL) service context
00212       stdair::STDAIR_Service& lSTDAIR_Service =
00213         lRMOL_ServiceContext.getSTDAIR_Service();
00214       stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00215
00216       // Build a dummy inventory with a leg-cabin which has the given capacity.
00217       lSTDAIR_Service.buildDummyInventory (iCabinCapacity);
00218
00219       // Complete the BOM tree with the optimisation problem specification
00220       InventoryParser::parseInputFileAndBuildBom (iInputFileName, lBomRoot);
00221     }
00222
00223     // //////////////////////////////////////////////////////////////////////
00224     void RMOL_Service::buildSampleBom() {
00225
00226       // Retrieve the RMOL service context
00227       if (_rmolServiceContext == NULL) {
00228         throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00229                                                       " been initialised");
00230       }
00231       assert (_rmolServiceContext != NULL);
00232
00233       // Retrieve the RMOL service context and whether it owns the Stdair
00234       // service
00235       RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00236       const bool doesOwnStdairService =
00237         lRMOL_ServiceContext.getOwnStdairServiceFlag();
00238
00239       // Retrieve the StdAir service object from the (RMOL) service context
00240       stdair::STDAIR_Service& lSTDAIR_Service =
00241         lRMOL_ServiceContext.getSTDAIR_Service();
00242
00247       if (doesOwnStdairService == true) {
00248         //
00249         lSTDAIR_Service.buildSampleBom();
00250       }
00251
00269     }
00270
00271     // //////////////////////////////////////////////////////////////////////
00272     void RMOL_Service::optimalOptimisationByMCIntegration (const int K) {
00273       assert (_rmolServiceContext != NULL);
00274       RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00275
00276       // Retrieve the StdAir service
00277       stdair::STDAIR_Service& lSTDAIR_Service =
00278         lRMOL_ServiceContext.getSTDAIR_Service();
00279       stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00280
00281       //
00282       stdair::LegCabin& lLegCabin =
00283         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00284
00285       stdair::BasChronometer lOptimisationChronometer;
00286       lOptimisationChronometer.start();
00287
00288       Optimiser::optimalOptimisationByMCIntegration (K, lLegCabin);
00289
00290       const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00291
00292       // DEBUG
00293       STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo performed in "
00294                         << lOptimisationMeasure);
00295       STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00296
00297       std::ostringstream logStream;
00298       stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00299       logStream << "Bid-Price Vector (BPV): ";
00300       unsigned int size = lBidPriceVector.size();
00301
00302       for (unsigned int i = 0; i < size - 1; ++i) {
00303         const double bidPrice = lBidPriceVector.at(i);
00304         logStream << std::fixed << std::setprecision (2) << bidPrice << ", ";
00305       }
00306       const double bidPrice = lBidPriceVector.at(size -1);
00307       logStream << std::fixed << std::setprecision (2) << bidPrice;
00308       STDAIR_LOG_DEBUG (logStream.str());
00309     }
00310
00311     // //////////////////////////////////////////////////////////////////////
00312     void RMOL_Service::optimalOptimisationByDP() {
00313     }
00314
```

```
00315    // ////////////////////////////////////////////////////////////////////
00316    void RMOL_Service::heuristicOptimisationByEmsr() {
00317      assert (_rmolServiceContext != NULL);
00318      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00319
00320      // Retrieve the StdAir service
00321      stdair::STDAIR_Service& lSTDAIR_Service =
00322        lRMOL_ServiceContext.getSTDAIR_Service();
00323      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00324
00325      //
00326      stdair::LegCabin& lLegCabin =
00327        stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00328
00329      stdair::BasChronometer lOptimisationChronometer;
00330      lOptimisationChronometer.start();
00331
00332      Optimiser::heuristicOptimisationByEmsr (lLegCabin);
00333
00334      const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00335      // DEBUG
00336      STDAIR_LOG_DEBUG ("Optimisation EMSR performed in "
00337                        << lOptimisationMeasure);
00338      STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00339
00340      stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00341      std::ostringstream logStream;
00342      logStream << "Bid-Price Vector (BPV): ";
00343      unsigned int idx = 0;
00344      for (stdair::BidPriceVector_T::const_iterator itBP = lBidPriceVector.begin(
     );
00345           itBP != lBidPriceVector.end(); ++itBP) {
00346        if (idx != 0) {
00347          logStream << ", ";
00348        }
00349        const stdair::BidPrice_T& lBidPrice = *itBP;
00350        logStream << std::fixed << std::setprecision (2) << lBidPrice;
00351      }
00352      // DEBUG
00353      STDAIR_LOG_DEBUG (logStream.str());
00354    }
00355
00356    // ////////////////////////////////////////////////////////////////////
00357    void RMOL_Service::heuristicOptimisationByEmsrA() {
00358      assert (_rmolServiceContext != NULL);
00359      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00360
00361      // Retrieve the StdAir service
00362      stdair::STDAIR_Service& lSTDAIR_Service =
00363        lRMOL_ServiceContext.getSTDAIR_Service();
00364      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00365
00366      //
00367      stdair::LegCabin& lLegCabin =
00368        stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00369
00370      Optimiser::heuristicOptimisationByEmsrA (lLegCabin);
00371
00372      // DEBUG
00373      STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00374
00375    }
00376
00377    // ////////////////////////////////////////////////////////////////////
00378    void RMOL_Service::heuristicOptimisationByEmsrB() {
00379      assert (_rmolServiceContext != NULL);
00380      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00381
00382      // Retrieve the StdAir service
00383      stdair::STDAIR_Service& lSTDAIR_Service =
00384        lRMOL_ServiceContext.getSTDAIR_Service();
00385      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00386
00387      //
00388      stdair::LegCabin& lLegCabin =
00389        stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00390
00391      Optimiser::heuristicOptimisationByEmsrB (lLegCabin);
00392
00393      // DEBUG
00394      STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00395    }
00396
00397    // ////////////////////////////////////////////////////////////////////
00398    bool RMOL_Service::
00399    optimise (stdair::FlightDate& ioFlightDate,
00400              const stdair::DateTime_T& iRMEventTime,
```

```
00401                const stdair::ForecastingMethod& iForecastingMethod,
00402                const stdair::PartnershipTechnique& iPartnershipTechnique) {
00403
00404
00405        STDAIR_LOG_DEBUG ("Forecast & Optimisation");
00406
00407        const stdair::PartnershipTechnique::EN_PartnershipTechnique&
       lPartnershipTechnique =
00408          iPartnershipTechnique.getTechnique();
00409
00410        switch (lPartnershipTechnique) {
00411        case stdair::PartnershipTechnique::RAE_DA:
00412        case stdair::PartnershipTechnique::IBP_DA:{
00413          if (_previousForecastDate < iRMEventTime.date()) {
00414            forecastOnD (iRMEventTime);
00415            resetDemandInformation (iRMEventTime);
00416            projectAggregatedDemandOnLegCabins (iRMEventTime);
00417            optimiseOnD (iRMEventTime);
00418          }
00419          break;
00420        }
00421        case stdair::PartnershipTechnique::RAE_YP:
00422        case stdair::PartnershipTechnique::IBP_YP:
00423        case stdair::PartnershipTechnique::IBP_YP_U:{
00424          if (_previousForecastDate < iRMEventTime.date()) {
00425            forecastOnD (iRMEventTime);
00426            resetDemandInformation (iRMEventTime);
00427            projectOnDDemandOnLegCabinsUsingYP (iRMEventTime);
00428            optimiseOnD (iRMEventTime);
00429          }
00430          break;
00431        }
00432        case stdair::PartnershipTechnique::RMC:{
00433          if (_previousForecastDate < iRMEventTime.date()) {
00434            forecastOnD (iRMEventTime);
00435            resetDemandInformation (iRMEventTime);
00436            updateBidPrice (iRMEventTime);
00437            projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00438            optimiseOnDUsingRMCooperation (iRMEventTime);
00439          }
00440          break;
00441        }
00442        case stdair::PartnershipTechnique::A_RMC:{
00443          if (_previousForecastDate < iRMEventTime.date()) {
00444            forecastOnD (iRMEventTime);
00445            resetDemandInformation (iRMEventTime);
00446            updateBidPrice (iRMEventTime);
00447            projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00448            optimiseOnDUsingAdvancedRMCooperation (iRMEventTime);
00449          }
00450          break;
00451        }
00452        case stdair::PartnershipTechnique::NONE:{
00453          // DEBUG
00454          STDAIR_LOG_DEBUG ("Forecast");
00455
00456          // 1. Forecast
00457          bool isForecasted = false;
00458          const stdair::ForecastingMethod::EN_ForecastingMethod& lForecastingMethod
       =
00459            iForecastingMethod.getMethod();
00460          switch (lForecastingMethod) {
00461          case stdair::ForecastingMethod::ADD_PK: {
00462            isForecasted = Forecaster::forecastUsingAdditivePickUp (ioFlightDate,
00463                                                                    iRMEventTime);
00464            break;
00465          }
00466          case stdair::ForecastingMethod::MUL_PK: {
00467            isForecasted =
00468              Forecaster::forecastUsingMultiplicativePickUp (ioFlightDate,
00469                                                             iRMEventTime);
00470            break;
00471          }
00472          default: {
00473            assert (false);
00474            break;
00475          }
00476          }
00477
00478          // DEBUG
00479          STDAIR_LOG_DEBUG ("Forecast successful: " << isForecasted);
00480
00481          // 2. Optimisation
00482          if (isForecasted == true) {
00483            // DEBUG
00484            STDAIR_LOG_DEBUG ("Optimise");
00485
```

```
00486              Optimiser::optimise (ioFlightDate);
00487              return true;
00488            }
00489          break;
00490          }
00491        default:{
00492          assert (false);
00493          break;
00494        }
00495      }
00496      return false;
00497    }
00498
00499    // //////////////////////////////////////////////////////////////////
00500    void RMOL_Service::forecastOnD (const stdair::DateTime_T& iRMEventTime) {
00501
00502      if (_rmolServiceContext == NULL) {
00503        throw stdair::NonInitialisedServiceException ("The Rmol service "
00504                                                      "has not been initialised")
      ;
00505      }
00506      assert (_rmolServiceContext != NULL);
00507      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00508
00509      // Retrieve the bom root
00510      stdair::STDAIR_Service& lSTDAIR_Service =
00511        lRMOL_ServiceContext.getSTDAIR_Service();
00512      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00513
00514      // Retrieve the date from the RM event
00515      const stdair::Date_T lDate = iRMEventTime.date();
00516
00517      _previousForecastDate = lDate;
00518
00519      const stdair::InventoryList_T& lInventoryList =
00520        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
00521      assert (!lInventoryList.empty());
00522      for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
      ;
00523            itInv != lInventoryList.end(); ++itInv) {
00524        const stdair::Inventory* lInventory_ptr = *itInv;
00525        assert (lInventory_ptr != NULL);
00526        if (stdair::BomManager::hasList<stdair::OnDDate> (*lInventory_ptr)) {
00527          const stdair::OnDDateList_T lOnDDateList =
00528          stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00529
00530          for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00531              itOD != lOnDDateList.end(); ++itOD) {
00532            stdair::OnDDate* lOnDDate_ptr = *itOD;
00533            assert (lOnDDate_ptr != NULL);
00534
00535            const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00536            stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
00537            stdair::DTD_T lDTD = short (lDateOffset.days());
00538
00539            stdair::DCPList_T::const_iterator itDCP =
00540              std::find (stdair::DEFAULT_DCP_LIST.begin(),
00541                          stdair::DEFAULT_DCP_LIST.end(), lDTD);
00542            // Check if the forecast for this O&D date needs to be forecasted.
00543            if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
00544              // Retrieve the total forecast map.
00545              const stdair::CabinForecastMap_T& lTotalForecastMap =
00546                lOnDDate_ptr->getTotalForecastMap();
00547
00548              // Browse the map and make a forecast for every cabin.
00549              for (stdair::CabinForecastMap_T::const_iterator itCF =
00550                    lTotalForecastMap.begin();
00551                  itCF != lTotalForecastMap.end(); ++itCF) {
00552                const stdair::CabinCode_T lCabinCode = itCF->first;
00553                stdair::YieldFeatures* lYieldFeatures_ptr =
00554                  getYieldFeatures(*lOnDDate_ptr, lCabinCode, lBomRoot);
00555                if (lYieldFeatures_ptr == NULL) {
00556                  STDAIR_LOG_ERROR ("Cannot find yield corresponding to "
00557                                    << "the O&D date"
00558                                    << lOnDDate_ptr->toString()
00559                                    << " Cabin " << lCabinCode);
00560                  assert (false);
00561                }
00562                forecastOnD (*lYieldFeatures_ptr, *lOnDDate_ptr, lCabinCode, lDTD
      ,
00563                             lBomRoot);
00564              }
00565            }
00566          }
00567        }
00568      }
00569    }
```

```
00570
00571    // //////////////////////////////////////////////////////////////////
00572    stdair::YieldFeatures* RMOL_Service::
00573    getYieldFeatures(const stdair::OnDDate& iOnDDate,
00574                     const stdair::CabinCode_T& iCabinCode,
00575                     stdair::BomRoot& iBomRoot) {
00576
00577      const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00578      const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00579
00580      const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00581
00582      // Build the airport pair key out of O&D and get the airport pair object
00583      const stdair::AirportPairKey lAirportPairKey(lOrigin, lDestination);
00584      stdair::AirportPair* lAirportPair_ptr = stdair::BomManager::
00585        getObjectPtr<stdair::AirportPair> (iBomRoot,
00586                                           lAirportPairKey.toString());
00587      if (lAirportPair_ptr == NULL) {
00588        STDAIR_LOG_ERROR ("Cannot find yield corresponding to the airport "
00589                          << "pair: " << lAirportPairKey.toString());
00590        assert (false);
00591      }
00592
00593      // Retrieve the corresponding date period to lDepartureDate.
00594      const stdair::DatePeriodList_T lDatePeriodList =
00595        stdair::BomManager::getList<stdair::DatePeriod> (*lAirportPair_ptr);
00596      for (stdair::DatePeriodList_T::const_iterator itDatePeriod =
00597             lDatePeriodList.begin();
00598           itDatePeriod != lDatePeriodList.end(); ++itDatePeriod) {
00599        const stdair::DatePeriod* lDatePeriod_ptr = *itDatePeriod;
00600        assert (lDatePeriod_ptr != NULL);
00601
00602        const bool isDepartureDateValid =
00603          lDatePeriod_ptr->isDepartureDateValid (lDepartureDate);
00604
00605        if (isDepartureDateValid == true) {
00606          // Retrieve the PoS-Channel.
00607          // TODO: Use POS and Channel from demand instead of default
00608          const stdair::PosChannelKey lPosChannelKey (stdair::DEFAULT_POS,
00609                                                       stdair::DEFAULT_CHANNEL);
00610          stdair::PosChannel* lPosChannel_ptr = stdair::BomManager::
00611            getObjectPtr<stdair::PosChannel> (*lDatePeriod_ptr,
00612                                              lPosChannelKey.toString());
00613          if (lPosChannel_ptr == NULL) {
00614            STDAIR_LOG_ERROR ("Cannot find yield corresponding to the PoS-"
00615                              << "Channel: " << lPosChannelKey.toString());
00616            assert (false);
00617          }
00618          // Retrieve the yield features.
00619          const stdair::TimePeriodList_T lTimePeriodList = stdair::
00620            BomManager::getList<stdair::TimePeriod> (*lPosChannel_ptr);
00621          for (stdair::TimePeriodList_T::const_iterator itTimePeriod =
00622                 lTimePeriodList.begin();
00623               itTimePeriod != lTimePeriodList.end(); ++itTimePeriod) {
00624            const stdair::TimePeriod* lTimePeriod_ptr = *itTimePeriod;
00625            assert (lTimePeriod_ptr != NULL);
00626
00627            // TODO: Use trip type from demand instead of default value.
00628            const stdair::YieldFeaturesKey lYieldFeaturesKey (
stdair::TRIP_TYPE_ONE_WAY,
00629                                                              iCabinCode);
00630            stdair::YieldFeatures* oYieldFeatures_ptr = stdair::BomManager::
00631              getObjectPtr<stdair::YieldFeatures>(*lTimePeriod_ptr,
00632                                                  lYieldFeaturesKey.toString());
00633            if (oYieldFeatures_ptr != NULL) {
00634              return oYieldFeatures_ptr;
00635            }
00636          }
00637        }
00638      }
00639      return NULL;
00640
00641    }
00642
00643
00644    // //////////////////////////////////////////////////////////////////
00645    void RMOL_Service::
00646    forecastOnD (const stdair::YieldFeatures& iYieldFeatures,
00647                 stdair::OnDDate& iOnDDate,
00648                 const stdair::CabinCode_T& iCabinCode,
00649                 const stdair::DTD_T& iDTD,
00650                 stdair::BomRoot& iBomRoot) {
00651
00652      const stdair::AirlineClassListList_T lAirlineClassListList =
00653        stdair::BomManager::getList<stdair::AirlineClassList> (iYieldFeatures);
00654      assert (lAirlineClassListList.begin() != lAirlineClassListList.end());
00655
```

```
00656        // Yield order check
00657        stdair::AirlineClassListList_T::const_iterator  itACL =
00658          lAirlineClassListList.begin();
00659        stdair::Yield_T lPreviousYield((*itACL)->getYield());
00660        ++itACL;
00661        for (; itACL != lAirlineClassListList.end(); ++itACL) {
00662          const stdair::AirlineClassList* lAirlineClassList = *itACL;
00663          const stdair::Yield_T& lYield = lAirlineClassList->getYield();
00664          if (lYield <= lPreviousYield) {
00665            lPreviousYield = lYield;
00666          }
00667          else{
00668            STDAIR_LOG_ERROR ("Yields should be given in a descendant order"
00669                              << " in the yield input file") ;
00670            assert (false);
00671          }
00672        }
00673        // Proportion factor list initialisation
00674        // Each element corresponds to a yield rule
00675        stdair::ProportionFactorList_T lProportionFactorList;
00676        stdair::ProportionFactor_T lPreviousProportionFactor = 0;
00677
00678        // Retrieve the minimal willingness to pay associated to the demand
00679        const stdair::WTPDemandPair_T& lTotalForecast =
00680          iOnDDate.getTotalForecast (iCabinCode);
00681        const stdair::WTP_T& lMinWTP = lTotalForecast.first;
00682
00683        // Retrieve the remaining percentage of booking requests
00684        const stdair::ContinuousAttributeLite<stdair::FloatDuration_T>
00685          lArrivalPattern (stdair::DEFAULT_DTD_PROB_MAP);
00686
00687        STDAIR_LOG_DEBUG (lArrivalPattern.displayCumulativeDistribution());
00688        const stdair::Probability_T lRemainingProportion =
00689          lArrivalPattern.getRemainingProportion(-float(iDTD));
00690
00691        // Compute the characteristics (mean and std dev) of the total
00692        // forecast demand to come
00693        const stdair::MeanStdDevPair_T lForecatsMeanStdDevPair =
00694          lTotalForecast.second;
00695        const stdair::MeanValue_T& lMeanValue =
00696          lForecatsMeanStdDevPair.first;
00697        const stdair::MeanValue_T& lRemainingMeanValue =
00698          lRemainingProportion*lMeanValue;
00699        const stdair::StdDevValue_T& lStdDevValue =
00700          lForecatsMeanStdDevPair.second;
00701        const stdair::StdDevValue_T& lRemainingStdDevValue =
00702          lRemainingProportion*lStdDevValue;
00703
00704        // Retrieve the frat5 coef corresponding to the input dtd
00705        stdair::DTDFratMap_T::const_iterator itDFC =
00706          stdair::DEFAULT_DTD_FRAT5COEF_MAP.find(iDTD);
00707        if (itDFC == stdair::DEFAULT_DTD_FRAT5COEF_MAP.end()) {
00708          STDAIR_LOG_ERROR ("Cannot find frat5 coef for DTD = " << iDTD );
00709          assert (false);
00710        }
00711        stdair::RealNumber_T lFrat5Coef =
00712          stdair::DEFAULT_DTD_FRAT5COEF_MAP.at(iDTD);
00713
00714        STDAIR_LOG_DEBUG ("Remaining proportion " << lRemainingProportion
00715                          << " Total " << lMeanValue
00716                          << " StdDev " << lStdDevValue
00717                          << "Frat5 Coef " << lFrat5Coef);
00718
00719        std::ostringstream oStr;
00720        // Compute the "forecast demand to come" proportion by class
00721        itACL = lAirlineClassListList.begin();
00722        for (; itACL != lAirlineClassListList.end(); ++itACL) {
00723          const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00724          const stdair::Yield_T& lYield = lAirlineClassList_ptr->getYield();
00725          stdair::ProportionFactor_T lProportionFactor =
00726            exp ((lYield - lMinWTP)*log(0.5)/(lMinWTP*(lFrat5Coef-1.0)));
00727          // If the yield is smaller than minimal WTP, the factor is greater than
00   1.
00728          // In that case it should be modified and put to 1.
00729          lProportionFactor = std::min (lProportionFactor, 1.0);
00730          lProportionFactorList.push_back(lProportionFactor -
00     lPreviousProportionFactor);
00731          lPreviousProportionFactor = lProportionFactor;
00732          oStr << lAirlineClassList_ptr->toString() << lProportionFactor << " ";
00733        }
00734
00735        STDAIR_LOG_DEBUG (oStr.str());
00736
00737        // Sanity check
00738        assert (lAirlineClassListList.size() == lProportionFactorList.size());
00739
00740        STDAIR_LOG_DEBUG ("Forecast for " << iOnDDate.describeKey()
```

```
00741                                 << " " << iDTD << " days to departure");
00742
00743        // store the forecast demand to come characteristics in the booking classes
00744        stdair::ProportionFactorList_T::const_iterator itPF =
00745          lProportionFactorList.begin();
00746        itACL = lAirlineClassListList.begin();
00747        for (; itACL != lAirlineClassListList.end(); ++itACL, ++itPF) {
00748          const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00749          const stdair::ProportionFactor_T& lProportionFactor = *itPF;
00750          stdair::MeanValue_T lMeanValue = lProportionFactor*lRemainingMeanValue;
00751          stdair::StdDevValue_T lStdDevValue =
00752            lProportionFactor*lRemainingStdDevValue;
00753          setOnDForecast(*lAirlineClassList_ptr, lMeanValue, lStdDevValue,
00754                         iOnDDate, iCabinCode, iBomRoot);
00755        }
00756
00757      }
00758
00759      // //////////////////////////////////////////////////////////////////////
00760      void RMOL_Service::
00761      setOnDForecast (const stdair::AirlineClassList& iAirlineClassList,
00762                      const stdair::MeanValue_T& iMeanValue,
00763                      const stdair::StdDevValue_T& iStdDevValue,
00764                      stdair::OnDDate& iOnDDate,
00765                      const stdair::CabinCode_T& iCabinCode,
00766                      stdair::BomRoot& iBomRoot) {
00767
00768        const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00769        const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00770
00771        const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00772
00773        const stdair::AirlineCodeList_T& lAirlineCodeList =
00774          iAirlineClassList.getAirlineCodeList();
00775
00776        // Retrieve the class list (one class per airline)
00777        const stdair::ClassList_StringList_T& lClassList_StringList =
00778          iAirlineClassList.getClassCodeList();
00779        assert (!lClassList_StringList.empty());
00780        stdair::ClassCodeList_T lClassCodeList;
00781        for (stdair::ClassList_StringList_T::const_iterator itCL =
00782               lClassList_StringList.begin();
00783             itCL != lClassList_StringList.end(); ++itCL){
00784          const stdair::ClassList_String_T& lClassList_String = *itCL;
00785          assert (lClassList_String.size() > 0);
00786          stdair::ClassCode_T lFirstClass;
00787          lFirstClass.append (lClassList_String, 0, 1);
00788          lClassCodeList.push_back(lFirstClass);
00789        }
00790
00791        // Sanity check
00792        assert (lAirlineCodeList.size() == lClassCodeList.size());
00793        assert (!lAirlineCodeList.empty());
00794
00795        if (lAirlineCodeList.size() == 1) {
00796          // Store the forecast information in the case of a single segment
00797          stdair::AirlineCode_T lAirlineCode = lAirlineCodeList.front();
00798          stdair::ClassCode_T lClassCode = lClassCodeList.front();
00799          stdair::Yield_T lYield = iAirlineClassList.getYield();
00800          setOnDForecast(lAirlineCode, lDepartureDate, lOrigin,
00801                         lDestination, iCabinCode, lClassCode,
00802                         iMeanValue, iStdDevValue, lYield, iBomRoot);
00803        } else {
00804          // Store the forecast information in the case of a multiple segment
00805
00806          stdair::Yield_T lYield = iAirlineClassList.getYield();
00807          for (stdair::AirlineCodeList_T::const_iterator itAC =
00808                 lAirlineCodeList.begin();
00809               itAC != lAirlineCodeList.end(); ++itAC) {
00810            const stdair::AirlineCode_T& lAirlineCode = *itAC;
00811            setOnDForecast(lAirlineCodeList, lAirlineCode, lDepartureDate, lOrigin,
00812                           lDestination, iCabinCode, lClassCodeList,
00813                           iMeanValue, iStdDevValue, lYield, iBomRoot);
00814          }
00815        }
00816      }
00817
00818      // //////////////////////////////////////////////////////////////////////
00819      void RMOL_Service::
00820      setOnDForecast (const stdair::AirlineCode_T& iAirlineCode,
00821                      const stdair::Date_T& iDepartureDate,
00822                      const stdair::AirportCode_T& iOrigin,
00823                      const stdair::AirportCode_T& iDestination,
00824                      const stdair::CabinCode_T& iCabinCode,
00825                      const stdair::ClassCode_T& iClassCode,
00826                      const stdair::MeanValue_T& iMeanValue,
00827                      const stdair::StdDevValue_T& iStdDevValue,
```

```
00828                     const stdair::Yield_T& iYield,
00829                     stdair::BomRoot& iBomRoot) {
00830      stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00831      if (lInventory_ptr == NULL) {
00832        STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00833                          << " to the airline" << iAirlineCode) ;
00834        assert(false);
00835      }
00836      const stdair::OnDDateList_T lOnDDateList =
00837        stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00838      assert (!lOnDDateList.empty());
00839      bool lFoundOnDDate = false;
00840      for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00841           itOD != lOnDDateList.end(); ++itOD) {
00842        stdair::OnDDate* lOnDDate_ptr = *itOD;
00843        assert (lOnDDate_ptr != NULL);
00844        const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00845        const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00846        const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination(
     );
00847        if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {
00848          STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00849                            << "has not been correctly initialized : SegmentDate
     list is missing");
00850          assert (false);
00851        }
00852        const stdair::SegmentDateList_T& lSegmentDateList =
00853          stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00854        // Check if the the O&D date is the one we are looking for
00855        if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00856            lDestination == iDestination && lSegmentDateList.size() == 1) {

00857          stdair::CabinClassPair_T lCabinClassPair (iCabinCode, iClassCode);
00858          stdair::CabinClassPairList_T lCabinClassPairList;
00859          lCabinClassPairList.push_back(lCabinClassPair);
00860          const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue,
     iStdDevValue);
00861          const stdair::WTPDemandPair_T lWTPDemandPair (iYield, lMeanStdDevPair);
00862          lOnDDate_ptr->setDemandInformation(lCabinClassPairList, lWTPDemandPair)
     ;
00863          lFoundOnDDate = true;
00864          STDAIR_LOG_DEBUG (iAirlineCode << " Class " << iClassCode
00865                            << " Mean " << iMeanValue
00866                            << " Std Dev " << iStdDevValue);
00867          break;
00868        }
00869      }
00870
00871      if (!lFoundOnDDate) {
00872        STDAIR_LOG_ERROR ("Cannot find class " << iClassCode << " in cabin "
00873                          << iCabinCode << " for the segment "
00874                          << iOrigin << "-" << iDestination << " with"
00875                          << " the airline " << iAirlineCode);
00876        assert(false);
00877      }
00878    }
00879
00880    // ////////////////////////////////////////////////////////////////////
00881    void RMOL_Service::
00882    setOnDForecast (const stdair::AirlineCodeList_T& iAirlineCodeList,
00883                    const stdair::AirlineCode_T& iAirlineCode,
00884                    const stdair::Date_T& iDepartureDate,
00885                    const stdair::AirportCode_T& iOrigin,
00886                    const stdair::AirportCode_T& iDestination,
00887                    const stdair::CabinCode_T& iCabinCode,
00888                    const stdair::ClassCodeList_T& iClassCodeList,
00889                    const stdair::MeanValue_T& iMeanValue,
00890                    const stdair::StdDevValue_T& iStdDevValue,
00891                    const stdair::Yield_T& iYield,
00892                    stdair::BomRoot& iBomRoot) {
00893      stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00894      if (lInventory_ptr == NULL) {
00895        STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00896                          << " to the airline" << iAirlineCode) ;
00897        assert(false);
00898      }
00899      const stdair::OnDDateList_T lOnDDateList =
00900        stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00901      assert (!lOnDDateList.empty());
00902      bool lFoundOnDDate = false;
00903      for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00904           itOD != lOnDDateList.end(); ++itOD) {
00905        stdair::OnDDate* lOnDDate_ptr = *itOD;
00906        assert (lOnDDate_ptr != NULL);
00907        const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00908        const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00909        const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination(
```

```
      );
00910        if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {
00911          STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00912                            << "has not been correctly initialized : SegmentDate
      list is missing");
00913          assert (false);
00914        }
00915        const stdair::SegmentDateList_T& lSegmentDateList =
00916          stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00917        // Check if the O&D date might be the one we are looking for.
00918        // There still is a test to go through to see if the combination of
      airlines is right.
00919        if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00920            lDestination == iDestination && lSegmentDateList.size() ==
      iAirlineCodeList.size()) {
00921          const stdair::SegmentDateList_T& lSegmentDateList =
00922            stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);

00923          stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.begin
      ();
00924          stdair::SegmentDateList_T::const_iterator itSD = lSegmentDateList.begin
      ();
00925          for (;itAC != iAirlineCodeList.end(); ++itAC, ++itSD) {
00926            const stdair::AirlineCode_T lForecastAirlineCode = *itAC;
00927            const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
00928            // Check if the operating airline is a different one and check if it
00929            // is the airline that we are looking for.
00930            const stdair::SegmentDate* lOperatingSegmentDate_ptr =
00931              lSegmentDate_ptr->getOperatingSegmentDate ();
00932            if (lOperatingSegmentDate_ptr != NULL) {
00933              const stdair::FlightDate* lOperatingFD_ptr =
00934                stdair::BomManager::getParentPtr<stdair::FlightDate>
      (*lOperatingSegmentDate_ptr);
00935              const stdair::AirlineCode_T lOperatingAirlineCode =
00936                lOperatingFD_ptr->getAirlineCode();
00937              if (lOperatingAirlineCode != lForecastAirlineCode) {
00938                break;
00939              }
00940            } else {
00941              const stdair::AirlineCode_T lOperatingAirlineCode =
00942                lOnDDate_ptr->getAirlineCode();
00943              if (lOperatingAirlineCode != lForecastAirlineCode) {
00944                break;
00945              }
00946            }
00947          }
00948          if (itAC == iAirlineCodeList.end()) {lFoundOnDDate = true;}
00949        }
00950        if (lFoundOnDDate) {
00951          stdair::CabinClassPairList_T lCabinClassPairList;
00952          for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.
      begin();
00953               itCC != iClassCodeList.end(); ++itCC) {
00954            const stdair::ClassCode_T lClassCode = *itCC;
00955            stdair::CabinClassPair_T lCabinClassPair (iCabinCode, lClassCode);
00956            lCabinClassPairList.push_back(lCabinClassPair);
00957          }
00958          const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue,
      iStdDevValue);
00959          const stdair::YieldDemandPair_T lYieldDemandPair (iYield,
      lMeanStdDevPair);
00960          lOnDDate_ptr->setDemandInformation(lCabinClassPairList,
      lYieldDemandPair);
00961          lFoundOnDDate = true;
00962          std::ostringstream oACStr;
00963          for (stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.
      begin();
00964               itAC != iAirlineCodeList.end(); ++itAC) {
00965            if (itAC == iAirlineCodeList.begin()) {
00966              oACStr << *itAC;
00967            }
00968            else {
00969              oACStr << "-" << *itAC;
00970            }
00971          }
00972          std::ostringstream oCCStr;
00973          for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.
      begin();
00974               itCC != iClassCodeList.end(); ++itCC) {
00975            if (itCC == iClassCodeList.begin()) {
00976              oCCStr << *itCC;
00977            }
00978            else {
00979              oCCStr << "-" << *itCC;
00980            }
00981          }
00982
```

```
00983          STDAIR_LOG_DEBUG (oACStr.str() << " Classes " << oCCStr.str()
00984                           << " Mean " << iMeanValue << " Std Dev " <<
     iStdDevValue);
00985          break;
00986        }
00987      }
00988      if (!lFoundOnDDate) {
00989        STDAIR_LOG_ERROR ("Cannot find the required multi-segment O&D date: "
00990                          << iOrigin << "-" << iDestination << " " <<
     iDepartureDate);
00991        assert(false);
00992      }
00993    }
00994
00995    // //////////////////////////////////////////////////////////////////
00996    void RMOL_Service::
00997    resetDemandInformation (const stdair::DateTime_T& iRMEventTime) {
00998      if (_rmolServiceContext == NULL) {
00999        throw stdair::NonInitialisedServiceException ("The Rmol service "
01000                                                      "has not been initialised")
     ;
01001      }
01002      assert (_rmolServiceContext != NULL);
01003      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01004
01005      // Retrieve the bom root
01006      stdair::STDAIR_Service& lSTDAIR_Service =
01007        lRMOL_ServiceContext.getSTDAIR_Service();
01008      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01009
01010      const stdair::InventoryList_T lInventoryList =
01011        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01012      assert (!lInventoryList.empty());
01013      for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
     ;
01014           itInv != lInventoryList.end(); ++itInv) {
01015        const stdair::Inventory* lInventory_ptr = *itInv;
01016        assert (lInventory_ptr != NULL);
01017        resetDemandInformation (iRMEventTime, *lInventory_ptr);
01018      }
01019    }
01020
01021    // //////////////////////////////////////////////////////////////////
01022    void RMOL_Service::
01023    resetDemandInformation (const stdair::DateTime_T& iRMEventTime,
01024                            const stdair::Inventory& iInventory) {
01025
01026      const stdair::FlightDateList_T lFlightDateList =
01027        stdair::BomManager::getList<stdair::FlightDate> (iInventory);
01028      assert (!lFlightDateList.empty());
01029      for (stdair::FlightDateList_T::const_iterator itFD = lFlightDateList.begin(
     );
01030           itFD != lFlightDateList.end(); ++itFD) {
01031        const stdair::FlightDate* lFlightDate_ptr = *itFD;
01032        assert (lFlightDate_ptr != NULL);
01033
01034        // Retrieve the date from the RM event
01035        const stdair::Date_T lDate = iRMEventTime.date();
01036
01037        const stdair::Date_T& lDepartureDate = lFlightDate_ptr->getDepartureDate(
     );
01038        stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01039        stdair::DTD_T lDTD = short (lDateOffset.days());
01040
01041        stdair::DCPList_T::const_iterator itDCP =
01042          std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
     end(), lDTD);
01043        // Check if the demand forecast info corresponding to this flight date
      needs to be reset.
01044        if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01045          // Check if the flight date holds a list of leg dates.
01046          // If so, find all leg cabin and reset the forecast they are holding.
01047          if (stdair::BomManager::hasList<stdair::LegDate> (*lFlightDate_ptr)) {
01048            const stdair::LegDateList_T lLegDateList =
01049              stdair::BomManager::getList<stdair::LegDate> (*lFlightDate_ptr);
01050            assert (!lLegDateList.empty());
01051            for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin(
     );
01052                 itLD != lLegDateList.end(); ++itLD) {
01053              const stdair::LegDate* lLegDate_ptr = *itLD;
01054              assert (lLegDate_ptr != NULL);
01055              const stdair::LegCabinList_T lLegCabinList =
01056                stdair::BomManager::getList<stdair::LegCabin> (*lLegDate_ptr);
01057              assert (!lLegCabinList.empty());
01058              for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
     begin();
01059                   itLC != lLegCabinList.end(); ++itLC) {
```

```
01060                    stdair::LegCabin* lLegCabin_ptr = *itLC;
01061                    assert (lLegCabin_ptr != NULL);
01062                    lLegCabin_ptr->emptyYieldLevelDemandMap();
01063                }
01064              }
01065            }
01066          }
01067        }
01068    }
01069
01070    // //////////////////////////////////////////////////////////////////
01071    void RMOL_Service::projectAggregatedDemandOnLegCabins(const
       stdair::DateTime_T& iRMEventTime) {
01072
01073        if (_rmolServiceContext == NULL) {
01074          throw stdair::NonInitialisedServiceException ("The Rmol service "
01075                                                    "has not been initialised")
       ;
01076        }
01077        assert (_rmolServiceContext != NULL);
01078        RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01079
01080        // Retrieve the bom root
01081        stdair::STDAIR_Service& lSTDAIR_Service =
01082          lRMOL_ServiceContext.getSTDAIR_Service();
01083        stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01084
01085        // Retrieve the date from the RM event
01086        const stdair::Date_T lDate = iRMEventTime.date();
01087
01088        const stdair::InventoryList_T lInventoryList =
01089          stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01090        assert (!lInventoryList.empty());
01091        for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
       ;
01092             itInv != lInventoryList.end(); ++itInv) {
01093          const stdair::Inventory* lInventory_ptr = *itInv;
01094          assert (lInventory_ptr != NULL);
01095          const stdair::OnDDateList_T lOnDDateList =
01096            stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01097          assert (!lOnDDateList.empty());
01098          for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01099               itOD != lOnDDateList.end(); ++itOD) {
01100            stdair::OnDDate* lOnDDate_ptr = *itOD;
01101            assert (lOnDDate_ptr != NULL);
01102
01103            const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01104            stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01105            stdair::DTD_T lDTD = short (lDateOffset.days());
01106
01107            stdair::DCPList_T::const_iterator itDCP =
01108              std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
       .end(), lDTD);
01109            // Check if the forecast for this O&D date needs to be projected.
01110            if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01111
01112              // Browse the demand info map.
01113              const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01114                lOnDDate_ptr->getDemandInfoMap ();
01115              for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
       lStringDemandStructMap.begin();
01116                   itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01117                std::string lCabinClassPath = itStrDS->first;
01118                const stdair::YieldDemandPair_T& lYieldDemandPair =
01119                  itStrDS->second;
01120                const stdair::CabinClassPairList_T& lCabinClassPairList =
01121                  lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01122                const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01123                // Sanity check
01124                assert (lCabinClassPairList.size() == lNbOfSegments);
01125
01126                const stdair::SegmentDateList_T lOnDSegmentDateList =
01127                  stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01128                // Sanity check
01129                assert (lOnDSegmentDateList.size() == lNbOfSegments);
01130                stdair::CabinClassPairList_T::const_iterator itCCP =
       lCabinClassPairList.begin();
01131                stdair::SegmentDateList_T::const_iterator itSD =
       lOnDSegmentDateList.begin();
01132                for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01133                  const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01134                  const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01135                    lSegmentDate_ptr->getOperatingSegmentDate ();
01136                  assert (lSegmentDate_ptr != NULL);
01137                  // Only operated legs receive the demand information.
01138                  if (lOperatingSegmentDate_ptr == NULL) {
01139                    const stdair::CabinCode_T lCabinCode = itCCP->first;
```

```
01140                    const stdair::ClassCode_T lClassCode = itCCP->second;
01141                    const stdair::SegmentCabin* lSegmentCabin_ptr =
01142                      stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
      lSegmentDate_ptr,
01143
      lCabinCode);
01144                    assert (lSegmentCabin_ptr != NULL);
01145                    // Retrieve the booking class (level of aggregation of demand).
01146                    // The yield of the class is assigned to all types of demand
       for it.
01147                    const stdair::BookingClass* lBookingClass_ptr =
01148                      stdair::BomManager::getObjectPtr<stdair::BookingClass> (*
      lSegmentCabin_ptr,
01149
      lClassCode);
01150                    assert (lBookingClass_ptr != NULL);
01151                    const stdair::LegCabinList_T lLegCabinList =
01152                      stdair::BomManager::getList<stdair::LegCabin>
      (*lSegmentCabin_ptr);
01153                    assert (!lLegCabinList.empty());
01154                    const int lNbOfLegs = lLegCabinList.size();
01155                    // Determine the yield (equally distributed over legs).
01156                    const stdair::Yield_T& lYield = lBookingClass_ptr->getYield()/
      lNbOfLegs;
01157                    const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01158                      lYieldDemandPair.second;
01159                    const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01160                    const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
      second;
01161                    for (stdair::LegCabinList_T::const_iterator itLC =
      lLegCabinList.begin();
01162                         itLC != lLegCabinList.end(); ++itLC) {
01163                      stdair::LegCabin* lLegCabin_ptr = *itLC;
01164                      assert (lLegCabin_ptr != NULL);
01165                      lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
      lStdDevValue);
01166                    }
01167                  }
01168                }
01169              }
01170            }
01171          }
01172        }
01173    }
01174
01175    // //////////////////////////////////////////////////////////////////
01176    void RMOL_Service::projectOnDDemandOnLegCabinsUsingYP(const
      stdair::DateTime_T& iRMEventTime) {
01177
01178      if (_rmolServiceContext == NULL) {
01179        throw stdair::NonInitialisedServiceException ("The Rmol service "
01180                                                       "has not been initialised")
      ;
01181      }
01182      assert (_rmolServiceContext != NULL);
01183      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01184
01185      // Retrieve the bom root
01186      stdair::STDAIR_Service& lSTDAIR_Service =
01187        lRMOL_ServiceContext.getSTDAIR_Service();
01188      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01189
01190      // Retrieve the date from the RM event
01191      const stdair::Date_T lDate = iRMEventTime.date();
01192
01193      const stdair::InventoryList_T lInventoryList =
01194        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01195      assert (!lInventoryList.empty());
01196      for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
      ;
01197           itInv != lInventoryList.end(); ++itInv) {
01198        const stdair::Inventory* lInventory_ptr = *itInv;
01199        assert (lInventory_ptr != NULL);
01200        const stdair::OnDDateList_T lOnDDateList =
01201          stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01202        assert (!lOnDDateList.empty());
01203        for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01204             itOD != lOnDDateList.end(); ++itOD) {
01205          stdair::OnDDate* lOnDDate_ptr = *itOD;
01206          assert (lOnDDate_ptr != NULL);
01207
01208          const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01209          stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01210          stdair::DTD_T lDTD = short (lDateOffset.days());
01211
01212          stdair::DCPList_T::const_iterator itDCP =
01213            std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
```

```
     .end(), lDTD);
01214        // Check if the forecast for this O&D date needs to be projected.
01215        if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01216
01217          // Browse the demand info map.
01218          const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01219            lOnDDate_ptr->getDemandInfoMap ();
01220          for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
     lStringDemandStructMap.begin();
01221               itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01222            std::string lCabinClassPath = itStrDS->first;
01223            const stdair::YieldDemandPair_T& lYieldDemandPair =
01224              itStrDS->second;
01225            const stdair::CabinClassPairList_T& lCabinClassPairList =
01226              lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01227            const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01228            // Sanity check
01229            assert (lCabinClassPairList.size() == lNbOfSegments);
01230
01231            const stdair::SegmentDateList_T lOnDSegmentDateList =
01232              stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01233            // Sanity check
01234            assert (lOnDSegmentDateList.size() == lNbOfSegments);
01235            stdair::CabinClassPairList_T::const_iterator itCCP =
     lCabinClassPairList.begin();
01236            stdair::SegmentDateList_T::const_iterator itSD =
     lOnDSegmentDateList.begin();
01237            for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01238              const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01239              assert (lSegmentDate_ptr != NULL);
01240              const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01241                lSegmentDate_ptr->getOperatingSegmentDate ();
01242              // Only operated legs receive the demand information.
01243              if (lOperatingSegmentDate_ptr == NULL) {
01244                const stdair::CabinCode_T lCabinCode = itCCP->first;
01245                const stdair::ClassCode_T lClassCode = itCCP->second;
01246                const stdair::SegmentCabin* lSegmentCabin_ptr =
01247                  stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
     lSegmentDate_ptr,
01248
     lCabinCode);
01249                assert (lSegmentCabin_ptr != NULL);
01250                const stdair::LegCabinList_T lLegCabinList =
01251                  stdair::BomManager::getList<stdair::LegCabin>
     (*lSegmentCabin_ptr);
01252                assert (!lLegCabinList.empty());
01253                const int lNbOfLegs = lLegCabinList.size();
01254                // Determine the yield (equally distributed over segments and
      then legs).
01255                const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01256                  lYieldDemandPair.second;
01257                const stdair::Yield_T& lYield = lYieldDemandPair.first/(
     lNbOfLegs*lNbOfSegments);
01258                const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01259                const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
     second;
01260                for (stdair::LegCabinList_T::const_iterator itLC =
     lLegCabinList.begin();
01261                     itLC != lLegCabinList.end(); ++itLC) {
01262                  stdair::LegCabin* lLegCabin_ptr = *itLC;
01263                  assert (lLegCabin_ptr != NULL);
01264                  lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
     lStdDevValue);
01265                }
01266              }
01267            }
01268          }
01269        }
01270      }
01271    }
01272  }
01273
01274  // //////////////////////////////////////////////////////////////////////
01275  void RMOL_Service::optimiseOnD (const stdair::DateTime_T& iRMEventTime) {
01276
01277    if (_rmolServiceContext == NULL) {
01278      throw stdair::NonInitialisedServiceException ("The Rmol service "
01279                                                    "has not been initialised")
     ;
01280    }
01281    assert (_rmolServiceContext != NULL);
01282    RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01283
01284    // Retrieve the bom root
01285    stdair::STDAIR_Service& lSTDAIR_Service =
01286      lRMOL_ServiceContext.getSTDAIR_Service();
01287    stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
```

```
01288
01289      // Retrieve the date from the RM event
01290      const stdair::Date_T lDate = iRMEventTime.date();
01291
01292      const stdair::InventoryList_T& lInvList =
01293        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01294      for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01295          itInv != lInvList.end(); ++itInv) {
01296        stdair::Inventory* lCurrentInv_ptr = *itInv;
01297        assert (lCurrentInv_ptr != NULL);
01298
01299        const stdair::FlightDateList_T& lFlightDateList =
01300          stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01301        for (stdair::FlightDateList_T::const_iterator itFlightDate =
01302               lFlightDateList.begin();
01303             itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01304          stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01305          assert (lCurrentFlightDate_ptr != NULL);
01306
01307          const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->
     getDepartureDate();
01308          stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01309          stdair::DTD_T lDTD = short (lDateOffset.days());
01310
01311          stdair::DCPList_T::const_iterator itDCP =
01312            std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
     .end(), lDTD);
01313          // Check if the optimisation is needed.
01314          if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01315            STDAIR_LOG_DEBUG ("Optimisation using O&D forecast: " <<
     lCurrentInv_ptr->getAirlineCode()
01316                              << " Departure " << lCurrentDepartureDate << " DTD
     " << lDTD);
01317            Optimiser::optimiseUsingOnDForecast (*lCurrentFlightDate_ptr);
01318          }
01319        }
01320      }
01321    }
01322
01323    // //////////////////////////////////////////////////////////////////
01324    void RMOL_Service::updateBidPrice (const stdair::DateTime_T& iRMEventTime) {
01325
01326      if (_rmolServiceContext == NULL) {
01327        throw stdair::NonInitialisedServiceException ("The Rmol service "
01328                                                      "has not been initialised")
     ;
01329      }
01330      assert (_rmolServiceContext != NULL);
01331      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01332
01333      // Retrieve the bom root
01334      stdair::STDAIR_Service& lSTDAIR_Service =
01335        lRMOL_ServiceContext.getSTDAIR_Service();
01336      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01337
01338      // Retrieve the date from the RM event
01339      const stdair::Date_T lDate = iRMEventTime.date();
01340
01341      const stdair::InventoryList_T& lInvList =
01342        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01343
01344      for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01345          itInv != lInvList.end(); ++itInv) {
01346        stdair::Inventory* lCurrentInv_ptr = *itInv;
01347        assert (lCurrentInv_ptr != NULL);
01348
01349        const stdair::FlightDateList_T& lFlightDateList =
01350          stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01351        for (stdair::FlightDateList_T::const_iterator itFlightDate =
01352               lFlightDateList.begin();
01353             itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01354          stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01355          assert (lCurrentFlightDate_ptr != NULL);
01356
01357          const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->
     getDepartureDate();
01358          stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01359          stdair::DTD_T lDTD = short (lDateOffset.days());
01360
01361          stdair::DCPList_T::const_iterator itDCP =
01362            std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
     .end(), lDTD);
01363          // Check if the operation is needed.
01364          if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01365            updateBidPrice (*lCurrentFlightDate_ptr, lBomRoot);
01366          }
01367        }
```

```
01368      }
01369    }
01370
01371    // //////////////////////////////////////////////////////////////////
01372    void RMOL_Service::updateBidPrice (const stdair::FlightDate& iFlightDate,
01373                                       stdair::BomRoot& iBomRoot) {
01374      const stdair::SegmentDateList_T& lSegmentDateList =
01375        stdair::BomManager::getList<stdair::SegmentDate> (iFlightDate);
01376      const stdair::AirlineCode_T& lOptAC = iFlightDate.getAirlineCode();
01377      const std::string lFDKeyStr = iFlightDate.describeKey();
01378
01379      for (stdair::SegmentDateList_T::const_iterator itSegmentDate =
01380           lSegmentDateList.begin();
01380           itSegmentDate != lSegmentDateList.end(); ++itSegmentDate) {
01381        stdair::SegmentDate* lSegmentDate_ptr = *itSegmentDate;
01382        assert (lSegmentDate_ptr != NULL);
01383        if (stdair::BomManager::hasList<stdair::SegmentDate>(*lSegmentDate_ptr))
    {
01384          const stdair::LegDateList_T& lLegDateList =
01385            stdair::BomManager::getList<stdair::LegDate>(*lSegmentDate_ptr);
01386          // Get the list of marketing carriers segments.
01387          // These are part of maketing partners inventories images held by the
    operating airline.
01388          const stdair::SegmentDateList_T& lMktSegmentDateList =
01389            stdair::BomManager::getList<stdair::SegmentDate>(*lSegmentDate_ptr);
01390          for (stdair::SegmentDateList_T::const_iterator itMktSD =
    lMktSegmentDateList.begin();
01391               itMktSD != lMktSegmentDateList.end(); ++itMktSD) {
01392            // Get the marketing airline code.
01393            stdair::SegmentDate* lMktSD_ptr = *itMktSD;
01394            assert (lMktSD_ptr != NULL);
01395            stdair::FlightDate* lMktFD_ptr =
01396              stdair::BomManager::getParentPtr<stdair::FlightDate>(*lMktSD_ptr);
01397            assert (lMktFD_ptr != NULL);
01398            const stdair::AirlineCode_T& lMktAC = lMktFD_ptr->getAirlineCode();
01399            // Get the (real) marketer inventory.
01400            const stdair::Inventory* lMktInv_ptr =
01401              stdair::BomManager::getObjectPtr<stdair::Inventory>(iBomRoot,lMktAC
    );
01402            assert (lMktInv_ptr != NULL);
01403            // Get the image of the operating airline inventory held by the
    marketer.
01404            const stdair::Inventory* lOptInv_ptr =
01405              stdair::BomManager::getObjectPtr<stdair::Inventory>(*lMktInv_ptr,
    lOptAC);
01406            assert (lOptInv_ptr != NULL);
01407            // Find the image of the concerned flight date.
01408            const stdair::FlightDate* lOptFD_ptr =
01409              stdair::BomManager::getObjectPtr<stdair::FlightDate>(*lOptInv_ptr,
    lFDKeyStr);
01410            assert (lOptFD_ptr != NULL);
01411            // Browse the list of leg dates in the real operating inventory.
01412            // Retrieve the image of each leg date.
01413            for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin(
    );
01414                 itLD != lLegDateList.end(); ++itLD) {
01415              const stdair::LegDate* lLD_ptr = *itLD;
01416              assert (lLD_ptr != NULL);
01417              const std::string lLDKeyStr = lLD_ptr->describeKey();
01418              stdair::LegDate* lOptLD_ptr =
01419                stdair::BomManager::getObjectPtr<stdair::LegDate>(*lOptFD_ptr,
    lLDKeyStr);
01420              assert (lOptLD_ptr != NULL);
01421              const stdair::LegCabinList_T& lLegCabinList_T =
01422                stdair::BomManager::getList<stdair::LegCabin>(*lLD_ptr);
01423              // Browse the list of leg cabins in the real operating inventory.
01424              // Retrieve the image of each leg cabin and update the bid price of
    the real and send it to the image.
01425              for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList_T.
    begin();
01426                   itLC != lLegCabinList_T.end(); ++itLC) {
01427                stdair::LegCabin* lLC_ptr = *itLC;
01428                assert (lLC_ptr != NULL);
01429                const std::string lLCKeyStr = lLC_ptr->describeKey();
01430                stdair::LegCabin* lOptLC_ptr =
01431                  stdair::BomManager::getObjectPtr<stdair::LegCabin>(*lOptLD_ptr,
    lLCKeyStr);
01432                assert (lOptLC_ptr != NULL);
01433                // Update the current bid price of the real leg.
01434                lLC_ptr->updateCurrentBidPrice();
01435                // Update the previous bid price (store the current).
01436                lOptLC_ptr->updatePreviousBidPrice();
01437                // Update the current bid price.
01438                lOptLC_ptr->setCurrentBidPrice (lLC_ptr->getCurrentBidPrice());
01439
01440                STDAIR_LOG_DEBUG ("Update bid price of " << lLC_ptr->getFullerKey
    ()
```

```
01441                                    << " : " << lOptLC_ptr->getCurrentBidPrice()
01442                                    << " Availability pool " << lLC_ptr->
     getAvailabilityPool());
01443                 }
01444               }
01445             }
01446           }
01447         }
01448     }
01449
01450     // ////////////////////////////////////////////////////////////////////
01451     void RMOL_Service::projectOnDDemandOnLegCabinsUsingDA(const
     stdair::DateTime_T& iRMEventTime) {
01452
01453       if (_rmolServiceContext == NULL) {
01454         throw stdair::NonInitialisedServiceException ("The Rmol service "
01455                                                "has not been initialised")
     ;
01456       }
01457       assert (_rmolServiceContext != NULL);
01458       RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01459
01460       // Retrieve the bom root
01461       stdair::STDAIR_Service& lSTDAIR_Service =
01462         lRMOL_ServiceContext.getSTDAIR_Service();
01463       stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01464
01465       // Retrieve the date from the RM event
01466       const stdair::Date_T lDate = iRMEventTime.date();
01467
01468       const stdair::InventoryList_T lInventoryList =
01469         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01470       assert (!lInventoryList.empty());
01471       for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
     ;
01472            itInv != lInventoryList.end(); ++itInv) {
01473         const stdair::Inventory* lInventory_ptr = *itInv;
01474         assert (lInventory_ptr != NULL);
01475         const stdair::OnDDateList_T lOnDDateList =
01476           stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01477         assert (!lOnDDateList.empty());
01478         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01479              itOD != lOnDDateList.end(); ++itOD) {
01480           stdair::OnDDate* lOnDDate_ptr = *itOD;
01481           assert (lOnDDate_ptr != NULL);
01482
01483           const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01484           stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01485           stdair::DTD_T lDTD = short (lDateOffset.days());
01486
01487           stdair::DCPList_T::const_iterator itDCP =
01488             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
     .end(), lDTD);
01489           // Check if the forecast for this O&D date needs to be projected.
01490           if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01491
01492             // Browse the demand info map.
01493             const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01494               lOnDDate_ptr->getDemandInfoMap ();
01495             for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
     lStringDemandStructMap.begin();
01496                  itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01497               std::string lCabinClassPath = itStrDS->first;
01498               const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second
     ;
01499               const stdair::CabinClassPairList_T& lCabinClassPairList =
01500                 lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01501               const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01502               // Sanity check
01503               assert (lCabinClassPairList.size() == lNbOfSegments);
01504
01505               //
01506               const stdair::SegmentDateList_T lOnDSegmentDateList =
01507                 stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01508               // Sanity check
01509               assert (lOnDSegmentDateList.size() == lNbOfSegments);
01510               stdair::CabinClassPairList_T::const_iterator itCCP =
     lCabinClassPairList.begin();
01511               stdair::SegmentDateList_T::const_iterator itSD =
     lOnDSegmentDateList.begin();
01512               // List of bid prices that will be used to easily compute
     displacement-ajusted yields.
01513               std::list<stdair::BidPrice_T> lBidPriceList;
01514               // The sum of bid prices that will be stored in the list above.
01515               stdair::BidPrice_T lTotalBidPrice = 0;
01516               // Retrieve the bid prices
01517               for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
```

```
01518                   // Get the operating segment cabin (it holds the bid price
        information).
01519                   const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01520                   assert (lSegmentDate_ptr != NULL);
01521                   // Get the operating airline code and check if it is the airline
        we are looking for.
01522                   const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01523                     lSegmentDate_ptr->getOperatingSegmentDate ();
01524                   if (lOperatingSegmentDate_ptr != NULL) {
01525                     lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01526                   }
01527                   const stdair::CabinCode_T lCabinCode = itCCP->first;
01528                   const stdair::SegmentCabin* lSegmentCabin_ptr =
01529                     stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
        lSegmentDate_ptr,
01530
        lCabinCode);
01531                   assert (lSegmentCabin_ptr != NULL);
01532                   stdair::BidPrice_T lBidPrice = 0;
01533                   const stdair::LegCabinList_T lLegCabinList =
01534                     stdair::BomManager::getList<stdair::LegCabin>
        (*lSegmentCabin_ptr);
01535                   for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
        begin();
01536                        itLC != lLegCabinList.end(); ++itLC) {
01537                     const stdair::LegCabin* lLegCabin_ptr = *itLC;
01538                     assert (lLegCabin_ptr != NULL);
01539                     lBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01540                   }
01541                   lBidPriceList.push_back (lBidPrice);
01542                   lTotalBidPrice += lBidPrice;
01543                 }
01544
01545
01546             itCCP = lCabinClassPairList.begin();
01547             itSD = lOnDSegmentDateList.begin();
01548             std::list<stdair::BidPrice_T>::const_iterator itBP = lBidPriceList.
        begin();
01549             for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD, ++itBP)
        {
01550                 stdair::BidPrice_T lBidPrice = *itBP;
01551                 stdair::BidPrice_T lComplementaryBidPrice = lTotalBidPrice -
        lBidPrice;
01552                 const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01553                 assert (lSegmentDate_ptr != NULL);
01554                 const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01555                   lSegmentDate_ptr->getOperatingSegmentDate ();
01556                 // Only operated legs receive the demand information.
01557                 if (lOperatingSegmentDate_ptr == NULL) {
01558                   const stdair::CabinCode_T lCabinCode = itCCP->first;
01559                   const stdair::ClassCode_T lClassCode = itCCP->second;
01560                   const stdair::SegmentCabin* lSegmentCabin_ptr =
01561                     stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
        lSegmentDate_ptr,
01562
        lCabinCode);
01563                   assert (lSegmentCabin_ptr != NULL);
01564                   const stdair::LegCabinList_T lLegCabinList =
01565                     stdair::BomManager::getList<stdair::LegCabin>
        (*lSegmentCabin_ptr);
01566                   assert (!lLegCabinList.empty());
01567                   // Determine the displacement-adjusted yield.
01568                   // It is set to 100 (positive small value), if the computed
        value is negative.
01569                   const stdair::Yield_T& lDAYield =
01570                     std::max(100., lYieldDemandPair.first -
        lComplementaryBidPrice);
01571
01572
01573                   stdair::Yield_T lYield = lDAYield;
01574                   // In order to be protected against important variations of
        partners' bid price,
01575                   // the displacement adjusted yield is noy allowed to get out of
        a certain range.
01576                   // This range is here chosen to be from 80% to 100% of the
        (static rule) prorated yield.
01577                   /*
01578                   const int lNbOfLegs = lLegCabinList.size();
01579                   const stdair::Yield_T& lStaticProrationYield =
01580                     lDemandStruct.getYield()/(lNbOfLegs*lNbOfSegments);
01581                   if (lDAYield < 0.8*lStaticProrationYield){
01582                     lYield = 0.8*lStaticProrationYield;
01583                   }
01584                   if (lDAYield > lStaticProrationYield) {
01585                     lYield = lStaticProrationYield;
01586                   }
01587                   */
```

```
01588                    const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01589                      lYieldDemandPair.second;
01590                    const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01591                    const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
      second;
01592                    for (stdair::LegCabinList_T::const_iterator itLC =
      lLegCabinList.begin();
01593                         itLC != lLegCabinList.end(); ++itLC) {
01594                      stdair::LegCabin* lLegCabin_ptr = *itLC;
01595                      assert (lLegCabin_ptr != NULL);
01596                      lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
      lStdDevValue);
01597                    }
01598                  }
01599                }
01600              }
01601            }
01602          }
01603        }
01604    }
01605
01606    // //////////////////////////////////////////////////////////////////////
01607    void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const
      stdair::DateTime_T& iRMEventTime) {
01608
01609      if (_rmolServiceContext == NULL) {
01610        throw stdair::NonInitialisedServiceException ("The Rmol service "
01611                                                       "has not been initialised")
      ;
01612      }
01613      assert (_rmolServiceContext != NULL);
01614      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01615
01616      // Retrieve the bom root
01617      stdair::STDAIR_Service& lSTDAIR_Service =
01618        lRMOL_ServiceContext.getSTDAIR_Service();
01619      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01620
01621      const stdair::InventoryList_T lInventoryList =
01622        stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01623      assert (!lInventoryList.empty());
01624      for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
      ;
01625           itInv != lInventoryList.end(); ++itInv) {
01626        const stdair::Inventory* lInventory_ptr = *itInv;
01627        assert (lInventory_ptr != NULL);
01628        projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lInventory_ptr);
01629      }
01630    }
01631
01632    // //////////////////////////////////////////////////////////////////////
01633    void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const
      stdair::DateTime_T& iRMEventTime,
01634                                                          const
      stdair::Inventory& iInventory) {
01635
01636      const stdair::OnDDateList_T lOnDDateList =
01637        stdair::BomManager::getList<stdair::OnDDate> (iInventory);
01638      assert (!lOnDDateList.empty());
01639      for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01640           itOD != lOnDDateList.end(); ++itOD) {
01641        stdair::OnDDate* lOnDDate_ptr = *itOD;
01642        assert (lOnDDate_ptr != NULL);
01643
01644        // Retrieve the date from the RM event
01645        const stdair::Date_T lDate = iRMEventTime.date();
01646
01647        const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01648        stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01649        stdair::DTD_T lDTD = short (lDateOffset.days());
01650
01651        stdair::DCPList_T::const_iterator itDCP =
01652          std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
      end(), lDTD);
01653        // Check if the forecast for this O&D date needs to be projected.
01654        if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01655
01656          // Browse the demand info map.
01657          const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01658            lOnDDate_ptr->getDemandInfoMap ();
01659          for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
      lStringDemandStructMap.begin();
01660               itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01661            std::string lCabinClassPath = itStrDS->first;
01662            const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second;
01663            const stdair::CabinClassPairList_T& lCabinClassPairList =
01664              lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
```

```
01665            const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01666            // Sanity check
01667            assert (lCabinClassPairList.size() == lNbOfSegments);
01668
01669            //
01670            const stdair::SegmentDateList_T lOnDSegmentDateList =
01671              stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01672            // Sanity check
01673            assert (lOnDSegmentDateList.size() == lNbOfSegments);
01674            stdair::CabinClassPairList_T::const_iterator itCCP =
    lCabinClassPairList.begin();
01675            stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
    begin();
01676            // The sum of bid prices of all cabins.
01677            stdair::BidPrice_T lTotalBidPrice = 0;
01678            for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01679              // Get the operating segment cabin (it holds the bid price
    information).
01680              const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01681              assert (lSegmentDate_ptr != NULL);
01682              // Get the operating airline code and check if it is the airline we
    are looking for.
01683              const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01684                lSegmentDate_ptr->getOperatingSegmentDate ();
01685              if (lOperatingSegmentDate_ptr != NULL) {
01686                lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01687              }
01688              const stdair::CabinCode_T lCabinCode = itCCP->first;
01689              const stdair::SegmentCabin* lSegmentCabin_ptr =
01690                stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
    lSegmentDate_ptr,
01691
    lCabinCode);
01692              assert (lSegmentCabin_ptr != NULL);
01693              const stdair::LegCabinList_T lLegCabinList =
01694                stdair::BomManager::getList<stdair::LegCabin>(*lSegmentCabin_ptr)
    ;
01695              for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
    begin();
01696                   itLC != lLegCabinList.end(); ++itLC) {
01697                const stdair::LegCabin* lLegCabin_ptr = *itLC;
01698                assert (lLegCabin_ptr != NULL);
01699                lTotalBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01700              }
01701            }
01702
01703
01704            itCCP = lCabinClassPairList.begin();
01705            itSD = lOnDSegmentDateList.begin();
01706            for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01707              const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01708              assert (lSegmentDate_ptr != NULL);
01709              const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01710                lSegmentDate_ptr->getOperatingSegmentDate ();
01711              // Only operated legs receive the demand information.
01712              if (lOperatingSegmentDate_ptr == NULL) {
01713                const stdair::CabinCode_T lCabinCode = itCCP->first;
01714                const stdair::ClassCode_T lClassCode = itCCP->second;
01715                const stdair::SegmentCabin* lSegmentCabin_ptr =
01716                  stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
    lSegmentDate_ptr,
01717
    lCabinCode);
01718                assert (lSegmentCabin_ptr != NULL);
01719                const stdair::LegCabinList_T lLegCabinList =
01720                  stdair::BomManager::getList<stdair::LegCabin>
    (*lSegmentCabin_ptr);
01721                assert (!lLegCabinList.empty());
01722                const stdair::Yield_T& lYield = lYieldDemandPair.first;

01723                const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01724                  lYieldDemandPair.second;
01725                const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01726                const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
    second;
01727                for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
    begin();
01728                     itLC != lLegCabinList.end(); ++itLC) {
01729                  stdair::LegCabin* lLegCabin_ptr = *itLC;
01730                  assert (lLegCabin_ptr != NULL);
01731                  const stdair::BidPrice_T& lBidPrice = lLegCabin_ptr->
    getCurrentBidPrice();
01732                  const stdair::RealNumber_T lDynamicYieldProrationFactor =
    lBidPrice / lTotalBidPrice;
01733                  const stdair::Yield_T lProratedYield =
    lDynamicYieldProrationFactor*lYield;
01734                  lLegCabin_ptr->addDemandInformation (lProratedYield, lMeanValue
```

```
, lStdDevValue);
01735
01736                 // STDAIR_LOG_DEBUG ("Adding demand information to leg-cabin "
       << lLegCabin_ptr->getFullerKey()
01737                 //                    << " Total yield " << lYield << "
       Proration factor "
01738                 //                    << lDynamicYieldProrationFactor << "
       Prorated yield " << lProratedYield
01739                 //                    << " Mean demand " << lMeanValue << "
       StdDev " << lStdDevValue);
01740             }
01741           }
01742         }
01743       }
01744     }
01745   }
01746 }
01747
01748   // //////////////////////////////////////////////////////////////////
01749   void RMOL_Service::optimiseOnDUsingRMCooperation (const stdair::DateTime_T&
       iRMEventTime) {
01750
01751     if (_rmolServiceContext == NULL) {
01752       throw stdair::NonInitialisedServiceException ("The Rmol service "
01753                                                     "has not been initialised")
       ;
01754     }
01755     assert (_rmolServiceContext != NULL);
01756     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01757
01758     // Retrieve the bom root
01759     stdair::STDAIR_Service& lSTDAIR_Service =
01760       lRMOL_ServiceContext.getSTDAIR_Service();
01761     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01762
01763     // Retrieve the date from the RM event
01764     const stdair::Date_T lDate = iRMEventTime.date();
01765
01766     // Browse the list of inventories and optimise within each one
       independently.
01767     const stdair::InventoryList_T& lInvList =
01768       stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01769     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01770          itInv != lInvList.end(); ++itInv) {
01771       stdair::Inventory* lCurrentInv_ptr = *itInv;
01772       assert (lCurrentInv_ptr != NULL);
01773
01774       double lMaxBPVariation = 1.0;
01775       short lIterationCounter = 0;
01776       // Iterate until the variation is under the wanted level or the maximal
       number of iterations is reached.
01777       while (lMaxBPVariation > 0.01 && lIterationCounter < 10) {
01778         lMaxBPVariation = 0.0;
01779         lIterationCounter++;
01780         const stdair::FlightDateList_T& lFlightDateList =
01781           stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01782         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01783              lFlightDateList.begin();
01784            itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01785           stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01786           assert (lCurrentFlightDate_ptr != NULL);
01787
01788           const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr
       ->getDepartureDate();
01789           stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01790           stdair::DTD_T lDTD = short (lDateOffset.days());
01791
01792           stdair::DCPList_T::const_iterator itDCP =
01793             std::find (stdair::DEFAULT_DCP_LIST.begin(),
       stdair::DEFAULT_DCP_LIST.end(), lDTD);
01794           // Check if the optimisation is needed.
01795           if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01796             const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
       lCurrentFlightDate_ptr);
01797             lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01798           }
01799         }
01800         // Update the prorated yields for the current inventory.
01801         resetDemandInformation (iRMEventTime, *lCurrentInv_ptr);
01802         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lCurrentInv_ptr);
01803       }
01804     }
01805   }
01806
01807
01808   // //////////////////////////////////////////////////////////////////
01809   void RMOL_Service::optimiseOnDUsingAdvancedRMCooperation (const
```

```
          stdair::DateTime_T& iRMEventTime) {
01810
01811      if (_rmolServiceContext == NULL) {
01812        throw stdair::NonInitialisedServiceException ("The Rmol service "
01813                                                        "has not been initialised")
      ;
01814      }
01815      assert (_rmolServiceContext != NULL);
01816      RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01817
01818      // Retrieve the bom root
01819      stdair::STDAIR_Service& lSTDAIR_Service =
01820        lRMOL_ServiceContext.getSTDAIR_Service();
01821      stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01822
01823      // Retrieve the date from the RM event
01824      const stdair::Date_T lDate = iRMEventTime.date();
01825
01826      double lMaxBPVariation = 1.0;
01827      short lIterationCounter = 0;
01828      // Iterate until the variation is under the wanted level or the maximal
      number of iterations is reached.
01829      // Every iteration corresponds to the optimisation of the whole network.
      Bid prices are communicated
01830      // between partners at the end of each iteration.
01831      while (lMaxBPVariation > 0.01 && lIterationCounter < 50) {
01832        lMaxBPVariation = 0.0;
01833        lIterationCounter++;
01834
01835        const stdair::InventoryList_T& lInvList =
01836          stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01837        for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01838             itInv != lInvList.end(); ++itInv) {
01839          stdair::Inventory* lCurrentInv_ptr = *itInv;
01840          assert (lCurrentInv_ptr != NULL);
01841          const stdair::FlightDateList_T& lFlightDateList =
01842            stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01843          for (stdair::FlightDateList_T::const_iterator itFlightDate =
01844               lFlightDateList.begin();
01845               itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01846            stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01847            assert (lCurrentFlightDate_ptr != NULL);
01848
01849            const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr
      ->getDepartureDate();
01850            stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01851            stdair::DTD_T lDTD = short (lDateOffset.days());
01852
01853            stdair::DCPList_T::const_iterator itDCP =
01854              std::find (stdair::DEFAULT_DCP_LIST.begin(),
      stdair::DEFAULT_DCP_LIST.end(), lDTD);
01855            if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01856              const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
      lCurrentFlightDate_ptr);
01857              lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01858            }
01859          }
01860        }
01861        // At the end of each iteration, communicate bid prices and compute
      displacement adjusted yields.
01862        updateBidPrice (iRMEventTime);
01863        resetDemandInformation (iRMEventTime);
01864        projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
01865      }
01866    }
01867
01868 }
```

28.97 rmol/service/RMOL_ServiceContext.cpp File Reference

```
#include <cassert>
#include <sstream>
#include <stdair/STDAIR_Service.hpp>
#include <rmol/basic/BasConst_RMOL_Service.hpp>
#include <rmol/service/RMOL_ServiceContext.hpp>
```

Namespaces

- namespace RMOL

28.98   RMOL_ServiceContext.cpp

```
00001 // //////////////////////////////////////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/STDAIR_Service.hpp>
00009 // RMOL
00010 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00011 #include <rmol/service/RMOL_ServiceContext.hpp>
00012
00013 namespace RMOL {
00014
00015   // //////////////////////////////////////////////////////////////////////
00016   RMOL_ServiceContext::RMOL_ServiceContext() : _ownStdairService (false) {
00017   }
00018
00019   // //////////////////////////////////////////////////////////////////////
00020   RMOL_ServiceContext::RMOL_ServiceContext (const RMOL_ServiceContext&) {
00021     assert (false);
00022   }
00023
00024   // //////////////////////////////////////////////////////////////////////
00025   RMOL_ServiceContext::~RMOL_ServiceContext() {
00026   }
00027
00028   // //////////////////////////////////////////////////////////////////////
00029   stdair::STDAIR_Service& RMOL_ServiceContext::getSTDAIR_Service() const {
00030     assert (_stdairService != NULL);
00031     return *_stdairService;
00032   }
00033
00034   // //////////////////////////////////////////////////////////////////////
00035   const std::string RMOL_ServiceContext::shortDisplay() const {
00036     std::ostringstream oStr;
00037     oStr << "RMOL_ServiceContext -- Owns StdAir service: " << _ownStdairService
;
00038     return oStr.str();
00039   }
00040
00041   // //////////////////////////////////////////////////////////////////////
00042   const std::string RMOL_ServiceContext::display() const {
00043     std::ostringstream oStr;
00044     oStr << shortDisplay();
00045     return oStr.str();
00046   }
00047
00048   // //////////////////////////////////////////////////////////////////////
00049   const std::string RMOL_ServiceContext::describe() const {
00050     return shortDisplay();
00051   }
00052
00053   // //////////////////////////////////////////////////////////////////////
00054   void RMOL_ServiceContext::reset() {
00055     if (_ownStdairService == true) {
00056       _stdairService.reset();
00057     }
00058   }
00059
00060 }
```

28.99   rmol/service/RMOL_ServiceContext.hpp File Reference

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_service_types.hpp>
#include <stdair/service/ServiceAbstract.hpp>
#include <rmol/RMOL_Types.hpp>
```

Classes

- class RMOL::RMOL_ServiceContext

    Inner class holding the context for the RMOL Service object.

Namespaces

- namespace stdair
- namespace RMOL

28.100   RMOL_ServiceContext.hpp

```
00001 #ifndef __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00003
00004 // //////////////////////////////////////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_maths_types.hpp>
00013 #include <stdair/stdair_service_types.hpp>
00014 #include <stdair/service/ServiceAbstract.hpp>
00015 // RMOL
00016 #include <rmol/RMOL_Types.hpp>
00017
00018 namespace stdair {
00019 namespace stdair {
00020   class STDAIR_Service;
00021   class LegCabin;
00022 }
00023
00024 namespace RMOL {
00025
00029   class RMOL_ServiceContext : public stdair::ServiceAbstract {
00035     friend class RMOL_Service;
00036     friend class FacRmolServiceContext;
00037
00038   private:
00039     // ///////// Getters //////////
00043     stdair::STDAIR_ServicePtr_T getSTDAIR_ServicePtr() const {
00044       return _stdairService;
00045     }
00046
00050     stdair::STDAIR_Service& getSTDAIR_Service() const;
00051
00055     const bool getOwnStdairServiceFlag() const {
00056       return _ownStdairService;
00057     }
00058
00059
00060   private:
00061     // ///////// Setters //////////
00065     void setSTDAIR_Service (stdair::STDAIR_ServicePtr_T ioSTDAIR_ServicePtr,
00066                             const bool iOwnStdairService) {
00067       _stdairService = ioSTDAIR_ServicePtr;
00068       _ownStdairService = iOwnStdairService;
00069     }
00070
00074     void reset();
00075
00076
00077   private:
00078     // ///////// Display Methods //////////
00082     const std::string shortDisplay() const;
00083
00087     const std::string display() const;
00088
00092     const std::string describe() const;
00093
00094
00095   private:
00096     // /////// Construction / initialisation ////////
```

```
00100     RMOL_ServiceContext();
00104     RMOL_ServiceContext (const RMOL_ServiceContext&);
00105
00109     ~RMOL_ServiceContext();
00110
00111
00112   private:
00113     // ///////////// Children /////////////
00117     stdair::STDAIR_ServicePtr_T _stdairService;
00118
00122     bool _ownStdairService;
00123   };
00124
00125 }
00126 #endif // __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
```

28.101 test/rmol/bomsforforecaster.cpp File Reference

28.102 bomsforforecaster.cpp

```
00001
00005 // //////////////////////////////////////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////////////////////////////////////
00008 // STL
00009 #include <cassert>
00010 #include <limits>
00011 #include <sstream>
00012 #include <fstream>
00013 #include <string>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE OptimiseTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir
00020 #include <stdair/basic/BasLogParams.hpp>
00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/service/Logger.hpp>
00023 // RMOL
00024 #include <rmol/RMOL_Service.hpp>
00025 #include <rmol/config/rmol-paths.hpp>
00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");
00031
00035 struct UnitTestConfig {
00037   UnitTestConfig() {
00038     boost_utf::unit_test_log.set_stream (utfReportStream);
00039     boost_utf::unit_test_log.set_format (boost_utf::XML);
00040     boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00041     //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
00042   }
00043
00045   ~UnitTestConfig() {
00046   }
00047 };
00048
00049 namespace RMOL {
00050
00052   struct BookingClassData {
00053
00054     // Attributes
00055     double _bookingCount;
00056     double _fare;
00057     double _sellupFactor;
00058     bool _censorshipFlag;
00059
00060     // Constructer
00061     BookingClassData (const double iBookingCount, const double iFare,
00062                       const double iSellupFactor, const bool iCensorshipFlag)
00063       : _bookingCount(iBookingCount), _fare(iFare),
00064         _sellupFactor(iSellupFactor), _censorshipFlag(iCensorshipFlag) {
00065     }
00066
00067     // Getters
00068     double getFare () const {
00069       return _fare;
00070     }
00071
```

```
00072     bool getCensorshipFlag () const {
00073       return _censorshipFlag;
00074     }
00075
00076     // Display
00077     std::string toString() const {
00078       std::ostringstream oStr;
00079       oStr <<  std::endl
00080           << "[Booking class data information]" << std::endl
00081           << "Booking counter: " << _bookingCount << std::endl
00082          << "Fare: " << _fare << std::endl
00083          << "Sell-up Factor: " << _sellupFactor << std::endl
00084          << "censorshipFlag: " << _censorshipFlag << std::endl;
00085       return oStr.str();
00086     }
00087
00088   };
00089
00091   struct BookingClassDataSet {
00092
00093     typedef std::vector<BookingClassData*> BookingClassDataList_T;
00094
00095     // Attributes
00096     int _numberOfClass;
00097     double _minimumFare;
00098     bool _censorshipFlag; // true if any of the classes is censored
00099     BookingClassDataList_T _bookingClassDataList;
00100
00101     // Constructor
00102     BookingClassDataSet ()
00103       : _numberOfClass(0), _minimumFare(0),
00104         _censorshipFlag(false) {
00105     }
00106
00107     // Add BookingClassData
00108     void addBookingClassData (BookingClassData& ioBookingClassData) {
00109       _bookingClassDataList.push_back (&ioBookingClassData);
00110     }
00111
00112     // Getters
00113     unsigned int getNumberOfClass () const {
00114       return _bookingClassDataList.size();
00115     }
00116
00117     double getMinimumFare () const {
00118       return _minimumFare;
00119     }
00120
00121     bool getCensorshipFlag () const {
00122       return _censorshipFlag;
00123     }
00124
00125     // Setters
00126     void setMinimumFare (const double iMinFare) {
00127       _minimumFare = iMinFare;
00128     }
00129
00130     void setCensorshipFlag (const bool iCensorshipFlag) {
00131       _censorshipFlag = iCensorshipFlag;
00132     }
00133
00134     // compute minimum fare
00135     void updateMinimumFare() {
00136       double minFare = std::numeric_limits<double>::max();
00137       BookingClassDataList_T::iterator itBookingClassDataList;
00138       for (itBookingClassDataList = _bookingClassDataList.begin();
00139           itBookingClassDataList != _bookingClassDataList.end();
00140          ++itBookingClassDataList) {
00141       BookingClassData* lBookingClassData = *itBookingClassDataList;
00142       assert (lBookingClassData != NULL);
00143
00144         const double lFare = lBookingClassData->getFare();
00145        if (lFare < minFare) {
00146          minFare = lFare;
00147        }
00148       }
00149       //
00150       setMinimumFare(minFare);
00151     }
00152
00153     // compute censorship flag for the data set
00154     void updateCensorshipFlag () {
00155       bool censorshipFlag = false;
00156       BookingClassDataList_T::iterator itBookingClassDataList;
00157       for (itBookingClassDataList = _bookingClassDataList.begin();
00158           itBookingClassDataList != _bookingClassDataList.end();
00159          ++itBookingClassDataList) {
```

```
00160           BookingClassData* lBookingClassData = *itBookingClassDataList;
00161           assert (lBookingClassData != NULL);
00162
00163           const bool lCensorshipFlagOfAClass =
00164             lBookingClassData->getCensorshipFlag();
00165           if (lCensorshipFlagOfAClass) {
00166             censorshipFlag = true;
00167             break;
00168           }
00169         }
00170         //
00171         setCensorshipFlag(censorshipFlag);
00172       }
00173
00174     // Display
00175     std::string toString() const {
00176       std::ostringstream oStr;
00177       oStr << std::endl
00178             << "[Booking class data set information]" << std::endl
00179             << "Number of classes: " << _numberOfClass << std::endl
00180             << "Minimum fare: " << _minimumFare << std::endl
00181             << "The data of the class set are sensored: " << _censorshipFlag
00182             << std::endl;
00183       return oStr.str();
00184     }
00185
00186   };
00187
00188   // /**-------------- BOM : Q-Forecaster ---------------------- */
00189   // struct QForecaster {
00190
00191   //   // Function focused BOM
00192
00193   //   // 1. calculate sell up probability for Q-eq
00194
00195   //   // 2. calculate Q-Equivalent Booking
00196   //   double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
00197   //     double lQEqBooking = 0.0;
00198   //     double lMinFare = iBookingClassDataSet.getMinimumFare();
00199
00200
00201   //     return lQEqBooking;
00202   //   }
00203
00204   //   /* Calculate Q-equivalent demand
00205   //       [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
00206   //   */
00207
00208
00209   //   // 3. Partition to each class
00210
00211   //   //
00212
00213   // };
00214
00215 }
00216
00217 // /////////////// Main: Unit Test Suite ///////////////
00218
00219 // Set the UTF configuration (re-direct the output to a specific file)
00220 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00221
00225 BOOST_AUTO_TEST_SUITE (master_test_suite)
00226
00227
00230 BOOST_AUTO_TEST_CASE (rmol_forecaster) {
00231
00232   // Output log File
00233   std::string lLogFilename ("bomsforforecaster.log");
00234   std::ofstream logOutputFile;
00235
00236   // Open and clean the log outputfile
00237   logOutputFile.open (lLogFilename.c_str());
00238   logOutputFile.clear();
00239
00240   // Initialise the RMOL service
00241   const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00242
00243   // Initialise the RMOL service
00244   RMOL::RMOL_Service rmolService (lLogParams);
00245
00246   // Build a sample BOM tree
00247   rmolService.buildSampleBom();
00248
00249   // Register BCDataSet
00250   RMOL::BookingClassDataSet lBookingClassDataSet;
00251
```

```
00252    // Register BookingClassData
00253    RMOL::BookingClassData QClassData (10, 100, 1, false);
00254    RMOL::BookingClassData MClassData (5, 150, 0.8, true);
00255    RMOL::BookingClassData BClassData (0, 200, 0.6, false);
00256    RMOL::BookingClassData YClassData (0, 300, 0.3, false);
00257
00258    // Display
00259    STDAIR_LOG_DEBUG (QClassData.toString());
00260    STDAIR_LOG_DEBUG (MClassData.toString());
00261    STDAIR_LOG_DEBUG (BClassData.toString());
00262    STDAIR_LOG_DEBUG (YClassData.toString());
00263
00264    // Add BookingClassData into the BCDataSet
00265    lBookingClassDataSet.addBookingClassData (QClassData);
00266    lBookingClassDataSet.addBookingClassData (MClassData);
00267    lBookingClassDataSet.addBookingClassData (BClassData);
00268    lBookingClassDataSet.addBookingClassData (YClassData);
00269
00270    // DEBUG
00271    STDAIR_LOG_DEBUG (lBookingClassDataSet.toString());
00272
00273    // Number of classes
00274    const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();
00275
00276    // DEBUG
00277    STDAIR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);
00278
00279    // Minimum fare
00280    BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
00281    const double lMinFare = lBookingClassDataSet.getMinimumFare();
00282
00283    // DEBUG
00284    STDAIR_LOG_DEBUG ("Minimum fare: " << lMinFare);
00285
00286    // Censorship flag
00287    BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
00288    const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();
00289
00290    // DEBUG
00291    STDAIR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);
00292
00293    // Close the log output file
00294    logOutputFile.close();
00295 }
00296
00297 // End the test suite
00298 BOOST_AUTO_TEST_SUITE_END()
00299
00300
```

28.103   test/rmol/ForecasterTestSuite.cpp File Reference

28.104   ForecasterTestSuite.cpp

```
00001
00005 // //////////////////////////////////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 #include <vector>
00013 #include <cmath>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE ForecasterTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir
00020 #include <stdair/basic/BasLogParams.hpp>
00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/basic/BasFileMgr.hpp>
00023 #include <stdair/service/Logger.hpp>
00024 // RMOL
00025 #include <rmol/RMOL_Service.hpp>
00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");
00031
00035 struct UnitTestConfig {
```

```
00037   UnitTestConfig() {
00038     boost_utf::unit_test_log.set_stream (utfReportStream);
00039     boost_utf::unit_test_log.set_format (boost_utf::XML);
00040     boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00041     //boost_utf::unit_test_log.set_threshold_level
     (boost_utf::log_successful_tests);
00042   }
00043
00045   ~UnitTestConfig() {
00046   }
00047 };
00048
00049
00050 // /////////////// Main: Unit Test Suite ///////////////
00051
00052 // Set the UTF configuration (re-direct the output to a specific file)
00053 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00054
00059 BOOST_AUTO_TEST_SUITE (master_test_suite)
00060
00061
00064 BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
00065   const bool lTestFlag = true; //testForecasterHelper(0);
00066   BOOST_CHECK_EQUAL (lTestFlag, true);
00067   BOOST_CHECK_MESSAGE (lTestFlag == true,
00068                        "The test has failed. Please see the log file for "
00069                        << "more details");
00070 }
00071
00072 // End the test suite
00073 BOOST_AUTO_TEST_SUITE_END()
00074
00075
```

28.105   test/rmol/ForecasterTestSuite.hpp File Reference

```
#include <sstream>
#include <cppunit/extensions/HelperMacros.h>
```

Classes

- class ForecasterTestSuite

Functions

- CPPUNIT_TEST_SUITE_REGISTRATION (ForecasterTestSuite)

28.105.1   Function Documentation

28.105.1.1   CPPUNIT_TEST_SUITE_REGISTRATION (ForecasterTestSuite)

28.106   ForecasterTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class ForecasterTestSuite : public CppUnit::TestFixture {
00007   CPPUNIT_TEST_SUITE (ForecasterTestSuite);
00008   CPPUNIT_TEST (testQForecaster);
00009   CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00013   void testQForecaster();
00014
00016   ForecasterTestSuite ();
00017
00018 protected:
00019   std::stringstream _describeKey;
00020 };
```

```
00021
00022 CPPUNIT_TEST_SUITE_REGISTRATION (ForecasterTestSuite);
```

28.107   test/rmol/OptimiseTestSuite.cpp File Reference

28.108   OptimiseTestSuite.cpp

```
00001
00005 // //////////////////////////////////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN
00015 #define BOOST_TEST_MODULE OptimiseTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024 #include <rmol/config/rmol-paths.hpp>
00025
00026 namespace boost_utf = boost::unit_test;
00027
00028 // (Boost) Unit Test XML Report
00029 std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");
00030
00034 struct UnitTestConfig {
00036   UnitTestConfig() {
00037     boost_utf::unit_test_log.set_stream (utfReportStream);
00038     boost_utf::unit_test_log.set_format (boost_utf::XML);
00039     boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00040     //boost_utf::unit_test_log.set_threshold_level
   (boost_utf::log_successful_tests);
00041   }
00042
00044   ~UnitTestConfig() {
00045   }
00046 };
00047
00048
00049 // //////////////////////////////////////////////////////////////////
00050 int testOptimiseHelper (const unsigned short optimisationMethodFlag,
00051                         const bool isBuiltin) {
00052
00053   // Return value
00054   int oExpectedBookingLimit = 0;
00055
00056   // Output log File
00057   std::ostringstream oStr;
00058   oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
00059   const stdair::Filename_T lLogFilename (oStr.str());
00060
00061   // Number of random draws to be generated (best if greater than 100)
00062   const int K = 100000;
00063
00064   // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00065   // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
00066   const unsigned short METHOD_FLAG = optimisationMethodFlag;
00067
00068   // Cabin Capacity (it must be greater then 100 here)
00069   const double cabinCapacity = 100.0;
00070
00071   // Set the log parameters
00072   std::ofstream logOutputFile;
00073   // Open and clean the log outputfile
00074   logOutputFile.open (lLogFilename.c_str());
00075   logOutputFile.clear();
00076
00077   // Initialise the RMOL service
00078   const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00079   RMOL::RMOL_Service rmolService (lLogParams);
00080
00081   // Check wether or not a (CSV) input file should be read
00082   if (isBuiltin == true) {
00083
```

```
00084      // Build the default sample BOM tree and build a dummy BOM tree.
00085      rmolService.buildSampleBom();
00086
00087    } else {
00088
00089      // Parse the optimisation data and build a dummy BOM tree
00090      const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
00091      rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);
00092    }
00093
00094    switch (METHOD_FLAG) {
00095    case 0: {
00096      // DEBUG
00097      STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");
00098
00099      // Calculate the optimal protections by the Monte Carlo
00100      // Integration approach
00101      rmolService.optimalOptimisationByMCIntegration (K);
00102      break;
00103    }
00104
00105    case 1: {
00106      // DEBUG
00107      STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");
00108
00109      // Calculate the optimal protections by DP.
00110      rmolService.optimalOptimisationByDP ();
00111      break;
00112    }
00113
00114    case 2: {
00115      // DEBUG
00116      STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");
00117
00118      // Calculate the Bid-Price Vector by EMSR
00119      rmolService.heuristicOptimisationByEmsr ();
00120      break;
00121    }
00122
00123    case 3: {
00124      // DEBUG
00125      STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");
00126
00127      // Calculate the protections by EMSR-a
00128      // Test the EMSR-a algorithm implementation
00129      rmolService.heuristicOptimisationByEmsrA ();
00130
00131      // Return a cumulated booking limit value to test
00132      // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
00133      break;
00134    }
00135
00136    case 4: {
00137      // DEBUG
00138      STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");
00139
00140      // Calculate the protections by EMSR-b
00141      rmolService.heuristicOptimisationByEmsrB ();
00142      break;
00143    }
00144
00145    default: rmolService.optimalOptimisationByMCIntegration (K);
00146    }
00147
00148    // Close the log file
00149    logOutputFile.close();
00150
00151    return oExpectedBookingLimit;
00152 }
00153
00154
00155 // /////////////// Main: Unit Test Suite ///////////////
00156
00157 // Set the UTF configuration (re-direct the output to a specific file)
00158 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00159
00160 // ////////////////////////////////////////////////////////////////////
00161 // Tests are based on the following input values
00162 // price; mean; standard deviation;
00163 // 1050; 17.3; 5.8;
00164 // 567; 45.1; 15.0;
00165 // 534; 39.6; 13.2;
00166 // 520; 34.0; 11.3;
00167 // ////////////////////////////////////////////////////////////////////
00168
00173 BOOST_AUTO_TEST_SUITE (master_test_suite)
00174
```

```
00175
00178 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {
00179
00180   // State whether the BOM tree should be built-in or parsed from an input file
00181   const bool isBuiltin = false;
00182
00183   BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin););
00184 }
00185
00189 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {
00190
00191   // State whether the BOM tree should be built-in or parsed from an input file
00192   const bool isBuiltin = false;
00193
00194   BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin););
00195 }
00196
00201 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {
00202
00203   // State whether the BOM tree should be built-in or parsed from an input file
00204   const bool isBuiltin = false;
00205
00206   BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin););
00207 }
00208
00213 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {
00214
00215   // State whether the BOM tree should be built-in or parsed from an input file
00216   const bool isBuiltin = false;
00217
00218   BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin););
00219   // const int lBookingLimit = testOptimiseHelper(3);
00220   // const int lExpectedBookingLimit = 61;
00221   // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
00222   // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,
00223   //                     "The booking limit is " << lBookingLimit
00224   //                      << ", but it is expected to be "
00225   //                      << lExpectedBookingLimit);
00226 }
00227
00232 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {
00233
00234   // State whether the BOM tree should be built-in or parsed from an input file
00235   const bool isBuiltin = false;
00236
00237   BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin););
00238 }
00239
00243 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {
00244
00245   // State whether the BOM tree should be built-in or parsed from an input file
00246   const bool isBuiltin = true;
00247
00248   BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin););
00249 }
00250
00254 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {
00255
00256   // State whether the BOM tree should be built-in or parsed from an input file
00257   const bool isBuiltin = true;
00258
00259   BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin););
00260 }
00261
00266 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {
00267
00268   // State whether the BOM tree should be built-in or parsed from an input file
00269   const bool isBuiltin = true;
00270
00271   BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin););
00272 }
00273
00278 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {
00279
00280   // State whether the BOM tree should be built-in or parsed from an input file
00281   const bool isBuiltin = true;
00282
00283   BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin););
00284 }
00285
00290 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {
00291
00292   // State whether the BOM tree should be built-in or parsed from an input file
00293   const bool isBuiltin = true;
00294
00295   BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin););
00296 }
```

```
00297
00298 // End the test suite
00299 BOOST_AUTO_TEST_SUITE_END()
00300
00301
```

28.109   test/rmol/OptimiseTestSuite.hpp File Reference

```
#include <sstream>
#include <cppunit/extensions/HelperMacros.h>
```

Classes

- class OptimiseTestSuite

Functions

- CPPUNIT_TEST_SUITE_REGISTRATION (OptimiseTestSuite)

28.109.1   Function Documentation

28.109.1.1   CPPUNIT_TEST_SUITE_REGISTRATION (OptimiseTestSuite)

28.110   OptimiseTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class OptimiseTestSuite : public CppUnit::TestFixture {
00007   CPPUNIT_TEST_SUITE (OptimiseTestSuite);
00008   CPPUNIT_TEST (testOptimiseMC);
00009   CPPUNIT_TEST (testOptimiseDP);
00010   CPPUNIT_TEST (testOptimiseEMSR);
00011   CPPUNIT_TEST (testOptimiseEMSRa);
00012   CPPUNIT_TEST (testOptimiseEMSRb);
00013   CPPUNIT_TEST (testOptimiseEMSRaWithSU);
00014   //  CPPUNIT_TEST (errorCase);
00015   CPPUNIT_TEST_SUITE_END ();
00016 public:
00017
00019   void testOptimiseMC();
00020
00022   void testOptimiseDP();
00023
00026   void testOptimiseEMSR();
00027
00030   void testOptimiseEMSRa();
00031
00034   void testOptimiseEMSRb();
00035
00037   //  void errorCase ();
00038
00040   OptimiseTestSuite ();
00041
00042 protected:
00043   std::stringstream _describeKey;
00044 };
00045
00046 CPPUNIT_TEST_SUITE_REGISTRATION (OptimiseTestSuite);
```

28.111   test/rmol/UnconstrainerTestSuite.cpp File Reference

28.112   UnconstrainerTestSuite.cpp

```
00001
```

```
00005 // //////////////////////////////////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN
00015 #define BOOST_TEST_MODULE UnconstrainerTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024
00025 namespace boost_utf = boost::unit_test;
00026
00027 // (Boost) Unit Test XML Report
00028 std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");
00029
00033 struct UnitTestConfig {
00035   UnitTestConfig() {
00036     boost_utf::unit_test_log.set_stream (utfReportStream);
00037     boost_utf::unit_test_log.set_format (boost_utf::XML);
00038     boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00039     //boost_utf::unit_test_log.set_threshold_level
      (boost_utf::log_successful_tests);
00040   }
00041
00043   ~UnitTestConfig() {
00044   }
00045 };
00046
00047
00048 // /////////////// Main: Unit Test Suite ///////////////
00049
00050 // Set the UTF configuration (re-direct the output to a specific file)
00051 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00052
00057 BOOST_AUTO_TEST_SUITE (master_test_suite)
00058
00059
00062 BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
00063   const bool lTestFlag = true;// testUnconstrainerHelper(0);
00064   BOOST_CHECK_EQUAL (lTestFlag, true);
00065   BOOST_CHECK_MESSAGE (lTestFlag == true,
00066                        "The test has failed. Please see the log file for "
00067                        << "more details");
00068 }
00069
00070 // End the test suite
00071 BOOST_AUTO_TEST_SUITE_END()
00072
00073
```

28.113 test/rmol/UnconstrainerTestSuite.hpp File Reference

```
#include <sstream>
#include <cppunit/extensions/HelperMacros.h>
```

Classes

- class UnconstrainerTestSuite

Functions

- CPPUNIT_TEST_SUITE_REGISTRATION (UnconstrainerTestSuite)

28.113.1 Function Documentation

28.113.1.1 CPPUNIT_TEST_SUITE_REGISTRATION (UnconstrainerTestSuite)

28.114 UnconstrainerTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class UnconstrainerTestSuite : public CppUnit::TestFixture {
00007   CPPUNIT_TEST_SUITE (UnconstrainerTestSuite);
00008   CPPUNIT_TEST (testUnconstrainingByEM);
00009   CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00013   void testUnconstrainingByEM();
00014
00016   UnconstrainerTestSuite ();
00017
00018 protected:
00019   std::stringstream _describeKey;
00020 };
00021
00022 CPPUNIT_TEST_SUITE_REGISTRATION (UnconstrainerTestSuite);
```

Index