DBatLoader: Abusing Discord to Deliver Warzone RAT

netskope.com/blog/dbatloader-abusing-discord-to-deliver-warzone-rat

Gustavo Palazolo October 21, 2021

Summary

67% of the malware downloads Netskope blocks come from popular cloud applications being abused by attackers. One of the services commonly abused by threat actors is Discord, which is abused to host malware such as TroubleGrabber using public attachment URLs.

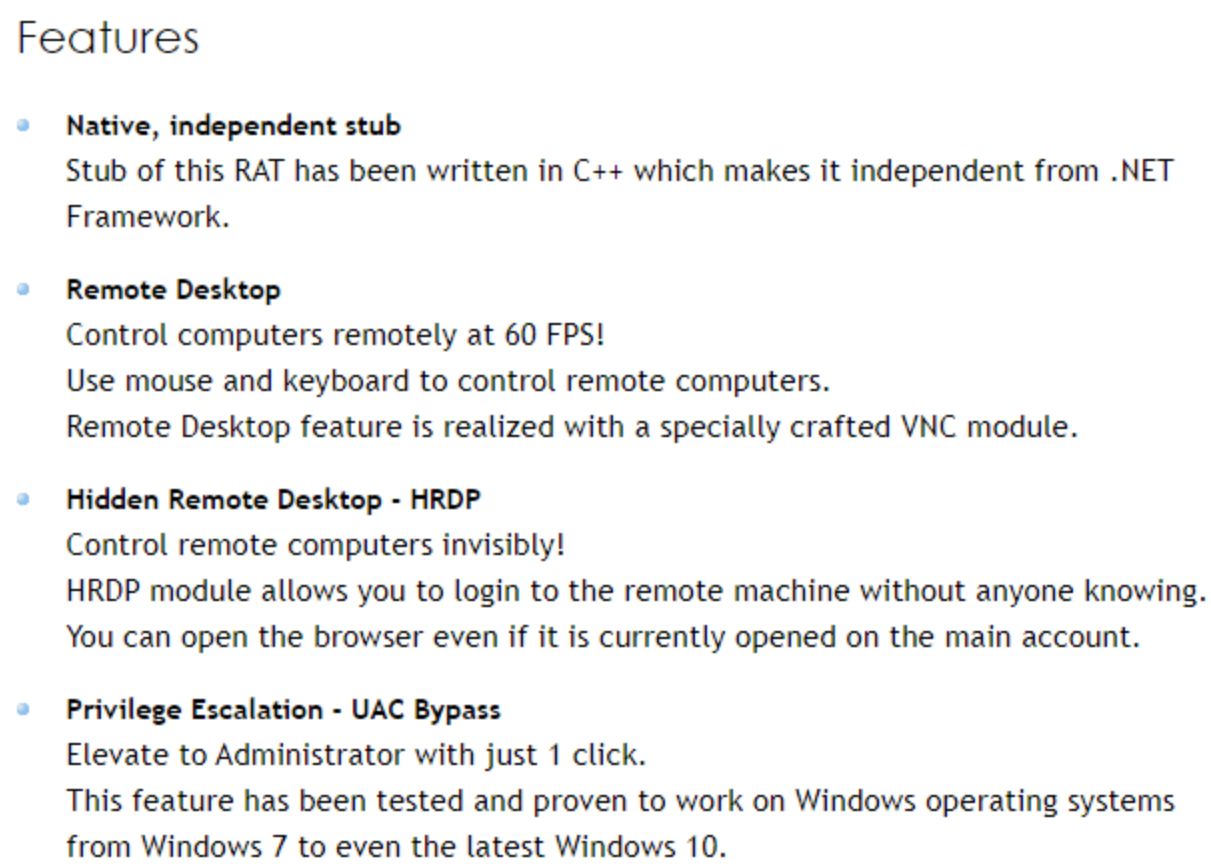
In this blog post, we will analyze a recent DBatLoader (a.k.a. ModiLoader) sample that uses this technique on Discord to deliver a malware known as Warzone (a.k.a. Ave Maria), a Remote Access Trojan created in 2018.

This malware is actively being sold on the internet, through a dedicated website:

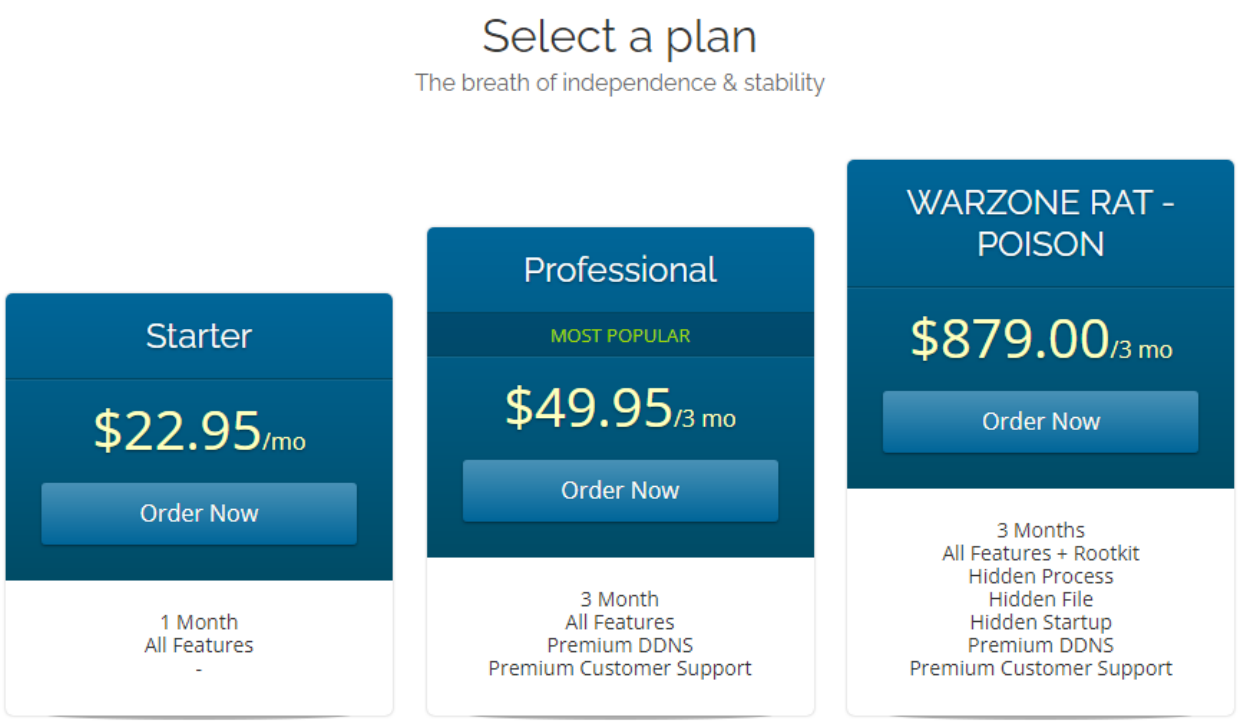
Warzone RAT website.

It offers a long list of capabilities, such as:

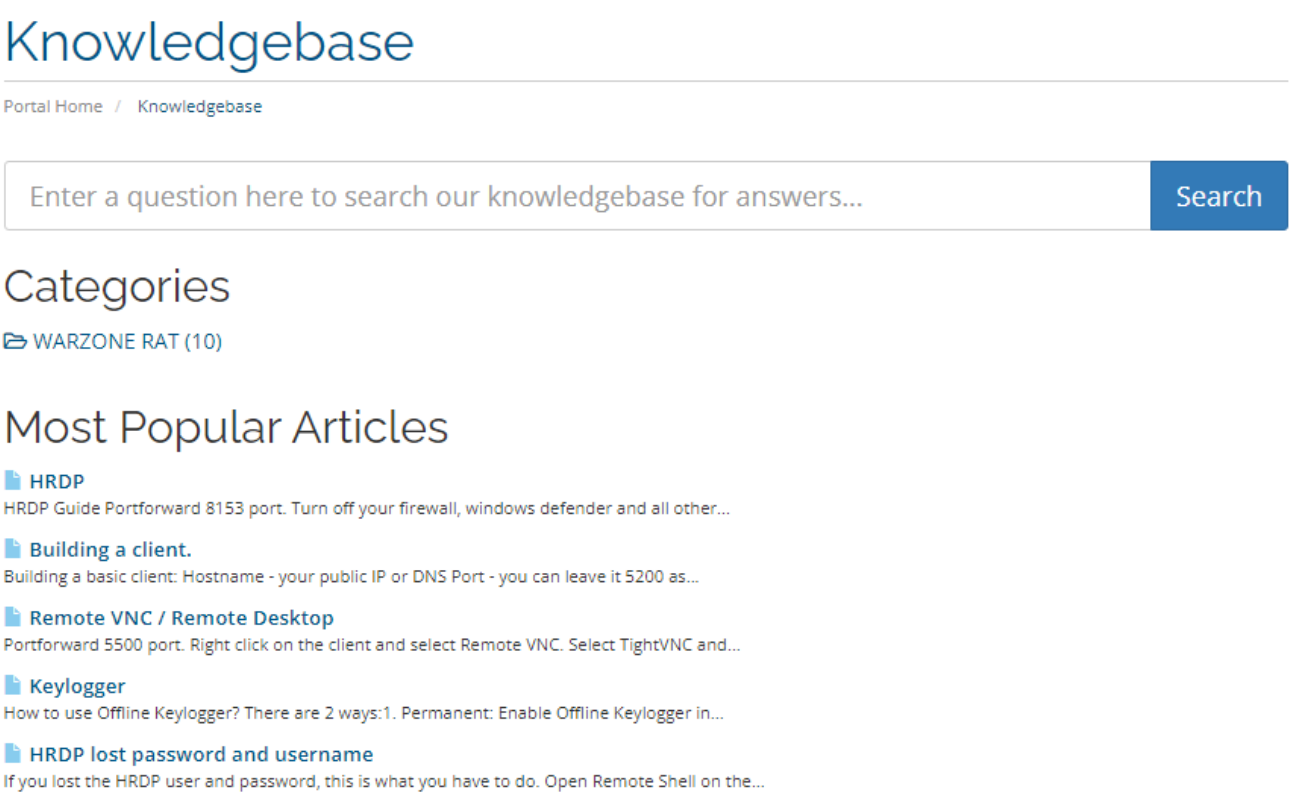
- Remote Desktop
- WebCam Live Stream
- Download/Upload Files
- Password Grabber (Chrome, Firefox, Internet Explorer, Edge, Outlook, etc.)
- Offline/Online Keylogger



Warzone features, according to their website.
The malware is being sold under many prices, depending on the selected plan:



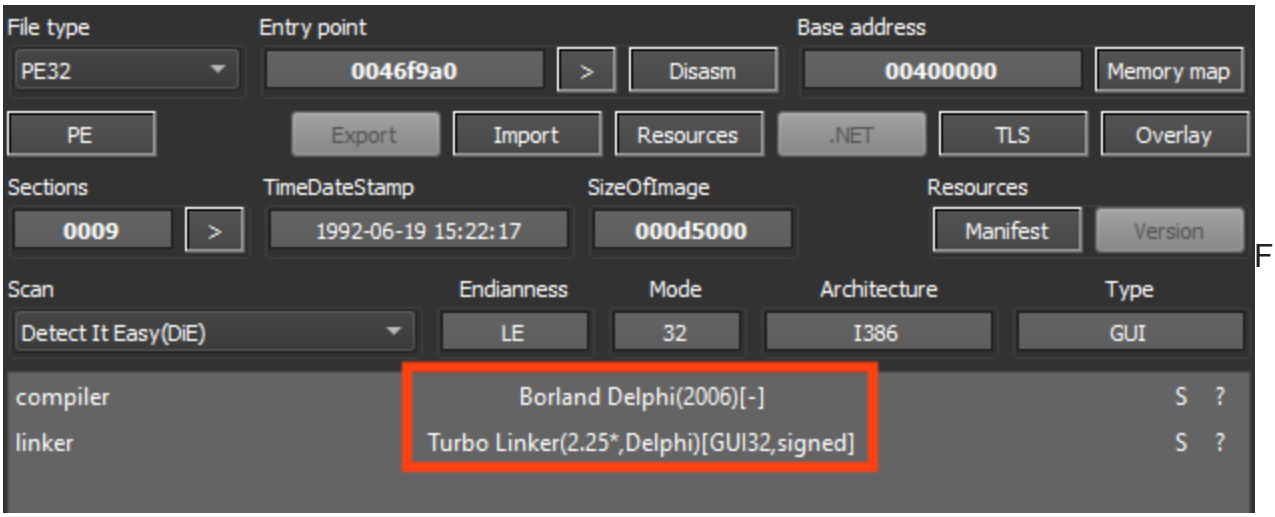
Warzone RAT prices.
The website even includes a knowledge base that contains information about the usage of Warzone RAT.



Warzone RAT knowledge base.

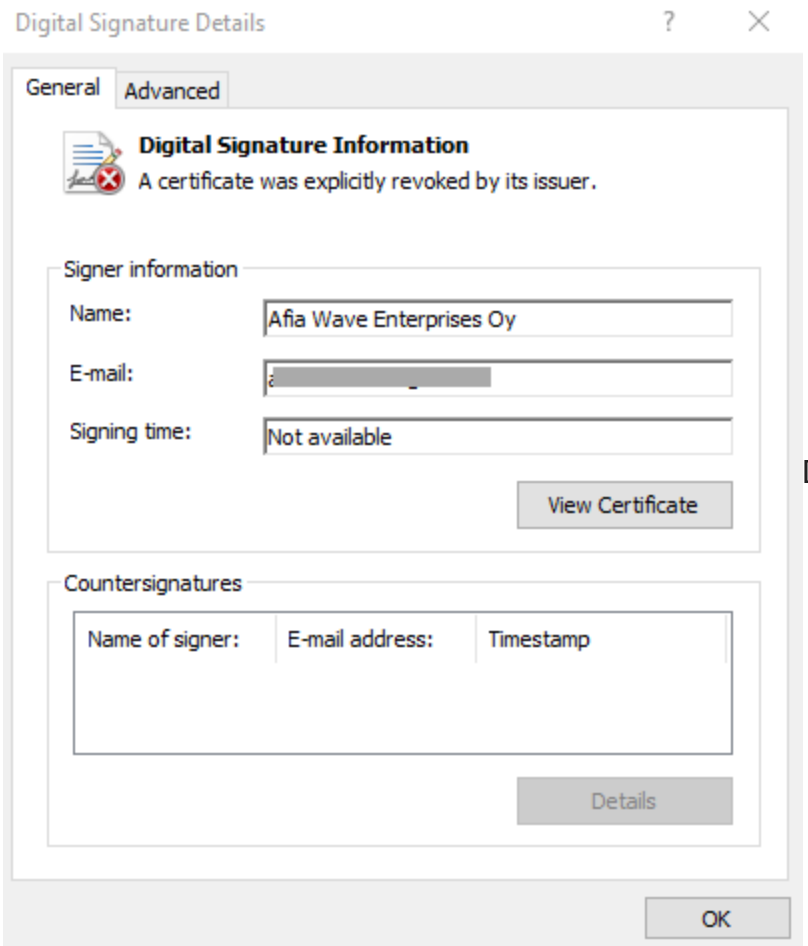
Analysis

It all starts with the first stage of DBatLoader, which is known for abusing cloud services, like Google Drive and Discord, to retrieve its second stage, both of which are developed in Delphi.



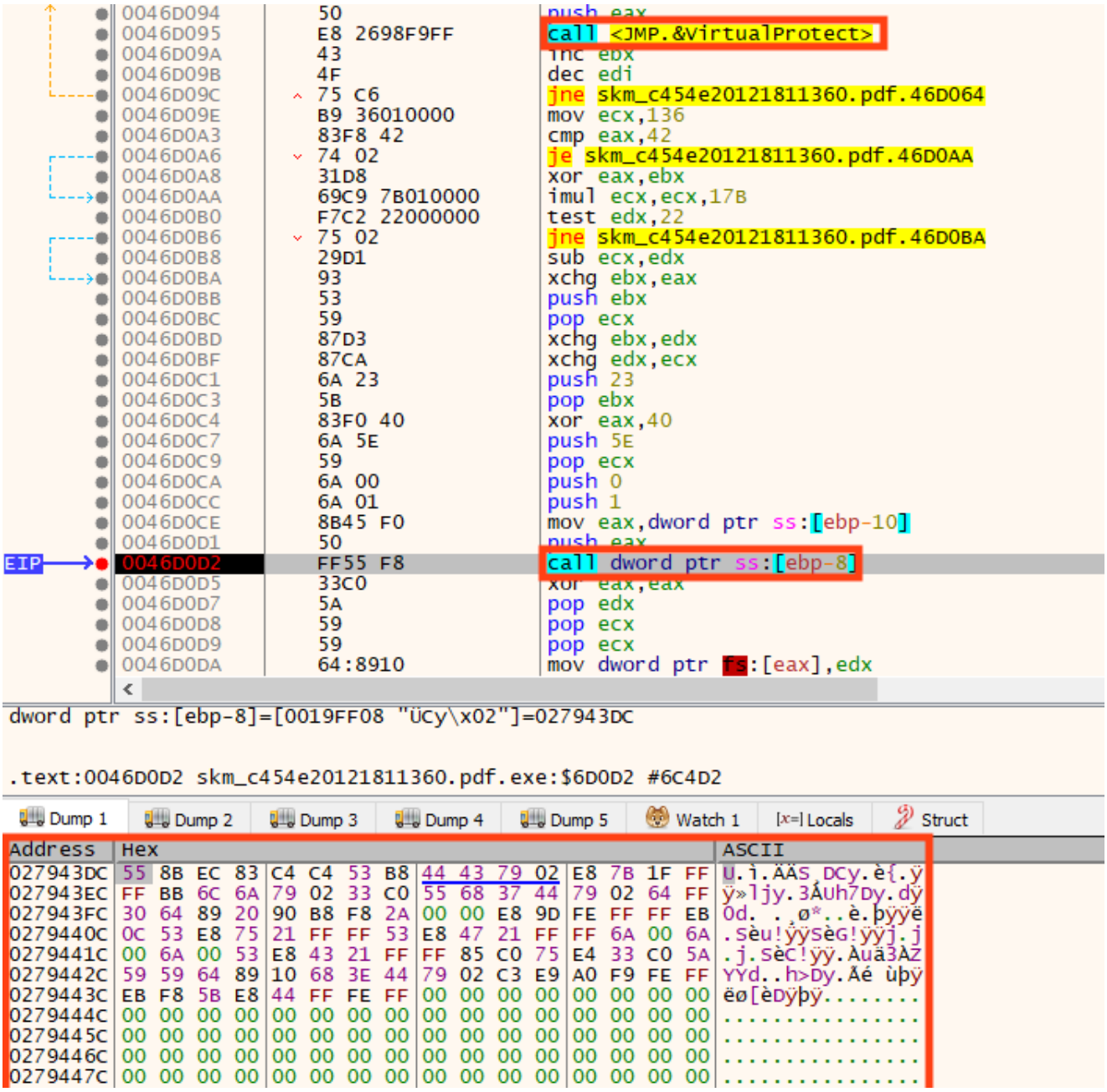
First stage of DBatLoader.

The sample is signed with a revoked certificate from “Afia Wave Enterprises”.



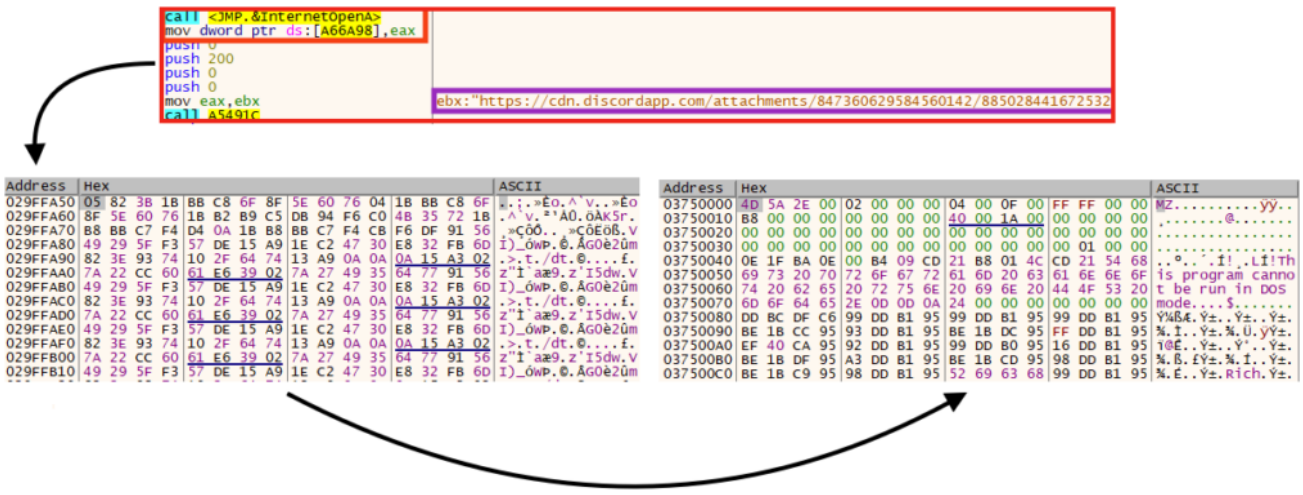
DBatLoader digital signature.

Once running, the malware allocates and executes a shellcode, which is responsible for downloading the second stage.



DBatLoader shellcode.

Later, the second stage is downloaded from Discord, which is eventually decrypted and executed in memory.



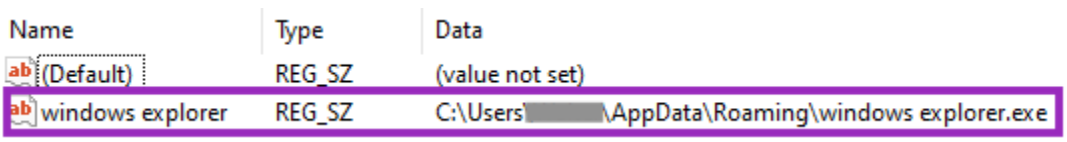
DBatLoader downloading its second stage from Discord.

Looking at the decrypted file strings, we can see references to a few batch scripts that are usually created and executed by this malware to accomplish small tasks, like disabling Windows Defender. However, this sample doesn't contain the routines to run these files.

```
C:\\Users\\Public\\Libraries
[InternetShortcut]
URL=file:\"
IconIndex=3
SOFTWARE\\Microsoft\\Windows\\CurrentVersion\\Run
C:\\Users\\Public\\nest
C:\\Users\\Public\\KDECO.bat
C:\\Users\\Public\\UKO.bat
C:\\Users\\Public\\Trast.bat
start /min C:\\Users\\Public\\UKO.bat
start /min reg delete hkcu\\Environment /v windir /f
C:\\Users\\Public\\nest.bat
```

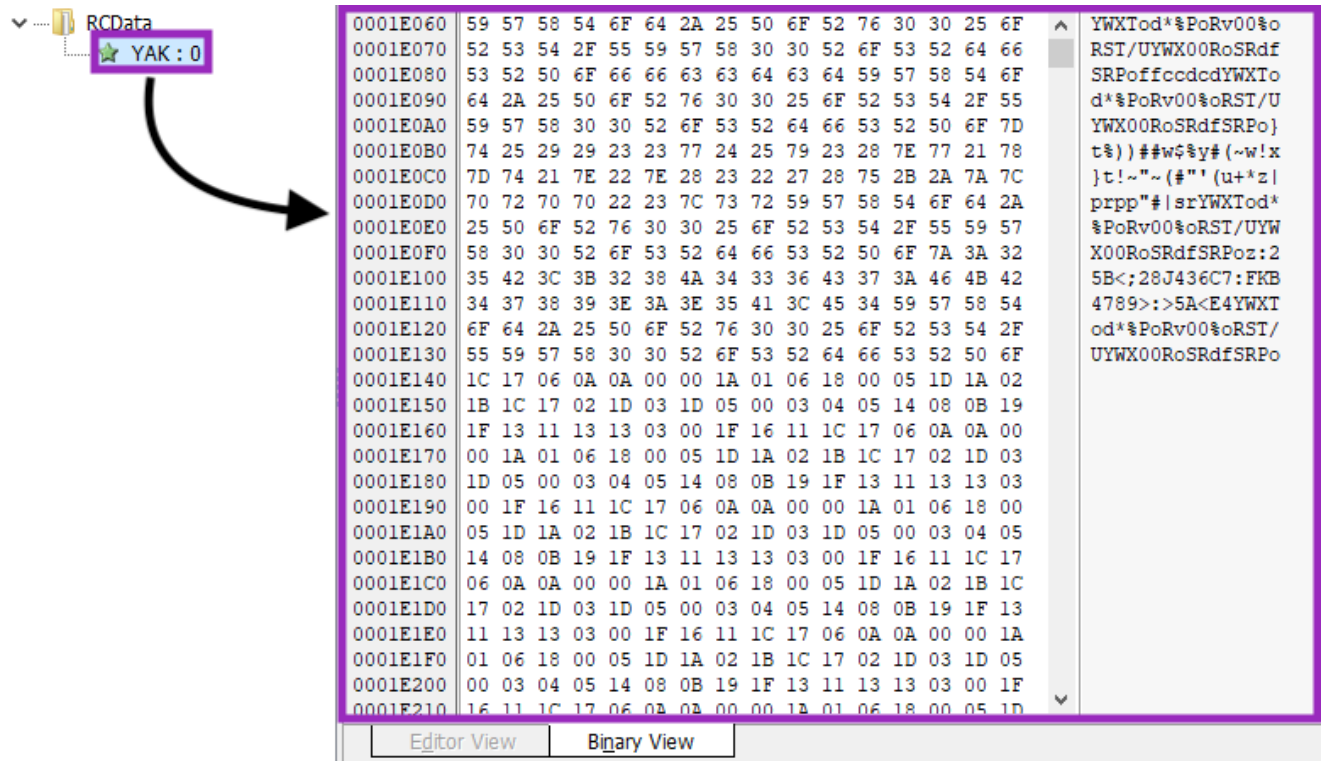
Strings related to batch scripts.

The loader then copies itself to "%AppData%" as "windows explorer.exe" and creates a very simple persistence technique through Windows Registry.



DBatLoader persistence mechanism.

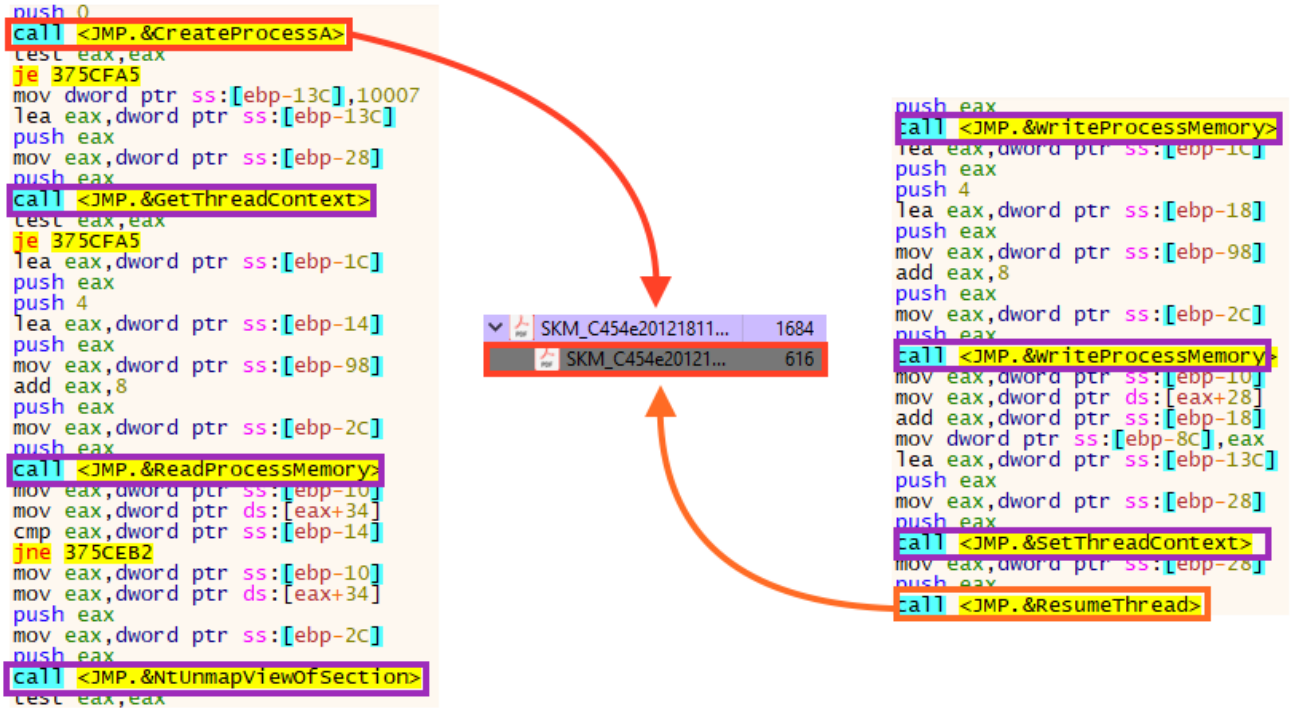
The final payload is encrypted and stored in DBatLoader's resources, named "YAK".



Warzone RAT encrypted payload.

After decrypting these bytes, the payload is executed using a technique known as Process Hollowing. Simply put, the code is injected through the following steps:

1. The target process is created in a suspended state with **CreateProcessA**;
2. The original process' code section is removed with **NtUnmapViewOfSection**;
3. New space is allocated in the process with **VirtualAllocEx**;
4. The malicious code is written using **WriteProcessMemory**;
5. Finally, the code is resumed with **SetThreatContext** and **ResumeThread**.



Warzone RAT being injected through Process Hollowing.

This is a very common process injection technique, used by many malware such as Astaroth, Cobalt Strike, and Trickbot. After injecting Warzone RAT, DBatLoader exits the process without further actions.

The final payload can be dumped from memory using a debugger or the pe-sieve tool.

Type	String
C (16...	Ave_Maria Stealer OpenSource github Link: https://github.com/syohex/java-simple-mine-swe...
C (16...	C:\\Users\\Vitali Kremez\\Documents\\MidgetPorn\\workspace\\MsgBox.exe
C (16...	Software\\Microsoft\\Windows\\CurrentVersion\\Explorer\\
C (16...	InitWindows
C (16...	Software\\Microsoft\\Windows\\CurrentVersion\\Run\\
C (16...	\\programs.bat
C (16...	for /F \"usebackq tokens=*\" %%A in (\"
C (16...	:start
C (16...	\") do %%A
C (16...	:ApplicationData
C (16...	wmic process call create '\"
C (16...	:Zone.Identifier
C	cmd.exe /C ping 1.2.3.4 -n 2 -w 1000 > Nul & Del /f /q
C (16...	SOFTWARE_rptls
C (16...	Install

Warzone RAT strings.

As we mentioned earlier in this blog post, Warzone provides full access to the infected machine and is also able to steal passwords from many browsers and email clients.

```
push    offset aMozillaFirefox ; "\\Mozilla\\Firefox\\"
lea     ecx, [ebp+arg_0]
call    sub_40346A
lea     eax, [ebp+arg_0]
push    eax
lea     ecx, [ebp+lpFileName]
call    sub_40362D
push    offset aProfilesIni ; "profiles.ini"
lea     ecx, [ebp+lpFileName]
call    sub_40346A
push    offset aProfile ; "Profile"
lea     ecx, [ebp+lpAddress]
call    sub_4035E5
push    eax
lea     ecx, [ebp+lpAppName]
call    sub_403437
mov     ecx, [ebp+lpAddress] ; lpAddress
call    sub_405EA5
push    ebx             ; lpAddress
lea     ecx, [ebp+lpAppName]
call    sub_403272
jmp     loc_40B105
```

Part of the Warzone RAT function that grabs passwords from browsers.

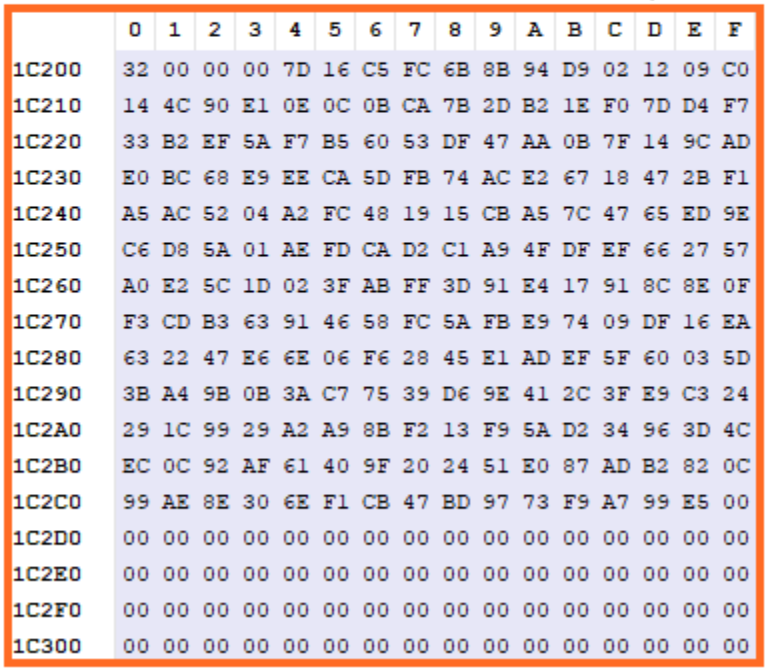
The malware communicates to its C2 server via TCP using sockets, through the port 1990 in this case.

windows explorer.exe	getaddrinfo ("79.134.225.39", NULL, 0x00d5f3e4, 0x00d5f404)
windows explorer.exe	socket (AF_INET, SOCK_STREAM, IPPROTO_IP)
windows explorer.exe	htons (1990)
windows explorer.exe	freeaddrinfo (0x00ddfba8)
windows explorer.exe	connect (928, 0x00d5fa1c, 16)

Warzone RAT C2 communication.

This information is encrypted and stored within the PE file in a section named ".bss". The first 4 bytes of the section are the key length, followed by the key and the encrypted data.

```
push    offset aBss     ; ".bss"
lea     ecx, [ebp+lpAddress]
call    mw_cp_str
push    eax
```



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1C200	32	00	00	00	7D	16	C5	FC	6B	8B	94	D9	02	12	09	C0
1C210	14	4C	90	E1	0E	0C	0B	CA	7B	2D	B2	1E	F0	7D	D4	F7
1C220	33	B2	EF	5A	F7	B5	60	53	DF	47	AA	0B	7F	14	9C	AD
1C230	E0	BC	68	E9	EE	CA	5D	FB	74	AC	E2	67	18	47	2B	F1
1C240	A5	AC	52	04	A2	FC	48	19	15	CB	A5	7C	47	65	ED	9E
1C250	C6	D8	5A	01	AE	FD	CA	D2	C1	A9	4F	DF	EF	66	27	57
1C260	A0	E2	5C	1D	02	3F	AB	FF	3D	91	E4	17	91	8C	8E	0F
1C270	F3	CD	B3	63	91	46	58	FC	5A	FB	E9	74	09	DF	16	EA
1C280	63	22	47	E6	6E	06	F6	28	45	E1	AD	EF	5F	60	03	5D
1C290	3B	A4	9B	0B	3A	C7	75	39	D6	9E	41	2C	3F	E9	C3	24
1C2A0	29	1C	99	29	A2	A9	8B	F2	13	F9	5A	D2	34	96	3D	4C
1C2B0	EC	0C	92	AF	61	40	9F	20	24	51	E0	87	AD	B2	82	0C
1C2C0	99	AE	8E	30	6E	F1	CB	47	BD	97	73	F9	A7	99	E5	00
1C2D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C2E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C2F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
1C300	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Warzone RAT encrypted configuration.

The data is encrypted with RC4 and, once we understood this structure, we created a python script that is able to parse and decrypt the C2 address from Warzone.

```
[+] Decrypted C2 Address:
79.134.225.39:1990
```

Decrypted data from Warzone.

Conclusion

Using Discord to host malicious payloads isn't something new, as we saw in TroubleGrabber in 2020. However, we should expect more malware to abuse not only Discord but other cloud services as well, as it can be more reliable and harder to detect. Netskope is actively monitoring attackers abusing cloud apps for malware delivery.

Protection

Netskope Threat Labs is actively monitoring this campaign and has ensured coverage for all known threat indicators and payloads.

- **Netskope Threat Protection**
  - Win32.Trojan.Modiloader
  - Win32.Trojan.WarzoneRAT

- **Netskope Advanced Threat Protection** provides proactive coverage against this threat.
    - Gen.Malware.Detect.By.StHeur indicates a sample that was detected using static analysis
    - Gen.Malware.Detect.By.Sandbox indicates a sample that was detected by our cloud sandbox

IOCs

SHA256 Hashes

DBatLoader First Stage	07915b1a44803fc9bd86d2d9ddad19434440b3d73f5c77f3400c84a935dd0255
DBatLoader Second Stage	8f1d0ba030b897786c9ad6b68bb9165e539371648a8a60e2a6f1136647b5104e
Warzone RAT	e89c137a4faa31d639492b045a78dd115468f9191143c302d165aefe85b3c06a

The full list of IOCs, the script that decrypts Warzone configuration, and a Yara rule can be found in our Github repository.