Dark Side of VSCode

~ How Attacker Abuse VSCode as RAT ~

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Agenda

01 Introduction

02 What is VSCode

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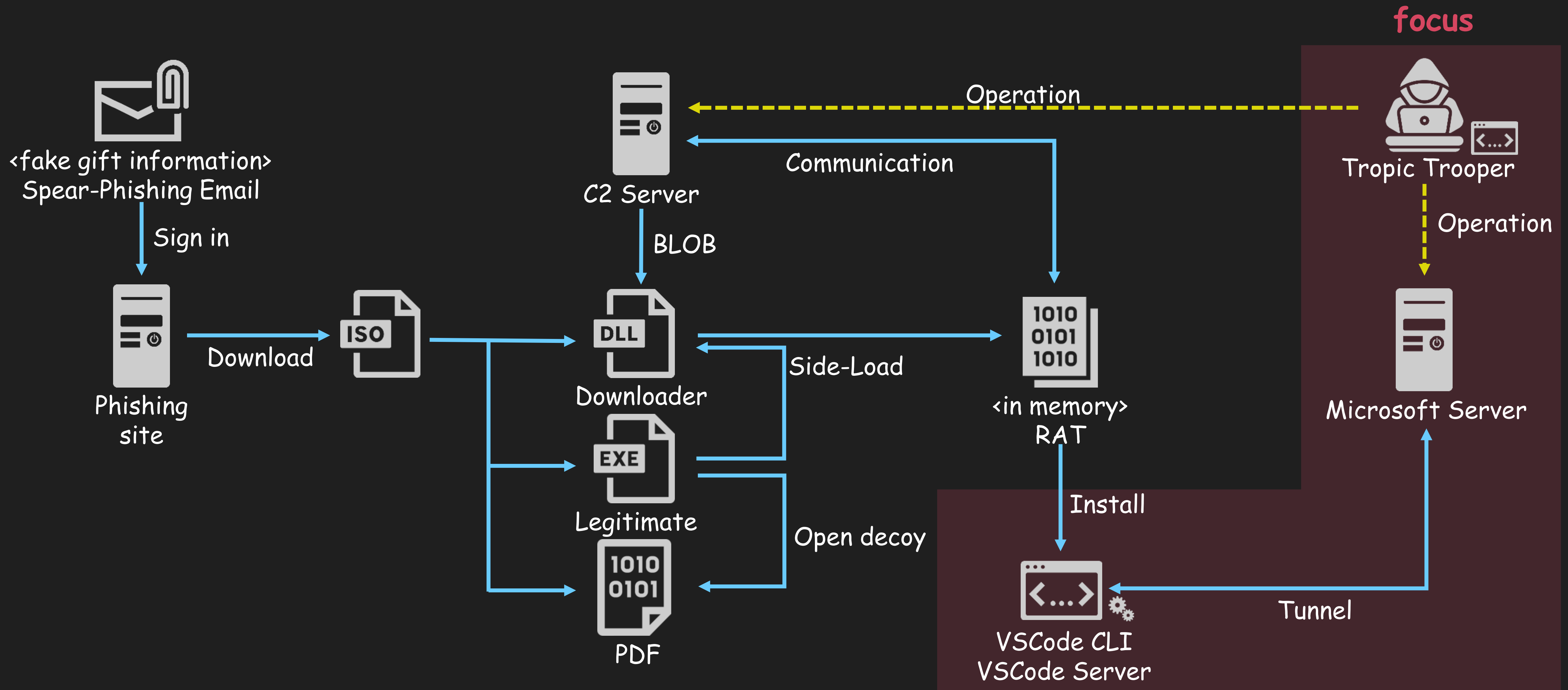
01 Introduction

Attacks overview and talk focus



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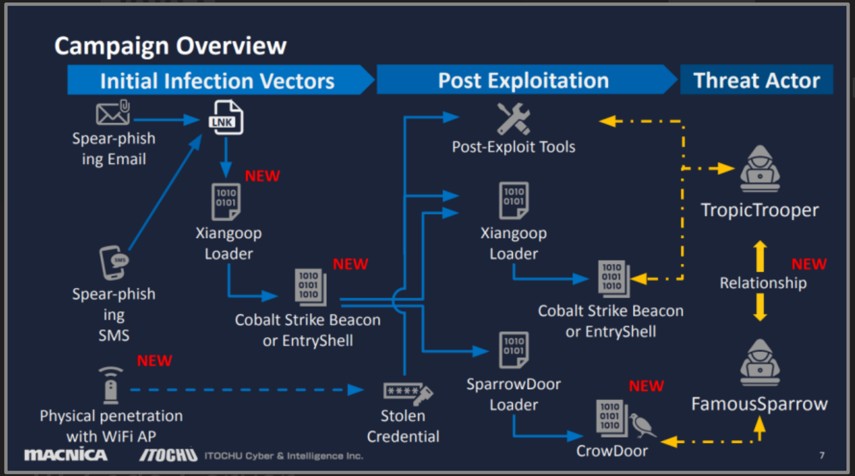
Attacks overview and talk focus

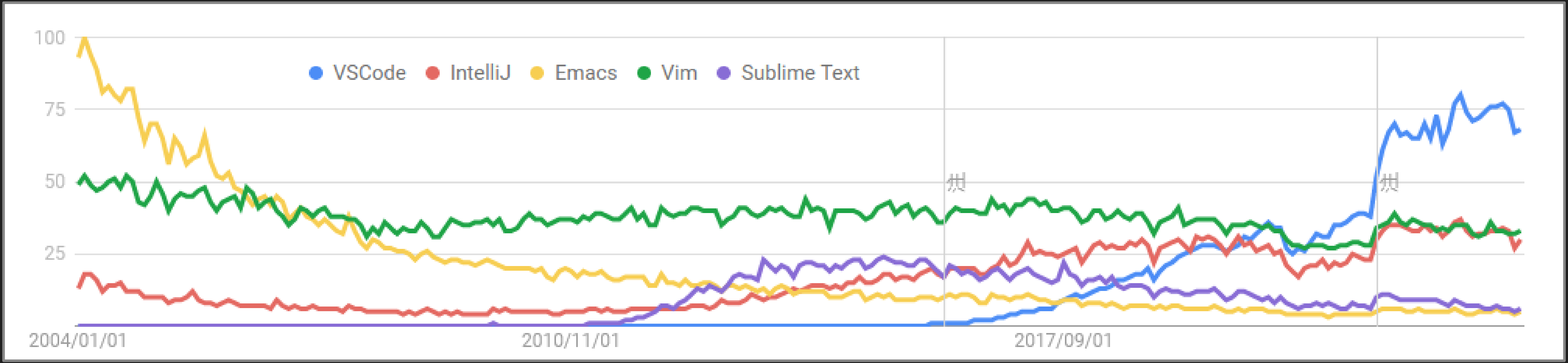
- The targeted attack was observed in late September 2023.
- VSCode abuse has been a long-standing concern, but this is the first confirmed case of APT abuse.
- Attackers used a combination of RAT and VSCode tunnels to compromise PCs through two routes.
- For complete details on Tropic Trooper(alias:Pirate Panda, KeyBoy) attack campaigns, please refer to the VB2023 London lecture material. (Unveiling Activities of Tropic Trooper 2023: Deep Analysis for Xiangoop Loader and EntryShell payload)



02 What is VSCode

What is the Visual Studio Code (VSCode)

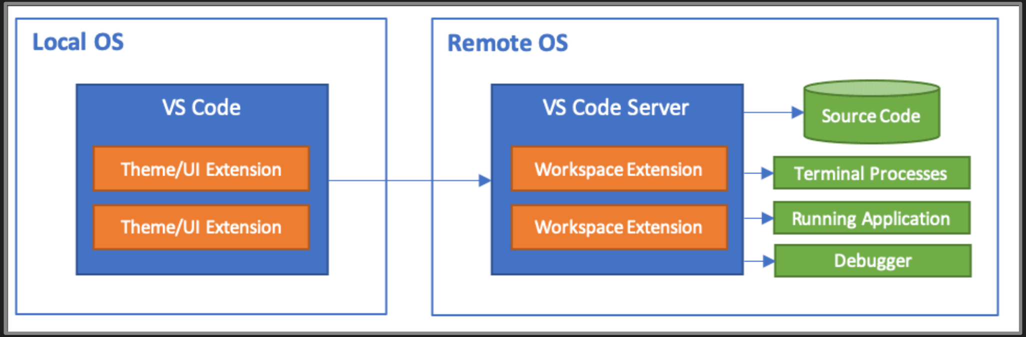
- VSCode is a code editor released by Microsoft in April 2015 (and OSS).
- It is extremely multifunctional and offers useful extensions provided by official, third-party vendors, and communities.
- Today, VSCode has become a standard in modern development, marking an end to the "editor wars".



03 What is Remote Development

VS Code Remote Development

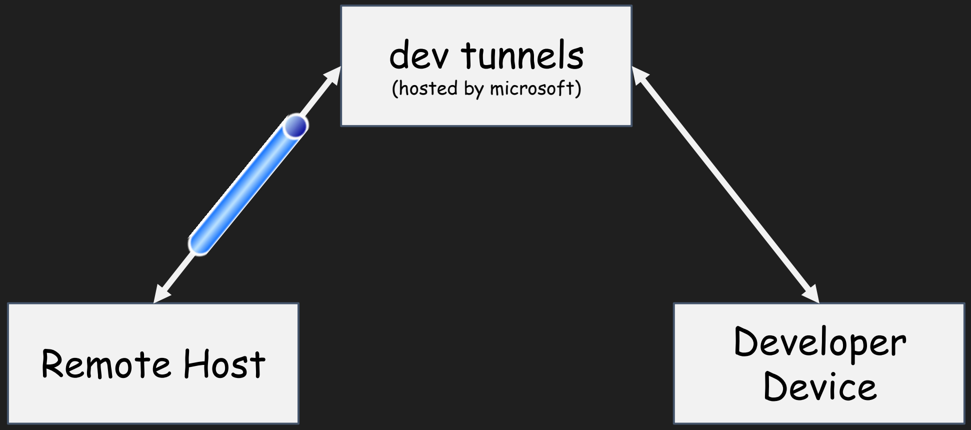
- Why we use remote development feature
  - Development on an operating system different from the host.
  - Utilization of standardized or pre-built development environments.
  - Isolation of the development environment from the host (also as protection against malicious packages/extensions).
  - Development on a more powerful host.
- How Remote Development works
  1. Connect to a remote host using methods such as SSH or tunneling.
  2. The "VS Code Server" is deployed on the remote host.
  3. By connecting from the developer's VSCode (Web/Standalone) on their device, they can edit source code on the remote host and execute commands.



VS Code Remote Development - Mirosoft

How dev tunnels work

1. Authentication using either a Github, Microsoft ID, or Entra ID establishes a connection with Microsoft's tunnel server (dev tunnels).
2. An endpoint corresponding to the Phase 1 connection is created.
3. Connect to the created endpoint using VSCode.



demo

[illegible]

Projection Only / TLP:RED

04 Artifacts

[illegible]

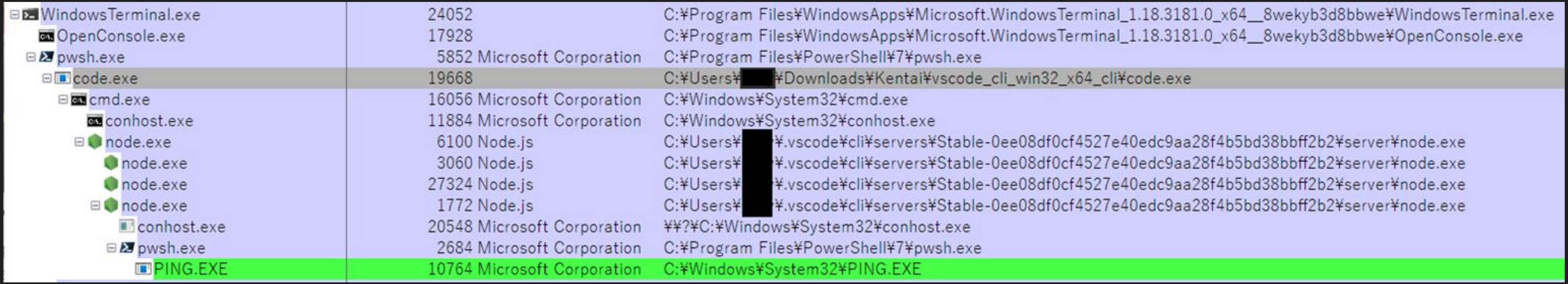
05 Detection and Protection

How to hunt vscode execution by network activity.

- Dev Tunnels use below hosts
  - Authentication
    - github.com
    - login.microsoftonline.com
  - Dev Tunnels
    - global.rel.tunnels.api.visualstudio.com
    - [clusterId].rel.tunnels.api.visualstudio.com
    - [clusterId]-data.rel.tunnels.api.visualstudio.com
    - *.[clusterId].devtunnels.ms
    - *.devtunnels.ms
    - [clusterId] list is available at https://global.rel.tunnels.api.visualstudio.com/api/v1/clusters
- Detect with Context
  - It would be better to detect the aforementioned communications in networks, such as business departments or production segments, where VSCode is not used.

How to hunt vscode executing by process behavior

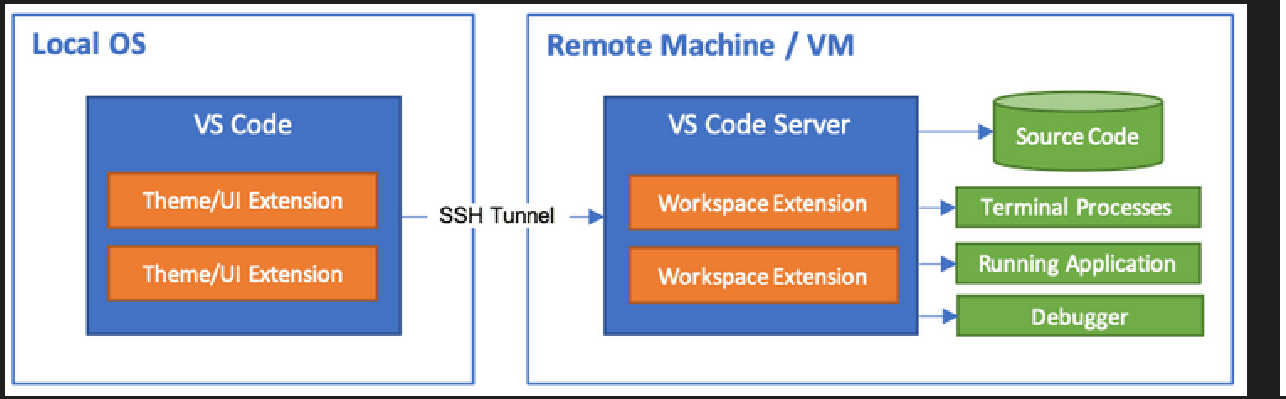
- “node.exe” execute under vscode and Image Path is “%USERPROFILE%¥.vscode¥cli¥servers¥Stable-[ID]¥server¥node.exe“
- PowerShell (pwsh.exe) is run under node.exe if actor create new terminal
- It’s anomaly and you can detect VSCode tunnel by that path and process name.



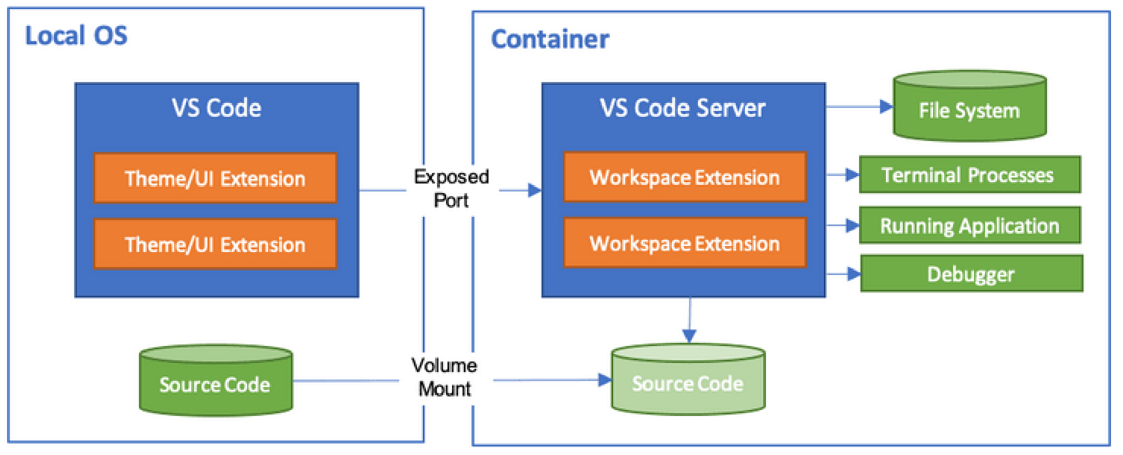
```
⊟ WindowsTerminal.exe          24052                            C:¥Program Files¥WindowsApps¥Microsoft.WindowsTerminal_1.18.3181.0_x64__8wekyb3d8bbwe¥WindowsTerminal.exe
    OpenConsole.exe            17928                            C:¥Program Files¥WindowsApps¥Microsoft.WindowsTerminal_1.18.3181.0_x64__8wekyb3d8bbwe¥OpenConsole.exe
  ⊟ pwsh.exe                    5852 Microsoft Corporation      C:¥Program Files¥PowerShell¥7¥pwsh.exe
    ⊟ code.exe                 19668                            C:¥Users¥[redacted]¥Downloads¥Kentai¥vscode_cli_win32_x64_cli¥code.exe
      ⊟ cmd.exe                16056 Microsoft Corporation      C:¥Windows¥System32¥cmd.exe
          conhost.exe          11884 Microsoft Corporation      C:¥Windows¥System32¥conhost.exe
        ⊟ node.exe              6100 Node.js                    C:¥Users¥[redacted]¥.vscode¥cli¥servers¥Stable-0ee08df0cf4527e40edc9aa28f4b5bd38bbff2b2¥server¥node.exe
            node.exe            3060 Node.js                    C:¥Users¥ ¥.vscode¥cli¥servers¥Stable-0ee08df0cf4527e40edc9aa28f4b5bd38bbff2b2¥server¥node.exe
            node.exe           27324 Node.js                    C:¥Users¥ ¥.vscode¥cli¥servers¥Stable-0ee08df0cf4527e40edc9aa28f4b5bd38bbff2b2¥server¥node.exe
          ⊟ node.exe            1772 Node.js                    C:¥Users¥ ¥.vscode¥cli¥servers¥Stable-0ee08df0cf4527e40edc9aa28f4b5bd38bbff2b2¥server¥node.exe
              conhost.exe      20548 Microsoft Corporation      ¥¥?¥C:¥Windows¥System32¥conhost.exe
            ⊟ pwsh.exe          2684 Microsoft Corporation      C:¥Program Files¥PowerShell¥7¥pwsh.exe
                PING.EXE       10764 Microsoft Corporation      C:¥Windows¥System32¥PING.EXE
```

Safe Use of VSCode Remote Development

- VSCode is essential for modern development, and the VS Code Remote Development feature itself is very useful.
- I recommend to use Dev Containers and Visual Studio Code Remote - SSH
- Dev Containers: Connect to local containers
- SSH: Establish SSH connections with remote hosts. Therefore, it can be controlled by firewall.



VS Code Remote Development - SSH



Dev Containers

06 Conclusion

Conclusion

- VSCode was actually used as a RAT by APT.
- By using dev tunnels, attackers can remotely control through proxies owned by Microsoft.
- In modern development, VSCode and Remote Tunnel are very useful, but for safe use, it is recommended to use SSH or Dev Containers.
- Hunt for communications to dev tunnels and processes of the VSCode Server.
- Alternatively, deny communication to dev tunnels in segments where development communication does not occur, such as in the sales department or production network.

Any Questions?

Appendix

Appendix

- Attackers can persist tunnel process by “code tunnel service install”
- The command make auto run registory
    - HKCU¥SOFTWARE¥Microsoft¥Windows¥CurrentVersion¥Run
        - Name: Visual Studio Code Tunnel
        - Data:

            -
              ```
              [Path to binary]¥code.exe
              --verbose
              --cli-data-dir %USERPROFILE%¥.vscode¥cli
              tunnel service internal-run
              --log-to-file %USERPROFILE%¥.vscode¥cli¥tunnel-service.log
              ```