Antivirus - System Protection Suite

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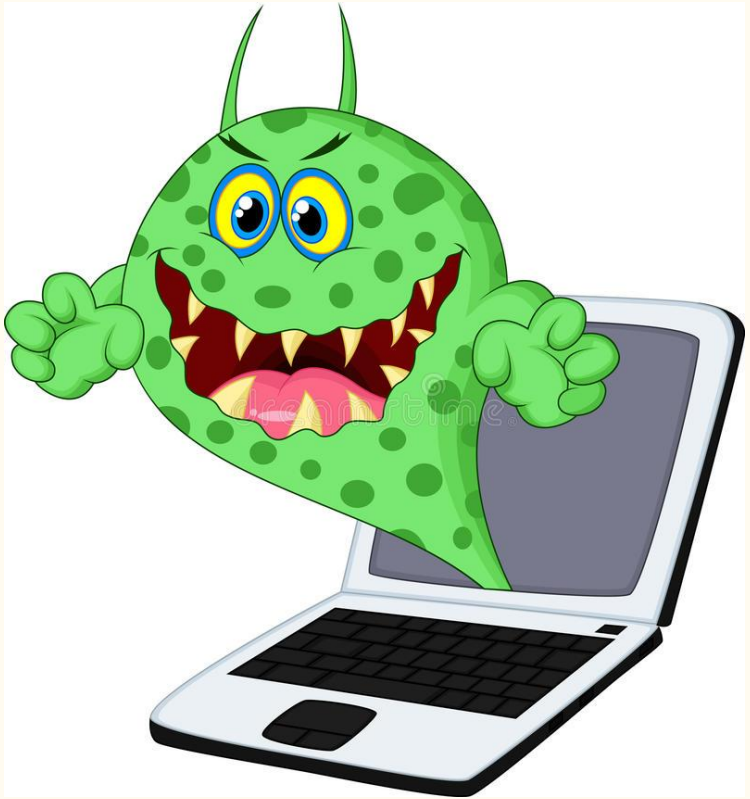
What is a malware?

- Derived from **Mal**icious-Soft**ware**
- A set of instructions to cause undesirable effects on a system
- Can self replicate[1]
- Could be of various types based on its actions



How malware affects systems

There are various possible ways of infection, some of them are ...

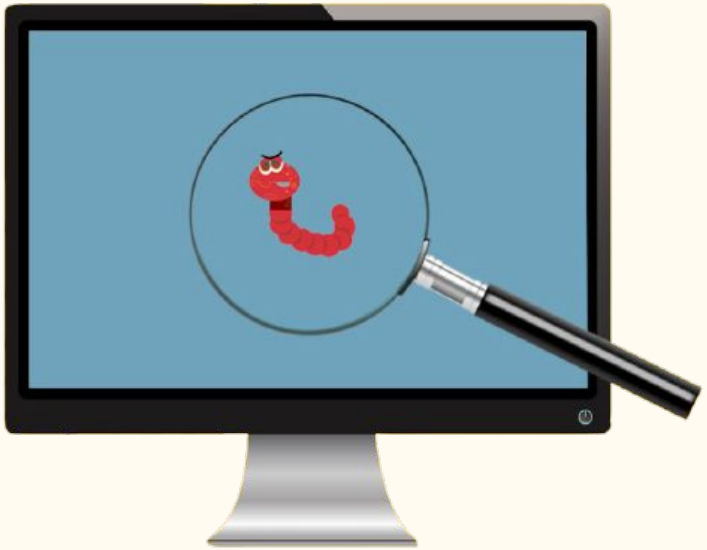
- File infections by attaching itself to executable files[1]
- Boot sector infections, by overwriting the boot sector[1]
- Macro viruses, executed with macro commands like word processors and excel

Antivirus to the rescue

- Scans files for malwares
- Can perform different types of scans[2]
  - On demand
  - Realtime
  - Smartscan
- Monitors network activities for possible attacks

Types of detection[2]

- Virus signatures
- Heuristic-based detection
- Behavior-based detection
- Sandbox Detection(Ex - Sigma)



Signature analysis[3][4]

- Usually the first and most common approach
- Antivirus maintains a database of signatures of known viruses
- Signatures could be simply static hash or more complex analysis of the virus
- Files are scanned for matching signatures
- Requires updates constantly
- Not very effective against new viruses

Heuristic Based[5]

- Can detect new viruses or polymorphic viruses
- Decompiles and examines the source code for matches with existing virus code
- Marks positive if matches above a certain threshold
- Can sometimes generate false positives

Behaviour Based[6]

- Malware tries to perform suspicious activity in background like ...
  - Installing rootkit to lock out the computer
  - Settings of other programs are changed
  - Registering for starting up automatically
- Observes the behaviour of a running process
- If finds suspicious activities, then flags it as virus
- Can detect completely new viruses, with different signatures from anything in databases

Sandbox analysis[7]

- Programs are executed in virtual environment first
- They are monitored for suspicious behaviour
- If found safe, it is executed in real environment
- Quite heavy process, so generally not used in personal systems

Beacon-based Network Activity Analysis[8]

- Malwares usually needs to communicate with the attacker
- Command & Control(C&C) servers allows communication with attacker and victim machine
- A compromised machine would periodically check with the C&C servers
- This activity can be revealed over time
- NTP servers could be a common false positives

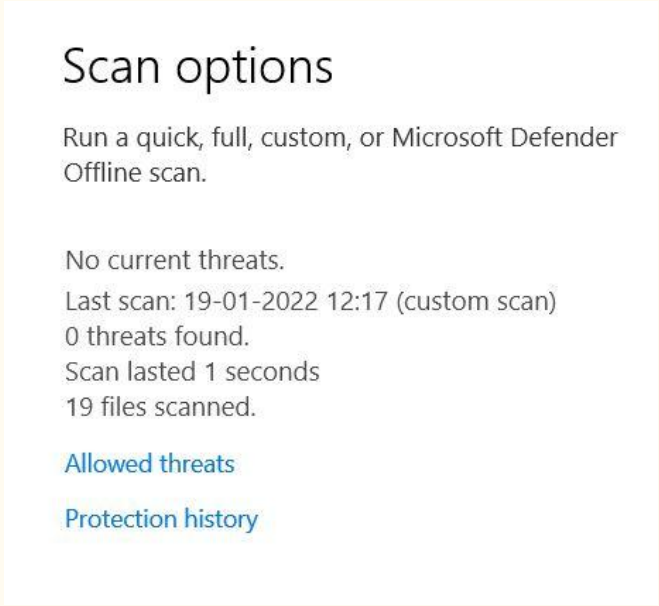
Our Progress

- Scanning files for viruses on local system
- Live website security analysis through browser extension

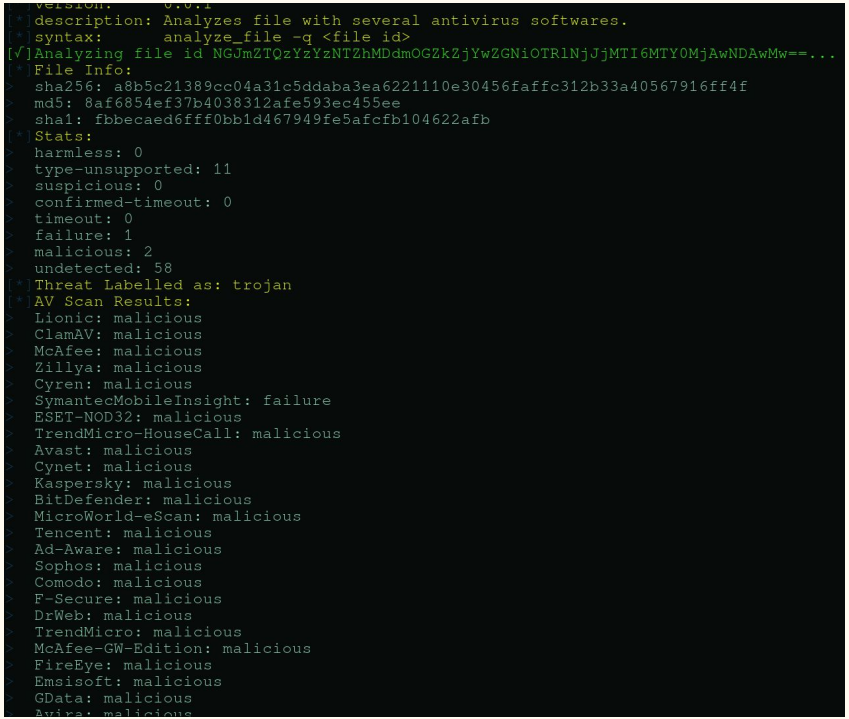
Demo - Scanning files for viruses on local system

Windows Defender vs Our Antivirus

- Windows defender failed to detect virus in a sample file



- Our antivirus was successful in detecting it



Demo - Website security analysis through browser extension

Future Scopes

- GUI Support
- Vulnerability detection using version info
- Web Application Firewall[9]
- Store and detect malware byte info in database
- YARA for static analysis offline
- Sandbox implementation for dynamic analysis of low severity malwares using logs generated by malware activity
- Self managed API

Reference

- [1]https://www.bleepingcomputer.com/forums/t/661440/how-do-viruses-replicate/
- [2]https://www.geeksforgeeks.org/how-an-antivirus-works/
- [3]https://www.kaspersky.com/blog/signature-virus-disinfection/13233/
- [4]https://www.lifewire.com/what-is-a-virus-signature-153629
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Thank You