Malware Analysis & Reverse Engineering

Assignment 1:

Question: Use the strings command to extract readable text from a given malware sample. Identify any URLs, IP addresses, or commands in the output.

To extract readable text, URLs, IP addresses, and commands safely in Kali Linux for both analysis and documentation, follow these steps using built-in tools and commands:

Procedure on Kali Linux

- Place the malware sample in an isolated or non-executable directory within your analysis virtual machine
- Run the strings command to extract readable text:

```
text
strings /malware_samples/malware_sample.exe/ > sample_strings.txt
```

    - This saves all extracted strings to sample_strings.txt for documentation and further review.

- document URLs in the output:

```
text
grep -Eo '\bhttps?://[a-zA-Z0-9./?=_-]*' sample_strings.txt > urls.txt
```

    - This extracts detected URLs and saves them to urls.txt.

- For IP addresses:

```
text
grep -Eo '([0-9]{1,3}\.){3}[0-9]{1,3}' sample_strings.txt > ips.txt
```

    - This extracts IPv4 addresses into ips.txt for further examination.

- To search for common command keywords (like "cmd", "powershell"):

```
text
grep -i -E 'cmd|powershell|shell|wget|curl|ftp' sample_strings.txt > commands.txt
```

    - This saves command-related strings to commands.txt.

Safety and Documentation Tips

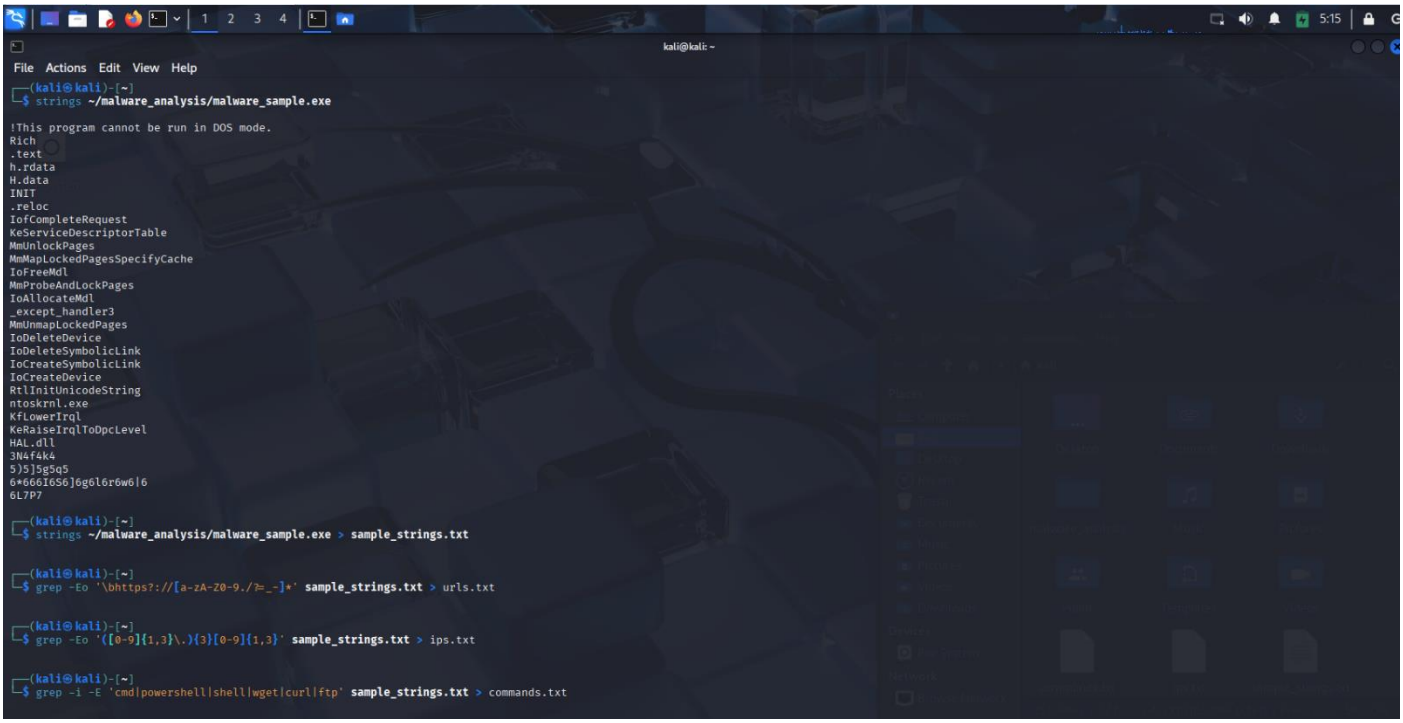
- Always analyze samples within a secure Kali Linux VM that is not connected to our main network for safety
- Document findings by saving extracted info into separate .txt files
- Create a report summarizing notable findings (URLs, IPs, and suspicious commands) for incident response or forensic review.
- Optionally, keep all shell commands and outputs in a Markdown or log file for audit trails.

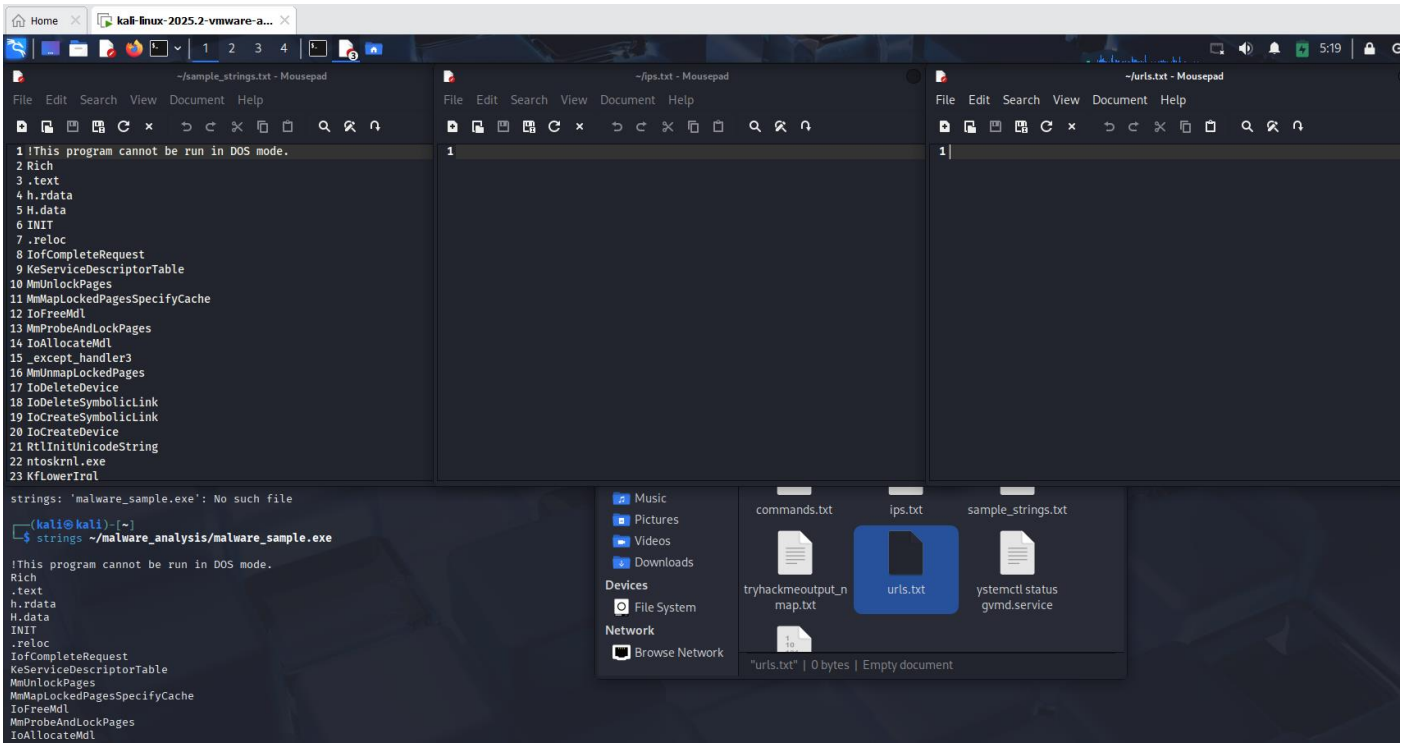
Safety Notes

- Do all static analysis in the Kali VM, not on the host machine.
- Don’t run or interact with the sample except through static tools like strings.
- Save findings in text files for evidence and documentation.

These are the findings:

sample_strings.txt ips.txt urls.txt commands.txt





Assignment 2

Objective: To set up a sandbox environment and run a malware sample with monitoring similar to Process Monitor, here is a detailed approach suitable for your Kali Linux and Windows VM-based malware analysis lab:

Step 1: Set Up a Sandbox Environment

- Use virtualization software like VMware or VirtualBox to create a dedicated Windows VM because Process Monitor runs on Windows.
- Install a clean Windows OS in the VM and take a snapshot to revert to a clean state after analysis.
- Isolate the VM network (host-only or no network) to prevent malware escape.
- Install malware analysis tools in the VM such as Process Monitor (Procmon) from Sysinternals, Wireshark for network monitoring, and a sandbox program like Sandboxie or Firejail for Linux sandboxing if needed.

Step 2: Run Process Monitor

- In the Windows VM, run Process Monitor (Procmon.exe).
- Clear existing logs (Ctrl + X) to start fresh.
- Configure filters to only focus on your malware sample process (filter by Process Name).
- Start capturing events (file system, registry access, network calls, process/thread activity).
- Execute the malware sample inside the VM.
- Let it run for enough time to trigger behaviors.
- Stop capturing (Ctrl + E).

Step 3: Monitor Behavior

- Observe logs for suspicious activity including:
    - Files created, modified, or deleted by malware.
    - Registry keys added, deleted, or changed for persistence.
    - Network connections or DNS queries attempted.
    - Process spawning or injection behaviors.
- Use filters in Procmon to focus on relevant events tied to the malware.

Step 4: Document Suspicious Behavior

- Save the Procmon captured event logs (File → Save).
- Note down suspicious file and registry changes with their timestamps.
- Log any unusual network communication attempts or external IPs contacted.
- Document any persistent techniques used by malware (auto-run registry keys, scheduled tasks).
- Take screenshots or export logs for thorough documentation.

Additional Tools on Kali Linux

- Use Wireshark or tcpdump for network traffic capture.
- Use Linux alternatives to Procmon like ProcMon for Linux or tools like strace, auditd for monitoring processes on Linux side.

Summary

Step	Description
Create VM sandbox	Isolated Windows VM with clean snapshot
Install Procmon	Sysinternals Process Monitor for Windows
Start monitoring	Clear old logs, set filter on malware process
Run malware sample	Execute inside VM, capture behaviors
Analyze logs	Observe file, registry, network suspicious activity
Document findings	Save event logs, note suspicious behaviors

This method combines the best practice of dynamic malware analysis, giving you visibility into file system, registry, and network activities safely.