Projected Data

The research project will be to investigate alternative methods to secure IOT devices from Spectre and Meltdown to reduce the effect of the operating system patches on the performance of the devices. Since these devices usually run on minimal hardware, it is beneficial to be able to protect the systems from the vulnerabilities posed while still allowing the systems to run at their full performance. The project will be focused on systems that use ARM processors and minimal hardware. Three performance areas, disk I/O, RAM, and CPU performance will be tested. Data from Table 1-3 is available for workstations and will be used as a reference and guide for the IOT system. Expected or hopeful output would look like the sample in Table 4-6.

# Reference Data Retrieved from P. Deb1

Table - Test results of disk performance of an Ubuntu 16.04 device before and after a Spectre/Meltdown OS patch.

|  |  |  |
| --- | --- | --- |
|  | Pre-Patch | Post-Patch |
| Read (MB/s) | 86.83 | 75.76 |
| Write (MB/s) | 83.17 | 74.49 |

Table - Test results of RAM performance of an Ubuntu 16.04 device before and after a Spectre/Meltdown OS patch.

|  |  |  |
| --- | --- | --- |
|  | Pre-Patch | Post-Patch |
| Copy – Integer (MB/s) | 10285 | 10003 |
| Copy – Floating Point (MB/s) | 10315 | 10190 |

Table - Test results of CPU performance of an Ubuntu 16.04 device before and after a Spectre/Meltdown OS patch

|  |  |  |
| --- | --- | --- |
|  | Pre-Patch | Post-Patch |
| C-Ray (s) | 494 | 662.5 |
| Compression (s) | 51.6 | 55.8 |
| Encryption (s) | 18.7 | 22.7 |

# Sample Data

Table - Sample disk performance results from an IOT device using both an OS patch and an alternate mitigation strategy

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-Patch | Post-Patch | Mitigation Function |
| Read (MB/s) | 30 | 25 | 29 |
| Write (MB/s) | 30 | 25 | 29 |

Table 5- Test results of RAM performance from an IOT device using both an OS patch and an alternate mitigation strategy

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-Patch | Post-Patch | Mitigation Function |
| Copy – Integer (MB/s) | 5000 | 4800 | 4980 |
| Copy – Floating Point (MB/s) | 4600 | 4400 | 4550 |

Table - Test results of CPU performance from an IOT device using both an OS patch and an alternate mitigation strategy

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-Patch | Post-Patch | Mitigation Function |
| C-Ray (s) | 900 | 1000 | 910 |
| Compression (s) | 300 | 380 | 320 |
| Encryption (s) | 70 | 80 | 72 |

**References:**

[1] P. Deb, "An Analysis on Effects after Mitigating Meltdown and Spectre Vulnerabilities", DAFFODIL INTERNATIONAL UNIVERSITY, 2018 [Online]. Available: http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/2568/P11684%20%283%25%29.pdf?sequence=1&isAllowed=y. [Accessed: 27- Jun- 2021]