

Bootable USB key to automate performance benchmarking

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I. CONTEXT

Studying the direct and indirect impacts of digital systems has recently become an increasingly significant area of interest. The term "digital" covers a broad scope, ranging from personal devices, such as smartphones and laptops, to data centers and large-scale computing infrastructure. The recent burst of artificial intelligence (AI) usage, which has led to a sharp increase in the demand for computing power and dedicated infrastructures, is contributing to a significant rise in demand for IT equipment. Consequently, the environmental impacts of digital technology with the entire life cycle of equipment - from manufacture and use to end-of-life - are rising sharply.

In this context, extending the lifespan of equipment is a key strategy for reducing the environmental impact of computers. By limiting the replacement of hardware, this approach reduces the resources required to produce new equipment and the environmental impacts associated with its manufacture. This represents a strategic challenge in response to growing pressures on supply chains and the global availability of electronic components.

One strategy to increase lifespan involves examining the origins of system performance decline, whether hardware or software, through a benchmarking suite. Using such benchmarking suite, several metrics can be generated to be latter evaluated, aiming to identify the reasons behind performance degradation on a machine. Based on this data, corrective actions to the degradation roots can be taken, thereby increasing the machine's lifespan.

II. GOAL OF THE PROJECT

The goal of this project is to develop a bootable USB key that will automatically benchmark the performance of a targeted machine. Developing the benchmark suite to be executed is not the focus of this subject (refer to the other proposal for that). This project is centered on creating a plug-and-play USB key that automatically runs a specified benchmarking suite on a device. The objective is to boot from the USB key, run a designated suite of benchmarks and save the results on a specified server to conduct further analysis on device health.

III. WHAT YOU WILL LEARN

- Operating system deployment
- Performance analysis of the benchmarking suite results

IV. WHAT YOU SHOULD LIKE

- System programming
- Scripting for automating experiments
- Versioning tool such as GitHub for reproducibility

V. CONTACTS

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