

# **Assignment: Performance Benchmarking**

## **Learning Outcomes:**

After completing this assignment, you will be able to:

- Get hands-on experience using various benchmarking tools and methodologies to assess the performance of computer systems.
  - Analyze benchmarking results and identify performance bottlenecks or issues
  - Compare and contrast benchmarking results from different hardware configurations or software setups.
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**This assignment is a group activity. Form groups of 5 students in the Moodle activity**

## **Activity**

There are various categories of computing devices which have optimized hardware features based on the application and utility. Here are some example categories you may consider:

- High-end/Low-end Laptops
- Office Desktops/ MiniPCs
- Gaming PCs, High End desktops
- Mobile phones,
- SBCs, Microcontrollers or embedded development boards, IoT/AIoT devices
- Ubiquitous computing devices
- Rack mounted servers for datacenters

Note that there are also different grades for some of the computing hardware, such as Consumer grade, Industrial/ Commercial/ Enterprise grade, Military grade etc.,

## **Tasks**

1. Choose a category of devices to test, in which you have access to at least three different devices from the same category. Prepare a specification of basic/essential and specialized/unique features in latest models of hardware which fall under the same category of devices. Also, give specifications of each device.
2. Choose three freely available benchmarking tools. Describe the benchmarks, and measures of performance used in each benchmark. If the metrics used in different benchmarks are not the same, describe the differences and how to compare them.

3. Execute the chosen benchmarks on the three devices of your choice (from the same category).
4. After executing the benchmarks, compare the results for each device. Choose which device has the best overall performance with justifications.
5. Compare your benchmark results with publicly available benchmark results (on same device model, if available).
6. Based on the data you have collected, analyze the data and determine which device is the best choice in terms of performance, and which benchmark is best? Justify.
7. Compare the cost of devices and describe which device can give the best performance for the cost. Justify your choice with some application categories such as gaming, content creation, etc.

### Notes

- Some freely available benchmarking tools are mentioned below. You are free to use any other tools as well.
  - [Geekbench](#) - All OSes
  - [Antutu benchmark](#) - All Oses
  - [Passmark](#) - Android / iOS, Linux / macOS (not free for Windows)
  - [Cinebench](#) - Windows/Mac
  - [3DMark](#) - Windows / Android / iOS
- Make sure to describe the operating system and a complete system specification including CPU, GPU, memory, disk, and battery life performance measures in your report.
- You can also compare your results with publicly available benchmark results from websites like AnandTech, and Tom's Hardware, or user reviews from websites like Amazon. Make sure to include the references. Also, note that there are other commercial benchmarks like SPEC as well.
- Make sure to provide evidence for the costs of different devices you wish to use.
- Which of the devices you've benchmarked has the best price/performance ratio?

### Submission guidelines

- A presentation of the benchmark analysis must be submitted. Make sure to complete all the tasks mentioned above and include them.
- Include the contribution and index number of each member of the group.
- To evaluate your work, you will need to submit a report, deliver a live presentation (10-15mins) and face a Q & A session (10 mins)
- Deadlines: Check the moodle assignment activity.
- Presentation and Viva: Check the moodle activity to select a timeslot.

## **Evaluation Criteria**

- Quality of the Report - 10%
- Quality of the Presentation - 10%
- Q & A - 10%
- Content - 70%
  - Selecting benchmarks and evaluation metrics/criteria - 10%
  - Device selection and specification - 5%
  - Description of the experiments - 10%
  - Results/ Findings - 20%
  - Analysis - 20%
  - Additional Experiments/Insights and Recommendations - 5%