GWDG / Goettingen University
AGC / Mathematic and Informatics
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Exercise 1 / October 20, 2023
HPC System Administration / WiSe 2022/23
15 Minutes Total

Exercise Introduction

Before attempting the exercises in this document please ensure that you have read and understood the key topics covered in tutorial.

Contents

Task 1: Task (15 min)

As benchmarking could help to understand a system's performance, this task is designed to create a simple benchmarking test program for estimating or measuring the compute performance of a system. For this, you could use your own choice of programming language and the guidelines for the tasks are as follows:

1. First, think about the pattern you would like to measure, e.g., computational time.
2. Define the measurement protocol and metrics: How to time the operations, granularity of the measurement. How do you increase confidence that the returned value reflects the true value in the system?
3. Think about the expected performance on your system and document it.
4. Implement the benchmark.
5. Run the benchmark in such a way that it meets your experiment's measurement protocol.
6. Compare the results with your observations and document them briefly.
7. Conclude the experiment in your measurement protocol. Compare your steps and methodology with the scientific method.

For example, you could use the sample code shared with you during the demo session. You could find them in the course website:

1. Use the factorial function as shown in there.
2. Take the readings of the factorials from 1 to 151.
3. Repeat previous step (2) for 5 times. i.e., take reading for five rounds with different timestamps.
4. Now, plot these timestamp records together for factorial 1, 50, 100 and 150 as highlighted in gray color in the table 1.
5. Show the readings of all the five timestamps for a single factorial with a single line graph.
6. Repeat previous step (5) for other three factorials as well.
7. Then plot these readings in a line graph chart. You will get a clear pattern for your system's performance.

- You could generate the showing factorial range in x-axis, time range on y-axis and each line graphs for each factorials for different timestamps with different legend names.

8. Illustrate your graph results and share with others.

Table 1: Sample for taking readings

Factorial	**Timestamp1**	**Timestamp2**	**Timestamp3**	**Timestamp4**	**Timestamp5**
1.	0.00	0.00	0.00	0.00	0.00
2.	0.02	0.01	0.00	0.01	0.01
..	..	..	..	..	..
..	..	..	..	..	..
50.	0.05	0.06	0.05	0.07	0.05
..	..	..	..	..	..
..	..	..	..	..	..
100.	0.10	0.09	0.10	0.11	0.10
..	..	..	..	..	..
..	..	..	..	..	..
150.	0.15	0.17	0.13	0.16	0.15
..	..	..	..	..	..
Total	**151**				

Hints

- You could create the graph plot as shown in demo session.

Portfolio (directory: `1/submission-folder`)

`1/submission-folder/findings.txt` You could share your findings during the session for the feedback.

Optional Task 2: Extra Task (5-10 min)

This is a difficult **additional** task which will support your understanding in the topic.

- For an advance practice, you could store your records in a CSV file, with the sheet name of respective timestamp.
- Once you have all the readings you could apply ETL (Extract, Transform, and Load) operations to generate the performance graphs from the data recorded in the respective file.