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Exercise 1: Programming Distributed Systems
(Summer 2020)

Submission

- You need to have registered a team and have been given a Gitlab repository for this exercise sheet.

- Create a folder named "ex1" in your repository and add your solutions as text files or pdf to this folder.

- If you want to get feedback on your solution, create a merge request in Gitlab and assign Albert Schimpf as assignee.

- Test your submission with the provided test cases. Feel free to add more tests, but do not change the existing test cases.

1 Characteristics of Distributed Systems

Search for an example of a distributed system and describe it in terms of the following characteristics:

Network Size How large is the network the distributed system is spanning? Local network, local area, distributed around the planet? What types of devices are involved?

Architecture What roles to the different processes take?

Resource Sharing What resources are managed by these processes?

Concurrency What type of concurrency does the system exhibit? Among servers, among users, concurrency inside one server ... ?

Transparency Is it transparent to the user that the system is distributed (e.g. Google uses the same search engine across the globe versus Amazon has different stores for each country)?

2 Key performance metrics for Distributed systems

How are the following terms defined?

- Latency
- Bandwidth
- Clock-drift rate

Explain (in your own words) why wrong assumptions about these system metrics can lead to issues!

3 Down right now?

- Try to find the average or guaranteed availability for a popular service of your choice (e.g. Google Docs, AWS Cloud, Dropbox, Netflix, Facebook)! Keep in mind that this is often quite difficult to find out - why?

- When was the last (major) outage of this system?