Institute of Computer Science, University of Bern
Distributed Algorithms, Spring 2020

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Solution for exercise 1

1.1 The trouble with distributed systems

Read the first parts of Chapter 8 in DDIA [Kle17], specifically pp. 273–291. The motto is:

> This chapter is a thoroughly pessimistic and depressing overview of things that may go wrong in a distributed system.

1.2 Describing dependable systems (5pt)

Using the terminology of dependable systems, describe a scenario with three systems as follows:

- System A is part of System B and that is part of System C;
- A fault in System A causes System C to fail.

Use ideas taken from Chapter 8 of DDIA, according to question 1.1. Describe the respective faults, errors, and failures.

Solution. System C is a garden system that consists of sprinklers (system B) for watering plants. Inside of each sprinkler, there is a timer (system A) that ticks every 1 hour and after that watering starts.
System A:

- **Fault:** The clock inside of the timer is broken.
- **Error:** The clock returns wrong time.
- **Failure:** The timer ticks every 10 minutes.

System B:

- **Fault:** The timer ticks every 10 minutes.
- **Error:** Sprinklers open water flow every 10 minutes.
- **Failure:** Sprinklers open flow too often.

System C:

- **Fault:** Sprinklers open flow too often.
- **Error:** There is more water than intended in the garden.
- **Failure:** Garden is flooded and plants die.

References

[Kle17] M. Kleppmann, *Designing data-intensive applications*, O'Reilly, 2017.