Università della Svizzera italiana

Faculty of Informatics

Distributed Systems **Autumn 2024/25**

Theory Assignment 7 — Consistency and Replication

Exercise 1 -

What is the reason for considering weak consistency models?

Exercise 2 -

In the figure below we can see three concurrent processes with two indivisible statements each. Their shared data consists of the variables x, y, and z, all initialized with 0. For a sequentially consistent memory, is 001110 a legal output? Why?

Process P_1	Process P_2	Process P_3
`x ← 1;`	`y ← 1;`	`z ← 1;`
`print(y,z);`	`print(x,z);`	`print(x,y);`

Exercise 3 -

What kind of consistency would you use to implement an electronic stock market? Explain your answer.

Exercise 4 -

Consider a nonblocking primary-backup protocol used to guarantee sequential consistency in a distributed data store. Does such a data store always provide read-your-writes consistency?

Exercise 5 -

For active replication to work in general, it is necessary that all operations be carried out in the same order at each replica. Is this ordering always necessary?