Università della Svizzera italiana

Faculty of Informatics

Distributed Systems **Autumn 2024/25**

Theory Assignment 8 — Fault Tolerance

Exercise 1 -

What makes the fail-stop model so difficult to implement in the case of crash failures?

Exercise 2 -

For each of the following applications, do you think at-least-once semantics or at-most-once semantics is best? Why?

(a) Reading and writing files from a file server.

(b) Compiling a program.

(c) Remote banking.

Exercise 3 -

What are the valid delivery orderings for the combination of FIFO and total-ordered multicast in the figure below (Distributed Systems 4 book, page 481)?

Event order	Process P_1	Process P_2	Process P_3	Process P_4
1	sends m_1	receives m_1	receives m_3	sends m_3
2	sends m_2	receives m_3	receives m_1	sends m_4
3		receives m_2	receives m_2	
4		receives m_4	receives m_4	

Figure 8.27: Four processes in the same group with two different senders, and a possible delivery order of messages under FIFO-ordered multicasting.

Exercise 4 -

Is scalability of reliable multicast always important?

Exercise 5 -

What is the difference between reliability and availability? Give an example of a reliable but unavailable system, and of an available but unreliable system.