

Managing Massive Multiplayer Online Games
SS 2019

Exercise Sheet 4: Persistence

The assignments are due May 29, 2019

Assignment 4-1 *Logging with simple algorithms*

Consider an abstract game with its information being stored server sided. Assume the data to be stored within the objects O_1 , O_2 and O_3 . Initially, every object O_i contains the value o_i . This means the initial state of the database is as follows:

Object	Value
O_1	o_1
O_2	o_2
O_3	o_3

Starting from time t_{10} , the game information should be stored persistently on disk every 10 ticks to avoid data loss in case of a system error. Assume that writing an object onto disk takes two ticks.

The server applies the following changes to the database:

Time	Object	New Value
t_6	O_1	o'_1
t_9	O_2	o'_2
t_{12}	O_3	o'_3
t_{15}	O_1	o''_1
t_{16}	O_3	o''_3
t_{22}	O_2	o''_2
t_{22}	O_3	o'''_3

- (a) Outline the procedure of the logging algorithm *Naive Snapshot*.
- (b) Outline the procedure of the logging algorithm *Copy-on-Update*.
- (c) Outline the procedure of the logging algorithm *Wait-Free Zigzag*.
- (d) Outline the procedure of the logging algorithm *Wait-Free Ping-Pong*.
- (e) Discuss advantages and disadvantages of these methods.