Distributed System I
Wintersemester2020/21
Assignment 3

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Team 19

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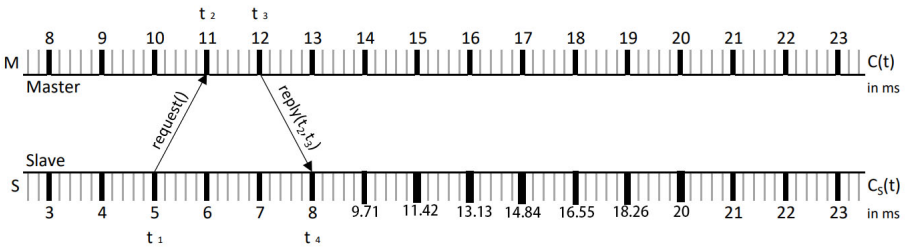
1 Physical Clocks

a)



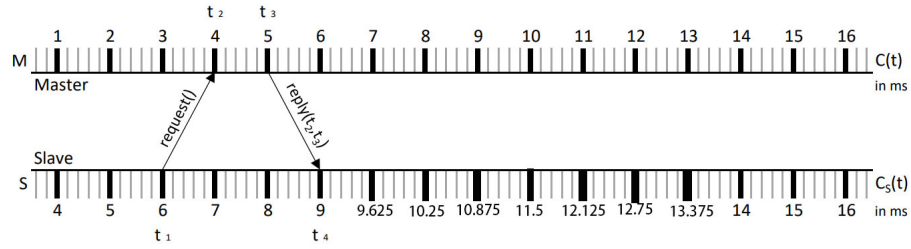
O = 5

d = 7

Δ = 7 $C_i(t_4+\Delta)$ = 20

$\frac{dC_s}{dt} = \frac{7+5}{7} = 1.71$ in time interval $(C_s(t_4), C_s(t_4+\Delta))$

b)



O = -3

d = 1

Δ = 8 $C_s(t_4+\Delta)$ = 14

$\frac{dC_s}{dt} = \frac{8-3}{8} = 0.625$ in time interval $(C_s(t_4), C_s(t_4+\Delta))$

c)

i.send two request and get two reply. Then calculte by this two time.

$$\frac{t_7 - t_3}{t_{15} - t_{10}} = 0.8$$

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ii.

2 Logical Clocks

a)

i.

$$e_1^1, e_3^1, e_1^2, e_1^3, e_2^1, e_3^2, e_2^2, e_3^3, e_2^3, e_1^4, e_2^4, e_3^4$$

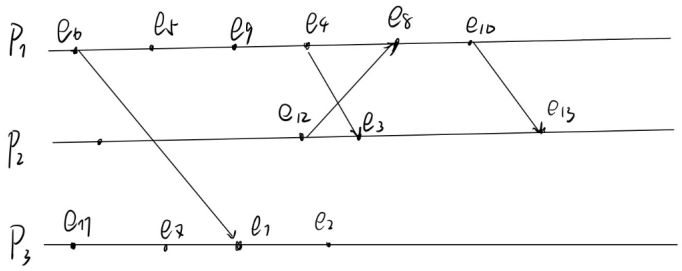
ii.

$e_1^1 = (1,0,0), e_3^1 = (0,0,1), e_1^2 = (2,0,1), e_1^3 = (3,0,1), e_3^2 = (0,0,2), e_3^3 = (0,0,3),$

$e_2^1 = (3,1,1), e_2^2 = (3,2,1), e_2^3 = (3,3,3), e_2^4 = (3,4,3), e_1^4 = (4,0,1), e_3^4 = (3,4,4)$

iii.
e_1^4. By the vector Clocks. $e_3^4 = (3,4,4)$. Thats mean all the events from P2 and P3 is related. Only one event form P1 is not related. e_1^1, e_1^2, e_1^3 is contributed to e_3^4 by $e_1^3 -> e_2^1$. So only e_1^4 is not related.

b)



3 Global State

a)

$$(e_1^1||e_2^1), (e_2^2||e_1^2), (e_1^1||e_2^2), (e_1^2||e_2^1), (e_1^1||e_2^3), (e_1^1, e_2^4), (e_1^2||e_2^3), (e_1^2||e_2^4), (e_2^3||e_1^4)$$

b)

i.Linearization. All the event is follow the rule happend-before.
ii. No Linearization. $e_2^4 -> e_1^5$ is not follw thw rule happend-before.

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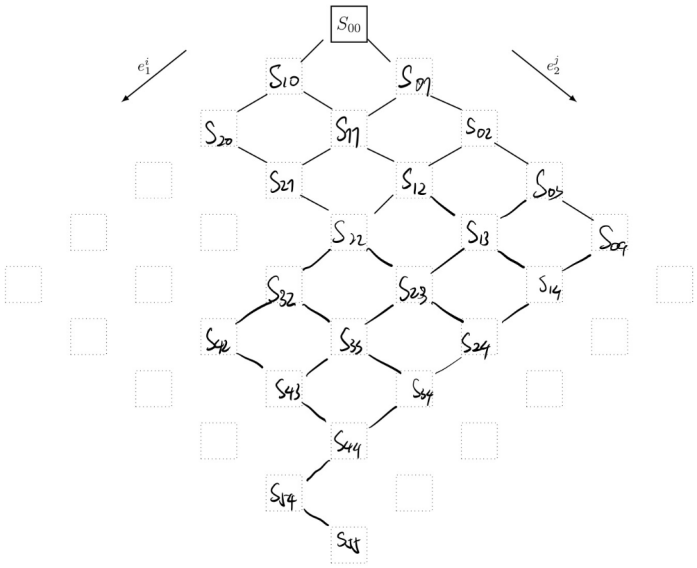
c)



4 Snap Algorithm

a