

Verteilte Systeme I

Winter Term 2019/20

G2T1 – Assignment 1 (theoretical part)

Felix Bühler
2973410

Clemens Lieb
xxxxxxx

Steffen Wonner
2862123

Fabian Bühler
xxxxxxx

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1 Transparency Levels

a)

The access is location transparent, because the location is hidden behind an unresolved URL.

b)

The service is not replication transparent because there is a unique link for every location that has to be checked separately.

c)

The access is replication transparent, because it is not apparent if Otto is checking one or multiple web services.

d)

i.

It is only possible to write all copies at once so all copies are always the same. That means independent from when or which copy is read the answer is always up to date.

ii.

Write operations are performed on $n-1$ copies. Read operations are performed on 2 copies, the client accepts the new version.

2 System Models

a)

- No message is lost
- The maximal possible delay is known

b)

i.

Every process i sends its own messages at time $i * \delta t$: $t_i^{\text{send}}(m) = i * \delta t$. The transmission of a given message is not longer than δt , so if a process i starts sending after $i * \delta t$ every process with a lower id has already finished and all processes know their messages.

ii.

The worst-case is $n * \delta t$ as δt is reserved for every process as time to send and δt is the longest time a process needs for transmitting a message.

3 Three-Army-Problem

a)

b)

4 System Availability

a)

$$A_x = \frac{80t}{100t} = 80\%$$

$$A_y = \frac{60t}{100t} = 60\%$$

b)

$$A_{A_x|A_y} = \frac{80t}{100t} = 80\%$$

c)

$P(A_i, A_j)$ = observing node A_i as up given that node A_j is up

$$P(A_x|A_y) = \frac{60t}{60t} = 100\% \rightarrow \text{not dependent}$$

$$P(A_y|A_x) = \frac{60t}{80t} = 75\% \rightarrow \text{is dependent}$$

d)

The availability depends on $A_x = 80\%$ which is equal to $A_{A_x|A_y}$.