



## Distributed Systems Part II

### Solution to Exercise Sheet 2

#### 1 Consensus with the Aid of a Wall

- a) The Algorithm looks like this:

```
Choose the color of the place you want to meet.
Go to the Painter and instruct him to paint the wall in the corresponding color
Look at the “before and after” picture which you get from the painter.
if {the wall was white before} {
    the meeting place is the one you have chosen
} else {
    the meeting place is the place according to the “before color”
}
```

- b) No. What Alice and Bob can do, is in a sense the same as the RMW-primitive swap. As swap is overwriting its consensus number is two. So there is no way to ensure that more than two persons can meet at the same place.
- c) If the wall is in front of the painters’ shop it is basically the same as the RMW-primitive Compare and Swap (because you would see if the painter is already painting, or if someone is in the shop and instructing the painter to paint) which has consensus number  $\infty$ . This means, that infinitely many persons could meet. The Algorithm would look like this:

```
Choose the color of the place you want to meet.
Go to the Painter
Look at the wall in front of the painters’ shop
if {the wall is white } {
    enter the shop and instruct the painter to paint the wall in your color
    the meeting place is the one you have chosen
} else {
    the meeting place is the place according to the color of the wall
}
```

#### 2 Consensus through “Fetch and Multiply”

I would tell him, that this is not possible. The method “Fetch and Multiply” he uses is commutative, therefore the consensus number of his algorithm cannot exceed two.