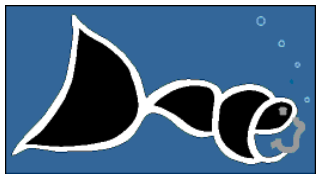
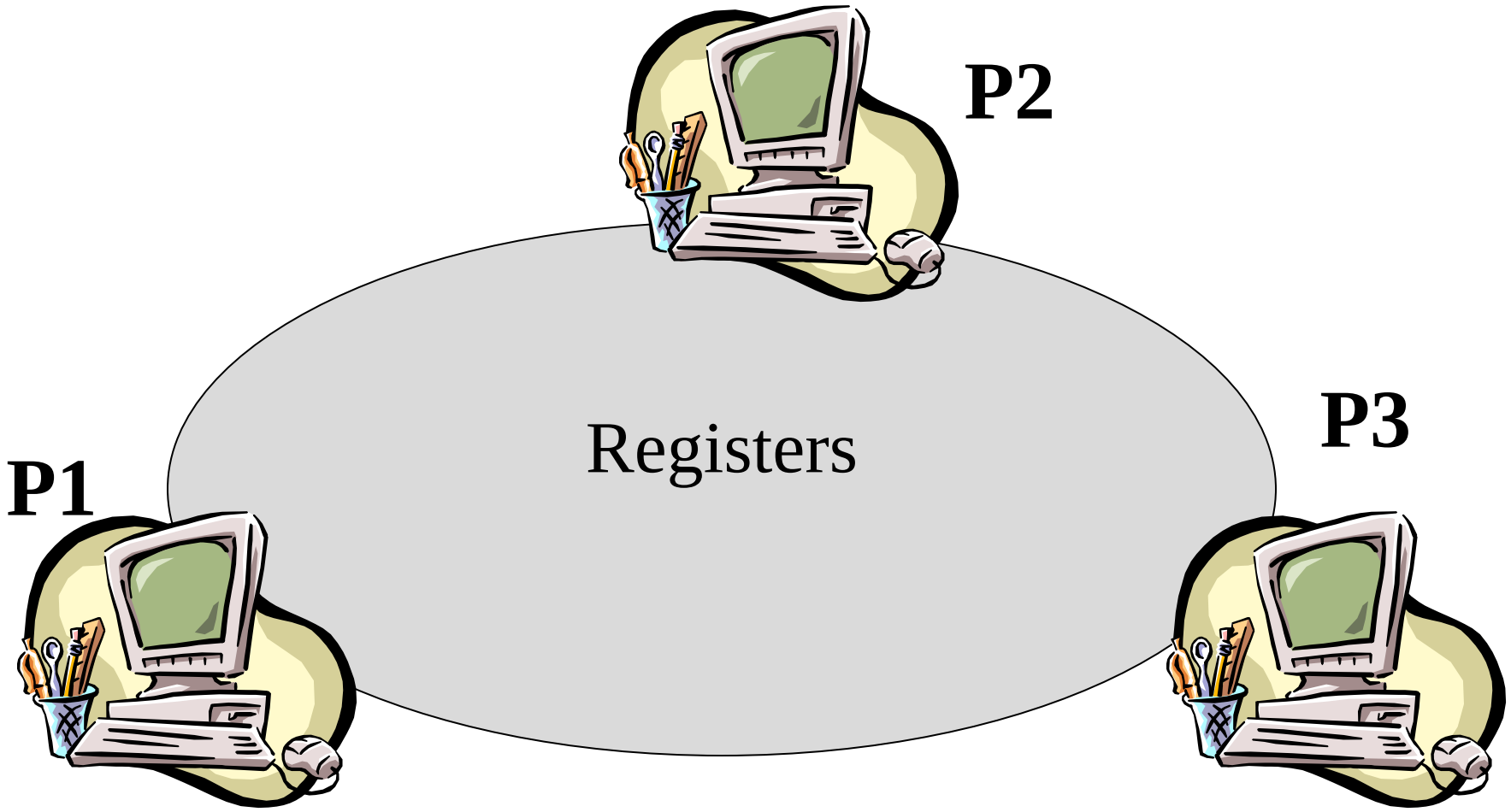
- Shared Memory -

R. Guerraoui
Distributed Programming Laboratory
lpdwww.epfl.ch



The application model



Register (assumptions)

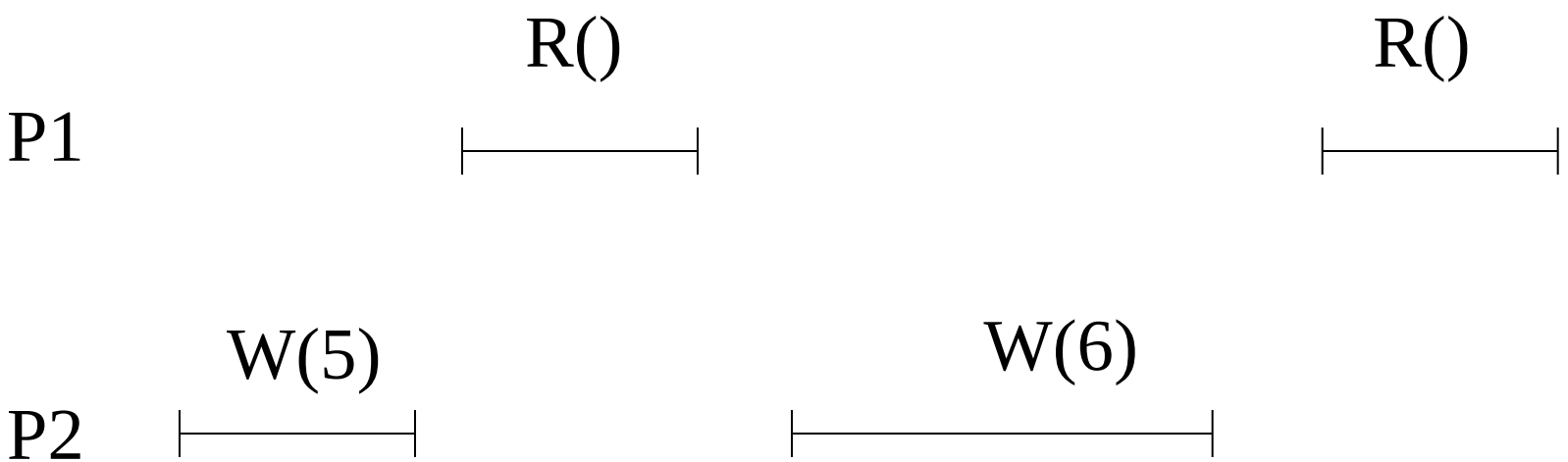
- For presentation simplicity, we assume registers of ***integers***
- We also assume that the initial value of a register is 0 and this value is initialized (written()) by some process before the register is used
- We assume that every value written is ***uniquely*** identified (this can be ensured by associating a process id and a timestamp with the value)

Register: specification

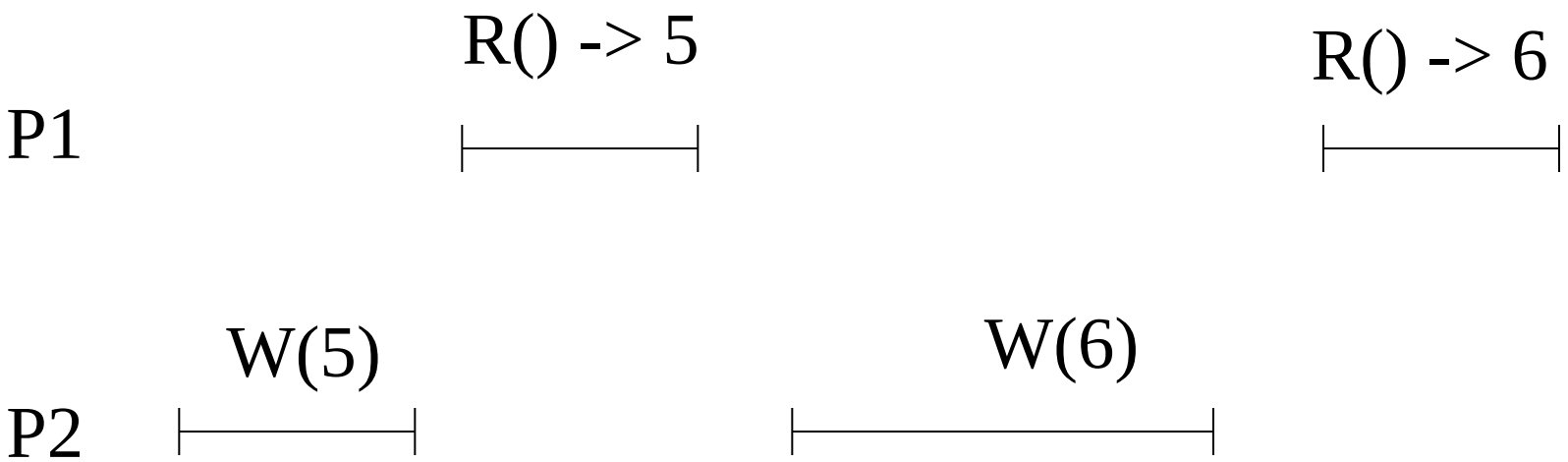
- Assume a register that is local to a process, i.e., accessed only by one process:

- In this case, the value returned by a ***Read()*** is the last value written

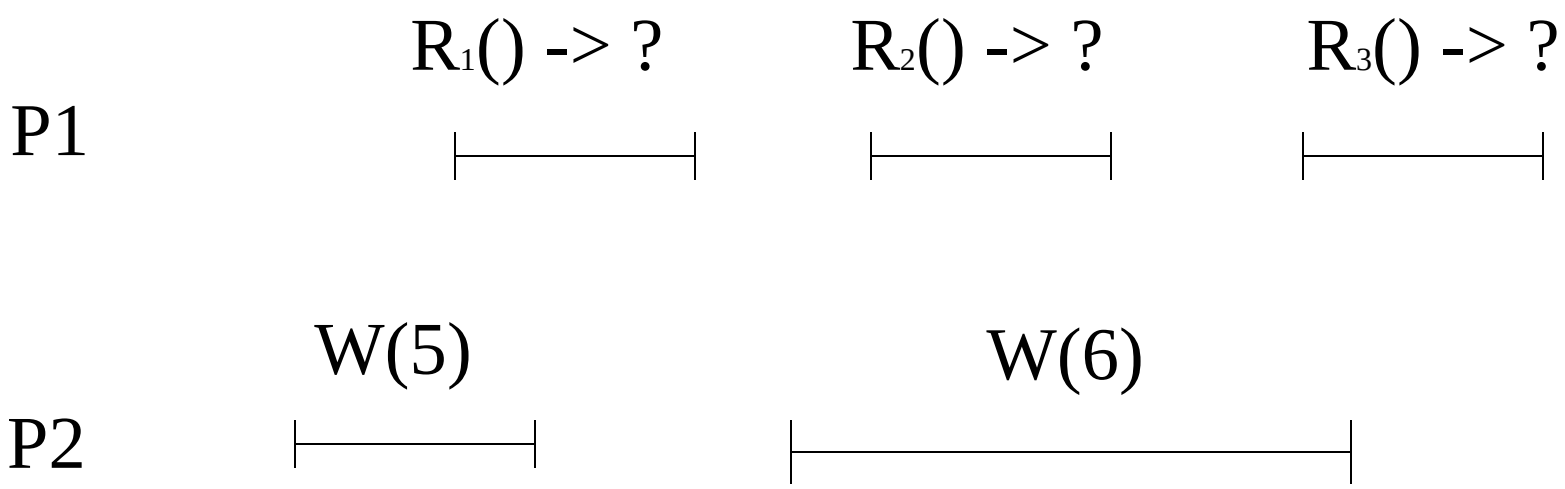
Sequential execution



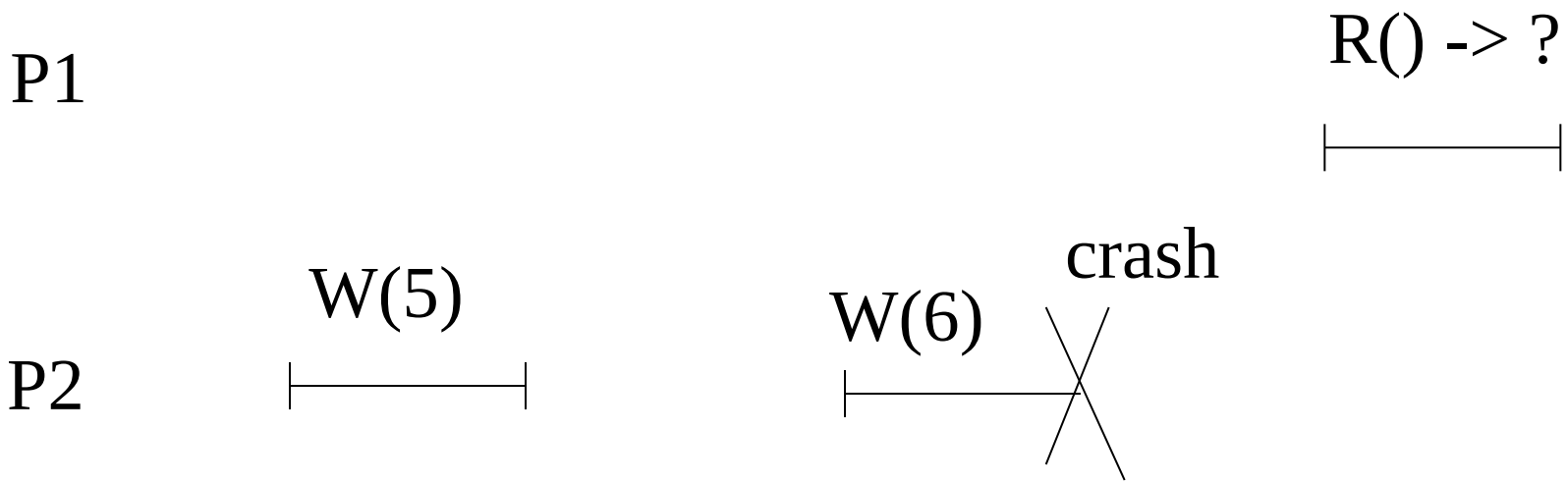
Sequential execution



Concurrent execution



Execution with failures



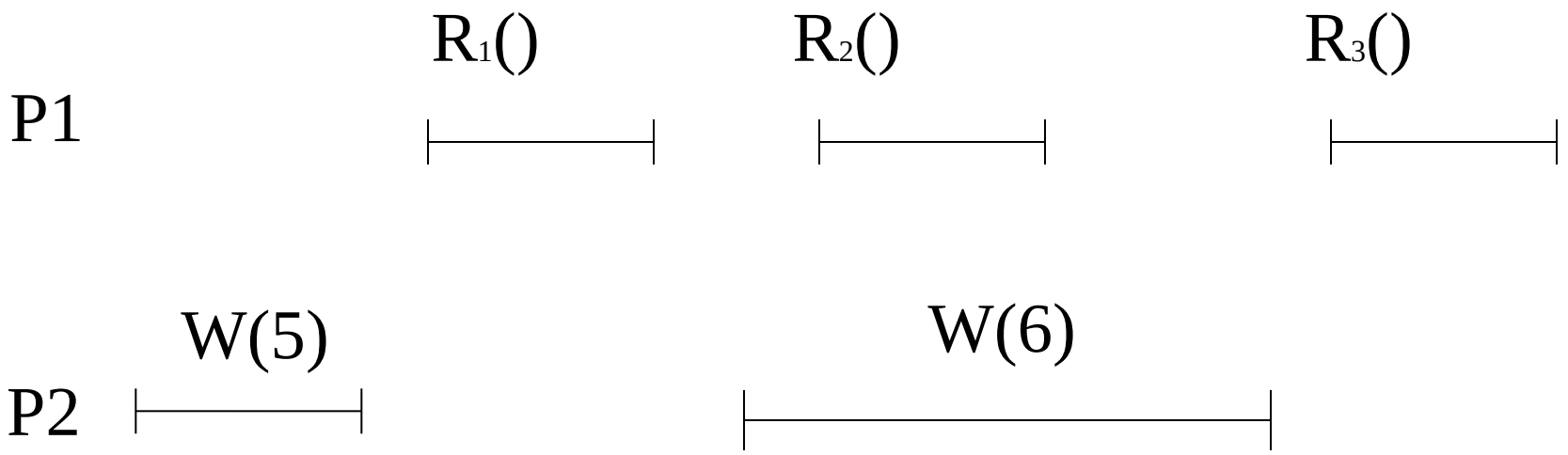
Regular register

- It assumes only ***one*** writer;
- It provides ***strong*** guarantees when there is no concurrent or failed operations (invoked by processes that fail in the middle)
- When some operations are concurrent, or some operation fails, the register provides ***minimal*** guarantees

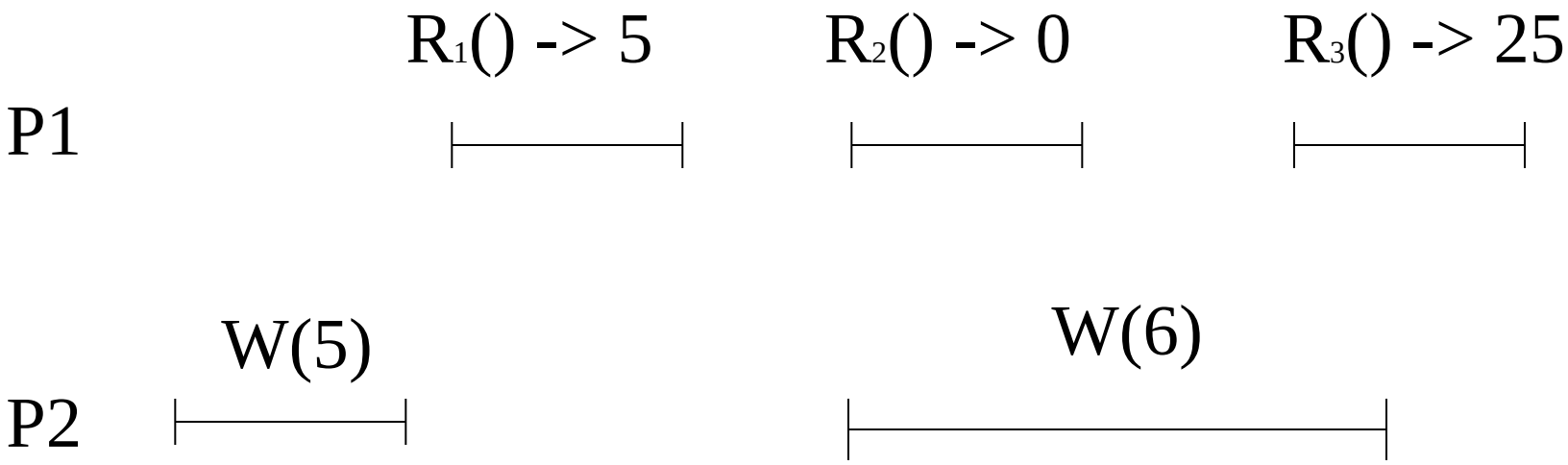
Regular register

- ***Read()*** returns:
  - ✓***the last value*** written if there is no concurrent or failed operations
  - ✓and otherwise the last value written or ***any*** value concurrently written, i.e., the input parameter of some ***Write()***

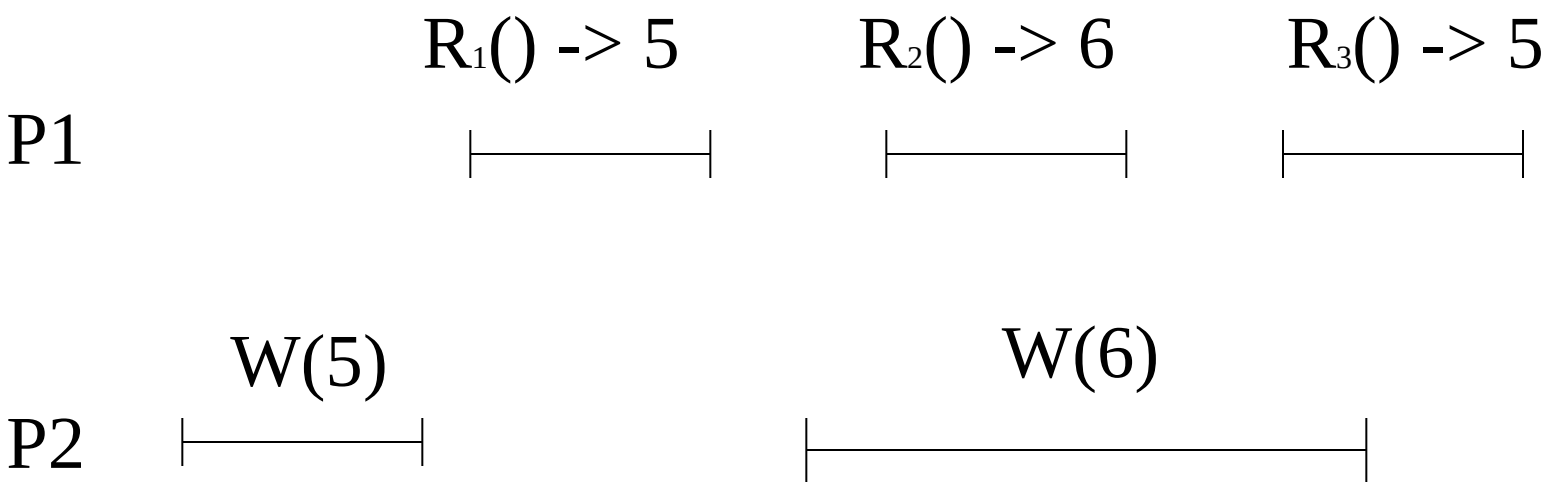
Execution



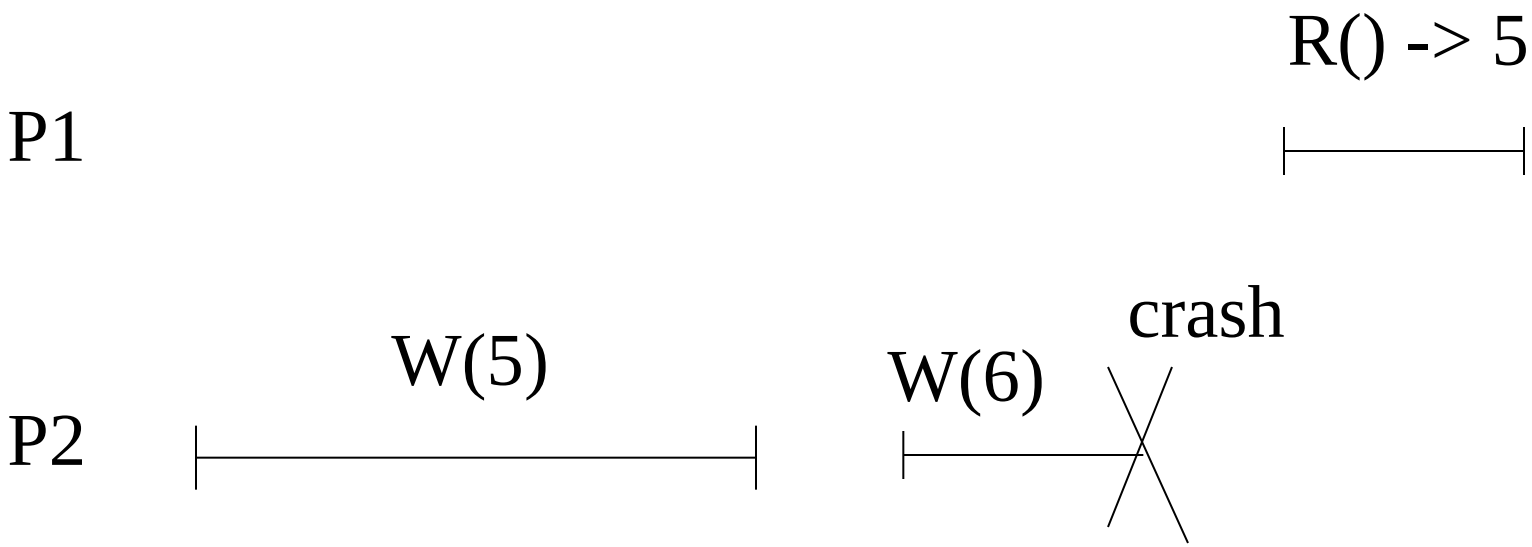
Results 1



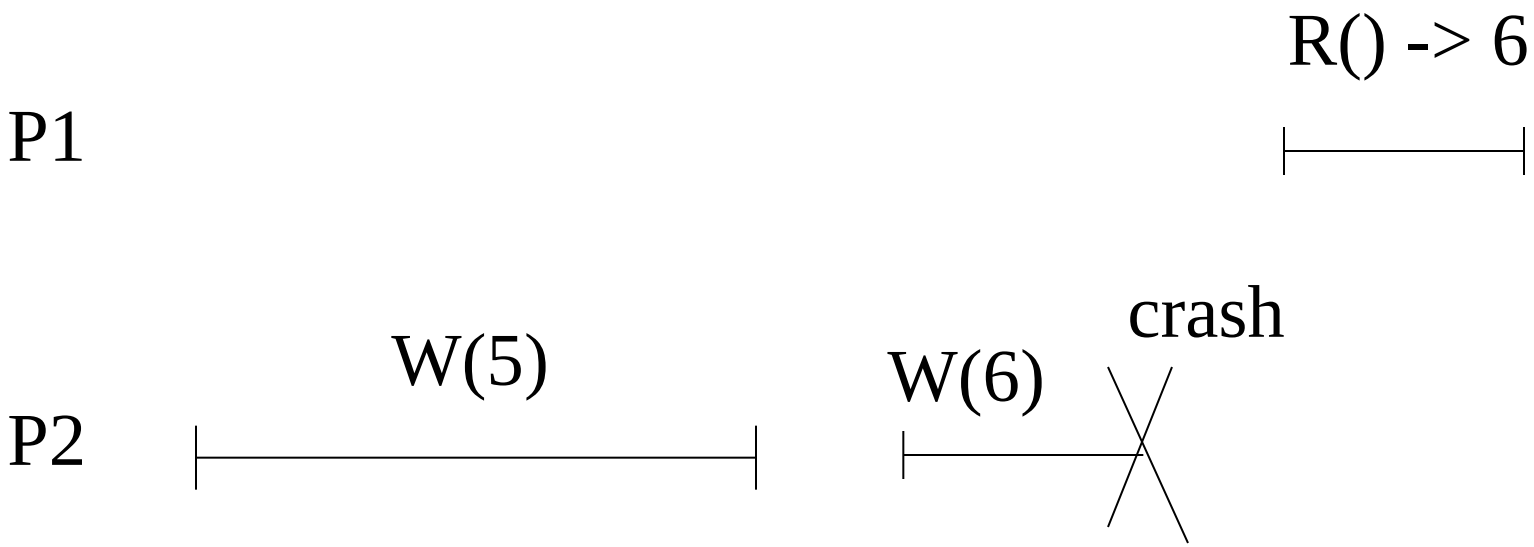
Results 2



Results 3



Results 4



Correctness

- Results 1: non-regular register (safe)
- Results 2; 3; 4: regular register