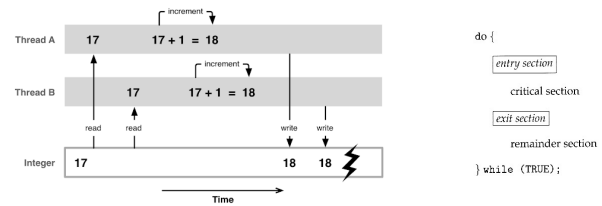


Graduate Operating Systems

Spring 2023

1

Race Condition & Critical Sections



2

Semaphores

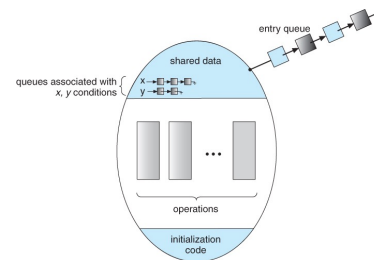
Semaphore S – integer variable

Can only be accessed via two indivisible (atomic) operations:

- `wait()` and `signal()`, originally called `P()` and `V()` respectively
- `wait (S) {`
 `while (S <= 0)`
 `;` // do nothing while (S<=0)
 `S--;`
 `}`
- `signal (S) {`
 `S++;`
 `}`

3

Paper “Monitors”



4

Paper “Monitors”

- Examples:
 - Condition variables
 - Bounded Buffer
 - Scheduled Waits
 - Readers and Writers