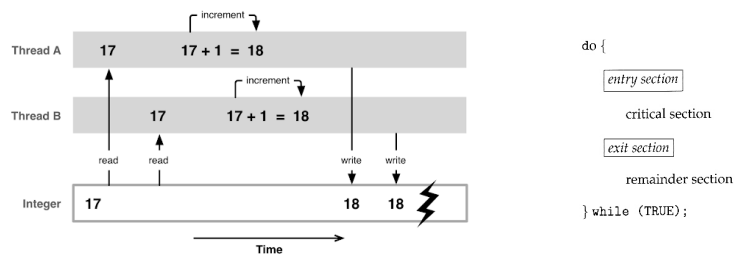


Graduate Operating Systems (Threads & Events)

Fall 2020

Race Condition & Critical Sections



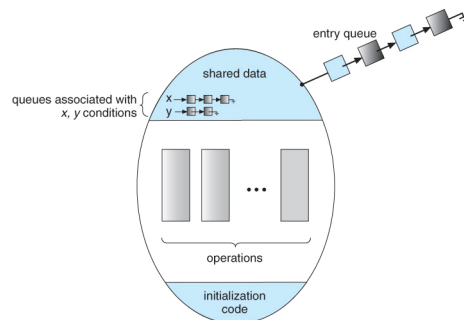
Semaphores

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++;
}
```

Paper “Monitors”



Paper “Monitors”

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