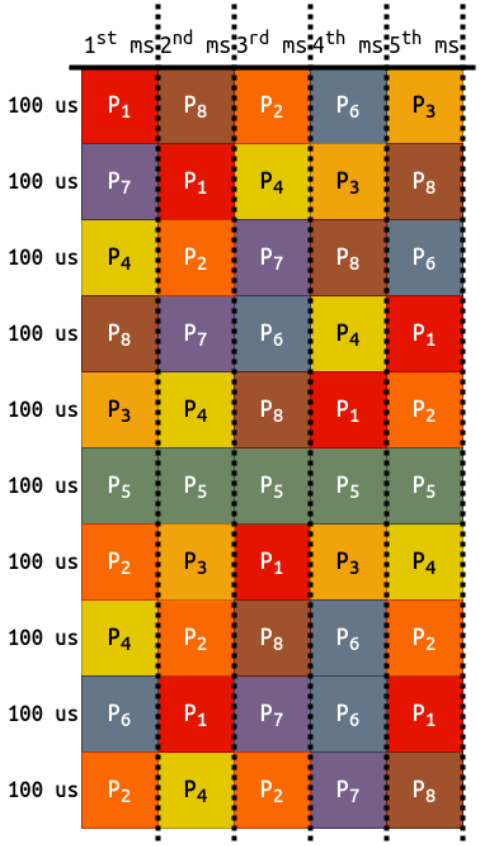
The Process Scheduler

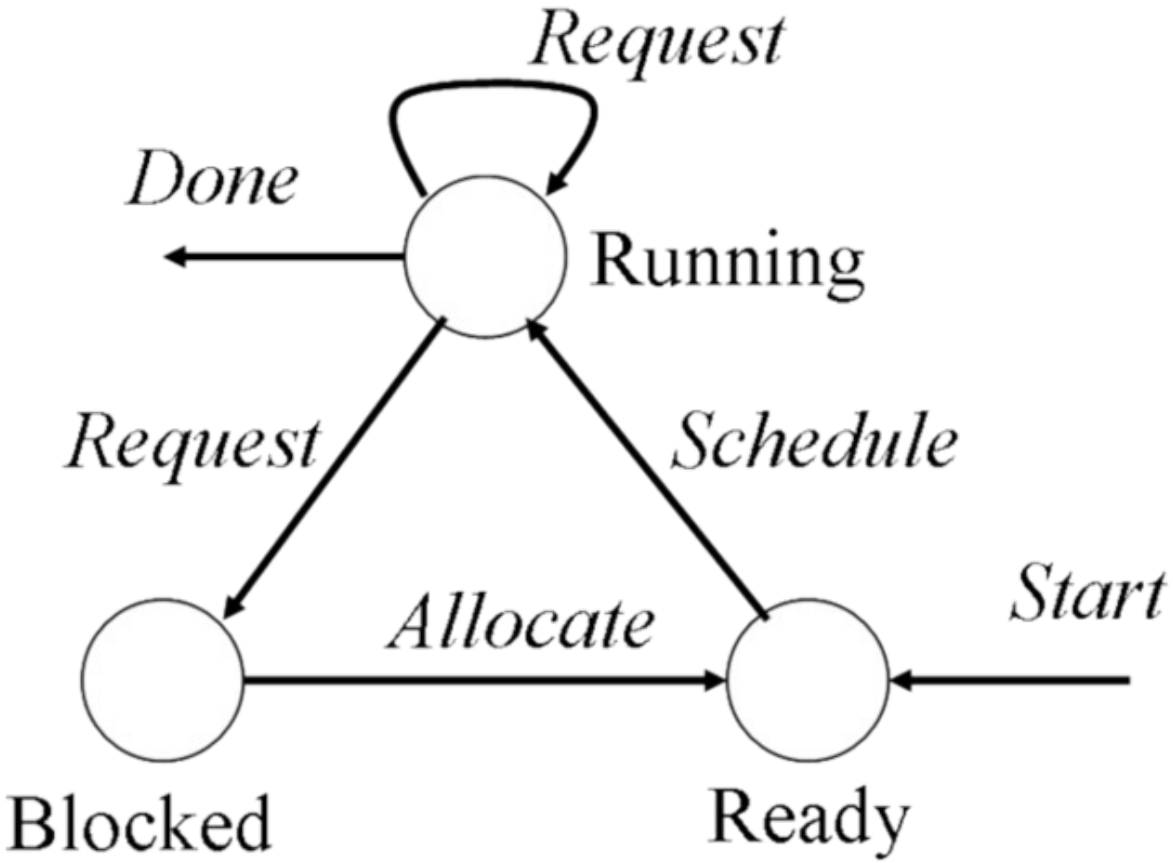


- Purpose: determine which process to run (at each given moment)
- Requirements of a working scheduler
  - Fair time distribution between processes
  - Deal with non-preemptive processes
  - Deal with prioritsed events (i.e. *interrupts*)

Simplified Process FSD

- Process Creation → *Start* → Process enters queue of **Ready** processes
- Scheduler → *Schedule* CPU control to Process → **Running** Process
- Depending on scheduling algorithm, Running Process continuously Requests CPU control
- Resource block or scheduler preemption → *Request* fails and Process is **Blocked**
- If resource (also CPU resource) available again→ Process *Allocates* resource → **Ready** queue
- Process reaches final instruction → return value on stack → process is *Done*

- **Audience Question**: why can only **Running** processes get *Done ?*



=> *Interactive Example*

The Process Scheduler

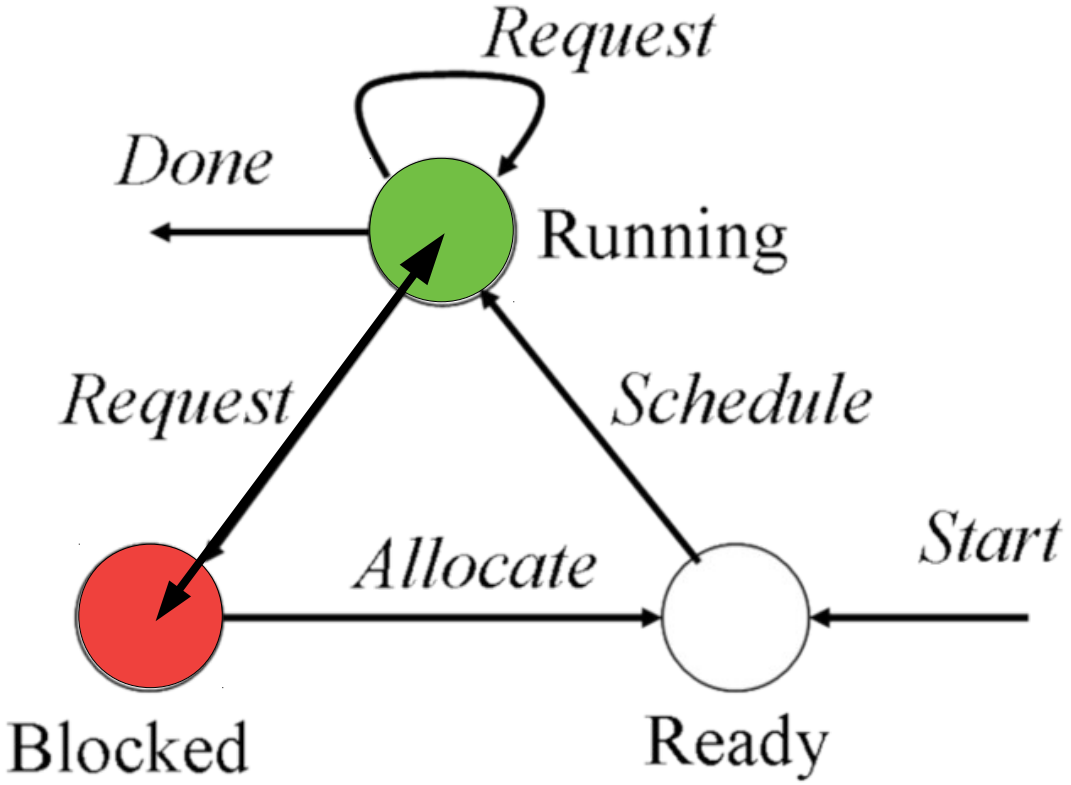
How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- CPU Utilization
- Waiting time
- Service time → time consumed on CPU by process
- Response time → waiting time for initialisation
- Turnaround time for a process → ‘process lifetime’

The Process Scheduler

How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- *CPU Utilization*
- Waiting time
- Service time
- Response time
- Turnaround time

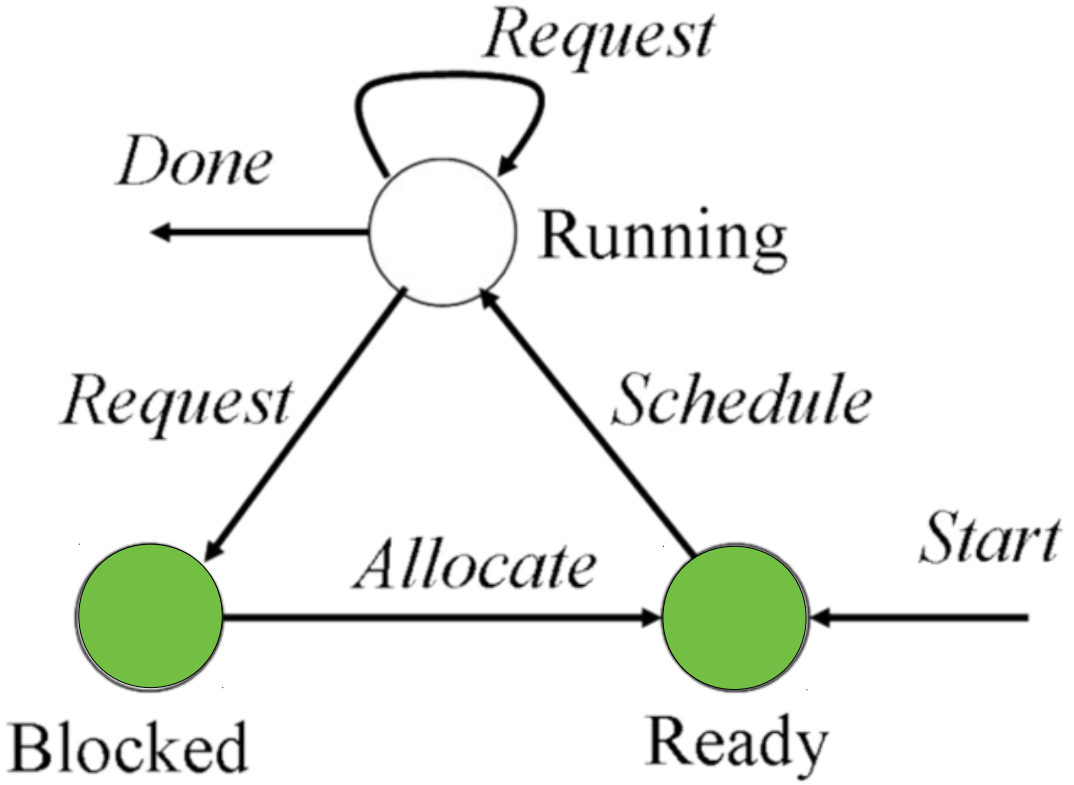


CPU_util = t(Running) / t(Blocked)

The Process Scheduler

How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- CPU Utilization
- *Waiting time*
- Service time
- Response time
- Turnaround time

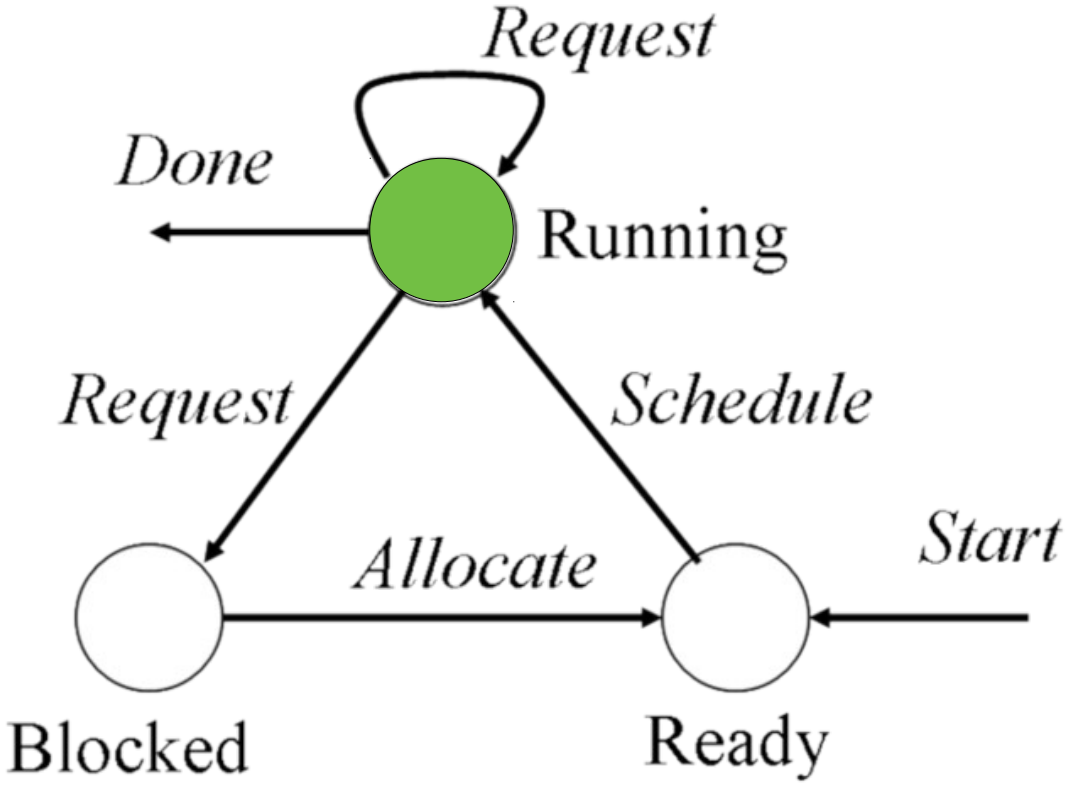


waiting = t(Blocked) + t(Ready)

The Process Scheduler

How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- CPU Utilization
- Waiting time
- *Service time*
- Response time
- Turnaround time

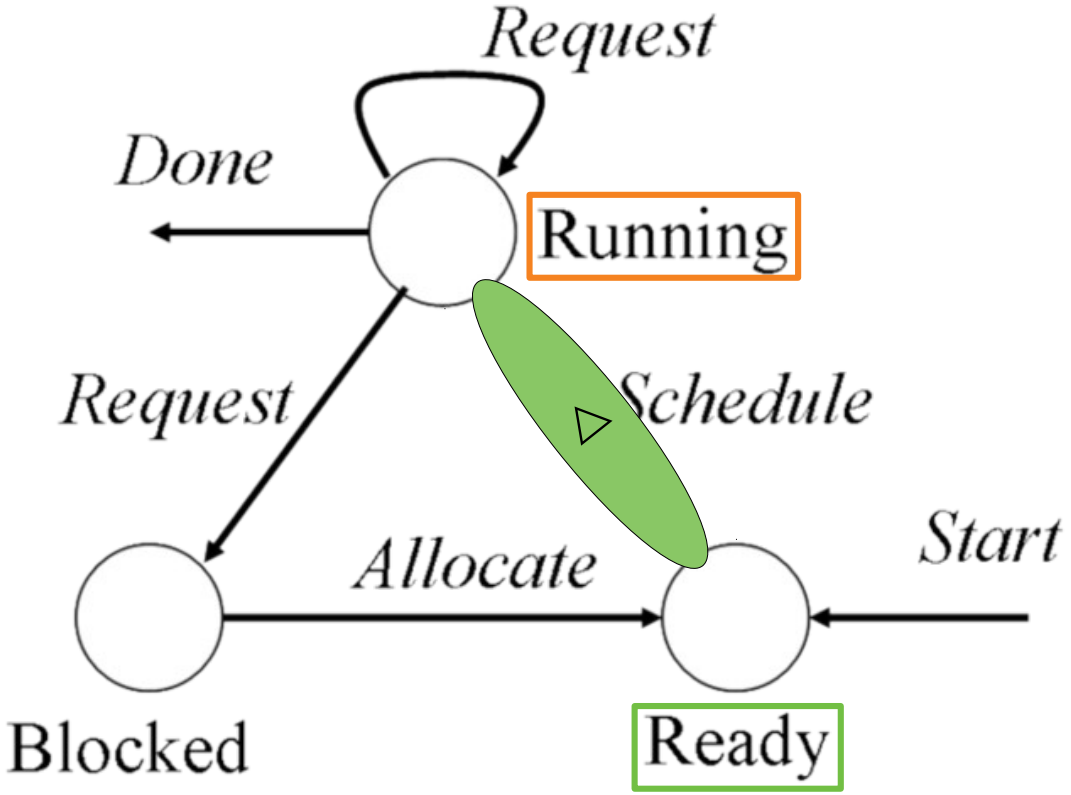


service = t(Running)

The Process Scheduler

How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- CPU Utilization
- Waiting time
- Service time
- *Response time*
- Turnaround time

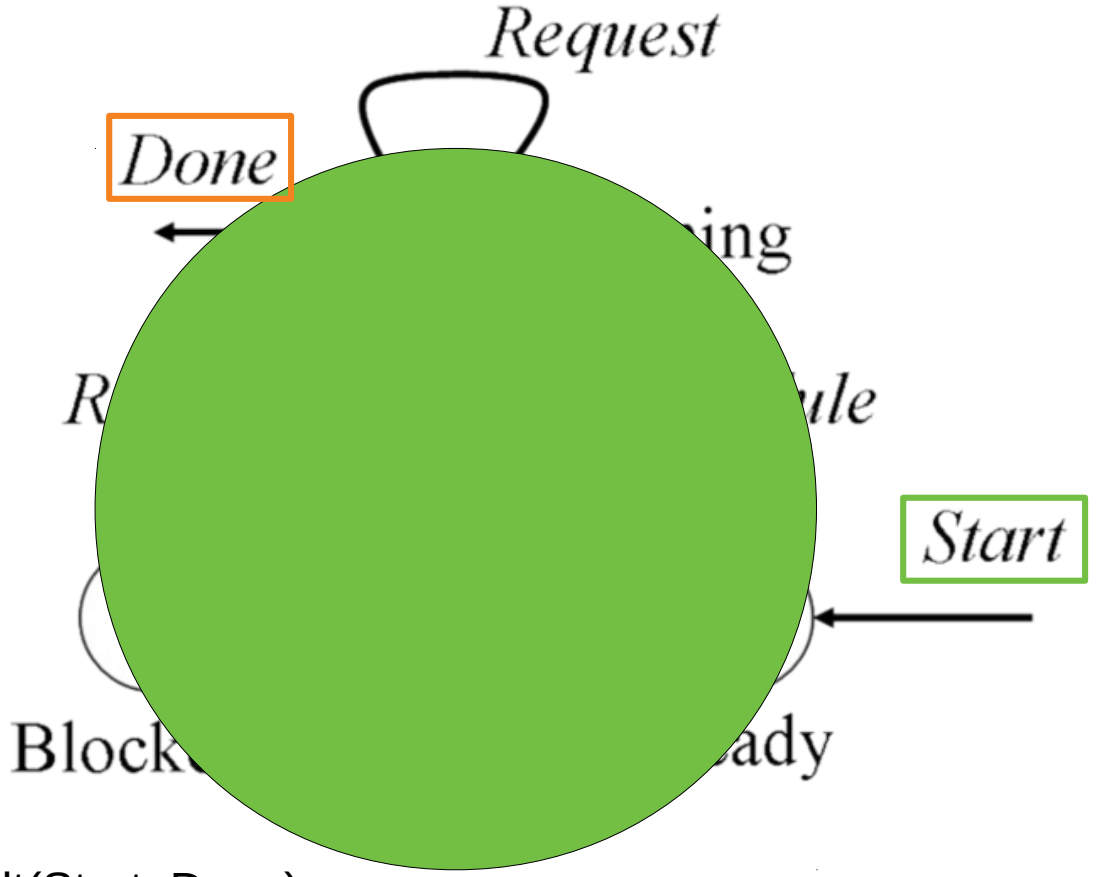


Response = dt(Ready, Running)

The Process Scheduler

How to we *fairly* decide which process to run next ?
=> **Scheduler Metrics**

- CPU Utilization
- Waiting time
- Service time
- Response time
- ***Turnaround time***



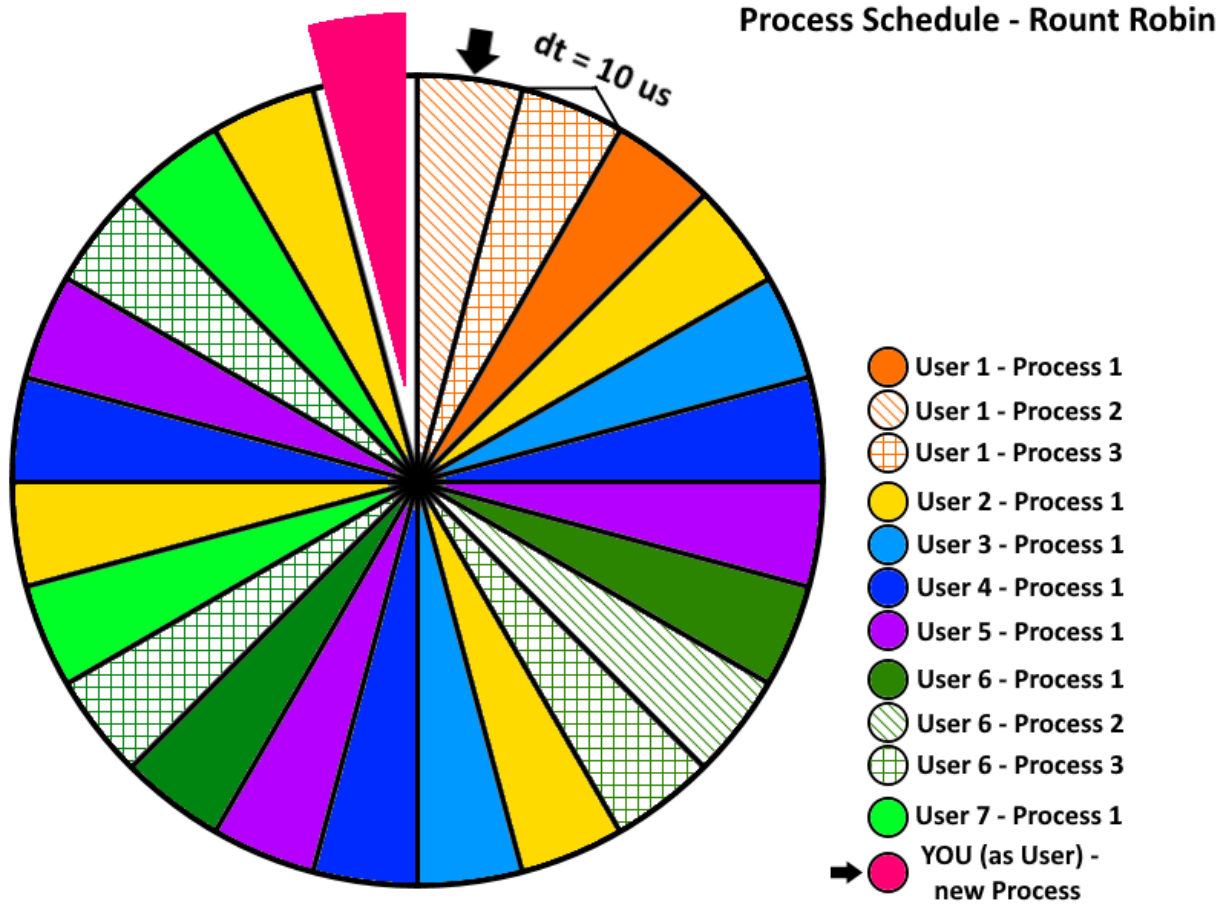
Turnaround = dt(Start, Done)

The Process Scheduler – Scheduling Metrics

- First Come – First Serve
- Shortest Job Next
- Priority Queue
- Round Robin

The Process Scheduler – Scheduling Algorithms

- First Come – First Serve
- Shortest Job Next
- Priority Queue
- Round Robin



The Process Scheduler – Scheduling Algorithms

- First Come – First Serve
- Shortest Job Next
- Priority Queue
- Round Robin

Process	Service time
p1	140
p2	75
p3	320
p4	280
p5	125