

# Programmable Temporal Isolation through Variable-Bandwidth Servers

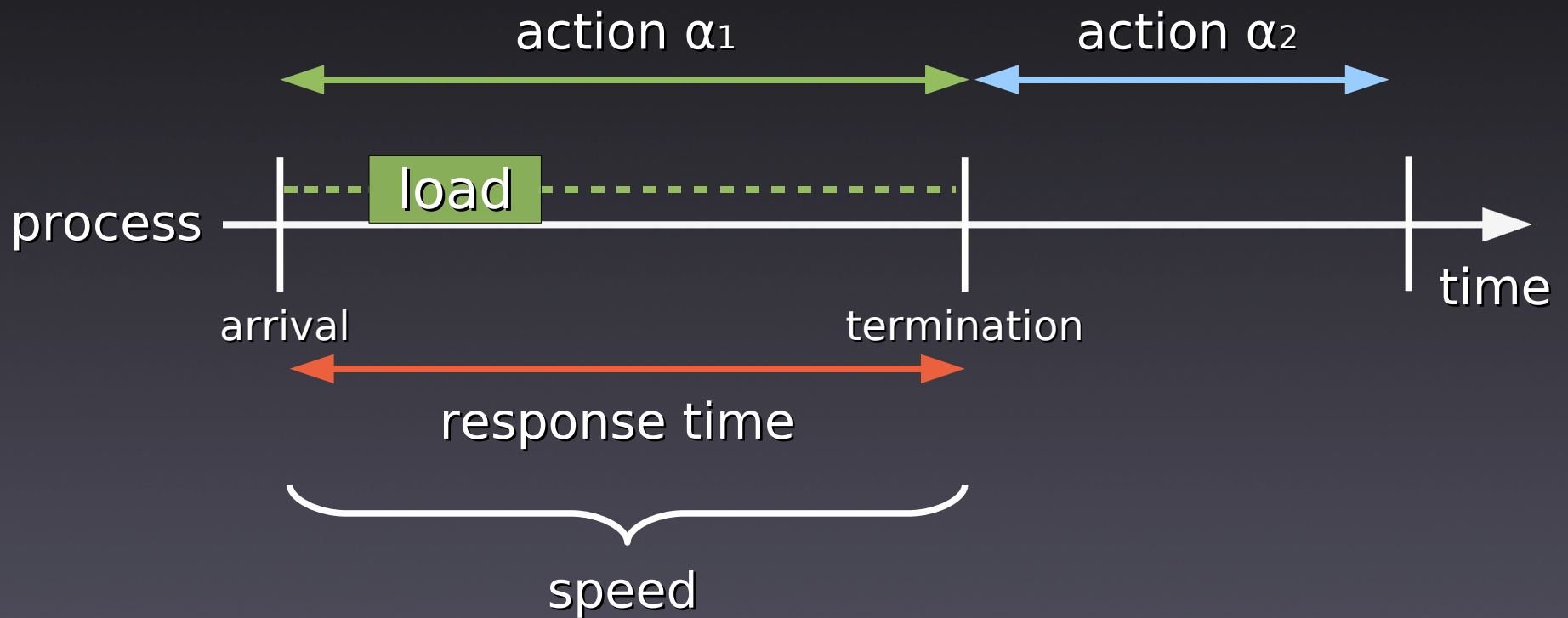
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joint work with  
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# Process model



- action is a piece of code
- process is a sequence of actions

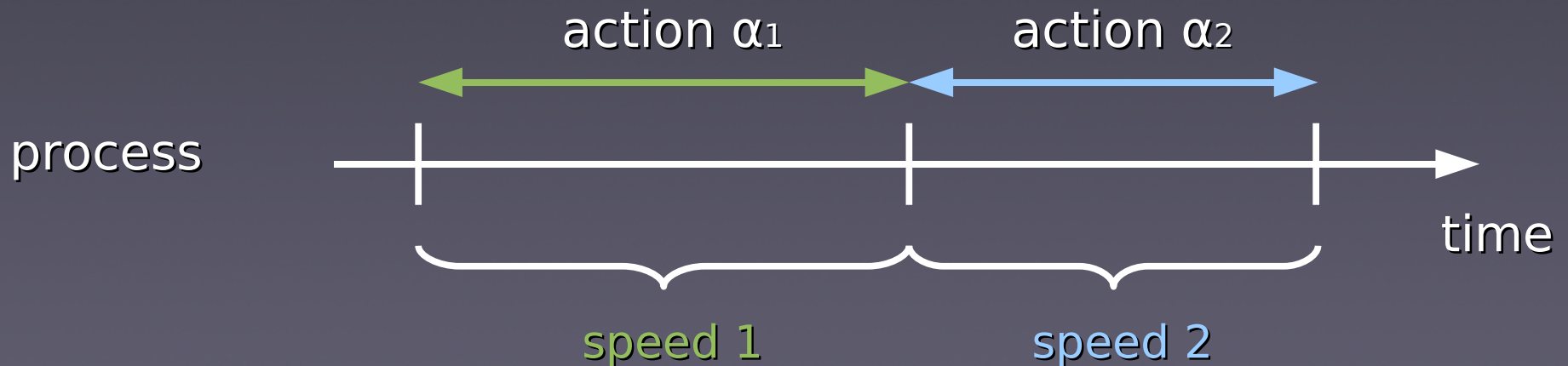
# Problem



schedule the processes so that each of their actions maintains its response time

# Goal

- solve the scheduling problem  
(temporal isolation)
- change execution speed of processes  
(programmable)
- solve admission problem  
(changeable set of processes)

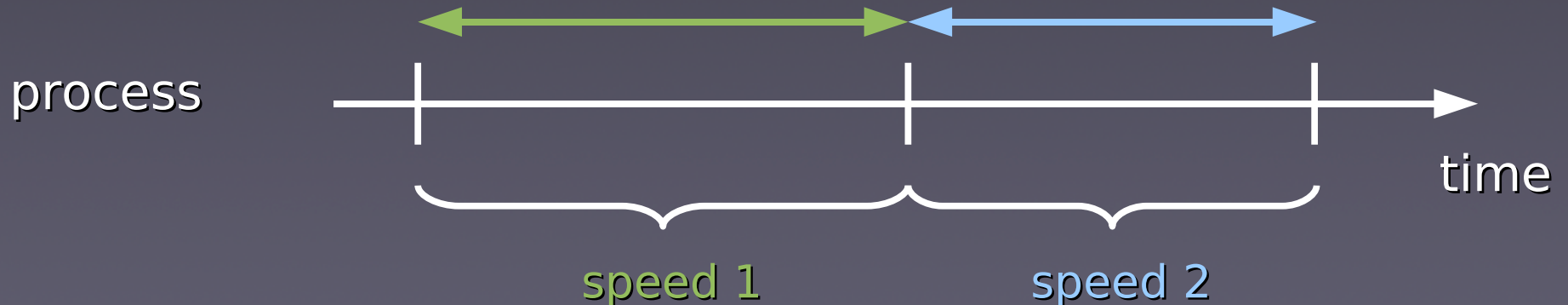


# Goal

- solve the scheduling problem

- characterize (relation)
- Solvable with variable bandwidth servers (VBS)

- solve (programmable)
- Results:
- a constant-time scheduling algorithm (cases)
  - a constant-time admission test



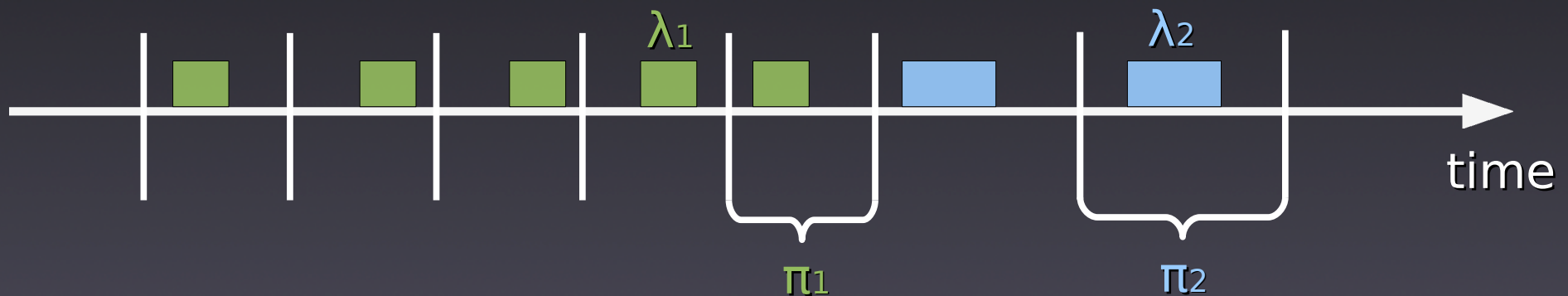
# Resources and VBS

virtual periodic resources

period  $\pi$

limit  $\lambda$

utilization  $\lambda/\pi$



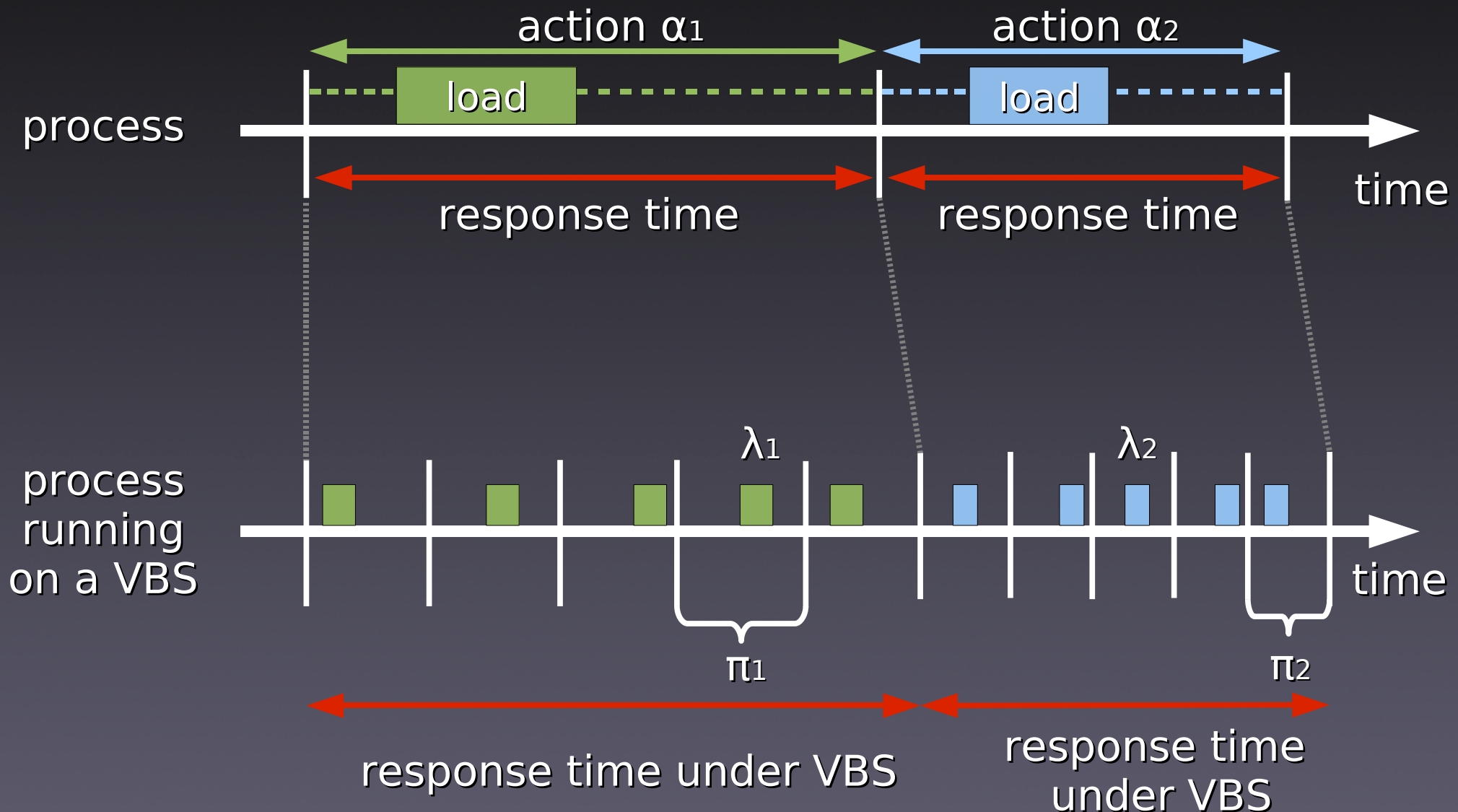
- VBS is determined by a bandwidth cap ( $u$ )
- VBS processes dynamically adjust speed (resource)

$$\lambda_1/\pi_1 \leq u \text{ and } \lambda_2/\pi_2 \leq u$$

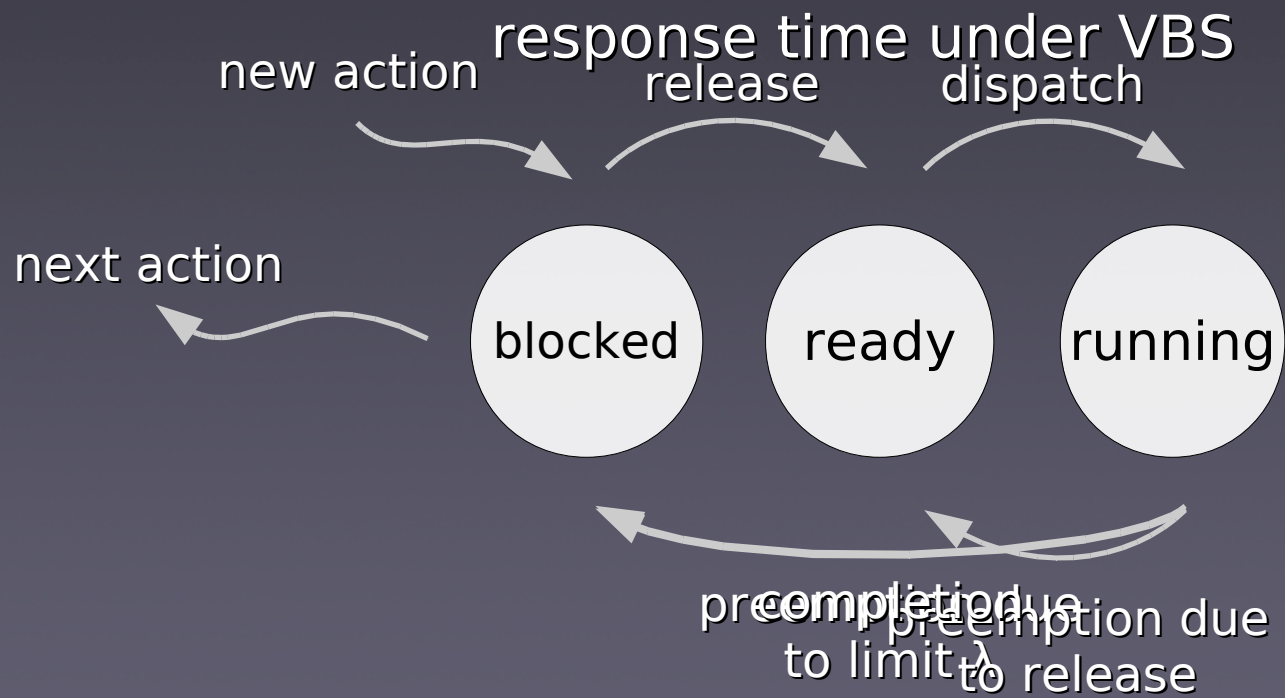
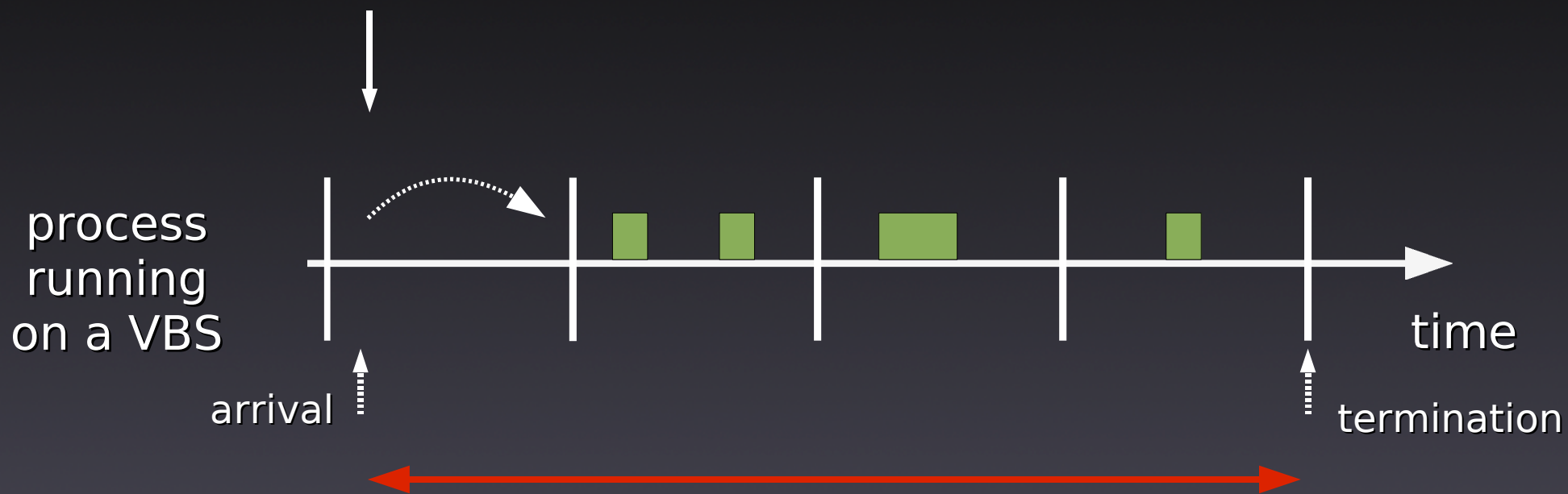
- generalization of constant bandwidth servers (CBS)

[Abeni and Buttazzo 2004]

# One process on a VBS

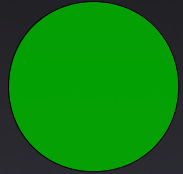


# VBS





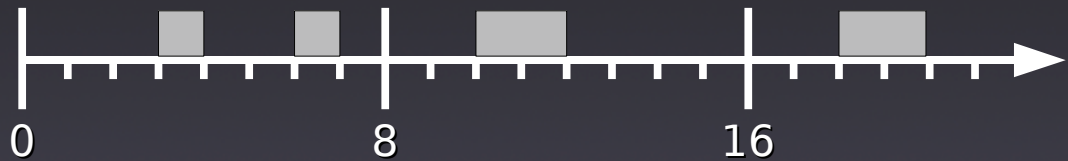
# VBS



process 1  
(2,4)



process 2  
(2,8)



process 3  
(1,6)



blocked



ready



running

multiple processes are EDF-scheduled