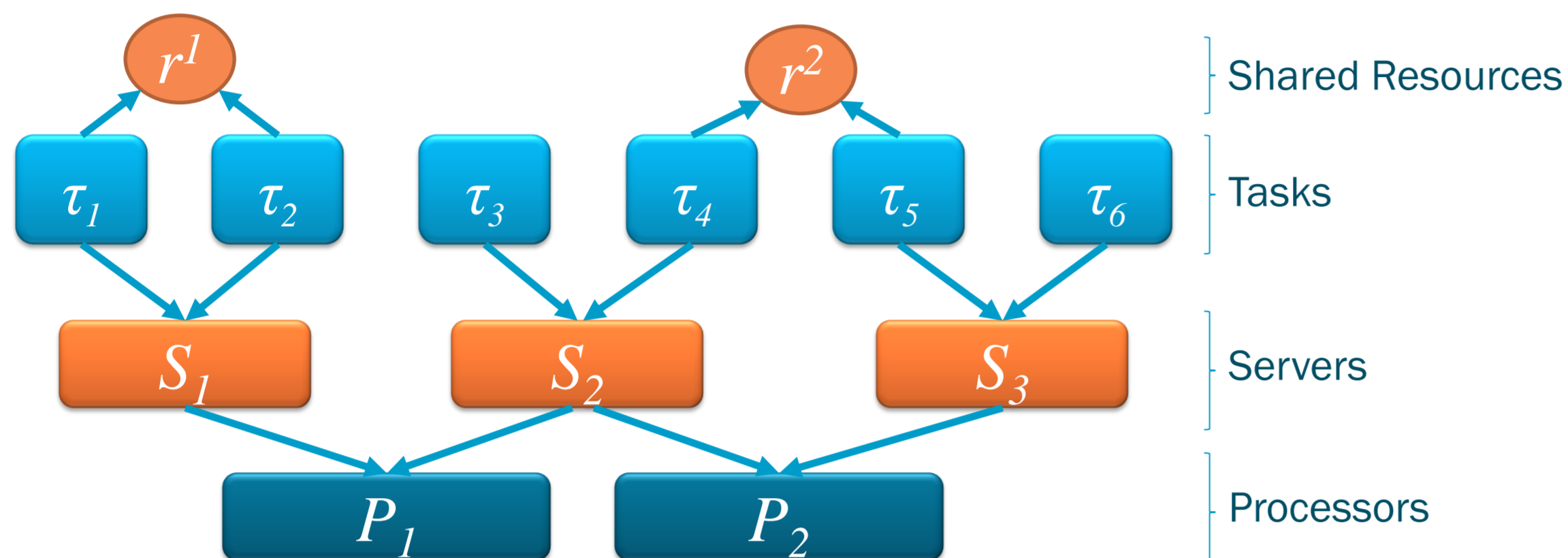


Resource Sharing Under a Server-based Semi-Partitioned Scheduling Approach

1. Context and Goal

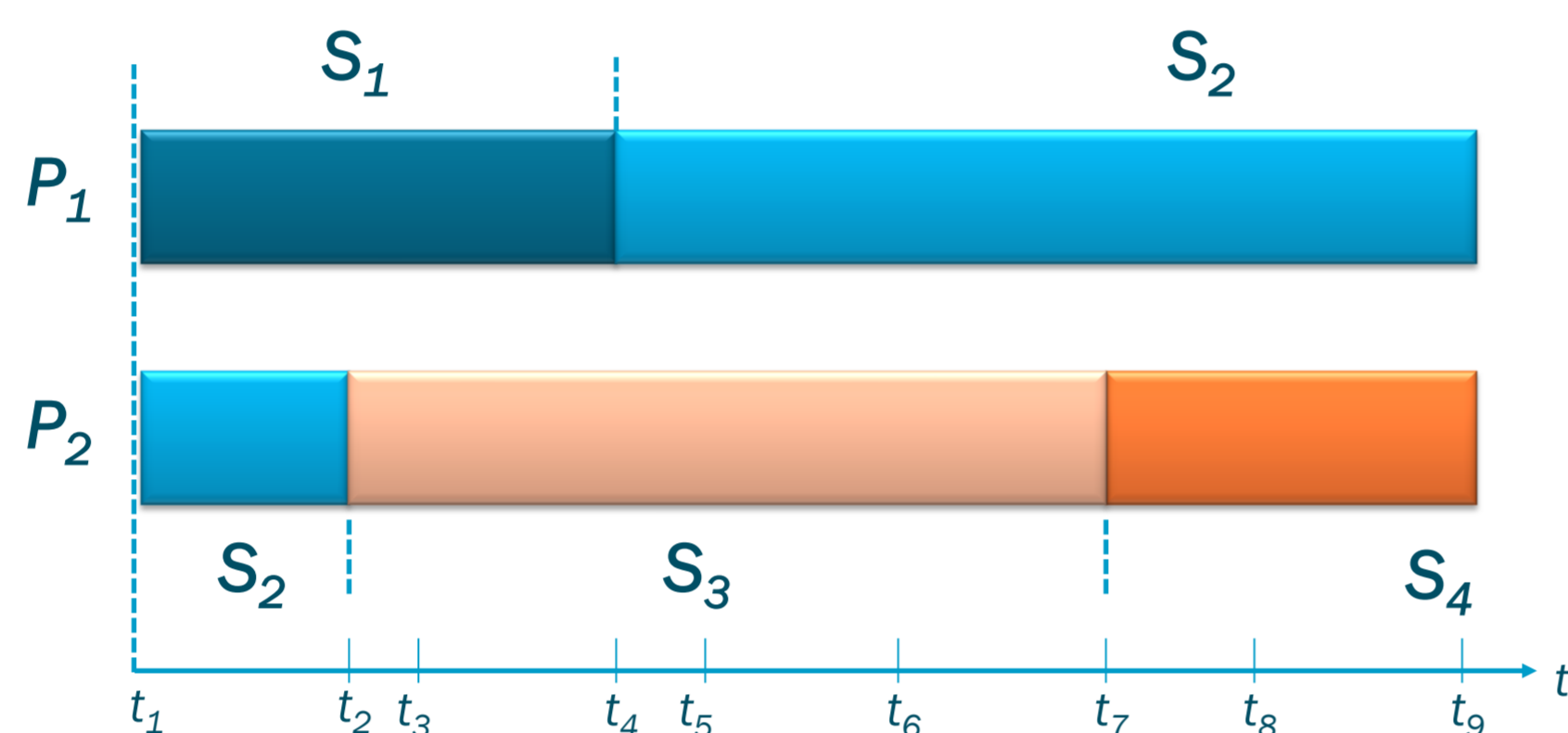
Goal:

- Adapt MrsP resource sharing protocol to work with servers through bandwidth inheritance
- Adapt NPS-F schedulability test to introduce adapted version of MrsP



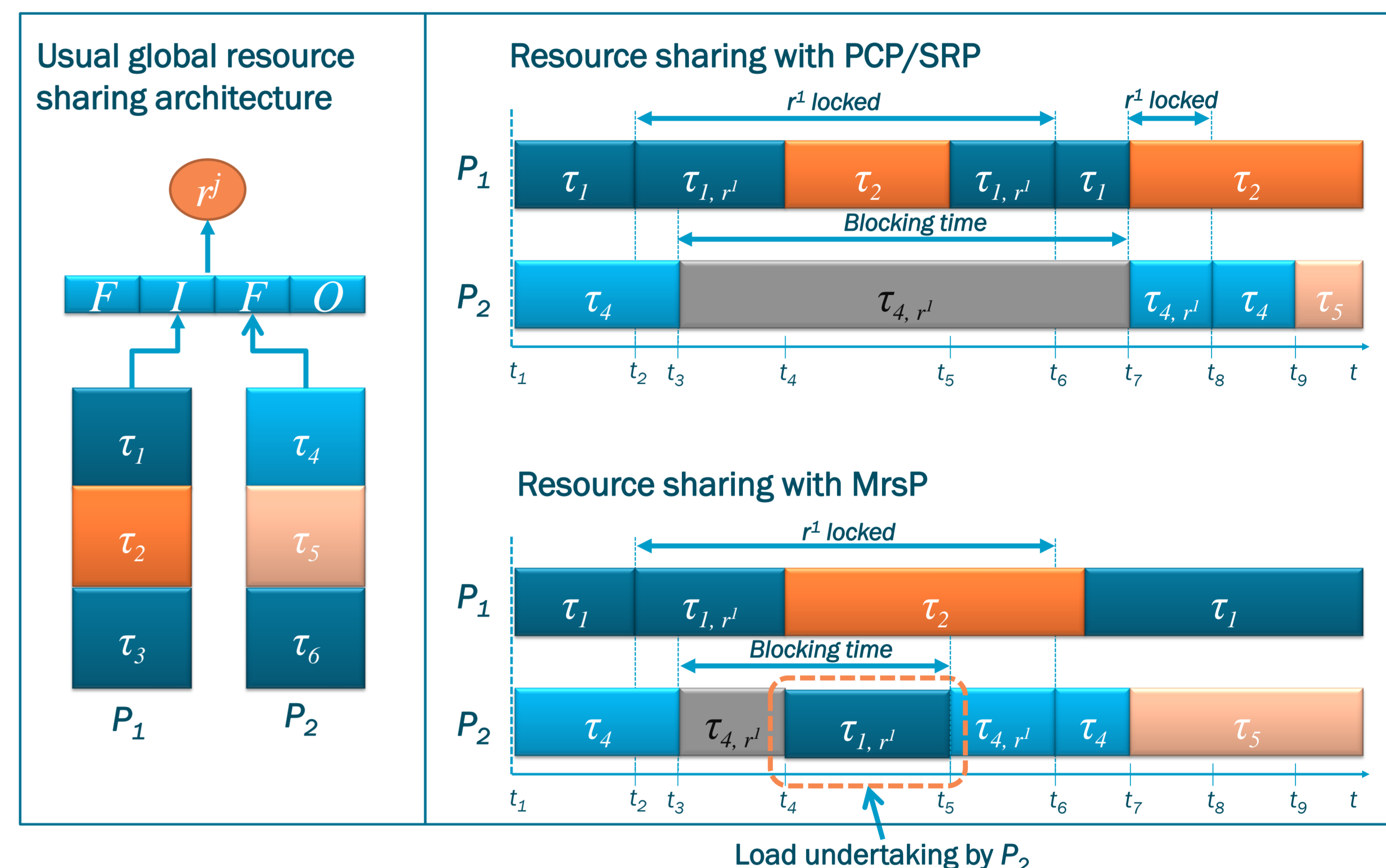
2.1. NPS-F

- Semi-partitioned scheduling algorithm
- Server-based approach
- Does not consider shared resources
- Servers serve one or more tasks using EDF



2.2. MrsP

- Generalization of PCP/SRP Response Time Analysis to multicore
- Defined for fully partitioned systems where tasks are scheduled using fixed priorities
- Only one task per processor accessing a resource at any time
- Blocked tasks can undertake load of tasks holding the resource that has been preempted



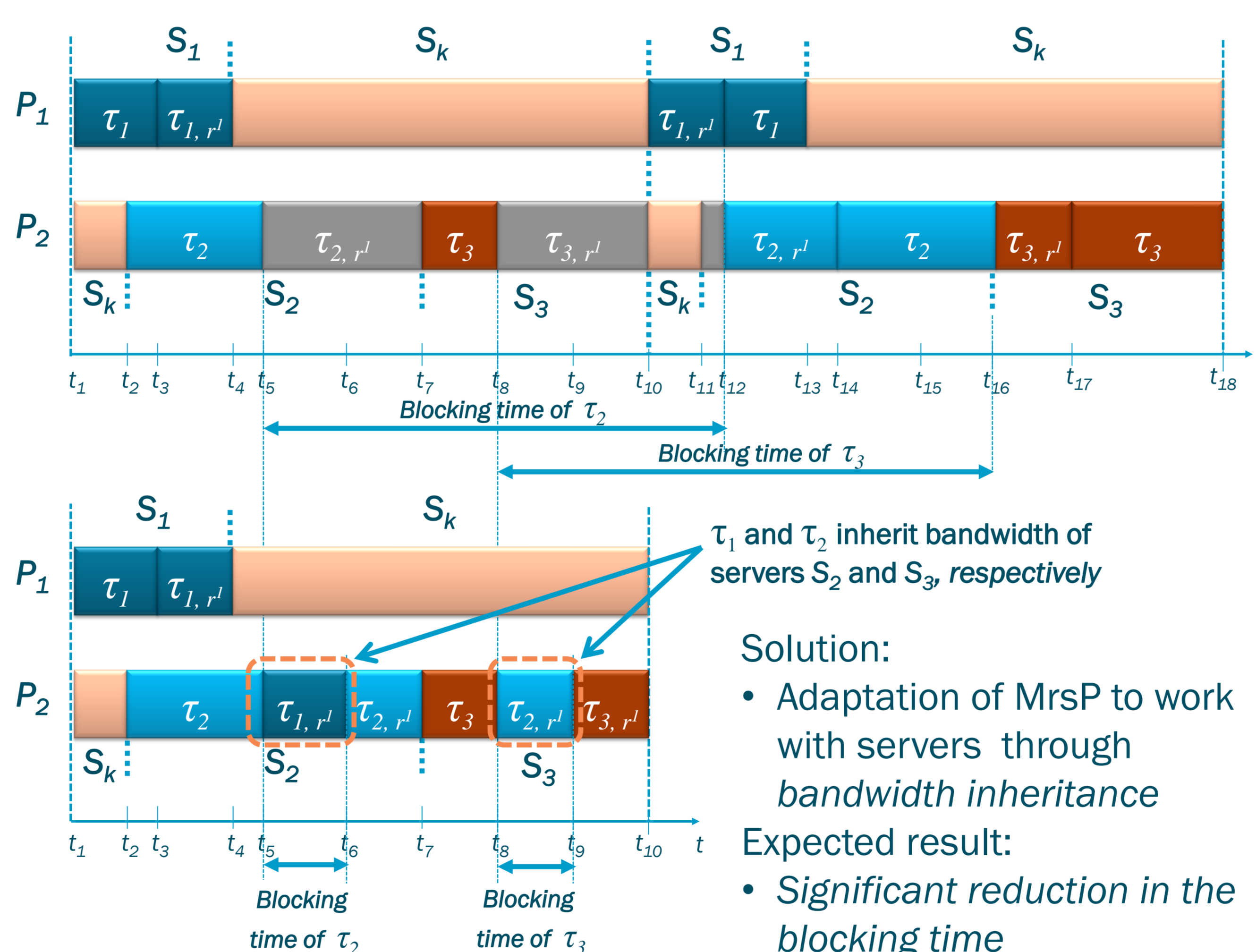
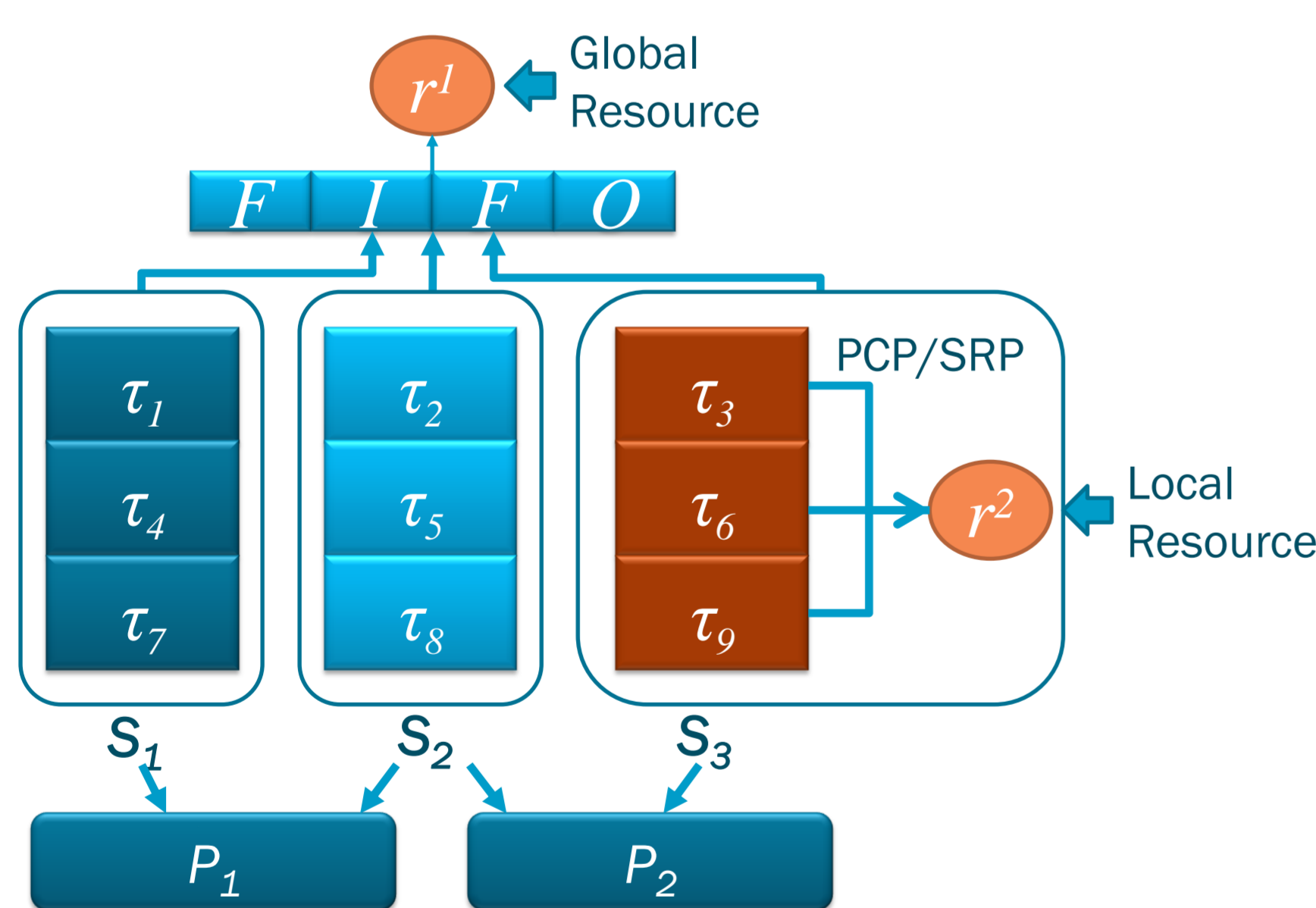
3. Contribution

Goal:

- Account for shared resources in NPS-F by adapting MrsP

Challenges:

- MrsP is defined for fixed priority while NPS-F uses EDF
- MrsP is defined for fully partitioned while NPS-F uses servers



Adaptation of MrsP schedulability test for EDF scheduling policy and Supply Bound Function (SBF)

$$\forall t : B^L(S_q) + \text{DBF}(S_q, t) \leq \text{SBF}(S_q, t)$$

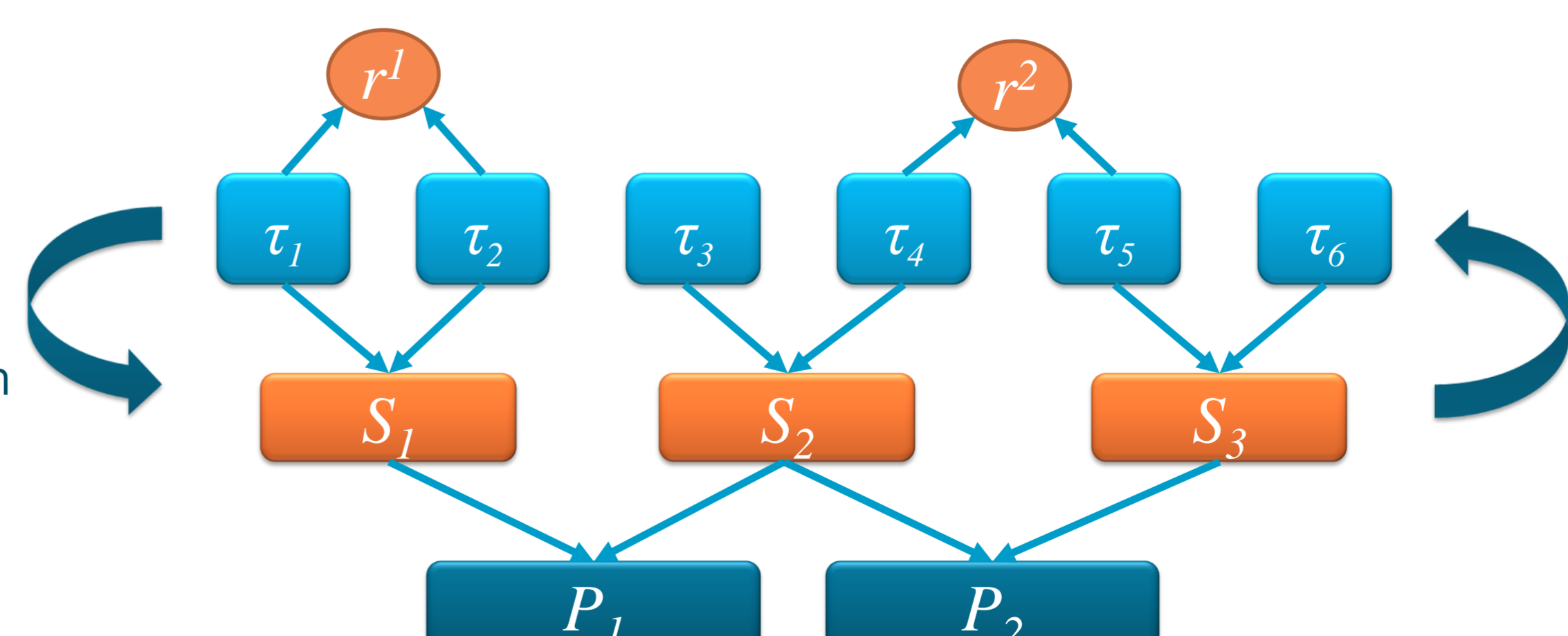
$$C_k = \text{WCET}(\tau_k) + \sum_{r^j \in F(\tau_k)} e^j$$

- Solution:
- Adaptation of MrsP to work with servers through bandwidth inheritance
- Expected result:
- Significant reduction in the blocking time

4. Future Work

- Prove the correctness of the schedulability test equations provided
- Define approach for mapping of the tasks to the servers:
 - Challenge → circular dependencies with the schedulability test provided
- Extend the approach to any server based scheduling algorithm for multicore architectures (e.g., RUN/SPRINT, CBS, SS)

Mapping tasks to servers: depends on DBF



DBF depends on where tasks accessing the same resource than τ_i are assigned