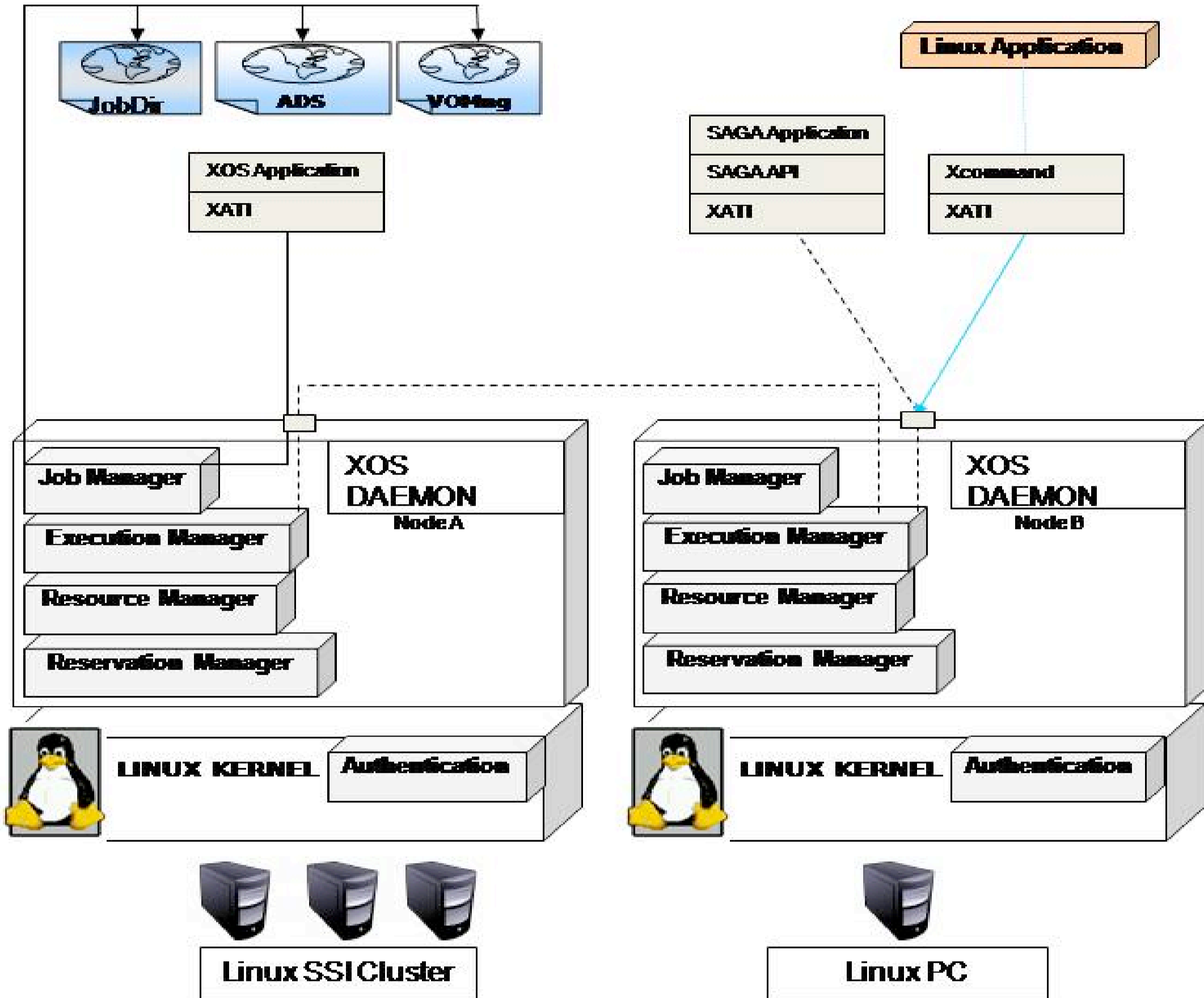




## Application Execution Management (AEM)

- Distributed job management and resource management
- One XtreemOS daemon on each grid node ( single PC, SSI cluster, mobile device )
- One job consists of one or more job units spread over grid nodes
- Job description in jsdl file ( conform to OGF standard )

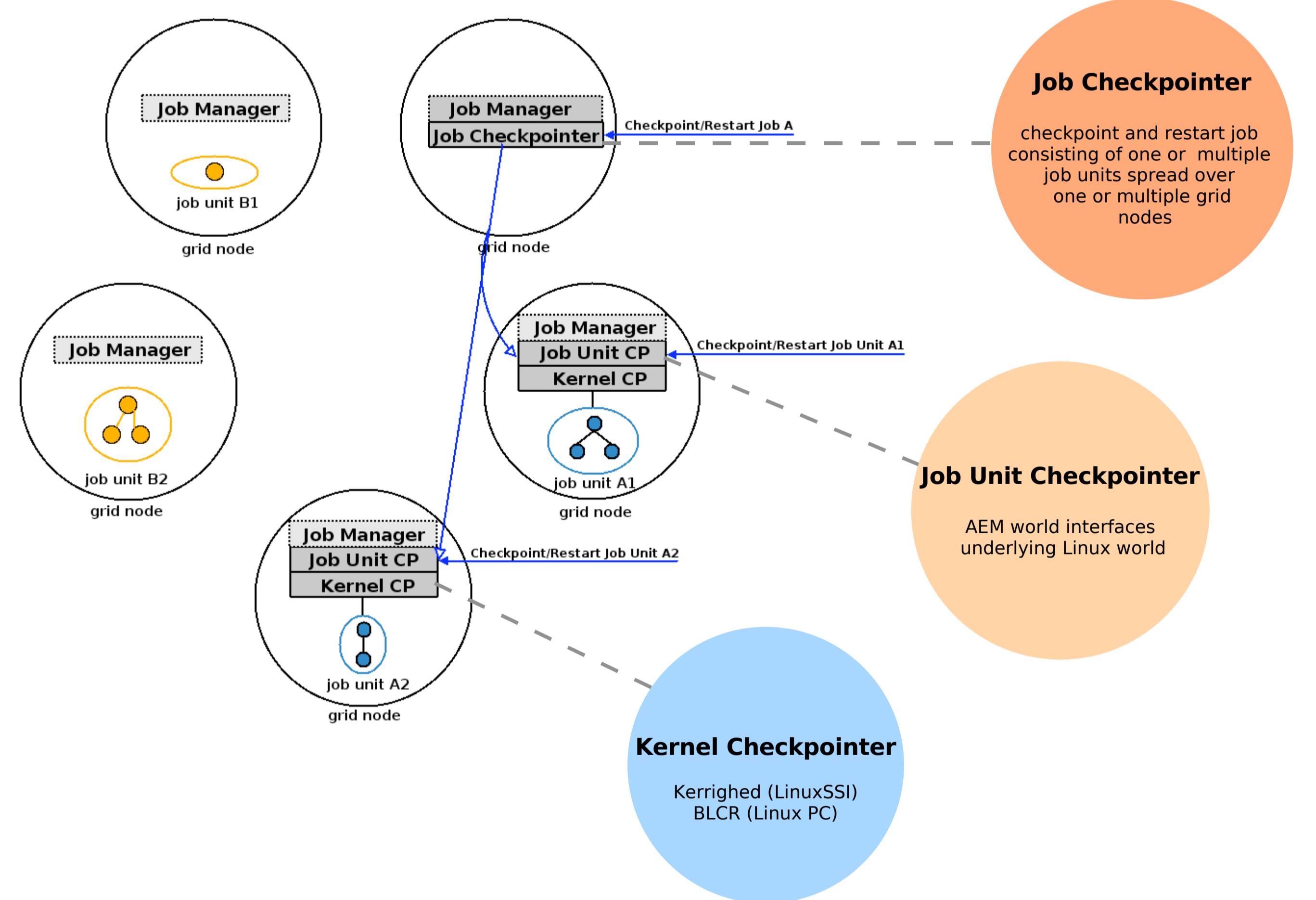
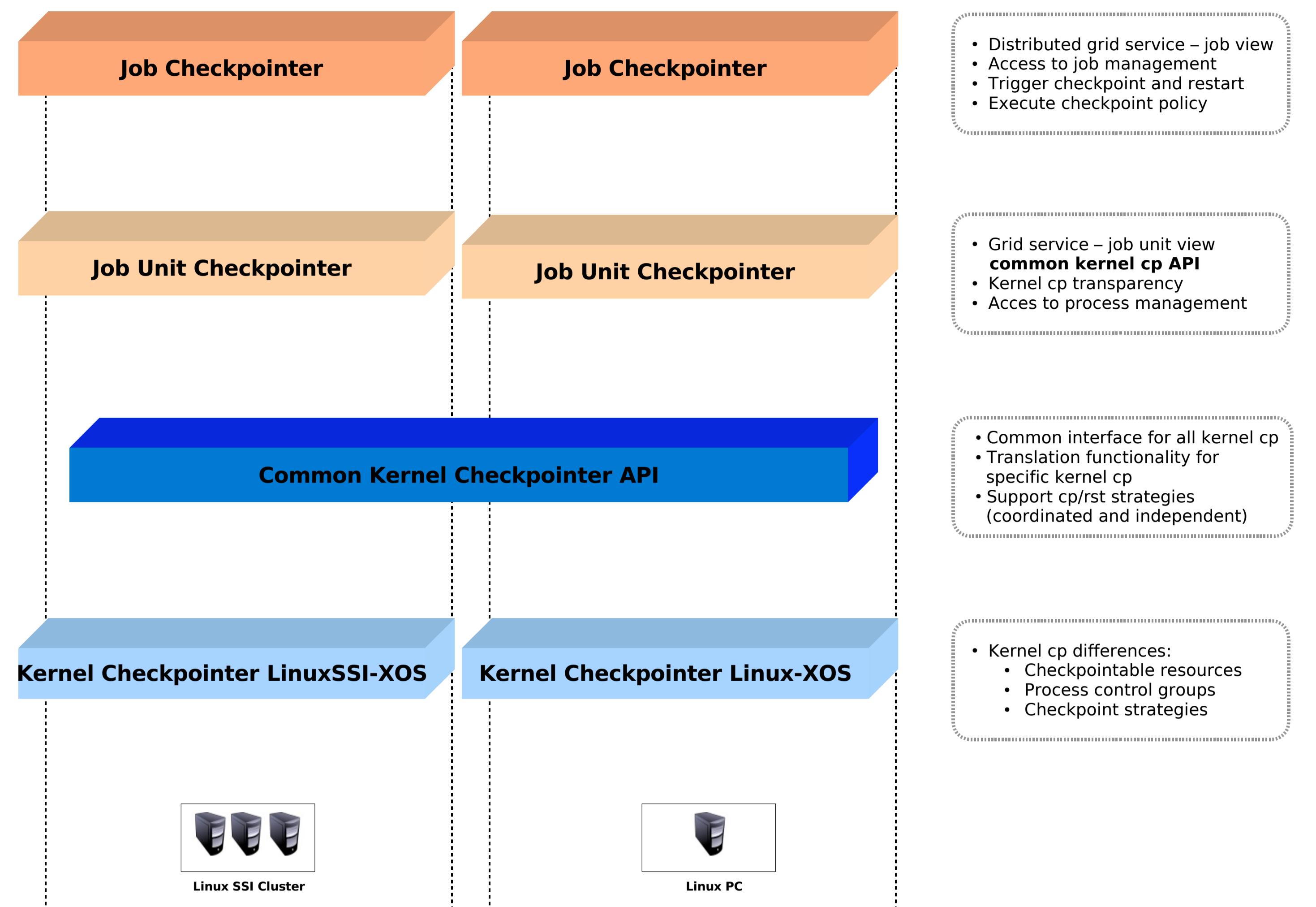


## Grid Checkpointing Goals

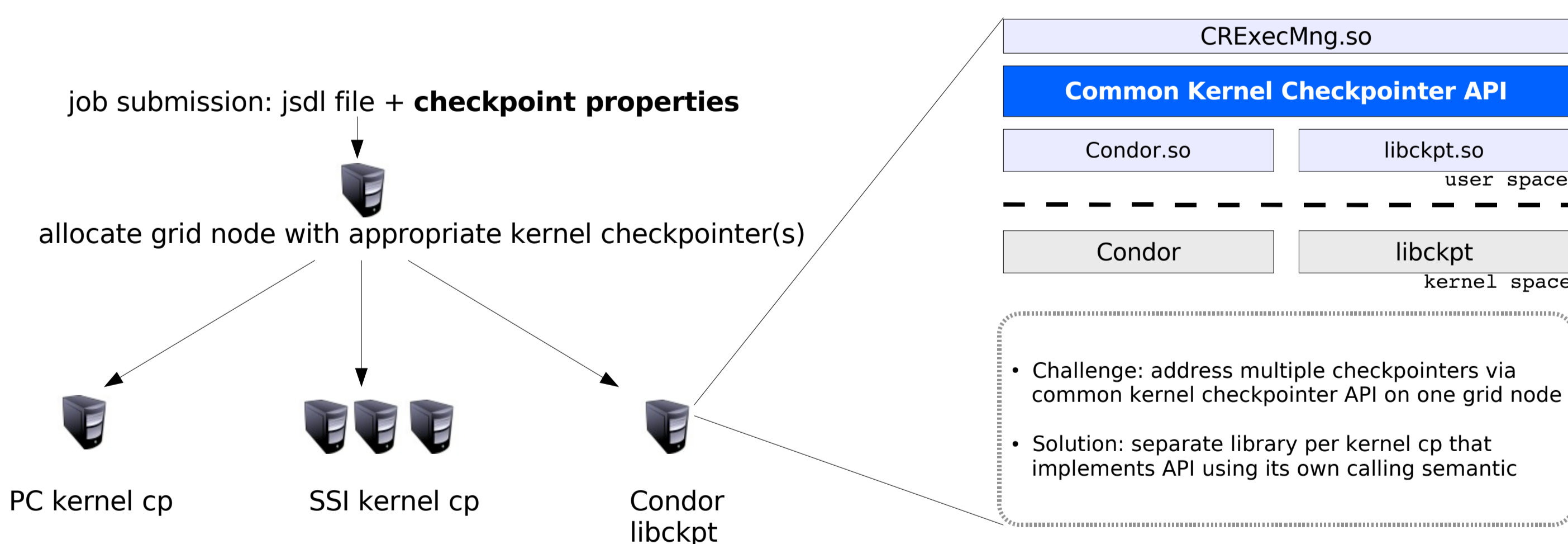
- Reliable job execution
- Load balancing ( based on migration )

## Grid Checkpointing Features

- Checkpoint and restart a grid job consisting out of more than one job unit
- Identify a kernel checkpointer that can checkpoint/restart relevant resources
- Isolation of multiple job units per grid node using Linux containers
- Secure restart from checkpoint images
- Adaptive grid checkpointing

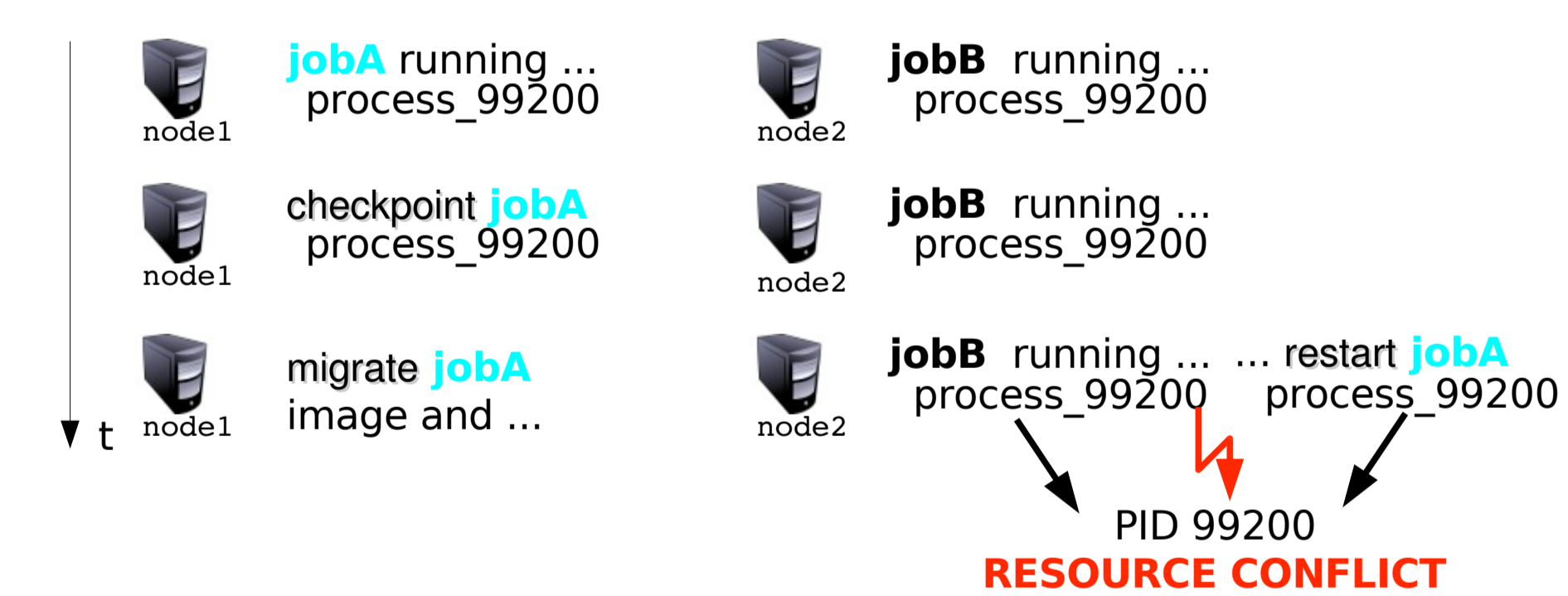


## Common Kernel Checkpointer API



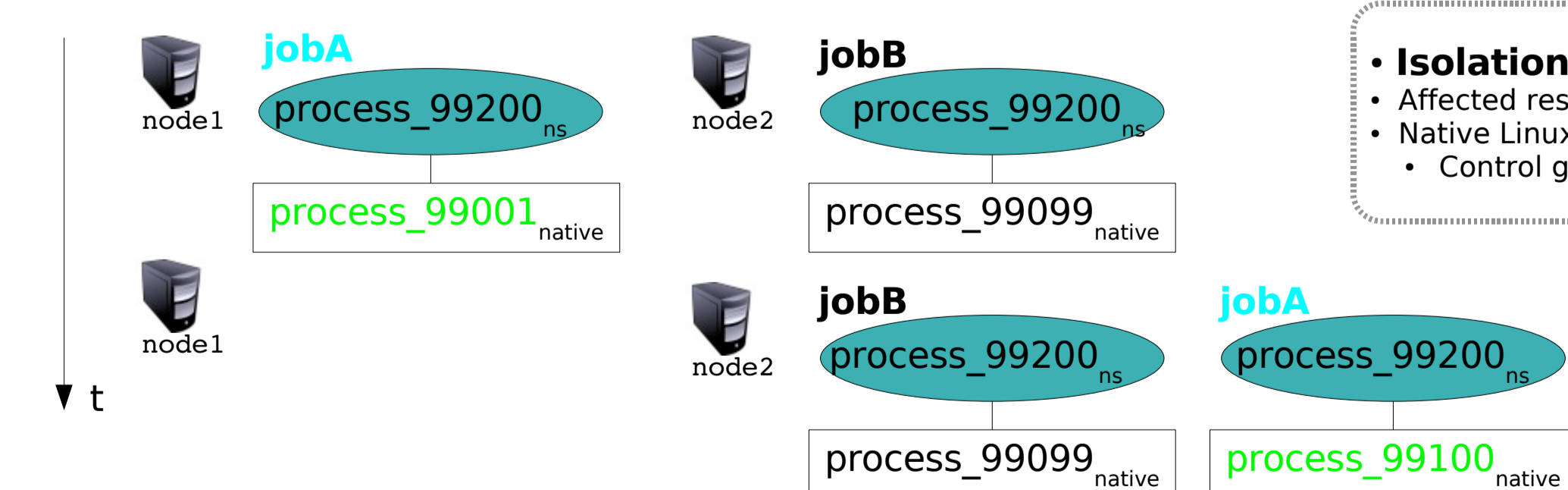
## Restart and Resource Management

### No Resource Isolation:



- **Resource isolation needed**
- Multiple jobs may share a grid node
- Resource conflicts are likely to occur, especially at restart

### Resource isolation:



- **Isolation by resource virtualisation**
- Affected resources: PID, IPC, network, ...
- Native Linux container mechanism
- Control groups tied to hierarchical **namespace**

## Checkpoint File Management

### 1) The checkpoints are used by the AEM

- For fault tolerance
- For scheduling optimization (migration, suspend)
- For the working of the system: node shutdown (migration)

### → The user should not pay for resources used by the system

- The disk space needed for the checkpoint must be managed by the AEM
- By default checkpoints files are deleted when the job is finished

### 2) The user has special needs

- He wants to keep several checkpoints of a job
- He does not want the checkpoints to be deleted at the end of the job

### → The user has to provide the disk space

- The user describes this disk space at job submission

## XtreemOS Checkpointing Partners:

XtreemOS is a member of OGF



www.xtreemos.eu

#FP6-033576 project

