Application Execution Management (AEM)

- Distributed job management and resource management
- One XtremOS 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 JDL 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 of more than one job unit
- Identify a kernel checkpoint 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

- Job submission: JDL file + checkpoint properties
- Allocate grid node with appropriate kernel checkpoint(s)

Checkpointer File Management

1) The checksofts 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 checksofts 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

Restart and Resource Management

No Resource Isolation:

- Resource isolation needed:
  - Multiple jobs share a grid node
  - Resource isolation may be required especially at restart

Resource Isolation:

- Isolation by resource virtualization
  - Effective isolation: KSs, K barriers
  - Resource isolation between checksofts
  - Distinct groups to remain isolated