Hierarchical, Container-based Grid Resource Management

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Abstract

Providing effective management and control of grid resources is a challenge. Traditional resource management techniques are not suitable for grids due to the dynamic nature of grid environments and the need for scalability. In this paper, we propose a hierarchical, container-based approach to grid resource management that addresses these challenges.

Hierarchical Grid Resource Management

- Provides a scalable and flexible structure for managing grid resources
- Allows for fine-grained resource allocation and control
- Supports dynamic resource allocation and adaptation

Containers and Grids

- Containers are virtual units that encapsulate resources
- Hierarchical container structure allows for nested resource management
- Containers can be created and destroyed dynamically

Grid Resource Management Requirements

- Minimize overhead
- Allow for accurate accounting and control of resource use
- Minimize storage and memory requirements

Virtual Container Management

- Control of grid-assigned resources
- Provided by host operating systems (OSes)
- Directly or indirectly (through other virtual containers)

Physical Container Management

- Physical containers
- May be nested
- Each execution unit

Related Work

- Containers were first proposed by Vahdat [3] for use in grids (focused on security issues)
- Aron, et al. [2] extended the use of containers as a mechanism for resource management in grids
- Containers were developed to allow for accurate accounting and control of resource use in processes or other scheduling units

Conclusions

- Container-based resource management offers a promising approach for grids
- Provides a flexible and extensible framework for grid resource management
- Further research is needed to investigate the practicality and effectiveness of this approach in real-world grid environments