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XtreemOS Grid Operating System

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The XtreemOS operating system provides for Grids what a traditional operating system offers for a single computer: abstraction from the hardware and secure resource sharing between different users. When a user runs an application on XtreemOS, the operating system automatically finds all resources necessary for the execution, configures user's credentials on the selected resources and starts the application. It simplifies the work of users by giving them the illusion of using a traditional computer.

The XtreemOS technology is being developed in the frame of the XtreemOS European IP.

Detailed analysis

The XtreemOS operating system provides three major distributed services to users: application execution management, data management and virtual organization management.

XtreemOS supports legacy Linux applications as well as MPI and SAGA parallel applications. Applications can be run in the background or interactively. This last possibility allows to exploit numerical computation platforms such as Scilab or Mathlab on the Grid. The application execution manager provides scalable resource discovery through a peer-to-peer overlay which dynamically connects all resources.

XtreemOS provides location-independent access to user data through XtreemFS, a POSIX-like file system spanning the Grid.

User management in XtreemOS is delegated to Virtual Organization managers. Access rights to resources in XtreemOS are based on policies. Policy rules are defined by Virtual Organizations as well as by administration domain, are checked at reservation-time and are enforced on resources during execution.

This system is available for PCs, clusters and mobile devices. The cluster flavour exploits the Kerrighed single system image Linux operating system.

Conclusions and Future Work

The XtreemOS project has released the second public release of its Linux-based Grid operating system in November 2009 under the motto "Making Grid Computing Easier". The consortium has conceived and integrated a platform of open source technologies to enable easier deployment, management, usage and programming on top of large-scale computing Grids. Supporting more volatile resources such as those provided by Cloud infrastructures is currently being investigated.

Impact

Many enterprises are operating in a distributed fashion. Thus, the whole company is divided into several administrative domains. Further, many joint research and development programmes exploit resources spanning multiple administrative domains. In order to run the overall business effectively, the different locations must cooperate and dynamically adapt as a whole during changes. One of the main goals during this operation is the minimization of administration tasks. Furthermore, it is essential for enterprise to be able to execute legacy software within these environments without the need to modify or recompile the various system components.

Users logged into an XtreamOS box transparently exploit VO-managed resources through the standard POSIX interface. In contrast to middleware approaches, XtreamOS is an operating system able to execute any kind of application on the Grid, including unmodified existing applications as well as interactive applications.

XtreamOS can be seen as an alternative to traditional Grid middleware, facilitating the use of federated resources for scientific as well as business communities.

Keywords

Grid operating system, Virtual Organization, Grid file system

URL for further information

www.xtreemos.eu

Justification for delivering demo and/or technical requirements (for demos)

XtreamOS will be demonstrated either on a single PC running multiple virtual machines or on external testbeds if Internet connectivity is provided by the conference organization.

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