XtreamOS

* XtreemOS Goals : Design, implement, validate, promote a Linux-based distributed operating system providing native virtual organization support for next generation Grids
* XtreemOS European Project
* XtreemOS Grid System :
  + Distributed operating system
  + Transparency
  + Scalability
* XtreemOS Mobile Device Flavour :
  + Objectives : Integration of XtreemOS services in mobile Linux OS enabling grid operation in an efficient and transparent way
* Virtual Organization (VO) = set of users that pool resources in order to achieve common goals - Rules overning the sharing of the resources
  + Cycle de vie :
    - Identification
    - Formation
    - Operation (boucle evolution)
    - Dissolution
* VBE : A Virtual Breeding Environment is composed of users and service providers. It provides user and service provider registration, certificate management, and VO lifecycle management
* XtreemOS Grid Checkpointing Service
  + Checkpointing: Saving periodically the state of the application in stable storage
  + Restart: In case of a fault we can restart from a checkpoint and do not fall back to the initial state
* Checkpointer classification
  + Application
  + Library
  + Kernel
  + Virtual machines
* Consistent Checkpoints must avoid orphan messages and lost messages
* XtreemOS-GCP checkpointing service aims at integrating existing checkpointer packages
* Uniform access to different checkpointer packages
* Callback Management :
  + Called before and after a checkpoint and after restart
  + Useful for:
    - Application optimizations
    - Complement checkpointer incapabilities
    - Checkpointing communication channels
* Currently, supported checkpointer packages
  + BLCR
  + OpenVZ
  + MTCP
  + LinuxSSI
  + (Linux native)
* XtreemOS and Cloud Computing
  + XtreemOS: a distributed operating system designed for Grids
  + Project started in June 2006
  + Cloud computing new era started in late 2007
    - How relevant is XtreemOS in this new context?
* Cloud Computing Functionality :
  + Infrastructure-as-a-Service (IaaS)
    - Delivery of computer infrastructure as a service
  + Platform-as-a-Service (PaaS)
    - Delivery of a computing platform and solution stack as a service
  + Delivery of computer infrastructure as a service :
    - A model of software deployment whereby a provider licenses an application to ustomers for use as a service on demand
* Cloud and Grid computing share many characteristics :
  + “Clouds are the user-friendly version of Grids”
  + Large pools of compute resources available as utilities
  + Statistical multiplexing
  + Emphasis on scalability
* There are also significant differences
  + Clouds rely on a pay-as-you-go business model
  + New types of Cloud services are being created
* XtreemOS as an IaaS Cloud Operating System :
  + Virtualization used in XtreemOS for isolation
  + XtreemOS could manage VM instead of jobs
  + XtreemFS could be used as a cloud storage system
  + XtreemOS as a system to provide an IaaS cloud service on top of hardware esources supplied by different providers
* Contrail Project :
  + Design, implement, validate and promote an open source software stack for cloud computing
* Contrail Vision :
  + To position clouds as the engine of the future Internet
  + Federation of resources provided by commercial and private clouds
    - Resources offered by different operators will be integrated into a single homogeneous Federated Cloud that users can access seamlessly
    - Any organization should be able to be both a Cloud provider when its IT infrastructure is not used at its maximal capacity, and a Cloud customer in periods of peak activity
* Virtual Machine Images
  + Available for PC releases
  + KVM, Virtual Box
  + Already configured images
  + Possible to build larger grids through VM cloning
  + Guide for VM installation
  + XtreemOS technical report #6
* Grid’5000
  + Distributed hardware platform
    - Currently 2890 processors / 5946 cores
  + Reservation of resources for a few hours
* XtreemOS on Grid’5000
  +  Large-scale experiments
    - Evaluation of XtreemOS components: DIXI, RSS, SRDS, AEM, OSS, XtreemGCP, ...
    - Reference applications on XtreemOS
  +  Tools to automate the deployment of XtreemOS on top G5K
    - xosautoconfig
    - G5Kdeploy
  +  Deployment on Nimbus
  +  Deployment on OpenNebula, Apache Tashi
* Conclusion :
  + XtreemOS software available for the community
    - Open source development
    - XtreemOS 2.1.2 & 3.0 releases available
    - XtreemOS open permanent testbed
  + XtreemOS & Clouds
    - XtreemOS is directly comparable to an IaaS platform
    - XtreemOS: a sound platform for providing PaaS
    - XtreemOS Grids extensible with cloud resources
  + Next goal: making XtreemOS a major platform
    - for utility computing in the coming years
    - CONTRAIL European Project opportunity