XTREEMOS-MD: GRID COMPUTING FROM MOBILE DEVICES
Overview

- **Introduction**
  - What? Why? How?

- **XtreemOS-MD basics**
  - Architecture
  - Foundation layer
  - Services Layer
  - Performance

- **XtreemOS-MD applications**
  - Job Manager
  - Grid Player
Introduction

XtreemOS

- Linux-based operating system to support Virtual Organizations (VOs) for Grids

XtreemOS-MD

- XtreemOS “mobile flavor” (for mobile devices)
Introduction

To make Grid easy for users

- Grid and Cloud computing are well known topics
- But… access to Grid from mobile devices is normally out of the scope (intrinsic limitations)

MAIN GOAL!

Transparent access to Grid facilities from mobile devices
XtreemOS-MD features

Integrated solution for mobile access to Grid computing

- VO support
- Graphical job management
- Flexible authentication
- Access to the Grid user's volume

... and resource sharing...
XtreemOS-MD Basics

Architecture

Applications

Optional Grid API (SAGA)

- Security Client
- XtreemFS module
- AEM module
- Context Awareness
- Resource Sharing
- VO support
- Mobility support
- FUSE
- Mobility modules

Linux libraries and services

Linux Kernel

Mobile device hardware

G-layer

F-layer

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**XtreemOS-MD Basics**

**F-layer**

**VOs and mobility support**
- Full support for VO management
- VO facilities for Grid users
- Mobility solution based on USAGI MIPv6, adapted to ARM architectures

**Context awareness**
Provides user’s terminal context information (battery, position, **network** info…) to upper levels
Sharing mobile device resources…

- Limitations are there… (not too powerful)
- Other problems: reliability, etc. … battery life!!!
- But there are still opportunities:

  - Data sharing
  - I/O Devices
  - Network access

Sharing module offers: **publication** of resources (through SRDS system) and **access** to the resources
Security: CDA (and CDAProxy)

1. SSL connection established
2. Username & Password VO
3. SSL connection established
4. Ask for a certificate
5a. Random private key generation
5b. Certificate request generated and signed
5c. Certificate request + VO
6. Certificate
7. Certificate + private key
XtreemOS-MD Basics

XtreemFS: Grid file system

Transparent access to the user’s volume (*automounting*)
AEM: Job execution on the Grid

- **AEM: Application Execution Management**
  - Composed by several services running on a XOSD
  - Distributed architecture with core and resource nodes
  - XATICA is the C interface for MDs
  - Additionally can register MD resources (I/O devices) and not only “computing resources”
XtreemOS-MD Basics

Performance

Video conversion

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XtreemOS-MD Applications

JobMA

Telefonica

Load JSDL File...

Abrir
GridPlayer: Multimedia player/converter

- MDs offer limited video capabilities
- Videos are converted when not supported
- The Grid makes the conversion!!
Conclusions and future works

- XtreemOS-MD: new way to enter in the Mobile Grid Computing arena
- Wide range of applications
- It could became a catalyst for popularizing the Grid

- Maemo 4 & Maemo 5 supported, Ubuntu will be (possible porting to Moblin, LIMO, Android…)
- New use cases involving resource sharing?
- Open source…

Future?

Conclusions and future work
Questions & answers

Your turn!