

# XtreemOS



*Enabling Linux  
for the Grid*

## **XtreemOS: Beyond Grid Middleware**

**John Mehnert-Spahn**

**Heinrich-Heine University Duesseldorf**

**4th december 2008, Dunedin, New Zealand**



Information Society  
Technologies

*XtreemOS IP project  
is funded by the European Commission under contract IST-FP6-033576*





# What is XtreemOS?

- **Linux-based Operating System**
- **with native Virtual Organization support**
- **for Next Generation Grids**





# XtreamOS Actors

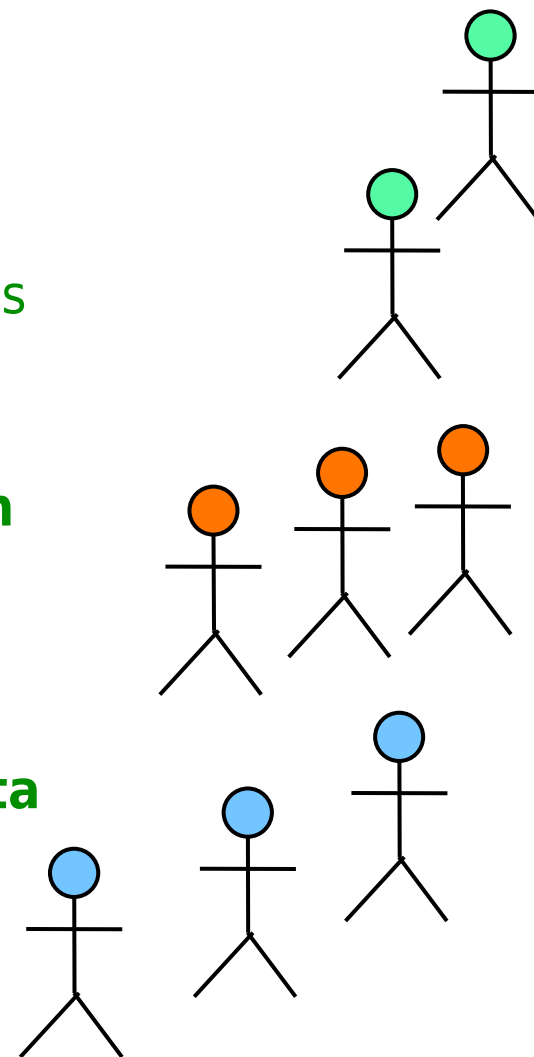
- **Users**
- **Administrators**
- **Developers**





# Users

- **Ease of use**
  - Do not want to care with Grid issues
  - Want to work with familiar interfaces
  - Want to use their non-Grid aware legacy applications
  - Simple login as a Grid user in a VO
- **Secure and reliable application/service execution**
- **High performance**
- **Ubiquitous access to services, applications & data**

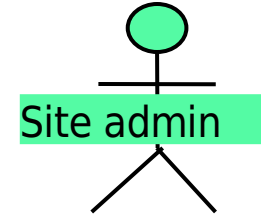




# Administrators

## Site administrators

- Ease of management
- Autonomous management of local resources
- should not be impacted by every single change in a VO



## VO administrators

- Ease of management
- Flexibility in VO policies
- Accounting





# Developer Needs

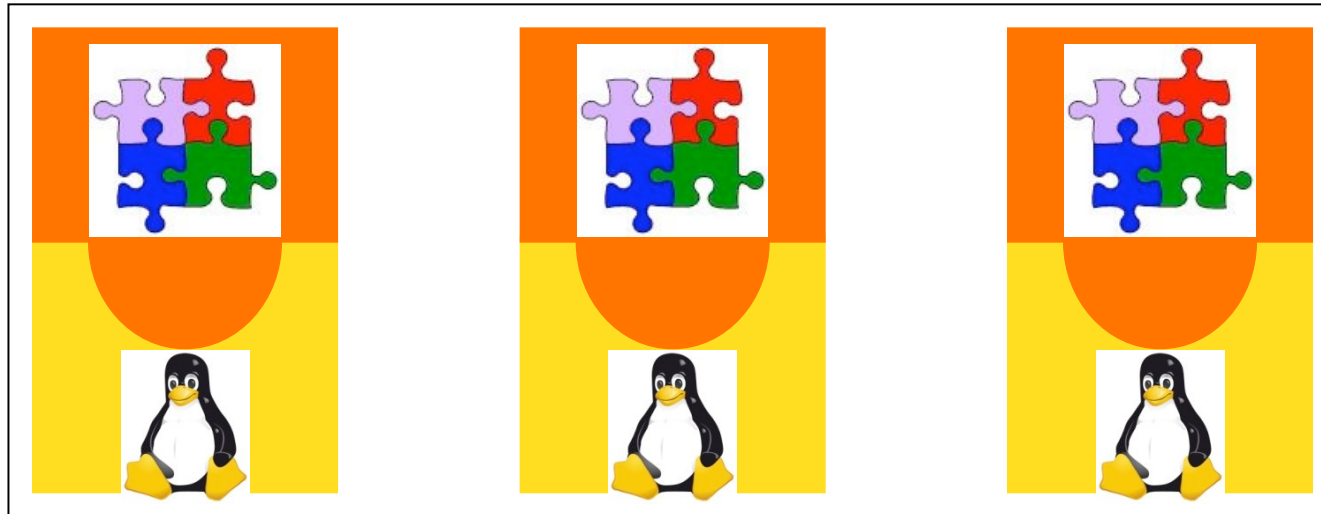
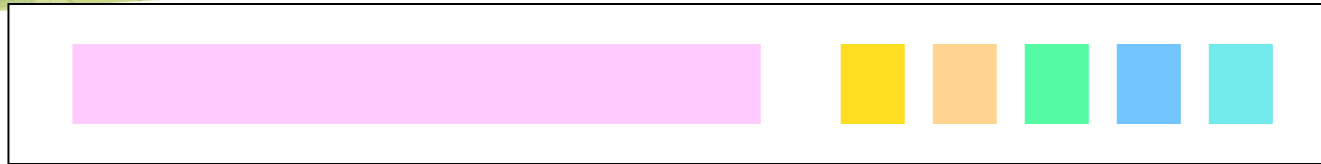
- **Ease of development of Grid applications**
  - Reuse existing code
  - Stable API to access grid services (SAGA)
  
- **Conformance to standard API**
  - Familiar API Posix – grid transparency
  - Grid application standards





# XtreamOS

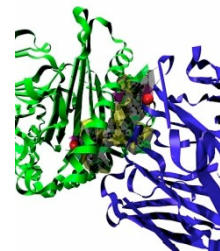
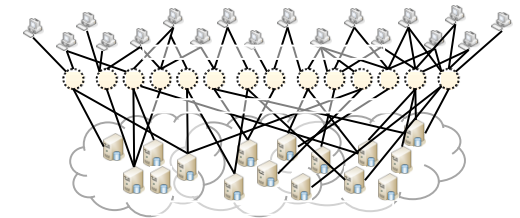
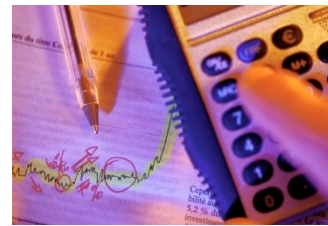
## A Grid OS based on Linux with Native VO Supports





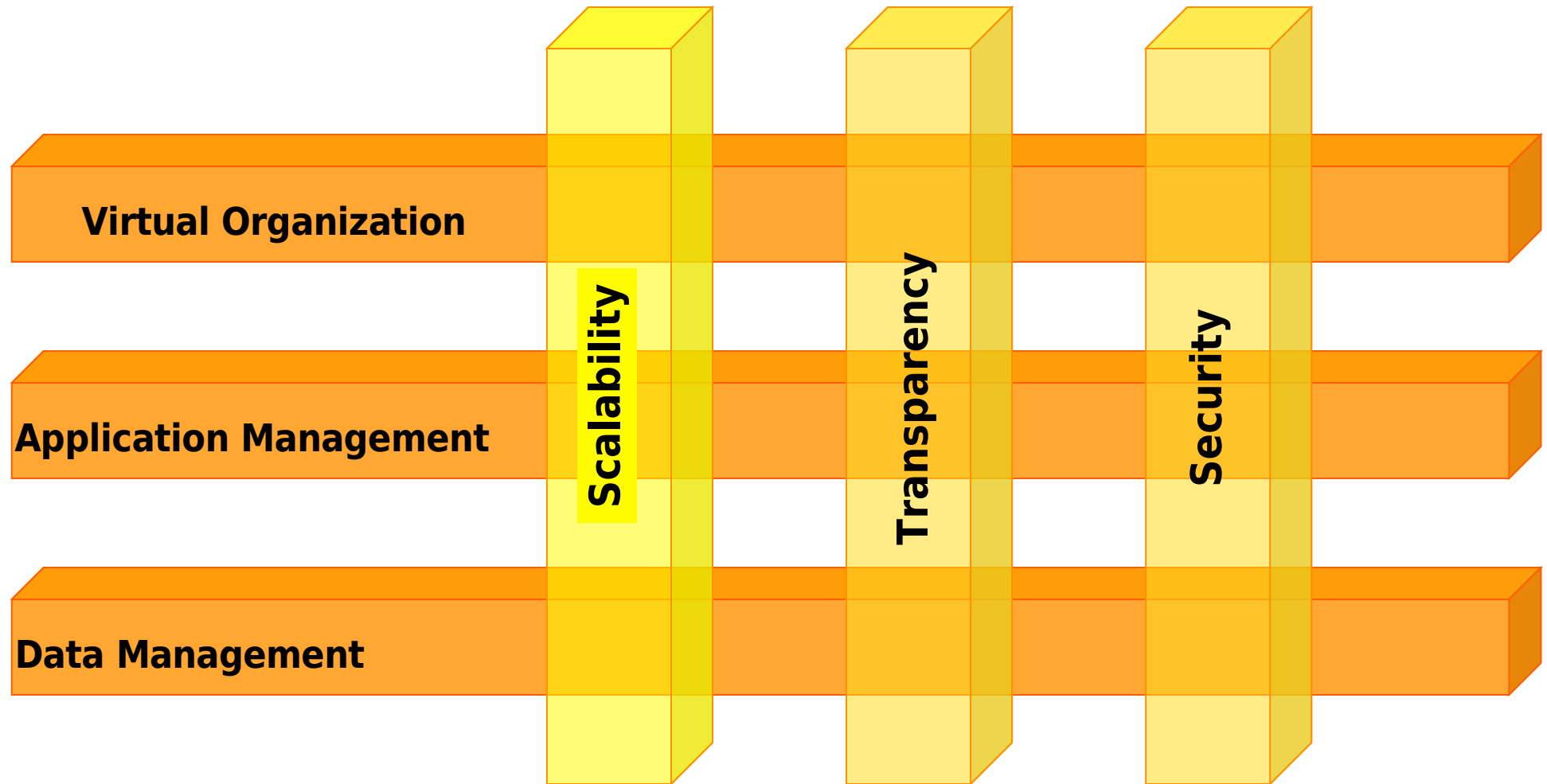
# Application Spectrum

- **Wide range of applications ...**
- **... in different domains**
  - E-business
    - Services
  - Scientific applications





# Fundamental Properties





# Scalability

- **High number of nodes and users**
- **Network condition**
- **Dynamicity of node leave/join**
- **Management of various VO models**
- **XtremOS services and number of entities**
- **Adaption to evolving system composition**





# Transparency

## ▪ User perspective

- Feeling to work with Linux machine
- No application type restriction
- Grid-aware user session
- VO can be built to isolate or share resources

## ▪ Application (developer) perspective

- Grid execution becomes transparent
- Grid file system for file location transparency
- Transparent fault tolerance
- SSI cluster made transparent to application

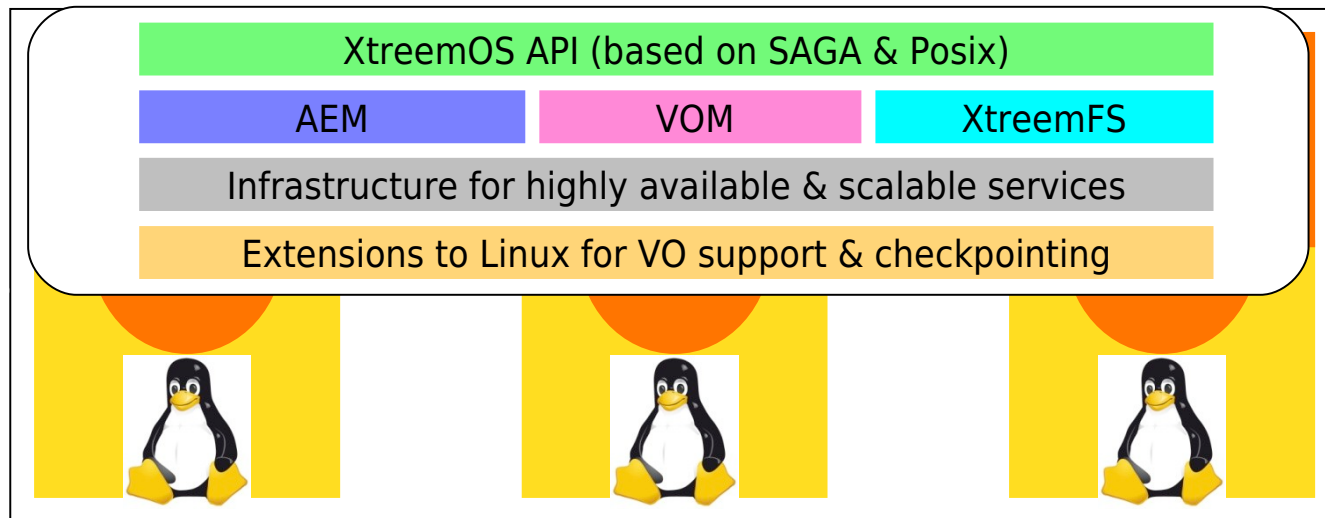
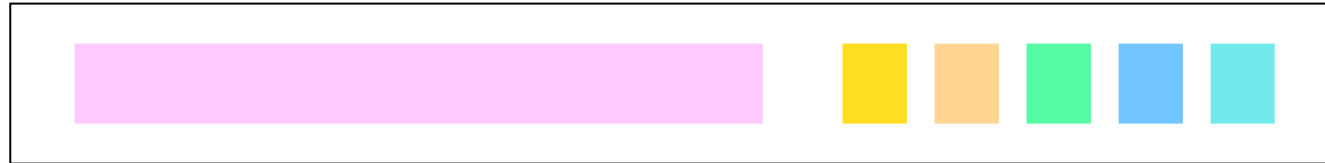




- **Secure VO management and application execution**
  - Mutual authentication for grid user and service
  - Confidentiality and integrity of stored and communicated data
  - Authorized access to data, services, resources
  - Isolation
  - Accountability of data access and services execution



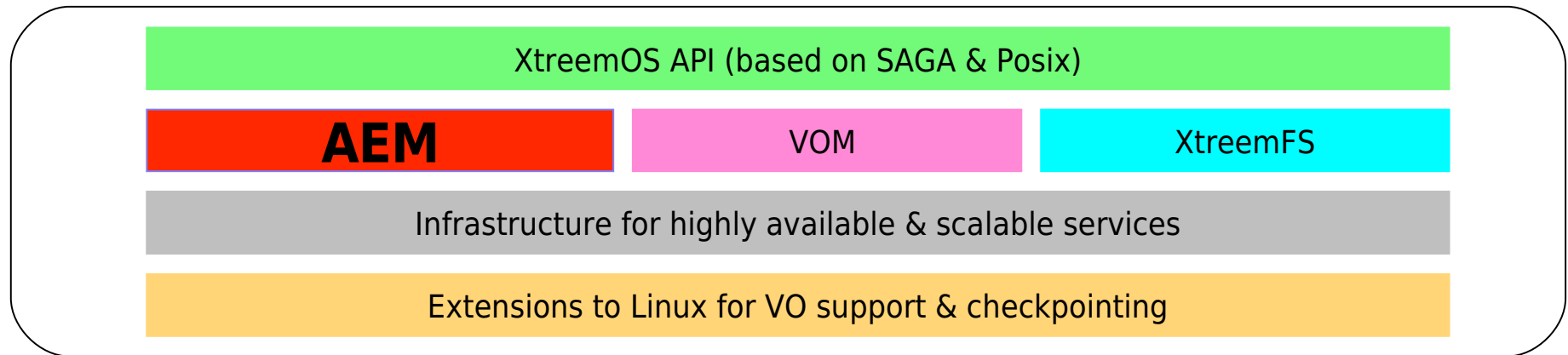
## A VO-aware OS based on Linux





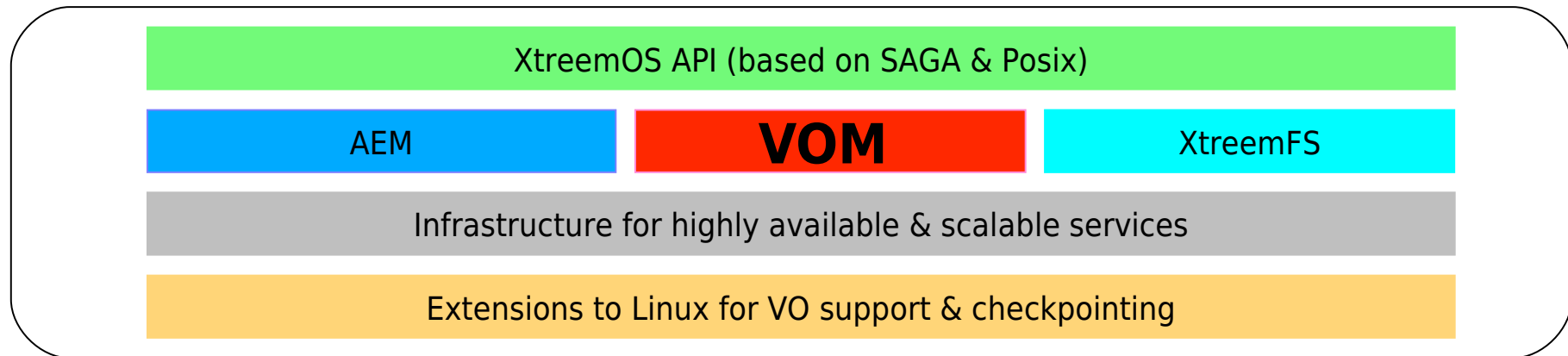
# Application Execution Management

- **Start, monitor, control applications**
- **Discover, select, allocate resources to application**
- **Security**





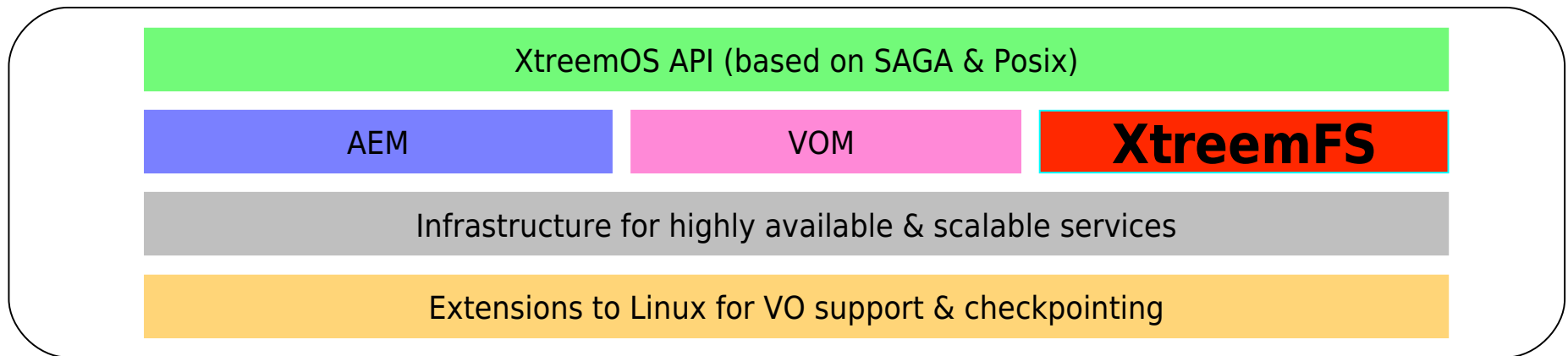
- **Allow multiple VO models**
- **Single-Sign-On**
- **Resource access determined policies**
- **VO-centric security architecture**





# Data Management XtreemFS

- **Grid file system – location-transparent access to data**
- **Autonomous data management with self-organized replication and distribution**
- **Consistent data sharing**





# Conclusion

- **XtreemOS is an Operating System**
  - XtreemOS first public release
  - <http://www.xtreemos.eu>, Open Development
- **Native Virtual Organization Support**
- **Secure, reliable, efficient service/application execution**
- **Ease of management**
- **Attractive in the context of new emerging computing models**

