The Role of Standards for Risk Reduction and Inter-operation in XSEDE

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“Less is more.”
—Jerry Brown

“Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away.”
—Antoine de Saint-Exupery

“Give me simple abstractions and make them work reliably”
—Kent Blackburn
Takeaway message

• The use of standards permits XSEDE to interoperate with other infrastructures, reduces risks including vendor lock-in, and allows us to focus on higher level capabilities and less on the mundane
What we mean by architecture

• Architecture defines the XSEDE system’s components and how they interact
  – each component is motivated by one or more requirements
  – each component is defined in terms of required capabilities: interfaces and qualities of service

• Equally important is the process by which we revise the architecture over time
  – key point: driven by new or revised requirements
System Architecture

• What is a system architecture?
  – Set of design principles
  – A definition of the basic components
  – A definition of how the components refer to one another and interact in order to meet requirements
  – An abstraction on top of the underlying components
Why Open Standards?

• Risk reduction
• Best-of-breed mix-and-match
• Allows innovation/competition at more interesting layers
• Facilitates interoperability with other infrastructures
XSEDE Services Layer
Simple services combined in many ways
Examples – not an complete list

– Resource Namespace Service 1.1
– OGSA Basic Execution Service
– OGSA WSRF BP – metadata and notification
– OGSA-ByteIO
– GridFTP
– WS Trust Secure Token Services
– WSI BSP for transport of credentials
– ...

OGSA Basic Execution Services

• Basic idea
  – Virtualizes a compute resource: host, queue on a supercomputer, a dynamic set of virtual machine images, a set of other BESs, ...
  – Publishes characteristics of the compute resource: OS, CPU count, memory, etc.
  – accept job description in JSDL and create an activity

• Many interoperable implementations
  – GridSam, Genesis II, UNICORE 6, Globus did one
Resource Namespace Service

• Used to create a global shared namespace
  • Analogous to Unix directories, entries “point” to grid resources
  • Most resources can be named using an intuitive path
    – /home/grimshaw/myfile or /bin/bio/blastp
  • Directories organized resources based on human relevant semantics
  • Namespace can be mapped into local file system, and grid resources accessed as if local
Most everything can have an RNS path

- Files
- Directories
- Web pages
- Execution services – queues and BESs
- Jobs
- Applications
- Archives
- Instruments
- Relational Databases
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Our reach will forever exceed our grasp, but, in stretching our horizon, we forever improve our world.