JxGrid Application: Project JXTA in the Sun Grid Engine Context

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Sun Grid Engine

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Overview

- Project JXTA
  - What is it?
  - How does it work?
- JxGrid
  - What is it?
  - How does it work?
- Q&A

What is Project JXTA?

- An open set of XML-based protocols for creating peer-to-peer style network computing applications and services
  - A virtual network overlay
  - Protocol based --> language, OS, network, and service agnostic technology
  - Defines mechanisms, not policies
  - Open Source project: *www.jxta.org*

JXTA Technology Objectives

- ## Interoperability
  - Across different P2P systems and communities

- ## Platform independence
  - Programming languages, system platforms, and networking platforms

- ## Ubiquity
  - Every device with a digital heartbeat

- ## Security and Monitoring
  - For commercial and enterprise deployment
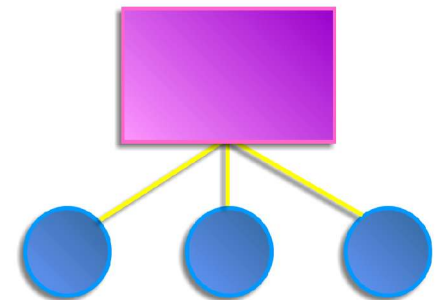
JXTA Software Architecture

JXTA Applications

Sample Applications

Instant Messaging   File Sharing   Resource Sharing

Collaborative Apps   Auctions

JXTA Services

Sample Services

Search   Indexing   Discovery   Membership

JXTA Core

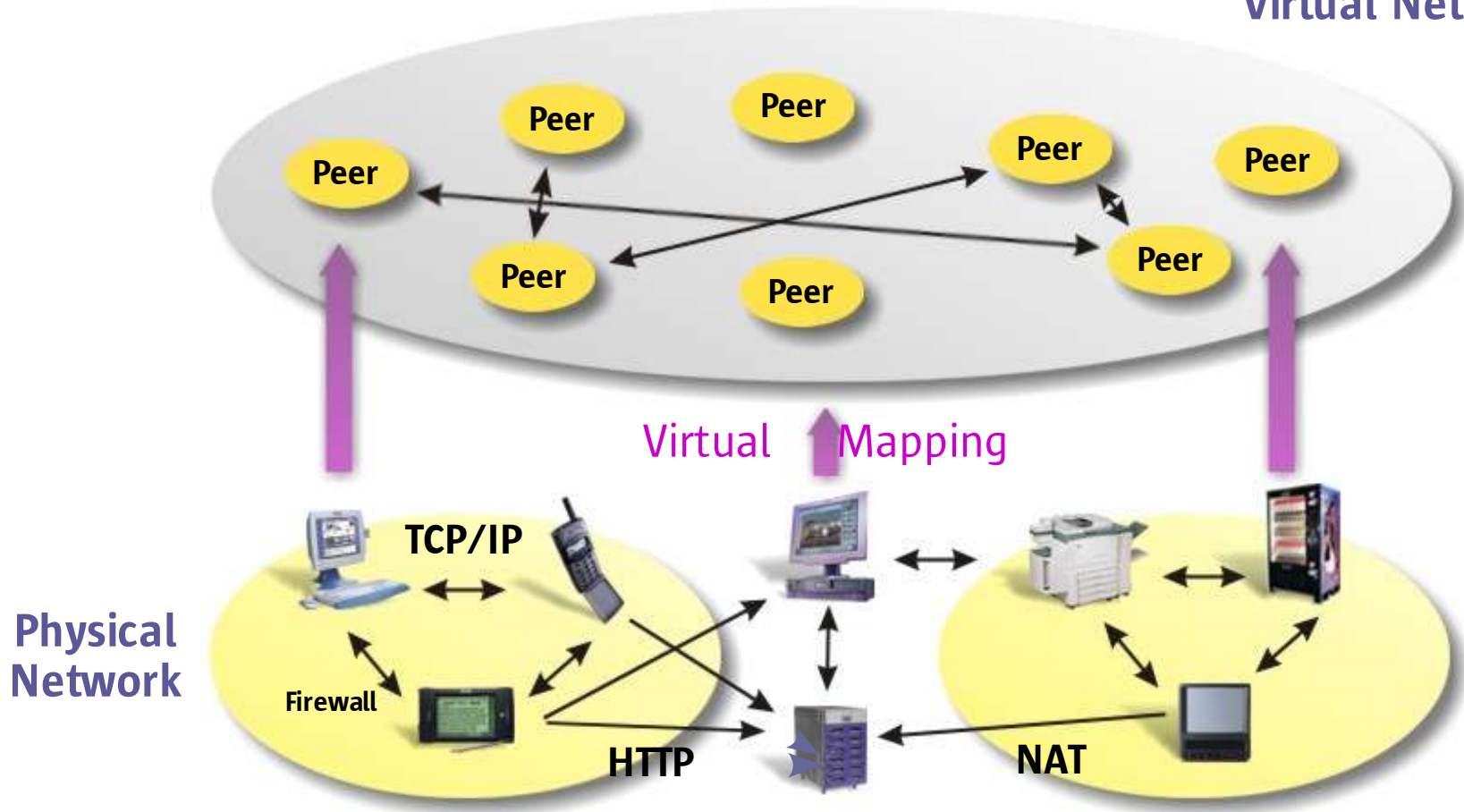Peer Groups   Peer Pipes   Peer Monitoring

Peer Advertisements   Peer IDs   Security
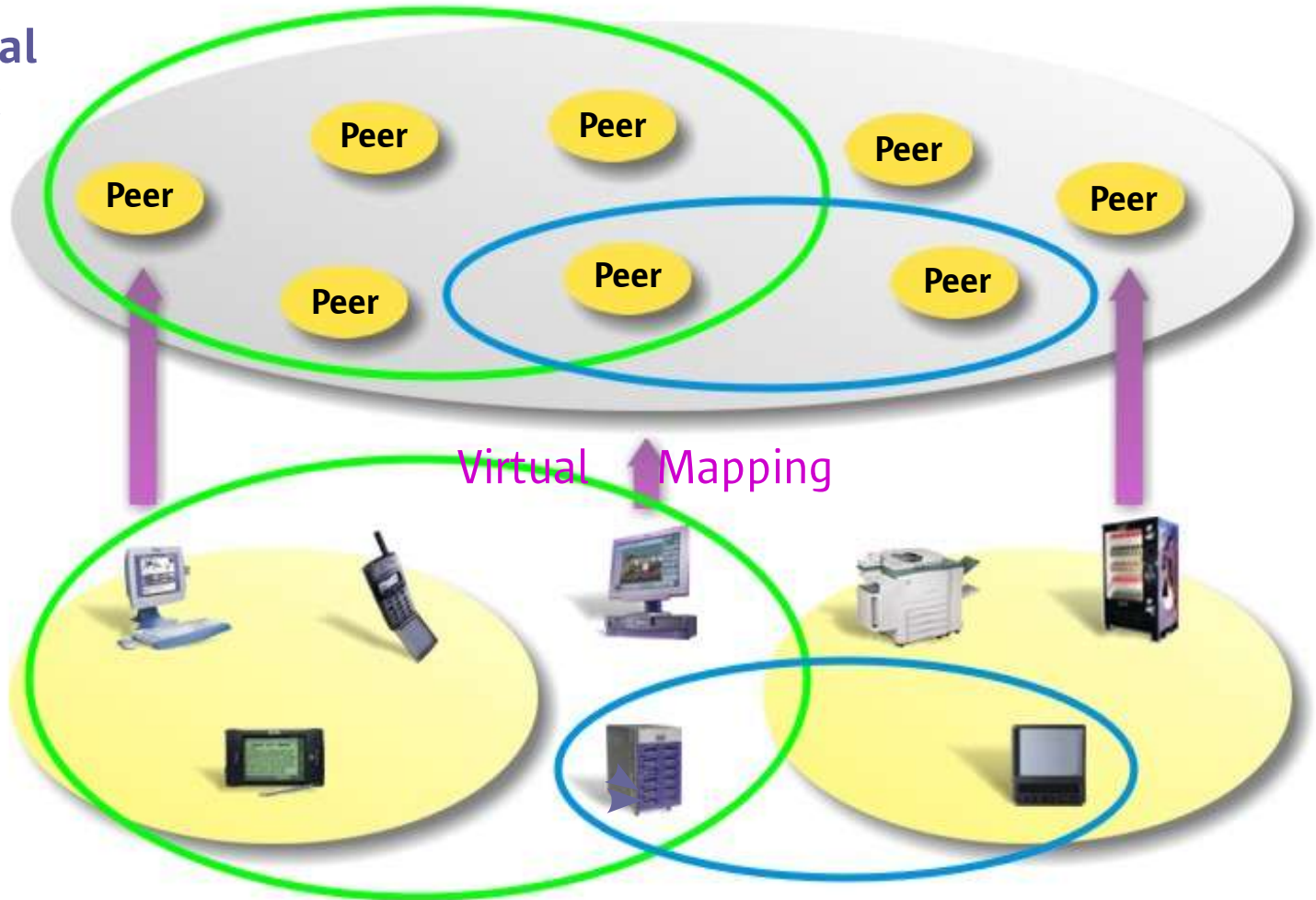
Any Connected Device

JXTA Virtual Network Building Blocks

- Uniform peer addressing
  - Peer IDs
- Dynamically configurable peer domains
  - Peer groups
- Uniform resource representation
  - Advertisements
- Virtual communication channels
  - Pipes
- Security and Monitoring

Peer Groups

JXTA Virtual Network

Peer
Peer
Peer
Peer
Peer
Peer
Peer
Peer
Peer

Virtual   Mapping

Physical Network

JXTA Is Based on Protocols

- JXTA defines XML message formats, or protocols, for communication between peers
- Protocols used to discover peers, advertise and discover resources, communicate and route messages, and provide monitoring
- Can be implemented in any language

JXTA Protocols

Super Peer

Peer

Micro Peer

		Peer Rendezvous Protocol
		Peer Discovery Protocol
	Peer Information Protocol	Peer Information Protocol
	Pipe Binding Protocol	Pipe Binding Protocol

Core Protocols

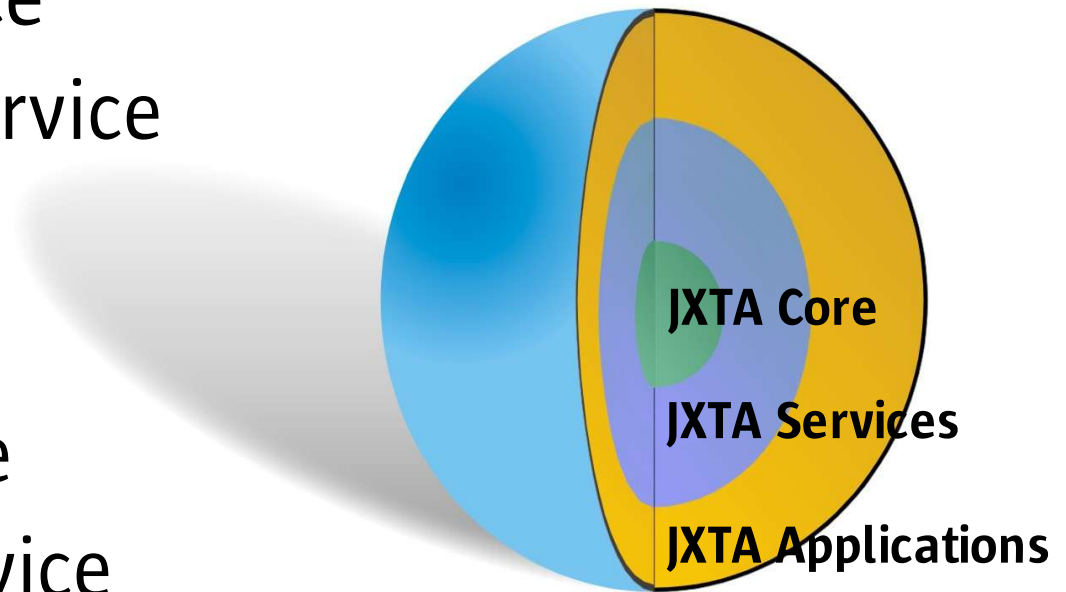| Peer Resolver Protocol	Peer Resolver Protocol	Peer Resolver Protocol
Endpoint Routing Protocol	Endpoint Routing Protocol	Endpoint Routing Protocol

JXTA Core Peer Group Services

- Discovery Service
- Membership Service
- Access Service
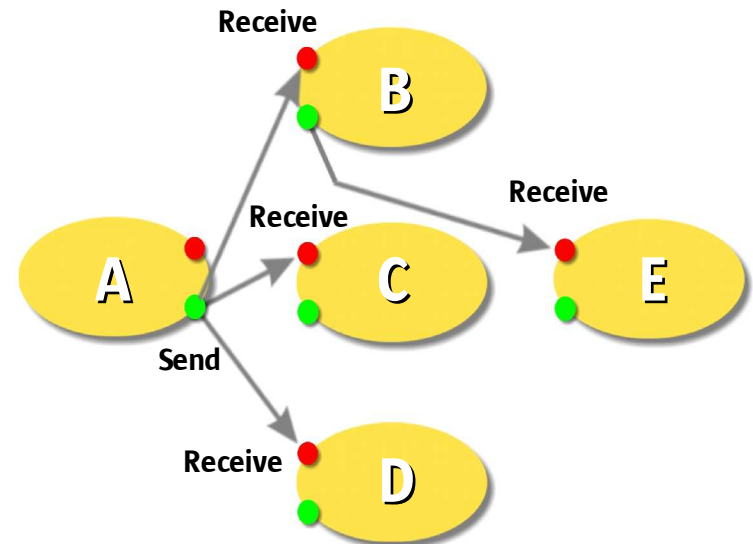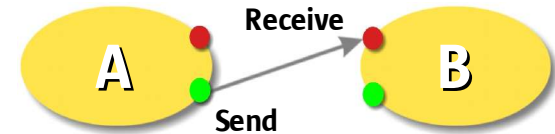- Pipe Service
- Resolver Service
- Monitoring Service

JXTA Core

JXTA Services

JXTA Applications

Peer Groups are not required to implement all services; can use default net peer group services.
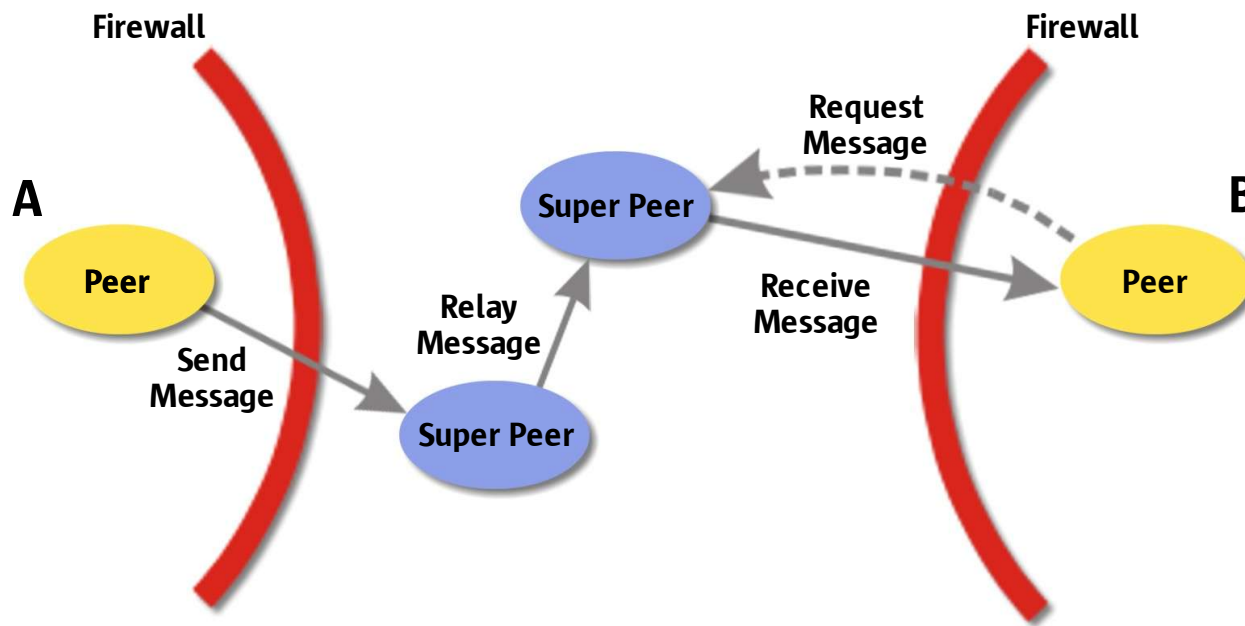
Pipe Types

- ## Point-to-Point Pipe
  - Connects exactly two peer endpoints together

- ## Propagate Pipe
  - Connects one output pipe to multiple input pipes

Additional pipe types can be created from the core types.

Message Routing Via Relay Peers
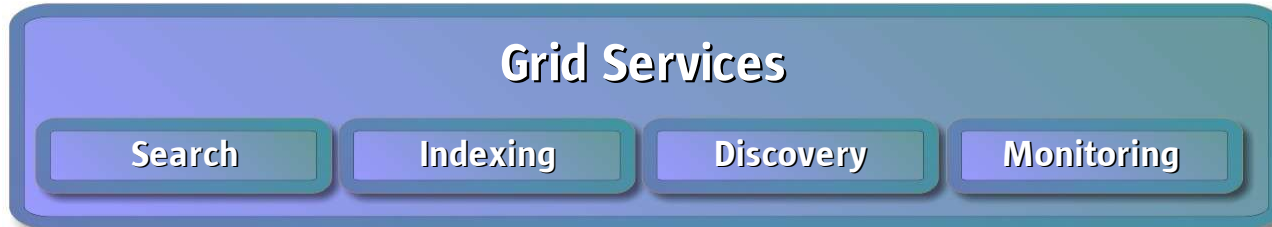
JXTA Implementation Platforms

- J2SE™ Implementation
  - Full implementation of JXTA protocols
  - Standard and Super Peer functionality
  - APIs and functionality frozen

- JXTA-C
  - Standard Peer functionality only
  - Runs on Linux, Solaris OE, and Windows

- JXTA for J2ME™
  - Micro Peer functionality only
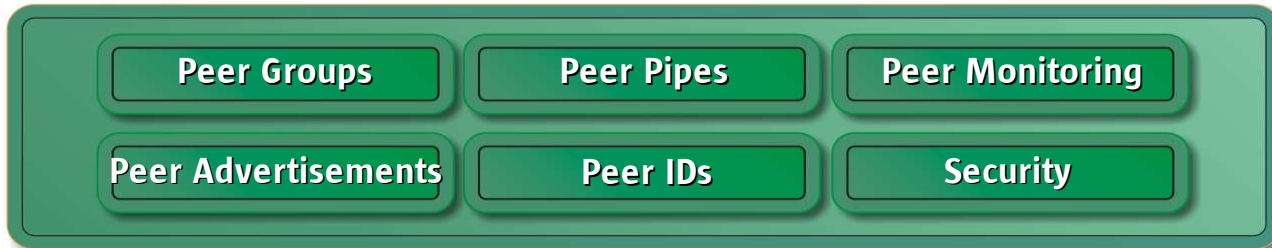 - MIDP-1.0 compliant
  - Iappli compliant

JxGrid: What is it ?

JXTA Applications

Grid Application

Self Configuration	Auto Installation	Node Removal

JXTA Services

Grid Services

Search	Indexing	Discovery	Monitoring

JXTA Core

| Peer Groups	Peer Pipes	Peer Monitoring
Peer Advertisements	Peer IDs	Security

Any Connected Device

JxGrid: How It Works

- Install SGE Master node – Manual
- Install SGE Execution node – Auto
  - Execution node discovers Master node
  - Execution node sends its platform details – hostname, OS, etc.
  - Master node sends configuration data to Execution Node – NFS mounts, Scripts, Data, etc.
  - Execution runs configuration scripts according to Master node's instructions

Master Node

Advertise

Configure

Advertise

Configure
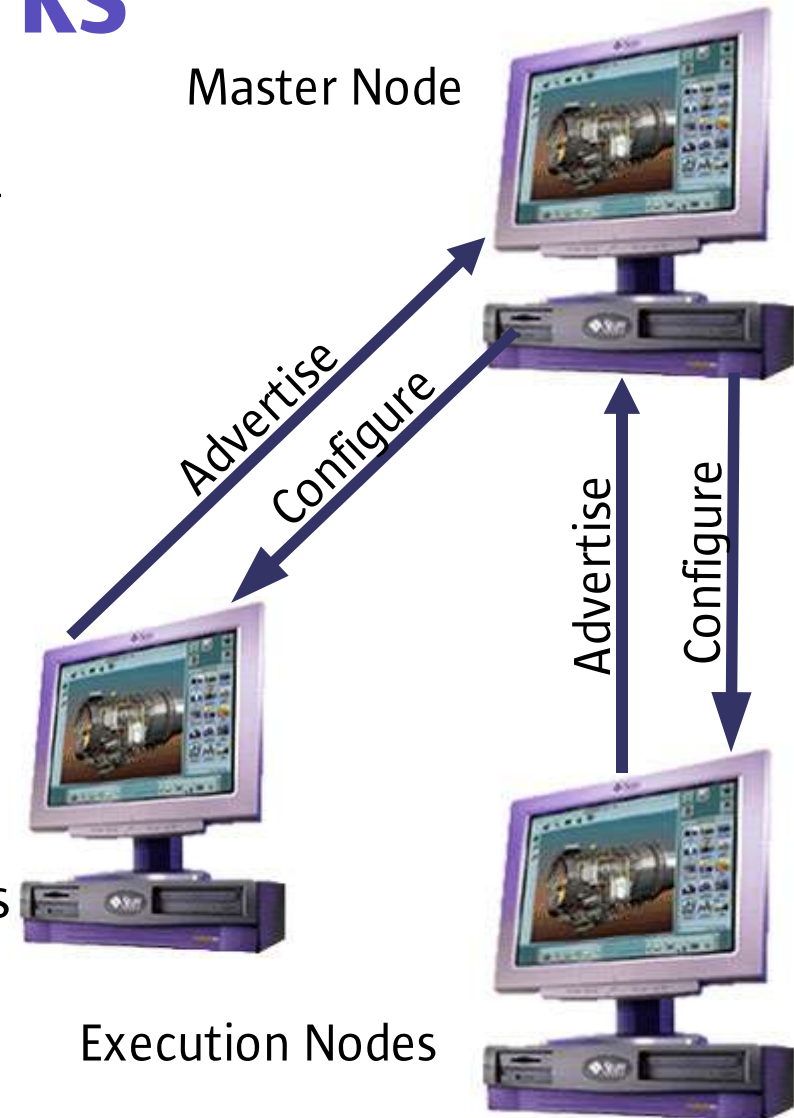
Execution Nodes

Project JXTA discovers resources. Sun Grid Engine (SGE) manages them

JxGrid add-on value

- Ease of installation.
- Self configuration
  - Ease of adding a new execution node.
  - Ease of removing an execution node.
- Build a Grid farm in a very short period of time.
- Concurrent install speeds the installation
  - proportional to the # of nodes
  - A grid with thousands of nodes can be installed and/or deinstalled in hours, not days

JxGrid: Benefit for Sysadmins

Without JxGrid

- SGE install script
- Manual
- Slower
  - 2-20 minutes per node
- Sequential Install
- Require human attendance
- Manual process to remove a node from grid
  - No automated process in place for nodes to join and leave the grid

With JxGrid

- Project JXTA's discovery protocol
- Automatic
- Fast
  - Less than 30 seconds per node
- Concurrently install multiple nodes
- Does not require human attendance
- Flexible Grid membership
  - Easy to add and remove nodes

JxGrid Benefits to Enterprise

- Thousands of nodes can be configured in hours instead of days.

- Speed and simplicity of grid deployment will enable "grid-on-demand" business model.
  - Use JXTA to detect idle machines for SGE
  - Make money from all unused computers
  - Release fast machines from the grid back to owners, when required.