IPv6 Globus - Experiences

Piers O’Hanlon
Sheng Jiang, Peter Kirstein, UCL
Outline

• Benefits of IPv6
• IPv6 infrastructure
• IPv6 Grid
• Globus porting activities
• Test platforms and services
• Current status
• Future
IPv6 Advantages

• Bigger Address Space (128bits)
• End-to-end addressing – No NATs..
• Auto-configuration, renumbering
• Mobility Support (MIPv6)
• Potential benefits
  – Mandates IPsec Security
  – Hooks for QoS - FlowID
  – Modular design
    • Streamlined processing
Platform Support for IPv6

- **IPv6-enabled network**
  - IPv6-enabled Routers
    - Forwarding (in hardware), dynamic routing
  - IPv6-enabled network services
    - E.g. DNS, Email, Web, etc

- **IPv6-enabled nodes**
  - Broad Operating System support
  - IPv6 capable application API libraries
    - Java 1.4 IPv6 (JDK1.5 will provide for IPv6 WinXP)
IPv6 Grids

• Massive scaling potential
• Virtual Orgs networking simplified
• Auto-configuration
  – Resource discovery
  – Addressing
• Peer-to-peer communication Enabler
• Better Mobility support
Porting Globus GT2 to IPv6

- Mainly written in C
- Globus I/O (GIO) network functions
  - Worked on TCP and UDP porting
  - UoS started TCP, UCL continued both IP ports
- Fairly straightforward to make either IPv4 or IPv6. Dual support trickier.
- Work not finished due GT3 release
Porting GT3 to IPv6

- Written mainly in Java
- Check for IP protocol dependencies
  - GT3 protocols/APIs
  - GT3 source code
- Identify network related source code
  - IP addresses or URLs (see RFC2732)
  - Sockets, Name lookups, etc
- Configuration
  - Initialisation, runtime
  - DNS naming issues
- Globus XIO (GT2 C based) - GridFTP
GT3 Protocols/APIs and IPv6

- GridFTP has already been flagged
  - Apply RFC2428 “FTP extensions for IPv6 & NATs”
- Other protocols are being examined (inc COG kit)
  - IP protocol dependencies
  - Initialisation and runtime protocol choices
- Preferable to modify before standardisation
  - Extension documents also possible
Associated Applications

- IPv6 support required in associated apps
- Java Run-time Environment
  - JDK1.4 (Solaris/linux). (JDK1.5 planned for winXP)
    - Java IPv6 specific initialisation options
- JDBC (PostgreSQL) – Used by RFT
  - IPv6 Patch required – undergoing testing
- Container environments
  - Tomcat4 tested on IPv6
  - Websphere and .Net – coming soon
IPv6 Porting Stages

• IPv6-only
  – Minimal modifications
• IPv4 and IPv6 dual stack
  – Initialisation preferences
  – Runtime preferences
• IPv4-only and IPv6-only
  – Transition mechanisms
  – Application gateways
Test Environment

- Rack of 8 Linux Redhat-8.0 machines
- Installed GT3 alpha release
  - JDK1.4.1, Ant-1.5, Tomcat4LE
- Uses host/user certificates
- Packet level network monitoring
  - Loopback and LAN interfaces
Test Services

- Shipped GT3 test services
- GT3 OGSA service browser
- UCL projects
  - Material Simulation (EPSRC) – GT3
    - Modelling Aspirin molecule
  - E-protein (UK E-Science) – GT2
    - Genome Structure based annotation
  - Multimedia gateway in development
- GGF community services welcome
Current Status

• Work being done on 6Net project; UCL & UoS
• Initial tests – Started default container config & client on ipv6 addresses
  – IPv4 seen on loopback and LAN
• Config files set for IPv6
  – IPv6 only on LAN, IPv4 on loopback
• Tested GT3 Container and Tomcat4
• Testing IPv6 Postgresql
• Submitting to bugzilla.globus.org
Future plans

- Making Globus IPv6-enabled is only a beginning
- Operate with a variety of services over IPv6
- Looking at issues of mobility and security
- Investigate Transition/coexistence services
IPv6 Links

- www.cs.ucl.ac.uk/staff/sjiang/
- www.6net.org
- www.6winit.org
- www.ipv6.org/v6-apps.html
  - General patch repositories
  - Current available IPv6 APP
Q & A

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