Kerberos Authentication in Grid Environment

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About GridwiseTech

Our services:
vendor-independent consulting and comprehensive technical assistance in Grid computing solutions.

Our references:
► major academic Grid projects: Globus, NEESgrid, CrossGrid, Virolab...
► commercial clients: BP, Turner Broadcasting, Philips, TRW, SAIC, Combinenet, Univa...
► nonprofit/government grids: MCNC, U.S. Geological Survey
Agenda

- Project rationale
- Introduction to Kerberos
- Grid stack general overview and layers description
- Project status
- Future work
Project rationale

- Grid computing over internet
- Secure communication
- Easy job management
Introduction to Kerberos
Kerberos

- Open standard network authentication protocol
- Provides Single Sign-On
- Developed initially at MIT
- Current release - v5
- Specified by RFC 4120
Kerberos overview

1. Login
2. Ask for Ticket
3. Encrypted Ticket (TGT)
4. Terminal

Password database
KDC

File system
Services
Kerberos in real world

- MS Windows 2000 and later releases
- X-Window
- Apache HTTPD
- NFSv4
- OpenSSH
- and many more...
Grid stack general overview and layers description
• Grid Portal: single point of access
• Runs on top of Apache Tomcat application server
• GridSphere: JSR-168 compliant portal
• JAAS (Java Authentication & Authorization Service) allows Kerberos authentication support
Resource Manager

- RM enables job execution and monitoring
- Torque: PBS-compliant Resource Manager
- Users and hosts ACLs
- Kerberos support via GSS (Generic Security Services) API mechanism
Distributed File System

- AFS (Andrew File System)
  - Originated at Carnegie-Mellon University
- OpenAFS:
  - maintained by IBM
  - open source AFS offspring
    - stable and secure distributed file system
- Kerberos grants user access to OpenAFS at user logon
IP-level encryption

Alternative approaches

➔ IPsec (IP security)

➔ VPN (Virtual Private Network)
IPsec overview

- Integral IPv6 part, optional IPv4 part
- Provides with encryption & authentication
- KAME – IPsec implementation bundled with Linux 2.6.x
IPsec diagram
VPN overview

- OpenVPN – open source VPN implementation
- Secure encrypted transmission (RSA keys)
- Cross-platform implementations:
  - Linux
  - Mac OS X
  - MS Windows
- IP Tunneling over NAT
Conclusions
Where are we now?

- Chosen OpenVPN over IPsec (firewall traversal)
- Implemented Proof-of-concept
- Tested on VMware virtual machines
- Tests on customer side on the way
Future work

- Creating more complex testbed
- Performing intensive tests
- Replacing GridStack elements e.g.
  - SGE instead of Torque
- OpenLDAP integration
Questions?

We welcome your questions or comments

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You are also welcome to visit our site:

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Thank you for your attention