

# Kerberos Authentication in Grid Environment

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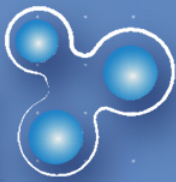
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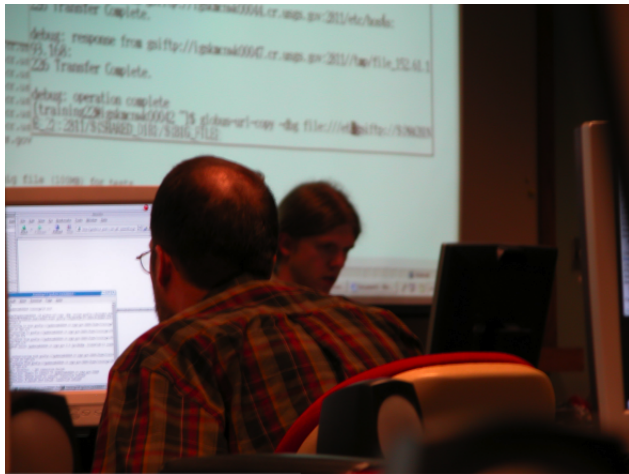
# About GridwiseTech

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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

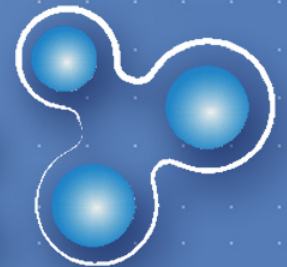
- Project rationale
- Introduction to Kerberos
- Grid stack general overview and layers description
- Project status
- Future work

# Project rationale

- Grid computing over internet
- Secure communication
- Easy job management

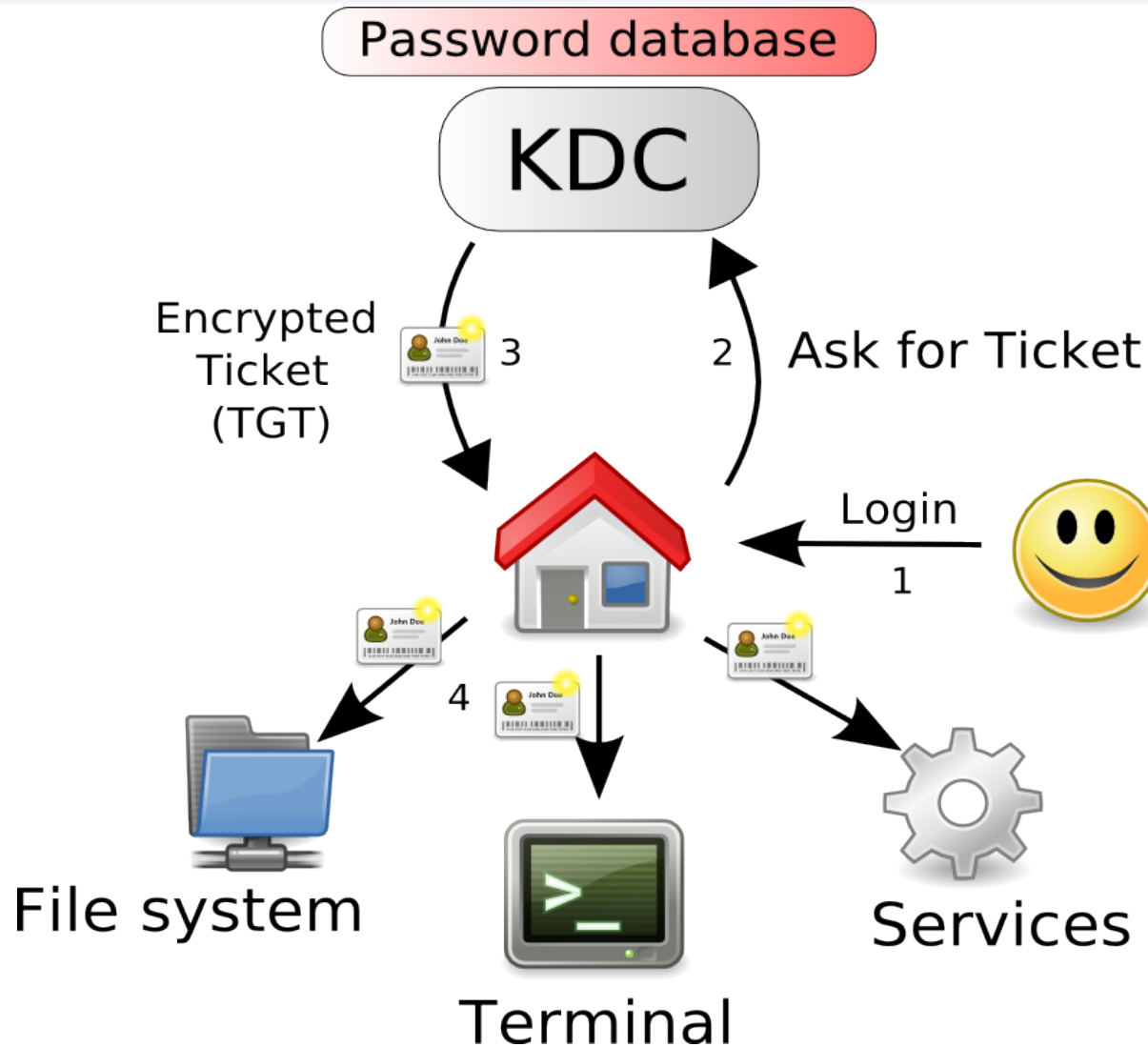
# Introduction to Kerberos

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

# Kerberos overview



- MS Windows 2000 and later releases
- X-Window
- Apache HTTPD
- NFSv4
- OpenSSH
- and many more...



# Grid stack general overview and layers description



Grid Portal

Resource  
Manager

Distributed  
File System

K  
e  
r  
b  
e  
r  
o  
s

IP-level encryption

Operating System

- 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

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

- 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

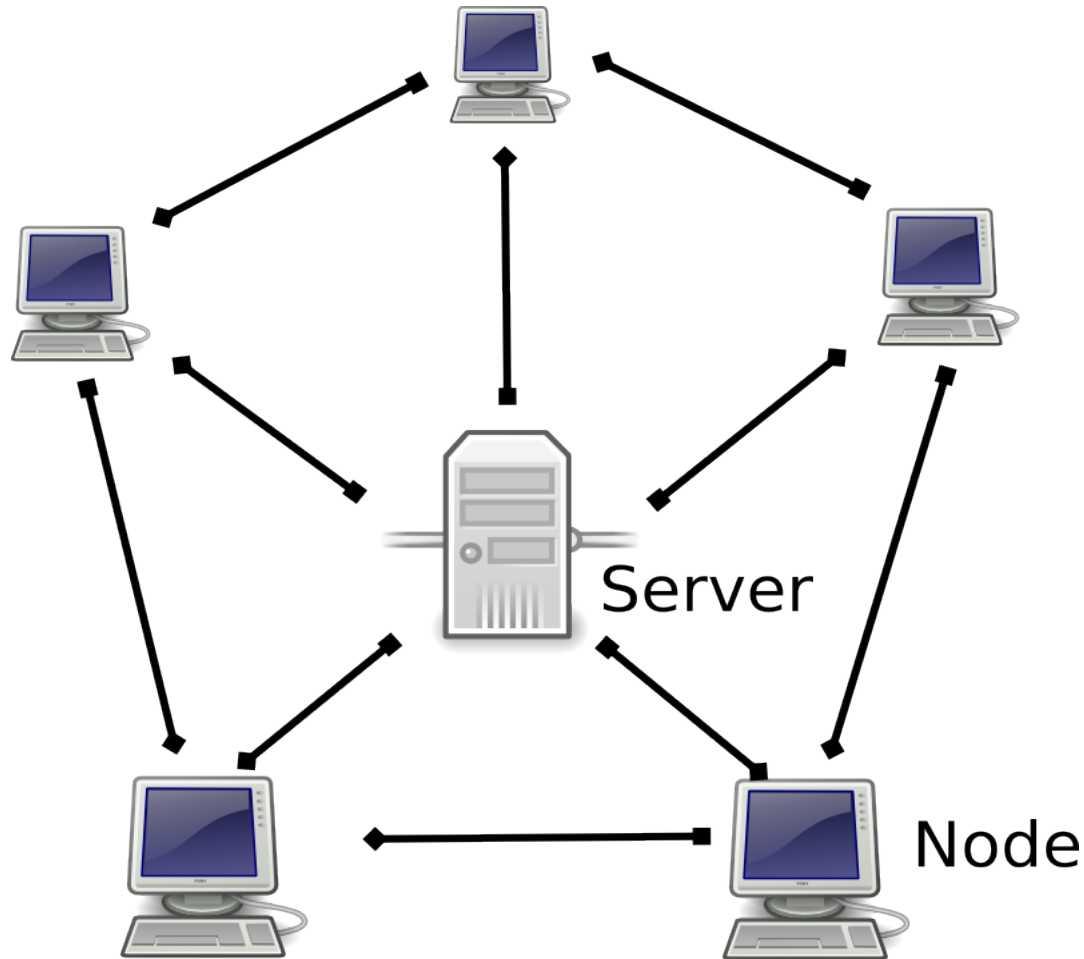
## Alternative approaches

→ IPsec (IP security)

→ VPN (Virtual Private Network)

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

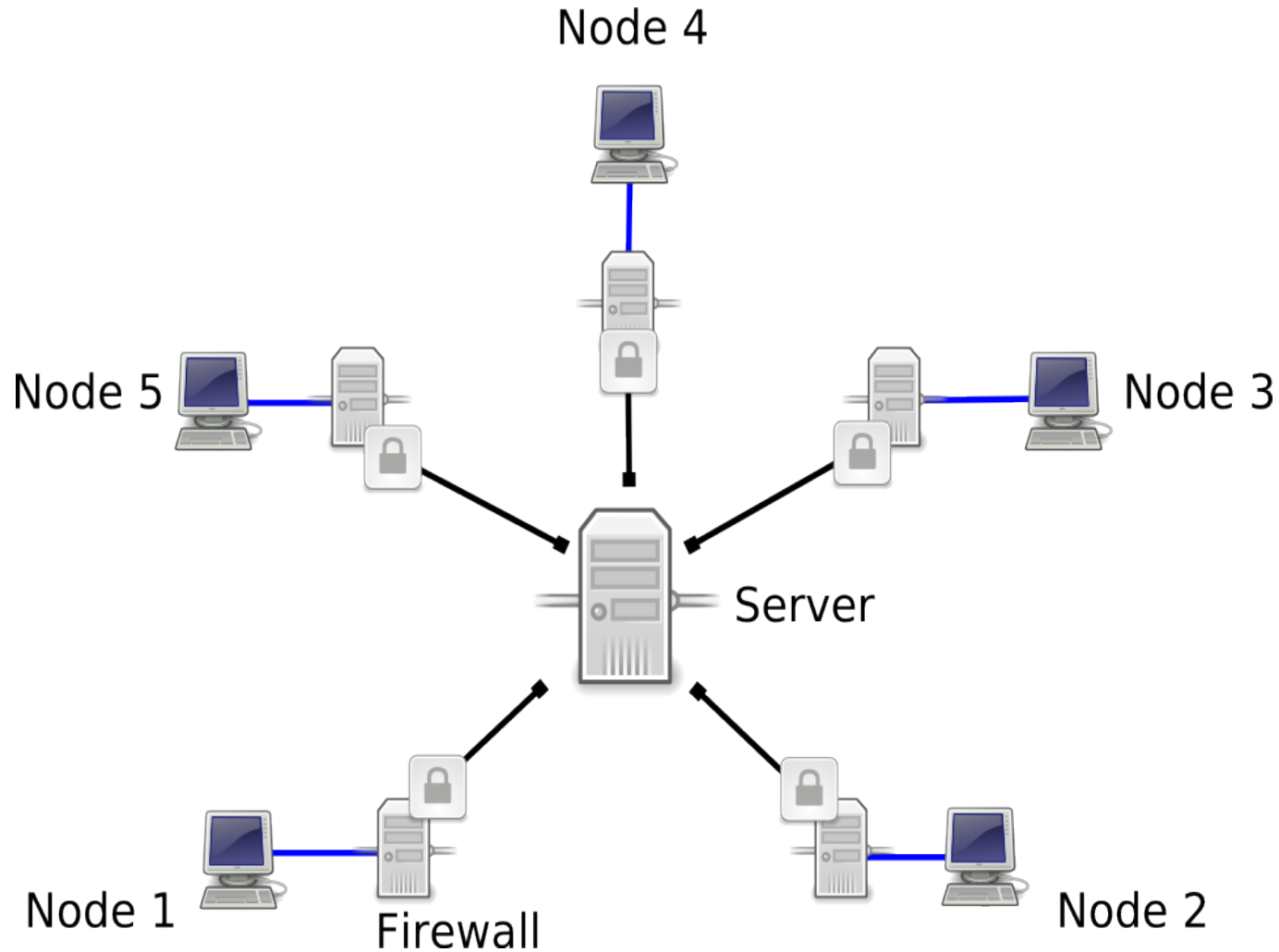
# IPsec diagram



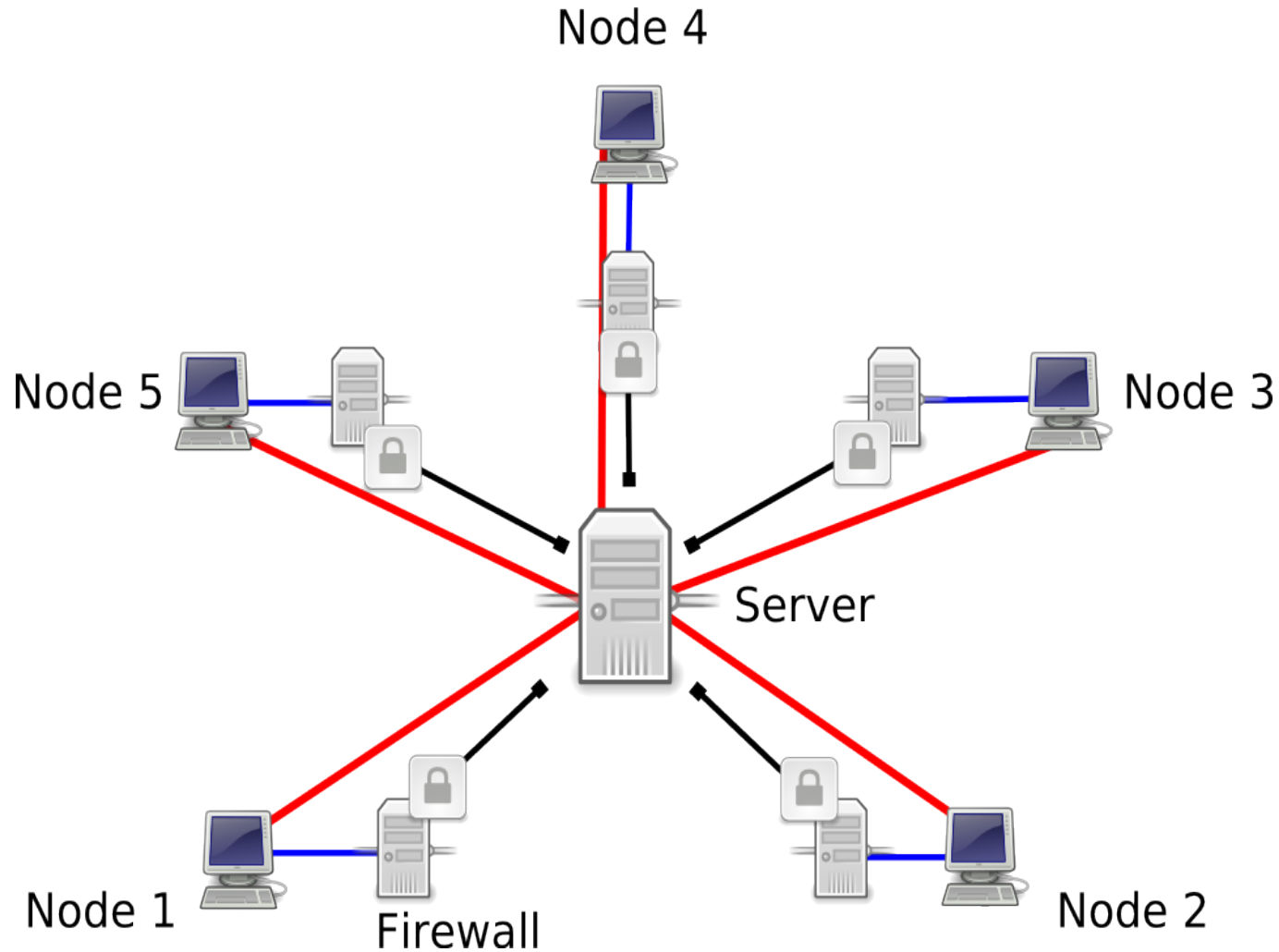


- OpenVPN – open source VPN implementation
- Secure encrypted transmission (RSA keys)
- Cross-platform implementations:
  - Linux
  - Mac OS X
  - MS Windows
- IP Tunneling over NAT

# VPN diagram



# VPN diagram



# 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

- 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