How to Fit Linux into your Enterprise

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Σ: Today We Will Cover

- The Structure of a Linux Platform
  - Component Capabilities
  - Key Services and Interoperability
- The Business Decision Framework
  - Implementation and Integration Strategies
  - Measuring Costs and Exposure
  - Planning the IT Roadmap
- Conclusions

What is this about?

- This is NOT a Linux 101 course
- IT Executives want to know:
  - HOW WILL LINUX AFFECT MY BUSINESS?

Linux Platform Structure

- Compare with MS Windows 200x Solutions
  - That is THE Enterprise benchmark
- Need to identify key structural components
  - Be Familiar with:
    - What are they?
    - What is the utility of each?
      - How does it affect my enterprise?
    - What are the benefits and the risks?

Σ: Structural Overview

- Core Issues Affecting Enterprise Integration
  - Authentication Subsystems
    - PAM (Pluggable Authentication Modules)
    - NSSwitch (Name Service Switch)
  - Control of System Services
    - Inetd/Xinetd (Network Super Daemon)
    - System V Initialization Scripts
  - Printing Infrastructure
  - Firewall and VPN (Virtual Private Networking)
  - Software Update Maintenance

The Linux Standards Base

- Linux Standards Base defines the platform
  - Refer: http://www.linuxbase.org
  - Is a working unit of The Free Standards Group
    - Refer: http://www.freestandards.org
- First LSB Specification was released: June 2001
  - All major Linux distributions are LSB compliant

Authentication Subsystems

- PAM (Pluggable Authentication Modules)
  - Linux, like Unix has:
    - /etc/passwd database, /etc/shadow file, /etc/group file
  - NIS (Network Information Service)
  - LDAP (Light Weight Directory Service)
  - Kerberos (MIT or Heimdal)
    - Ticket based authentication service

MS Windows Interoperability

- Opportunity for Integration of Microsoft Windows into Unix environments
  - LDAP and Kerberos with proprietary extensions
    - Require custom software / client drivers
    - Active Directory is a super-set of LDAP and Kerberos
    - Can act as an LDAP / Kerberos Server
  - NIS support for Windows NT/200x
    - Requires client software drivers (GINA)
  - eDirectory (Novell product)
    - Requires client software drivers

PAM and Microsoft Integration

- Samba Winbind Integrates Microsoft Network Authentication into Linux/Unix environment
  - Other Samba server authentication server
  - NT4 Domain Controller as authentication server
  - Active Directory Authentication Server
- Caldera/SCO VAS
  - Uses Unix extensions to Active Directory
    - Integrates Linux into Active Directory Environment
    - See http://www.sco.com/products/authentication

Other PAM or External Options

- Novell e-Directory
  - On NetWare or on Linux
    - See http://www.novell.com/products/edirectory
- Sun One (iPlanet) Directory Server
  - LDAP Based Server
    - See http://www.sun.com/software/products/directory_srvr/home_directory.html
- IBM Authentication Server
  - LDAP Based Server
    - See http://www-3.ibm.com/software/network/directory/server/v5.html

Linux User Accounts

- Contains very basic Information
  - User names limited to 32 characters
    - No upper case, no spaces
  - Group names limited to 16 characters
    - No upper case, no spaces
- Groups can NOT be nested
  - Has scalability and management implications
- Has account expiry capability

Example Linux Account Entries

/etc/passwd:

jht:x:500:100:John H Terpstra:/home/jht:/bin/bash
ajt:x:501:100:Amos Terpstra:/home/ajt:/bin/bash
met:x:502:100:Melissa
Terpstra:/home/met:/bin/bash
lct:x:503:100:Lyndell C Terpstra:/home/lct:/bin/bash

/etc/shadow:

jht:1pziz8yzz$6RXcJ/kO/gatqx7Xs4BiV.:12172:0:99999:7:::
ajt:$1$6zezJyzQ$JVlP.4WF2SeH9zU.46Ij/0:12172:0:99999:7:::
met:1CgWs5xyz$klM.j82dKbKgqw/ma1mMv.:12172:0:99999:7:::
lct:1//wztlsz$e.jx4ftSTW.U04mKKOsWG1:12172:0:99999:7:::

/etc/group

ntadmin:x:71:jht
ntpowerusr:x:73:jh
t

MS Windows NT/200x Accounts

- Contains comprehensive data
  - User names can be up to 254 characters
    - CAN have mixed case
    - Spaces are allowed
  - Group names can be up to 254 characters
    - Local Groups
    - Global Groups
    - Universal Groups
  - Groups CAN be nested

Microsoft Windows Accounts

- Features NOT in Linux OS Accounts
  - Password uniqueness controls
  - Workstations from which Access is Permitted
  - Can set future dated account activation
  - Desktop profile controls
  - Per user and/or per workstation access policies
  - Logon script control
  - Other subtle features

Key Basic Services

- Basic Services
  - DNS (Domain Name Service)
    - Internet Software Consortium
    - Bind 9 has support for Dynamic DNS
  - DHCP (Dynamic Host Configuration Service)
    - Internet Software Consortium
    - DHCP version 3
- Both are RFC (standards) compliant

Printing Infrastructure

- Original Choice
  - AT&T System V Spooler *or* Berkeley LPR/LPD
- Then came LPRng (LPR Next Generation)
  - Still in popular use. Default on some Linux platforms
- CUPS – Common Unix Print System
  - Comprehensive print filtering and rendering system based on IPP (Internet Print Protocols)

Security Services

- Firewall
  - Kernel based IPTables
  - Several configuration and management tools
- Virtual Private Networks (VPN)
  - Open Source package is a Linux Kernel add-on called FreeS/WAN
    - Current stable version 2.00 (released April 28, 2003)
  - Does IPsec

Linux Software Updates

- Automatic Update services available for
  - Red Hat Linux
  - UnitedLinux (SuSE,SCO,Conectiva,TurboLinux)
- Many network administrators prefer manual update
  - Safety concerns
  - Control issues
    - Dislike of feature creep
    - Principle of less surprises

Commercial Security Tools

- Main players include
  - CheckPoint: Firewall-1 and VPN-1
  - FWBuilder: http://fwbuilder.sourceforge.net
  - Phoenix Progressive Systems: Adaptive Firewall
    - Inside Sun's Cobalt Microcube solutions
- Commercial Support is offered by many organizations

Σ: Key Layered Services

- Layered Services
  - File and Print
  - Electronic Mail and Messaging
  - Web Proxy Services
  - SQL Server
  - Web Serving
  - Directory Services

File And Print

- MS Windows support provided by Samba
  - Current stable version 2.2.8a
    - NT4 style Domain Control support
    - No Internal Unicode support
    - Can not natively join an Active Directory Domain
- Apple MacIntosh support by NetAtalk
  - Current stable version 1.6.2
- NetWare support by MARS_NWE package
  - Current stable version 0.99pl20

File and Print: Samba-3 Futures

- Can natively join MS Active Directory
- Internal Unicode support
- Extended LDAP support
- New Security Account Manager database
  - Similar database as MS Windows NT4/ADS
- New Documentation for easier deployment
- Many new NT4+ Win2K+ features
- New tools to allow full control of MS Windows networking from Unix/Linux environment
- Better integration with NT4/Win200x admin tools

Electronic Mail & Messaging

- Every Linux system has a mail server
- Component lexicon
  - Message Transport Agent (MTA)
    - Does the sending and receiving
  - Message Delivery Agent (MDA)
    - Affects local delivery
  - Mail User Agent (MUA)
    - Used by the user to send/receive/manage mail
  - Message Retrieval Agent (MRA)
    - Can be used to access mailbox (mail store)

Popular Applications

- Application Types
  - MTA: Postfix, sendmail
  - MDA: Deliver, local
  - MUA: Most popular is MS Outlook Express
  - MRA: Pop2/3, IMAP
- Mail Boxes can be:
  - System mail box, or a *file in the user's home directory, or a file system database*
  - *An SQL back-end*

Microsoft Exchange Server

- Exchange components include:
  - MTA, MDA, MRA
  - MS Outlook Exchange Client
- A Directory
  - NT4 Domain or Active Directory database
- Data Store
  - File based with Backup/Restore facilities
- Interfaces
  - Virus Scanning, SPAM control, etc.

Linux Exchange Alternatives

- Roll your own from components
  - Postfix, imap, pop, cyrus extensions, etc.
- Commercially Supported Solutions
  - SuSE OpenExchange Server
  - SCO Office Server
  - XchangeNetwork
    - http://xcserver2.xcnetwork.com/index.jsp
  - Included in commercial solutions
    - Virus Scanning (several 3rd party)
    - SPAM Control

Web Proxy Services

- Main package is called SQUID
  - Installed based estimated at 1.5M systems
  - Has access control facilities
    - Time of day
    - Per User / Group
    - Can use NT4/ADS authentication backend
    - Can do content and URL filtering
  - High performance

SQL Server Options

- Major Open Source Projects:
  (Have ODBC drivers for Windows clients)
  - Postgresql: http://www.postgresql.org
  - MySQL: http://www.mysql.com
- Major Commercial
  - Oracle SQL
  - IBM DB2
- There are many commercial SQL server products

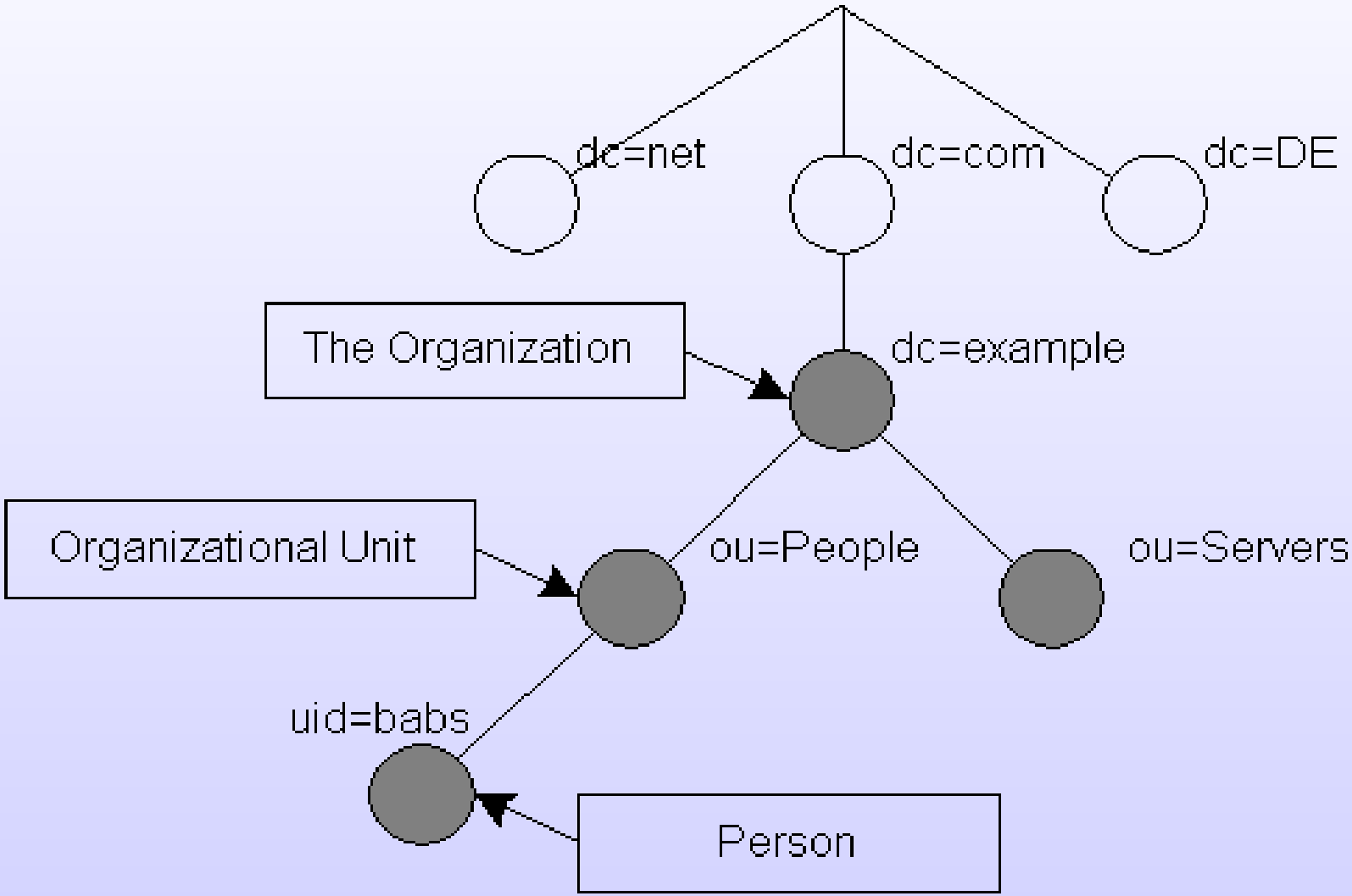
Web Servers

- The dominant web server today is Apache
  - Installed base is approx. 24M servers (62% of market)
    - See http://www.netcraft.com/
    - Approximately 50% of web servers run on Linux
- Apache modules are VERY important
  - SSL,PHP, Perl, Jakarta Tomcat + many more
- Apache and Modules can be run on many platforms including MS Windows

Directory Services

- OpenLDAP is the main open source package
  - Current stable version 2.1.17
  - What is OpenLDAP?
    - Open source implementation of LDAP version 3
      - Light Weight Directory Access Protocol
  - What is LDAP?
    - A lightweight protocol for accessing directory services, specifically X.500-based directory services
    - Details of LDAP are defined in RFC2251, and more

OpenLDAP: Data Organization



LDAP Schema Files

- The following schema files ship with OpenLDAP
  - Core (needed by OpenLDAP)
  - Cosine (Internet X.500)
  - Interorgperson (POSIX User Account Info)
  - Others (misc, NIS, OpenLDAP Experimental)
- Are other schema files required?
  - Yes!
    - Samba schema
      - MS Windows user / machine account information

LDAP Features

- Integrity and Confidentiality Protection via TLS (SSL)
- Internationalization (Unicode)
- Referrals and Continuations, Schema Discovery, Extensibility
- Delegation and Replication
- Strong Authentication (SASL/GSSAPI)
  - Simple Application and Security Layer Services
  - Generic Security Services Application Programming Interface
    - A generic API for doing client-server authentication

Σ: Linux Platform Summary

- Has many of the features / services of MS Windows NT4 / 200x environments
- Services are similar
  - NOT the same
  - Some have deficiencies
  - Some have greater functionality / utility
  - You have a CHOICE
- Linux and MS Windows can transparently share a common Network environment

Σ: Business Decision Framework

- Implementation and Integration Strategies
  - In-House orientation versus Out-Sourcing
  - Maintenance of Integrity
  - Managing Potential Exposure
  - Disruptiveness and Change Control

Σ: Decision Framework - I

- Measuring Cost of Ownership
  - Comparison of Linux and MS Windows Solutions
  - Hardware requirements and life-cycle
  - Staff Overheads
  - Software Upgrade and Maintenance costs
  - Risks
    - Technology / software suppliers going out of business
    - Support Availability
    - Bugs and Defects

Σ: Decision Framework - II

- Application Concerns
  - Availability of the Right Package
  - Application and Data Interoperability
- Intellectual Property
  - What is the debate really about?
  - Schizophrenia and Reality

Σ: Decision Framework – III

- Planning the IT Roadmap
  - Preparing for Futures
  - Avoidance of Isolation
- Common Objections and Answers
  - From the User's perspective
  - The Administrator's Dilema

Σ: Summary

- Linux is a rapidly maturing platform
  - Many features are ready for enterprise adoption / deployment
  - Some questions still not answered
- Microsoft Windows is here to stay
  - Interoperability is paramount factor in Linux deployment
- Alternatives can be financially attractive

DEMO:

A brief look at some key interoperability capabilities