O22
SUSE LINUX Enterprise Server 9

Technical Overview - v4

CONFIDENTIAL

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Agenda

Target Audiences and Business Concerns

SUSE LINUX Build Process and Common Code Base

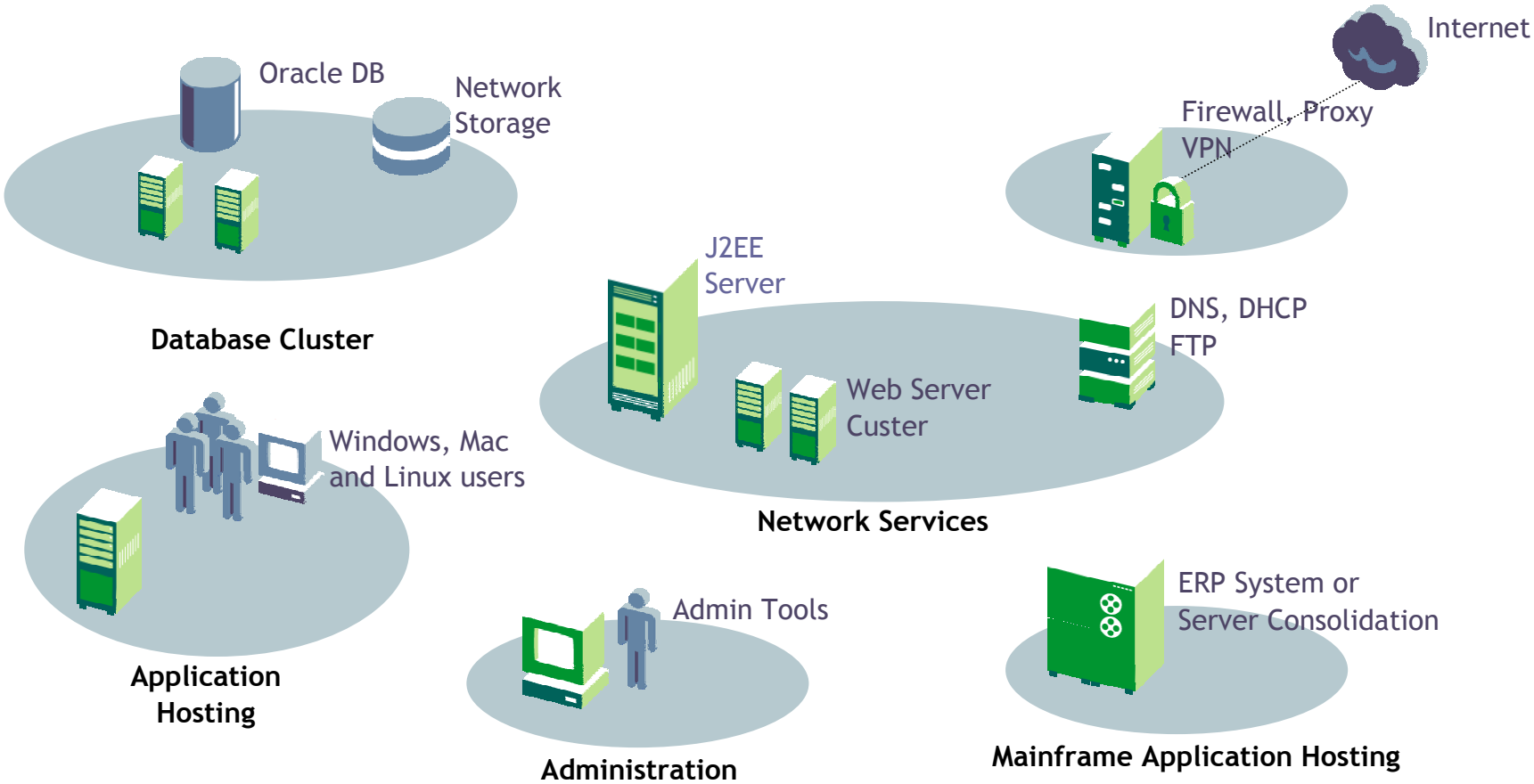
SUSE LINUX Enterprise Server 9 Overview

- Performance and Scalability
- High Availability and Fail-over
- Deployment and Management
- Security
- Application Services
- Backed by Novell

Screenshots

Target Audiences & Business Concerns

SUSE LINUX Enterprise Servers in the Enterprise

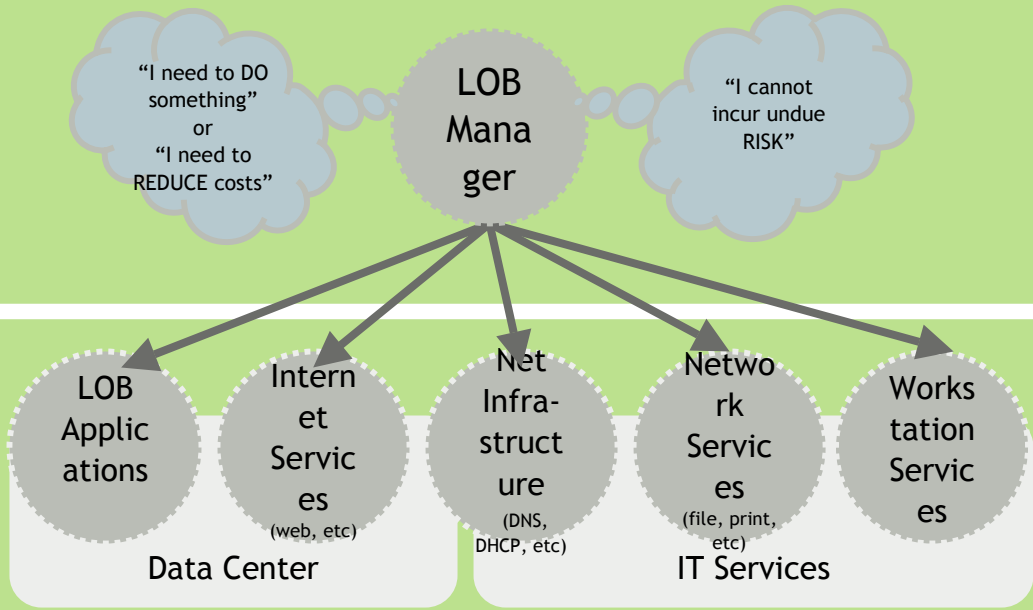


Enterprise Buying Chain

1. Enterprise purchasing actions begin with business initiatives

2. Enterprise Buying Personas

Potential Linux Buyers



3. **Two major buying personae**
   - Data center buyers
   - Services and infrastructure buyers

IT Infrastructure and Services Audience

Mission:

Provide network infrastructure services: to general end-users and workgroups

Examples:

- File and print services
- Document management
- Collaboration and teaming
- Intranet services
- Branch office support
- Network services

IT Infrastructure and Services Audience Concerns

"How can I reduce costs?"

- File, print, Web, network services built-in to SUSE LINUX
- Support for ISV applications

"How can I improve end user satisfaction?"

- Services easy for IT administrators to publish and manage
- Services easy for end users to find and configure
- Remote administration and automated deployment
- Easy to troubleshoot

"Who can I call for support"

- 7/24/365 technical support, with guaranteed response times
- Seven call centers worldwide, over 800 dedicated staff
- Support staff who can speak Linux, Windows, Mac, NetWare, Unix and applications

Data Center Audience

Mission:

Deliver and support mission-critical line-of-business applications

Examples:

- Corporate Web site
- Enterprise resource planning
- Customer relationship Management
- Supply chain management

Data Center Audience Concerns

"How can I eliminate downtime?"

- Rigorous 5-point quality and stress testing with input from major vendors
- Unique high availability features included
- Novell's superior technical support and partner network

"How can I guaranteed data privacy?"

- Robust security features: firewall, proxy, certificate management, encrypted file systems
- Industry's highest certification

"How can I ensure application compatibility?"

- Broad support for third party applications
- Only platform to support 7 systems architectures, built with AutoBuild(TM)

SUSE LINUX Build Process and Common Code Base

About SUSE LINUX

Acquired by Novell in January 2004

Delivering Linux distributions since 1993

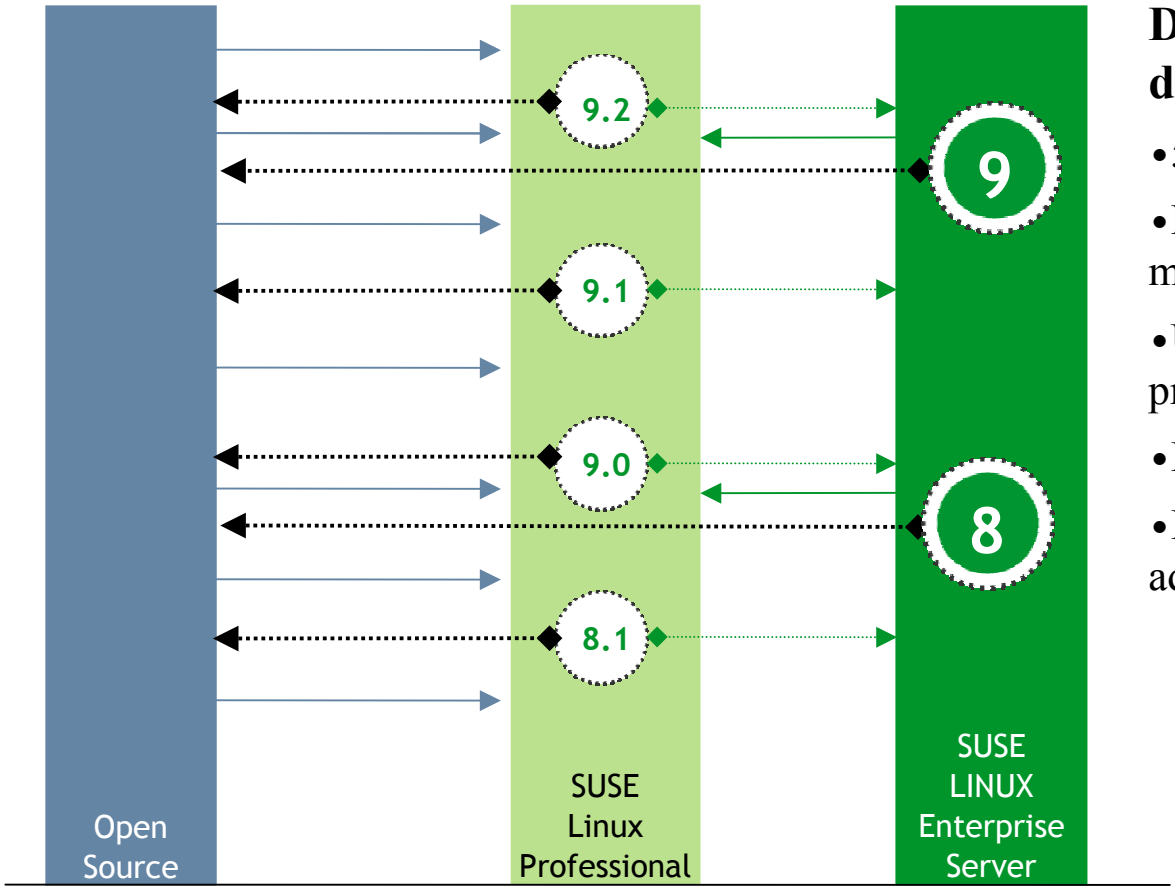
The undisputed technology leader in 64-bit Linux

Dominates the non x86 enterprise Linux markets

- More than 50% of the IBM i/pSeries *
- More than 80% of the Linux for IBM S/390 and IBM zSeries markets *

* According to IBM, pSeries, iSeries are now IBM POWER
** According Butler Group study

SUSE LINUX Enterprise Release Model



Designed for enterprise deployments

- 5 year support
- Predictable 12-18 month road map
- Uniform ISV/OEM certification process
- Extensive beta testing
- Extensive testing by early adopters and community members
  - SUSE LINUX Professional

About AutoBuild™

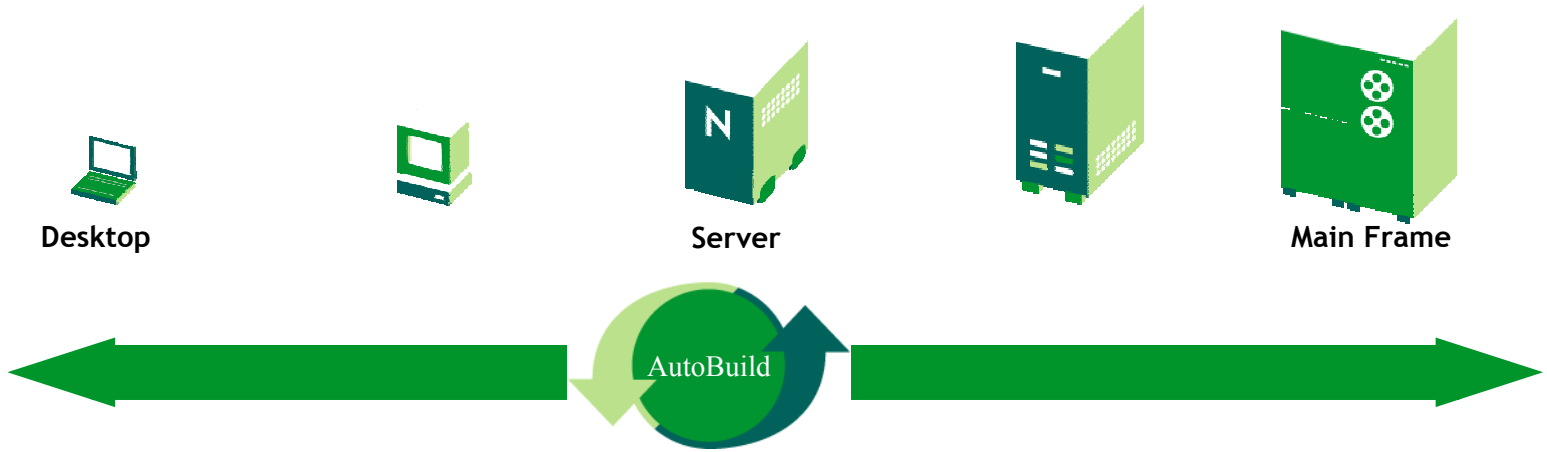
AutoBuild is unique to Novell

- A system for automating the SUSE LINUX build process from a common code base
- Builds each platform
- Integrates all test suites
- Assures that all SUSE LINUX products work together perfectly

Why is this important? For the customer it . . .

- Reduces production problems
- Improves operations
- Consolidates skill sets
- Expedites IT solutions

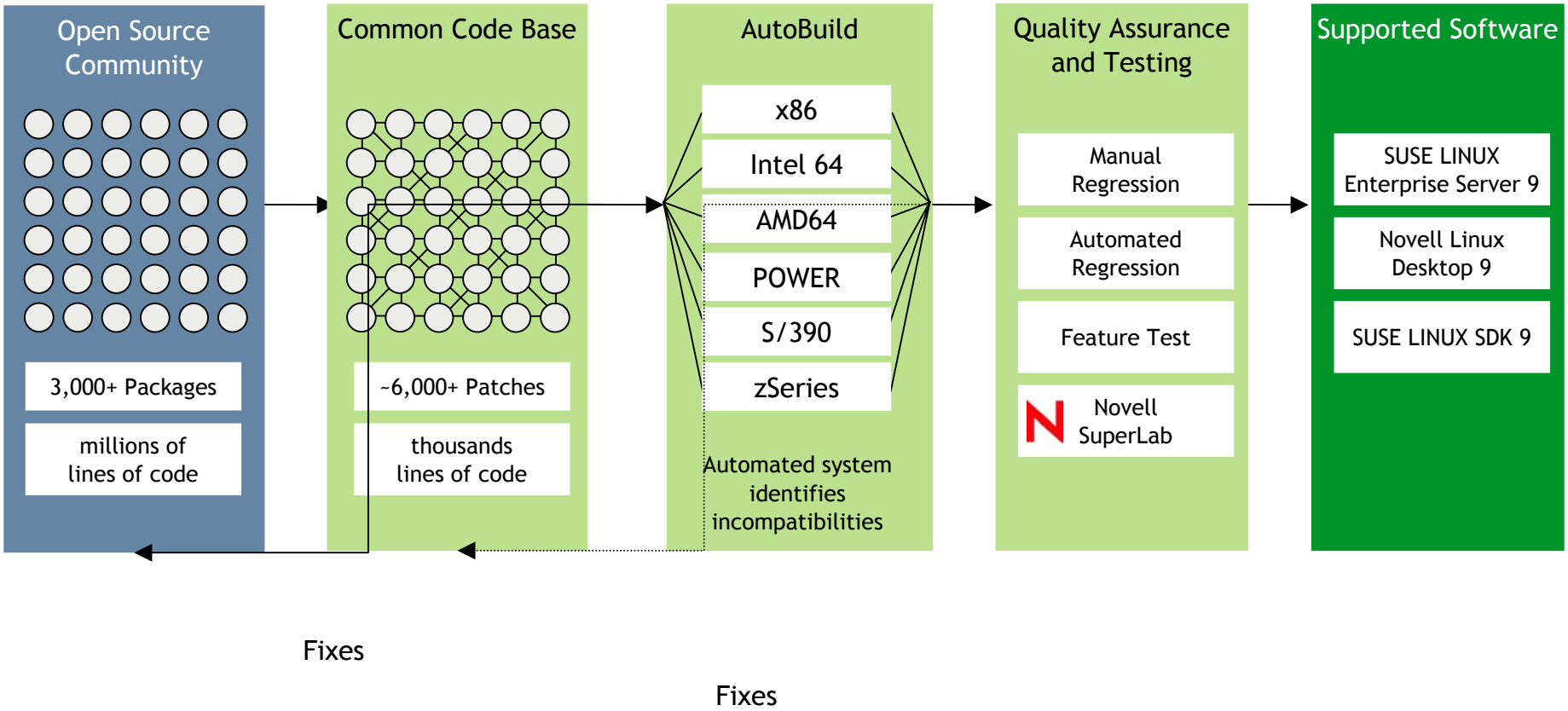
Benefits of the Common Code Base



Supported Platforms

- Intel x86 Pentium, Xeon (32 bit)
- Intel Itanium 2 (64 bit)
- AMD x86 (32 bit)
- AMD64 (32/64 bit)
- Intel EM64T
- IBM POWER
- IBM zSeries and IBM S/390

SUSE LINUX Development Process



SUSE LINUX Enterprise Server 9 Overview

SUSE LINUX Enterprise Server 9 Overview

A secure, reliable platform for Linux and open-source computing in the enterprise:

- **Unmatched manageability** lowers the cost of ownership
- **Strongest security capabilities** ensures data privacy
- **Industry leading scalability and reliability** enables mission-critical deployments
- **Robust application support for third party and line of business applications**
- **Backed by Novell empowering businesses to deploy Linux with confidence**

Novell.

Industry Leading Performance and Scalability

Fact: SUSE LINUX Enterprise Server 9 offers industry-leading performance and scalability capabilities for large-scale Linux deployments

Features

- Performance
  - Kernel 2.6 performance
  - Flexible and pluggable I/O schedulers
- Scalability
  - NPTL
  - Hyperthreading
  - Non-uniform memory management
  - Infiniband

Performance

Kernel 2.6 Performance

- SUSE-driven kernel enhancements and patches
- Enhanced scalability features lead to performance gains

Flexible and pluggable I/O schedulers

- Four available schedulers: CFQ, NOOP, Deadline or Anticipatory schedulers fitting best your needs

Various I/O Characteristics

- Raw I/O and Async I/O to provide high bandwidth (e.g. for databases)
- Multipath I/O: multiple paths to storage increases data throughput

Fastest Linux TPC-C Benchmark Performance

“Oracle Achieves World Record Database Performance using SUSE LINUX Enterprise Server 9”

- Using NEC's Express 5800/1320Xd server with 32 Intel Itanium 2 processors at 1.5 GHz with 6 MB L3 cache running on **Novell's SUSE LINUX Enterprise Server 9**, Oracle Database 10g achieved 683,575 tpmC (transactions per minute) with a price-performance ratio of $5.99/tpmC.
- TPC-C performance benchmark result for Oracle Database 10g running on Linux-based SMPs.
- http://www3.sys-con.com/banners/linuxworld336.cfm

"More and more customers are turning to Linux to support their large-scale enterprises. By showing outstanding Linux database performance on the largest SMPs, Oracle continues to prove that Linux can handle the world's toughest workloads."

- Richard Sarwal, vice president of Server Performance of Oracle Corp.

Scalability

Native POSIX Thread Library for Linux (NPTL)

- New architecture results in dramatic performance gain across all platforms

Hyperthreading support improved for throughput of current x86 hardware

NUMA (non-uniform memory management)

- Allows to scale more efficiently for systems with dozens, or hundreds of CPUs
- More effective scalability across large scale implementations

Scalability

InfiniBand(TM)

- Inter-system connect for greater performance, lower latency, easier and faster sharing of data, built in security and quality of service and improved usability

Large-scale user and file support

- Number of unique users and groups has been expanded from 65k to over 4 billion in the kernel
- Number of Process IDs has been increased from 32k to 65k in userland, while kernel supports 1 billion

Reliability, High Availability and Fail-Over

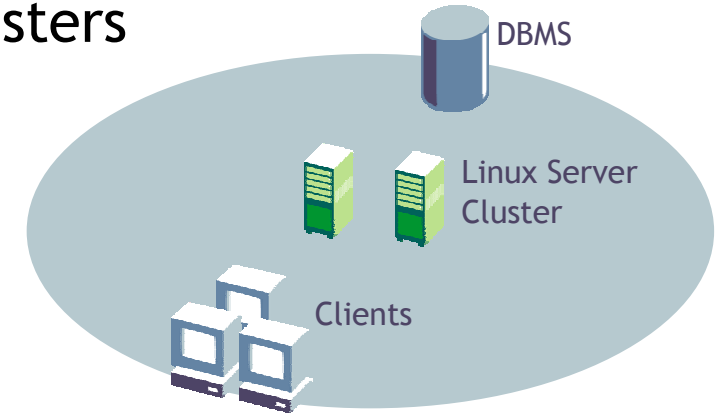
Fact: SUSE LINUX Enterprise Server 9 is reliable and provides multi-server clustering capabilities

Features

- Multi-server clustering
- Hotplug services
- Support for latest reliable hardware
- Data Center Linux
- Carrier Grade Linux

High Availability Features

Fail-over and load balancing clusters



- Heartbeat infrastructure
- Hotplug services
- Automated fail-over
- Cluster IP Alias
- Linux Virtual Server
- Multipath I/O
- ***Distributed Replicated Block Device (***DRBD)
- Enterprise Volume Manager (EVMS)

Database clusters

- Certified base for IBM DB2 ICE (Integrated Cluster Environment)
- Certified base for Oracle Cluster Filesystem (OCF)

High Performance File System Support

ReiserFS

- SUSE is a primary contributor
- Extensive file I/O performance gain over other distros

ext2/3

- Popular file system on Linux

JFS and XFS

- 64-bit, for large files and partitions

Clustered file system (Lustre)

- Optimized for network storage and high performance computing (HPC) environments

Data Center Linux

SUSE LINUX, the first Enterprise Linux OS to market with Carrier Grade Linux

- http://www.osdl.org/lab_activities/carrier_grade_linux/
- ***Industry standard developed in cooperation with telecom carriers***
- ***Features benefit all enterprises***

Many Requirements in common with “Data Center Linux”

- Reliability, availability, serviceability (RAS) features
  - Crash dump and fast reboot
  - Console access over the network
- Clustered volume management
  - Intuitive administration console for EVMS

Linux Manageability

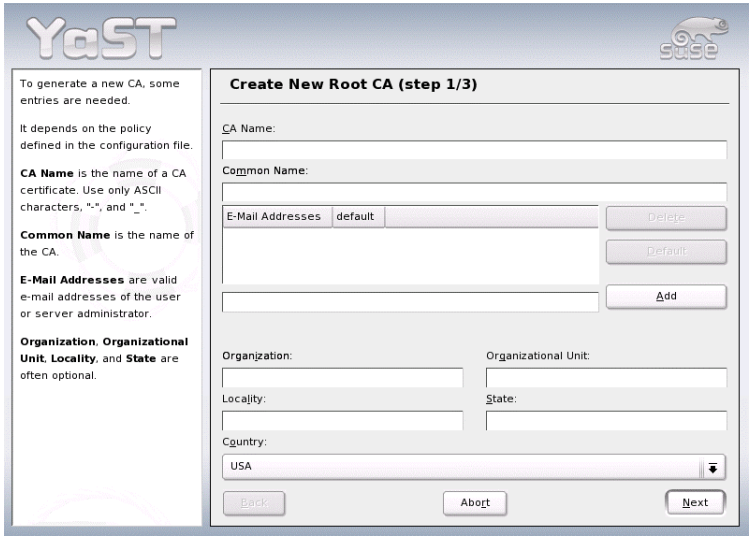
Fact: SUSE LINUX Enterprise Server 9 offers the industry's most comprehensive installation, updating, and monitoring services

Features

- YaST
- AutoYaST
- YOU
- SLP
- LDAP Support
- CIM Support
- ZENworks Linux Management

Novell.

Unmatched Manageability via YaST



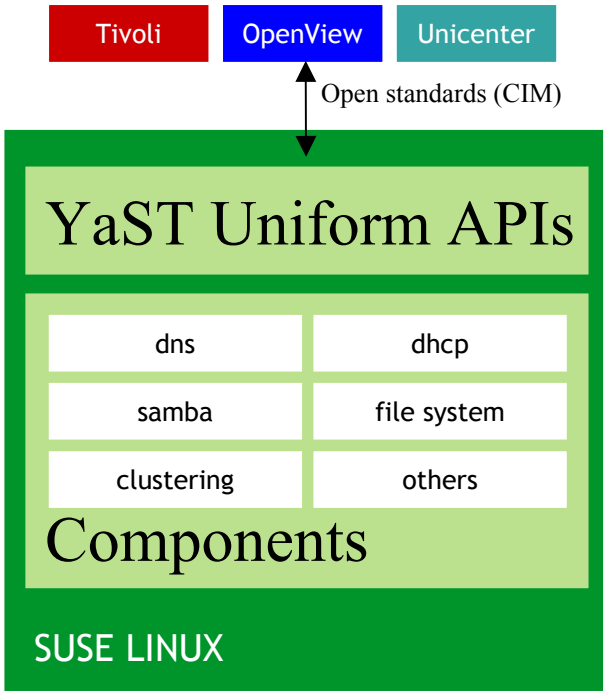
YaST makes it easy to deploy, manage, secure and update Linux

- YaST for configuration of the OS
- YaST for configuration of services (e.g., Mail-, File&Print Server)
- SLP (service location protocol) for automated client configuration
- YaST Online Update (YOU) for software updates
- AutoYaST for zero-administration deployment
- Open APIs
- CIM Enabled

Common Information Model (CIM) Support

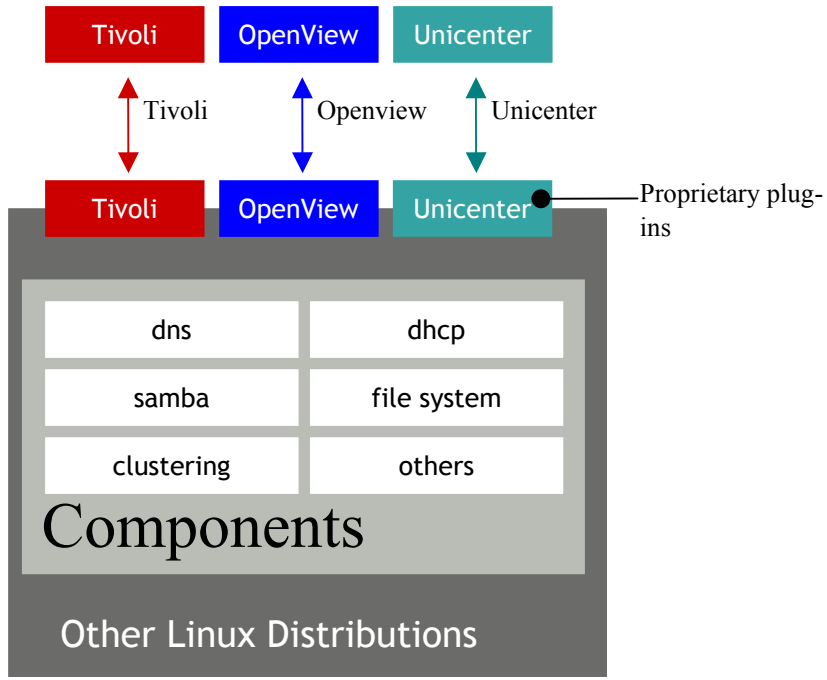
SUSE LINUX Enterprise Server

- Compatible with any CIM system
- Flexible architecture
- Eases IT change



Other Linux Distributions

- Proprietary solutions
- Brittle architecture
- Implementation-specific APIs



Automatic Deployment with AutoYaST

“No Touch” Linux deployment

- Works without user or IT intervention
- Supports configuration deployment on any hardware configuration

Configuration-driven automation

- Hardware configurations
- Software configurations
- Custom settings

Supports directory stored settings

Advanced Management Features

Enterprise Volume Management System (EVMS)

- Cross-node storage management
- Supports resizing and alteration at runtime

Class-based kernel resource management (CKRM)

- Mainframe-like resource allocation and management
- Co-developed with IBM

SLP - Service Location Protocol

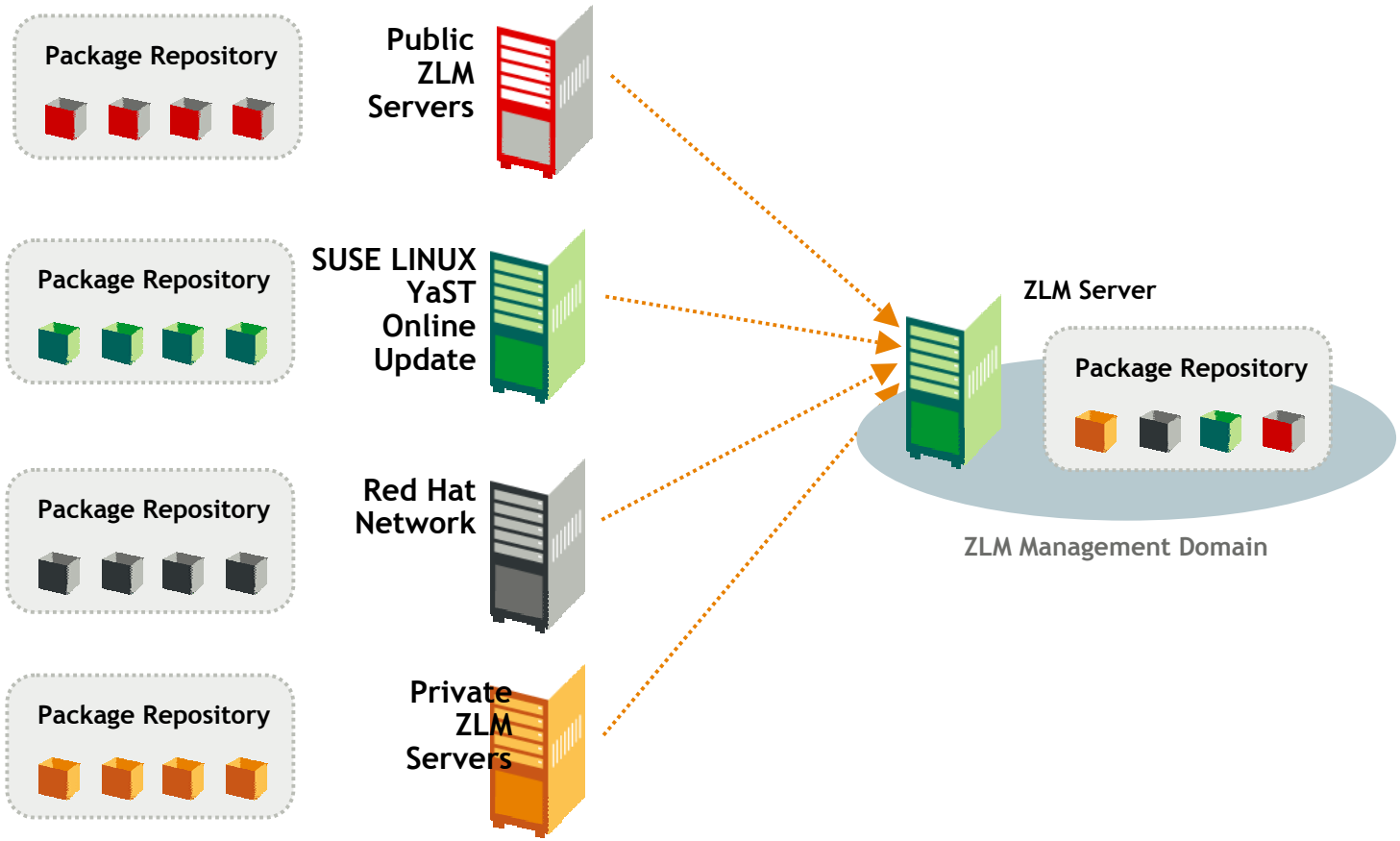
- Client and server interact automatically to set configuration data

Simple Network Management Protocol (SNMP)

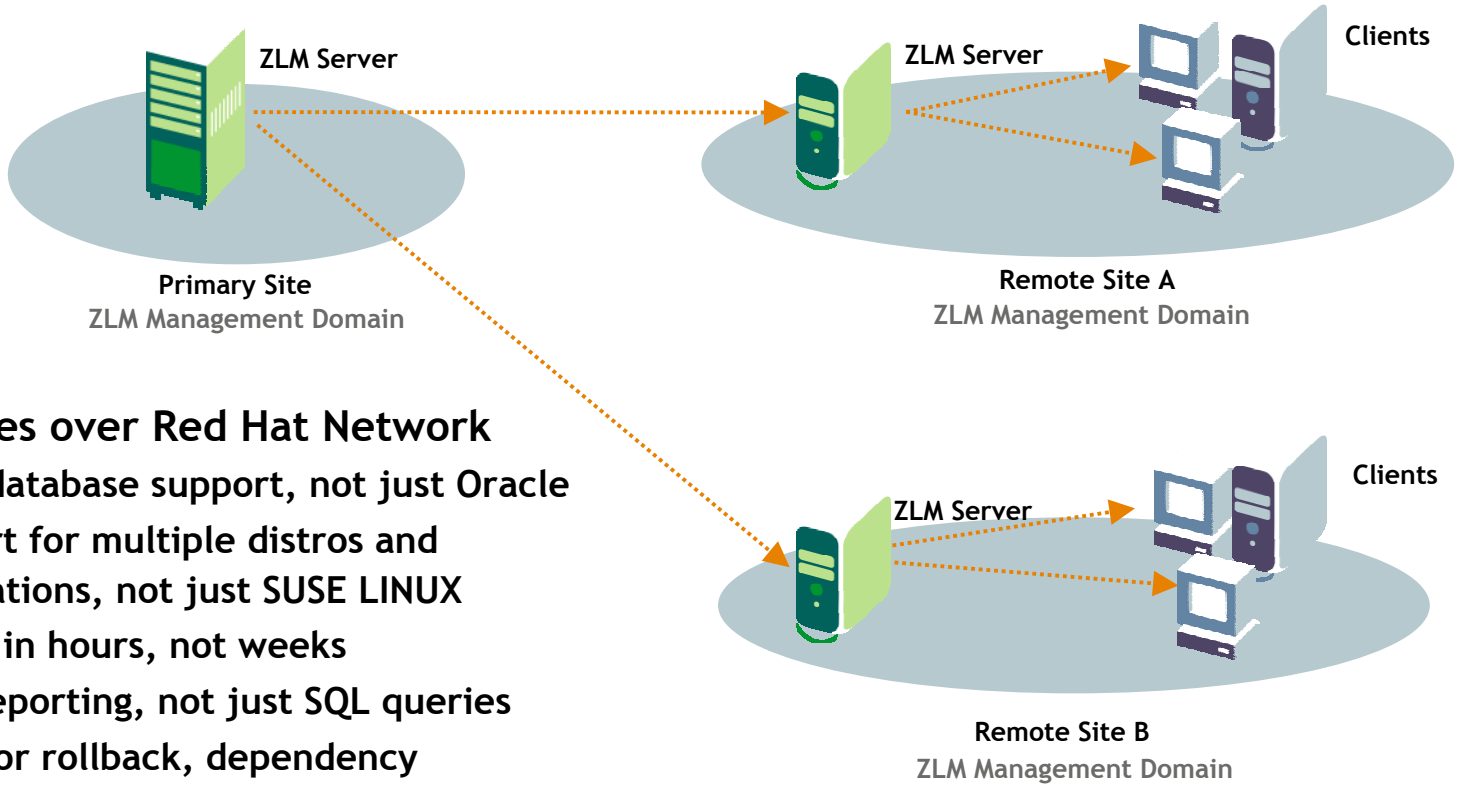
- Centralize management of network workstation and servers, routers, bridges
- Widely accepted standard

ZENworks Linux Management (ZLM) enabled

Using ZLM to Aggregate Updates



Using ZLM to Distribute System Updates



Advantages over Red Hat Network

- Open database support, not just Oracle
- Support for multiple distros and applications, not just SUSE LINUX
- Set up in hours, not weeks
- Easy reporting, not just SQL queries
- Superior rollback, dependency resolution and user interface
- ZENworks suite works on other platforms

Unmatched Security Support

Fact: SUSE LINUX Enterprise Server received the highest level of security and operations certification ever reached in the Linux market, Common Criteria Evaluation Assurance Level (EAL) 3+

Features

- Virtual Private Networking
- EAL certification
- Certificate Management
- Support for Encrypted File System
- Secure Network connections

Unmatched Security Capabilities

- Virtual Private Networking
- Rich Access control lists (ACL)
- Secure network connections with 128-Bit SSL, IPSec, Secure Shell, Kerberos 5 authentication, etc.
- Robust certificate management
- Built-in monitoring
  - File manipulation monitoring
  - Intruder detection
  - Linux Audit System (LAuS)
- Support for encrypted file system
- SUSE LINUX Firewall and Proxy Suite
  - configuration frontend for security related rules and NAT (Network Adress Translation)

EAL Certification

SUSE LINUX Enterprise Server 8 is the first EAL3+ certified Linux platform

- EAL3+ is an internationally accepted security certification standard important for security sensitive markets (e.g. government, finance sector)

"Evaluation Assurance Level" is documented by "Common Criteria" ISO standard (ISO 15408)

- Audit subsystem for SLES
- security evaluated development processes

SLES 9 meets all of the requirements for EAL4+

- Certification on track

Benefits to Customers

- Backing of independent, objective certification body
- Worldwide acceptance by 14 nations
- Easy comparison and measurement of functionality and procedure background
- Linux buyer's job insurance

Robust Application Support

Fact: SUSE LINUX Enterprise Server includes core open source functionality, support for 3rd party applications and tools for delivering applications on Linux

Features

- Built-in application services
- Third party application support
- Rich SDK offering
- User Mode Linux support

Novell.

Built-In Application Services

File and print services

- samba 3, NFS, CUPS
- supporting Linux, UNIX, Windows and Macintosh clients

E-Mail Services

- Postfix, IMAP, etc.

Databases

- MySQL
- PostgreSQL

Middleware services

- Apache Web Server and PHP Support
- Java, Tomcat, JBoss

Network services

- DNS
- DHCP
- OpenLDAP
- NTP
- SLP
- ***Ipv4, Ipv6***
- ***SNMP***
- ***Proxy***
- ***FTP***
- ***PXE***
- Installserver
- Bootserver
- Updateserver

Third Party Software and Hardware Support

Application Support

Hardware Support

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Developer APIs and Tools

Runtime Application Support

Perl

Java

Python

Shell Scripting

TCL/TK

Ruby

C# (Mono)

Compatibility for
SUSE LINUX Enterprise Server 8

SUSE LINUX SDK

Comprehensive APIs

Open tools support

ISV enablement

- YaST module development and development tools

Eclipse and Kdevelop

Mono

Integrated into the
- Novell Software Evaluation and Development Library

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User Mode Linux

- Self hosting environment run SLES9 as user space application with full debug capabilities
- Easy cloning of instances by copying predefined images
- Test interaction of several instances and applications on one machine
- UML instance is manageable as the hosting SLES instance

Standards Support

Linux Standards Base

- Ensures compatibility between Linux distributions
- 1.3 compliant, 2.0 prepared/candidate
- http://www.linuxbase.org/

Carrier Grade Linux

- Priority 1 features
- ***http://www.osdl.org/lab_activities/carrier_grade_linux/***

Data Center Linux

- Many priority 1 features
- http://www.osdl.org/lab_activities/data_center_linux/

Accessibility

- Section 508 - *http://novell.com/accessibility*

Evaluation Assurance Level (EAL) Common criteria

- Highest security level for Linux

Standards Support

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Evaluation Assurance Level (EAL) Common criteria

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Backed by Novell

Fact: SUSE LINUX Enterprise Server is backed by the largest support ecosystem, Novell's unique indemnification program and Novell's unmatched commitment to Linux and open source.

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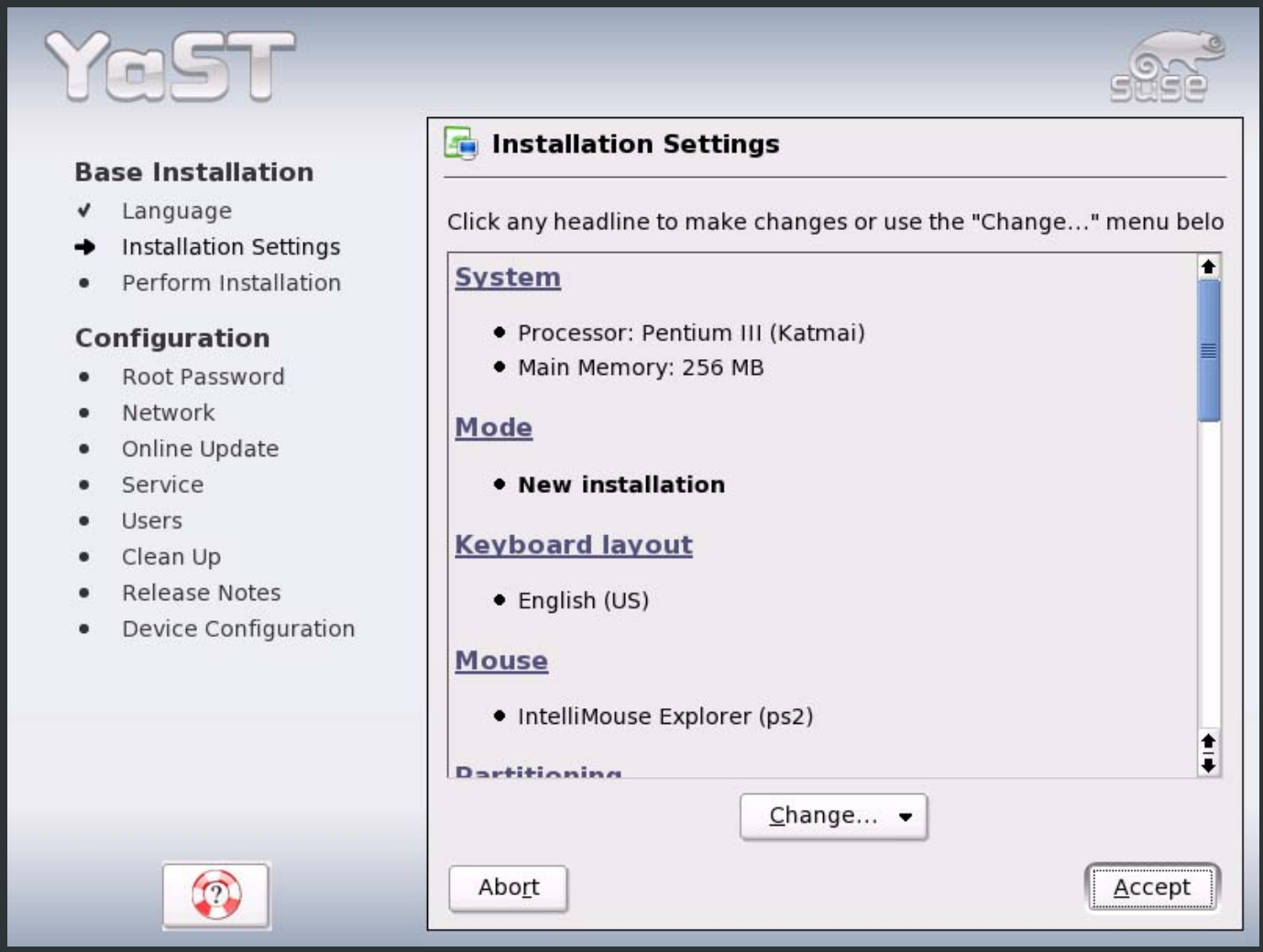
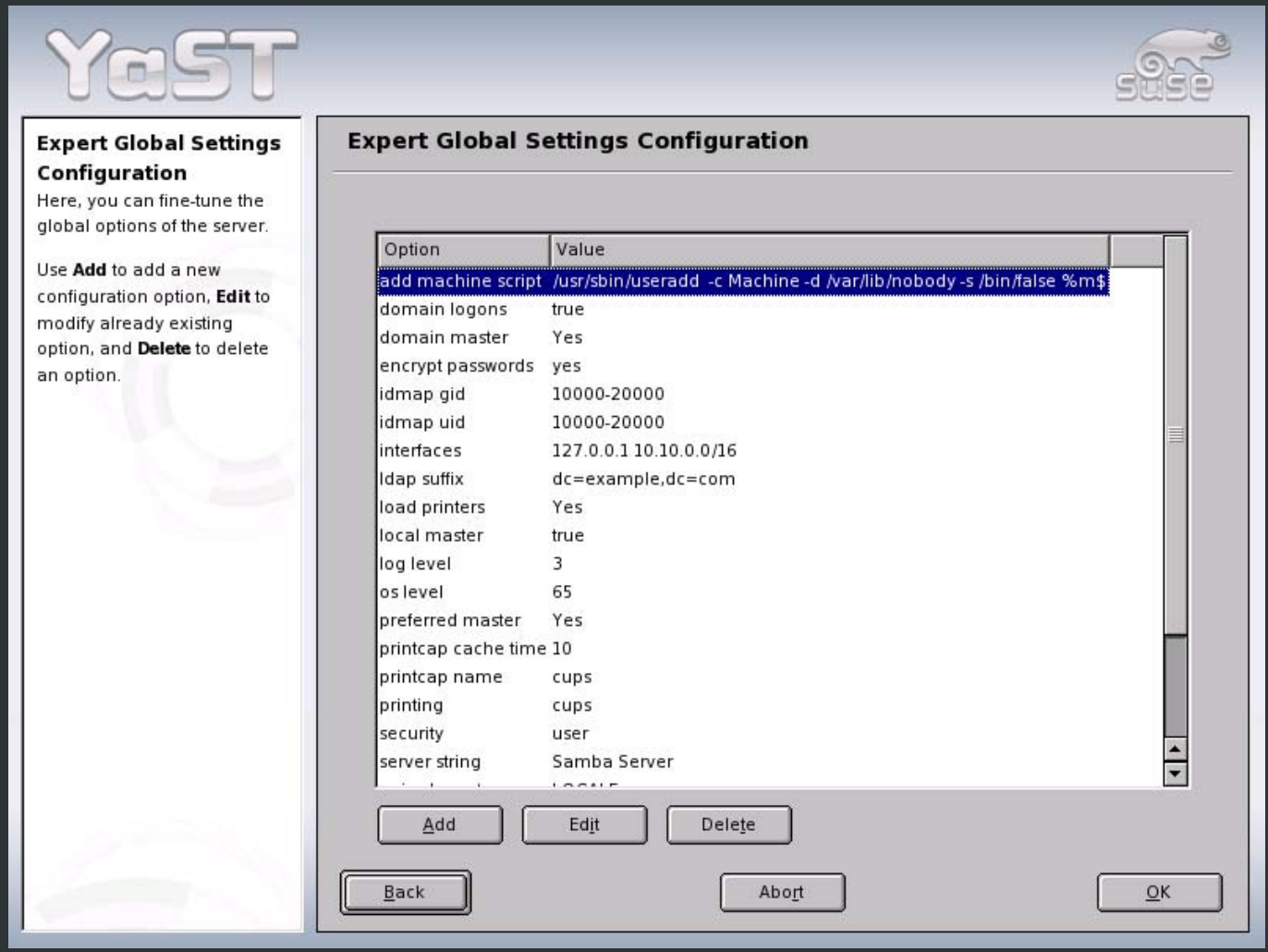
Demo Screenshots

Novell.

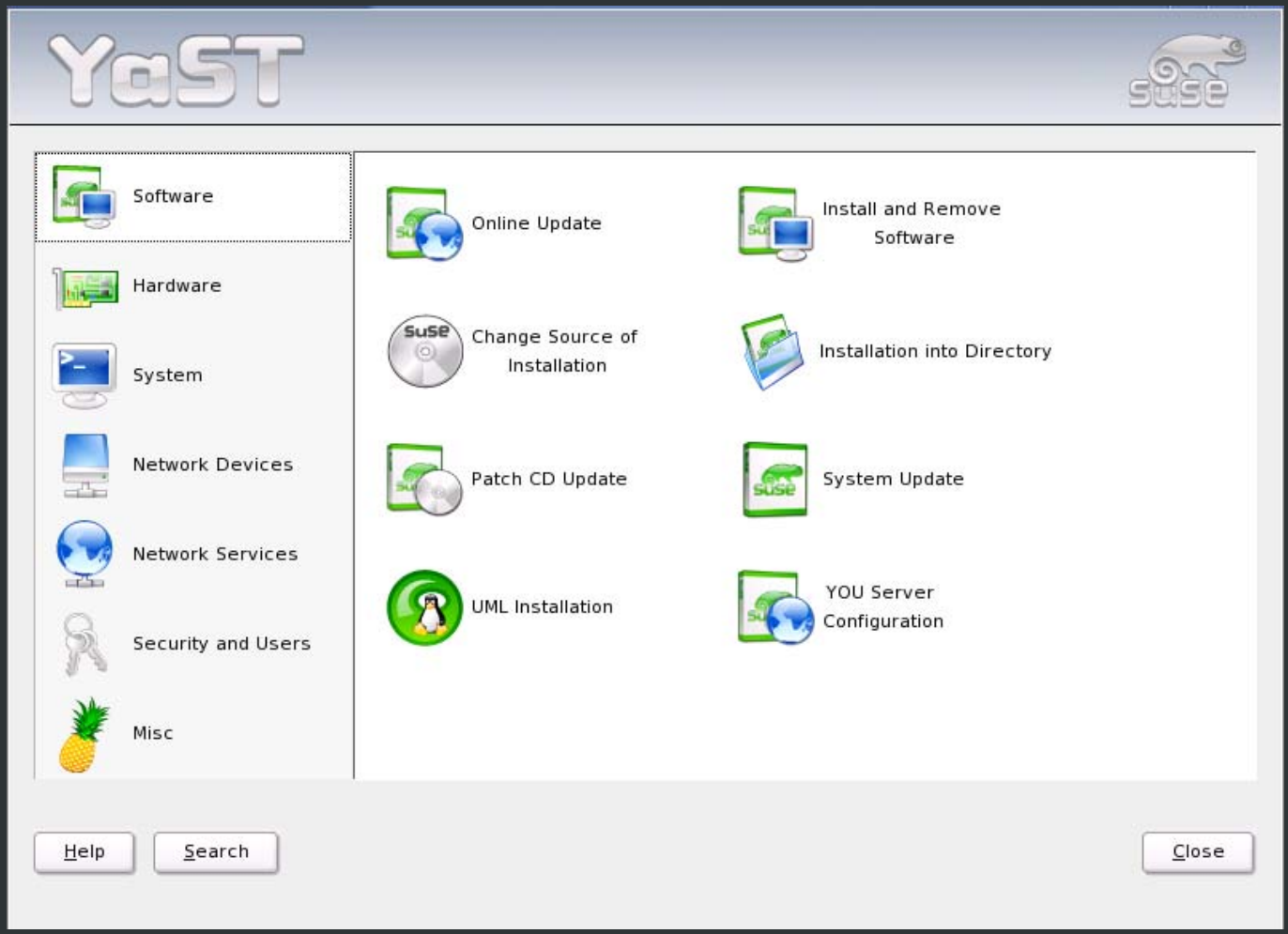


Installing SUSE LINUX Enterprise Server is easy - often in just 3 mouse clicks!

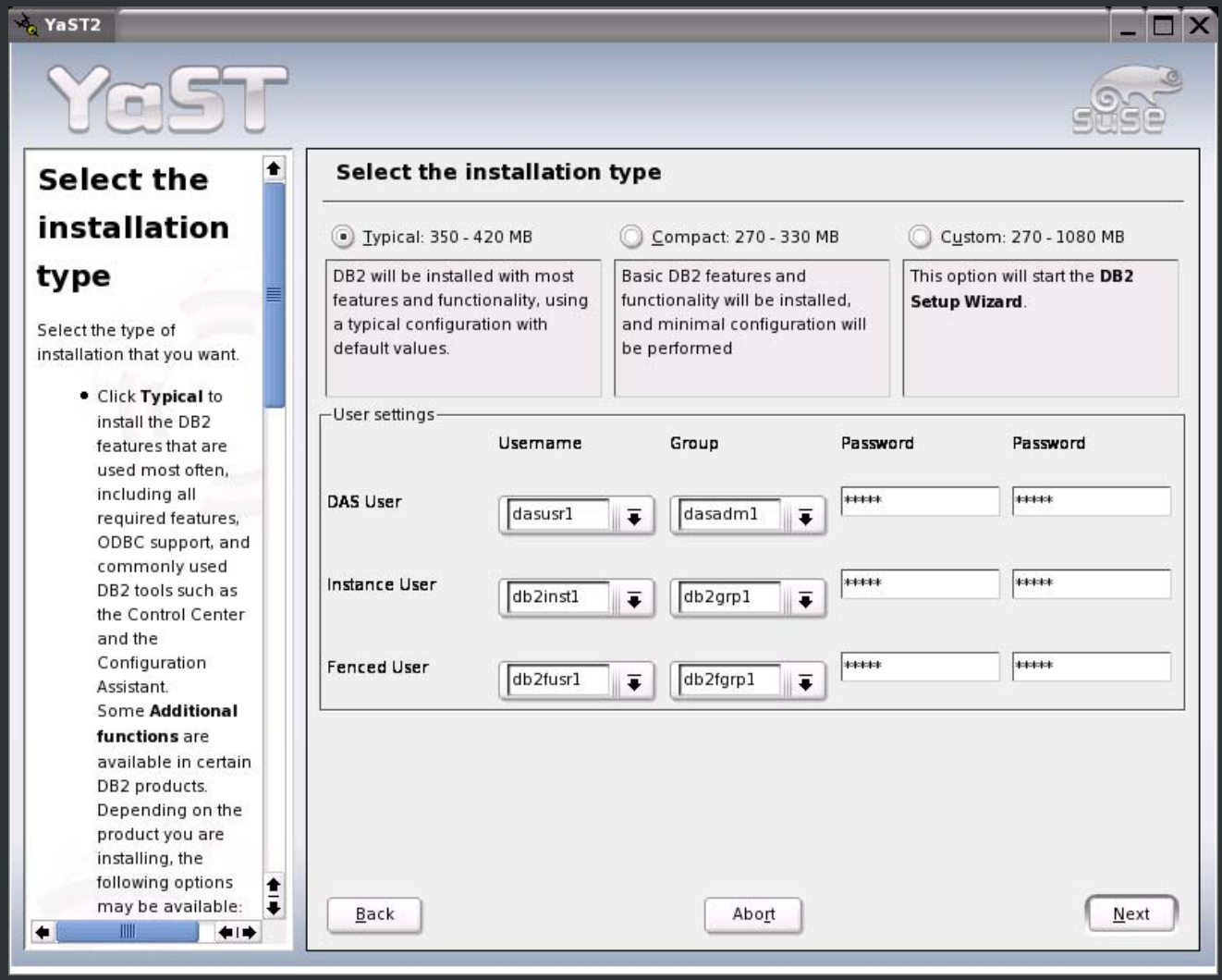
SUSE LINUX Enterprise Server 9 is easy to setup and easy to use. The YaST installer guides systems administrators through the process of configuring the system and installing the software. Installing SUSE LINUX Enterprise Server 9 can also



YaST provides an intuitive management console and uniform API for configuring virtually any OS component or service, such as samba, apache or even clustering.



Getting access to the latest system updates can be performed on an individual system using YaST Online Update (YOU) or in a managed fashion using Novell ZENworks Linux Management.



ISVs applications, such as IBM DB2, can be managed using YaST.

General Disclaimer

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