SHARE Anaheim 2011
SUSE Linux Enterprise Server
for IBM System z

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Session 8483

2011-02-24

Novell®

Overview

Product lifecycle & value

SLES for System z specific features

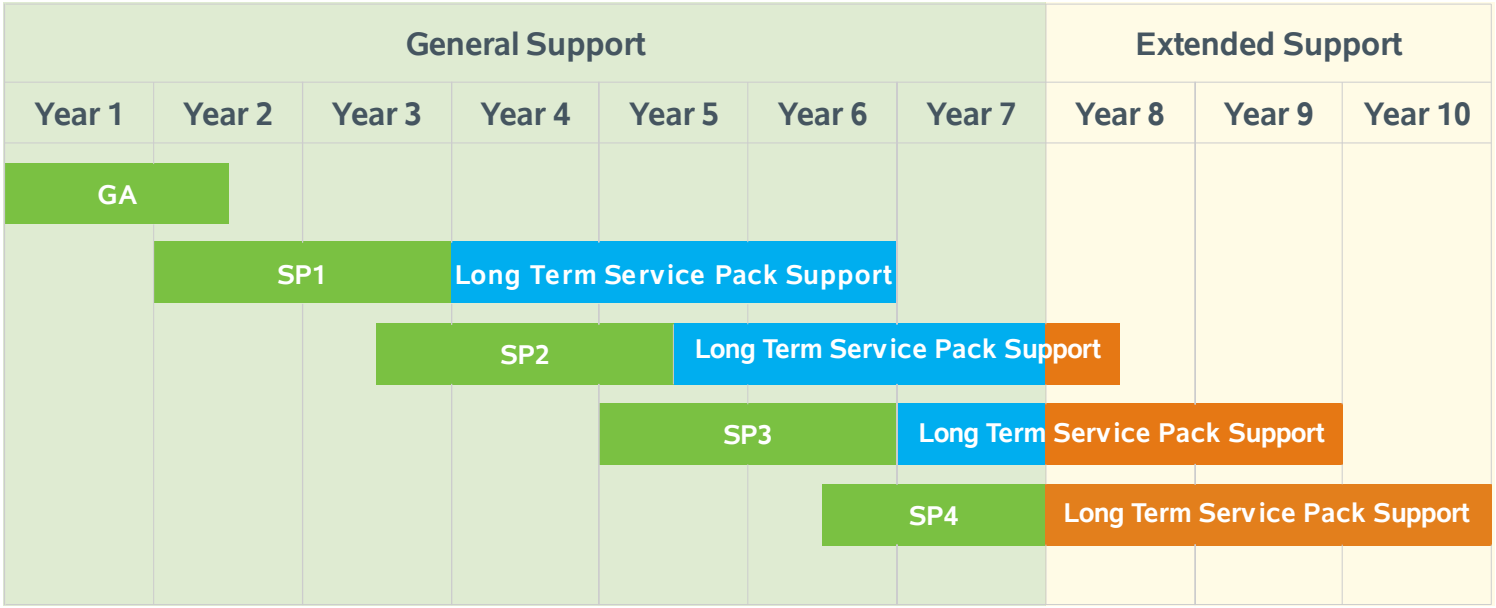
Complementing Technologies

SUSE Linux Enterprise

The most interoperable platform for mission-critical computing, both physical and virtual—from the desktop to the data center

Product Lifecycle & Value

SUSE Linux Enterprise
Standard Platform Lifecycle



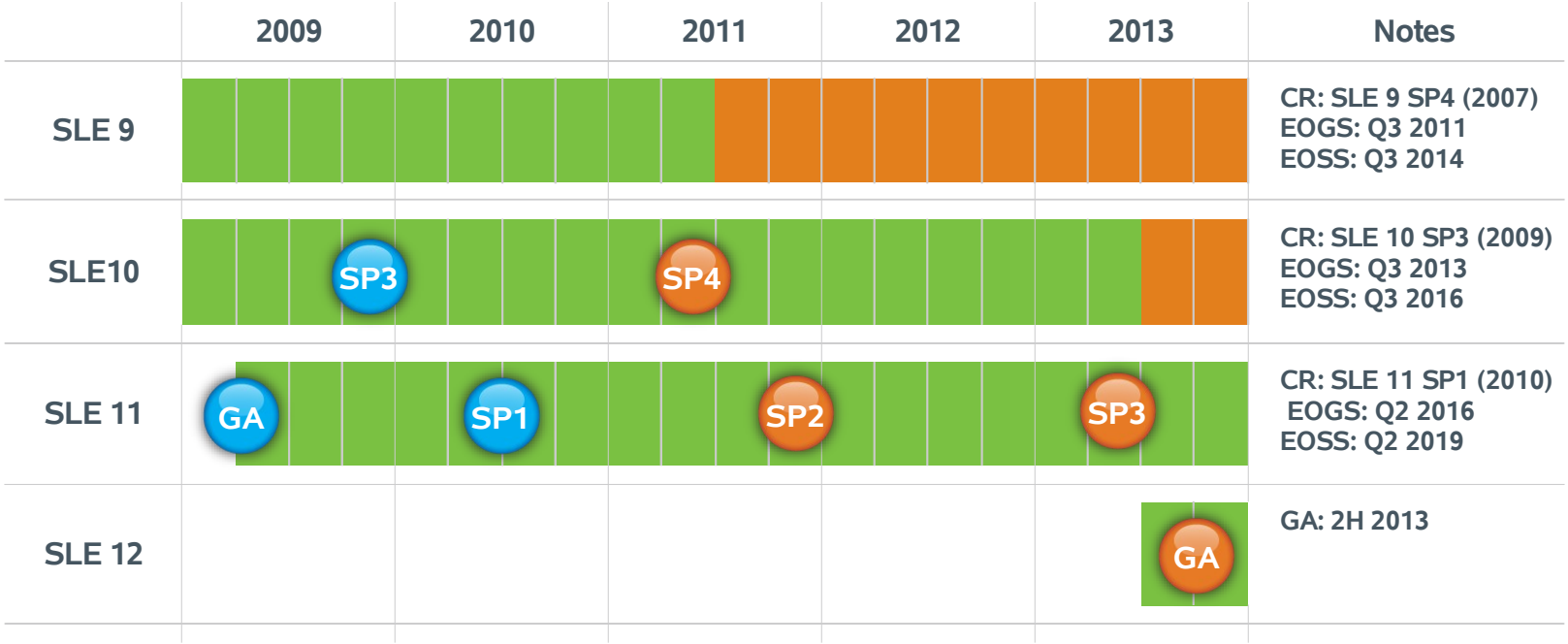
10-year lifecycle (7 years General Support, 3 years Extended Support)

Service packs every 16-18 months, major release every ~ 4 years

Six month upgrade window

Long Term Service Pack Support – extend upgrade window or extend major release lifecycle

SUSE Linux Enterprise
Current Platform Lifecycle

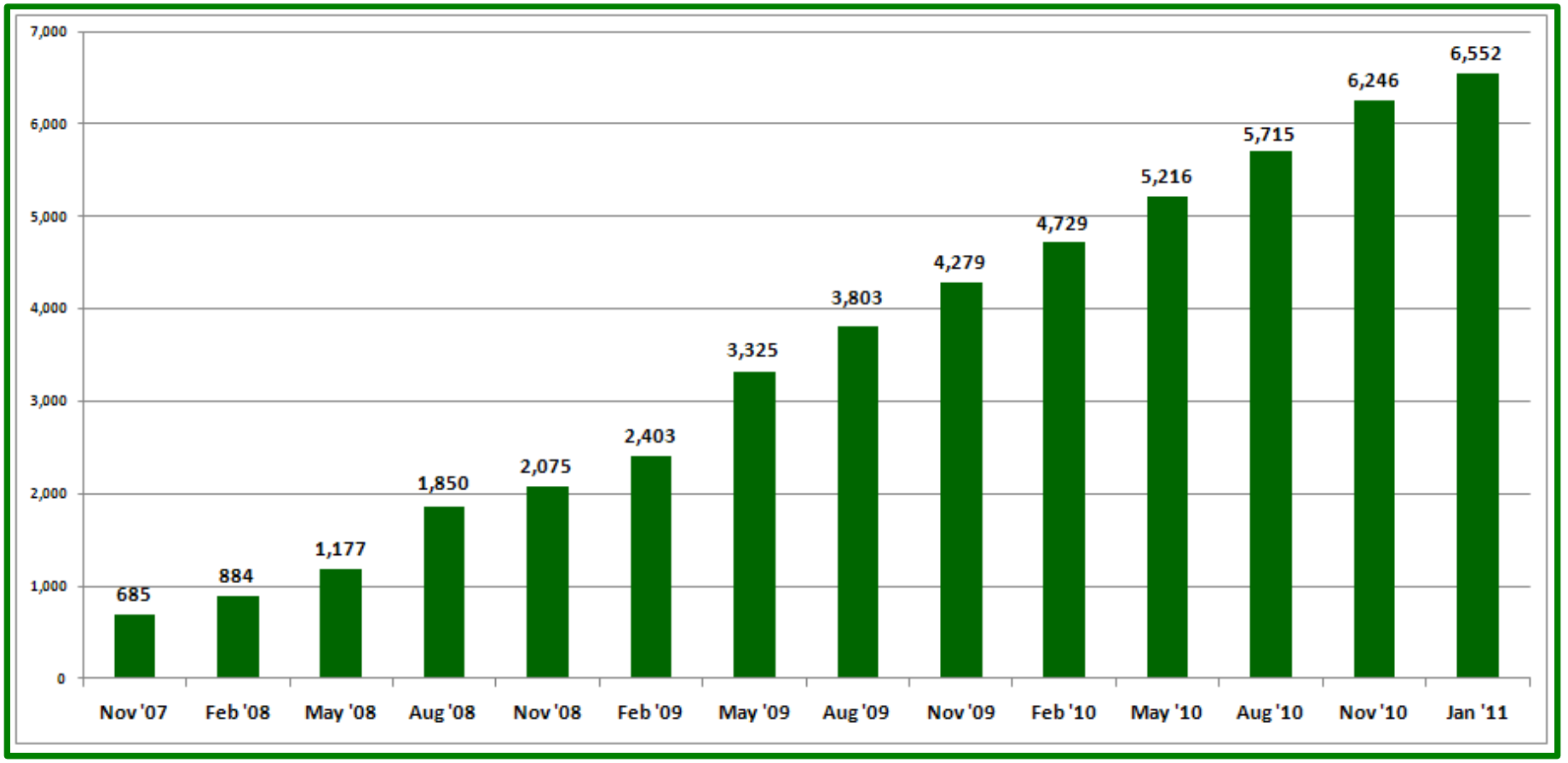


Novell announces Service Pack releases and development and product schedules to customers and partners

Dependable release timing

Predictability for planning rollouts and migrations

SUSE® Linux Enterprise (v9+)
Catalog Application Count by Quarter



Novell ISV catalog: www.novell.com/partner/isv , ~1.750 System z specific applications Jan '11

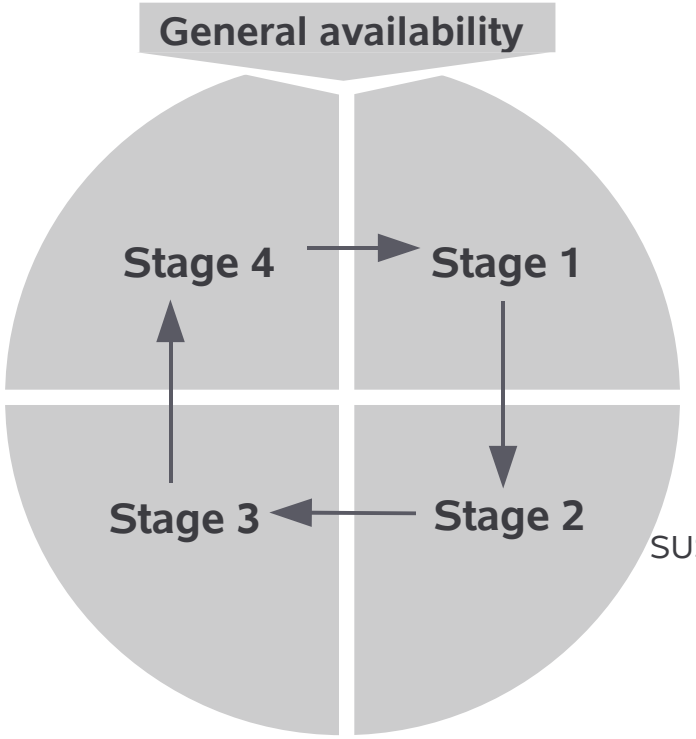
Includes applications on SLE 9, 10 and 11

SUSE Linux Enterprise
Maintenance & Support Process

Maintenance

Support

Level 3 support incident
(level 1/2 support identifies customer problem as level 3)



Stage 4:
Customer implements new patch level (via Maintenance Web)

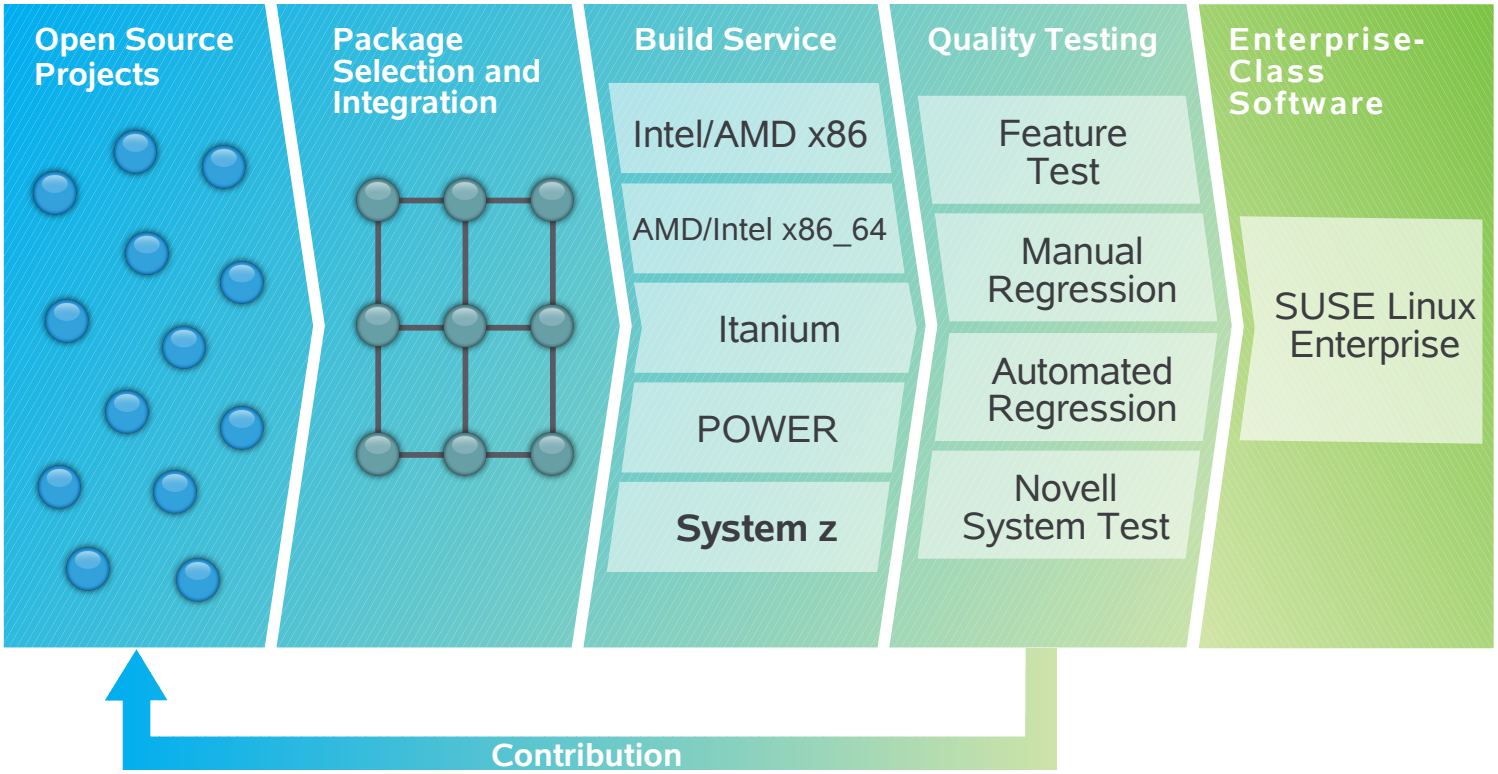
Stage 1:
Program Temporary fix (PTF) (Level 3 support makes PTF available to customer, enabling continued productive system utilization)

Stage 3:
SUSE Linux Enterprise - certified patch becomes part of the product (Delivery of new patch level to customer)

Stage 2:
SUSE Linux Enterprise engineering develops product-compliant patch from the PTF

(SUSE Linux Enterprise engineering handles certification of the patch, quality assurance)

Differentiators - Technology
The Build Service* Advantage



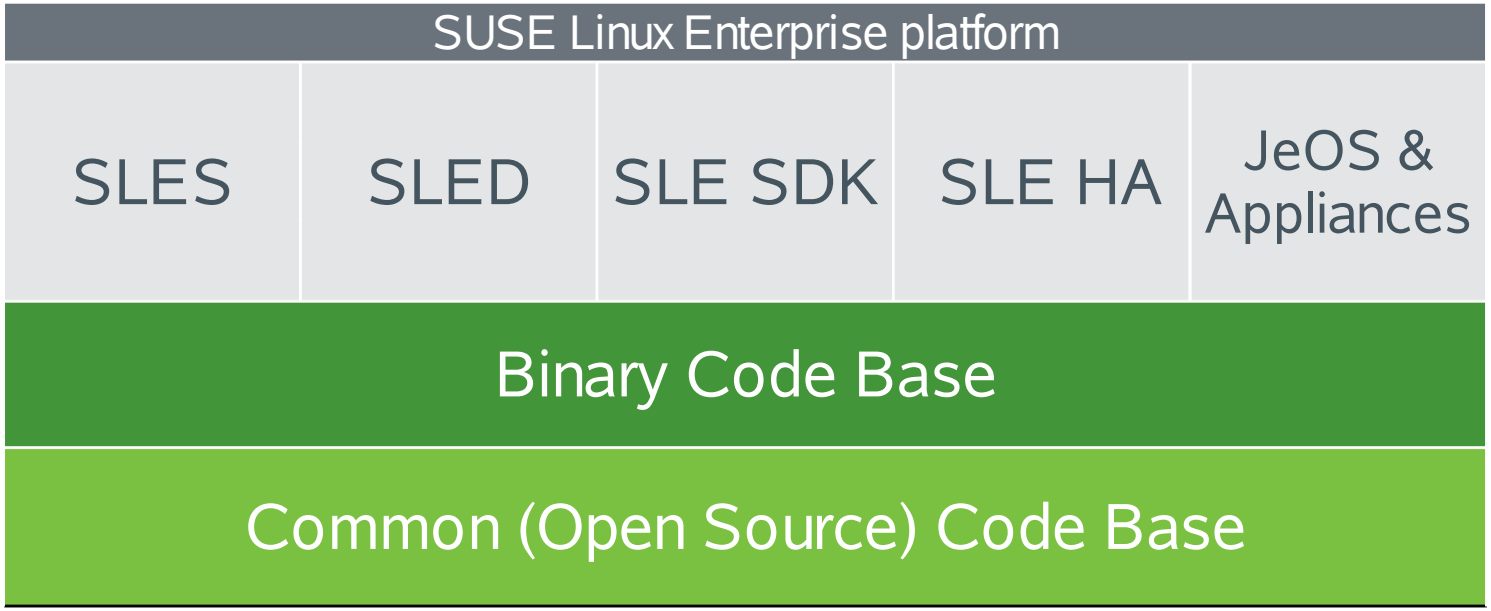
Reduces production problems

Consolidates IT skills across disparate systems

Delivers critical updates in hours – not days or weeks

* Build Service is the internal entity of the openSUSE BuildService infrastructure

SUSE® Linux Enterprise
Common Code Base



Foundation for SUSE Linux Enterprise products

Fully supported core system: L3 support commitment

SUSE® Linux Enterprise Server
Unique Tools

Package Management Subsystem

ZYpp, ZYpper, libzypp

Integrated Systems Management

with YaST, AutoYaST, WebYaST

Subscription Management Tool Hosting on System z

Local package proxy tightly integrated with NCC included at no cost

Secure centralized deployment within firewall, reduced bandwidth needs

Starter System for System z

Pre-built installation server — facilitates installation of SUSE Linux Enterprise Server for System z on a z/VM system

Easily initiate evaluations of SUSE Linux Enterprise Server for System z

Differentiators – Unique Tools
YaST, AutoYaST, WebYaST

YaST installation and configuration management framework

Unified and consistent single interface to all systems management tasks via modules

Configure every aspect of the server

Enhanced YaST Partitioner

CIM Standard adopted

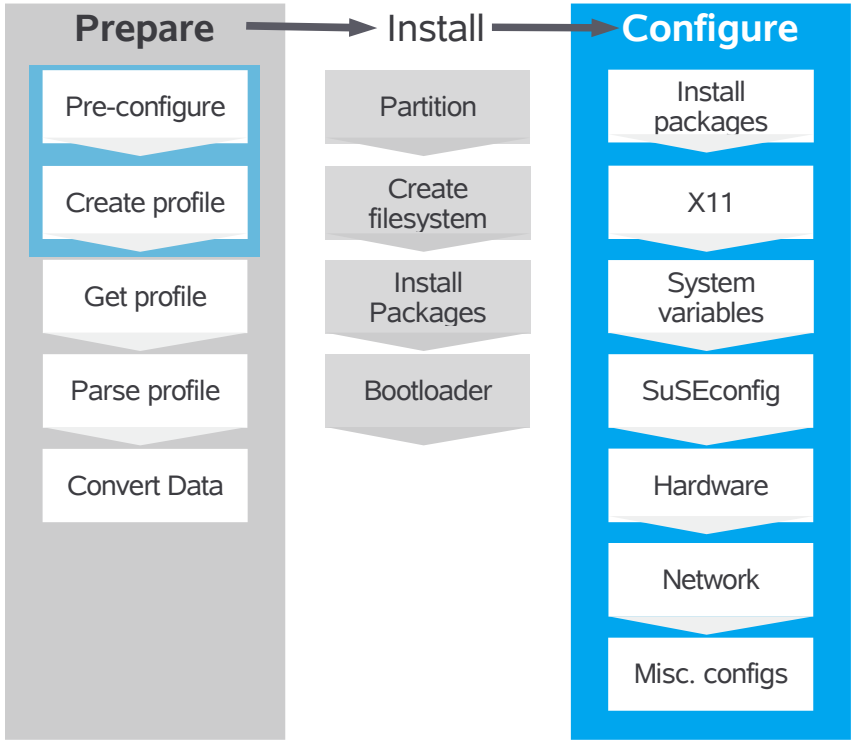
AutoYaST auto-installation

A tool for installing SUSE® Linux Enterprise on systems with as much (or little) automation as you want

Works in networked and non-networked environments

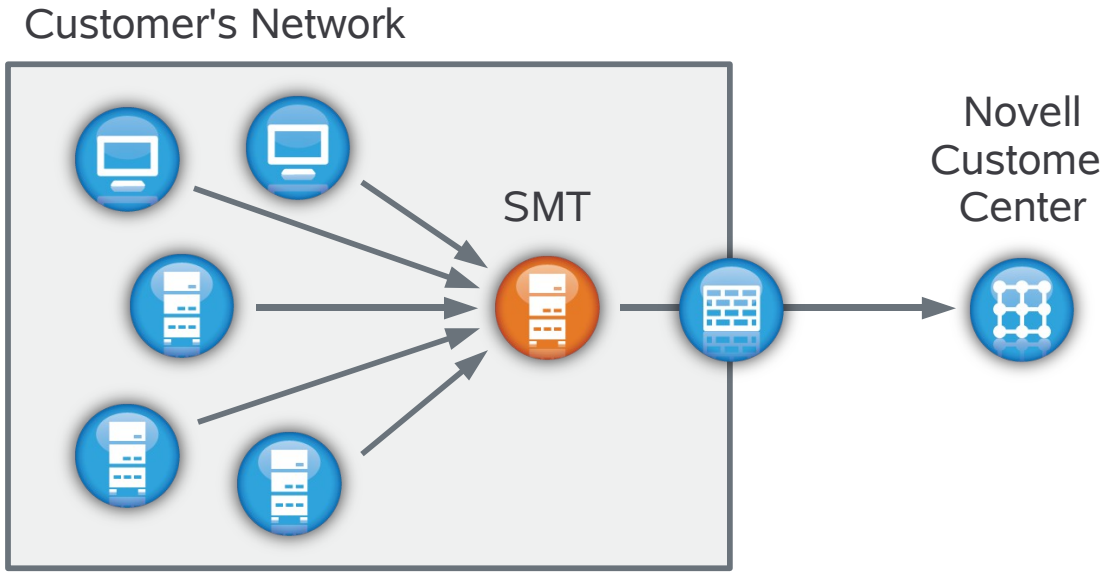
Very flexible, very scalable, easy to use

WebYaST



Subscription Management Tool
Overview

SMT is a proxy and auditing tool that mirrors the Novell® Customer Center and tightly integrates with it. It allows you to accurately register and manage an entire SUSE® Linux Enterprise deployment, guaranteeing the subscription compliance and secure IT process flow organizations require.



SUSE® Linux Enterprise 11 Service Pack 1
Security and Certifications Today

- System architecture with security in mind: customers are guided to install in a secure way:
  - Minimize number of running daemons (services)
  - Firewall installed in default pattern
- System is hardened by default, hardening can be validated and tuned using YaST Security Center
- Built-in audit capabilities: security analysis/compliance
- Security team/response team/code reviews
  - Active participation of the Novell® SUSE Team: improve overall code quality and security
- Application confinement with AppArmor
  - Prevent local and remote attacks
  - Improves security also towards external networks
- Check integrity of systems on file level with Advanced Intrusion Detection Environment (AIDE)

SUSE® Linux Enterprise 11 Service Pack 1
Security and Certifications Today

Help customers improve network security by:

Using the enhanced authentication capabilities of NFSv4 (Kerberos)

Installing Virtual Private Networks (VPNs) across architectures and operating systems without additional software (using openVPN or IPSec)

Protect systems and data using encryption on several levels:

“Full Disk” encryption (device mapper layer)

Volume encryption (device mapper layer)

Filesystem encryption (eCryptFS)

Filesystem POSIX capabilities allow administrators to allow access to files and running executables in a standardized way

Certifications

- Carrier Grade Linux 4.0 registration: validated for telecos (x86_64)
- IPv6 (refresh)

Support of cryptographic acceleration cards
to improve the speed of ssl connection and
free the IFL/CP for other workload.

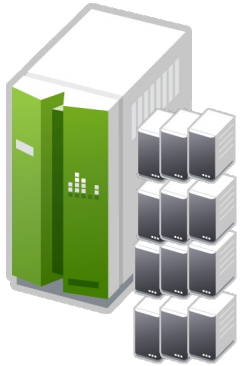
SUSE Linux Enterprise 10 SP4

- Hardware Enablement (all architectures)
  - Selective Driver Updates on explicit Partner, OEM and Customer request
  - "evolutionary", all old hardware remains supported
  - System z: Updates according to Business needs
  - Hardware enablement (selective)
- Kernel ABI
  - no change, to keep certifications for third-party kernel modules
- Consolidation of Maintenance Updates
- GA planned for Q2 2011

SUSE® Linux Enterprise Server 10 for System z
New Features in Service Pack 4

Targeted features

309805 FICON - HyperPAV enablement – kernel
309796 Recompile openSSH to enable HW Crypto
309846 zipl integration of device mapper devices (s390-tools)
309789 Optimized Latency Mode (OLM) toleration
309790 Dump on panic - Prevent reipl loop (s390-tools)
309791 snIPL enhanced to trigger SCSI dump on remote container
309795 31bit compat library for c++ Boost



FICON – Hyper PAV enablement

Fate 304066 / [LTC 201000]

http://www.ibm.com/developerworks/linux/linux390/kernel-2.6.25.html -> HyperPAV

Device Drivers, Features, and Commands as available with SUSE Linux Enterprise Server 11 p.19ff

z I/O feature exploitation: sustained I/O performanceimprovements exploiting Parallel Access Volume (PAV) support for disk storage access, leads to significantly reduced configuration efforts as opposed to static PAV setups, system will dynamically self optimizing its I/O configuration.

Customer benefit

technical	**business**
• Less configuration overhead, better IO performance, reduced responcse times • Improved hardware utilization	• Improved response times for services bound to IO (like databases) • Better storage IO resource exploitation • Higher VM consolidation ratios

SLES	**10**	**11**
GA	-	**yes**
SP1	-	**yes**
SP2	-	n/a
SP4	**yes**	n/a

openSSH exploitation of hardware accelerated crypto card

Fate 309796 / [LTC 63611]

http://www.ibm.com/developerworks/linux/linux390/development_recommended.html -> Crypto Express3

Exploitation of Crypto Express3 Accelerator (CEX3A) and Crypto Express3 Coprocessor (CEX3C): hardware based acceleration for encrypted network connections, eg. ssh or scp sessions, or https transfers.

Customer benefit

technical	business
Offload cyles to the crypto adapter, reduces cycles in user space, increases network connection throughput	More cycles left for workload, better exploitation of available hardware

SLES	10	11
SP1	-	**yes**
SP2	-	n/a
SP3	-	n/a
SP4	**yes**	n/a

Category: Performance

Complementing Technologies

Unique Offerings

SUSE Linux Enterprise High Availability Extension

- Delivers all of the essential monitoring, messaging and cluster resource management functionality of proprietary third-party solutions

AppArmor Linux Application Security Framework

- Easy to use GUI tools with static analysis and learning-based profile development
- Create custom policy in hours, not days

SUSE Linux Enterprise Mono Extension

- Consolidate Windows workloads to System z - use Mono to develop .NET applications for System z

SUSE® Linux Enterprise High Availability Extension
What's New in Service Pack 1

	GA	SP1
Continuous data replication	Distributed replicated block device (DRBD)	Improved DRBD that supports data compression and simultaneous 3 node synchronous / asynchronous replication cmirrord (SAN-based cluster-concurrent RAID1, live storage migration)
GUI and CLI tools	Graphical user interface Unified command line interface YaST modules for DRBD, OpenAIS and multipath	Web GUI Cluster Test Drive (simulator) YaST2 module for load balancer Cluster aware configuration sync (eases management) Extended documentation
Resource agents	For third party apps - SAP, IBM WebSphere, DB2, Informix, Oracle and VMware	Agents for DRBD, postfix, squid, libvirt, iSCSI and SAP
Virtualization aware	For many open source apps Xen aware cluster resource manager	Support for CTDB (clustered Samba) OCFS2 “reflinks” (cluster-wide snapshots, fast and space-efficient VM cloning, backup), KVM support (x86,x86_64)

SUSE® Linux Enterprise High Availability
Scalable Samba Cluster

What?

Multiple active Samba nodes with a shared storage of 16 TiB and beyond

Why?

Highly available CIFS server with huge storage demands

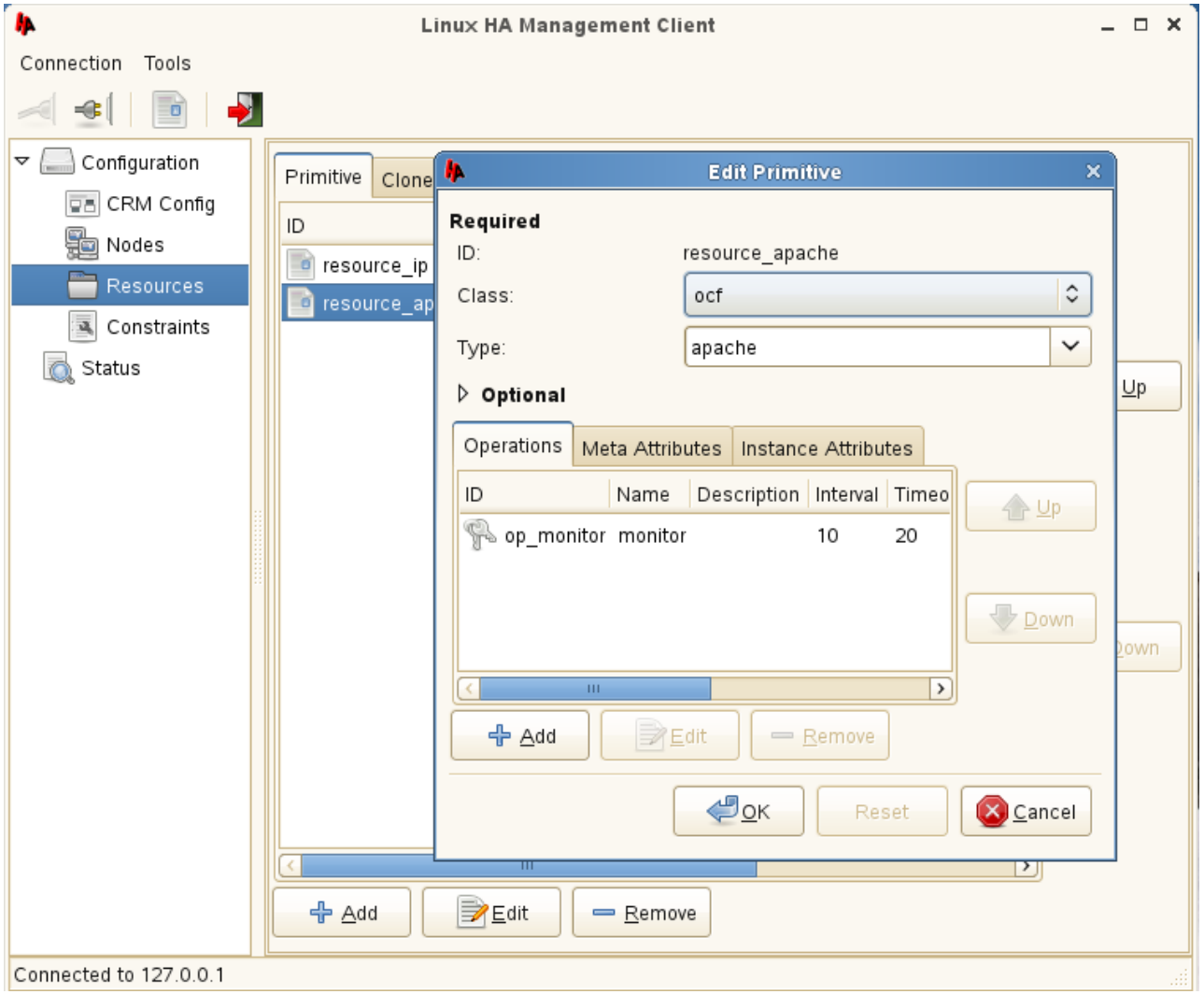
How?

Integrate Samba (cluster-tdb interface) with ocfs2 cluster filesystem

When?

TODAY!

SUSE® Linux Enterprise High Availability Extension
Features – HA GUI



AppArmor Security

Creates firewall around any Linux program (custom, open source, third party)

Prevents the exploitation of unknown or undiscovered application vulnerabilities

Easy to use GUI tools with static analysis and learning-based profile development

Default policies included

Create custom policy in hours, not days

SUSE® Linux Enterprise Mono® Extension

The open source implementation of the .NET
application framework that allows you to run .NET-based applications on SUSE Linux Enterprise Server

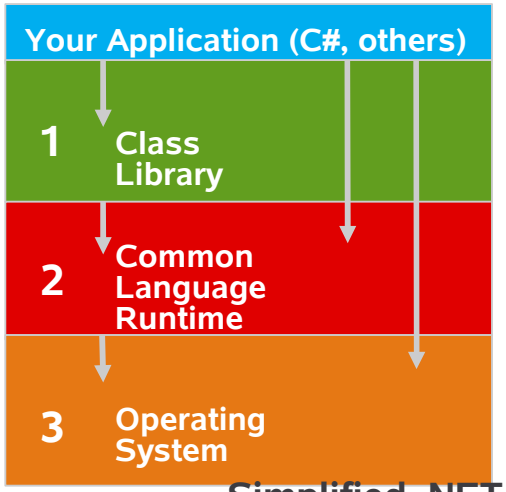
Advantages

Run .NET applications on Linux (including ASP.NET)

Mainframe support for .NET applications

Performance and scalability advantages Windows

Target Linux from Visual Studio



Simplified .NET Architecture

Develop anywhere – Deploy anywhere

Includes a toolchain for Linux

Runtime is binary-compatible with .NET on Windows

Technologies Outlook

SUSE® Linux Enterprise
Reliability Future

Enable customers to run SUSE Linux Enterprise systems “uninterrupted”:

Kernel patching without reboot (using technology such as “ksplice” or similar approaches)

Snapshot / rollback for full system (based on btrfs)

SUSE® Linux Enterprise
Snapshot – Rollback

What?

Enable customers to rollback changes to the system, which have been unwanted (administrator error) or did show unwanted results or side effects

Why?

Improve reliability and overall uptime of systems in Mission Critical environments

How?

Build an interface between ZYPP and btrfs

When?

SUSE Linux Enterprise Server 11 Service Pack 2

SUSE Linux Enterprise
The btrfs (better fs) filesystem

- Integrated Volume Management
- Support for copy on write
- Powerful snapshot capabilities
- Scalability
- Other Capabilities:
  - Compression
  - Data integrity (checksums)
  - Desktops: SSD optimization (MeeGo has chosen btrfs as default)
- Technology preview in SLE 11 SP1, support planned for SLE 11 SP2, default in SLE 12.

Appliances for z: Studio & kiwi

SUSE Studio

SUSE Studio is a service that makes it possible to create customized software appliances by combining your software with the SUSE Linux Enterprise operating system.

http://susestudio.com/
http://www.novell.com/promo/home/susestudio.html
http://www.novell.com/products/suse-appliance-toolkit/

SUSE® Linux Enterprise
Virtualization, Appliances and Beyond

SUSE Linux Enterprise Sever

Drives SUSE Studio

- Fast and simple creation and testing of SLES based appliances
- Build an appliance in many formats, incl. virtual appliances for KVM, Xen, VMware, Hyper-V, OVF and Amazon EC2
- Extensive use of virtualization (build, test drive) internally

Is key to the SUSE Appliance Program

- The easiest way for partners and enterprise to build, test, get to market, and manage virtual and software appliances
- Platform, tools to build, manage and update appliances

Is a foundation for Intelligent Workload Management

- Workloads as appliances, deployed virtualized or in the cloud
- Virtualization management tools, Platespin® Orchestrate

Kiwi Planned Image Types

Virtual disk images (vmx)

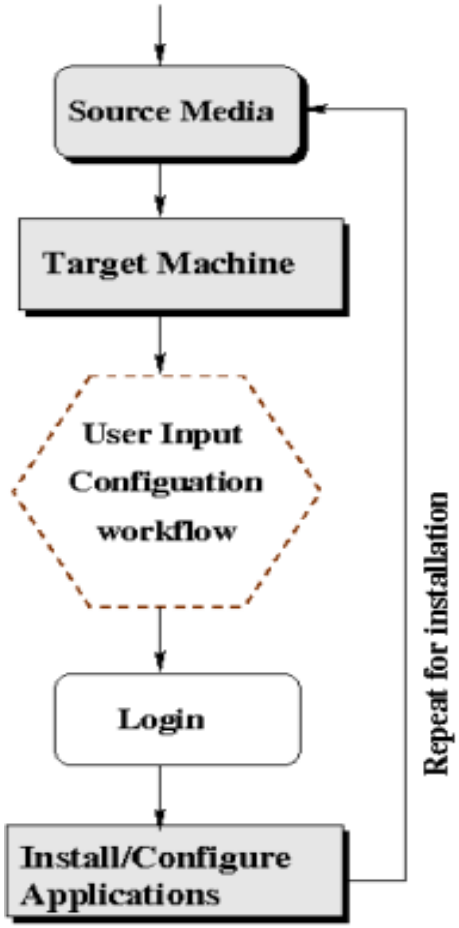
Virtual disk OEM images (oem)

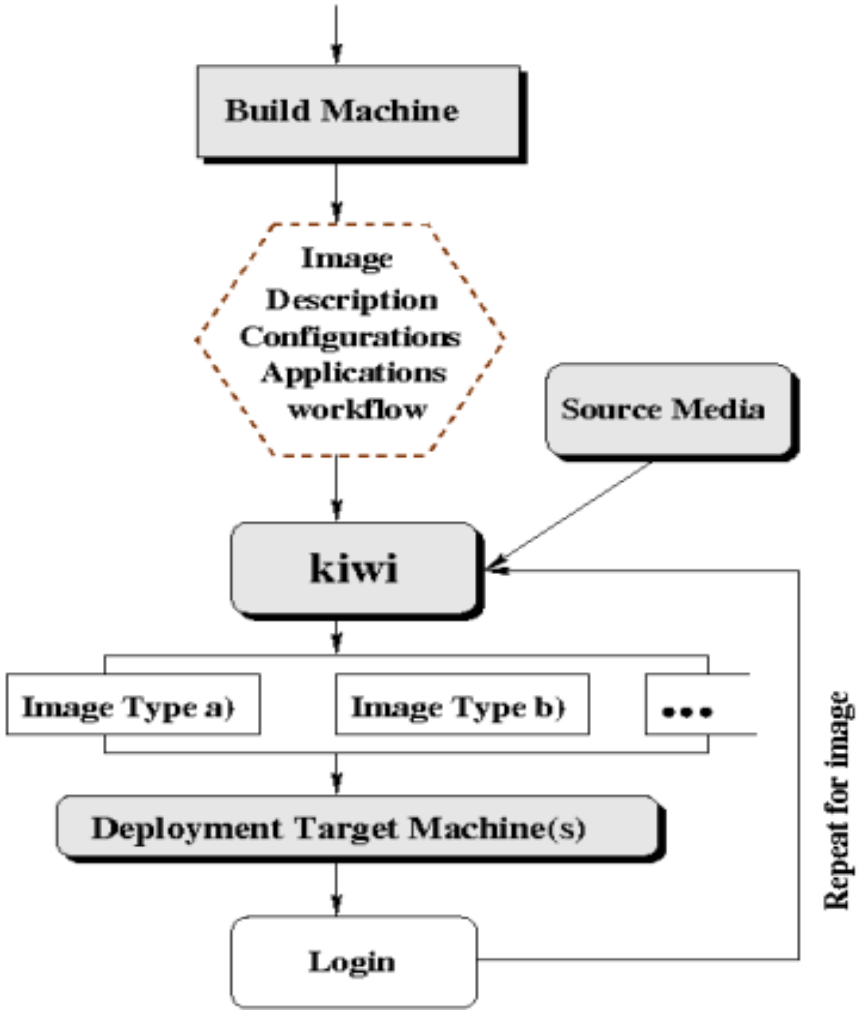
- Ability to repartition to the real disk geometry

Supported s390 disk types

- Virtio disk together with KVM
- DASD disk together with z/VM and/or LPAR
- SCSI disk together with z/VM and/or LPAR

Image build process





Creating a z/VM / DASD oem image

kiwi --create /kiwi/kiwi-sle11 -d /kiwi/mytest \
--type oem --targetdevice **/dev/dasdc**

a DASD disk device is required to create an image. This is because the blocksize of the loop device kiwi normally operates on is not suitable for the blocksize of dasd devices

#cp ipl 0530

#cp vi vmsg 1

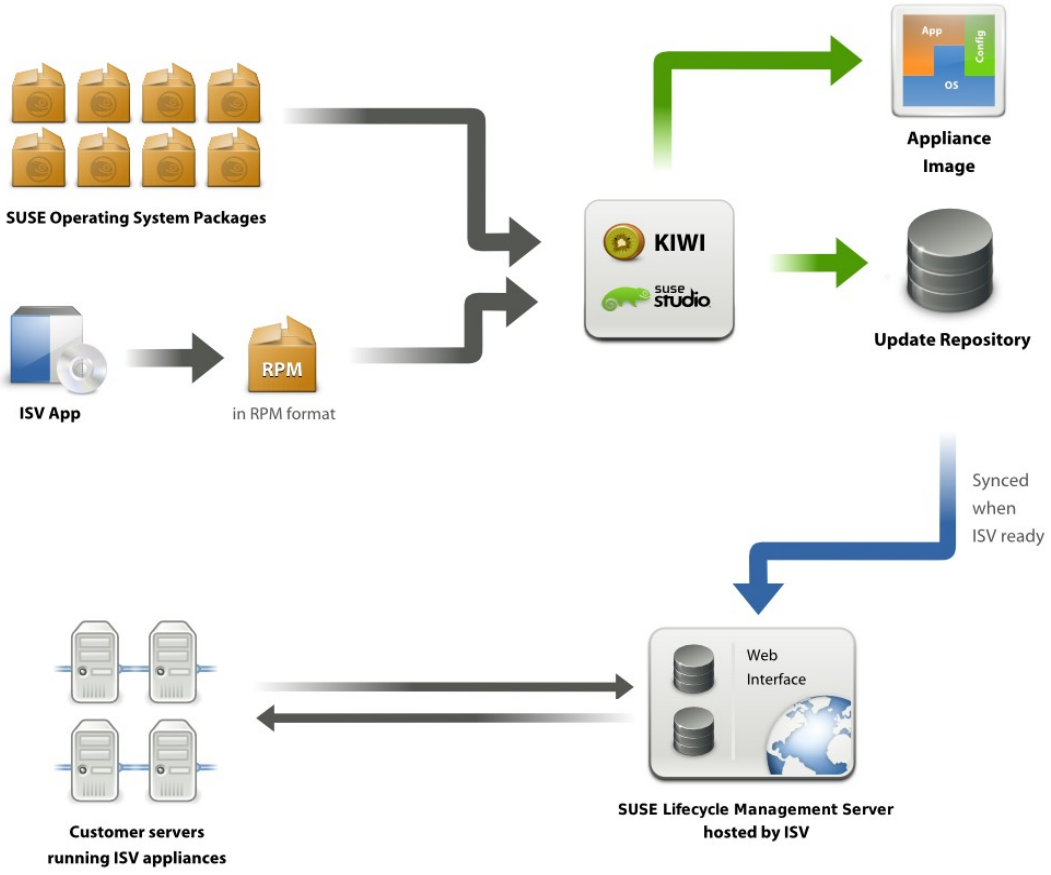
dd if=LimeJeOS-SLE11.s390x-1.1.0.raw
of=**/dev/dasdd** bs=32k

#cp ipl 0540

#cp vi vmsg 1 busid=0.0.0540

SUSE Studio, WebYast, Lifecycle Management

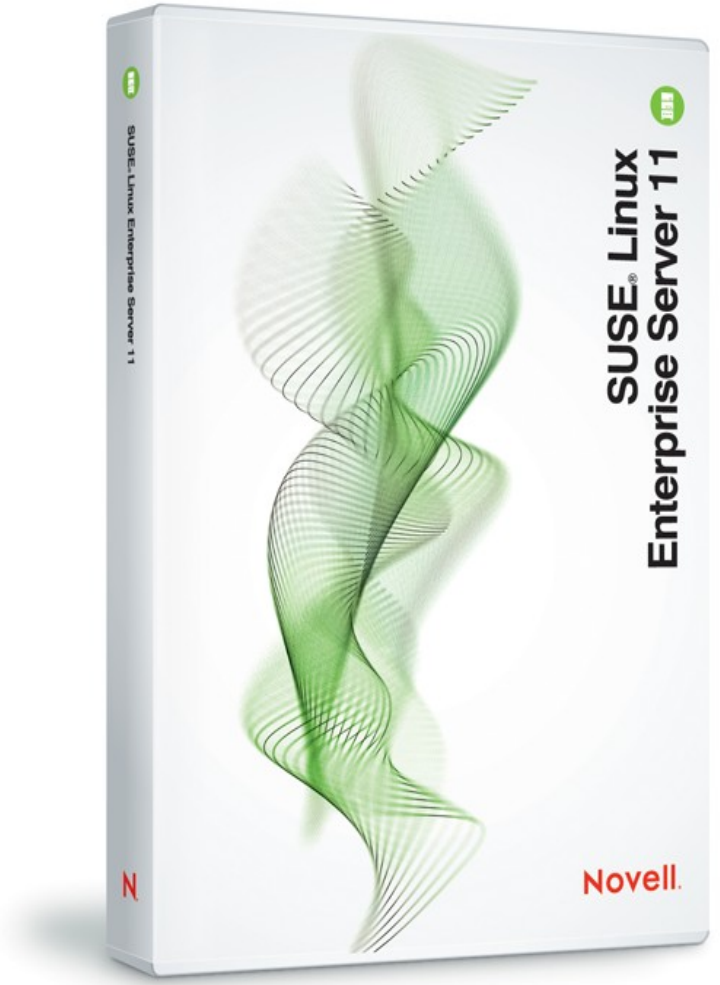
SUSE Studio + Webyast + Lifecylce management allows customers and ISVs to create and maintain customized software appliances.



SUSE® Linux Enterprise Server

A highly reliable, scalable and secure server operating system, built to power both physical and virtual mission-critical workloads.

An affordable, interoperable and manageable open source foundation that enterprises can use to cost-effectively deliver core business services, enable secure networks and easily manage their heterogeneous IT resources, maximizing efficiency and value.




Novell®

SUSE Linux Enterprise Server for System z
Resources – Web Pages

Product Website:
http://www.novell.com/products/systemz

Promotion Website:
http://www.novell.com/mainframe/els

Starter System for System z
http://www.novell.com/partners/ibm/mainframe/starterpack.html

Download SUSE Linux Enterprise Server for System z
http://www.novell.com/products/server/eval.html

SUSE® Linux Enterprise
Documentation and Release Notes

Product Pages

http://www.novell.com/mainframe

http://www.novell.com/products/highavailability/

http://www.novell.com/products/mono/

Unix to Linux Migration

http://www.novell.com/linux/unixtolinux/

Documentation

http://www.novell.com/documentation/suse.html

Product Life-cycle

http://support.novell.com/lifecycle/linux.html

Release Notes

http://www.novell.com/linux/releasenotes/

Starter System for System z

Historically, one of the biggest hurdles to implementing Linux on the mainframe has been gaining network access to the installation media from the mainframe (Installation routine cannot access built-in DVD reader, Firewall rule changes needed)

SUSE Linux Enterprise Server Starter System for System z is a pre-built installation server — facilitates installation of SUSE Linux Enterprise Server for System z on a z/VM system

Eliminates the network access hurdle to try out Linux on the mainframe — gaining network access to the installation media from the mainframe
Allows customers with little or no Linux or z/VM experience to initiate evaluations of SUSE Linux Enterprise Server for System z

http://www.novell.com/partners/ibm/mainframe/starterpack.html

Consolidation of .net workloads ? !

www.redbooks.ibm.com/redbooks/pdfs/sg247727.pdf

18

Mono Extensions and Microsoft .NET migration

This chapter discusses early experiences in installing and using Mo
Because of the wide use of .NET, there are millions of developers w
experience building applications in C#. There are benefits to choosi
application development, as explained here.

Note that this chapter simply presents an overview of this subject, b
authors did not personally have in-depth experience with Mono or w
Framework. However, this subject is presented here because it is re
topic of migrating to Linux on System z and to current developments
industry.

Apart from that, the Attendance module worked perfectly, with all the MS.NET controls handled correctly by the Mono extensions. Figure 18-2 shows our successful application launch from the Web browser.

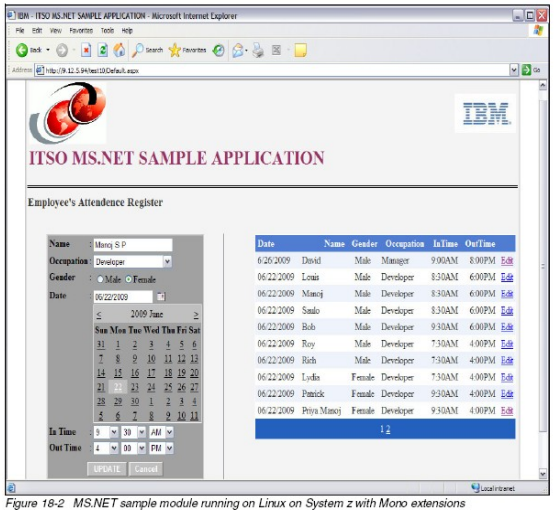


Figure 18-2 MS.NET sample module running on Linux on System z with Mono extensions

IBM

Practical Migration to Linux on System z

- Overview and migration methodology
- Migration analysis
- Hands-on migration case study

Lydia Parziale
Joseph Apuzzo
Saulo Augusto M Martins da Silva
Louis Henderson
Manoj Srinivasan Pattabhiraman
Richard Sewell

Redbooks

ibm.com/redbooks

ASP.NET on zLinux: A New Workload

Session 8473: Tuesday, March 1, 2011: 9:30 AM-10:30 AM
Room 203B (Anaheim Convention Center)

Speaker: Michael Friesenegger (Novell, Inc.)

Are you looking for a new workload to use on your zLinux guests? Mono, the open source implementation of the .NET framework, is supported on System z using the SUSE Linux Enterprise Mono Extension. This session will introduce the attendees to Mono, how to evaluate if an existing ASP.NET application can run on Mono, demonstrate the installation of the Mono Extension and test the deployment of an ASP.NET application to zLinux.

SUSE® Linux Enterprise High Availability Extension
Value Proposition and Benefits

An affordable, integrated suite of robust open source clustering technologies that you can use to implement highly available physical and virtual Linux services.

Used with SUSE Linux Enterprise Server, it helps you maintain business continuity, protect your data, and reduce unplanned downtime for your mission critical Linux workloads.

Benefits

Cost effectively meet your service-level agreements

Ensure continuous access to your mission-critical systems and data

Maintain data integrity

Increase resource utilization

SUSE® Linux Enterprise IPv6

What?

Full certification according to major standards / testing profiles

Why?

Help to drive IPv6

Interest in Telecommunications

How?

Participate in Linux industry effort to implement all major standards in Kernel and Userland (2007-today)

When?

SUSE Linux Enterprise 10 Service Pack 2: Q3/2008 (US DoD IPv6 testing profile)

SUSE Linux Enterprise 11 Service Pack 1: Q2/2011 (USGv6 IPv6 testing profile)

SUSE® Linux Enterprise vs Red Hat Enterprise Linux
Linux Kernels

SUSE Linux Enterprise Server 9 (GA 08/2004)
Kernel 2.6.5, GCC 3.3.3, Service Pack 4 (GA 12/2007)

SUSE Linux Enterprise Server 10 (GA 07/2006)
Kernel 2.6.16, GCC 4.1.0, Service Pack 3 (GA 09/2009)

SUSE Linux Enterprise Server 11 (GA 03/2009)
Kernel 2.6.27, GCC 4.3.3,
Service Pack 1 Kernel 2.6.32, GCC 4.3.4 (GA 06/2010)

Red Hat Enterprise Linux AS 4 (GA 02/2005)
Kernel 2.6.9, GCC 3.4.3, Update 8 (GA 05/2009)

Red Hat Enterprise Linux AS 5 (GA 03/2007)
Kernel 2.6.18, GCC 4.1.0, Update 4 (GA 09/2009)

SUSE® Linux Enterprise 11 Service Pack 1
Kernel Capabilities

SLE 11 SP 1 (2.6.32)	x86	ia64	x86_64	s390x	ppc64
CPU bits	32	64	64	64	64
max. # logical CPUs	32	up to 4096	up to 4096	64	up to 1024
max. RAM (theoretical/practical)	64/ 16 GiB	1 PiB/ 8+ TiB	64 TiB/ 16TiB	4 TiB/ 256 GiB	1 PiB/ 512 GiB
max. user-/ kernelspace	3/1 GiB	2 EiB/ϕ	128 TiB/ 128 TiB	ϕ/ϕ	2 TiB/ 2 EiB
max. swap space	up to 31 * 64 GB				
max. #processes	1048576				
max. #threads per process	tested with more than 120000; maximum limit depends on memory and other parameters				
max. size per block device	up to 16 TiB	and up to 8 EiB on all 64-bit architectures			
	Supported on certified hardware only				

SUSE® Linux Enterprise 11 Service Pack 1
Filesystems

Feature	Ext 3	reiserfs	XFS	OCFS 2	btrfs
Data/Metadata Journaling	•/•	○/•	○/•	○/•	N/A [3]
Journal internal/external	•/•	•/•	•/•	•/○	N/A
Offline extend/shrink	•/•	•/•	○/○	•/○	•/•
Online extend/shrink	•/○	•/○	•/○	•/○	•/•
Inode-Allocation-Map	table	u. B*-tree	B+-tree	table	B-tree
Sparse Files	•	•	•	•	•
Tail Packing	○	•	○	○	•
Defrag	○	○	•	○	•
ExtAttr / ACLs	•/•	•/•	•/•	•/•	•/•
Quotas	•	•	•	•	•
Dump/Restore	•	○	•	○	○
Blocksize default	4KiB				
max. Filesystemsize [1]	16 TiB	16 TiB	8 EiB	4 PiB	16 EiB
max. Filesize [1]	2 TiB	1 EiB	8 EiB	4 PiB	16 EiB
Support Status	SLES	SLES	SLES	SLE HA	Technology Preview

SUSE® Linux Enterprise was the first enterprise Linux distribution to support journaling filesystems and logical volume managers back in 2000. Today, we have customers running XFS and ReiserFS with more than 8TiB in one filesystem, and the SUSE Linux Enterprise engineering team is using our 3 major Linux journaling filesystems for all their servers. We are excited to add the OCFS2 cluster filesystem to the range of supported filesystems in SUSE Linux Enterprise. For large-scale filesystems, for example for file serving (e.g., with with Samba, NFS, etc.), we recommend using XFS. (In this table "+" means "available/supported"; "-" is "unsupported")

[1] The maximum file size above can be larger than the filesystem's actual size due to usage of sparse blocks. It should also be noted that unless a filesystem comes with large file support (LFS), the maximum file size on a 32-bit system is 2 GB (2^{31} bytes). Currently all of our standard filesystems (including ext3 and ReiserFS) have LFS, which gives a maximum file size of 2^{63} bytes in theory. The numbers given in the above tables assume that the filesystems are using 4 KiB block size. When using different block sizes, the results are different, but 4 KiB reflects the most common standard.

[2] 1024 Bytes = 1 KiB; 1024 KiB = 1 MiB; 1024 MiB = 1 GiB; 1024 GiB = 1 TiB; 1024 TiB = 1 PiB; 1024 PiB = 1 EiB (see also http://physics.nist.gov/cuu/Units/binary.html)

[3] Btrfs is a copy-on-write logging-style file system, so rather than needing to journal changes before writing them in-place, it writes them in a new location, and then links it in. Until the last write, the new changes are not "committed."

[4] Btrfs quotas will operate differently than traditional quotas. The quotas will be per-subvolume rather than operating on the entire filesystem at the user/group level. They can be made functionally equivalent by creating a subvolume per- user or group.

SUSE® Linux Enterprise 11 Service Pack 1
Background and Objective

Customer reality

- Most people do not apply all Maintenance Updates, but are handpicking
- Resistance to apply Service Packs quickly, start with SP1

Review of existing maintenance models (SLE9, SLE10, and others) for weaknesses and strengths.

Goals:

- Improve Customer Satisfaction
- Become more flexible with respect to maintenance updates and packages – make selective updates more easy
- Make Service Packs more lightweight – help customers to deploy Service Packs with reduced latency

SUSE® Linux Enterprise 11 Service Pack 1
Concept / Model

- All repositories are available and active
- The Service Pack repositories only contain packages specific to a Service Pack and its Themes (e.g. hardware enablement)
- Maintenance updates and selective feature updates are provided in the SLE 11 SP1 repository
- Target: >80% of all packages live in the SLE 11 SP1 repository
- Maintenance updates are not delayed, but delivered to the respective repository as soon as possible

SUSE® Linux Enterprise 11 Service Pack 1
Model and Benefit

Model

- One primary repository
- Service Packs are like “patch-sets” besides / in addition to this repository
- Service Packs are are strictly bound together by dependencies and by the separated repository

Advantages / Benefit

- Service Packs are more lightweight / easy to apply
- Handpicking is possible
- Clear dependency resolution
- No risk of inconsistent systems
- Customers are not technically forced to upgrade the entire system when deploying a Service Pack

SUSE® Linux Enterprise 11 Service Pack 1
Where do packages end up?

New package or fully compatible update, bugfixes or improvements with minor impact

→ SLE 11 SP1 repository at any time
Target > 80% of the packages

New package or fully compatible update, bugfixes or improvements with major impact or high QA need

→ SLE 11 SP1 repository together with Service Pack
Target < 5% of the packages

Change which might affect compatibility or where (new or existing) package depends on other packages in a Service Pack repository (example: X server depends on kms-module in the Linux kernel)

→ SLE 11 SP(n) repository together with the Service Pack. Target < 10% of the packages

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Maintenance Evolution