SUSE Linux Enterprise Server for System z
Current & Future Features

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SUSE          SUSE

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Session 14542

www.SHARE.org
Agenda

- SUSE Linux Enterprise Server for System z Roadmap Update

SUSE and the Attachmate Group

- **SUSE**, headquartered in Nürnberg / Germany, is an independently operating business unit of The Attachmate Group, Inc.

- The Attachmate Group is a privately held 1 billion+ $ revenue software company with four brands:
  - Cloud Infrastructure
  - Enterprise Computing
  - Integrated Systems
  - Novell
  - NetIQ
SUSE Linux Enterprise Server

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

Linux you can rely on—for years to come
Run more mission-critical applications—physical, virtual and cloud
SUSE Linux Enterprise Server 11 SP3
SUSE Linux Enterprise

Build Service*

Development Contribution

Open Source Projects
- Linux Kernel
- LibreOffice
- YaST2
- ZYpp
- Snapper
- KVM
- Xen
- OCFS2
- New Linux HA Stack
...

Package Selection and Integration

Build Service
- Intel/AMD x86
- AMD64/Intel64
- Itanium
- POWER
- System z

Quality Testing
- Feature Test
- Manual Regression
- Automated Regression
- SUSE System Test

Enterprise Class Software
- SUSE Linux Enterprise

Infrastructure Contribution

Itanium

Power

System z

* SUSE Build Service is the internal entity of the Open Build Service

- Reduces production problems
- Consolidates IT skills across disparate systems
- Delivers critical updates in hours – not days or weeks

Quality Contribution

Complete your session evaluations online at www.SHARE.org/AnaheimEval
SUSE Linux Enterprise
How We Combine It

<table>
<thead>
<tr>
<th>SUSE Linux Enterprise platform</th>
<th>Server</th>
<th>Desktop (Intel/AMD only)</th>
<th>SDK</th>
<th>HA</th>
<th>Appliances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Code Base</td>
<td>Intel/AMD 32bit</td>
<td>AMD64/Intel64</td>
<td>Itanium</td>
<td>IBM POWER</td>
<td>IBM System z</td>
</tr>
<tr>
<td>Common (Source) Code Base</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- Foundation for all SUSE products
- Fully supported core system
- Choose the right architecture for your workload
Unique Tools Included

- AppArmor Security Framework
  - Application confinement

- High Availability Extension
  - Cluster Framework, Cluster FS, DRBD, GEO-cluster*

- YaST2 systems management
  - Install, deploy, and configure every aspect of the server

- Subscription Management Tool
  - Subscription and patch management, proxy/mirroring/staging

- Starter System for System z
  - A pre-built installation server, deployable with z/VM tools
AppArmor: usr.sbin.vsftpd
/etc/apparmor/profiles/extras/

#include <tunables/global>

/usr/sbin/vsftpd {
    #include <abstracts/base>
    #include <abstracts/nameservice>
    #include <abstracts/authentication>

    /dev/urandom r,
    /etc/fstab r,
    /etc/hosts.allow r,
    /etc/hosts.deny r,
    /etc/mtab r,
    /etc/shells r,
    /etc/vsftpd.* r,
    /etc/vsftpd/* r,
    /usr/sbin/vsftpd rmix,
    /var/log/vsftpd.log w,
    /var/log/xferlog w,
    # anon chroots
    /
    /pub r,
    /pub/** r,
    @HOMEDIRS r,
    @HOME/** r
}
SUSE® Linux Enterprise
High Availability Extension

- Service availability 24/7
  - Policy driven clustering
    - Messaging and membership layer
    - Pacemaker cluster resource manager

- Sharing and Scaling data-access by multiple nodes
  - Cluster file system
    - OCFS2
    - Clustered Logical Volume Manager

- Disaster tolerance
  - Data replication via IP
    - Distributed Replicated Block Device
  - Node recovery

- Scale network services
  - IP load-balancing

- User friendly tools
  - Graphical user interface
  - Unified command line interface
Cluster Example
SUSE Linux Enterprise High Availability Extension

Network Links

VM 1
LAMP
Apache
IP
ext3

VM 2

cLVM2+OCFS2
DLM
Pacemaker
Corosync + openAIS
Kernel

Client

Storage

Complete your session evaluations online at www.SHARE.org/AnaheimEval
Geo Cluster – Setup

Site C
(Arbitrator)
boothd

Site A
Node 1
Node 2
boothd

Site B
Node 7
Node 8
boothd

Site C
boothd
btrfs
Why btrfs?

Btrfs – Features

- Scalability (16 EiB) including effective shrink
- Supports offline in-place migration from ext2, ext3
- Support for Copy on Write
- Powerful Snapshot capabilities

Other Capabilities:
- SSD optimization (TRIM support)
- Data integrity (checksums)
Technology Overview

Copy on Write

“Normal” Write

Copy on Write

FREE

FREE

FREE

FREE

AA

BB

CC

DD

AA

BB

CC

AA

BB

CC

DD

AA

BB

CC

DD

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE

FREE
Technology Overview

Subvolume

Normal Filesystem

```
/  
/usr  /opt
```

With Subvolumes

```
/  
/usr  /opt
```

SubVols

```
/  /usr  /opt
```

FSTREE
Btrfs Disk Space And Extents

In case of a Btrfs filesystem on a single underlying block device:

```
# btrfs filesystem df /
Data: total=14.50GB, used=12.20GB
System, DUP: total=8.00MB, used=12.00KB
System: total=4.00MB, used=0.00
Metadata, DUP: total=1.75GB, used=904.11MB

# df -h /
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda7        20G   14G  4.3G  77% /

Disk utilization
12.2GB + 2x 0.9GB + = 14 GB
```
Snapshots in SUSE Linux Enterprise 11 SP3
YaST2 Management

![YaST2 Management Interface]

The image shows the YaST2 Management interface with a list of snapshots and an overview of selected snapshot changes. The snapshots include details such as ID, type, start and end dates, and a brief description. The selected snapshot overview displays changes in files such as `/etc/cups/printers.conf` and provides options to restore from different snapshots.
SLES for System z 11 SP3
SUSE® Linux Enterprise Server for System z 11 SP3

• zEC12 + zBX = IBM zEnterprise exploitation continued
  - zBC12, z/VM 6.3, zBX HX5 support (blade center extension)
  - z9 EC, z10 EC, z196 EC, z9 BC, z10 BC, z114 BC support
  - Java 7 and supportive kernel enhancements
  - Flash Express SC Memory support (/dev/scm)
  - GCC 4.7 for applications targeting zEC12 processor

• Improved RAS tools and System z specific support
  - 2 stage dump & network storage sharing with compression
  - Robust disk mirroring for large pools of DASDs (MD RAID10)
  - Enhanced DASD statistics for PAV & HPF
  - IUCV terminal server client & server setup support
  - s390-tools update
zEC12 Exploitation

- Kernel support to improve Java performance (Transactional Execution)
  - Middleware & applications using Java will benefit
  - Inclusion of latest Java 7

- Storage class memory – Flash Express
  - Support for storage device: /dev/scm
  - Provides low latency and high throughput for block I/O

- Support for Crypto Express 4S cards

- Leverage Cross Memory Attach Functionality
  - Speedy middleware data exchange via shared main storage

- Backport GCC 4.7.x patches (SDK)
  - Add new instructions to the compiler (z196, zEC12)
  - Added new pipeline description to generate optimized code
Enhanced Dump Capabilities

• Two Stage Dumper framework
  - More flexible and efficient handling of dumps

• Compression of kernel dumps
  - More efficient use of disk storage, lower space requirements

• Fuzzy live dump
  - Extract current memory state of the kernel for debugging

• Allow to compare dump system with boot system
  - Did the dump occurred on the system it was IPLed?

• Add option to mkdumprd to clean up older initrd's
  - Dump and initrd handling in /boot

• FICON DASD sanity check
  - Detect path connection errors
Misc

• Enhanced DASD statistics for PAV and HPF
  - Improved diagnosis and analysis
  - Supports recommendations on the use of eg aliases

• Optimized compression library zlib
  - Enhanced to speed up Java, report generation, backup and installation

• ZYpp transaction auditing
  - Track transaction id also for client side

• libhugetlbfs support
  - Allow applications to benefit from hugetbls w/o recompile

• Enable larger shm segments than 256GB
  - Allows data bases to share larger areas
Technical Preview: KVM for s390x

• Kernel Based Virtual Machine
  - KVM (for Kernel-based Virtual Machine) is a virtualization solution for Linux on x86, POWER and z/Architecture hardware containing virtualization extensions.
  
  - It consists of a loadable kernel module, kvm.ko, that provides the core virtualization infrastructure and a processor specific module (eg. kvm-intel.ko or kvm-amd.ko)
  
  - KVM also requires a modified QEMU to connect to the I/O world of the hosting system.
  
  - Lowers the entry barrier for non-mainframe, but Linux skilled users to explore hardware and virtualization options of the mainframe
zPDT
IBM System z Personal Development Tool
https://www.ibm.com/partnerworld/page/pw_com_zpdt

• zPDT is a software-based application tool
  - IBM System z platform for ISV application development, testing, demo
  - A virtual System z architecture environment that allows select mainframe operating systems, middleware and software to run unaltered on x86 processor-compatible platforms.
  - Portable System z platform for training & education of applications and operating system environments
  - Supports openSUSE 11+, SLES 11 SP3+ x86_64, and others
  - SUSE's evaluation versions for x86_64 and s390x available at http://www.suse.com/products/server/eval.html
Developer Tools In SDK
Dynamic analysis tools

- valgrind
  - Memcheck
  - Cachegrind
  - Massif
  - Helgrind
  - DRD
  - None
  - Exp-ptrcheck
  - Callgrind

- http://valgrind.org
Lifecycle
SUSE Linux Enterprise Server 11
Lifecyle Model

- **13-year lifecycle** (10 years general support, 3 years extended support)
- **5-year lifecycle per Service Pack** (2 years general + 3 years extended support)
- Long Term Service Pack Support (LTSS) available for all versions, including GA
http://www.suse.com/lifecycle/

Product Support Lifecycle

Quick Search

SUSE Linux Enterprise Server 11

Start typing to find a product, then click to select

View Policy

Frequently Asked Questions

Choose a List

- All Products
- Products under General Support
- Products exiting General Support within 90 days
- Products under Extended Support
- Products exiting Extended Support within 90 days

Product Support Lifecycle Details

<table>
<thead>
<tr>
<th>PRODUCT RELEASE</th>
<th>GENERAL SUPPORT ENDS</th>
<th>EXTENDED SUPPORT ENDS</th>
<th>SELF-SUPPORT ENDS</th>
<th>CURRENT VERSION</th>
<th>REPLACEMENT PRODUCT</th>
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</thead>
</table>

Service Pack Release

<table>
<thead>
<tr>
<th>SERVICE PACK RELEASE</th>
<th>ICS DATE</th>
<th>GENERAL ENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE Linux Enterprise Server 11</td>
<td>24 Mar 2009</td>
<td>31 Dec 2010</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 SP1</td>
<td>02 Jun 2010</td>
<td>31 Aug 2012</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 SP2</td>
<td>29 Feb 2012</td>
<td>31 Jan 2014</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 SP3</td>
<td>01 Jul 2013</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Read more
Hardware
SUSE Linux Enterprise 12 is 64-bit

- 64-bit hardware is the future
  - 64-bit kernels only
  - Execution of 32-bit applications fully supported via 32-bit execution environment on top of 64-bit kernel

- Virtualization
  - KVM, Xen, z/VM, LPAR support (depends on architecture)
  - 64-bit host; 64-bit and 32-bit guests

- Hybrid Computing
  - Platform specific workloads, GPUs, special purpose PUs

- Device Driver Innovation
  - SUSE Solid Driver Program (SSDP)
Technology
Systems Management

• Made for Cloud
  – Integration of SLES and SUSE Cloud
  – Best Guest → Best Cloud OS

• Overhaul of network management
  – Address the increased complexity of IaaS

• Improve monitoring support

• Systemd replaces SysVinit
• Standardize bootloader to Grub2
SUSE Linux Enterprise

Continuously Running Systems (1)

- Snapshot & Rollback For Full System
- Restore the whole system to a known state that is working
- Reduce upgrade risk
- Components
  - ZYpp
  - Btrfs
  - Snapper
  - Grub2 Bootloader integration
SUSE Linux Enterprise 12

Local Systems Management – Benefits

• **Best managed** Linux operating system
  - Familiar and consistent **User Interface**
    - during installation
    - for administrative tasks in the installed system

• **Reduced training costs**
  - Fast learning curve for people new to SUSE Linux Enterprise from other Operating Systems

• **High grade of Automation**
SUSE Linux Enterprise 12
Installer

- **Reduced installation time and effort**
  - Possibility to install directly with updates thanks to early registration

- **Manual Installation**
  - Improved Workflow, no second stage
  - Network configuration at the beginning of the installation process → network connection “everywhere” during installation
  - Multiple UI options

- **Automated**
  → AutoYaST

- **Customized**
  - Write your own modules in Ruby
SUSE Linux Enterprise 12
Installer – Workflow

SUSE Linux Enterprise 11

Installation Setup → Install without updates → Wait

Reboot → Network → Register → Update → Wait

Reboot → Services → Log-in

SUSE Linux Enterprise 12

Installation Setup → Network → Register → Install with updates

Wait

Reboot → Log-in
Overhaul Network Management
Goal

- Cope with increasingly complex configurations
- Data Center and End Users
- Benefit
  - Network configuration as a service
  - Smooth adoption & migration

Technical Attributes

- Architecture-independent
- Extensible
- Small footprint
- Event based
Overhaul System Initialization
SUSE Linux Enterprise 12 Technology – **Systemd**

- **Init Replacement** – bring up system and start services
  - Integrate system wide ulimit settings and CGroups
  - Activation via Socket and d-bus
  - Command line “systemctl”

- **Compatibility** with SystemV init scripts
  - Provide infrastructure for existing ISV applications
  - LSB compatibility

- **SUSE specific usability enhancements**
  - Keep insserv, chkconfig and /sbin/service
  - Old style (calling “rc...”) redirected to systemctl
  - LSB compatibility for targets like $network...
Made for Cloud
SUSE Linux Enterprise 12
Made for Cloud – Hypervisor Support

Virtualization Technology Support

• **z/VM**
  - Full support and exploitation of z/VM related features
  - Proven mission critical track record

• **LXC**
  - Linux Containers & Control Groups
  - “OS level partitioning”

• **KVM – technical preview**
  - I/O improvements, storage and network device hotplugging
Technical Preview: KVM for s390x

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  - Lowers the entry barrier for non-mainframe, but Linux skilled users to explore hardware and virtualization options of the mainframe
Interoperability
SUSE Linux Enterprise 12

Interoperability - Vision

- Network
  - IPv6 (USGv6)

- Virtualization and Cloud

- Operating Systems Interop
  - Windows
  - UNIX
  - Linux

- Standards Compliance
  - Accessibility
  - Security (NIST, BSI)
SUSE Linux Enterprise 12
Interoperability - IPv6

• Leading OS – IPv6 compatibility and certification (USGv6)
  - https://www.iol.unh.edu/services/testing/ipv6/usgv6tested.php

• Tested scenarios
  - DHCP6 server and client
  - IPv6 support in NFS
  - Ensure IPv6 capabilities with UEFI network boot

• Network services

• System Installation & Patching over IPv6 Benefit
  - Deploy and use in pure IPv6 environment
  - Scale networks beyond IPv4 limitations
  - Answer compliance needs
SUSE Linux Enterprise 12
Interoperability – Samba 4

- Better Distributed Filesystem (DFS) capabilities

- File Server Remote VSS Protocol (FSRVP)
  - Server: integration with btrfs and Snapper
  - Client

- Server-side copy enhancements (btrfs backend)

- Protocol enhancements
  - Encryption
  - SMB 3.0 negotiation
  - Benefit
    - Authentication with recent Windows / AD Servers
    - Linux Server behaves as expected (FSRVP)
SUSE Linux Enterprise 12
Interoperability – Samba 4

- Traditional Copy
- Server-Side Copy
- Btrfs Enhanced Server-Side Copy

Complete your session evaluations online at www.SHARE.org/AnaheimEval
Filesystem recommendations

1. New Filesystem?
   - Yes
   - New Filesystem?
     - OS
     - Purpose?
       - Yes
       - Snapshots?
         - Yes
         - btrfs
         - No
         - xfs
       - No
       - xfs
   - No
     - Type?
       - ext2/3/4
       - xfs
       - reiserfs
       - Snapshots?
         - Yes
         - Convert
         - No
         - ext3|4

Note: the conversion to btrfs from ext2/3 leaves a copy of the old file system which should be deleted at some point.
Security And Certifications
SUSE Linux Enterprise 12

Security and Certifications

• Standards and Certifications
  - Preparation for
    • Common Criteria certification and
    • FIPS 140-2/-3 validation

• NIST (SP) 800-131a compliance

• Linux Security Modules
  - SELinux support
    • including MLS policy
    • SELinux not default due to performance impact (~7%)

• AppArmor support

• Research
  - Next level of Trusted Computing / Attestation
SLES for System z 12
SUSE® Linux Enterprise Server for System z 12

• IBM zEnterprise exploitation continued
  - zEC12, zBC12, z/VM 6.3, z196 EC, z114 BC support
  - Architecture Level Set (ALS)
  - zBX support (blade center extension)

• Improved RAS tools and System z specific support
  - kdump based stand-alone dumper
  - Dump to zfcp/SCSI partition
  - CryptoExpress4 support
  - Disk mirroring with RT enhancement (DASD/mdadm)
  - ...

Complete your session evaluations online at www.SHARE.org/AnaheimEval
CEX4 - zcrypt device driver changes for exploitation of EP11
Fate 315299 / LTC 92996

• **Description:** This feature provides an updated zcrypt device driver to support of the Enterprise PKCS#11 (EP11) features of the CEX4S crypto adapter that implement certified PKCS#11 mechanisms.

• **Customer benefit**

<table>
<thead>
<tr>
<th>technical</th>
<th>business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• See above</td>
<td>• Enable customer that need certified PKCS#11 implementations to use the EP11 (Enterprise PKCS#11) features of the System z CEX4S crypto card</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLES</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP0</td>
<td>-</td>
<td>yes</td>
</tr>
<tr>
<td>SP1</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP2</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP3</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP4</td>
<td>tbd</td>
<td>tbd</td>
</tr>
</tbody>
</table>

yes = included / no = not included
tbd = to be done
**Description:** z10 processor and successors have a random number generator built in, that can be accessed at /dev/hwrng if active. However, with z90crypt device driver and crypto express cards /dev/random delivers hardware generated random numbers at high rate.

**Customer benefit**

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>• Use /dev/random as a source of random numbers generated by hardware at a high rate</td>
<td>• Better scalability for workloads with lots of processes requiring randomness to execute or proceed</td>
</tr>
<tr>
<td>• Avoids stalling of processes querying for randomness</td>
<td>• Improved security if using a CEX card (larger keys at a faster rate)</td>
</tr>
</tbody>
</table>

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<tr>
<td>SP3</td>
<td>yes</td>
<td>tbd</td>
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</tbody>
</table>

*yes = included / no = not included  
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Improve performance of dasdfmt
Fate 315312 / LTC 92766

• **Description:** This feature improves the speed of the DASD formatting process. The kernel internal handling of format requests is reorganized and the usage of the PAV feature is enabled to accelerate format requests.

• **Customer benefit**

<table>
<thead>
<tr>
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<th>business</th>
</tr>
</thead>
</table>
| • The dasdfmt tool gets a new command line option to specify the request size that is passed to the kernel interface.  
• Part of s390-tools package | • Lowers administrational time and effort  
• Support larger future DASDs |

| SLES 11 12 |  |
| SP0 | - | yes |
| SP1 | - | tbd |
| SP2 | - | tbd |
| SP3 | - | tbd |
| SP4 | tbd | tbd |

*yes = included / no = not included  
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**Kernel support for concurrent Flash MCL updates**
Fate 315317 / LTC 92770

- **Description:** This feature is to ensure that concurrent microcode level upgrades (MCL) can be applied without impacting I/O operations to the Flash storage media and to notify users of the changed Flash hardware service level.

- **Customer benefit**

<table>
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<tbody>
<tr>
<td>• Non disruptive MCL upgrades, concurrent service.</td>
<td>• No downtime</td>
</tr>
</tbody>
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*yes = included / no = not included / tbd = to be done*
Multiple netiucv paths between z/VM guests
Fate 315290 / LTC 92750

- **Description:** This feature allows to establish multiple netiucv connections between the same two z/VM guests, by using IUCV userdata (in addition to the VM userid) to identify a network interface.

- **Customer benefit**

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>• Allows to improve networking performance between Linux on System z z/VM guests.</td>
<td>• Improved performance</td>
</tr>
</tbody>
</table>

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<td>SP4</td>
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</tbody>
</table>

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**src_vipa: IPv6 Enablement**
Fate 315295 / LTC 93371

- **Description:** This feature adds support for IPv6 addresses to the src_vipa tool. src_vipa provides IP address virtualization for Linux guests (eg. For failover for IP based services).

- **Customer benefit**

<table>
<thead>
<tr>
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<th>business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Choice of IPv4 or IPv6 failover.</td>
<td>• Allow choice depending on business need</td>
</tr>
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<td>SP0</td>
<td>-</td>
<td>yes</td>
</tr>
<tr>
<td>SP1</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP2</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP3</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP4</td>
<td>tbd</td>
<td>tbd</td>
</tr>
</tbody>
</table>

yes = included / no = not included
tbd = to be done
Disk mirroring with real-time enhancement for System z
Fate 315976 / LTC 95619

• **Description:** Improve storage operation to enable continuous operation even in case of a temporary DS8000/ESS failure or timeout.

• **Customer benefit**

<table>
<thead>
<tr>
<th>technical</th>
<th>business</th>
</tr>
</thead>
</table>
| • Improve storage operation to enable continuous operation even in case of a temporary DS8000/ESS failure or timeout  
• Based on enhanced RAID 10 / md driver implementation | • RAS, availability of service |

<table>
<thead>
<tr>
<th></th>
<th>SLES 11 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP0</td>
<td>- yes</td>
</tr>
<tr>
<td>SP1</td>
<td>- tbd</td>
</tr>
<tr>
<td>SP2</td>
<td>yes tbd</td>
</tr>
<tr>
<td>SP3</td>
<td>yes tbd</td>
</tr>
<tr>
<td>SP4</td>
<td>tbd tbd</td>
</tr>
</tbody>
</table>

yes = included / no = not included  
tbd = to be done
QSAM Access Method for Data sharing with z/OS
Fate 315314 / LTC 92768

• **Description:** enhances the functionality of the s390-tools to allow to access z/OS legacy data directly on the DASD storage devices from a Linux system. Stage 1 comprises non-concurrent access, that is Linux access to z/OS data occurs regardless of z/OS processing (user needs to ensure data is not modified during Linux reading it).

• **Customer benefit**

<table>
<thead>
<tr>
<th>technical</th>
<th>business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>NOTE:</strong> be aware of the consequences regarding sharing data on disk between system</td>
<td>• By avoiding FTP or NFS transfer of data from z/OS the turnaround time for batch processing is significantly reduced.</td>
</tr>
<tr>
<td>• Uses new filesystem zdsfs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLES</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP0</td>
<td>-</td>
<td>yes</td>
</tr>
<tr>
<td>SP1</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP2</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP3</td>
<td>-</td>
<td>tbd</td>
</tr>
<tr>
<td>SP4</td>
<td>tbd</td>
<td>tbd</td>
</tr>
</tbody>
</table>

*yes = included / no = not included / tbd = to be done
Support of transparent large pages
Fate 315302 / LTC 92758

• **Description:** Transparent large pages promise a considerable speedup for applications that access large amounts of anonymous memory, e.g. heap for Java programs, caching area for databases.

• **Customer benefit**

<table>
<thead>
<tr>
<th>technical</th>
<th>business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More efficient handling of large memory</td>
<td>• Improved performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLES 11 12 SP0 SP1 SP2 SP3 SP4</th>
<th>yes  tbd  tbd  tbd  tbd  tbd</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLES 11 12 SP0 SP1 SP2 SP3 SP4</td>
<td>yes  tbd  tbd  tbd  tbd  tbd</td>
</tr>
</tbody>
</table>

*yes = included / no = not included / tbd = to be done*
Provide PCHID mapping  
Fate 315316 / LTC 92769

- **Description:** Enable Linux users to determine the physical channel-ID (PCHID) associated with a CHPID. The ability to map CHPID to PCHID values is important for maintenance and error determination processes.

- **Customer benefit**

<table>
<thead>
<tr>
<th>technical</th>
<th>business</th>
</tr>
</thead>
</table>
| • The CHPID is a logical channel-path identifier unique in a single LPAR.  
• The PCHID is a machine-wide unique channel-path identifier which can be used to determine the actual hardware associated with a CHPID or I/O device. | • Improved RAS capabilities |

| SLES | 11 | 12 | SP0 | - | yes | SP1 | - | tbd | SP2 | - | tbd | SP3 | - | tbd | SP4 | tbd | tbd |

*yes = included / no = not included / tbd = to be done*
SUSE Customer Center
http://scc.suse.com

SUSE Customer Center
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Account erstellen

Sign in
marcuskrath

Can't access your account?

This site saves some information in cookies but only when strictly necessary - Learn more.
# Systems List

<table>
<thead>
<tr>
<th>Hostname</th>
<th>Hardware</th>
<th>Subscriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>nas</td>
<td>Processor: x86_64, Platform: x86_64</td>
<td>SUSE Linux Enterprise Server 10 for X86 and for AMD64 &amp; Intel EM64T/Itanium &amp; IBM Power</td>
</tr>
<tr>
<td>nas</td>
<td>Processor: x86_64, Platform: x86_64</td>
<td>SUSE Linux Enterprise Server 10 for X86 and for AMD64 &amp; Intel EM64T/Itanium &amp; IBM Power</td>
</tr>
<tr>
<td>s390106.suse.de</td>
<td>Processor: s390x, Platform: s390x</td>
<td>SUSE Linux Enterprise Server 10 for System z</td>
</tr>
<tr>
<td>utila</td>
<td>Processor:i586, Platform: i586</td>
<td>SUSE Linux Enterprise Desktop 1-Instance 3-Year Subscription</td>
</tr>
<tr>
<td>x201</td>
<td>Processor: x86_64, Platform: x86_64</td>
<td>SUSE Linux Enterprise Server 10 for X86 and for AMD64 &amp; Intel EM64T/Itanium &amp; IBM Power</td>
</tr>
</tbody>
</table>

Displaying all 5 systems
Complete your session evaluations online at www.SHARE.org/AnaheimEval
Subscription Management Tool

Overview

SMT is a proxy and auditing tool that mirrors the 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 Manager
How Does SUSE Manager Work?

Customer Center

SUSE Manager Server

Management
Provisioning
Monitoring

API Layer

Managed Systems

SUSE Proxy Manager Server

Firewall

IT Application

Custom Content

Web Interface

Managed Systems

Complete your session evaluations online at www.SHARE.org/AnaheimEval
SUSE Manager Management Module

- NCC integration
- ZYpp update stack
- Server groups
- Custom repositories
- SUSE Manager API
- Scheduler
- Role-based access control
- Search
- Virtual guest, appliance and System z management
Summary
SUSE® Building Blocks
for the Linux OS Lifecycle

SUSE Studio
Building workloads for physical and cloud environments

SUSE Manager
Provisioning Management Monitoring

SUSE Linux Enterprise
The foundation for your datacenter workloads and virtualization, from x86 to the mainframe

Complete your session evaluations online at www.SHARE.org/AnaheimEval
More SHARE LVM sessions

- 14545: Experiences with Linux and System z - Customer Panel
- 14802: Linux Bootloaders on System Z - Current and Future Implementations
- 14559: What's New in Linux on System z
- 14546: Exploiting System z Cryptographic Hardware on Linux for System z
- 14809: Make Your Linux System More Secure
- 14794: How To Make Databases on Linux on System z Highly Available
- 14479: KVM for System z
- 14764: KVM Customer Experience
- 14540: Alternatives to Solaris Containers and ZFS for Linux on System z
Thank you!
Appendix
Lifecycle
### Product Support Lifecycle for SUSE Linux Enterprise Platform Solutions

<table>
<thead>
<tr>
<th></th>
<th>General Support</th>
<th></th>
<th>Extended Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years 1-5</td>
<td>Year 6-7</td>
<td>Years 8-10</td>
</tr>
<tr>
<td>Enhancement Requests</td>
<td>yes</td>
<td>yes&lt;sup&gt;1&lt;/sup&gt;</td>
<td>no</td>
</tr>
<tr>
<td>Hardware Enablement/Optimization</td>
<td>yes</td>
<td>yes&lt;sup&gt;1&lt;/sup&gt;</td>
<td>no</td>
</tr>
<tr>
<td>Defect Resolution</td>
<td>yes</td>
<td>yes</td>
<td>yes&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Critical Security Updates</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Installation and Configuration Support</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Access to Patches and Fixes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Access to SUSE Knowledgebase</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Access to Support Forums</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Technical Subscriptions</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Access to Documentation</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

<sup>1</sup> Limited. Based on partner and customer requests.

<sup>2</sup> Limited. Severity Level 1 and 2 defects only.
Long Term Service Pack Support (LTSS)

• Use Cases
  - I want to run my software stack unchanged for a very long time
    • Updating OS does not improve my business process
    • Updates can be very expensive to deploy
    • Any change may impose additional risk

• I need more time to move to the next Service Pack
  - Approval process from stakeholders
  - QA processes
  - Very large and/or distributed environment
systemd
What is systemd?

- systemd is a system and session manager for Linux, compatible with SysV and LSB init scripts.
- *systemd*
  - Provides aggressive parallelization capabilities,
  - Uses socket and D-Bus activation for starting services,
  - Offers on-demand starting of daemons,
  - Keeps track of processes using Linux cgroups,
  - Supports snapshotting and restoring of the system state,
  - Maintains mount and automount points
  - Implements an elaborate transactional dependency-based service control logic.
- It can work as a drop-in replacement for sysvinit.
Systemctl: Start / Stop Service

• systemctl start|stop|restart|try-restart|reload foobar.service
• systemctl kill foobar.service
• systemctl kill -s SIGKILL foobar.service
• systemctl kill -s HUP –kill-who=main crond.service
**Systemctl: Service status**

- systemctl: give you a list of all started services and their status
- systemctl status foobar.service: status for one specific service

```
$ systemctl status icecream.service
icecream.service - LSB: icecc
   Loaded: loaded (/etc/init.d/icecream)
   Active: active (running) since Fri, 2013-04-19 09:27:31 CEST; 4 days ago
   CGroup: name=systemd:/system/icecream.service
   ├  4786 /usr/sbin/icecc-scheduler -d -l /var/log/icecc_scheduler
   └  4791 /usr/sbin/iceccd -d -l /var/log/iceccd --nice 5 -u...

Apr 19 09:27:31 foobar systemd[1]: Starting LSB: icecc...
Apr 19 09:27:31 foobar icecream[4777]: Starting Distribut...
```
Unit file

- Generic term used by systemd for the following:
  - Service (ends with .service)
  - Targets (ends with .target)
  - Sockets (ends .socket)
  - Path (ends with .path, used to trigger other units)
  - Timer (ends with .timer)
  - Mount point (ends with .mount), usually autogenerated by fstab generator
  - Automount point (ends with .automount)
  - Swap (ends with .swap)
  - Device (ends with .device)
  - Scope / Slice (ends with .scope/.slice, introduced in v205)
Journal

- Logs facilities bundled in systemd since v38
- Structured logs (stored in binary format on disk, supports compression, rotation)
- Each record is associated with emitting services: allow to see “last log output” when checking a service status
- Can be configured to have persistent (on disk) journal or not (for embedded)
- Allow unprivileged users to have their own separate journal
- Each entry is cryptographically hashed along hash of previous entries (à la git)
- Can work peacefully with various syslog implementations
- Stored on disk by default (use `systemd-logg` package and `/var/log/journal` directory)
File Server Remote VSS Protocol

- Overview
  - The File Server Remote VSS Protocol is designed to remotely create shadow copies of file shares hosted on a file server. This facilitates applications hosting their data on a file server to back up and restore their application state.

  The client-side implementation of this protocol typically runs on an application server and the server-side implementation runs on a file server.

  This protocol is modeled in such way that the client-side and server-side implementation can be integrated with existing volume shadow copy creation utilities.

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