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SUSE Linux Enterprise Server for System z
Current & Future Features

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March 10th, 2014
Session 14542

www.SHARE.org

SHARE in Anaheim

Agenda

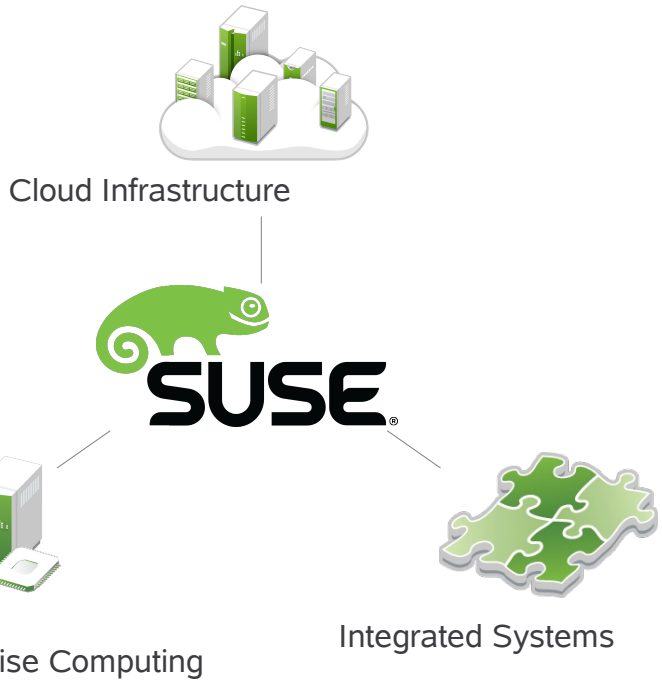
- SUSE Linux Enterprise Server for System z Roadmap Update

http://www-03.ibm.com/press/us/en/attachment/40318.wss?fileId=ATTACH_FILE2&fileName=Enterprise%20Familylores.jpg

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:



SUSE Linux Enterprise Server

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

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SUSE Linux Enterprise Server 11 SP3

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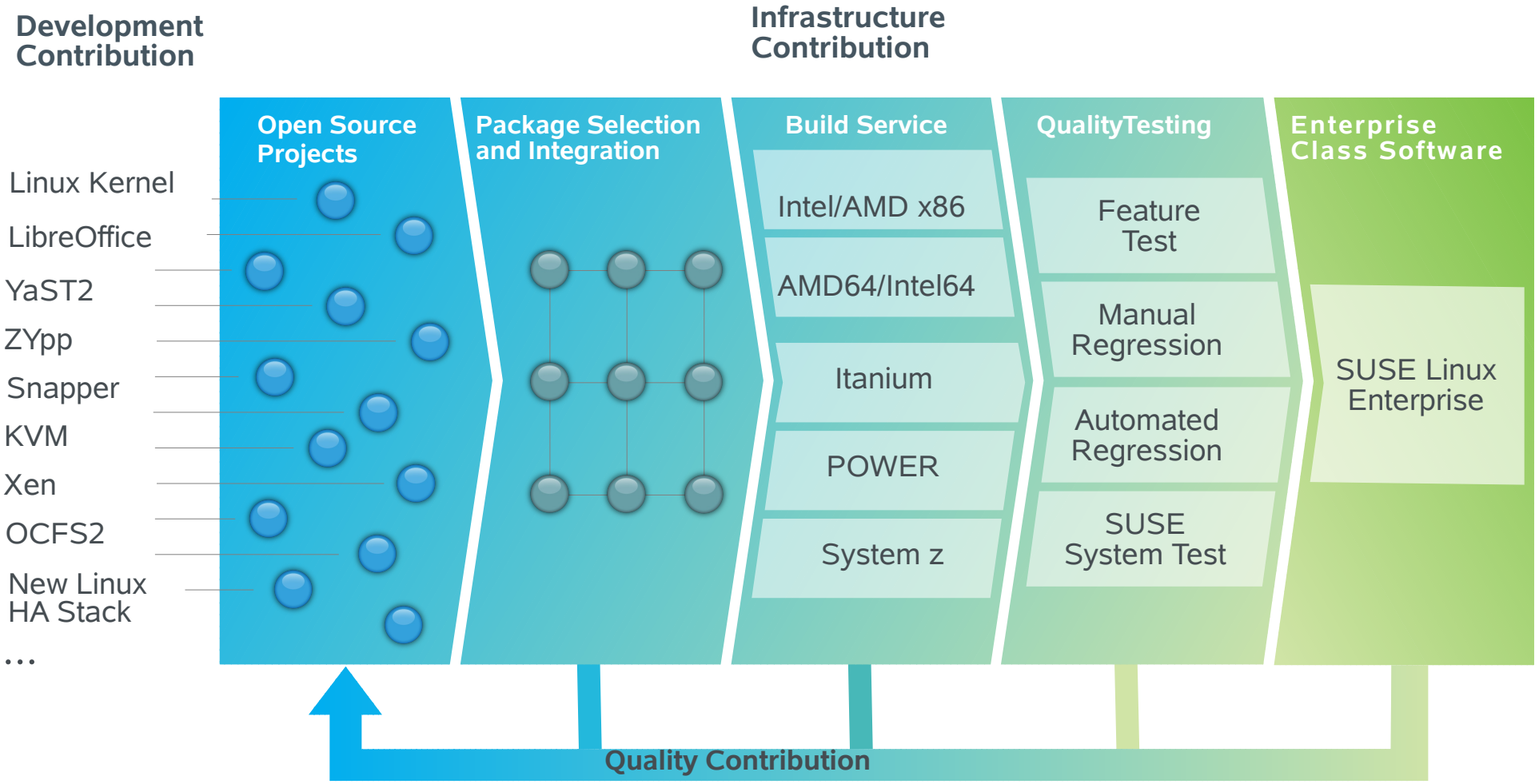
SUSE® Linux Enterprise

Build Service*

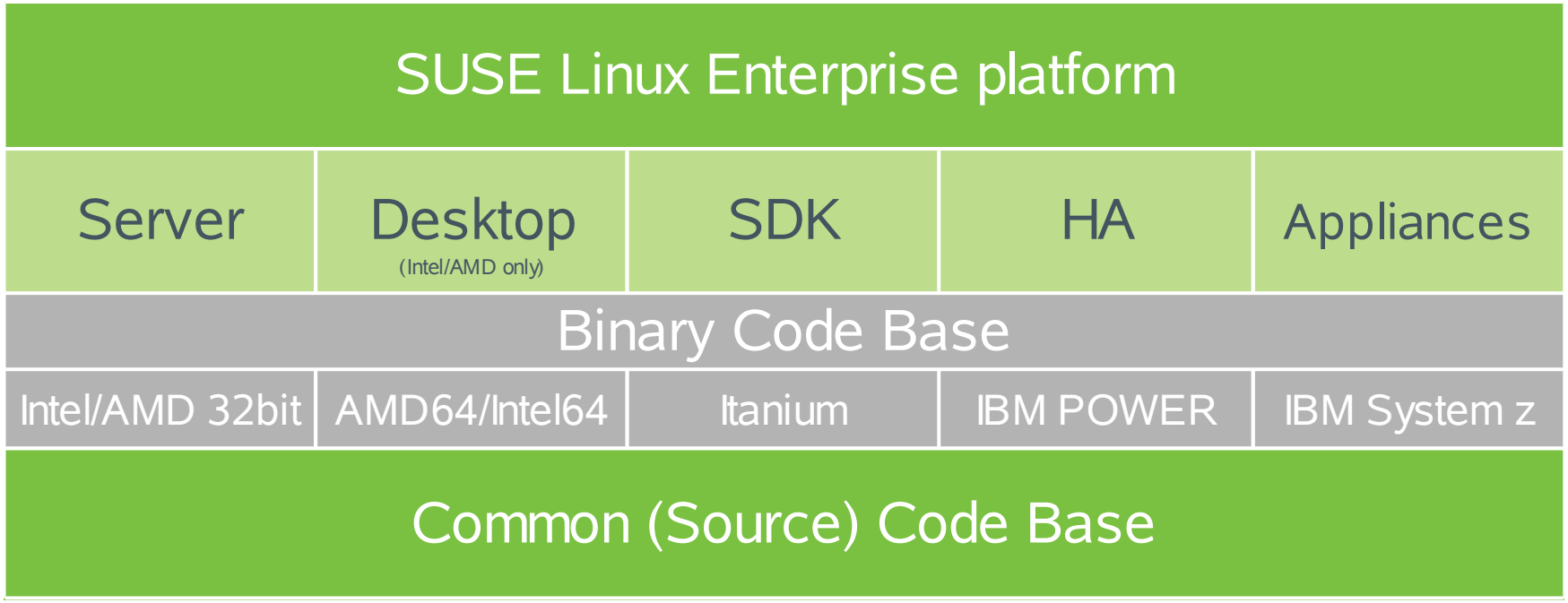


* SUSE Build Service is the internal entity of the Open® Build Service

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

SUSE® Linux Enterprise

How We Combine It



- 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/

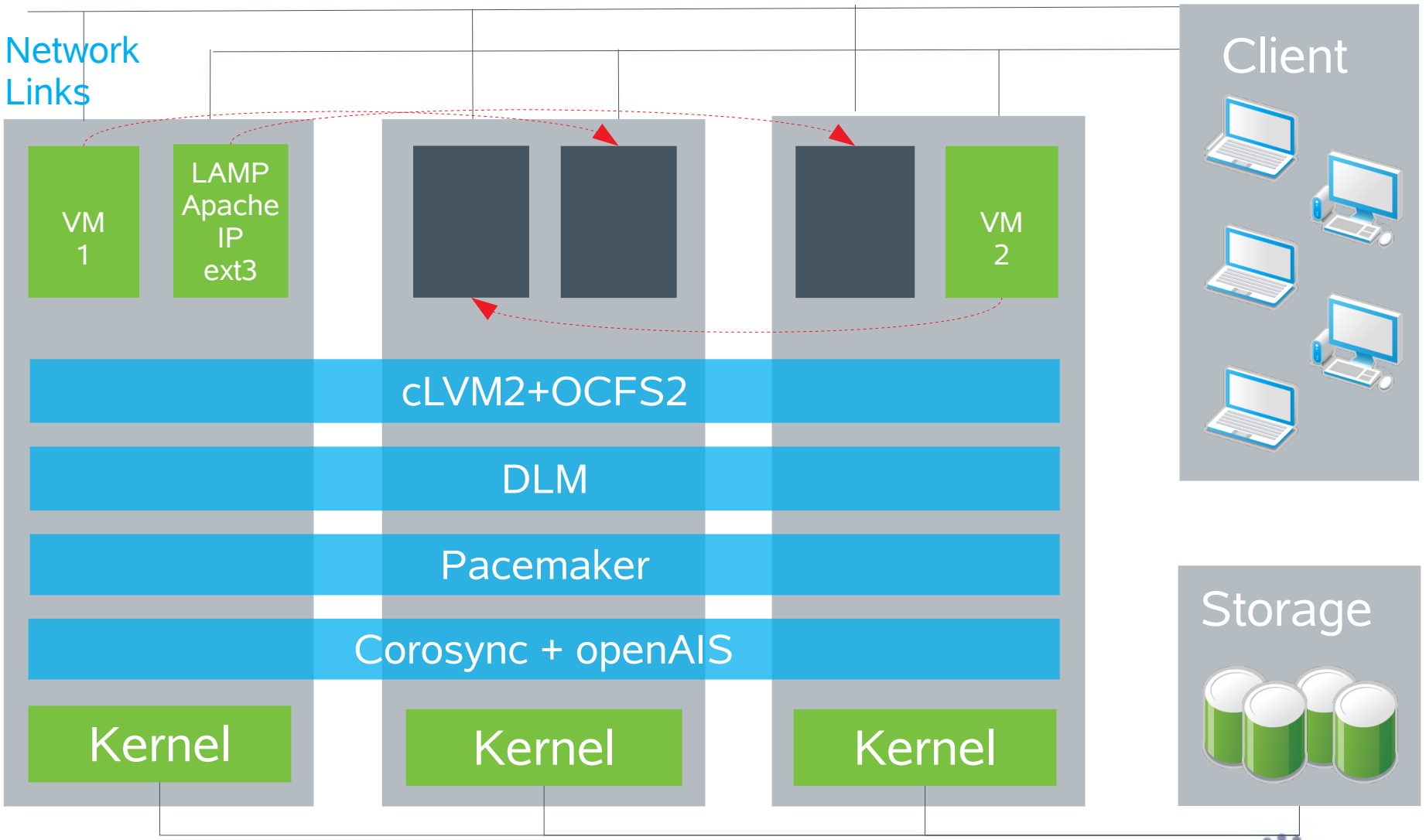
```
#include <tunables/global>

/usr/sbin/vsftpd {
  #include <abstractions/base>
  #include <abstractions/nameservice>
  #include <abstractions/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
  /                         r,
  /pub                      r,
  /pub/**                   r,
  @{HOMEDIRS}               r,
  @{HOME}/**                rwl,
}
```

SUSE® Linux Enterprise High Availability Extension

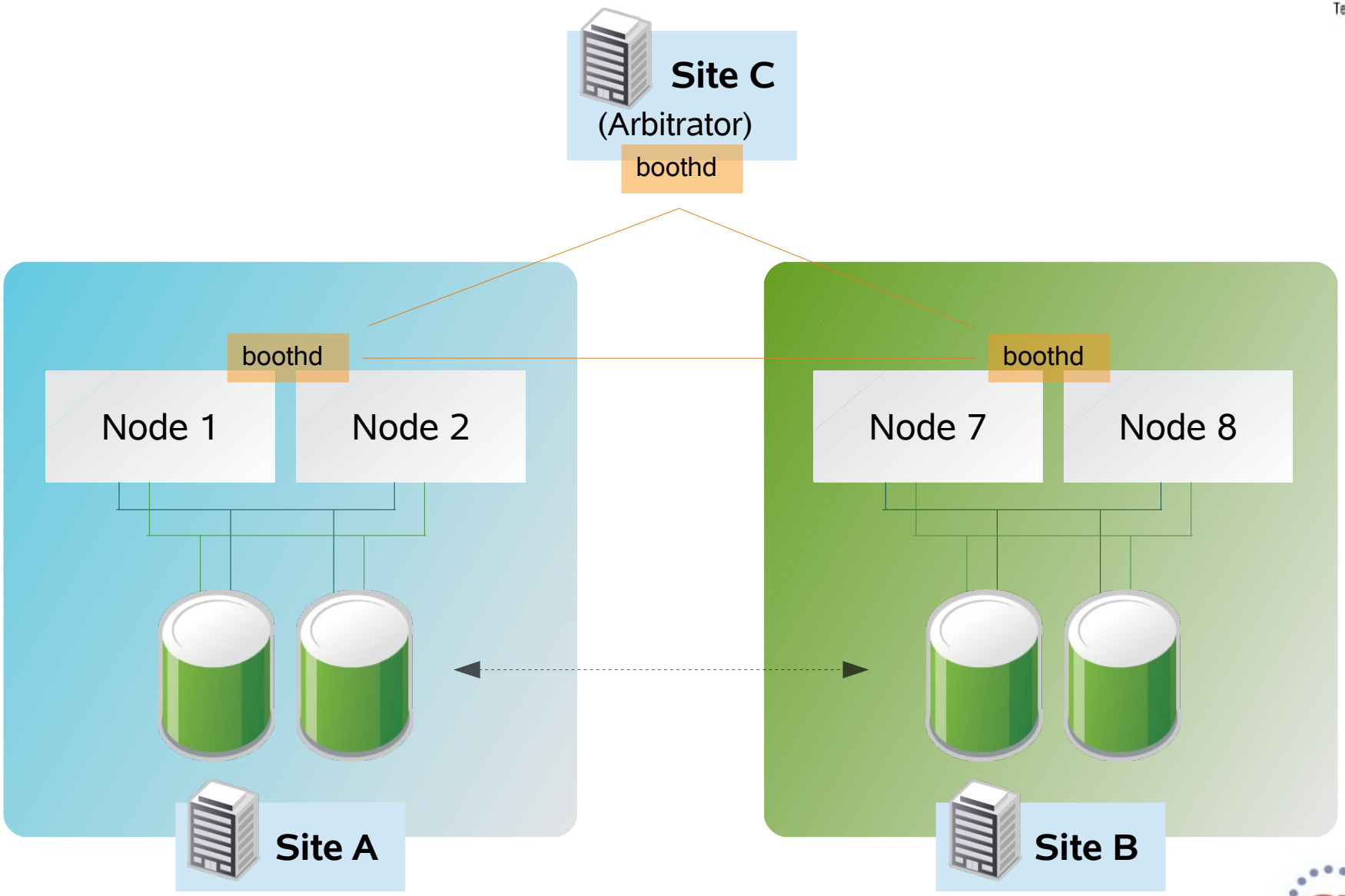
- Service availability 24/7
  - Policy driven clustering
    - Messaging and membership layer
    - Pacemaker cluster resource manager
- Sharing and Scaling data-access by multiple nodes
  - Cluster file system
    - OCFS2
    - Clustered Logical Volume Manager
- Disaster tolerance
  - Data replication 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



Geo Cluster – Setup



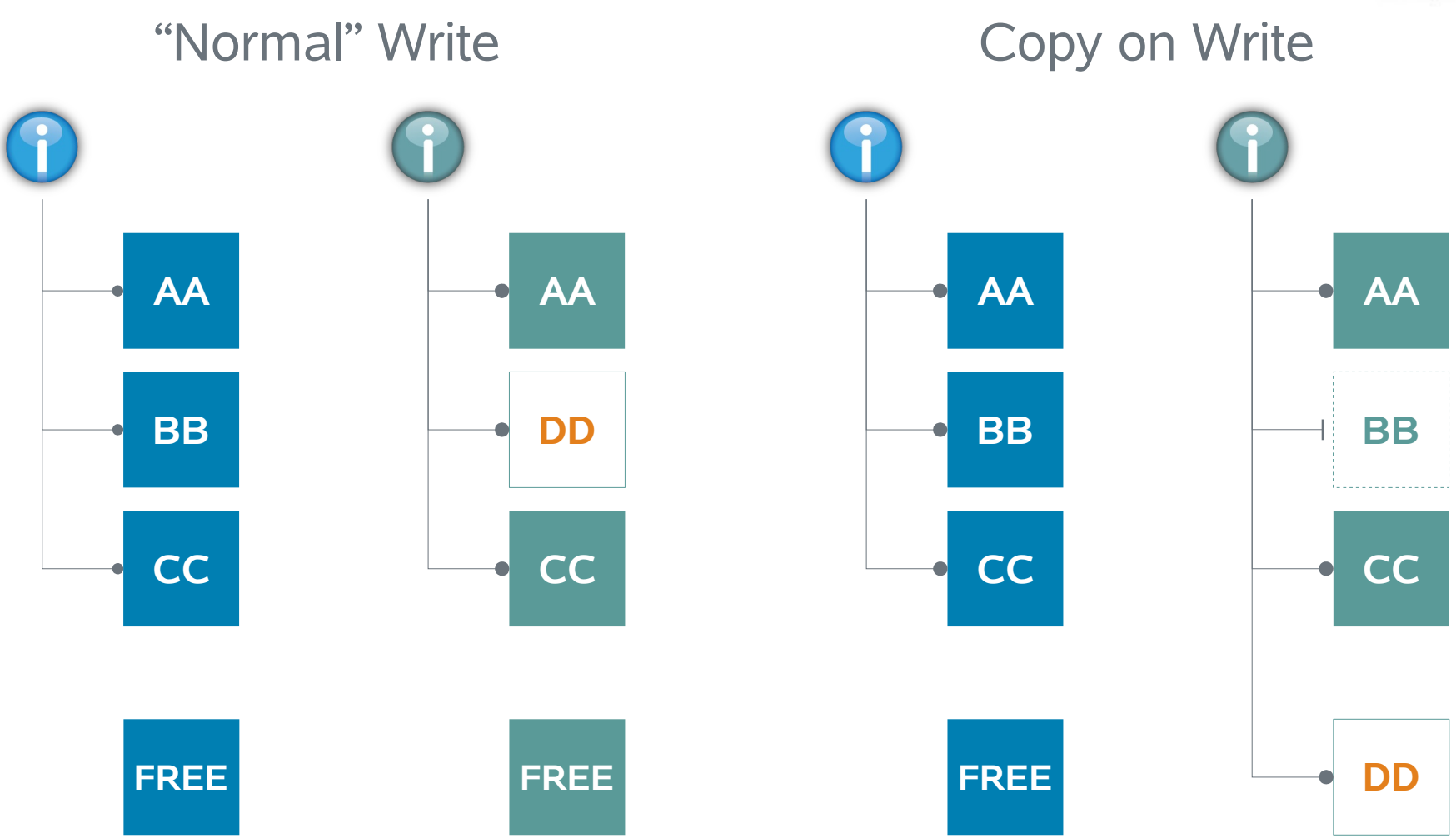
btrfs

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

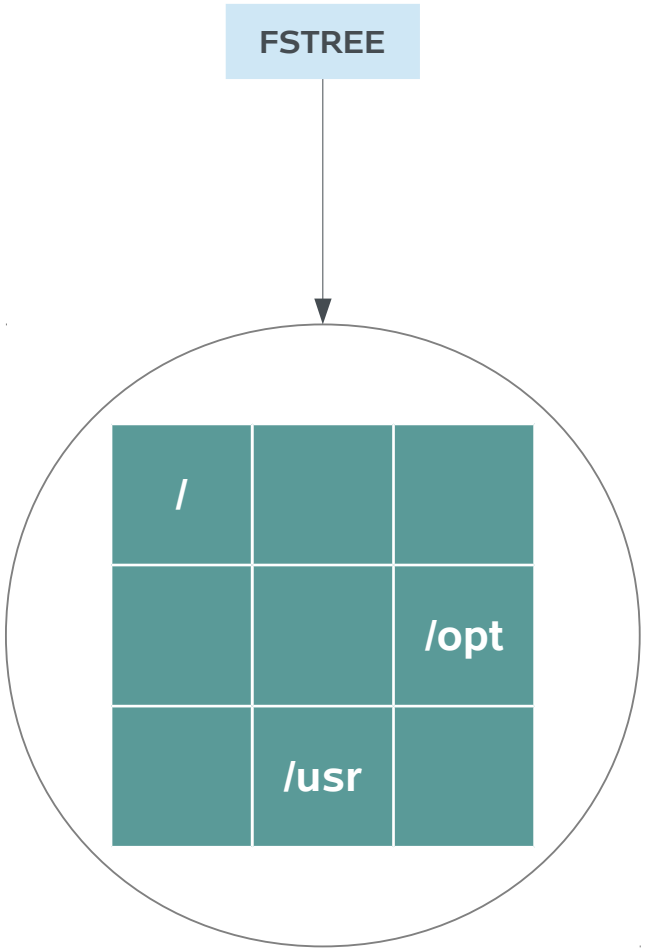
Copy on Write



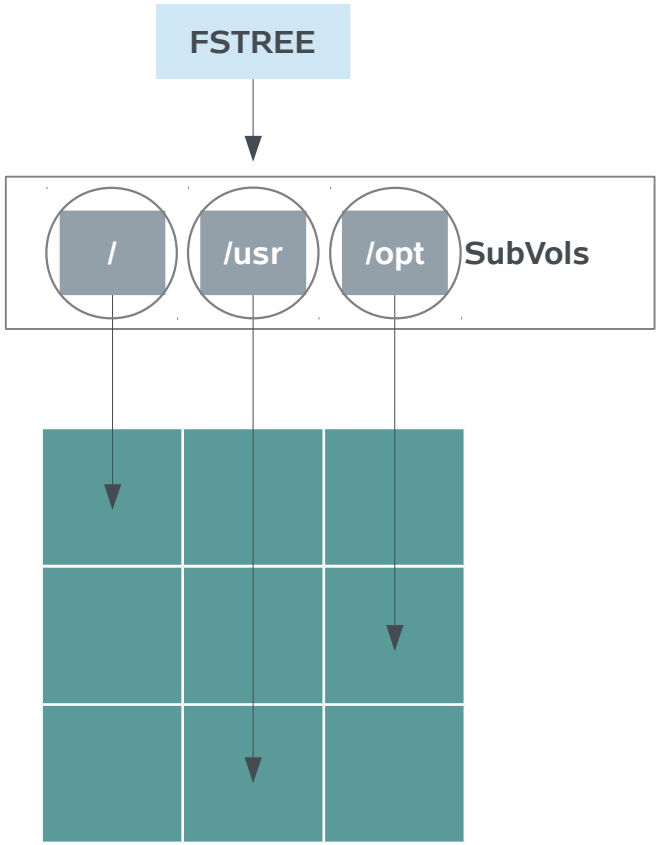
Technology Overview

Subvolume

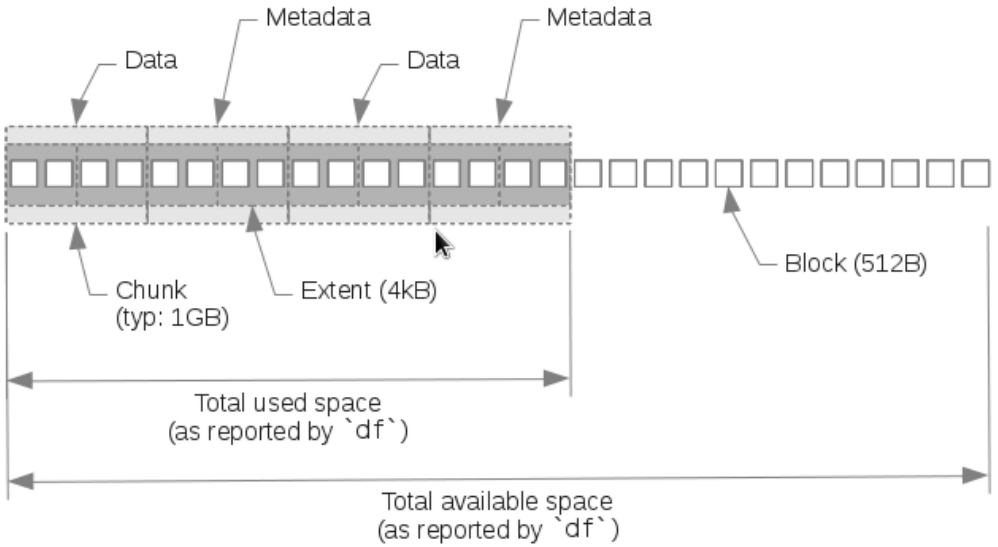
Normal Filesystem



With Subvolumes



Btrfs Disk Space And Extents



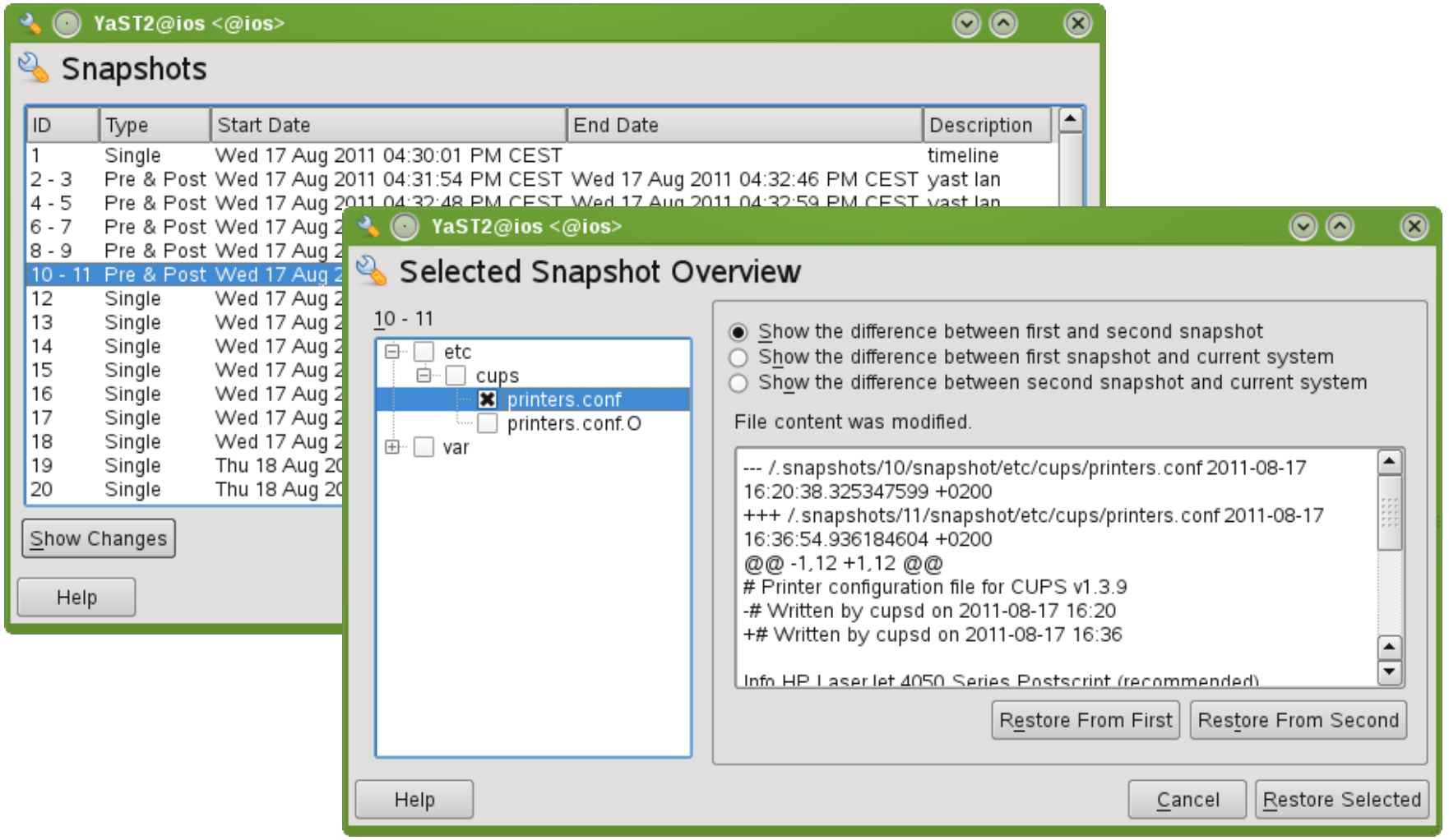
In case of a Btrfs filesystem on a single underlying block device

```
# 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



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

Tools / SDK

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

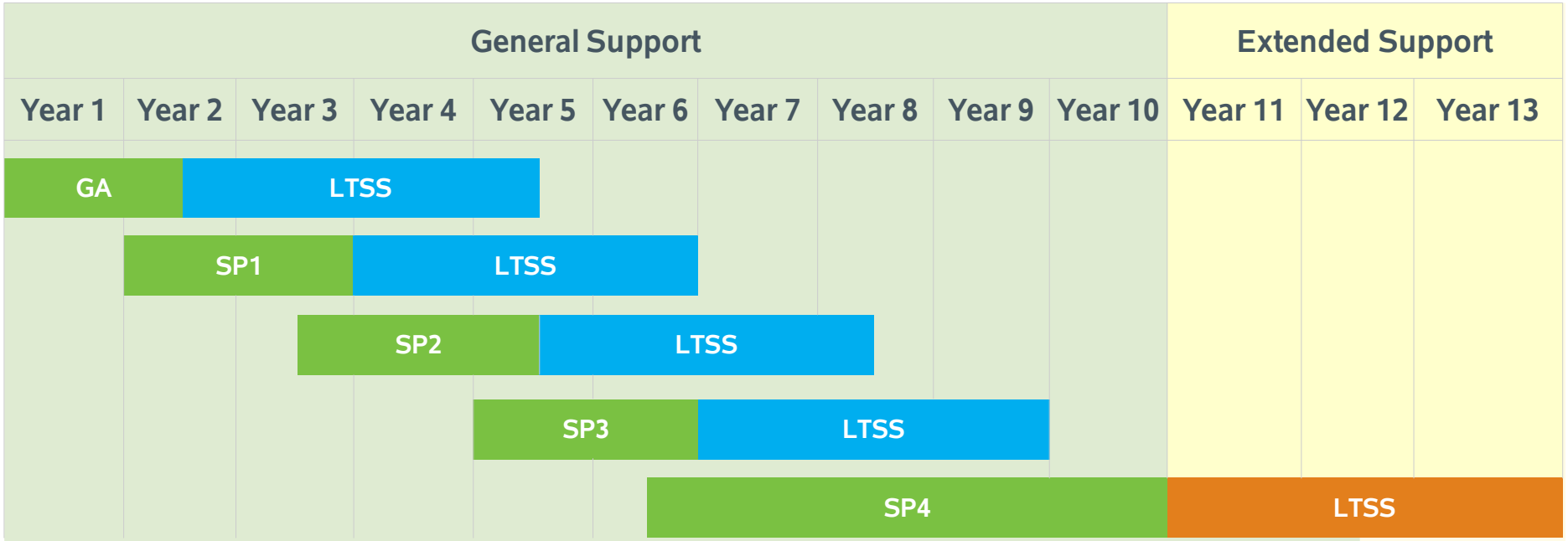
- valgrind
  - Memcheck
  - Cachegrind
  - Massif
  - Helgrind
  - DRD
  - None
  - Exp-ptrcheck
  - Callgrind

- http://valgrind.org

Lifecycle

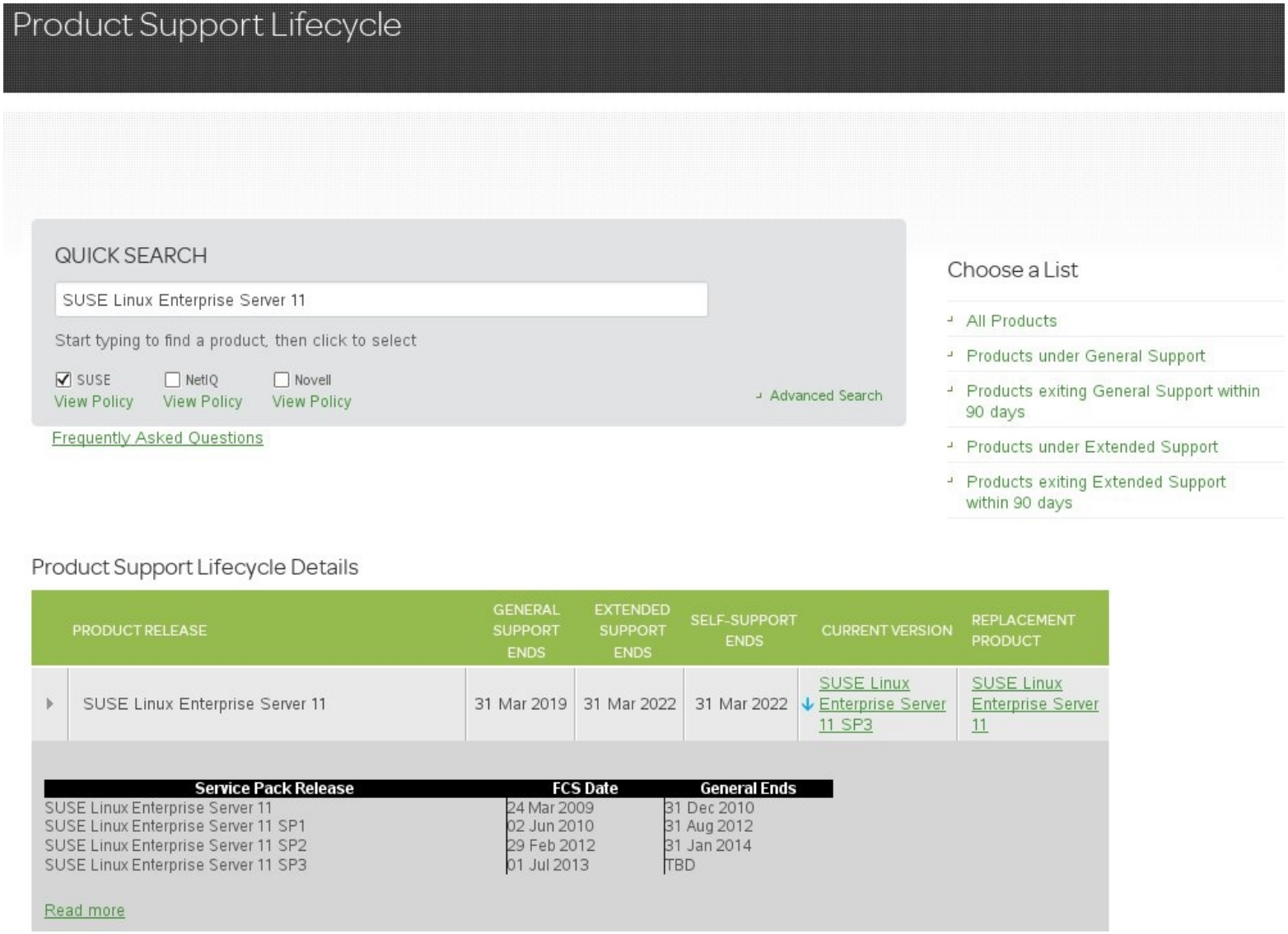
SUSE® Linux Enterprise Server 11

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

SUSE View Policy | NetIQ View Policy | Novell View Policy

Advanced Search

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

PRODUCT RELEASE	GENERAL SUPPORT ENDS	EXTENDED SUPPORT ENDS	SELF-SUPPORT ENDS	CURRENT VERSION	REPLACEMENT PRODUCT
SUSE Linux Enterprise Server 11	31 Mar 2019	31 Mar 2022	31 Mar 2022	SUSE Linux Enterprise Server 11 SP3	SUSE Linux Enterprise Server 11

Service Pack Release	FCS Date	General Ends
SUSE Linux Enterprise Server 11	24 Mar 2009	31 Dec 2010
SUSE Linux Enterprise Server 11 SP1	02 Jun 2010	31 Aug 2012
SUSE Linux Enterprise Server 11 SP2	29 Feb 2012	31 Jan 2014
SUSE Linux Enterprise Server 11 SP3	01 Jul 2013	TBD

Read more

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SUSE Linux Enterprise Server 12

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Hardware
SUSE Linux Enterprise 12 is 64-bit

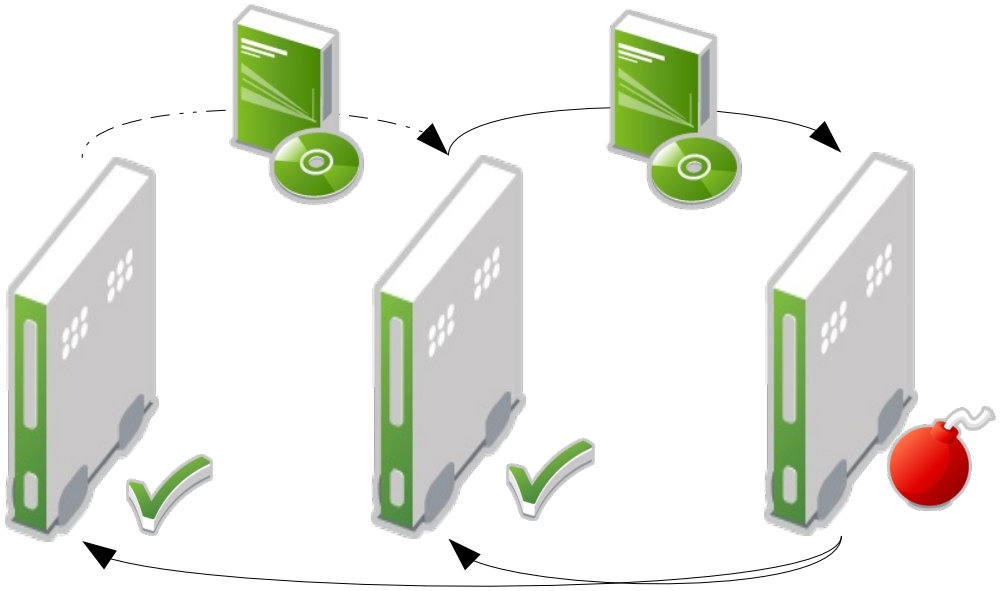
- 64-bit hardware is the future
  - 64-bit kernels only
  - Execution of 32-bit applications fully supported via 32-bit execution environment on top of 64-bit kernel
- Virtualization
  - KVM, Xen, z/VM, LPAR support (depends on architecture)
  - 64-bit host; 64-bit and 32-bit guests
- Hybrid Computing
  - 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

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



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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

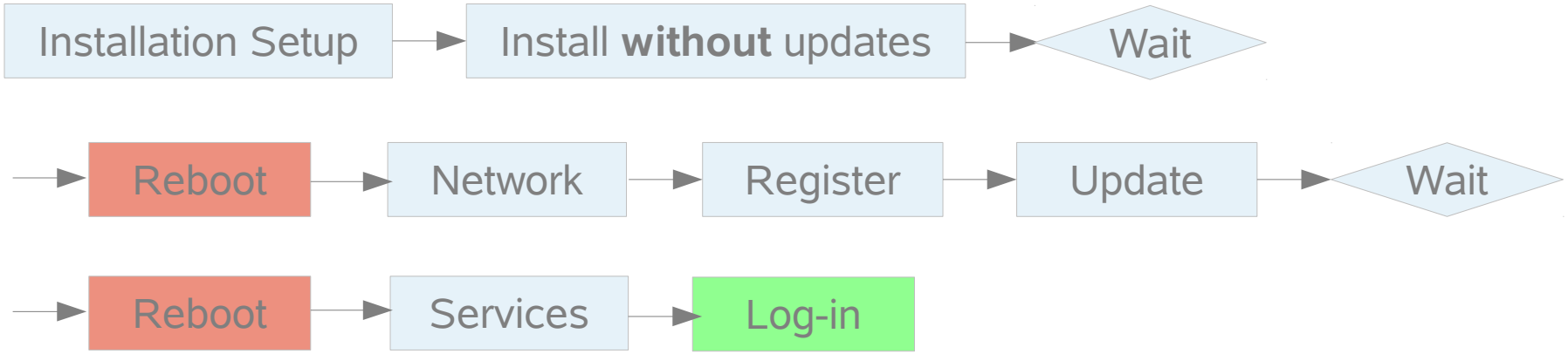
- Reduced installation time and effort
  - Possibility to install directly with updates thanks to early registration
- Manual Installation
  - Improved Workflow, no second stage
  - Network configuration at the beginning of the installation process → network connection “everywhere” during installation
  - Multiple UI options
- Automated

  → AutoYaST
- Customized
  - Write your own modules in Ruby

SUSE Linux Enterprise 12

Installer – Workflow

SUSE Linux Enterprise 11



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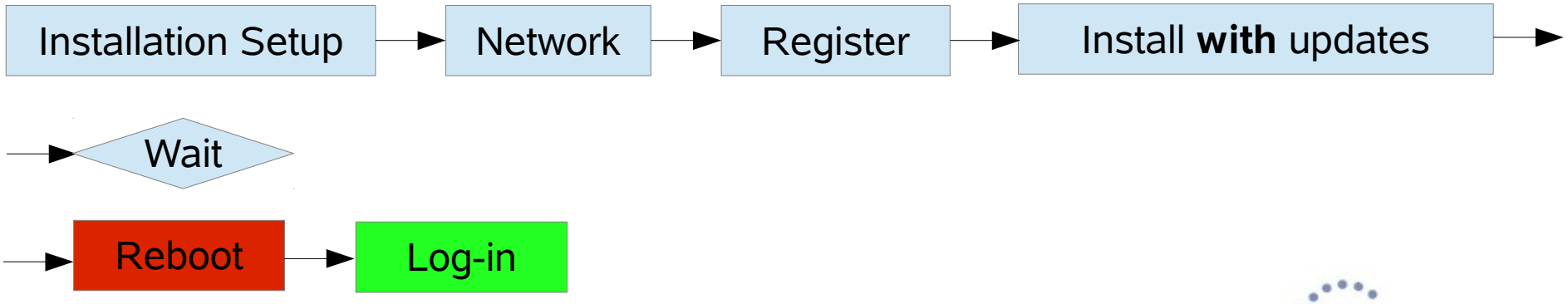

Overhaul Network Management

SUSE Linux Enterprise 12

Network Management

The “Wicked” Project

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

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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

- **K**ernel Based **V**irtual **M**achine
  - 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*.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

Interoperability

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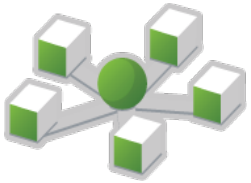
Interoperability - Vision



- Network
  - IPv6 (USGv6)

- Virtualization and Cloud

- Operating Systems Interop
  - Windows
  - UNIX
  - Linux

- Standards Compliance
  - Accessibility
  - Security (NIST, BSI)

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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

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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)

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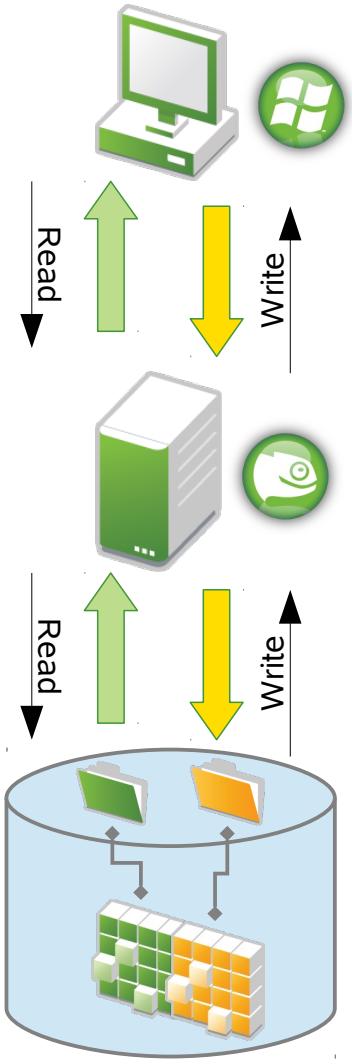
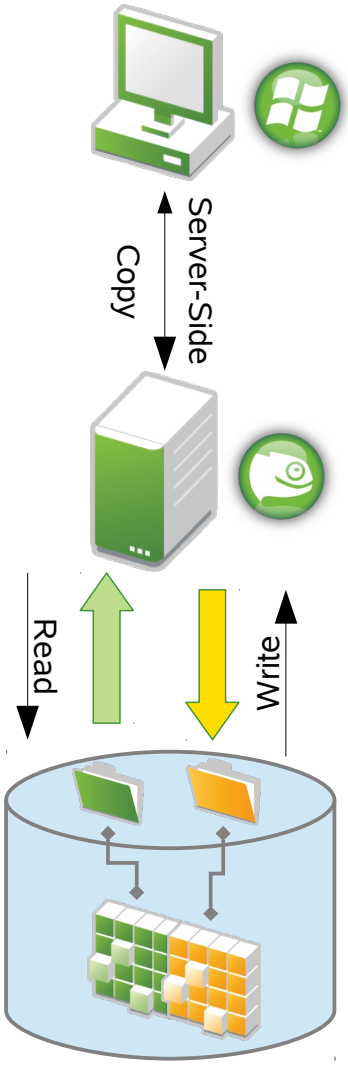
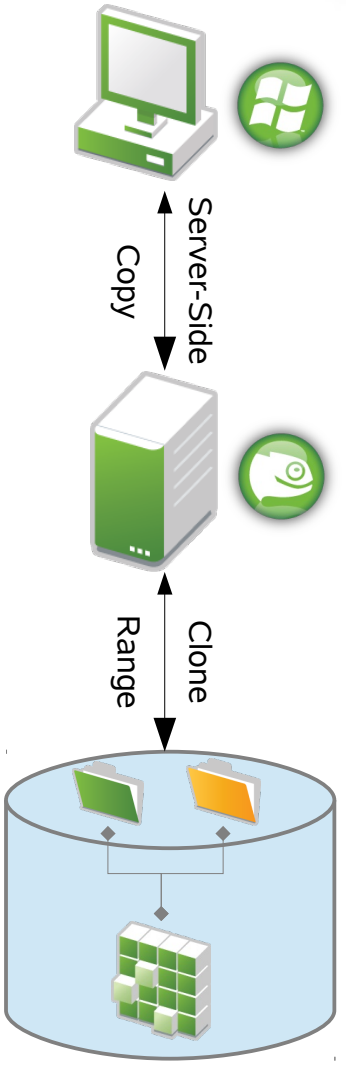
Interoperability – Samba 4



Traditional Copy

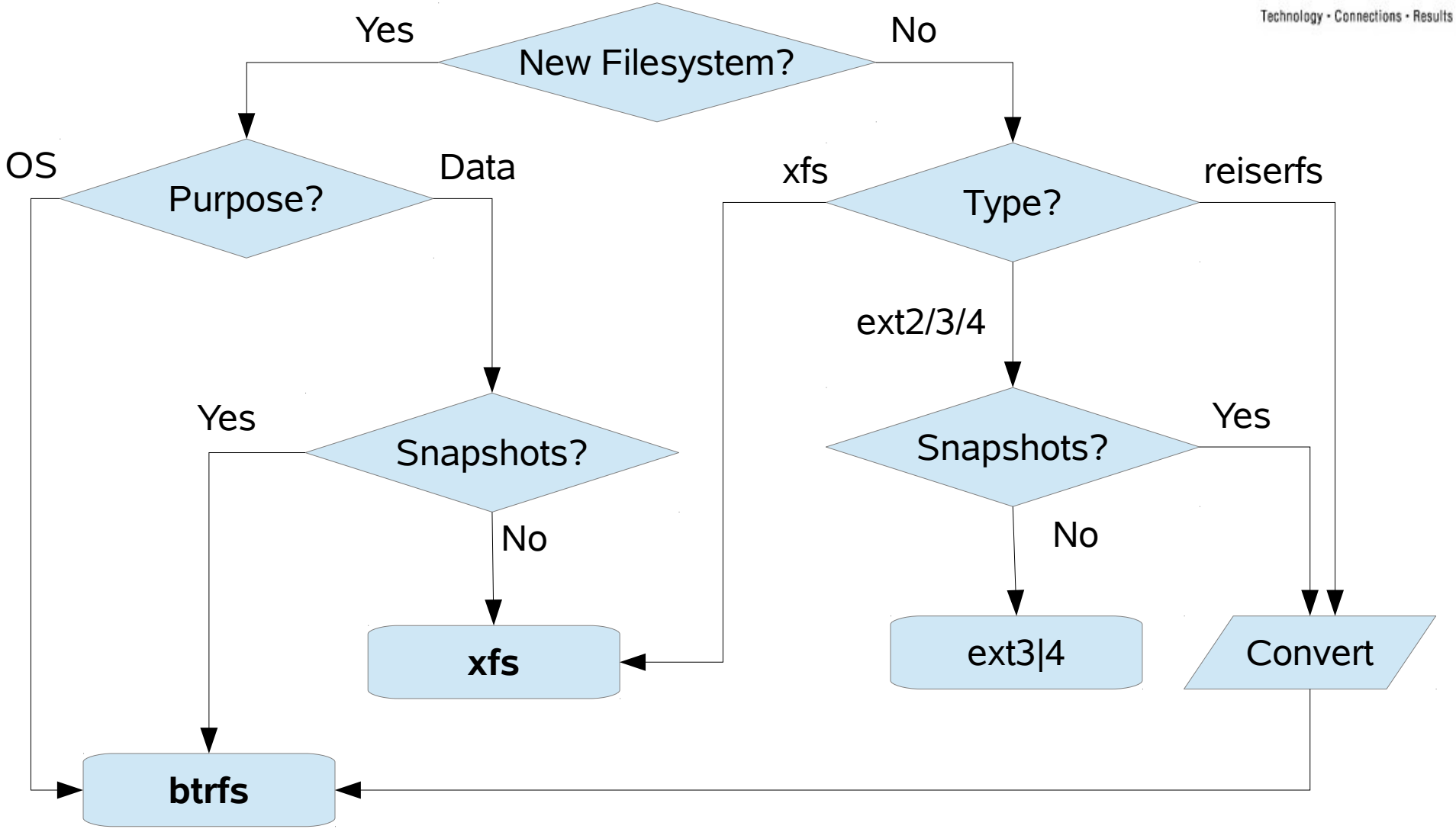


Server-Side Copy



Btrfs Enhanced Server-Side Copy

Filesystem recommendations



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 Certifcations

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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)
  - …

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**

technical	business
• See above	• Enable customer that need certified PKCS#11 implementations to use the EP11 (Enterprise PKCS#11) features of the System z CEX4S crypto card

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

yes = included / no = not included
tbd = to be done

Fill entropy pool with hwrandom for z10

Fate 310591 / [LTC -]

- **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**

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

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

yes = included / no = not included
tbd = to be done

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**

technical	business
• 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
tbd = to be done

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**

technical	business
• Non disruptive MCL upgrades, concurrent service.	• No downtime

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

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**

technical	business
• Allows to improve networking performance between Linux on System z z/VM guests.	• Improved performance

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

yes = included / no = not included
tbd = to be done

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**

technical	business
• Choice of IPv4 or IPv6 failover.	• Allow choice depending on business need

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

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**

technical	business
• 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

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

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**

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

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

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**

technical	business
• More efficent handling of large memory	• Improved performance

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

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.

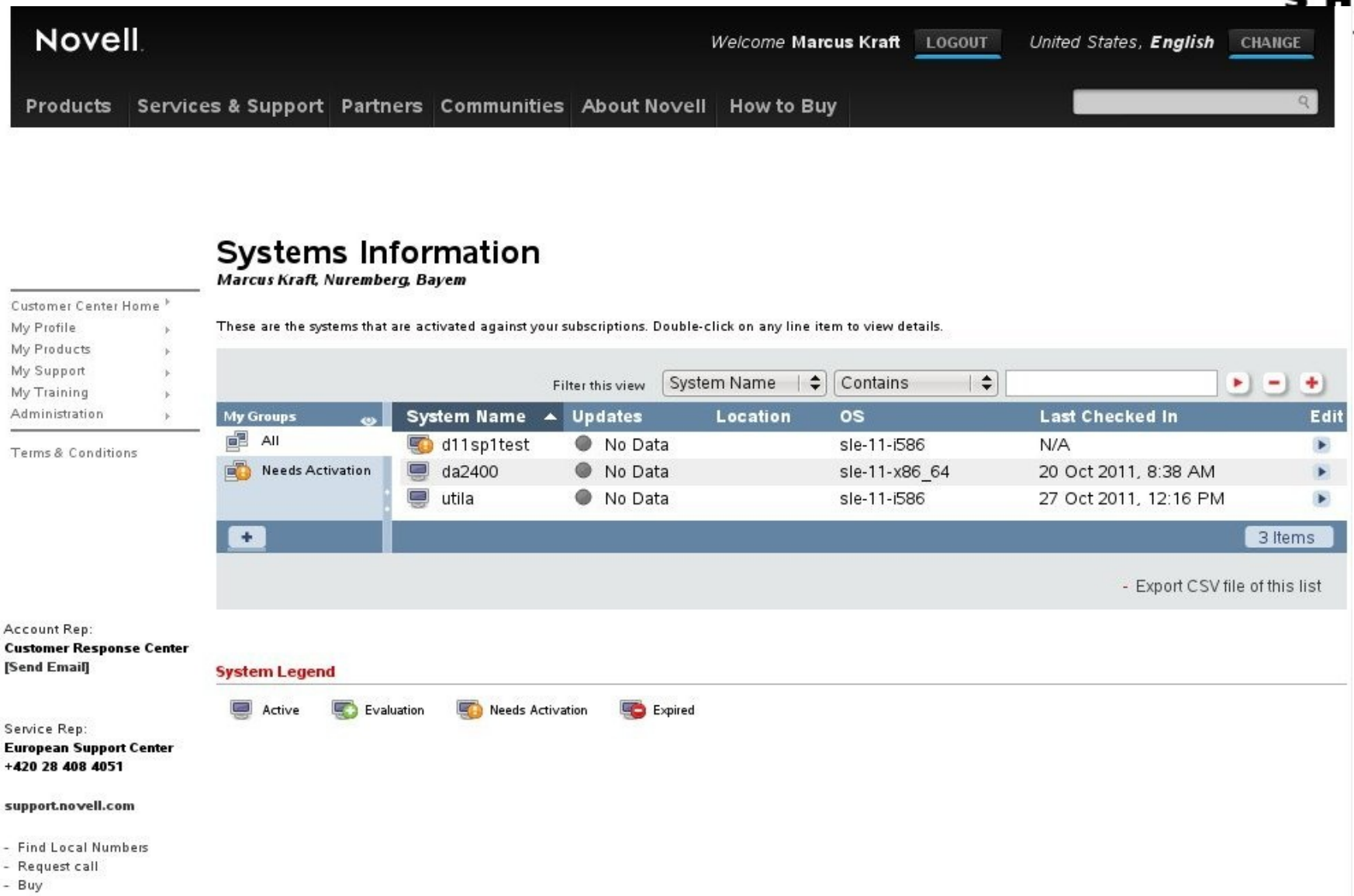
- **Customer benefit**

technical	business
• 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

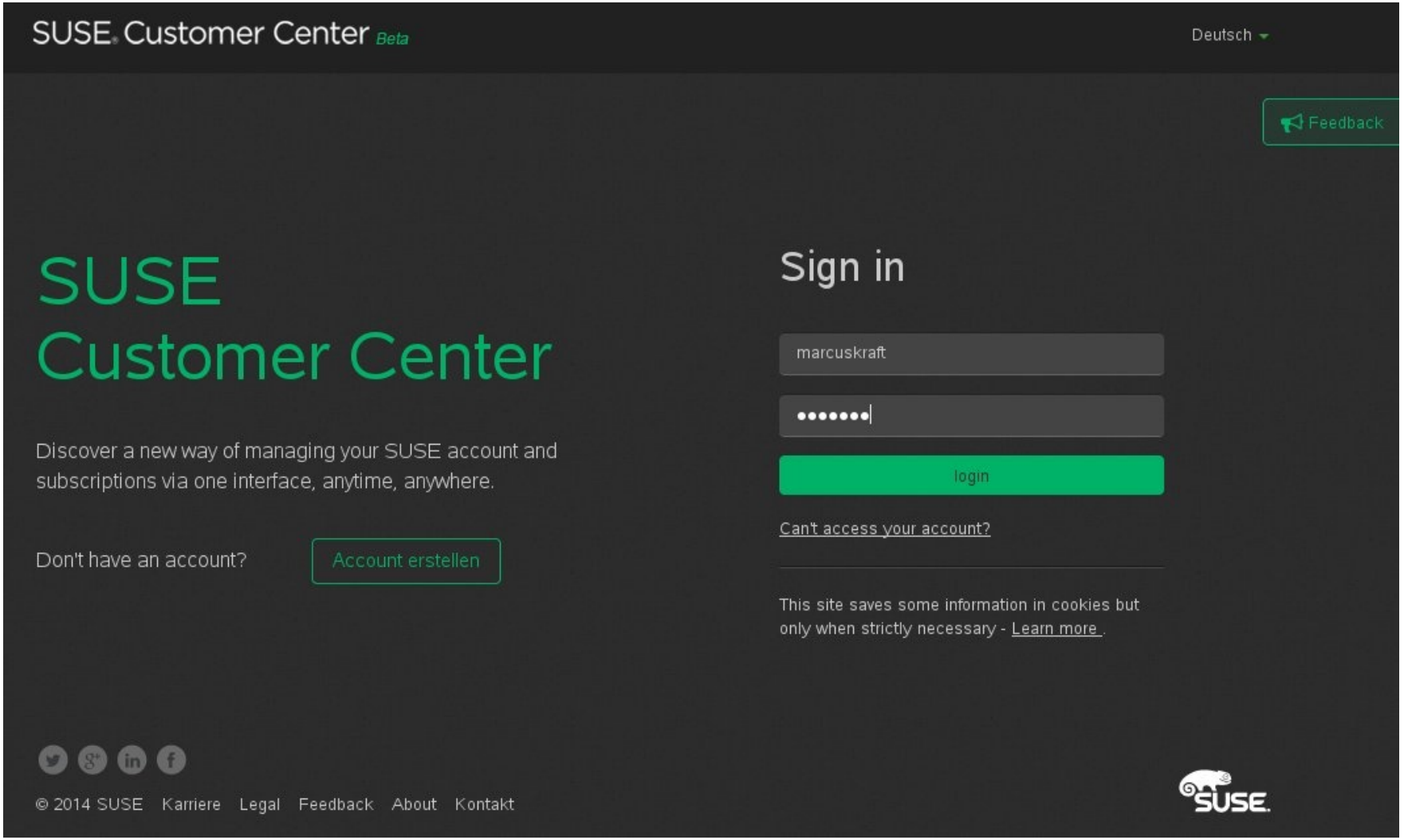
yes = included / no = not included
tbd = to be done

Novell Customer Center



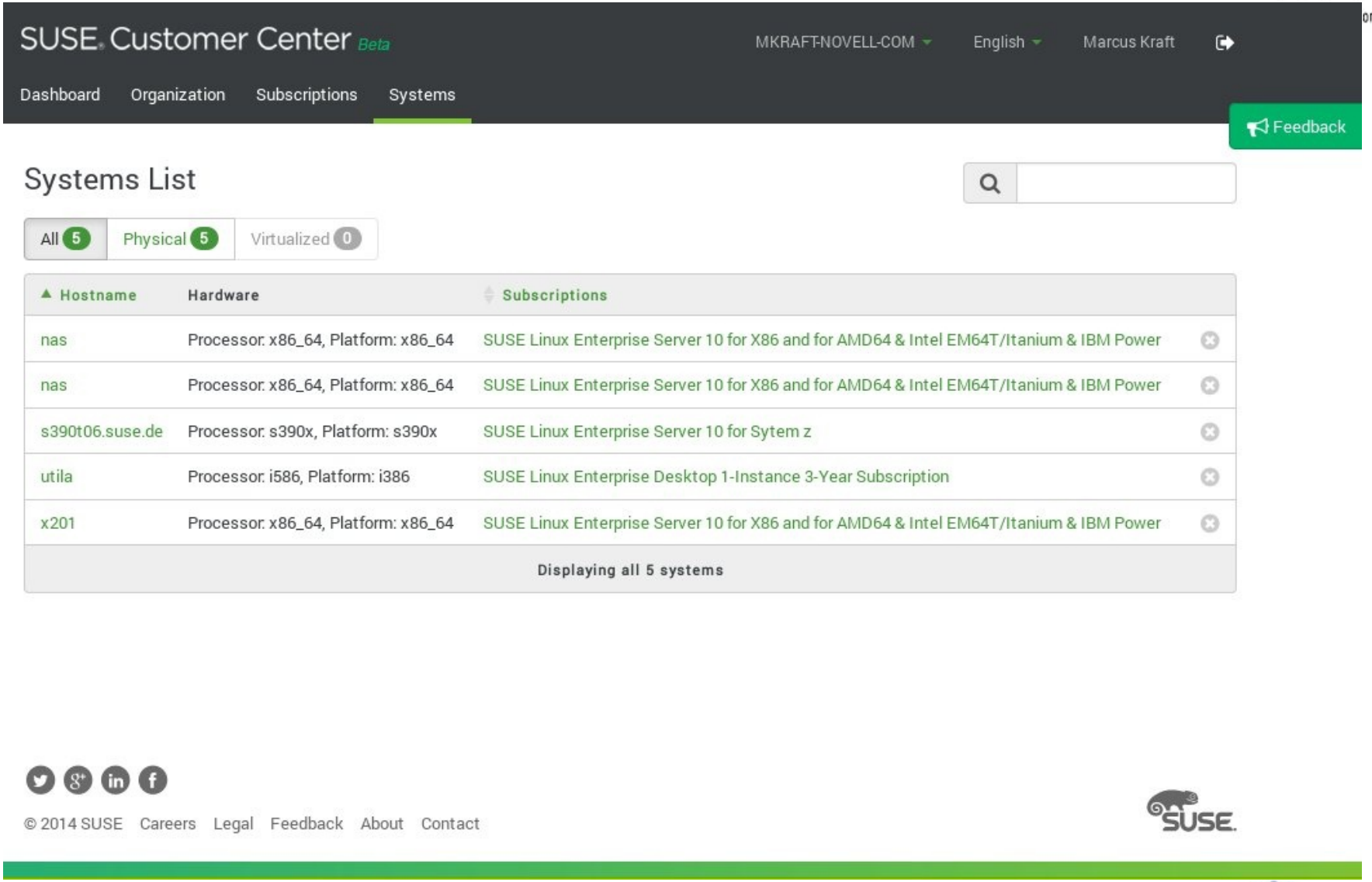
SUSE Customer Center

http://scc.suse.com



SUSE Customer Center

http://scc.suse.com

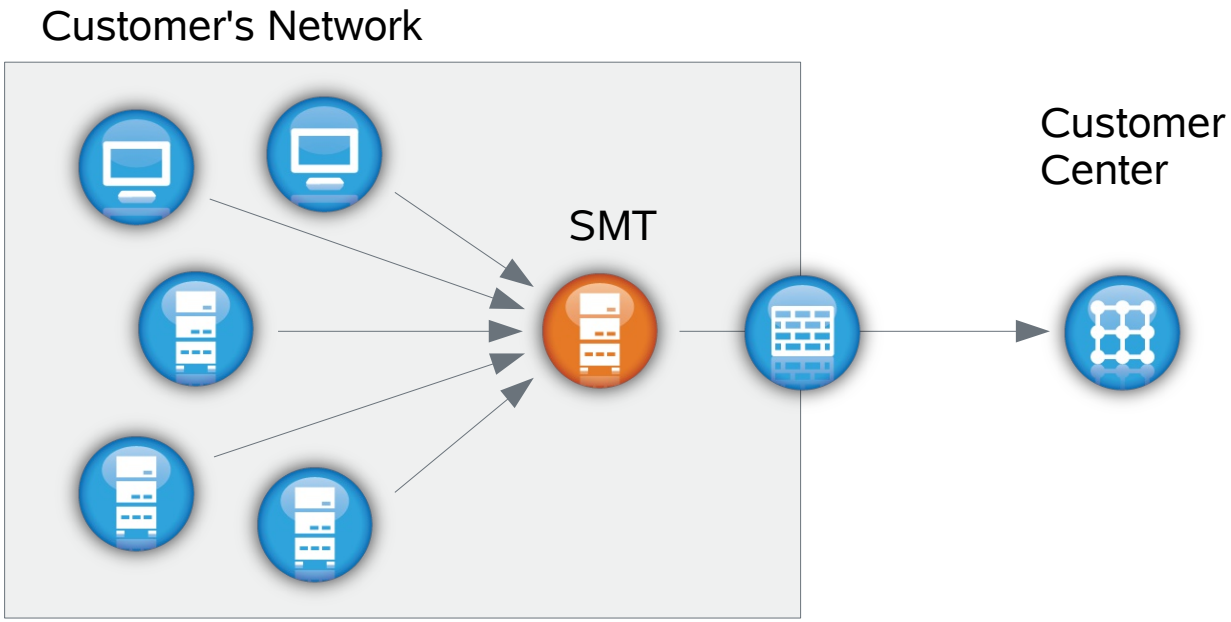


Subscription Management Tool

Overview

SMT is a proxy and auditing tool that mirrors the Customer Center and tightly integrates with it.

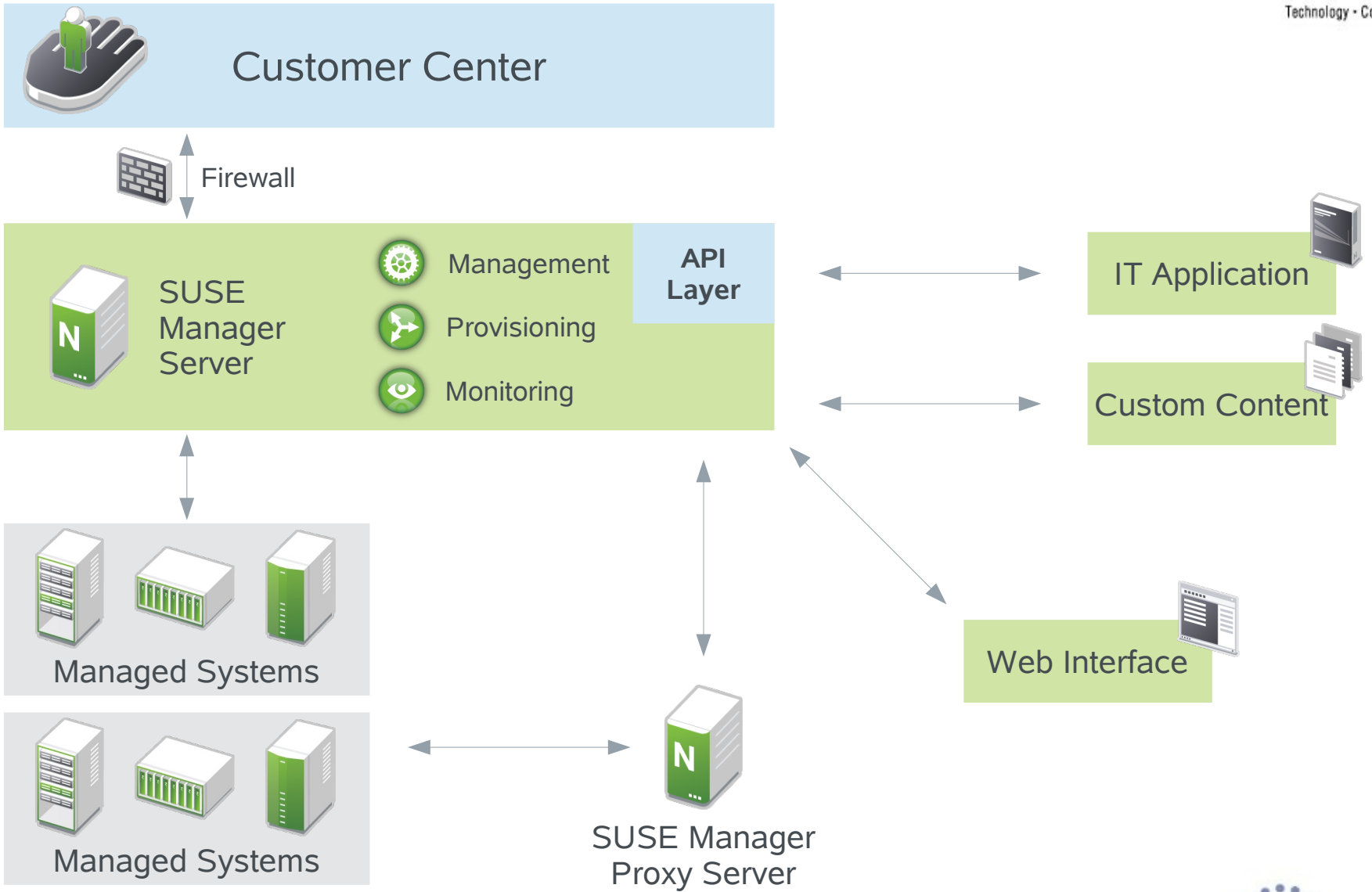
It allows you to accurately register and manage an entire SUSE® Linux Enterprise deployment, guaranteeing the subscription compliance and secure IT process flow organizations require.




IBM
zEnterprise
SUSE

SUSE Manager

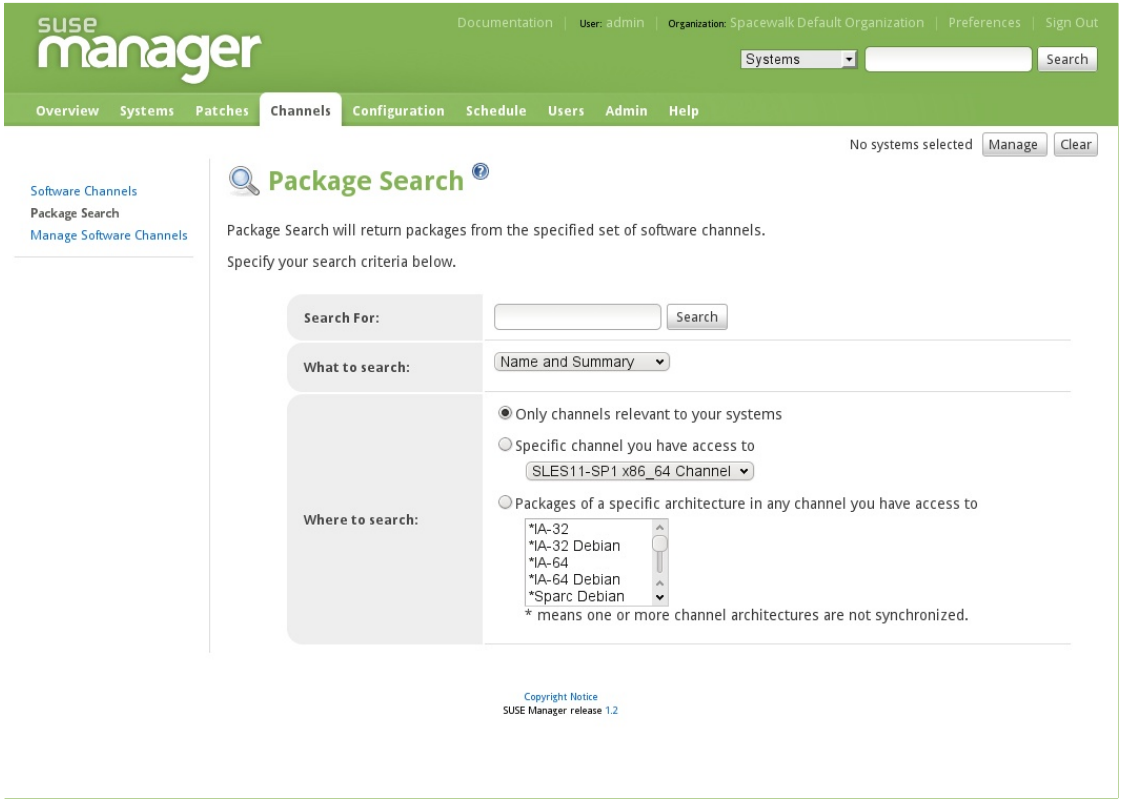
How Does SUSE Manager Work?



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



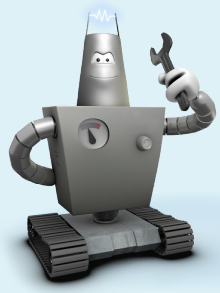
Summary

SHARE
Technology · Connections · Results

SHARE in Anaheim

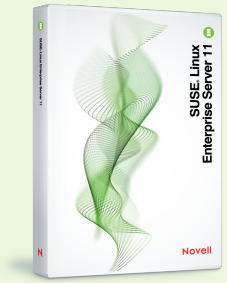
SUSE® Building Blocks

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

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

http://www.suse.com/lifecycle/policy.html

Product Support Lifecycle for SUSE Linux Enterprise Platform Solutions

	General Support			Extended Support
	Years 1-5	Year 6-7	Years 8-10	Years 11-13
Enhancement Requests	yes	yes[1]	no	no
Hardware Enablement/Optimization	yes	yes[1]	no	no
Defect Resolution	yes	yes	yes[2]	optional
Critical Security Updates	yes	yes	yes	optional
Installation and Configuration Support	yes	yes	yes	optional
Access to Patches and Fixes	yes	yes	yes	yes
Access to SUSE Knowledgebase	yes	yes	yes	yes
Access to Support Forums	yes	yes	yes	yes
Technical Subscriptions	yes	yes	yes	yes
Access to Documentation	yes	yes	yes	yes

1 Limited. Based on partner and customer requests.
2 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 stake holders
  - 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_sch...
          └ 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...
Apr 19 09:27:31 foobar systemd[1]: Started LSB: icecc.
```

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-logger 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.

    See also http://msdn.microsoft.com/en-us/library/hh554852.aspx