

SUSE[®] Linux Enterprise Server for System z

Installation Options and Software Lifecycle Management

Marcus Kraft

Product Manager SUSE Linux Enterprise Server for System z

mkraft@suse.com

Session 10739



Agenda

- Installation And Repositories
- Lifecycle Management



zEnterprise 196



z BladeCenter Extension

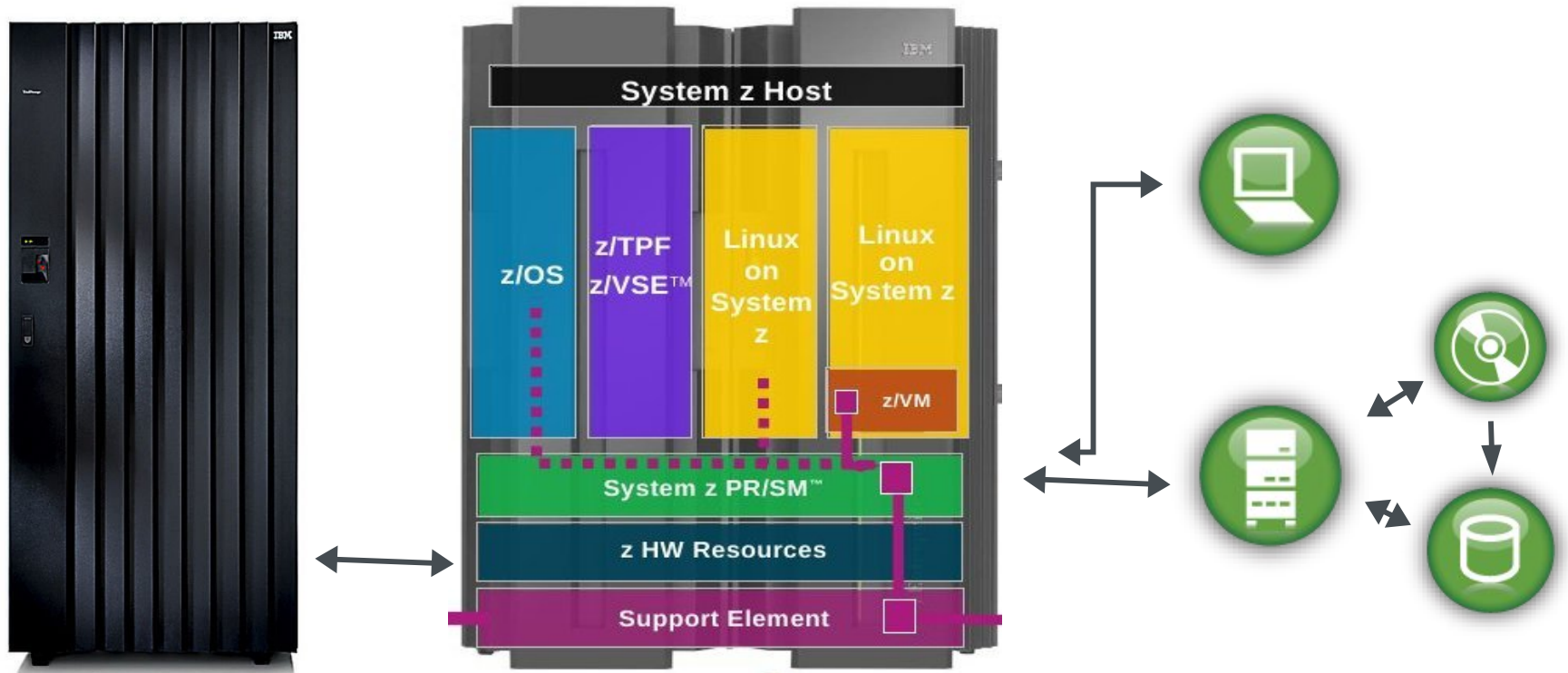


Installation And Setup

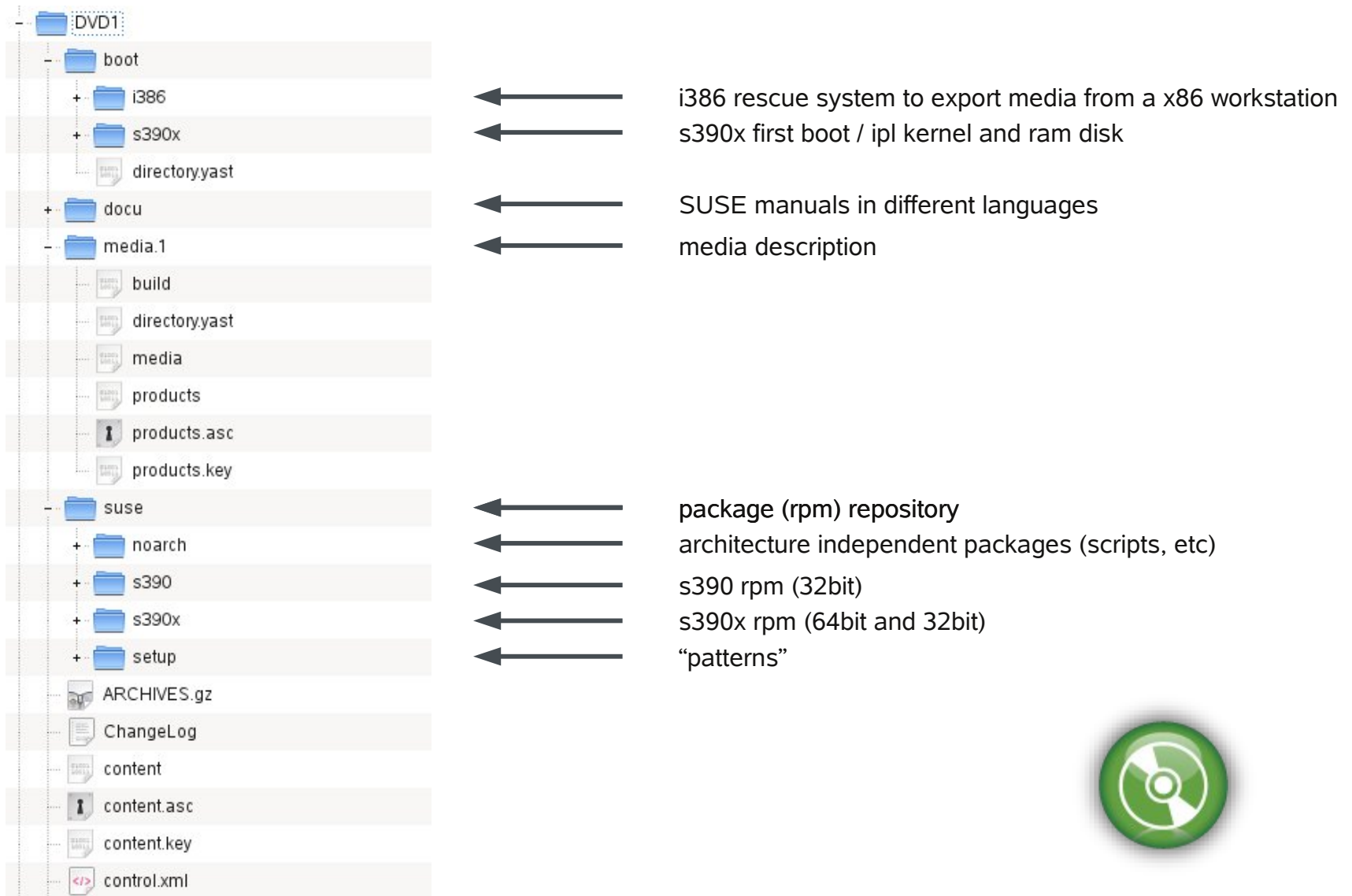
Installation And Setup

- Different options to deploy Linux: LPAR and/or z/VM
- Different ways to perform the initial OS installation
 - LPAR: Load from HMC / DVD or tape
 - z/VM: IPL from RDR, disk, or tape
 - IPL from an zFCP SCSI DVD
 - Installation via network from a server: ftp, nfs, http, smb
 - SLES Starter System
 - Cloning
 - KIWI images and CMSDDR (z/VM) or dd (Linux)
- SUSE Installation and Configuration Tool: YaST

Installation Environment



Installation Repository Tree



Installation Repository: Patterns

- + noarch
- + s390
- + s390x
- setup
- - descr
 - 32bit-11-38.13.9.s390x.pat.gz
 - apparmor-11-38.13.9.s390x.pat.gz
 - apparmor-32bit-11-38.13.9.s390x...
 - base-11-38.13.9.s390x.pat.gz
 - base-32bit-11-38.13.9.s390x.pat.gz
 - Basis-Devel-11-38.13.9.s390x.pat.gz
 - Basis-Devel-32bit-11-38.13.9.s39...
 - dhcp_dns_server-11-38.13.9.s390...
 - dhcp_dns_server-32bit-11-38.13.9...
 - directory_server-11-38.13.9.s390x...
 - directory_server-32bit-11-38.13.9.s...
 - directoryyast
 - documentation-11-38.13.9.s390x.p...
 - documentation-32bit-11-38.13.9.s...
 - file_server-11-38.13.9.s390x.pat.gz
 - file_server-32bit-11-38.13.9.s390x...
 - gateway_server-11-38.13.9.s390x...
 - gateway_server-32bit-11-38.13.9.s...
 - gnome-11-38.13.9.s390x.pat.gz
 - gnome-32bit-11-38.13.9.s390x.pat.gz
 - jeos-11-38.13.9.s390x.pat.gz



“patterns”



AppArmor pattern



base system pattern



gnome desktop pattern



jeos minimal pattern



Installation Repository: Packages

```
nas (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
libterm-0.5.20040304-259.27.s390x.rpm
libjasper-1.900.1-134.9.s390x.rpm
libjasper-32bit-1.900.1-134.9.s390x.rpm
libjpeg-32bit-6.2.0-879.10.s390x.rpm
libjpeg-6.2.0-879.10.s390x.rpm
libkde4-32bit-4.3.5-0.2.46.s390x.rpm
libkde4-4.3.5-0.2.46.s390x.rpm
libkdecore4-32bit-4.3.5-0.2.46.s390x.rpm
libkdecore4-4.3.5-0.2.46.s390x.rpm
libkdepim4-4.3.5-0.1.67.s390x.rpm
libkdepimlibs4-4.3.5-0.1.68.s390x.rpm
libkexiv2-7-4.3.5-0.1.74.s390x.rpm
libkipi6-4.3.5-0.1.74.s390x.rpm
libnotificationitem-1-1-4.3.5-0.1.64.s390x.rpm
libkonq5-4.3.5-0.1.74.s390x.rpm
libksba-1.0.4-1.16.s390x.rpm
liblazy1-0.2-35.16.s390x.rpm
liblcms1-1.17-77.14.19.s390x.rpm
liblcms1-32bit-1.17-77.14.19.s390x.rpm
libldap-2_4-2-2.4.20-0.4.29.s390x.rpm
libldap-2_4-2-32bit-2.4.20-0.4.29.s390x.rpm
libldapcddl-0.1.2-3.1.42.s390x.rpm
liblog4c3-1.2.1-10.34.s390x.rpm
liblog4c3-32bit-1.2.1-10.34.s390x.rpm
liblouis0-1.7.0-1.2.42.s390x.rpm
liblouis-1.7.0-1.2.42.s390x.rpm
libltdl7-2.2.6-2.131.1.s390x.rpm
libltdl7-32bit-2.2.6-2.131.1.s390x.rpm
liblua5_1-5.1.4-1.15.s390x.rpm
liblzo2-2-2.03-3.18.s390x.rpm
liblzo2-2-32bit-2.03-3.18.s390x.rpm
libMagickCore1-32bit-6.4.3.6-7.20.1.s390x.rpm
libMagickCore1-6.4.3.6-7.20.1.s390x.rpm
libmcrypt-2.5.8-43.21.s390x.rpm
2059
yast2-pkg-bindings-2.17.45-0.2.10.s390x.rpm
yast2-printer-2.17.63-0.2.43.s390x.rpm
yast2-profile-manager-2.17.1-1.53.s390x.rpm
yast2-python-bindings-2.17.4-1.27.s390x.rpm
yast2-qt-2.18.11-0.2.12.s390x.rpm
yast2-qt-pkg-2.18.20-1.2.35.s390x.rpm
yast2-s390-2.17.16-0.2.46.s390x.rpm
yast2-slp-2.16.0-1.37.s390x.rpm
yast2-sound-2.17.16-0.1.1.s390x.rpm
yast2-squid-2.17.11-0.3.46.s390x.rpm
yast2-storage-2.17.99-0.2.5.s390x.rpm
yast2-storage-lib-2.17.99-0.2.5.s390x.rpm
yast2-transfer-2.16.2-0.1.126.s390x.rpm
yast2-tune-2.17.7-1.28.s390x.rpm
yast2-update-2.17.20-0.2.52.s390x.rpm
yast2-users-2.17.43-0.2.20.s390x.rpm
yast2-xml-2.16.1-1.23.s390x.rpm
yast2-ycp-ui-bindings-2.18.5-1.1.60.s390x.rpm
yelp-2.28.1-1.1.163.s390x.rpm
yelp-lang-2.28.1-1.1.163.s390x.rpm
ypbind-1.22-1.17.s390x.rpm
ypserv-2.22-0.1.35.s390x.rpm
yp-tools-2.12-0.2.5.s390x.rpm
yudit-2.9.0-71.17.s390x.rpm
zenity-2.28.0-1.1.230.s390x.rpm
zenity-lang-2.28.0-1.1.230.s390x.rpm
zip-2.32-75.21.s390x.rpm
zisofs-tools-1.0.6-138.22.s390x.rpm
zlib-1.2.3-106.34.s390x.rpm
zlib-32bit-1.2.3-106.34.s390x.rpm
zoo-2.10-911.22.s390x.rpm
zsh-4.3.6-67.5.s390x.rpm
zypper-1.3.7-0.2.1.s390x.rpm
nas:/data/space/install/sles11splz/suse/s390x # █
```


Installation Server Example

Different options are available

- nfs, ftp, smb, http
 - Either use DVD or copy DVD content to a directory
 - Windows: export DVD via smb shares
 - Linux: nfs, ftp, http, samba server (nfs from rescue disk)
- Example: ftp
 - Create and export target directory on ftp server
 - eg. /srv/ftp/sles11sp1s390x/
 - Copy all (hidden) files and subdirectories to target directory
 - Test ftp access to target dir and list files (also in sub dirs)
 - Note down TCP/IP address of ftp server, and target dir
- Alternative: SLES Starter System
 - Download images, use with z/VM

Resource Recommendations (1)

Memory

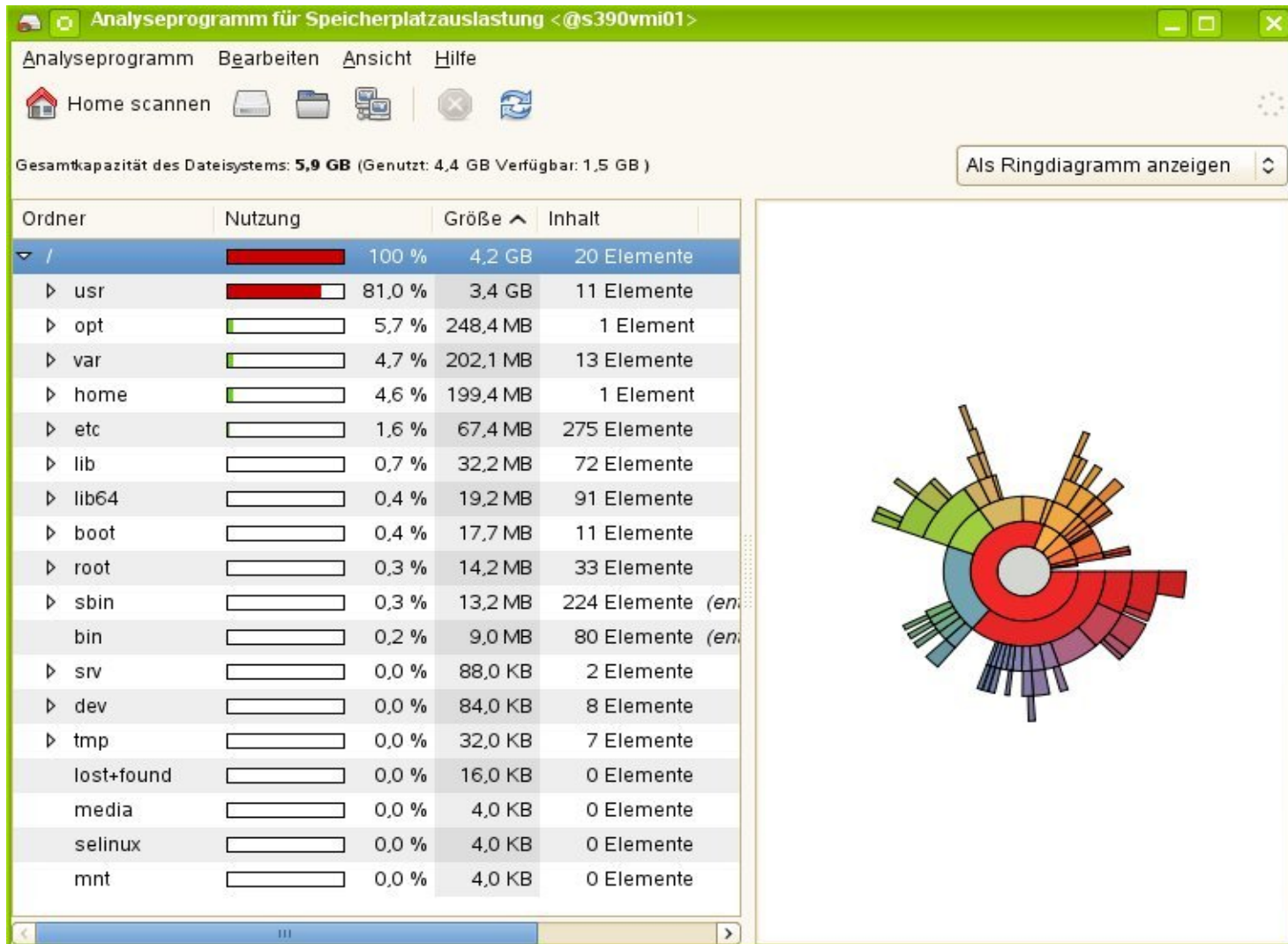
- Different install methods, other memory requirements
 - 512 MB RAM for installation with text UI (ssh)
 - 1 GB RAM for installation with GUI (X11, vnc)
- Use kernel parameter `cio_ignore` to mask out devices
 - The number of devices visible to the z/VM guest or LPAR image affects memory requirements.
 - Installation with hundreds of accessible devices (even if unused for the installation) may require more memory
 - After installation is completed, adjust memory to workset size if using an z/VM guest

Resource Recommendations (2)

Disk Storage

- Disk requirements depend on installation type
 - Text based or GUI (X11, vnc)
- Minimal requirements
 - 0.6 GB for JeOS (just enough operating system)
 - 2.6 GB for default installation
 - 3.6 GB recommended (with graphical desktop, development packages and java)
- Add space for logs, data and updates
- Add space for additional packages
- Commonly, you need more space than the installation software itself needs to have a system that works properly.

Installed System: File System Stats



Another File System Layout

- # df -h

- Filesystem Size Used Avail Use% Mounted on

- /dev/dasda1 388M 119M 250M 33% /

- /dev/dasda2 97M 4.2M 88M 5% /home

- /dev/dasda3 74M 21M 50M 30% /opt

- /dev/dasdb1 291M 17M 260M 6% /tmp

- /dev/dasdb2 1.2G 915M 183M 84% /usr

- /dev/dasdb3 245M 69M 164M 30% /var

- /dev/dasdc1 1.2G 1.1G 100M 92% /srv

High Level Installation Workflow (1)

- First stage

- IPL kernel, parmfile and initial ram disk are loaded into memory via rdr, kernel decompress itself and initializes the system
- Initial RAM disk is mounted (lives in memory), contains linuxrc
- Linuxrc takes over (small environment incl. scripts)
- Interactive scripts prompt for network configuration
- Establish access to installation server via network
- Network connection info is posted for remote login

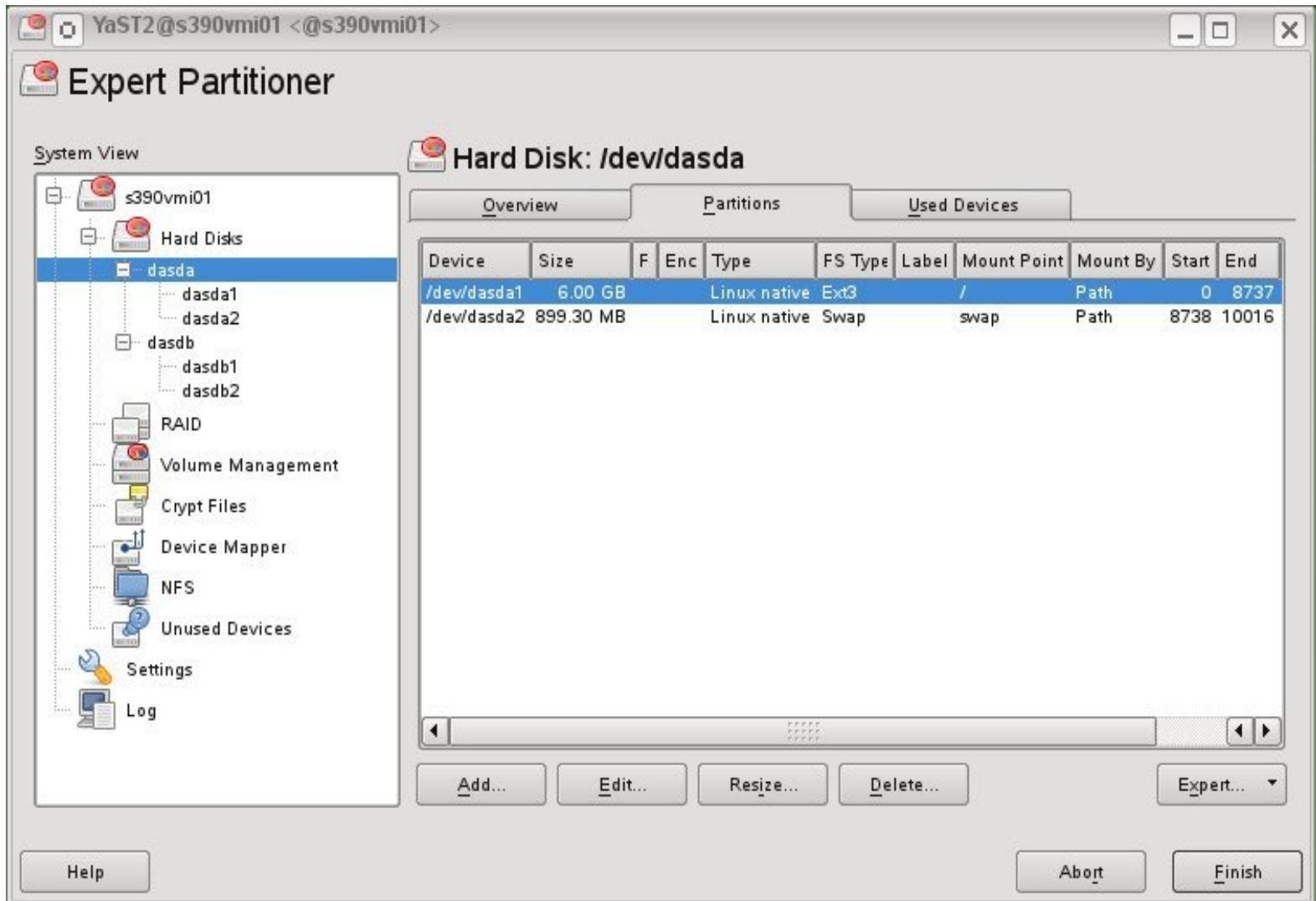
- Second stage

- ...

High Level Installation Workflow (2)

- Second stage
 - Remote access using text based terminal or graphical GUI
 - YaST (text based or GUI) takes over
 - User enters system settings (language, keyboard, ...)
 - User enters system config data (disk storage, software patterns, etc)
 - ...

YaST



YaST

The screenshot shows the YaST2 configuration window for a system named 's390vmi01'. The window is divided into several sections:

- Left Panel (Pattern Selection):** Shows a tree view of installation patterns. The 'Basistechnologien' (Basic Technologies) pattern is selected, and its sub-items are checked: 'Basissystem', 'Novell AppArmor', 'Hilfe und Support-Dokumentation', and 'Minimales System (Appliances)'. Other patterns like 'Grafische Umgebun...', 'Primäre Funktionen', and 'DHCP- und DNS-Server' are also visible but not selected.
- Right Panel (Package List):** A table listing installed and available packages. The 'ConsoleKit' package is selected and highlighted in blue.

Package	Summary	Installed (Available)	Size
<input checked="" type="checkbox"/> ConsoleKit	System daemon for tracking users, se...	0 2.10-64.65.1	326,0 KiB
<input checked="" type="checkbox"/> OpenIPMI	OpenIPMI	2.0.16-0.3.29	5,3 MiB
<input checked="" type="checkbox"/> PolicyKit	Authorization Toolkit	0.9-14.34.9	453,0 KiB
<input checked="" type="checkbox"/> SuSEfirewall2	Stateful Packet Filter Using iptables ...	3.6_SVN#208-2.5.1	234,0 KiB
<input checked="" type="checkbox"/> acl	Commands for Manipulating POSIX ...	2.2.47-30.34.29	200,0 KiB
<input checked="" type="checkbox"/> at	A Job Manager	3.1.8-1069.18.2	125,0 KiB
<input checked="" type="checkbox"/> attr	Commands for Manipulating Extend...	2.4.43-1.18	158,0 KiB
<input checked="" type="checkbox"/> audit-libs	Dynamic library for libaudit	1.7.7-5.16	162,0 KiB
<input checked="" type="checkbox"/> autofs	A Kernel-Based Automounter	5.0.5-11.13.1	1,7 MiB
<input checked="" type="checkbox"/> autoyast2	YaST2 - Automated Installation	2.17.43-0.2.36	1,6 MiB
<input checked="" type="checkbox"/> autoyast2-installation	YaST2 - Auto Installation Modules	2.17.43-0.2.36	1,4 MiB
<input checked="" type="checkbox"/> bc	GNU Command Line Calculator	1.06-838.15	255,0 KiB
<input checked="" type="checkbox"/> bind-libs	Shared libraries of BIND	9.6ESVR4P3-0.4.3.1	3,4 MiB
<input checked="" type="checkbox"/> bind-utils	Utilities to query and test DNS	9.6ESVR4P3-0.4.3.1	1,0 MiB
<input checked="" type="checkbox"/> binutils	GNU Binutils	2.20.0-0.7.9	13,1 MiB

ConsoleKit Details:

Description | **Technical Data** | **Dependencies** | **Versions** | **File List** | **Change Log**

ConsoleKit - System daemon for tracking users, sessions and seats

ConsoleKit is a system daemon for tracking what users are logged into the system and how they interact with the computer (e.g. which keyboard and mouse they use).

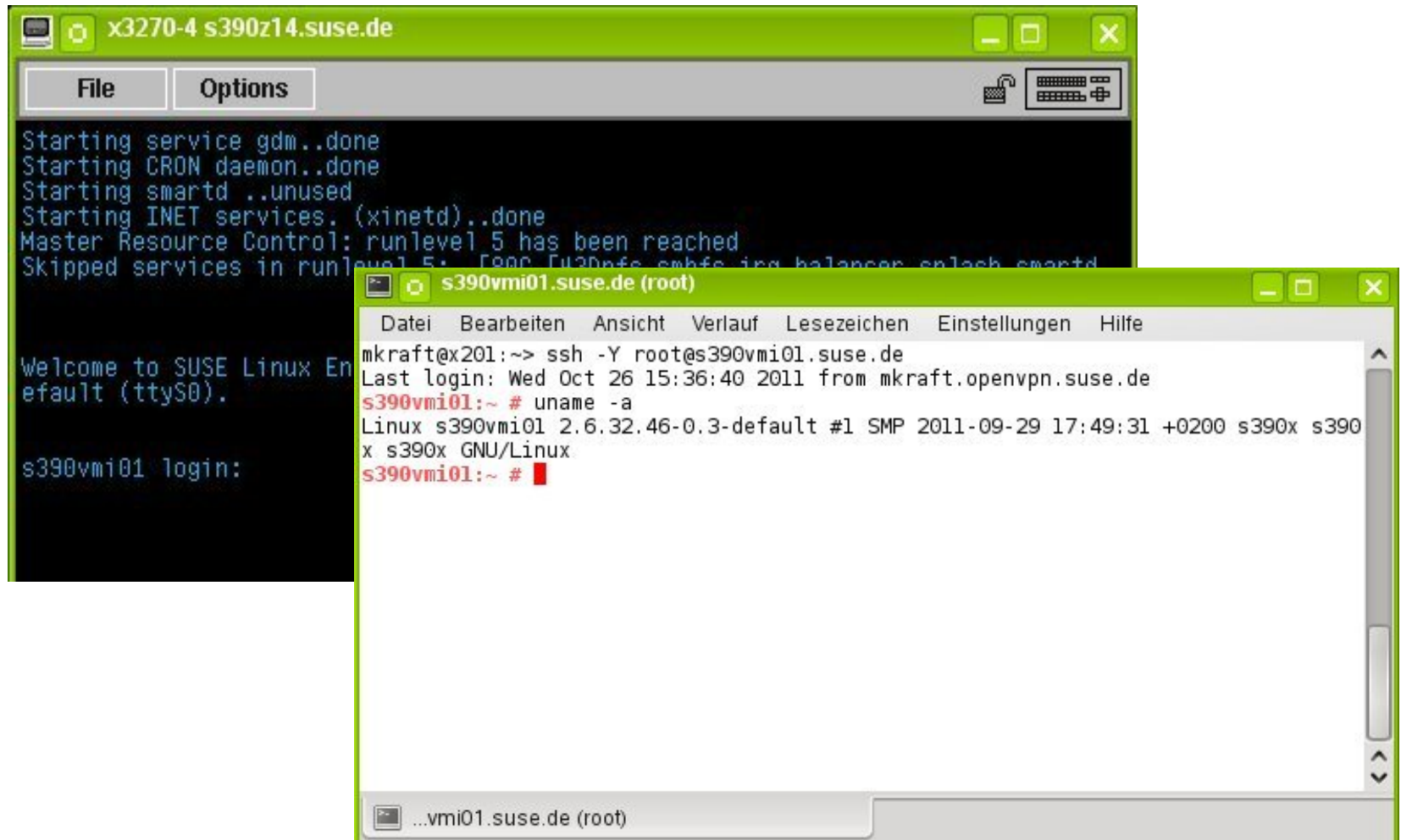
Supportability: Stufe 3

Buttons: **Cancel** | **Accept**

High Level Installation Workflow (3)

- Second stage
 - ...
 - Software packages are fetched from installation server
 - Packages are unpacked, installed, post processed
 - Final system config settings are prompted (eg. user/password)
 - Boot loader is written (zipl), YaST terminates
 - Initial reboot to new system
 - Login prompt ... done.

First Login, what is next ?



The image shows two terminal windows. The top window, titled 'x3270-4 s390z14.suse.de', displays system startup logs for SUSE Linux Enterprise Server. The bottom window, titled 's390vmi01.suse.de (root)', shows a remote login session from 'mkraft@x201' to 's390vmi01.suse.de' via SSH. The user runs 'uname -a' to display system information.

```
x3270-4 s390z14.suse.de
File Options
Starting service gdm..done
Starting CRON daemon..done
Starting smartd ..unused
Starting INET services. (xinetd)..done
Master Resource Control: runlevel 5 has been reached
Skipped services in runlevel 5: [900 [430nfs smbfs iing balancer enlshc smartd

Welcome to SUSE Linux Enterprise Server 11 SP2 (ttyS0).
s390vmi01 login:

s390vmi01.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
mkraft@x201:~> ssh -Y root@s390vmi01.suse.de
Last login: Wed Oct 26 15:36:40 2011 from mkraft.openvpn.suse.de
s390vmi01:~ # uname -a
Linux s390vmi01 2.6.32.46-0.3-default #1 SMP 2011-09-29 17:49:31 +0200 s390x s390x
s390x GNU/Linux
s390vmi01:~ #
```

RTFM – Read The Fine Manual



Let's do it again – with less interaction

- Parmfile – automating the initial system configuration
 - The installation process can be partly automated by specifying the crucial parameters in the parmfile.
 - The parmfile contains all the data required for network setup and disk storage configuration. In addition to that, it can be used to set up the connection to the installation server.
 - User interaction is thus limited to the actual YaST installation controlled by YaST dialogs.

Parmfile Entries

- Scope And Usage

- The number of lines in the parmfile is limited to 10.
- Specify more than one parameter on a line.
- Parameter names are not case-sensitive.
- Separate the parameters by spaces. Any order is allowed.
 - ramdisk_size=131072 root=/dev/ram1 ro init=/linuxrc TERM=dumb
HostIP=10.11.134.65 Hostname=s390zvm01.suse.de Domain=suse.com
Gateway=192.168.1.3 Nameserver=192.168.1.4 InstNetDev=osa
Netmask=255.255.255.0 Broadcast=192.168.255.255
OsaInterface=qdio OsaMedium=eth PortNo=1 ReadChannel=0.0.0524
WriteChannel=0.0.0525 DataChannel=0.0.0526 Portname=FEF400
UseSSH=1 SSHPassword=testing

**Install=nfs://server/directory/sles11sp1/
AutoYaST=<URL> Manual=0 Info=<URL>**

Recycle

- First stage

- Kernel `vmrdr.ikr`
- Parmfile `parmfile`
- Initial RAM Disk `initrd`

- Second Stage

- Linuxrc reads parmfile
- YaST / user interaction on various settings ...
- Fetch from repositories, install, post processing, reboot
- Login ... done.

Once again ...



AutoYaST – even more efficient

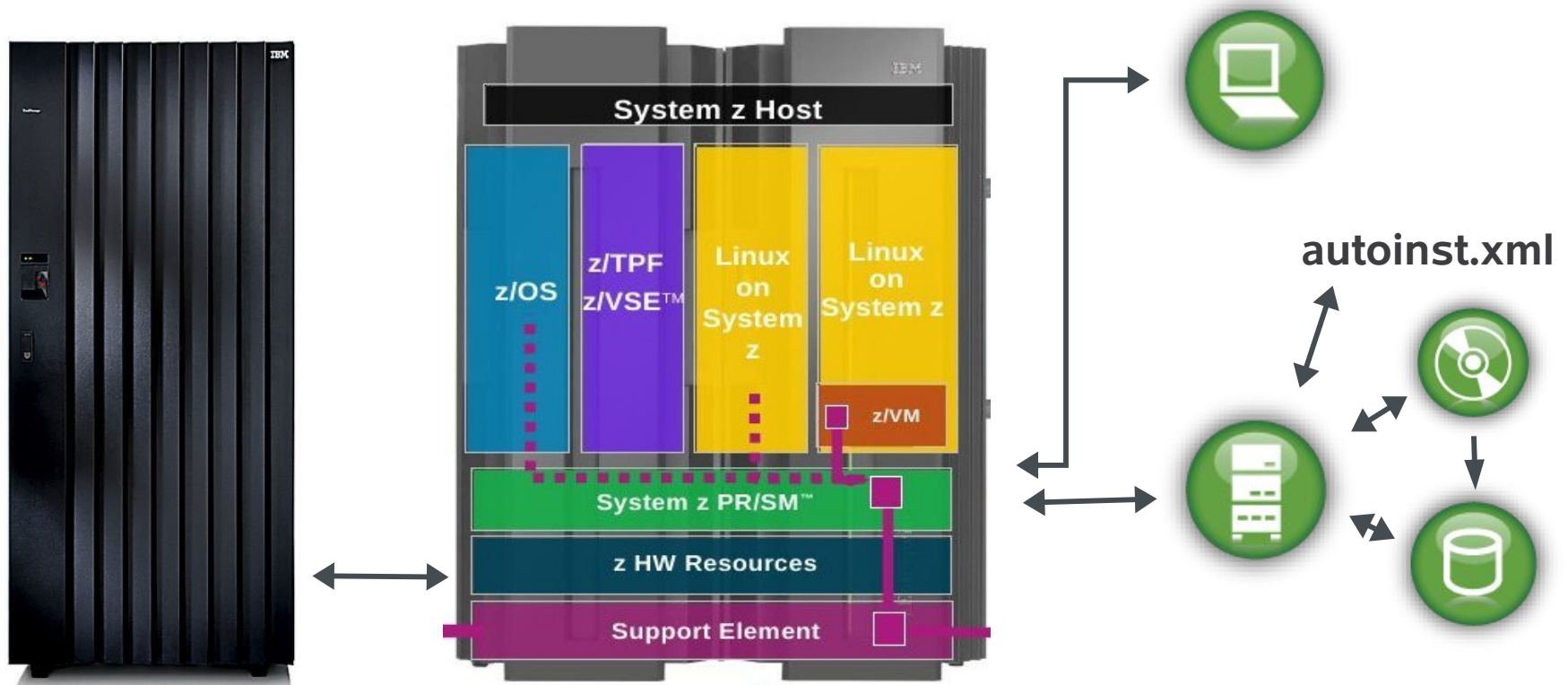
Unattended Automated Installation



• AutoYaST

- AutoYaST is a system for installing one or more SUSE systems automatically and without user intervention.
- AutoYaST is rules based and can suite different types of hardware resources and system purposes
- AutoYaST installations are performed using an autoyast profile with installation and configuration data (eg. autoinst.xml) and can be provided to YaST2 during installation in different ways. (eg. retrieved from a remote location).
- The profile can be created using the configuration interface of AutoYaST or command line tools
- Use vnc (GUI) 'mode' for unintended installation
- **parmfile:**
AutoYaST=<URL> Info=<URL>
linuxrclog=/dev/console usevnc=1 vncpassword=testing

Installation Environment (2)



autoinst.xml (1)

```
<?xml version="1.0" ?>
<!DOCTYPE profile>
<profile xmlns="http://www.suse.com/1.0/yast2ns" xmlns:config="http://www.suse.com/1.0/configs">
  <add-on>
    <add_on_products config:type="list"/>
  </add-on>
  <ca_mgm>
  <dasd>
    <devices config:type="list">
      <listentry>
        <bus>None</bus>
        <bus_hwcfg>none</bus_hwcfg>
        <channel>0.0.0150</channel>
        <class_id config:type="integer">262</class_id>
        <detail>
          <dev_name>/dev/dasda</dev_name>
          <dev_names config:type="list">
            <listentry>/dev/dasda</listentry>
            <listentry>/dev/disk/by-path/ccw-0.0.0150</listentry>
          </dev_names>
          <dev_num>
            <device>DASD</device>
            <device_id config:type="integer">276880</device_id>
            <driver>io_subchannel</driver>
            <drivers config:type="list">
              <formatted config:type="boolean">true</formatted>
              <hotpluggable config:type="boolean">true</hotpluggable>
            </drivers>
            <model>IBM DASD</model>
            <old_unique_key>N5EP.r0ENMk3aQ50</old_unique_key>
            <partition_info>/dev/dasda1 (Linux native), /dev/dasda2 (Linux native)</partition_info>
            <prog_if config:type="integer">1</prog_if>
            <resource>
              <disk_log_geo config:type="list">
                <listentry>
                  <cylinders config:type="integer">10017</cylinders>
                  <heads config:type="integer">15</heads>
                  <sectors config:type="integer">12</sectors>
                </listentry>
              </disk_log_geo>
            </resource>
          </detail>
        </listentry>
      </devices>
    </ca_mgm>
  </add-on>
</profile>
```

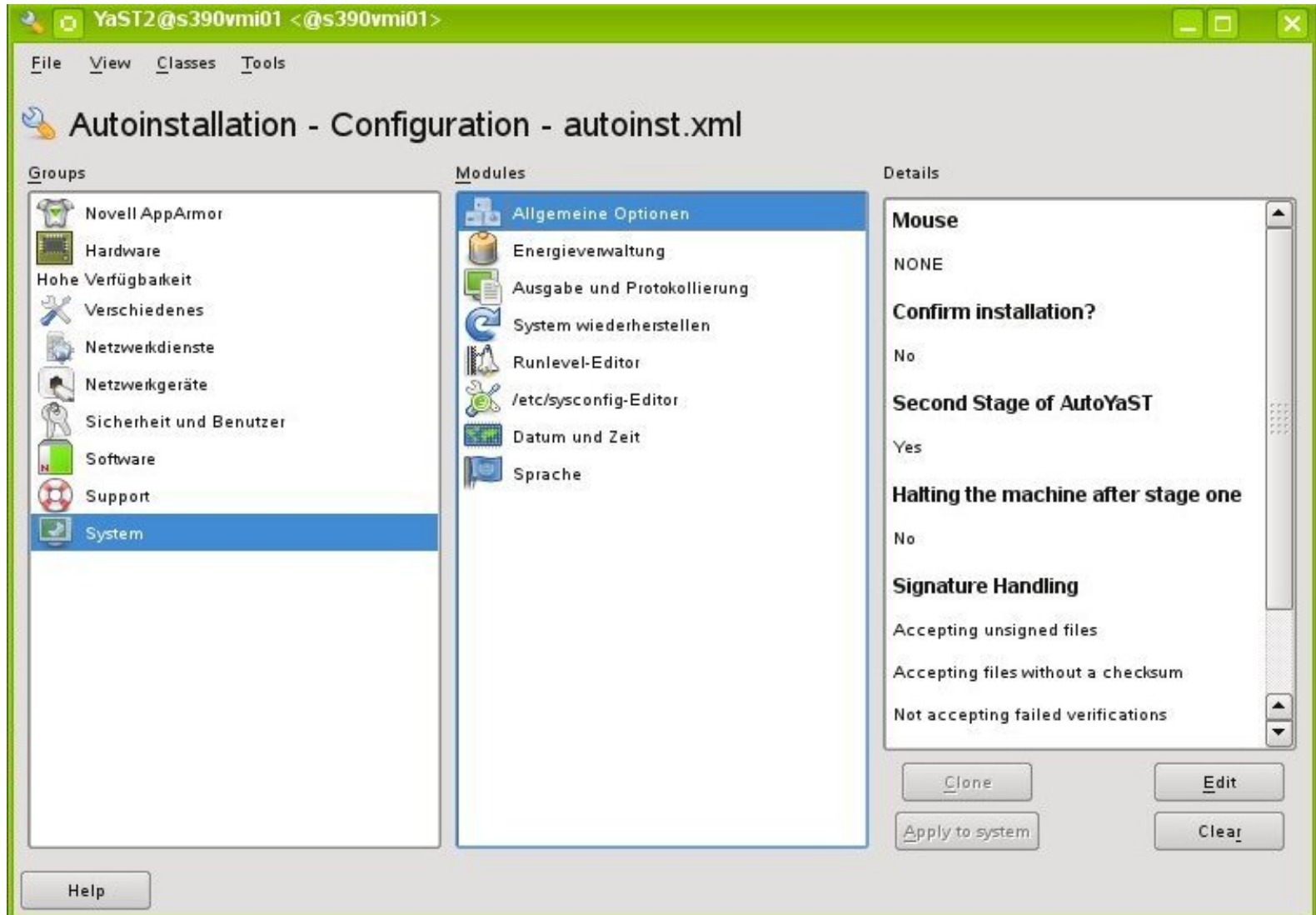
autoinst.xml (2)

```
<runlevel>
  <default>5</default>
</runlevel>
<software>
  <patterns config:type="list">
    <pattern>Minimal</pattern>
    <pattern>apparmor</pattern>
    <pattern>base</pattern>
    <pattern>documentation</pattern>
    <pattern>file_server</pattern>
    <pattern>gnome</pattern>
    <pattern>kde</pattern>
    <pattern>print_server</pattern>
    <pattern>sdk_kernel</pattern>
    <pattern>x11</pattern>
  </patterns>
  <packages config:type="list">
    <package>bonnie</package>
    <package>cmsfs</package>
    <package>ConsoleKit-32bit</package>
    <package>mc</package>
    <package>kernel-docs</package>
    <package>kernel-syms</package>
    <package>Mesa-32bit</package>
    <package>PolicyKit-32bit</package>
```

AutoYaST Tools

- Clone existing configuration
 - At the end of the initial installation (reuse for reproduction)
 - Later in a configured and operational system
 - `# yast2 clone_system → autoinst.xml`
- Edit and Modify
 - `# yast2 autoyast → load autoinst.xml → edit → save`
 - autoinst.xml is just the default file name

AutoYaST GUI





Let's do it once again – cloning

Most used, proven, fast

- Cloning

- Based on already installed and configured system
- Done at z/VM level or with a dedicated Linux system
- Advantages
 - Prepared 'golden' images of different types (“image warehouse”)
 - Configuration parameters can be stored 'outside' the system for self customization at IPL
 - Fast, due to disk storage copying speed
- Drawbacks
 - Images need to be customized before production, fixed disk storage size
 - Software updates of golden images requires care
 - Logging / tracking of changes if golden images evolve over time

Let's do it different

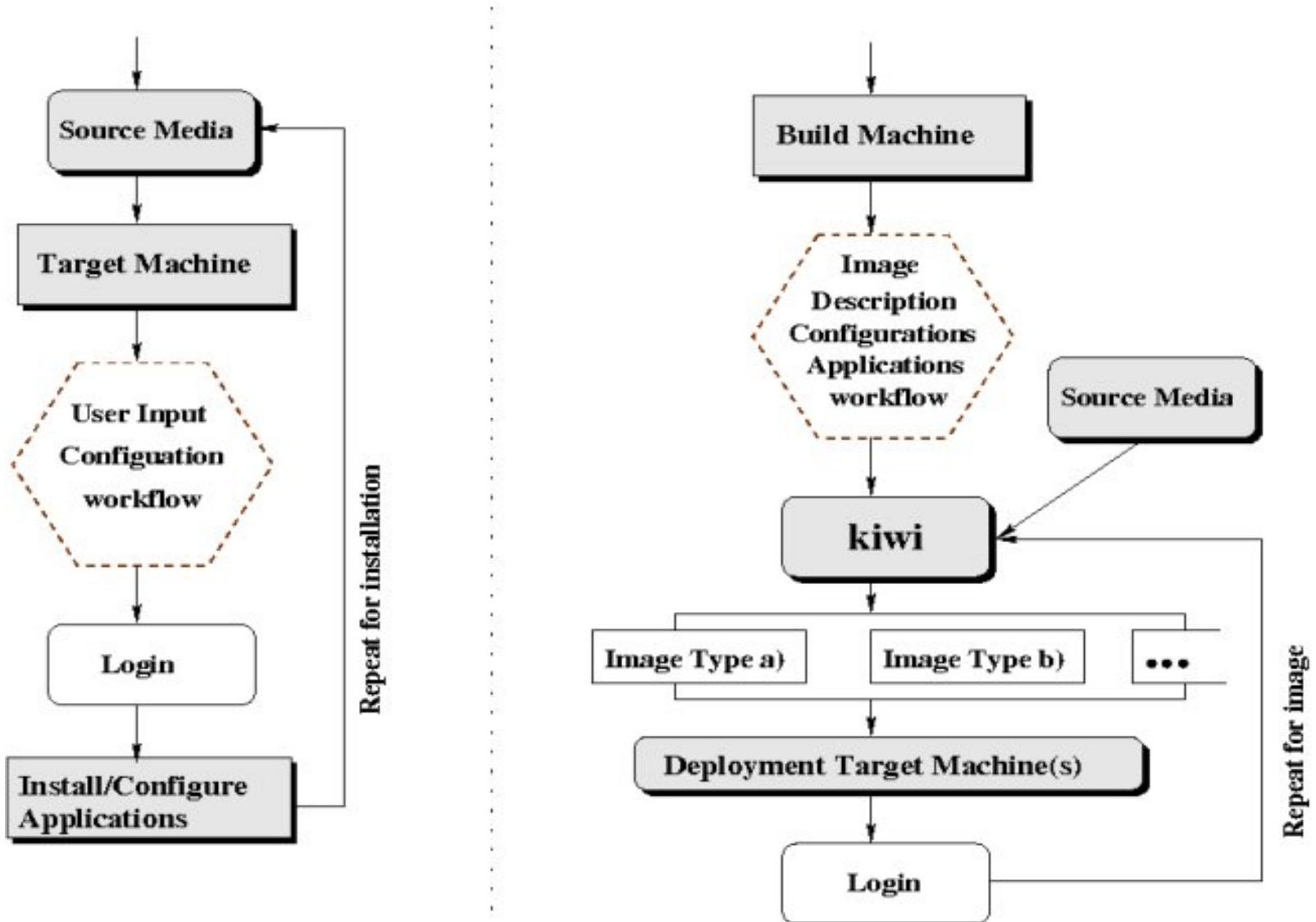
Cold Install

- kiwi

- Scriptable command line tool that builds software images from a description file and repositories
- Generate suitable image format for different deployment types
- Reproducible
- To access kiwi & documentation, add SDK as a repository and issue 'zypper se kiwi'



Kiwi Image Build Process



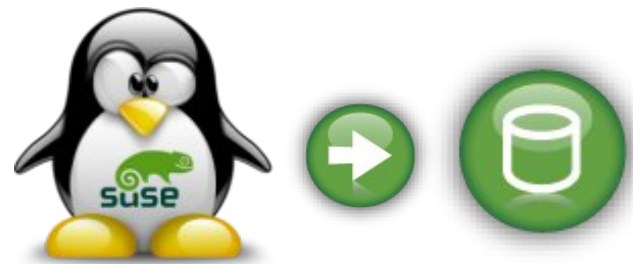
Kiwi Image Types

- Supported x86-64 image types
 - Virtual disk formats (vmx, usb, iso)
 - Virtual disk OEM images: able to repartition to real disk size
- Supported s390x image types
 - Virtio disk with kvm_s390x
 - DASD disk with Linux, z/VM and/or LPAR
 - SCSI/zFCP disk with Linux, z/VM and/or LPAR



Kiwi Image Disk Storage Deployment

- Using z/VM
 - Transfer image to z/VM via FTP
 - CMSDDR
 - <http://www.vm.ibm.com/download/packages/cmsddr.vmarc>
- Using existing Linux system
 - dasd_configure <target_dasd> 1
 - dd if=Appliance_image.dasd of=/dev/<target_device> bs=4k
 - sync
 - dasd_configure <target_dasd> 0
- IPL from target device



Lifecycle Management

How to build an operating system ?

Things need to work together

- Kernel
- Device drivers
- Userland
 - Tools
 - Applications
 - Documentation
- Where to place file?
 - FHS, LFS
- And updates ?

Delivery: Archives

Grouping applications, configs, and docs

- Multiple files
 - Combine to single archive
 - cpio, tar, zip, zap, zoom, ...
- Multiple locations
- Fire & forget ?
- Updates ?
- Where to place ?
- Prerequisites
 - Build environment
- Dependencies
 - Execution environment

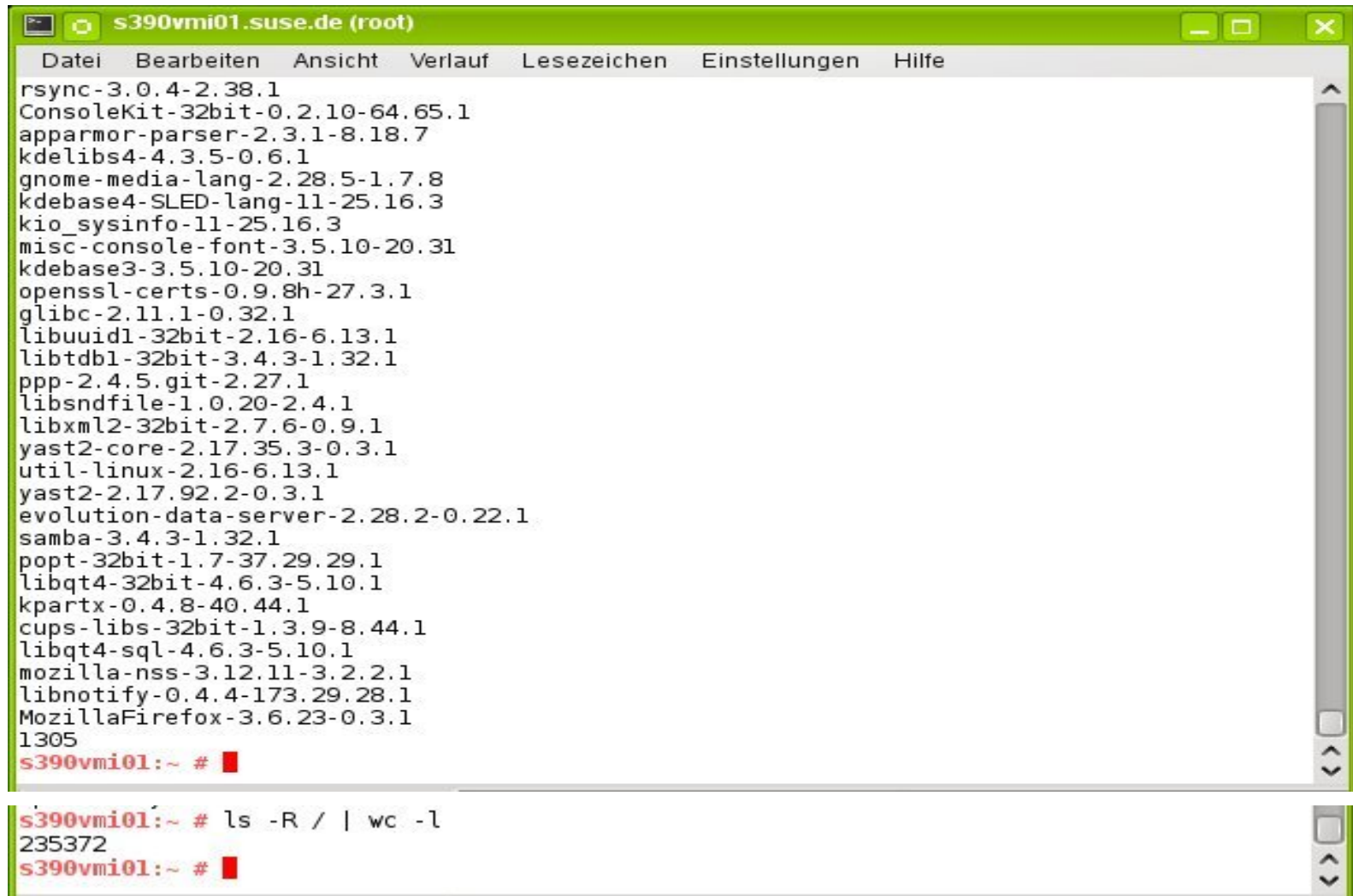
The Quartermaster

Knowing where files are to be placed

- Red Hat Package Manager (rpm)
 - Source code packages to build applications (w/ spec file & change log)
 - Executables, config files and documentation included in rpm to deploy and uninstall applications
 - Meta data management by rpm
 - rpm database
 - file locations
 - requirements and dependencies tracking
 - Install, Update and delete
 - Changes and check sum tracking
 - Key management (signed packages, authentication)
 - ... (see man rpm)

rpm -qa

list all installed packages



```
s390vmi01.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
rsync-3.0.4-2.38.1
ConsoleKit-32bit-0.2.10-64.65.1
apparmor-parser-2.3.1-8.18.7
kdelibs4-4.3.5-0.6.1
gnome-media-lang-2.28.5-1.7.8
kdebase4-SLED-lang-11-25.16.3
kio_sysinfo-11-25.16.3
misc-console-font-3.5.10-20.31
kdebase3-3.5.10-20.31
openssl-certs-0.9.8h-27.3.1
glibc-2.11.1-0.32.1
libuuid1-32bit-2.16-6.13.1
libtdb1-32bit-3.4.3-1.32.1
ppp-2.4.5.git-2.27.1
libsndfile-1.0.20-2.4.1
libxml2-32bit-2.7.6-0.9.1
yast2-core-2.17.35.3-0.3.1
util-linux-2.16-6.13.1
yast2-2.17.92.2-0.3.1
evolution-data-server-2.28.2-0.22.1
samba-3.4.3-1.32.1
popt-32bit-1.7-37.29.29.1
libqt4-32bit-4.6.3-5.10.1
kpartx-0.4.8-40.44.1
cups-libs-32bit-1.3.9-8.44.1
libqt4-sql-4.6.3-5.10.1
mozilla-nss-3.12.11-3.2.2.1
libnotify-0.4.4-173.29.28.1
MozillaFirefox-3.6.23-0.3.1
1305
s390vmi01:~ # █

s390vmi01:~ # ls -R / | wc -l
235372
s390vmi01:~ # █
```

rpm -qaV

list all changes


```
s390vmi01.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
s390vmi01:~ # rpm -qaV
S.5....T c /usr/share/fonts/encodings/encodings.dir
S.5....T c /usr/share/fonts/misc/fonts.dir
.....T c /usr/share/fonts/misc/fonts.scale
S.5....T c /etc/pam.d/login
.....T /var/lib/misc/PolicyKit.reload
S.5....T d /usr/share/man/man1/kbookmarkmerger.1.gz
S.5....T c /etc/gdm/custom.conf
SMS...GT c /etc/cups/cupsd.conf
S.5....T c /etc/fonts/suse-font-dirs.conf
S.5....T c /etc/modprobe.conf
..5....T c /etc/modprobe.d/unsupported-modules
.....T /usr/lib64/xulrunner-1.9.2.23/.autoreg
....L... c /etc/pam.d/common-account
....L... c /etc/pam.d/common-auth
....L... c /etc/pam.d/common-password
....L... c /etc/pam.d/common-session
.....T c /usr/share/fonts/100dpi/fonts.dir
.....T c /usr/share/fonts/100dpi/fonts.scale
S.5....T c /usr/share/fonts/Speedo/fonts.dir
S.5....T c /usr/share/fonts/Speedo/fonts.scale
S.5....T c /usr/share/fonts/Typel/fonts.dir
S.5....T c /usr/share/fonts/Typel/fonts.scale
.....T c /usr/share/fonts/cyrillic/fonts.dir
.....T c /usr/share/fonts/cyrillic/fonts.scale
S.5....T c /usr/share/fonts/truetype/fonts.dir
S.5....T c /usr/share/fonts/truetype/fonts.scale
.....T /usr/lib64/xulrunner-1.9.1.19/.autoreg
.....T /usr/lib64/gconv/gconv-modules.cache
S.5....T d /usr/share/man/man1/kfind.1.gz
S.5....T c /etc/xinetd.d/vnc
.....T c /etc/YaST2/control.xml
S.5....T c /etc/X11/xdm/Xservers
S.5....T c /etc/X11/xdm/xdm-config
.M...U.. /var/log/gdm
S.5....T c /etc/cups/client.conf
^C
s390vmi01:~ #
```

*c %config configuration file
d %doc documentation file
g %ghost file
l %license license file.
r %readme readme file*

*S file Size differs
M Mode differs
5 MD5 sum differs
D Device major/minor # mismatch
L readLink(2) path mismatch
U User ownership differs
G Group ownership differs
T mTime differs*

rpm -q sysstat -R

list all requirements for package sysstat



```
s390vmi01.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
s390vmi01:~ # rpm -q sysstat --requires
insserv
sed
fillup
coreutils
grep
diffutils
procmail
gettext
/bin/sh
/bin/sh
/bin/sh
rpmlib(PayloadFilesHavePrefix) <= 4.0-1
rpmlib(CompressedFileNames) <= 3.0.4-1
/bin/sh
libc.so.6()(64bit)
libc.so.6(GLIBC_2.2)(64bit)
libc.so.6(GLIBC_2.3)(64bit)
libc.so.6(GLIBC_2.3.4)(64bit)
libc.so.6(GLIBC_2.4)(64bit)
libc.so.6(GLIBC_2.7)(64bit)
rpmlib(PayloadIsLzma) <= 4.4.2-1
s390vmi01:~ #
```

Who Instructs The Quartermaster ?

Resolving dependencies and managing software installations

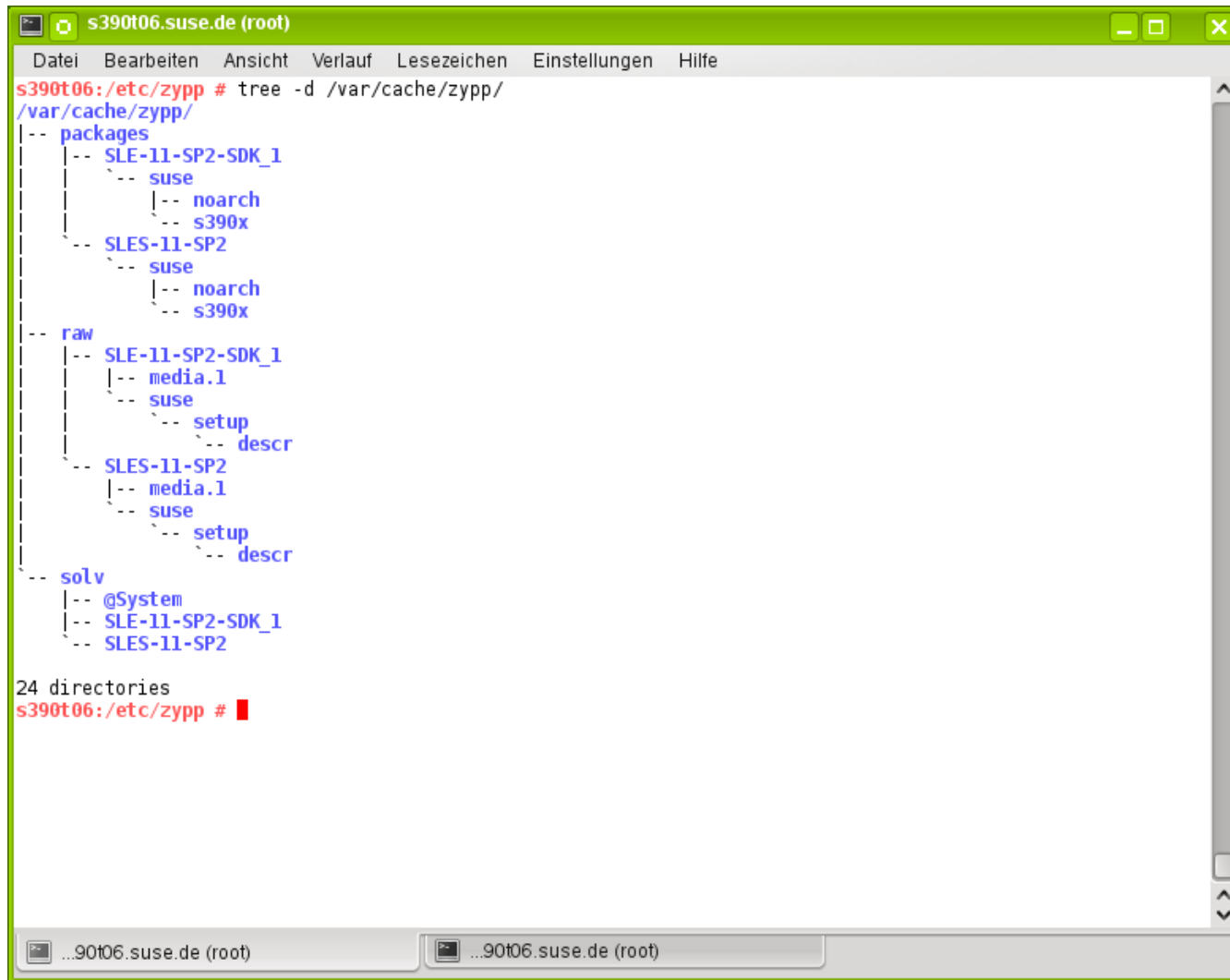
- Zypper (zmd & yum & package & patch management)
 - Software management and command line interface to libzypp
 - Manage, query and refresh repositories
 - Resolve dependencies across all attached repositories
 - Install & uninstall packages
 - Manage patterns (predefines groups of packages)
 - Logging
- Consult zypper manual page for more details
- Check for size of /var/cache/zypp, set keeppackages=0

zypper lr – list all repositories

```
s390t06.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
s390t06:/etc/zypp # zypper lr
# | Alias | Name | Aktiviert | Aktualisieren
-----
1 | SLE-11-SP2-SDK_1 | SLE-11-SP2-SDK | Ja | Nein
2 | SLES-11-SP2 | SLES-11-SP2 | Ja | Nein
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp # zypper lr --url
# | Alias | Name | Aktiviert | Aktualisieren | URI
-----
1 | SLE-11-SP2-SDK_1 | SLE-11-SP2-SDK | Ja | Nein | ftp://schnell.suse.de/CD-ARCHIVE/SLE11/SLE-11-SP2-SDK-GM/s390x/DVD1
2 | SLES-11-SP2 | SLES-11-SP2 | Ja | Nein | ftp://schnell.suse.de/CD-ARCHIVE/SLE11/SLES-11-SP2-GM/s390x/DVD1
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp # tree .
.
|-- credentials.d
|   |-- NCCcredentials
|   |-- repos.d
|       |-- SLE-11-SP2-SDK_1.repo
|       |-- SLES-11-SP2.repo
|-- services.d
|-- systemCheck
|-- zypp.conf
|-- zypper.conf
3 directories, 6 files
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp # cat repos.d/SLES-11-SP2.repo
[SLES-11-SP2]
name=SLES-11-SP2
enabled=1
autorefresh=0
baseurl=ftp://schnell.suse.de/CD-ARCHIVE/SLE11/SLES-11-SP2-GM/s390x/DVD1
path=/
type=yast2
keppackages=0
s390t06:/etc/zypp #
s390t06:/etc/zypp #
s390t06:/etc/zypp # du -sh /var/cache/zypp/
8,7M /var/cache/zypp/
s390t06:/etc/zypp #
```

zypper cache

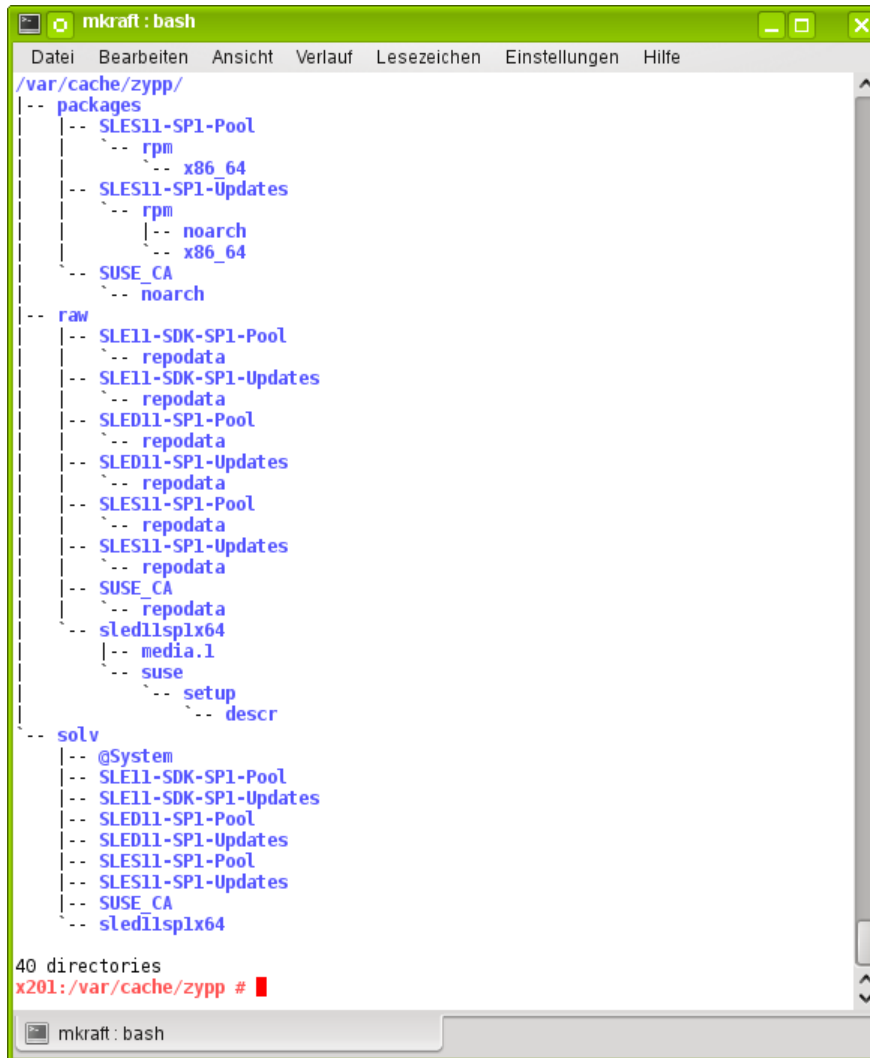
8-32MB /var/cache/zypp



```
s390t06.suse.de (root)
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
s390t06:/etc/zypp # tree -d /var/cache/zypp/
/var/cache/zypp/
|-- packages
|   |-- SLE-11-SP2-SDK_1
|   |   |-- suse
|   |   |   |-- noarch
|   |   |   |-- s390x
|   |   |-- SLES-11-SP2
|   |   |   |-- suse
|   |   |   |   |-- noarch
|   |   |   |   |-- s390x
|   |-- raw
|   |   |-- SLE-11-SP2-SDK_1
|   |   |   |-- media.1
|   |   |   |-- suse
|   |   |   |   |-- setup
|   |   |   |   |-- descr
|   |   |-- SLES-11-SP2
|   |   |   |-- media.1
|   |   |   |-- suse
|   |   |   |   |-- setup
|   |   |   |   |-- descr
|   |-- solv
|   |   |-- @System
|   |   |-- SLE-11-SP2-SDK_1
|   |   |-- SLES-11-SP2
24 directories
s390t06:/etc/zypp #
```

2nd zypper cache example

8-32MB /var/cache/zypp



```
mkraft : bash
Datei Bearbeiten Ansicht Verlauf Lesezeichen Einstellungen Hilfe
/var/cache/zypp/
-- packages
  |-- SLES11-SP1-Pool
  |   |-- rpm
  |   |   |-- x86_64
  |   |-- SLES11-SP1-Updates
  |   |   |-- rpm
  |   |   |   |-- noarch
  |   |   |   |-- x86_64
  |-- SUSE_CA
  |   |-- noarch
-- raw
  |-- SLE11-SDK-SP1-Pool
  |   |-- repodata
  |-- SLE11-SDK-SP1-Updates
  |   |-- repodata
  |-- SLED11-SP1-Pool
  |   |-- repodata
  |-- SLED11-SP1-Updates
  |   |-- repodata
  |-- SLES11-SP1-Pool
  |   |-- repodata
  |-- SLES11-SP1-Updates
  |   |-- repodata
  |-- SUSE_CA
  |   |-- repodata
  |-- sled11sp1x64
  |   |-- media.1
  |   |-- suse
  |   |   |-- setup
  |   |   |-- descr
-- solv
  |-- @System
  |-- SLE11-SDK-SP1-Pool
  |-- SLE11-SDK-SP1-Updates
  |-- SLED11-SP1-Pool
  |-- SLED11-SP1-Updates
  |-- SLES11-SP1-Pool
  |-- SLES11-SP1-Updates
  |-- SUSE_CA
  |-- sled11sp1x64

40 directories
x201:/var/cache/zypp #
```

Novell Customer Center

Novell Welcome **Marcus Kraft** [LOGOUT](#) United States, **English** [CHANGE](#)

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Systems Information

Marcus Kraft, Nuremberg, Bayern

- Customer Center Home >
- My Profile >
- My Products >
- My Support >
- My Training >
- Administration >

[Terms & Conditions](#)

Account Rep:
Customer Response Center
[\[Send Email\]](#)

Service Rep:
European Support Center
+420 28 408 4051

support.novell.com

- Find Local Numbers
- Request call
- Buy

These are the systems that are activated against your subscriptions. Double-click on any line item to view details.

Filter this view

My Groups	System Name	Updates	Location	OS	Last Checked In	Edit
All	d11sp1test	No Data		sle-11-i586	N/A	
Needs Activation	da2400	No Data		sle-11-x86_64	20 Oct 2011, 8:38 AM	
	utila	No Data		sle-11-i586	27 Oct 2011, 12:16 PM	

[+](#) 3 Items

- Export CSV file of this list

System Legend

-  Active
-  Evaluation
-  Needs Activation
-  Expired

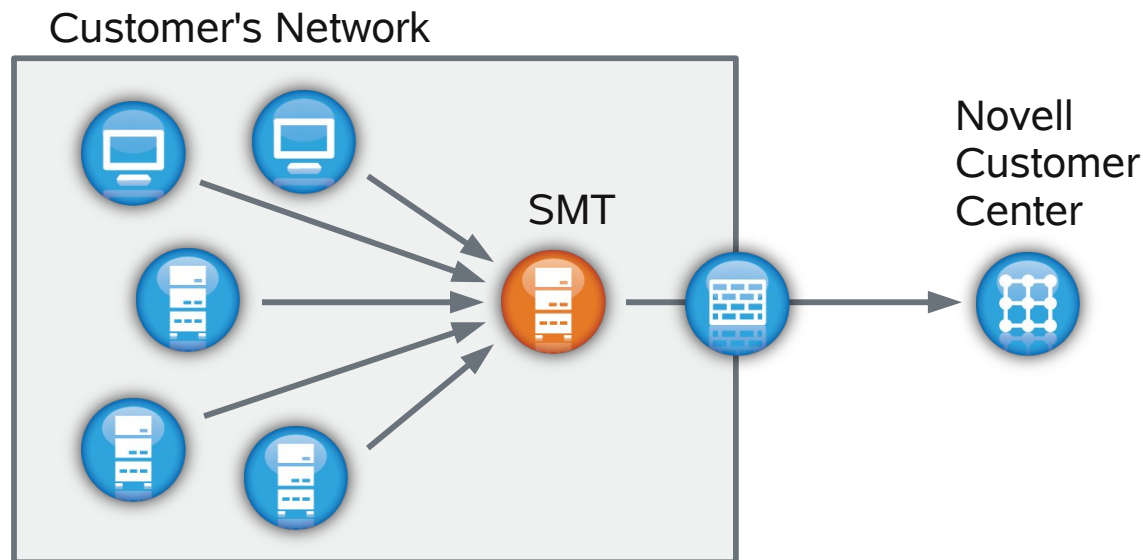
Subscription Management Tool

Overview

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

It allows you to accurately register and manage an entire SUSE Linux Enterprise deployment and subscriptions.

It allows for retrieving and staging of updates to support the deployment process workflow.

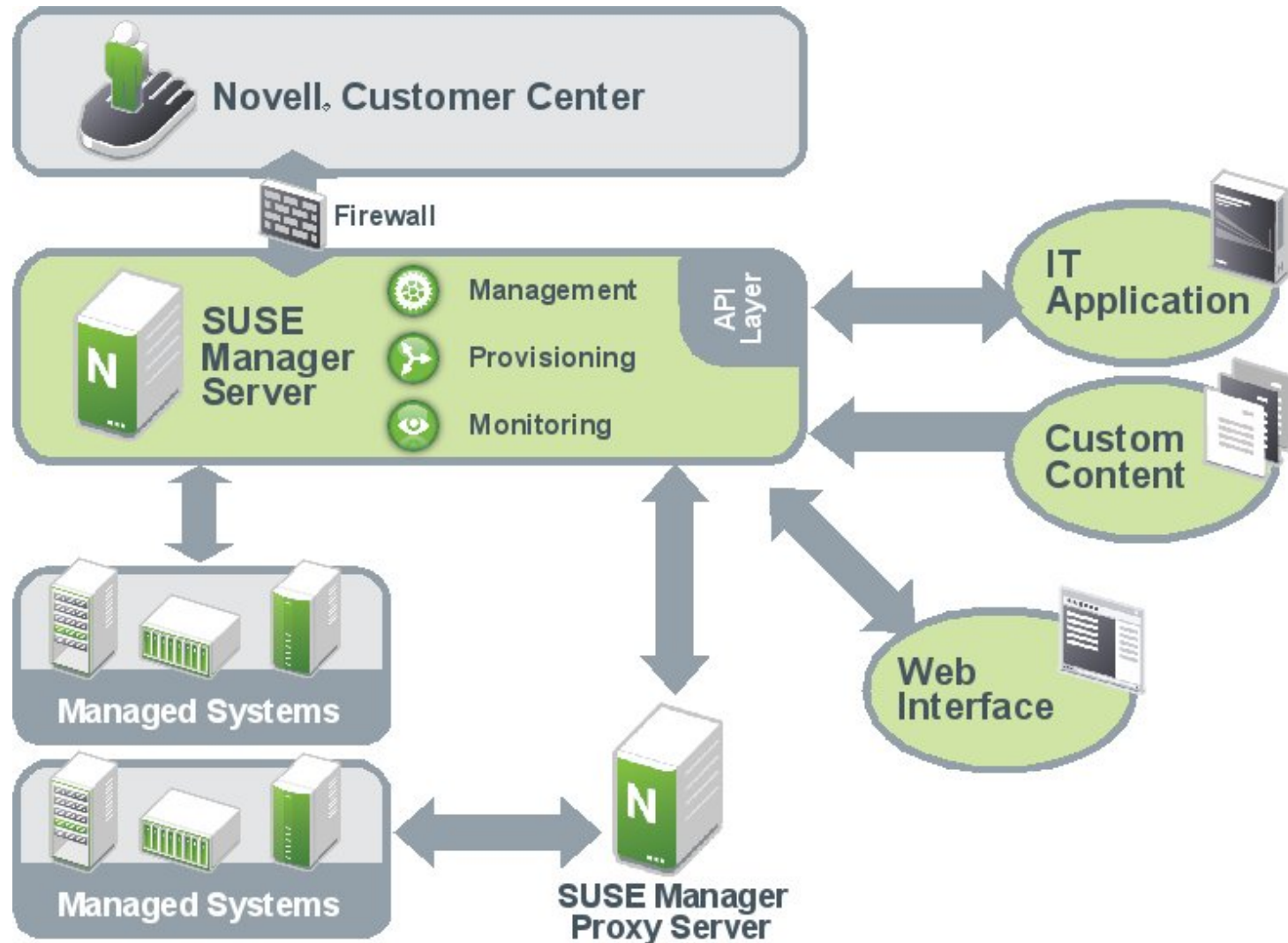




zEnterprise 196

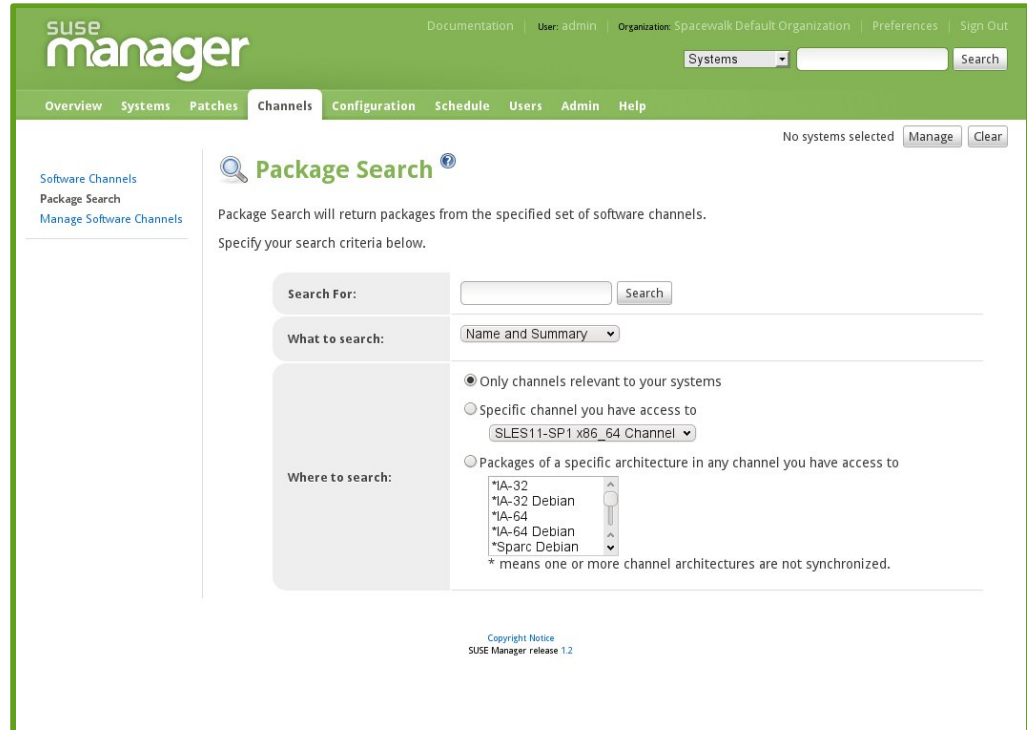
z BladeCenter Extension

SUSE® Manager



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



Overview

- [Your Account](#)
- [Your Preferences](#)
- [Locale Preferences](#)
- [Subscription Management](#)
- [Organization Trusts](#)

Overview Legend

-  OK
-  Critical
-  Warning
-  Unknown
-  Locked
-  Autoinstalling
-  Pending Actions
-  Failed Actions
-  Completed Actions
-  Security
-  Bug Fix
-  Enhancement

Overview

Tasks


- [Manage Entitlements and Subscriptions:](#)
My Organization | SUSE Manager-Wide
- [Register Systems](#)
- [Manage Activation Keys](#)
- [Manage Autoinstallations](#)
- [Manage Configuration Files](#)
- [Manage SUSE Manager Organizations](#)
- [Configure SUSE Manager](#)

Inactive Systems

 f251.suse.de	4 Week(s)
 f32.suse.de	15 Week(s)

[View All Inactive Systems \(2\)](#)

Most Critical Systems

System Name	All Updates	Security Patches	Bugfix Patches	Enhancement Patches
f32.suse.de	27	 9	 17	 1

1 - 1 of 1 most critical systems displayed

[View All Critical Systems](#)

Recently Scheduled Actions

No recently scheduled actions.

You have scheduled no actions within the past thirty days. You may view a list of past completed actions at [Schedule > Completed Actions](#) and a list of past failed actions at [Schedule > Failed Actions](#).

Relevant Security Patches

Relevant Security Patches		Systems	Updated
 RHSA-2010:0839	Moderate: kernel security and bug fix update	1	09.11.10
 RHSA-2010:0819	Moderate: pam security update	1	01.11.10
 RHSA-2010:0811	Important: cups security update	1	28.10.10

Package Management

- Channels (package repositories)
 - Tree-like structure
 - Private channels
- Package operations
 - View
 - Verify
 - Install
 - Update
 - Delete
- Profiles



Patch and Update Management

- View pending updates
- Notifications
- Manual or automatic update
- Scheduled reboots



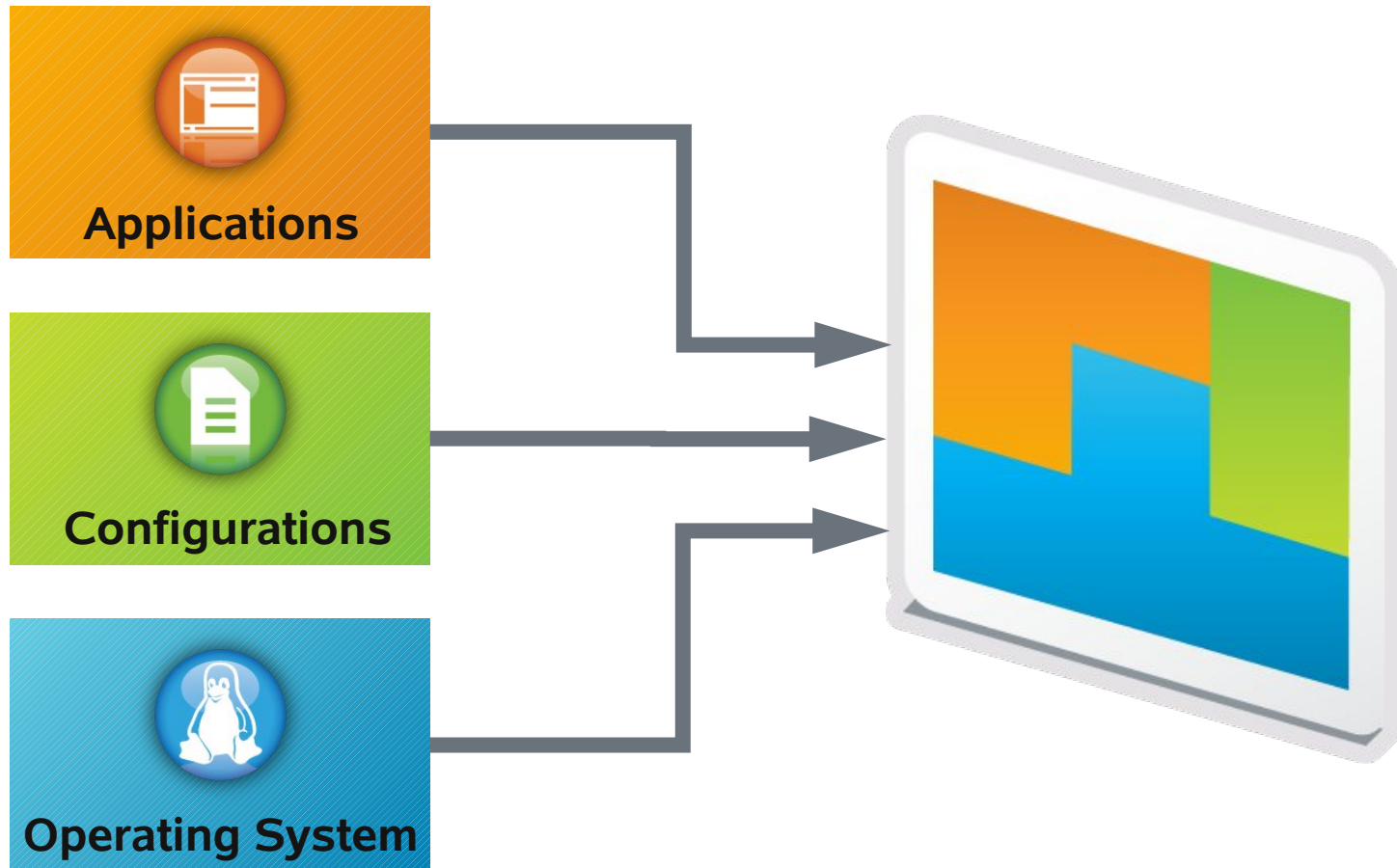
SUSE Studio™

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/>



Why Not Do All This Just Once?



SUSE® Studio™ Components



Build

SUSE Studio Core Engine

Behind firewall stand-alone version of SUSE Studio

Kiwi Support:

Fully supported, command line scriptable appliance creation behind the firewall, integrates with SUSE Studio



Manage

WebYaST:

Provides YaST functionality through a web interface



Maintain

SUSE Lifecycle Management Server:

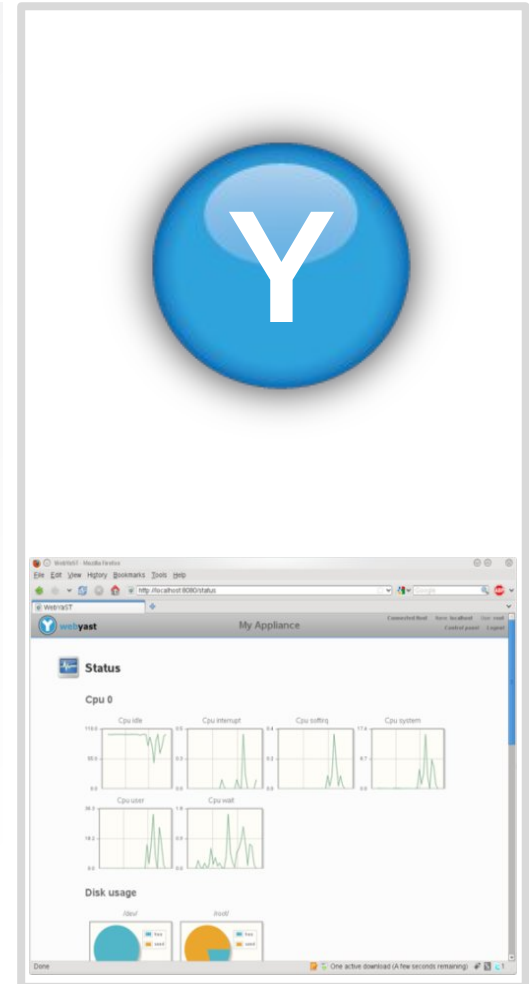
Serves updates, includes access control to restrict access to repositories, allows for multiple update streams or channels

Manage with WebYaST

Web-based management interface for full visibility into the configuration, health and performance of your SUSE® Linux Enterprise

Configuration of software appliances
(Modules include: storage, bootloader, timezone, software appliance management updates, user management, hardware customization)

Administration of installed system
(Modules include: Status, soft-shutdown, reboot, monitoring, license/EULA and registration, service start/stop/status)



WebYast

Web based System Management Interface

webvast **My Appliance** Language: [English \(US\)](#) Connected host: **localhost** User: **root**
[Control panel](#) [Logout](#)

Status

Your system is up to date.

Registration is missing

System actions

Reboot

Shutdown

Configuration

- Updates**
- Status**
- System Services**
- Users**
- Software Repositories**
- Registration**
- Network**
- Language**
- Groups**
- Mail Settings**
- Time**
- Firewall**
- Administrator Settings**

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WebYaST

The image displays two overlapping screenshots of the WebYaST 'My Appliance' status page. The top-left screenshot shows the 'Status' page with the 'Network' section expanded for the 'eth0' interface. It features a line graph showing network activity in MByte/s over a 5-minute period. The graph has two data series: 'received' (blue line) and 'sent' (orange line). The 'sent' data shows a significant spike around 14:26:34, reaching approximately 9 MByte/s. The 'received' data shows a smaller spike at the same time, reaching about 10 MByte/s. Below the graph are expandable sections for Memory, Disk, and CPU. The top-right screenshot shows the same 'Status' page but with the 'Memory' section expanded. It displays a stacked area chart of memory usage in MByte over a 5-minute period. The chart is divided into three categories: 'cached' (blue), 'used' (orange), and 'free' (grey). The total memory usage is approximately 400 MByte, with 'cached' memory at about 125 MByte, 'used' memory at about 275 MByte, and 'free' memory at about 125 MByte. Below the chart are expandable sections for Disk, CPU, and System messages. Both screenshots show a browser window with the URL 'https://dhcp27.54984/status' and a 'Done' status bar at the bottom.



Maintain with SUSE® Lifecycle Management Server

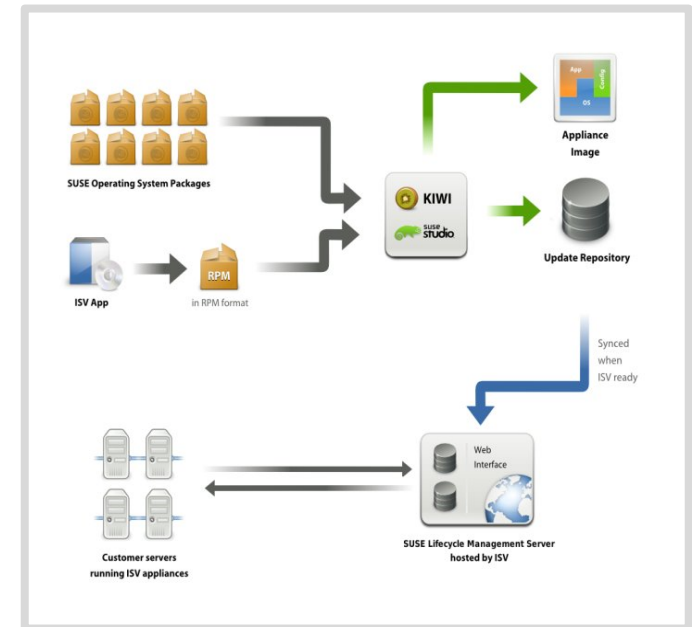
Update and maintenance of deployed software appliances.

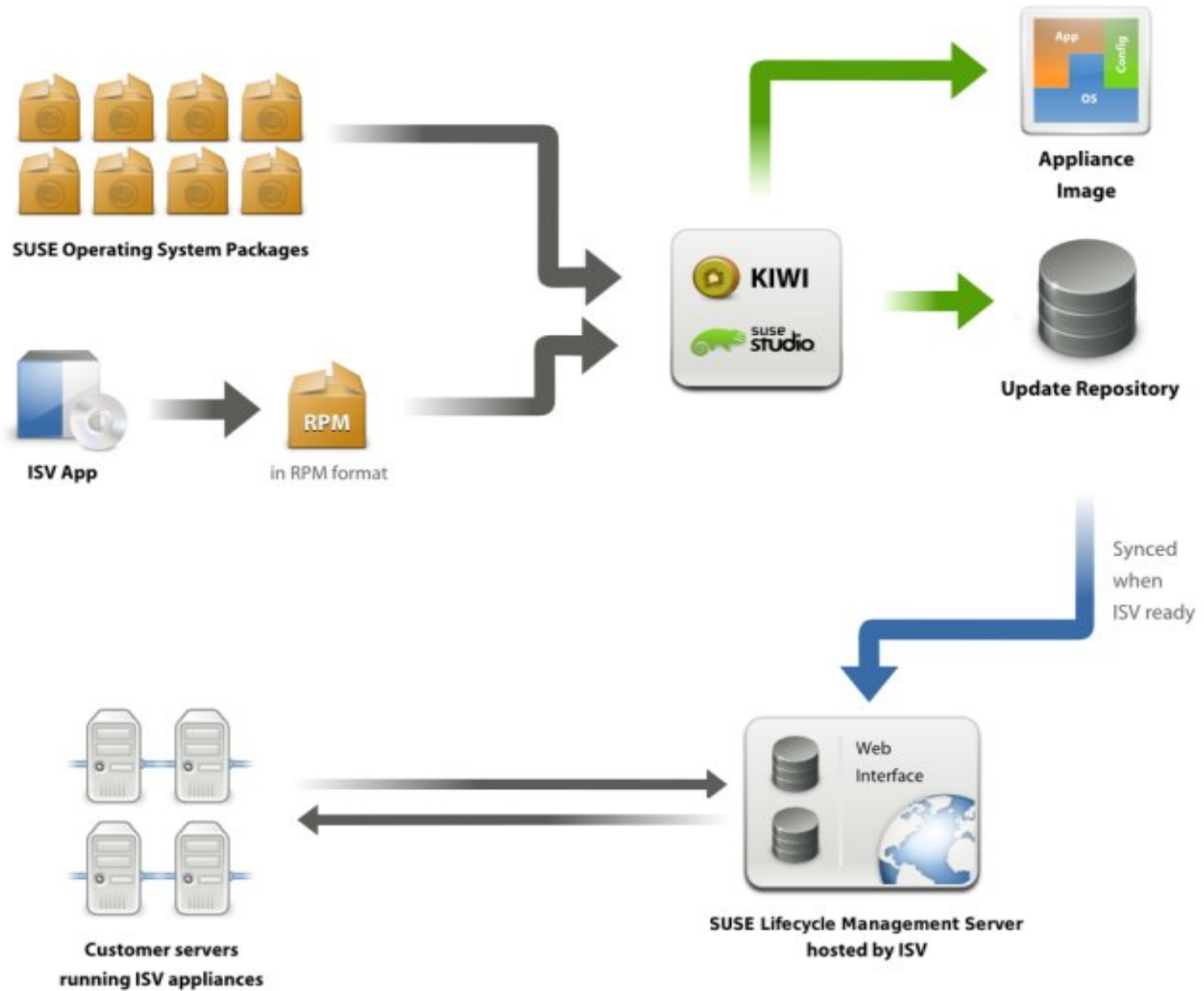
Unified update mechanism, federating updates for all components of the appliance.

Repository management, staging repositories support for quality assurance

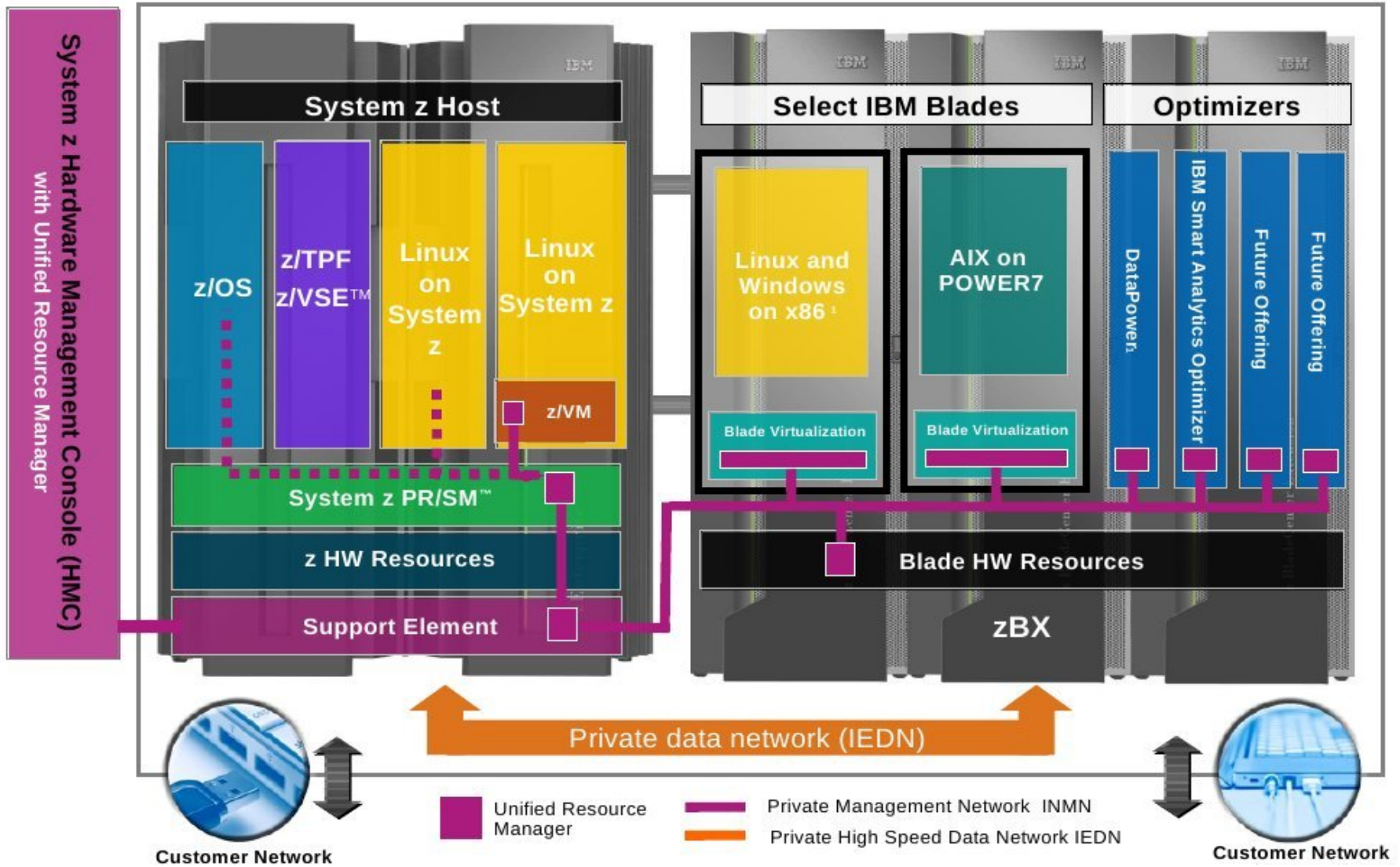
Authentication, entitlement and access control required to distribute updates.

Management of essential customer data, interface to CRM systems





IBM zEnterprise



Questions & Answers

- “An expert is someone who knows some of the worst mistakes that can be made in his subject, and how to avoid them.”
 - Werner Heisenberg (1971)
Physics and Beyond: Encounters and Conversation





Corporate Headquarters
Maxfeldstrasse 5
90409 Nuremberg
Germany

+49 911 740 53 0 (Worldwide)
www.suse.com

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Resources

- SUSE Linux Enterprise Server for System z
<http://www.suse.com/products/systemz/>
- SUSE Linux Enterprise Server and IBM zEnterprise
http://www.novell.com/docrep/2010/11/suse_linux_enterprise_server_and_ibm_zenterprise_system.pdf
- zBX entitlement for SUSE Linux Enterprise Server offering
<http://www.suse.com/promo/zbx.html>
- SUSE Manager
<http://www.suse.com/products/suse-manager>
- SUSE Studio
<http://www.susestudio.com>
- Chalk Talk: Server consolidation on IBM System z
<http://www.novell.com/media/content/chalktalk-server-consolidation-on-system-z.html>
- IBM zEnterprise Success Story: Sparda-Datenverarbeitung
<http://www.novell.com/success/sparda.html>



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