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SUSE® Linux Enterprise Server for System z

Installation Options and Software Lifecycle Management

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Session 11814

SHARE in Anaheim 2012

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Agenda

- Installation And Repositories
- Lifecycle Management

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

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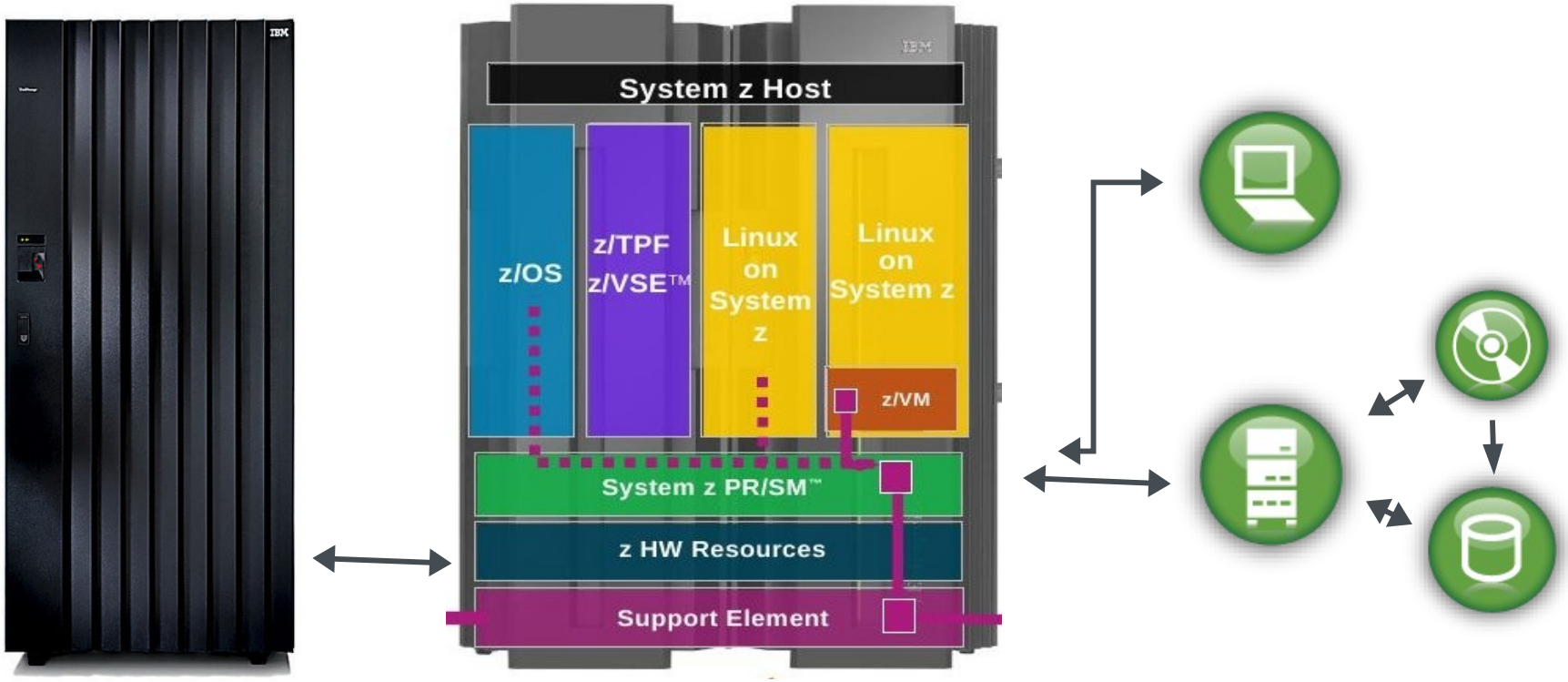
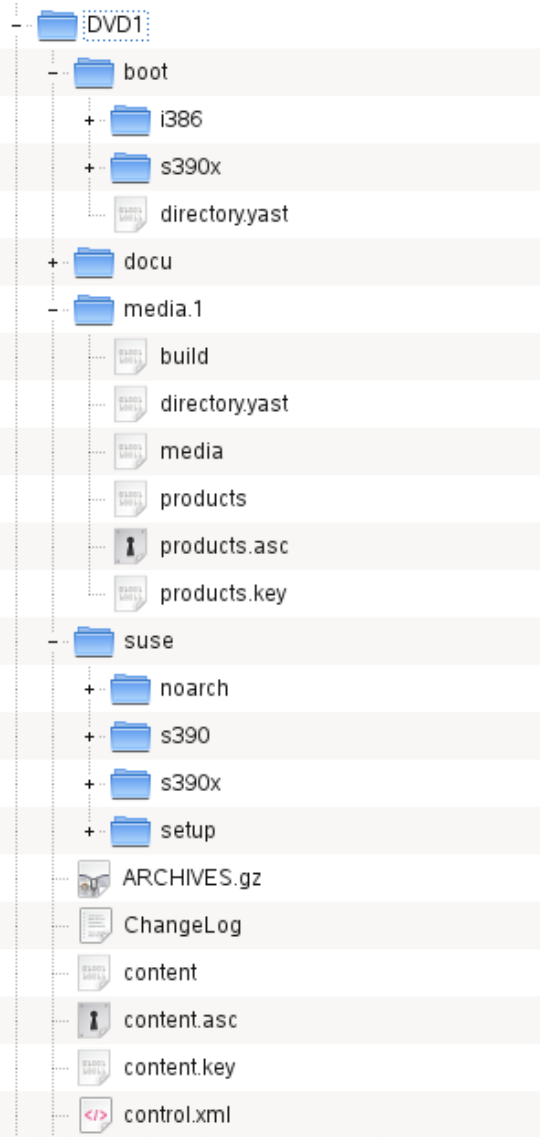
Installation Environment



Installation Repository Tree



i386 rescue system to export media from a x86 workstation

s390x first boot / ipl kernel and ram disk

SUSE manuals in different languages

media description

package (rpm) repository

architecture independent packages (scripts, etc)

s390 rpm (32bit)

s390x rpm (64bit and 32bit)

“patterns”

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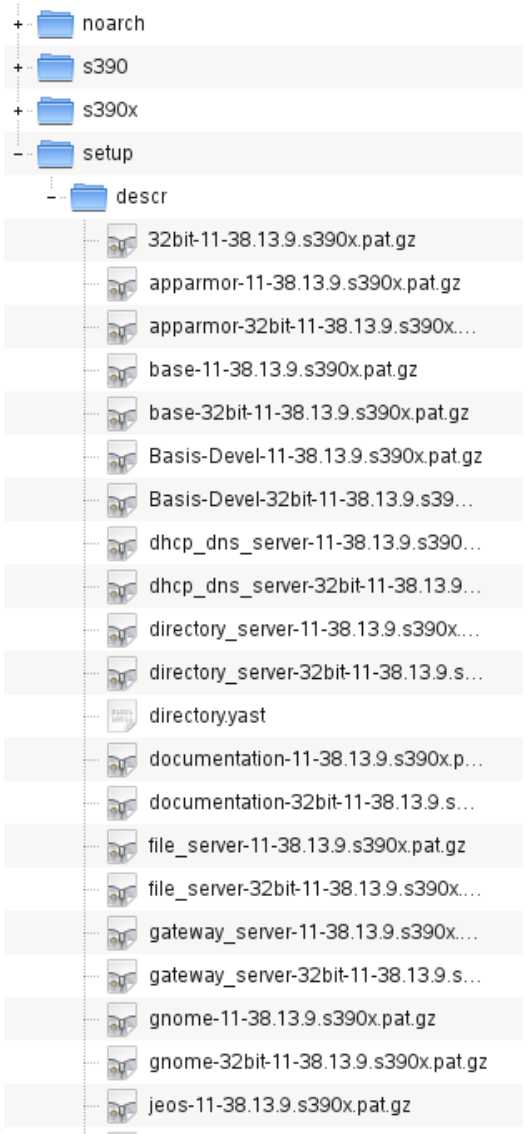
Installation Repository: Patterns



"patterns"

AppArmor pattern

base system pattern

gnome desktop pattern

jeos minimal pattern

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Installation Repository: Packages

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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

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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

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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.

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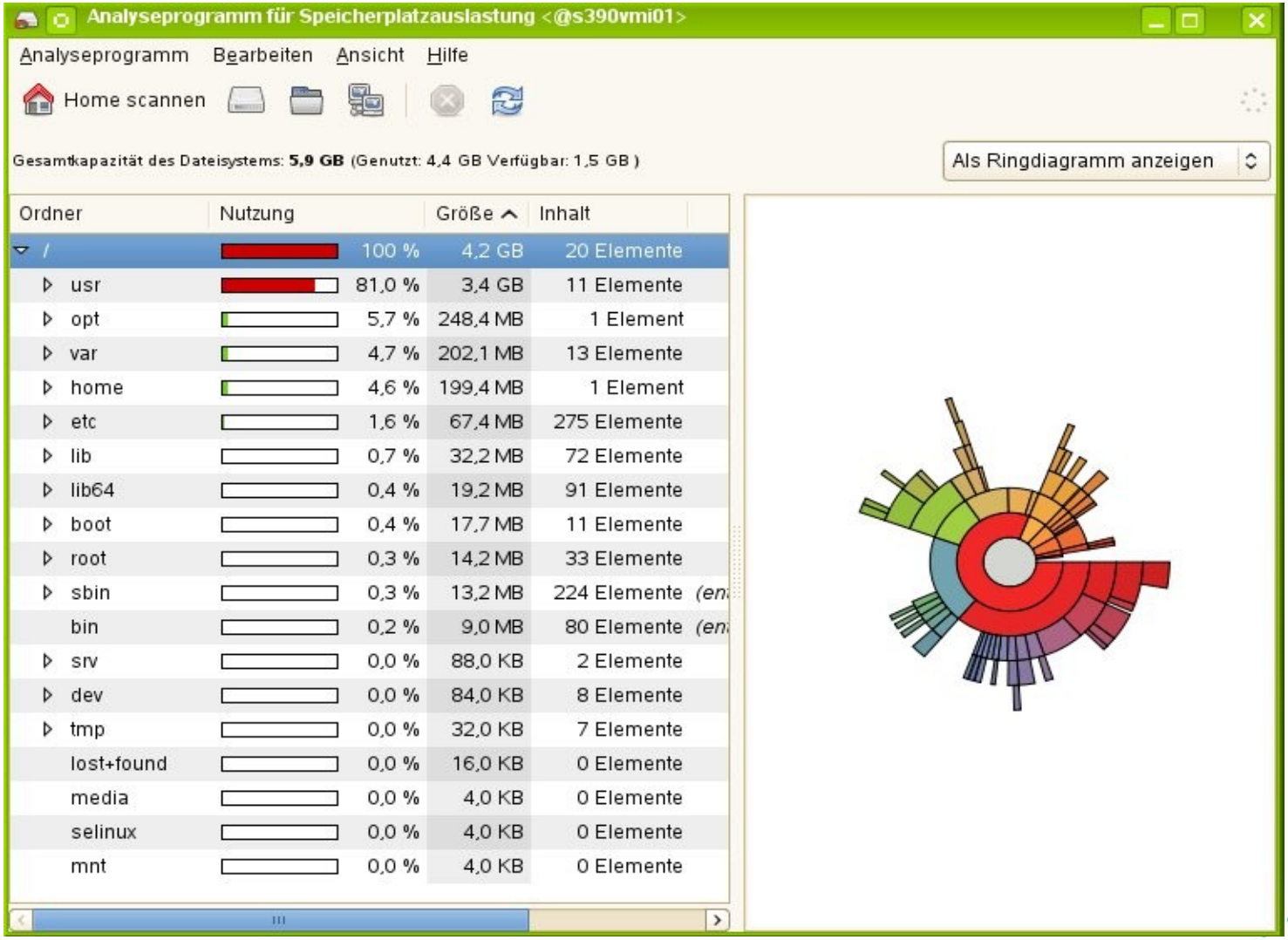
Installed System: File System Stats



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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

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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
  - ...

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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)
  - ...

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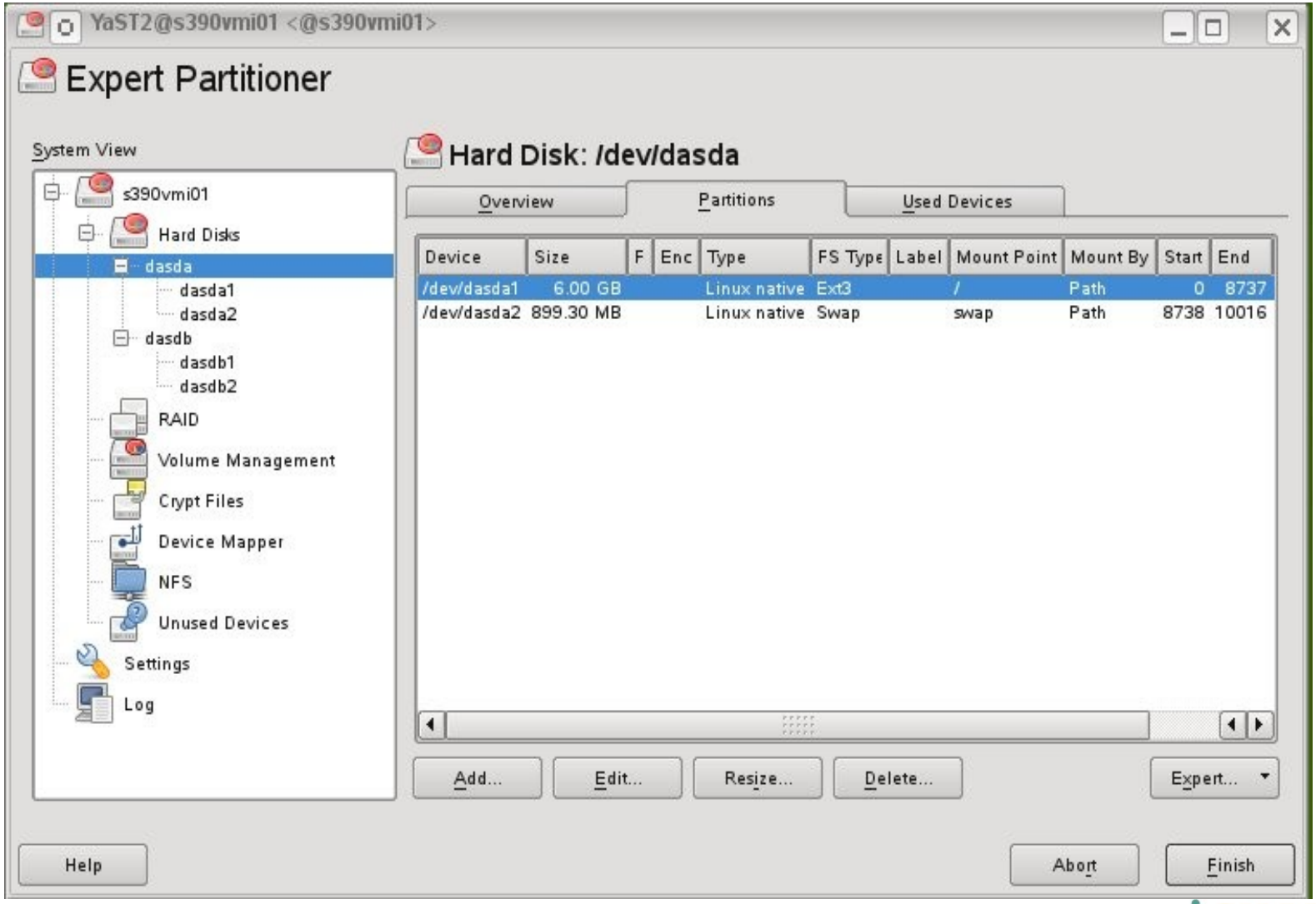
YaST



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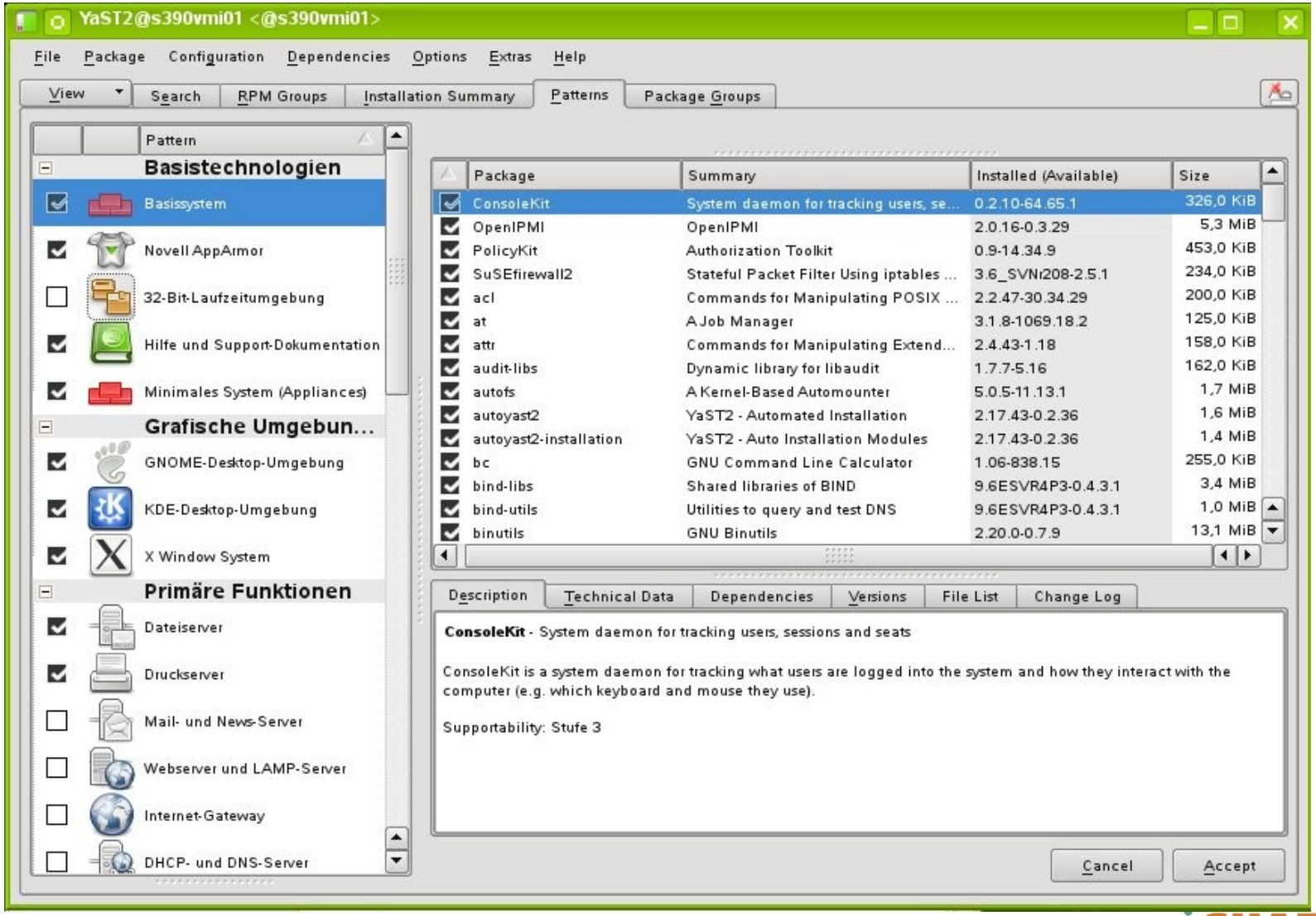
YaST



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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.

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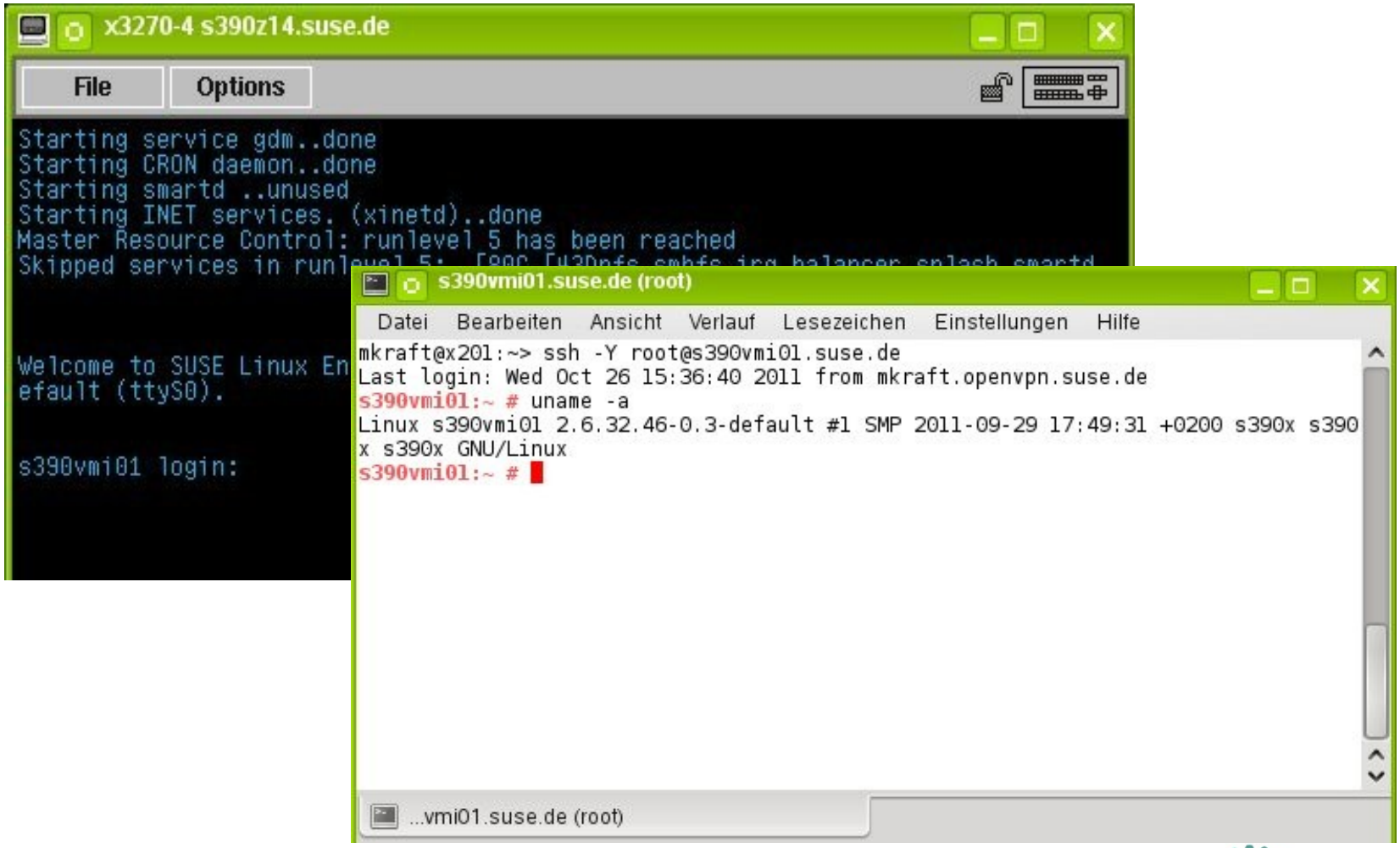
First Login, what is next ?



RTFM – Read The Fine Manual

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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.

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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>

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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.

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Once again ...

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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 unattended installation
  - **parmfile:**
    AutoYaST=<URL> Info=<URL>
    linuxrclog=/dev/console usevnc=1 vncpassword=testing

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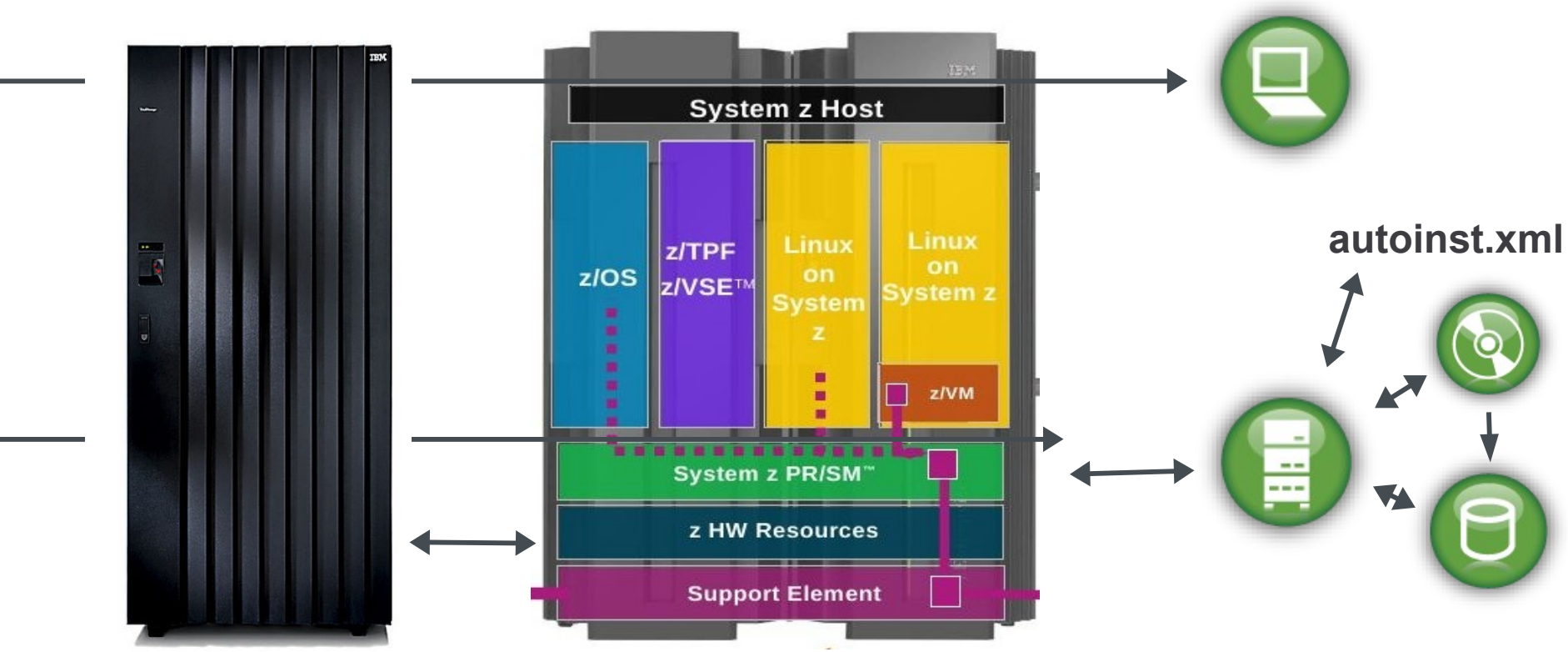
Installation Environment (2)



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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/configns">
  <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>
        <model>IBM DASD</model>
        <old_unique_key>N5EP.rOENMk3aQ50</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>
```

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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>
```


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AutoYaST Tools

- Clone exisiting 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

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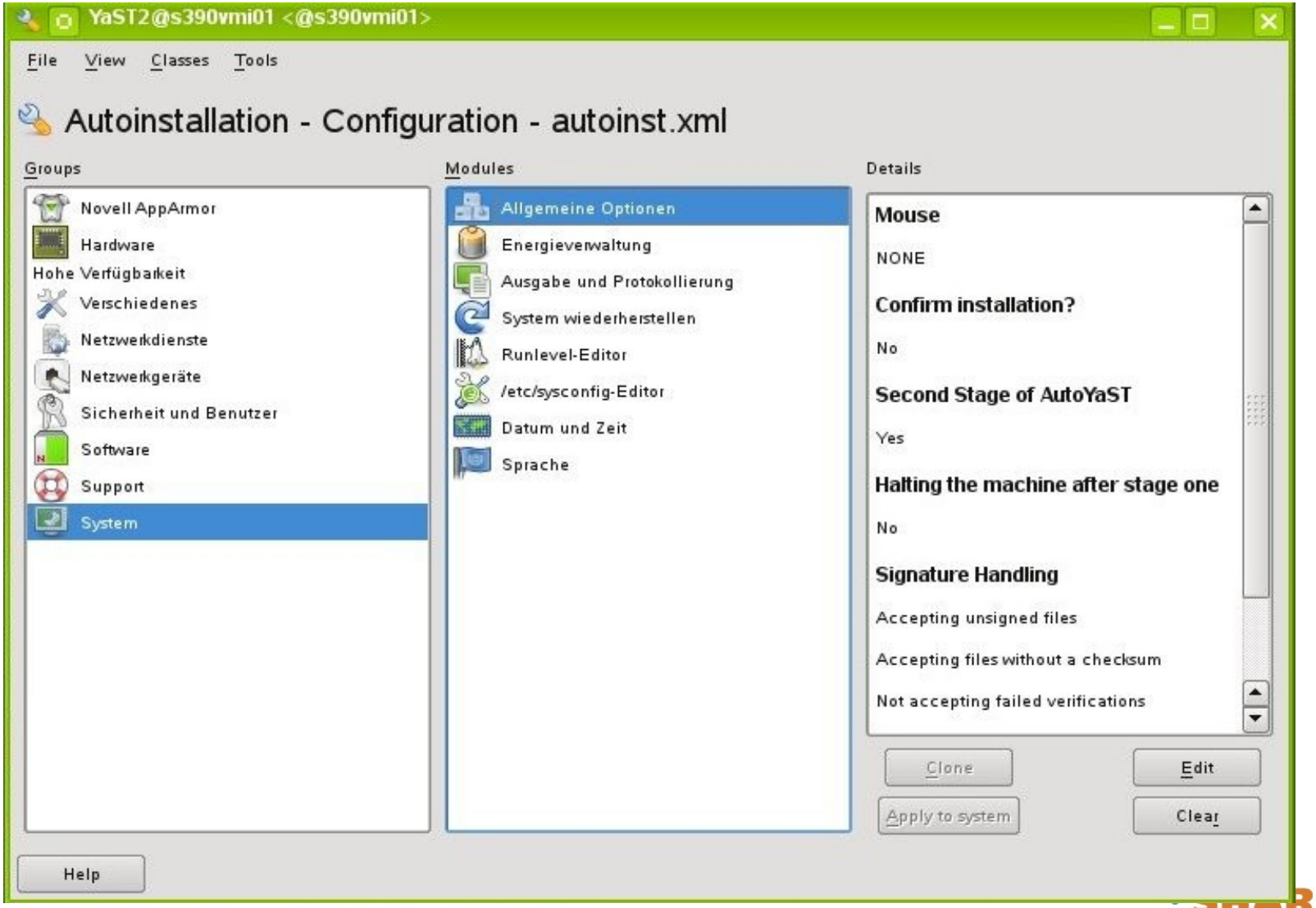
AutoYaST GUI



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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

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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'

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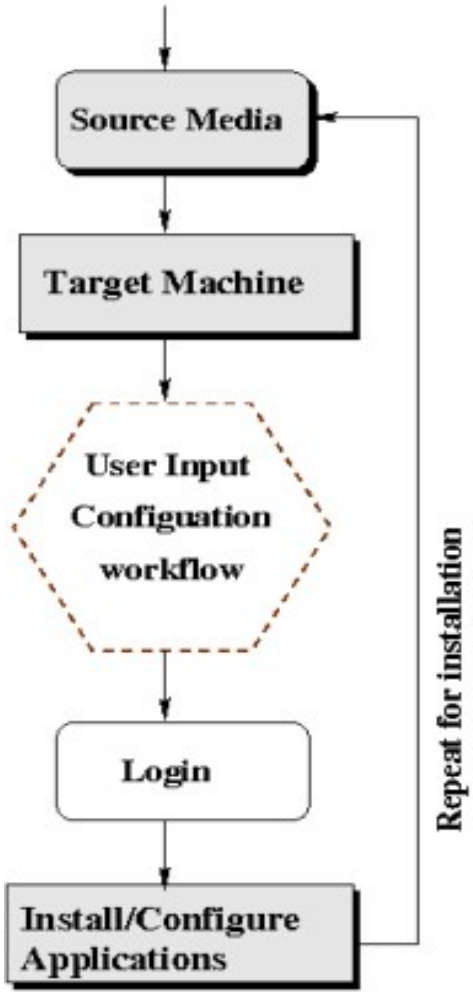
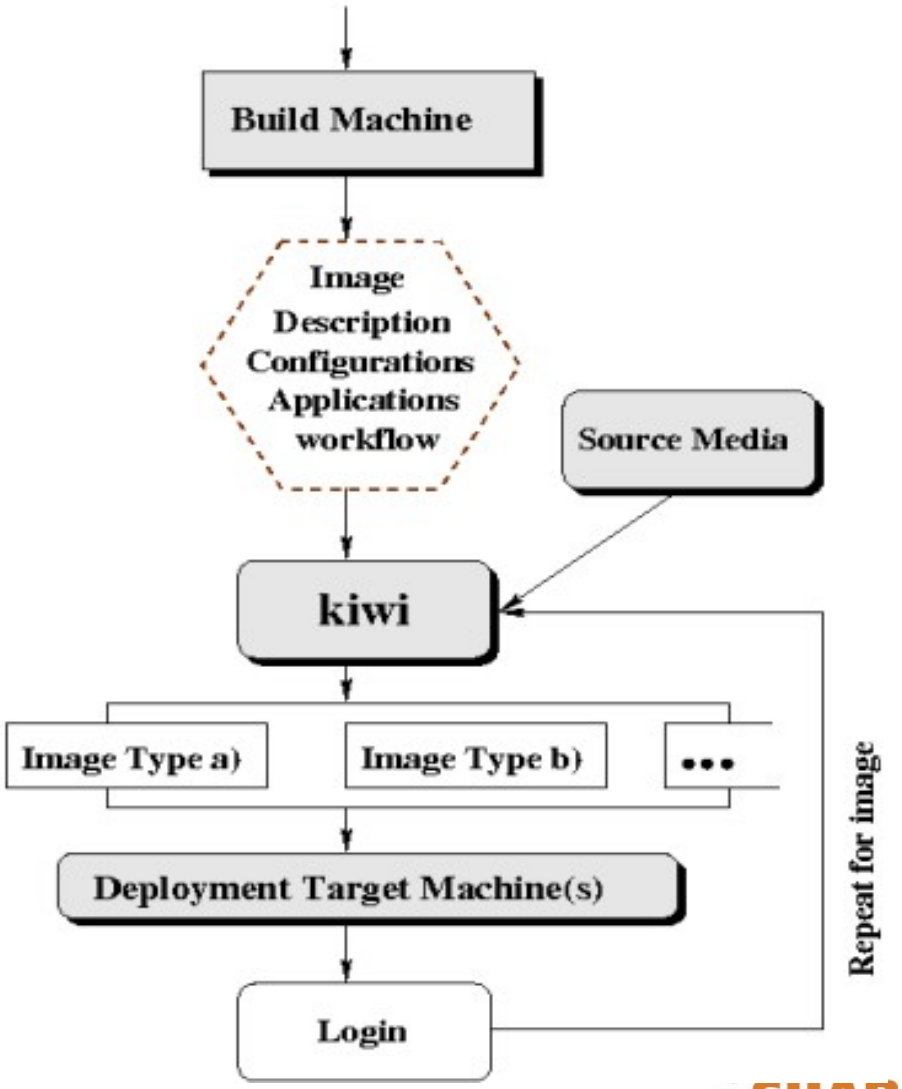
Kiwi Image Build Process





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

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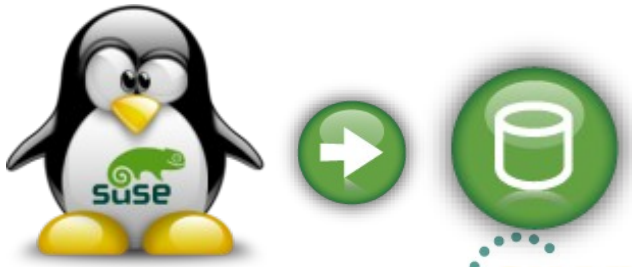
Kiwi Image Disk Storage Deployment

- 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



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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 ?

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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

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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)

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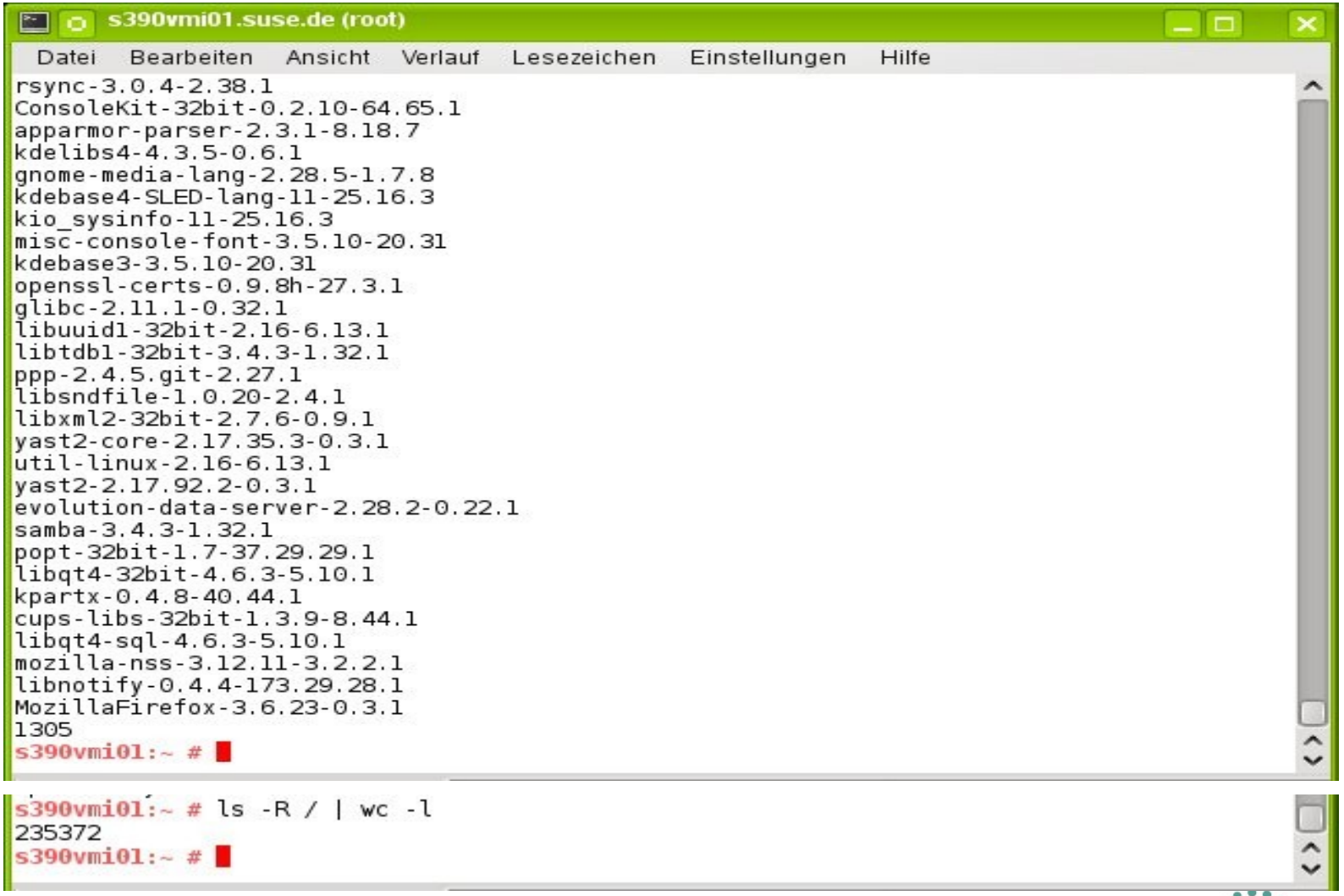
rpm -qa
list all installed packages



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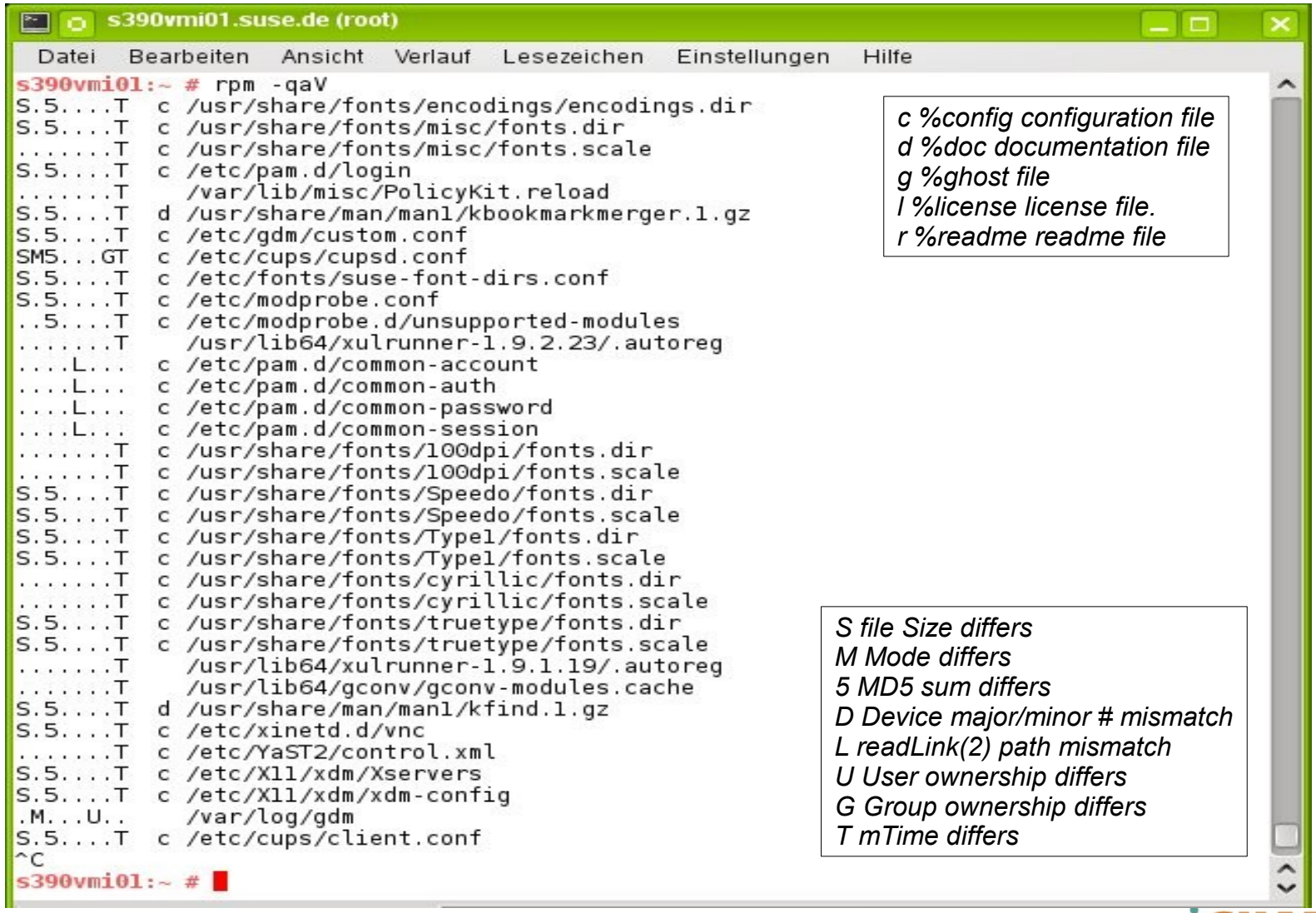
rpm -qaV
list all changes



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rpm -q sysstat -R

list all requirements for package sysstat

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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

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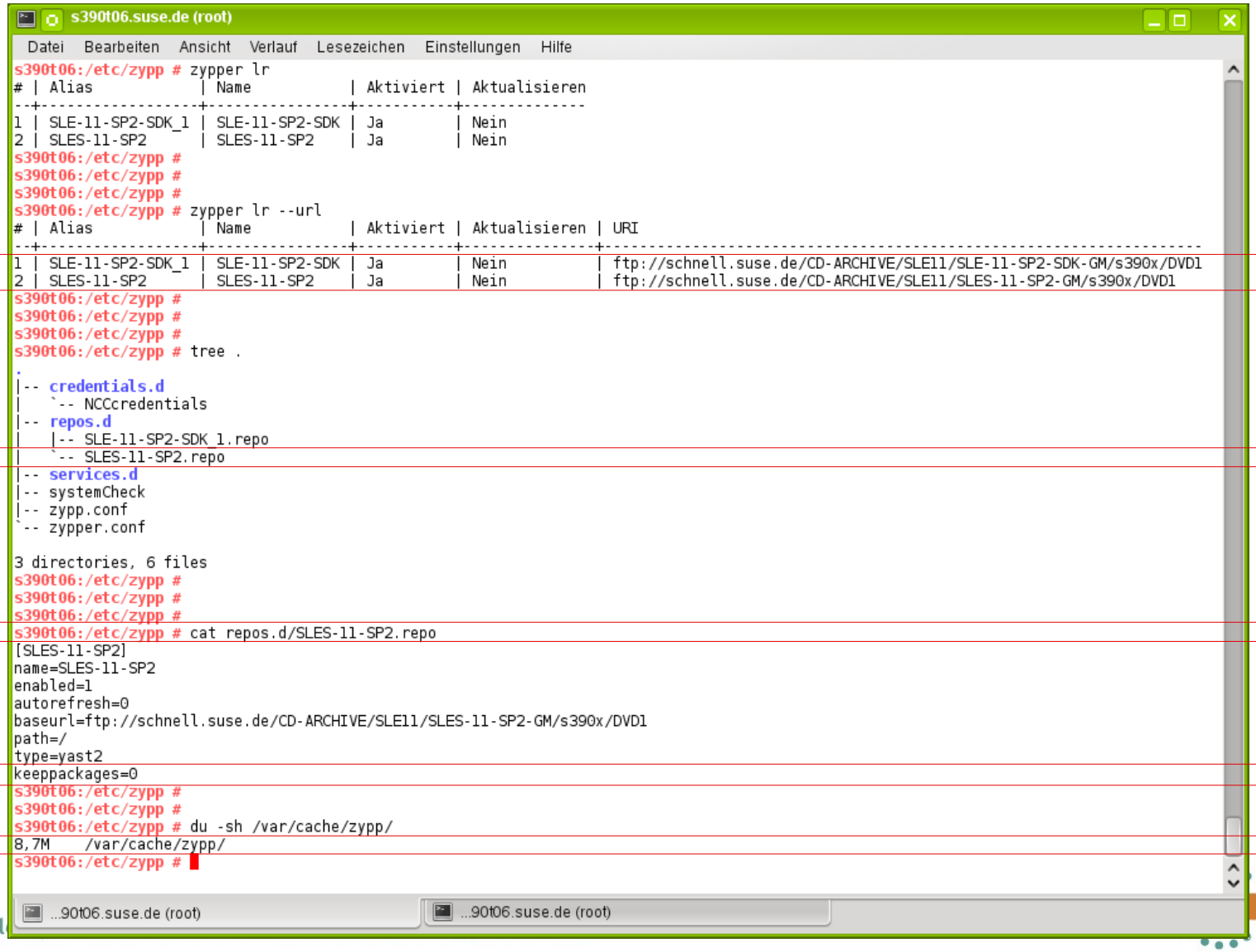
zypper lr – list all repositories



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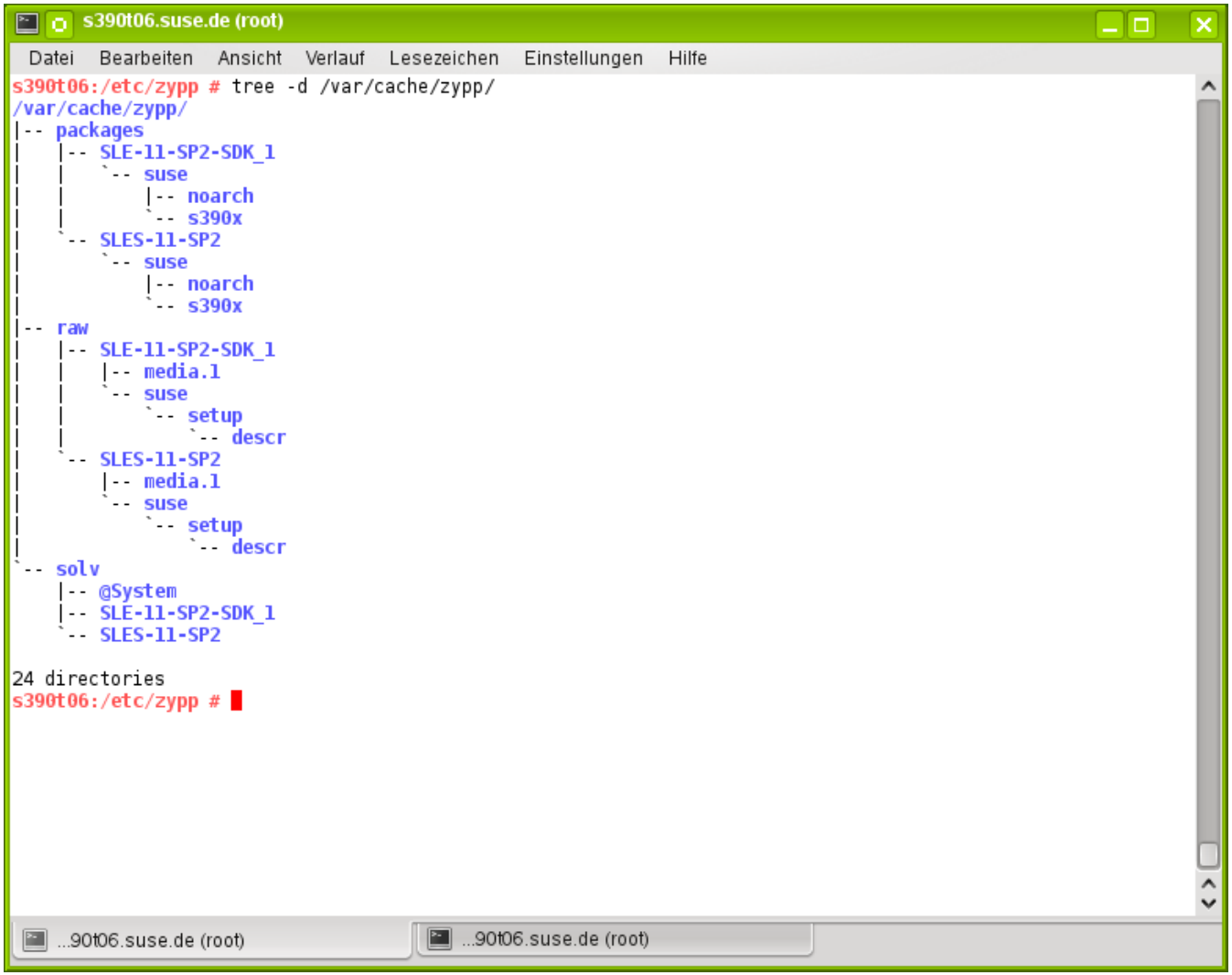
zypper cache

8-32MB /var/cache/zypp



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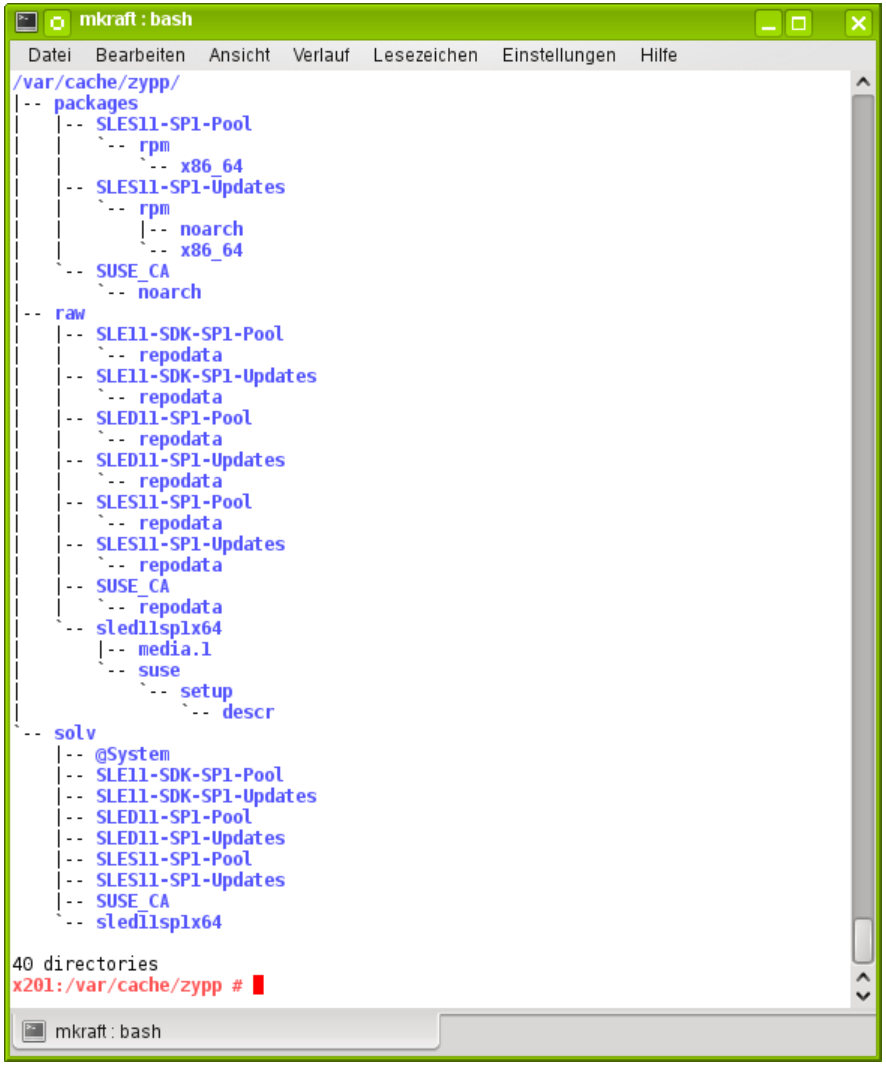
2nd zypper cache example

8-32MB /var/cache/zypp



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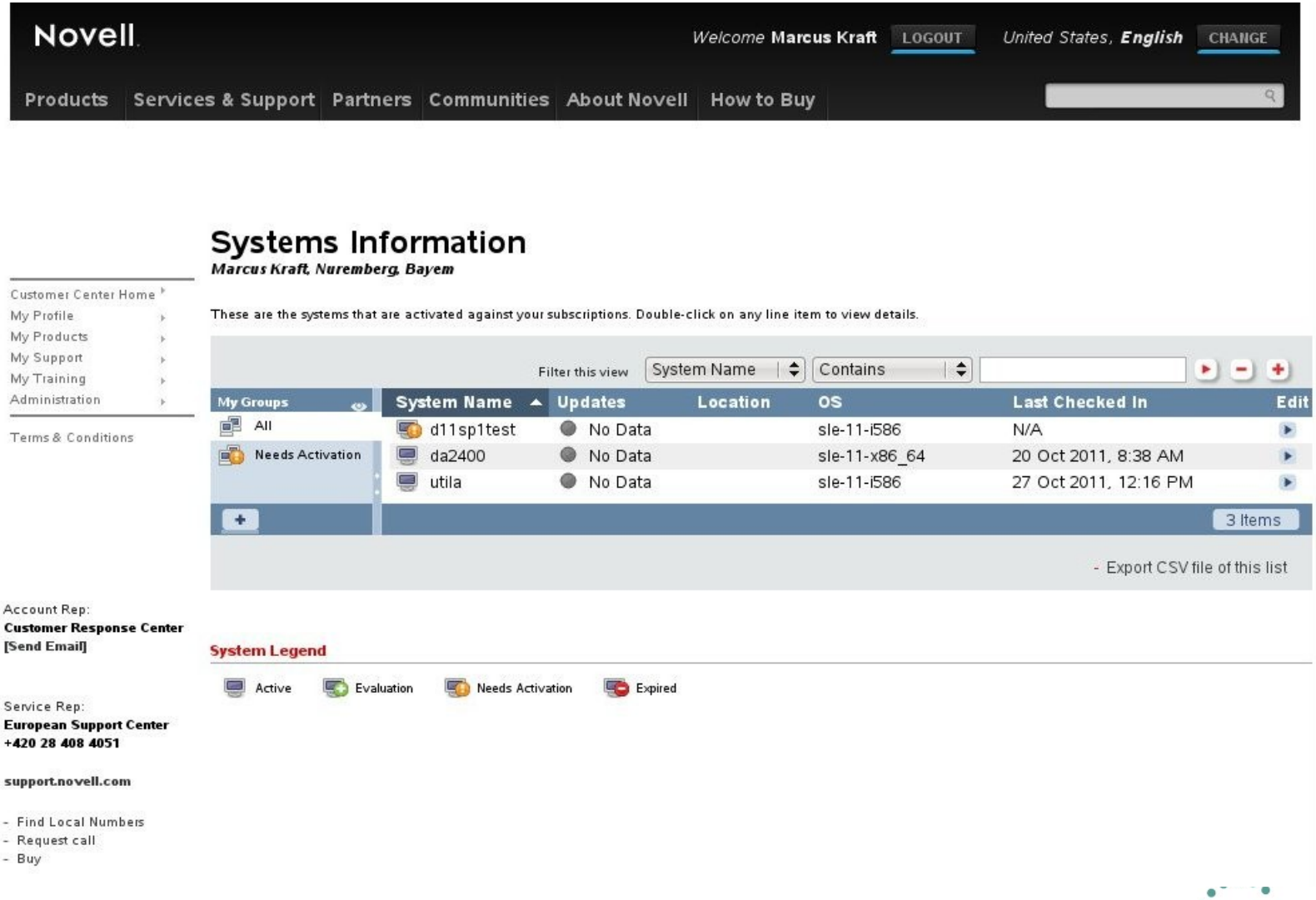
Customer Center



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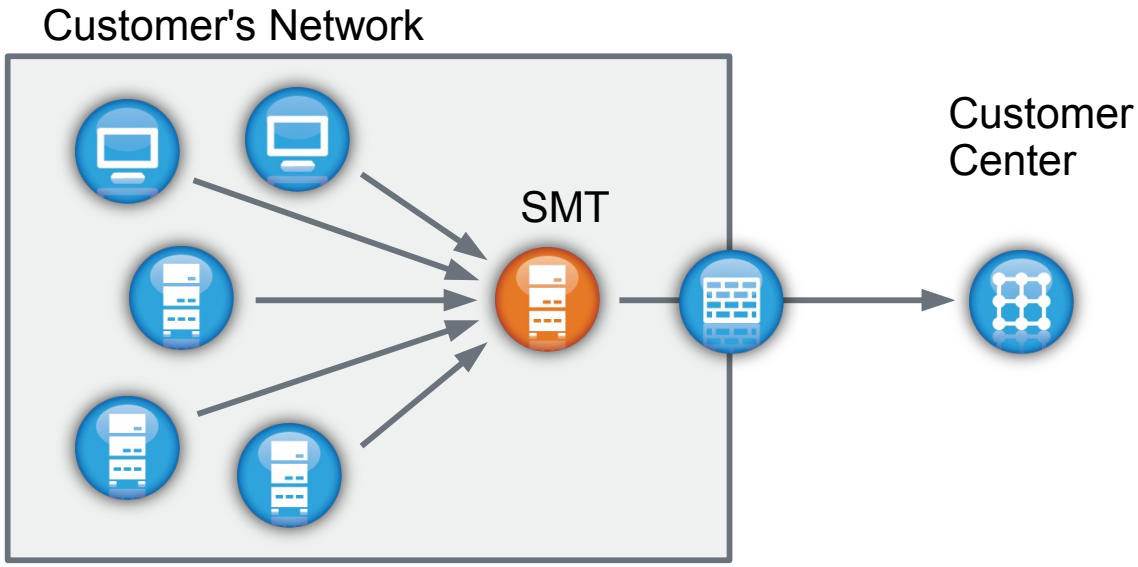
Subscription Management Tool (SMT)
Overview

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.



SMT 11 SP2 is available for download now !

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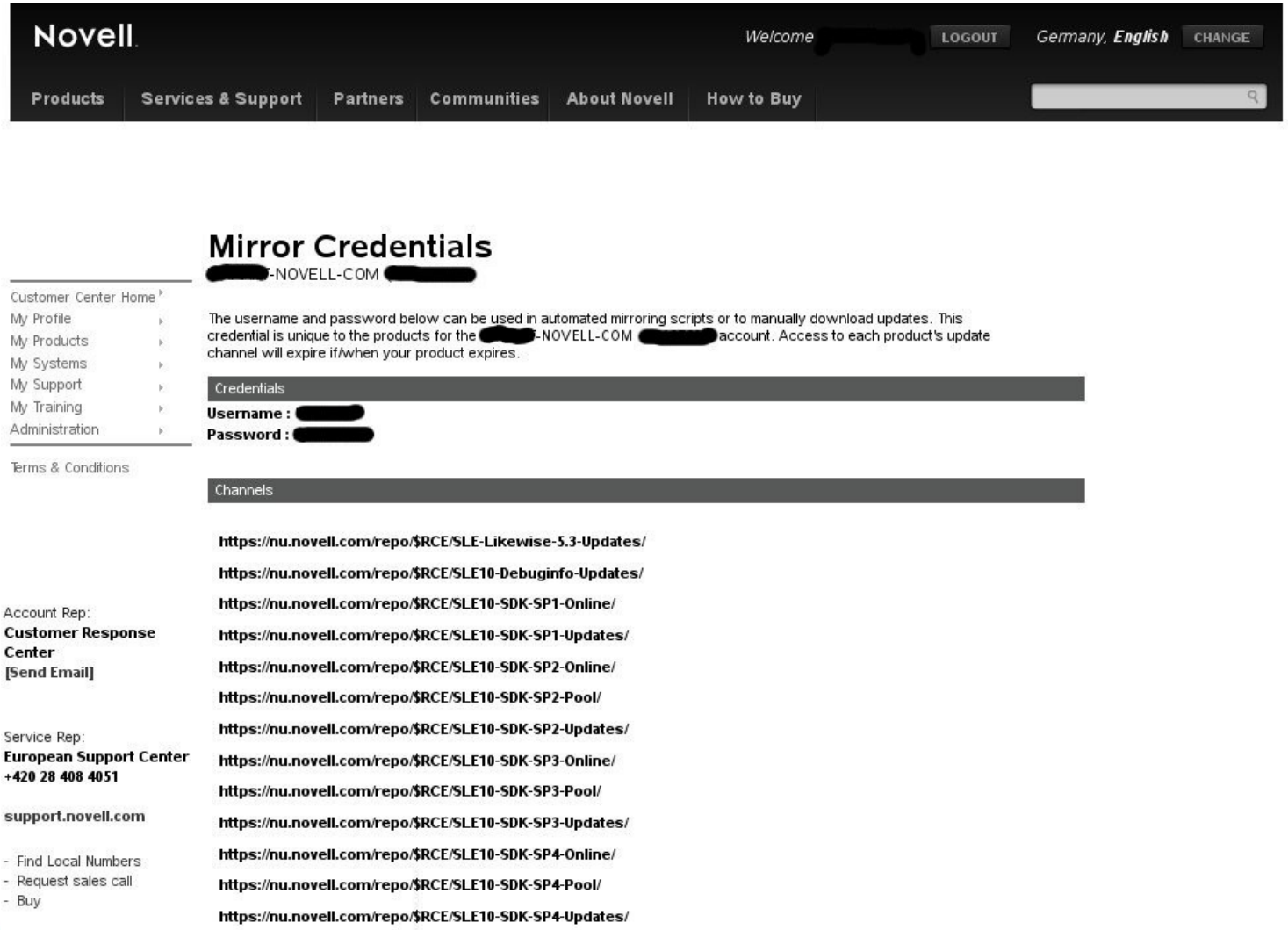
SMT & Customer Center Channels



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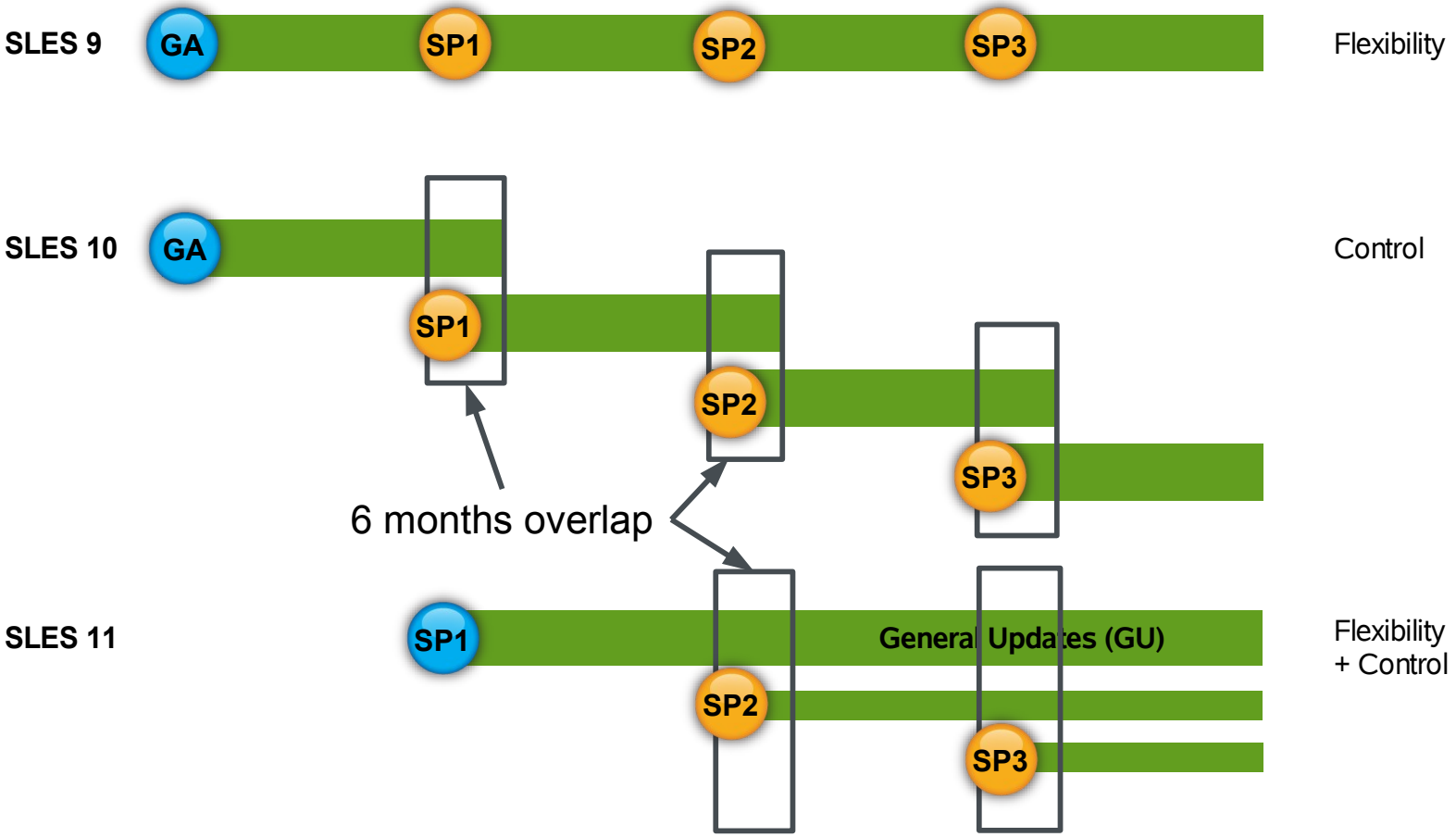
SUSE Linux Enterprise 11

Maintenance Delivery Evolution



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SUSE® Linux Enterprise 11

SUSE Maintenance Model Benefits

1. Make service packs more lightweight
   - easier to test and deploy
2. Allow for staying with older package versions
   - with support for the full system
3. Answer market needs in between Service Packs by
   - Selective enhancements
   - Allowing more updates in the GU repository

Remaining on older package versions?

- Customers can choose to remain on an specific version of a package in the GU repository, if technically feasible
- SUSE will support them, i.e.
  - analyze with the customer if his issue is already fixed
  - trigger fixing of an obvious issue
  - try to minimize the need of customers to upgrade
- Fixes to the package will only be delivered on top of the latest version
- If the latest version is in a Service Pack repository, customer either must migrate to that Service Pack or buy LTSS

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Where do SP packages end up?

- Final decision by SUSE Release Managers and Maintenance Team depending on technical feasibility
- General Rules:
  - Independent new package or fully compatible update, bugfixes or improvements with minor impact
    → SLE 11 SP1 repository = GU Repository
  - New package or fully compatible update, bugfixes or improvements with major impact or high QA need
    → SLE 11 SP1 repository together with Service Pack
  - Change which might affect compatibility or where (new or existing) package depends on other packages in a Service Pack
    → SLE 11 SP(n) repository together with Service Pack

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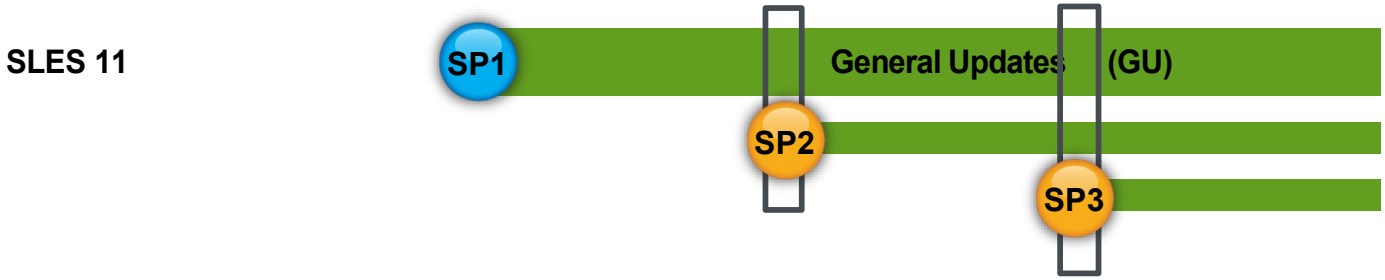
SUSE Maintenance Model Implementation



- One primary repository per major version
  - For SUSE Linux Enterprise 11 we start with the SP1 updates repository
  - you may hear “GU” (General Update repository) here.
  - Keep in mind: GU repo = existing SP1 updates repo
- Service Pack repositories contain dependencies that are strictly bound together “patch sets” each with its own repository
- Updates are released when they are ready
- Quality for the enterprise – test entire service pack

Complete your sessions evaluation online at SHARE.org/AnaheimEval

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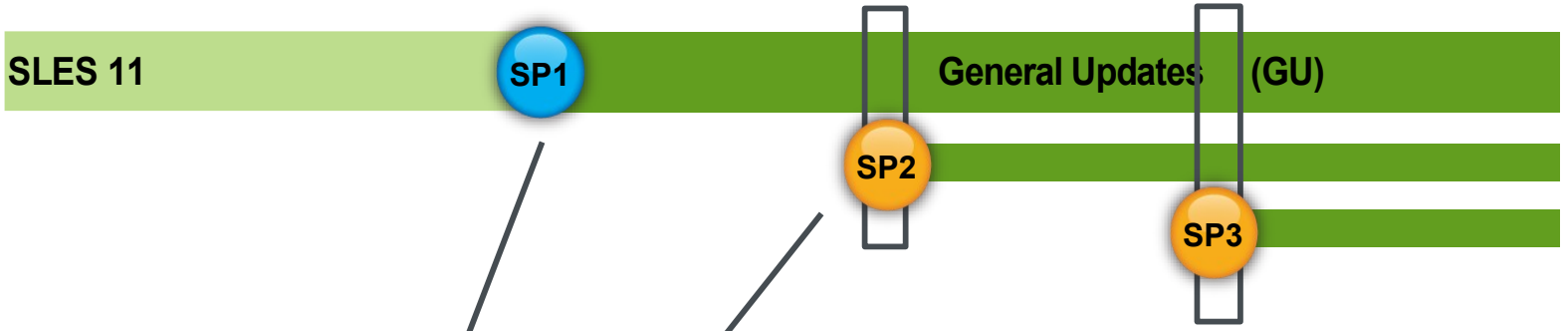
SMT & Repositories



Additional repositorties

```
s390t06:~ # zypper lr -u # with columns removed for better display
#  | Alias                                    |URI
---+------------------------------------------+-----------------------------------------------------------------------------------------------
 1 | SLE-11-SP2-SDK_1                         | ftp://schnell.suse.de/CD-ARCHIVE/SLE11/SLE-11-SP2-SDK-GM/s390x/DVD1
 2 | SLES-11-SP2                              | ftp://schnell.suse.de/CD-ARCHIVE/SLE11/SLES-11-SP2-GM/s390x/DVD1
 3 | SLES-11-SP2-Updates                      | http://smt.suse.de/repo/%24RCE/SLES11-SP2-Updates/sle-11-s390x/

11 | nu_novell_com:SLES11-SP1-Pool            | https://nu.novell.com/repo/$RCE/SLES11-SP1-Pool/sle-11-s390x?credentials=NCCcredentials
12 | nu_novell_com:SLES11-SP1-Updates         | https://nu.novell.com/repo/$RCE/SLES11-SP1-Updates/sle-11-s390x?credentials=NCCcredentials

13 | nu_novell_com:SLES11-SP2-Core            | https://nu.novell.com/repo/$RCE/SLES11-SP2-Core/sle-11-s390x?credentials=NCCcredentials
15 | nu_novell_com:SLES11-SP2-Updates         | https://nu.novell.com/repo/$RCE/SLES11-SP2-Updates/sle-11-s390x?credentials=NCCcredentials

10 | nu_novell_com:SLES11-Extras              | https://nu.novell.com/repo/$RCE/SLES11-Extras/sle-11-s390x?credentials=NCCcredentials
14 | nu_novell_com:SLES11-SP2-Extension-Store | ...
```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SMT & Repositories

- Migration between eg. SP1 → SP2
- Use yast wagon / migration patch
  - Will be offered via SP1 update and be marked as such
  - Meta patch to disconnect from SP1 channels
  - Reconnects to SP2 channels
  - 'Knows' channel structure
  - Automated process when you apply the migration patch

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Other Options

What if they multiply ?

- “Virtual server sprawl”
- Different type of systems
  - Development, Test, Production
- Different major versions of OS
  - Madanted by software certifications
  - “Migration” backlog
  - Or other requirements
- Different administrator roles & responsibilities
  - DBMS, Webapplication Servers, SAP, ...

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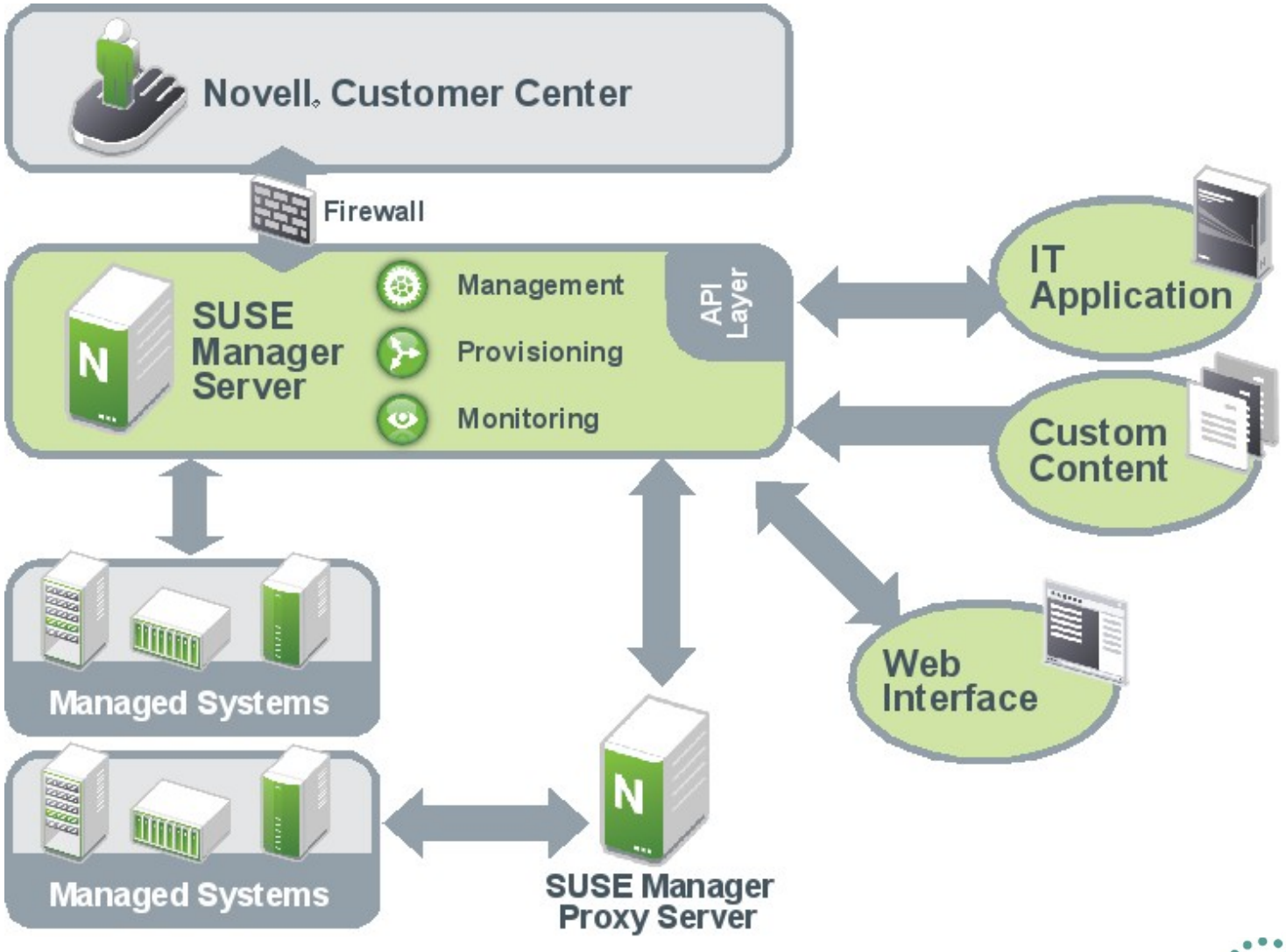
SUSE® Manager



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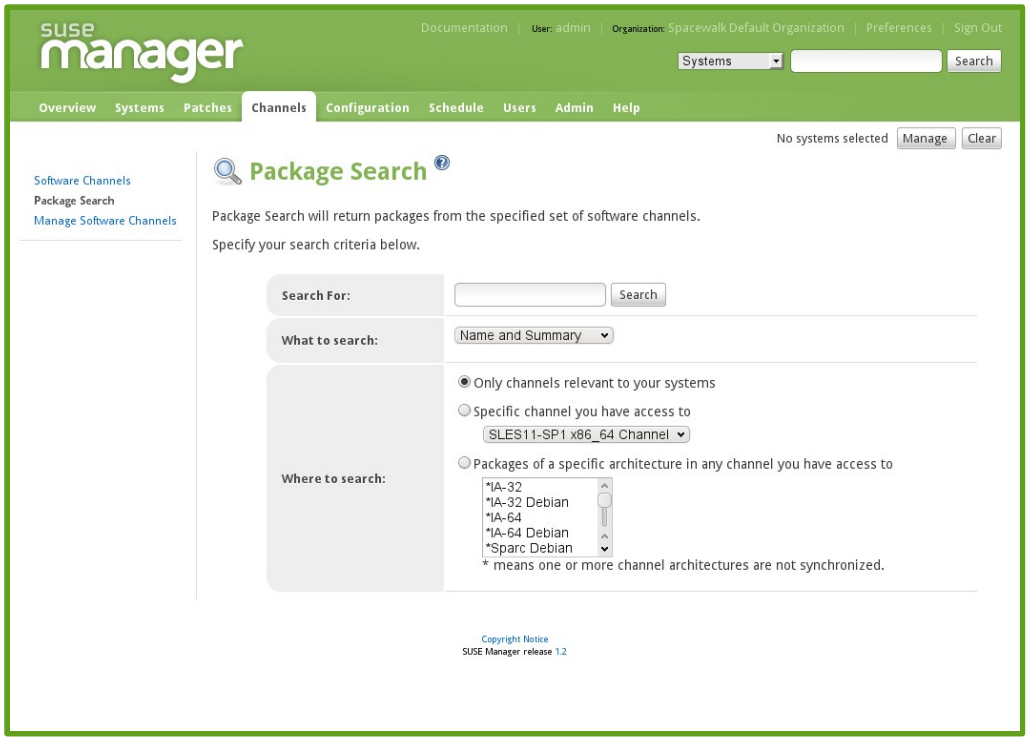
SUSE® Manager

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



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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		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

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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/

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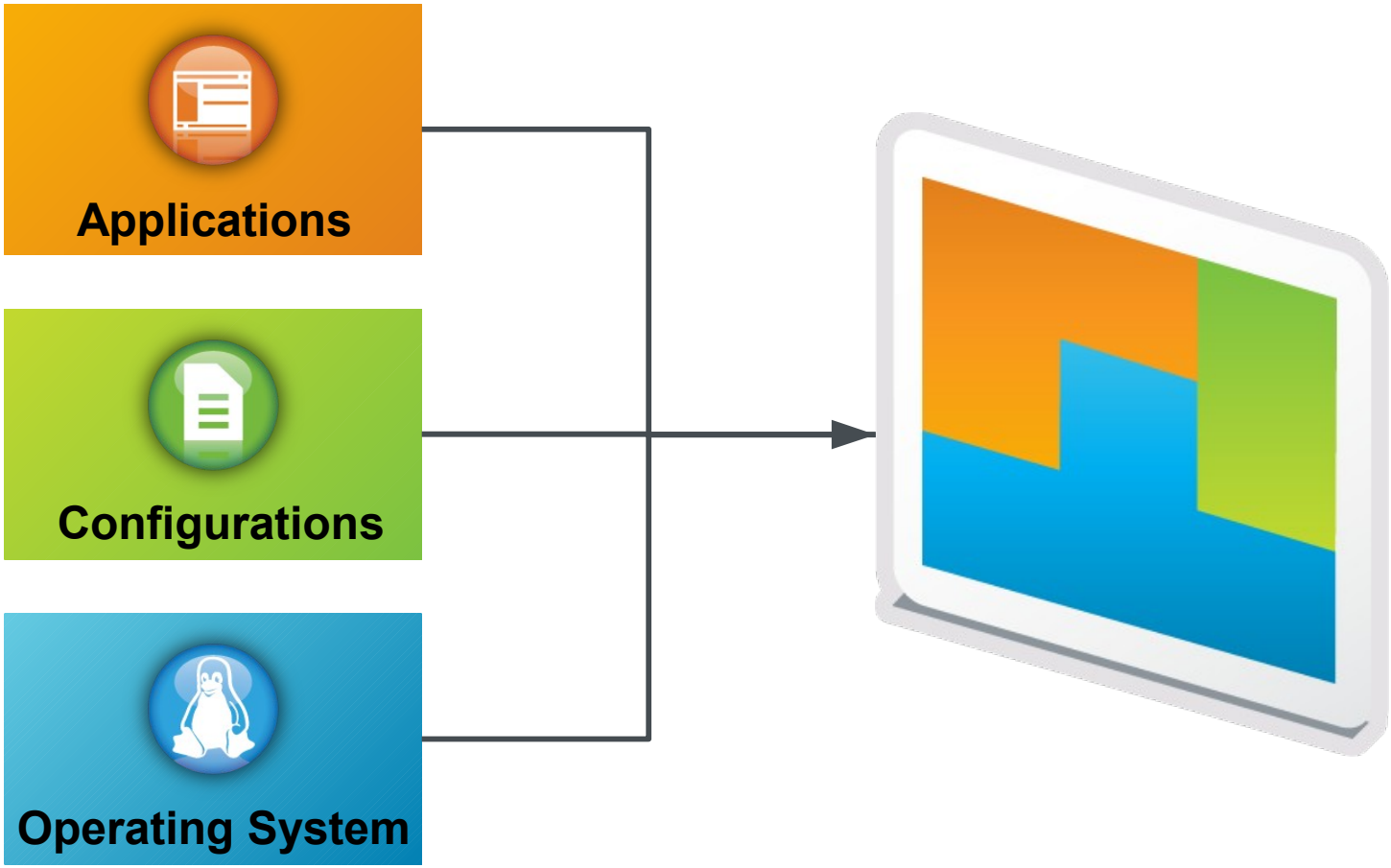
Why Not Do All This Just Once?



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SUSE® Studio™ Components

Build | Manage | Maintain

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

WebYaST:

Provides YaST functionality through a web interface

SUSE Lifecycle Management Server:

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

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Manage with WebYaST

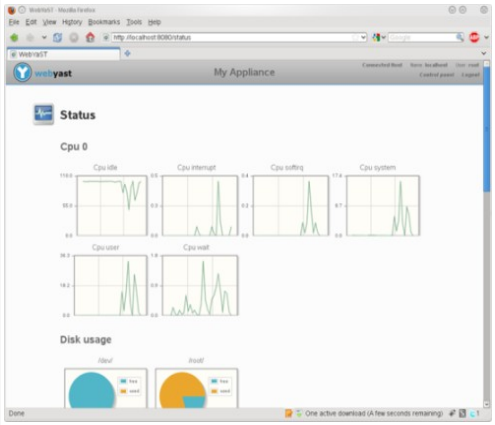
Web-based management interface for full visibility into the configuration, health and performance of your SUSE® Linux Enterprise

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)



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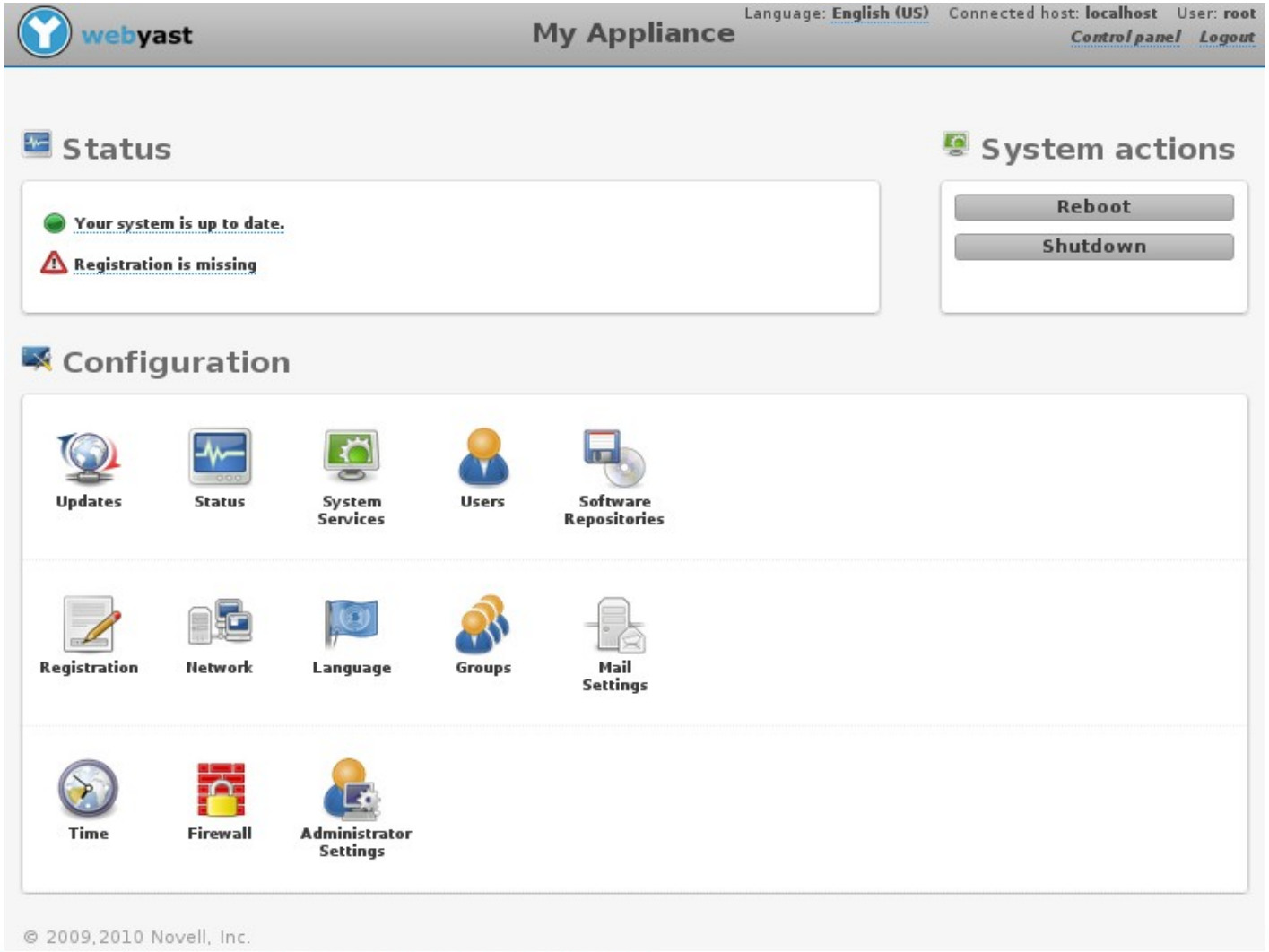
WebYast

Web based System Management Interface



Complete your sessions evaluation online at SHARE.org/AnaheimEval

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Maintain with
SUSE® Lifecycle Management Server

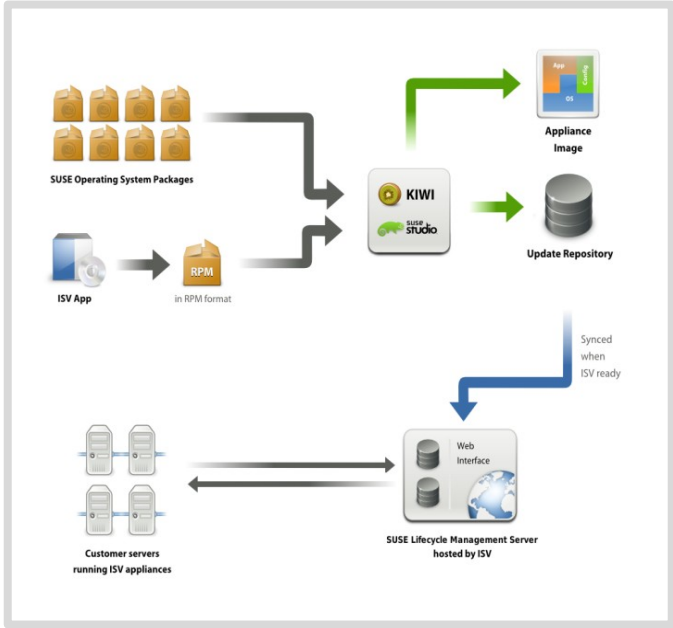
Update and maintenance of deployed software appliances.

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



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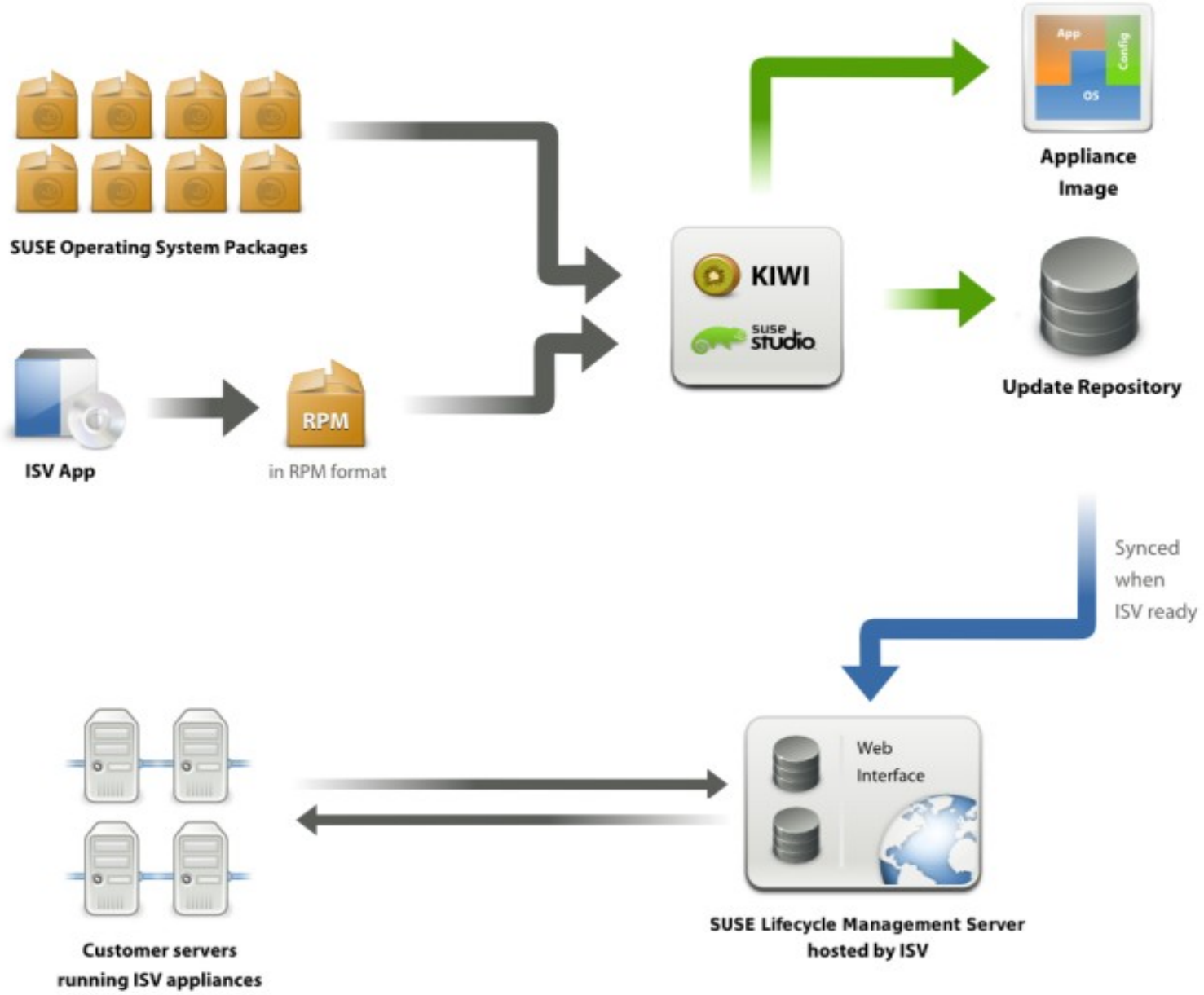
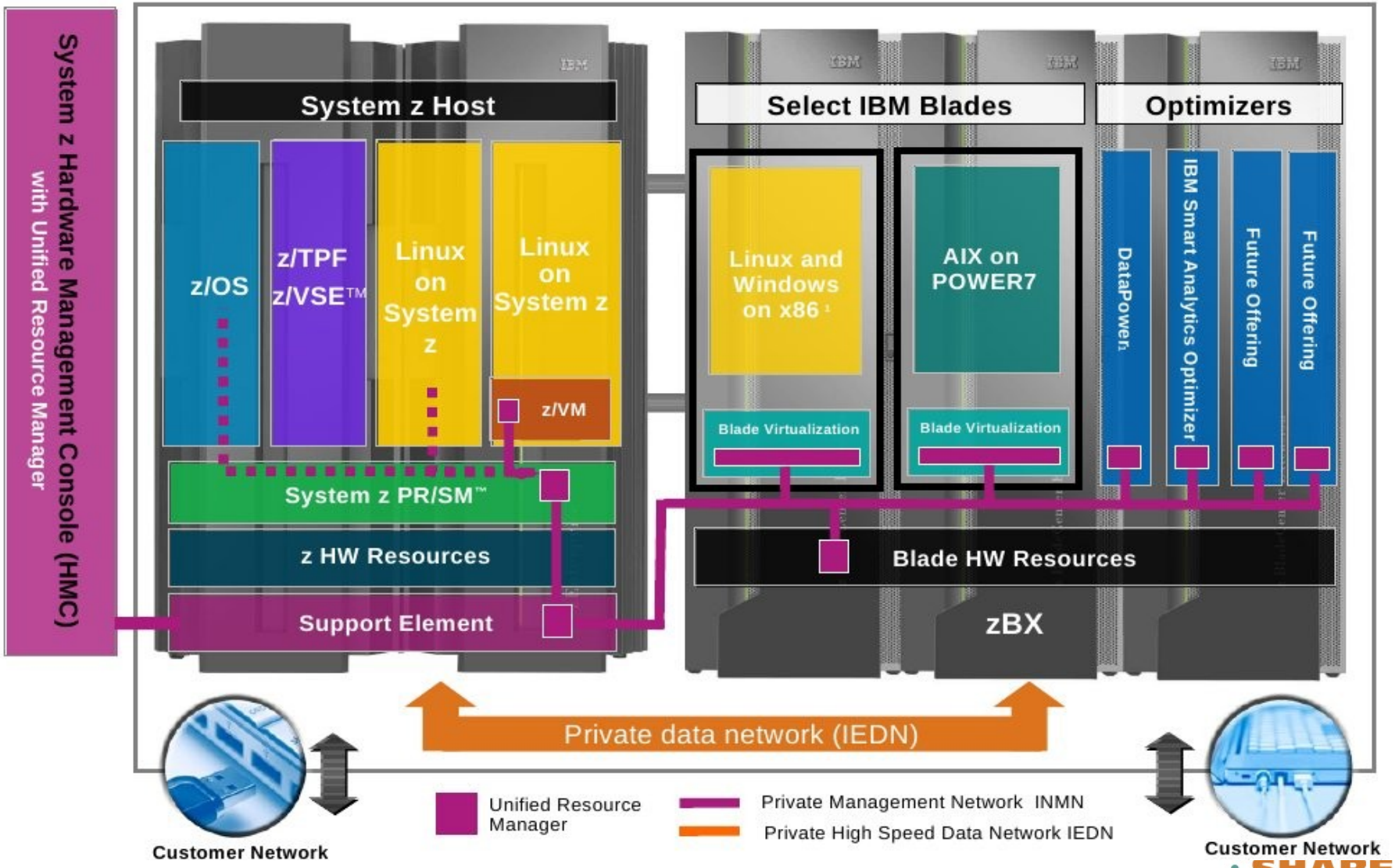

App
Config
OS
Appliance Image
SUSE Operating System Packages
KIWI
suse STUDIO
Update Repository
ISV App
RPM
in RPM format
Synced when ISV ready
Web Interface
SUSE Lifecycle Management Server hosted by ISV
Customer servers running ISV appliances

IBM zEnterprise



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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

Evaluations

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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-Datenverarbe
  http://www.novell.com/success/sparda.html

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