Images for the Clouds with KIWI & OBS

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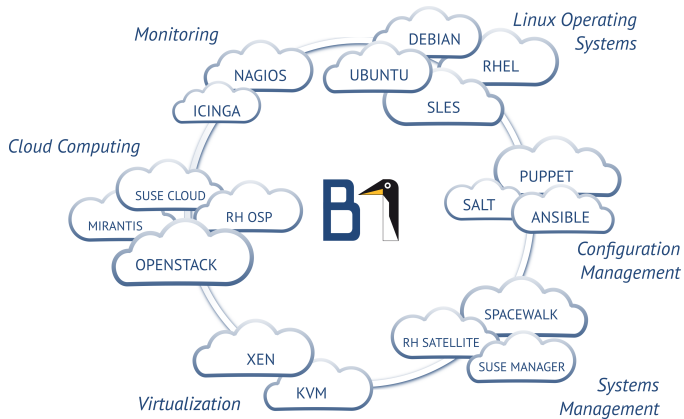B1 Systems GmbH
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Introducing B1 Systems

- founded in 2004
- operating both nationally and internationally
- nearly 100 employees
- provider for IBM, SUSE, Oracle & HP
- vendor-independent (hardware and software)
- focus:
  - consulting
  - support
  - development
  - training
  - operations
  - solutions

Areas of Expertise

Monitoring

Linux Operating Systems

Cloud Computing

Configuration Management

Systems Management

Virtualization

DEBIAN
NAGIOS
UBUNTU
RHEL
ICINGA
SLES
SUSE CLOUD
PUPPET
MIRANTIS
RH OSP
SALT
ANSIBLE
OPENSTACK
SPACEWALK
RH SATELLITE
SUSE MANAGER
XEN
KVM

Images for the clouds with KIWI and OBS

Images for the Clouds with KIWI and OBS 1/2

Why images?

- *cloud* is everywhere
- systems are not *installed* anymore → ready-made images get deployed and configured instead

Images for the Clouds with KIWI and OBS 2/2

Image creation should be like package creation:

- easy
- reproducible
- automatic

KIWI?

KIWI?

Source: The.Rohit - Elusive KiwiUploaded by Snowmanradio, CC BY 2.0,

https://commons.wikimedia.org/w/index.php?curid=10708202

KIWI?

Source: André Karwath aka Aka - Eigenes Werk, CC BY-SA 2.5,

https://commons.wikimedia.org/w/index.php?curid=65257

KIWI!

Source: http://suse.github.io/kiwi

KIWI – Image System

- image system
- appliance builder

KIWI

Supported image types/formats:

- ISO, Live CD/DVD
- PXEBoot
- Hard Disk/USB
- Amazon EC2 (.ami)
- Docker
- Google Cloud Format (..gce)
- Vagrant
- Virtual Systems: KVM/Qemu, XEN, VirtualBox, VMware
- Open Virtualization Format (.ovf, .ova)

KIWI

- written in Perl ($<$ version 8)
- written in Python ($>$ version 8)
- configuration file in XML
- scripts for any fine-tuning of the image creation

KIWI

Integration into Open Build Service:

- builds images according to XML configuration
- handles images like packages
- access to packages built in OBS

KIWI XML 1/2

```xml
<?xml version="1.0" encoding="utf-8"?>
<image schemaversion="5.3" name="dm" displayname="DM">
  <preferences>
    <type image="vmx" boot="vmxboot/suse-13.2"
          format="qcow2"  bootloader="grub2">
      <machine memory="1024">
              <vmdisk controller="ide" id="0"/>
      </machine>
    </type>
 ...
  </preferences>
  <packages type="image">
    <package name="open-vm-tools"/>
    <package name="bind-libs"/>
    <package name="bind-utils"/>
```

KIWI XML 2/2

```xml
<users group="root">
        <user name="root" pwd="..." home="/root"/>
</users>
<repository type="rpm-md" priority="2">
        <source path='...'/>
</repository>
```

KIWI XML

- description (author, contact,..)
- type of image
- preferences (locale, package manager configuration)
- packages to install
- packages to delete
- repositories to use (optional)

OBS?

OBS

What is OBS?

- `http://www.openbuildservice.org`

  A generic system to build and distribute packages from sources in an automatic, consistent and reproducible way. Release your software for a wide range of operating systems and hardware architectures.

KIWI in OBS

KIWI in OBS 1/5

Integration into Open Build Service:

- builds images according to XML configuration
- handles images like packages, including dependencies
- one configuration file can build multiple images with a similar configuration
    - QCOW image
    - RAW image
    - self-installing ISO image for hardware deployment
    - HDD image for PXE deployment including PXE installer

KIWI in OBS 2/5

Integration into Open Build Service:
KIWI has access to packages/repositories built in this OBS instance

- custom-built packages can be included in the image
- a new version of a custom-built package triggers image rebuild
- images always contain latest version

KIWI in OBS 3/5

Source Files

Show [25 ▼] entries   Search: [   ]

Filename ▲	Size ⇕	Changed ⇕	Actions
test.kiwi	3.92 KB	now	
root.tar.bz2	438 Bytes	now	

Showing 1 to 2 of 2 entries   ◀ Previous   Next ▶

KIWI in OBS 4/5

File test.kiwi of Package kiwi-test

| Save | undo | redo | | 9pt | --- |

```
 1  <?xml version="1.0" encoding="utf-8"?>
 2  <image name="B1-Thin-Client-Image_Firefox_TESTING" displayname="B1-Thin-Client-Image_Firefox" schemaversion="5.6">
 3      <description type="system">
 4          <author>B1 Systems GmbH</author>
 5          <contact>info@b1-systems.de</contact>
 6          <specification>B1 Thin Client</specification>
 7      </description>
 8      <preferences>
 9          <type compressed="true" image="vmx" primary="true" filesystem="ext4" boot="vmxboot/suse-13.2" format="qcow2" kernelcmdlin
10              <machine memory="1024">
11                  <vmdisk controller="ide" id="0"/>
12              </machine>
13          </type>
14
15          <version>2.3.1</version>
16          <packagemanager>zypper</packagemanager>
17          <rpm-check-signatures>false</rpm-check-signatures>
18          <rpm-excludedocs>true</rpm-excludedocs>
19          <rpm-force>false</rpm-force>
20          <bootloader-theme>Fraport</bootloader-theme>
21          <bootsplash-theme>Fraport</bootsplash-theme>
22          <timezone>Europe/Berlin</timezone>
23          <hwclock>localtime</hwclock>
24              <locale>de_DE</locale>
25              <keytable>de.map.gz</keytable>
26      </preferences>
```

KIWI in OBS 5/5

root.tar.bz2

```
etc/
etc/sysconfig/
etc/sysconfig/network/
etc/sysconfig/network/ifcfg-eth0
```

KIWI in OBS – Repository Definitions 1/3

Repository definitions:

- directly in KIWI XML definition
- in project's repository definition

KIWI in OBS – Repository Definitions 2/3

directly in KIWI XML definition

*.kiwi

```
<repository type="rpm-md">
 <source path="obs://openSUSE:Leap:42.1:Update/standard"/>
</repository>
<repository type="rpm-md">
 <source path="obs://openSUSE:Leap:42.1/standard"/>
</repository>
```

KIWI in OBS – Repository Definitions 3/3

... in project's repository definition

*.kiwi

```
<repository type="rpm-md" priority="2">
 <source path='obsrepositories:/'/>
</repository>
```

Project XML

```
<repository name="images">
 <path project="OBS:Server:2.7" repository="openSUSE_42.1"/>
 <path project="openSUSE:Tools" repository="openSUSE_42.1"/>
 <path project="openSUSE:Leap:42.1:NonFree:Update" repository="standard"/>
 <path project="openSUSE:Leap:42.1:Update" repository="standard"/>
 <arch>x86_64</arch>
</repository>
```

KIWI vs. KIWI in OBS

Particularities of plain KIWI vs. KIWI in OBS

Plain KIWI	in OBS
can use expanded directories with files as source	directories need to be packed up as tarball
can use any repository for building images	can only use OBS repositories

Challenges with KIWI in OBS

Challenges with KIWI in OBS

Particularly nasty problems of KIWI in OBS vs. plain KIWI:
Building images of non-SUSE distributions, example: CentOS

- plain KIWI uses the build system's tools to assemble the image
- OBS installs a VM with the same distribution as the image, and builds the image in this VM
- subtle differences in the tools might reveal KIWI bugs
- per default, non-SUSE distributions in OBS use the kernel of the build host for the build VM. It might be necessary to create a `kernel-obs-build` package for the non-SUSE distribution to make KIWI in OBS work

Challenges with KIWI in OBS

A few more from my list of interesting facts regarding KIWI in OBS:

- The order of package repositories matters.
    - The repository containing kiwi needs to come first, or...
      `unresolvable: nothing provides kiwi = 7.03.75 needed by kiwi-requires, nothing provides kiwi-desc-vmxboot = 7.03.75 needed by kiwi-desc-vmxboot-requires`
    - Not all OBS prjconf are used equally.
- In the end, it all comes down to "'trial and error"'
- It is practically impossible to debug package resolution problems in OBS, not even by changing the code ;-)

Challenges with KIWI in OBS – An Example

This works:

```
<repository type='rpm-md'>
    <source path='obs://Infrastructure:KIWI/SLES12'/>
</repository>
<repository type='rpm-md'>
    <source path='obs://SLES12-SP1-FU/standard'/>
</repository>
```

This doesn't work (cannot resolve kiwi packages):

```
<repository type='rpm-md'>
    <source path='obs://SLES12-SP1-FU/standard'/>
</repository>
<repository type='rpm-md'>
    <source path='obs://Infrastructure:KIWI/SLES12'/>
</repository>
```

Thank You!

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or +49 (0)8457 - 931096