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Automatische Systemkonfiguration in Solaris 11 mit First Boot Services

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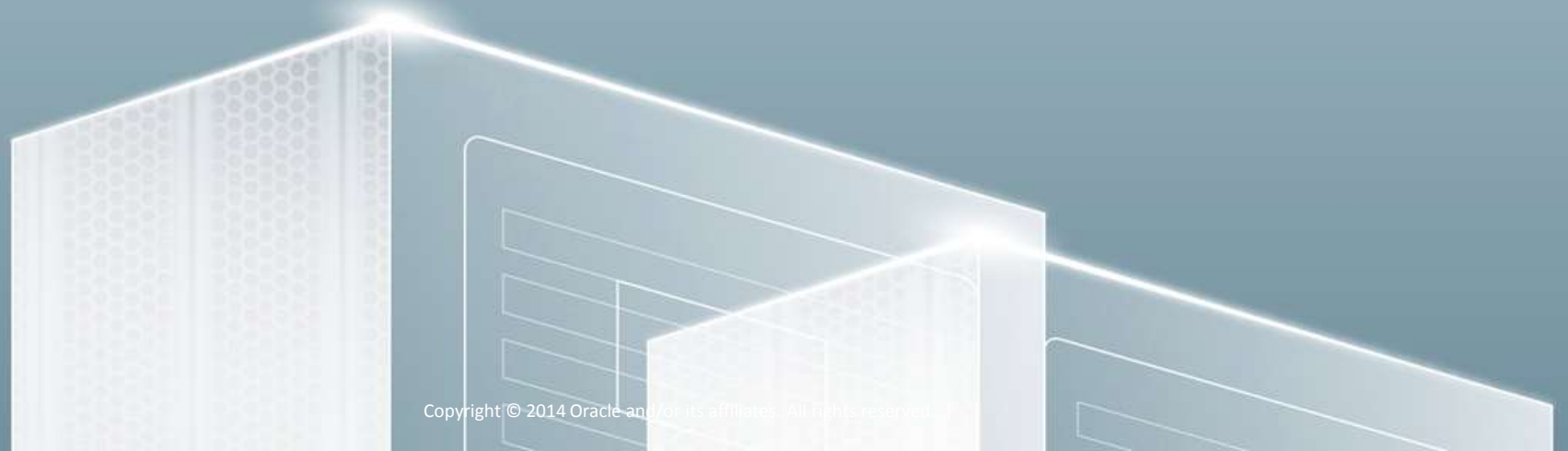
Master Principal Sales Consultant



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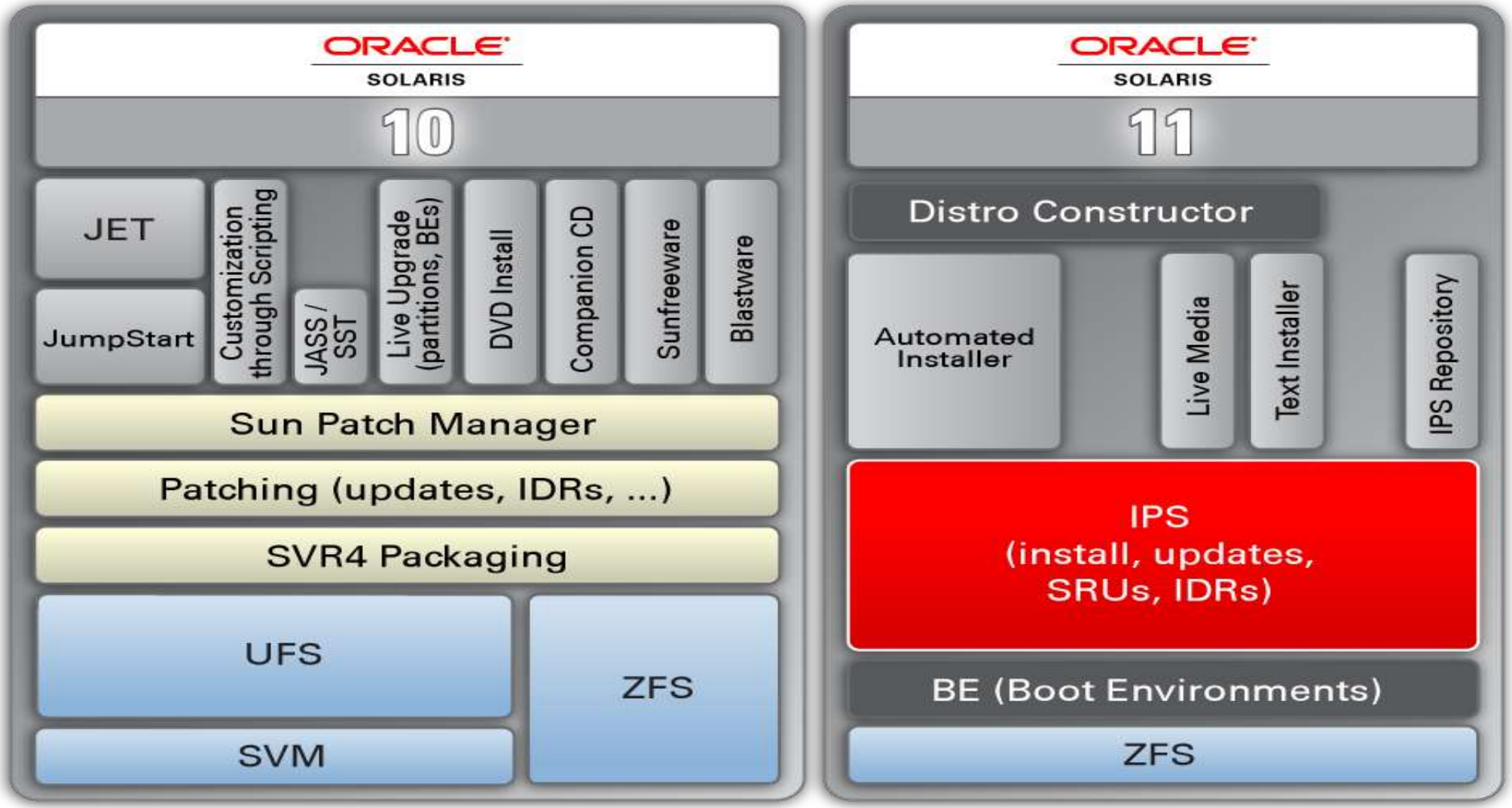
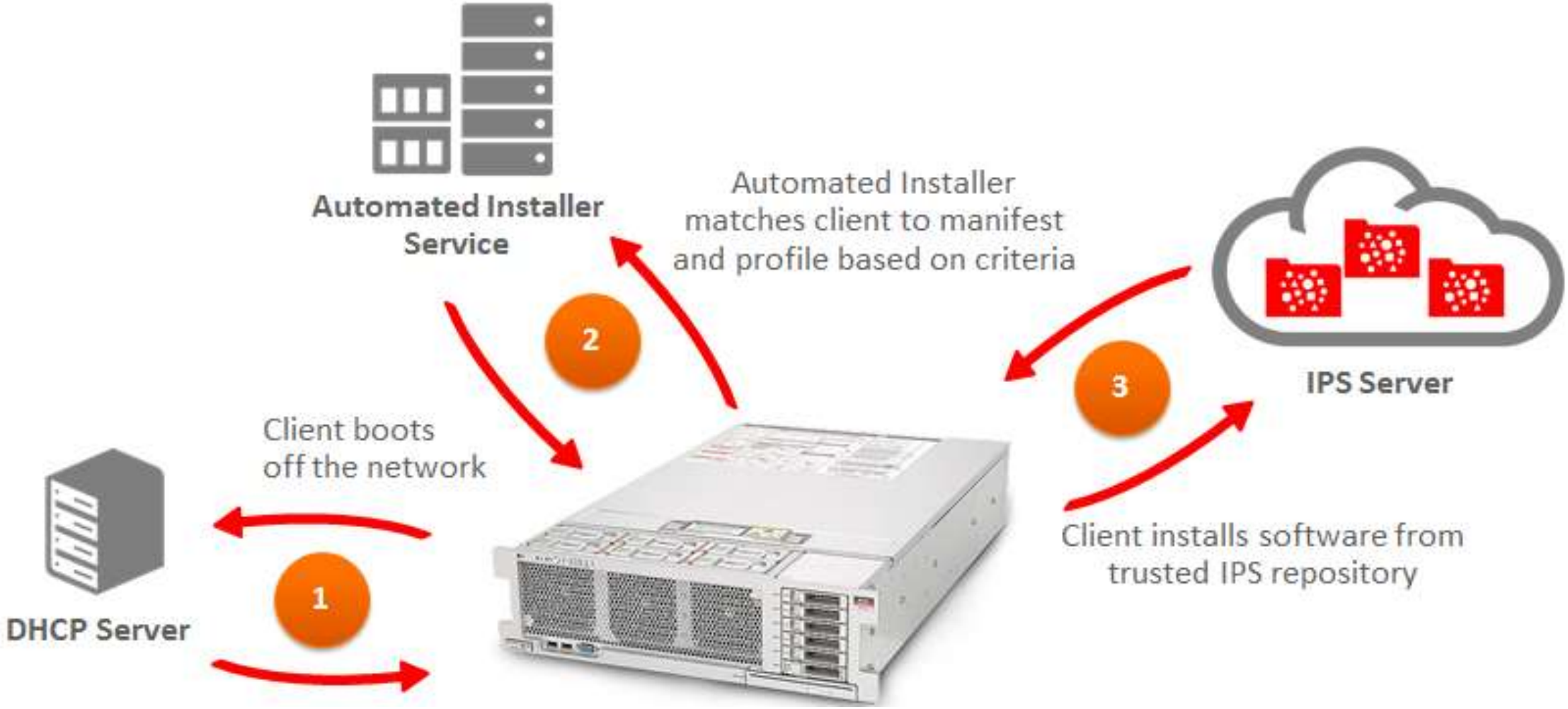
Intro: Oracle Solaris 11 Lifecycle Management



Intro: Automated Installer



What's next with automated System Installation ?

- Create additional user
- Network Configuration
- Customizing the system
- Additional software
- Site specific software and configuration

Options for Automatic System Configuration

- 1. Self assemblies, profiles and SMF services
  - Installed with IPS packages and used during the next boot
    - /etc/system.d/*
      - Kernel parameters
    - /etc/svc/profile/site
      - System Configuration Profile
      - Configuration of SMF services
    - /lib/svc/manifest/site
      - Create new SMF services
- 2. First Boot Service

First Boot Service (FBS)

- SMF Service
  - Activated with the first boot of a fresh installed system
  - Runs exactly once
  - Deactivates (and possibly removes) itself after job done
  - Maybe "Secondary Boot" after job done

First Boot Service (FBS) - ToDo

- Install FBS with IPS package in AI manifest
  - Create Simple IPS Package
  - Create SMF Manifest
  - Design SMF start method
  - Design Configuration files

First Boot Service (FBS) - This very easy Example

- Name the IPS package fbs
- Name the SMF service /site/fbs
- Put the package to /opt/fbs

- Actions
  - Limit the ZFS ARC Cache, depending on a condition
  - Run a script, that does something (Here: Set boot timeout to 5 seconds)

Before we begin ... some IPS Basics

Some IPS Package Basics - Parts of a Package

- Metadata and Actions
- Actions
  - Create Directories
  - Install files
  - Create dependencies
  - Set attributes
  - Create users and groups
  - Install device driver

Some IPS Package Basics - Controlled Installation of Contents

- variant - Predefined by Solaris - can not be self-defined
  - Install alternative package parts into an identical path
    - variant.arch — sparc, i386
    - variant.opensolaris.zone — global, nonglobal
    - variant.debug.* — true, false
- facet - Predefined by Solaris - but can be extended by self-defined facets
  - Install optional parts of a package (locales, man pages, etc.)
    - facet.locale.* — true, false
    - facet.doc.man — true, false
    - **facet.fbs.vm** — true, false

Create a simple FBS-IPS Package

Task-List

1. Create Prototype Directories (Sourcetree)
2. Create the "real" Content (Start method, Files, ...)
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Create a simple FBS-IPS Package

1. Create Prototype Directories (Sourcetree)

- Prototype tree in fbs/proto
- FBS SMF Manifest in lib/svc/manifest/site
  - Detected at boot by svc:/system/manifest-import:default
- Kernel Parameters in etc/system.d/*
- Package in opt/fbs

```
# mkdir -p fbs/proto/lib/svc/manifest/site
# mkdir -p fbs/proto/etc/system.d
# mkdir -p fbs/proto/opt/fbs
...
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

2. Package Content - fbs.sh = The SMF Method: Begin

 # vi proto/fbs/opt/fbs.sh

```
#!/bin/sh
# Wrapper Script to run First Boot Configuration Scripts
# Load SMF shell support definitions
. /lib/svc/share/smf_include.sh

# Prints out messages to console
fbsecho ()
{
        echo $1 | tee /dev/sysmsg
}

completed=$(svcprop -p config/completed site/fbs:default)
# If already done, exit with temporary disable
if [ "${completed}" = "true" ]; then
        svcadm disable svc:/site/fbs
        smf_method_exit $SMF_EXIT_OK completed "Configuration already done"
```

Create a simple FBS-IPS Package

2. Package Content - fbs.sh = The SMF Method: Actions

```
else
        # My FBS-stuff comes here
        DIR=/opt/fbs
        FBS="First Boot Service:"
        fbsecho "$FBS Waiting for another reboot ..."
        # Run *.cfg, installed depending of facet.site.*
        for ACTION in `ls ${DIR}/bin/*.cfg 2>/dev/null`
        do
                . ${ACTION}
        done
```

Create a simple FBS-IPS Package

2. Package Content - fbs.sh = The SMF Method: Finish

```
        ## temp disable to prevent from going online if we go ahead
        svcadm disable -t svc:/milestone/multi-user:default
        # Record that this script's work is done
        svccfg -s site/fbs:default setprop config/completed = true
        svcadm refresh site/fbs:default
                    ## Job Done - disable  FBS now
        fbsecho "\n $FBS cleaning up"
        svcadm disable svc:/site/fbs
         fbsecho "\n $FBS Done ...rebooting ..."
         init 6
        smf_method_exit $SMF_EXIT_OK method_completed "Configuration done”
fi
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

3. Create SMF FBS-Manifest

```
# svcbundle -s service-name=site/fbs
      -s start-method=/opt/fbs/fbs.sh \
      -s instance-property=config:completed:boolean:false > proto/fbs/lib/svc/manifest/site/fbs.xml
```

- Add Customizations
  - timeout_seconds: Might be important for long running FBS !
  - dependencies
  - dependents

Create a simple FBS-IPS Package

3. Create SMF FBS-Manifest - 1/2

```
<?xml version="1.0" ?>
<!DOCTYPE service_bundle
  SYSTEM '/usr/share/lib/xml/dtd/service_bundle.dtd.1'>
<service_bundle type="manifest" name="site/fbs">
    <service version="1" type="service" name="site/fbs">
        <!--
            We want to run after milestone name-services has been reached
           and before milestone multi-user has been reached.
        -->
        <dependency restart_on="none" type="service"
                name="name-services_dependency" grouping="require_all">
                <service_fmri value="svc:/milestone/name-services:default"/>
        </dependency>
        <dependent restart_on="none"
                name="multi-user_dependent" grouping="optional_all">
                <service_fmri value="svc:/milestone/multi-user:default" />
       </dependent>
```

Create a simple FBS-IPS Package

3. Create SMF FBS-Manifest - 2/2

```
        <exec_method timeout_seconds="60" type="method" name="start"
            exec="/opt/fbs/fbs.sh"/>
         <exec_method timeout_seconds="60" type="method" name="stop"
            exec=":true"/>
         <property_group type="framework" name="startd">
            <propval type="astring" name="duration" value="transient"/>
         </property_group>
         <instance enabled="true" name="default">
            <property_group type="application" name="config">
               <propval type="boolean" name="completed" value="false"/>
            </property_group>
         </instance>
      </service>
   </service_bundle>
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

4. Create Metainformation for Package

```
#  more fbs.meta
set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="Site: First Boot Service"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value=\
      "org.opensolaris.category.2008:System/Administration and Configuration"
```

Create a simple FBS-IPS Package

Task-List

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Create a simple FBS-IPS Package

5. Create Package Manifest 1/3

```
# pkgsend generate proto | pkgfmt > fbs.lst
# pkgmogrify fbs.lst fbs.meta | pkgfmt > fbs.p5m
# cat fbs.p5m

set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="AI First Boot Configuration"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value="org.opensolaris.category.2008:System/Administration and Configuration"
dir  path=lib owner=root group=bin mode=0755
dir  path=lib/svc owner=root group=bin mode=0755
dir  path=lib/svc/manifest owner=root group=bin mode=0755
dir  path=lib/svc/manifest/site owner=root group=bin mode=0755
file lib/svc/manifest/site/fbs.xml path=lib/svc/manifest/site/fbs.xml owner=root group=bin mode=0644
dir  path=opt owner=root group=bin mode=0755
dir  path=opt/fbs owner=root group=bin mode=0755
dir  path=opt/fbs/bin owner=root group=bin mode=0755
file opt/fbs/fbs.sh path=opt/fbs/fbs.sh owner=root group=bin mode=0755
```

Create a simple FBS-IPS Package

5. Create Package Manifest 2/3

- Ignore directories, which has already been installed by other packages
  - Control actions for *pkgmogrify(1)*

```
#  more fbs.meta
set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="Site: First Boot Service"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value=\
      "org.opensolaris.category.2008:System/Administration and Configuration"
<transform dir path=lib -> drop>
<transform dir path=opt$ -> drop>
```

Create a simple FBS-IPS Package

5. Create Package Manifest 3/3

```
# pkgsend generate proto | pkgfmt > fbs.lst
# pkgmogrify fbs.lst fbs.meta | pkgfmt > fbs.p5m
# cat fbs.p5m

set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="Site: First Boot Service"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value="org.opensolaris.category.2008:System/Administration and Configuration"
file lib/svc/manifest/site/fbs.xml path=lib/svc/manifest/site/fbs.xml owner=root group=bin mode=0644
dir  path=opt/fbs owner=root group=bin mode=0755
dir  path=opt/fbs/bin owner=root group=bin mode=0755
file opt/fbs/bin/10-vm.cfg path=opt/fbs/bin/10-vm.cfg owner=root group=bin mode=0755
file opt/fbs/fbs.sh path=opt/fbs/fbs.sh owner=root group=bin mode=0755
```

How to control partial package installations ?

Create a simple FBS-IPS Package

5.1 Use of Facets

- Control partial installation of packages
- Set with "pkg change-facet" or in AI-Manifest
- **Caution**: Not defined facets are preset in IPS package operations as "true"

```
# pkg change-facet facet.site.vm="true"
# pkg facet
```

```
set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="Site: First Boot Service"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value=\
    "org.opensolaris.category.2008:System/Administration and Configuration"
<transform dir path=lib -> drop>
<transform dir path=opt$ -> drop>
<transform file path=.*10-vm.cfg -> add facet.site.vm true>
```

Create a simple FBS-IPS Package

5.1 Use of Facets

 # cat fbs.p5m

```
set name=pkg.fmri value=fbs@1.0
set name=pkg.summary value="Site: First Boot Service"
set name=pkg.description value="Script that runs once at first boot after a new AI installation"
set name=info.classification value="org.opensolaris.category.2008:System/Administration and Configuration"
file lib/svc/manifest/site/fbs.xml path=lib/svc/manifest/site/fbs.xml owner=root group=bin mode=0644
dir  path=opt/fbs owner=root group=bin mode=0755
dir  path=opt/fbs/bin owner=root group=bin mode=0755
file opt/fbs/bin/10-vm.cfg path=opt/fbs/bin/10-vm.cfg owner=root group=bin mode=0755 facet.site.vm=true
file opt/fbs/fbs.sh path=opt/fbs/fbs.sh owner=root group=bin mode=0755
```

 # cat ai-manifest.xml

```
...
<facet set="false">facet.site.*</facet>
<facet set="true">facet.site.vm</facet>
...
```

Create a simple FBS-IPS Package

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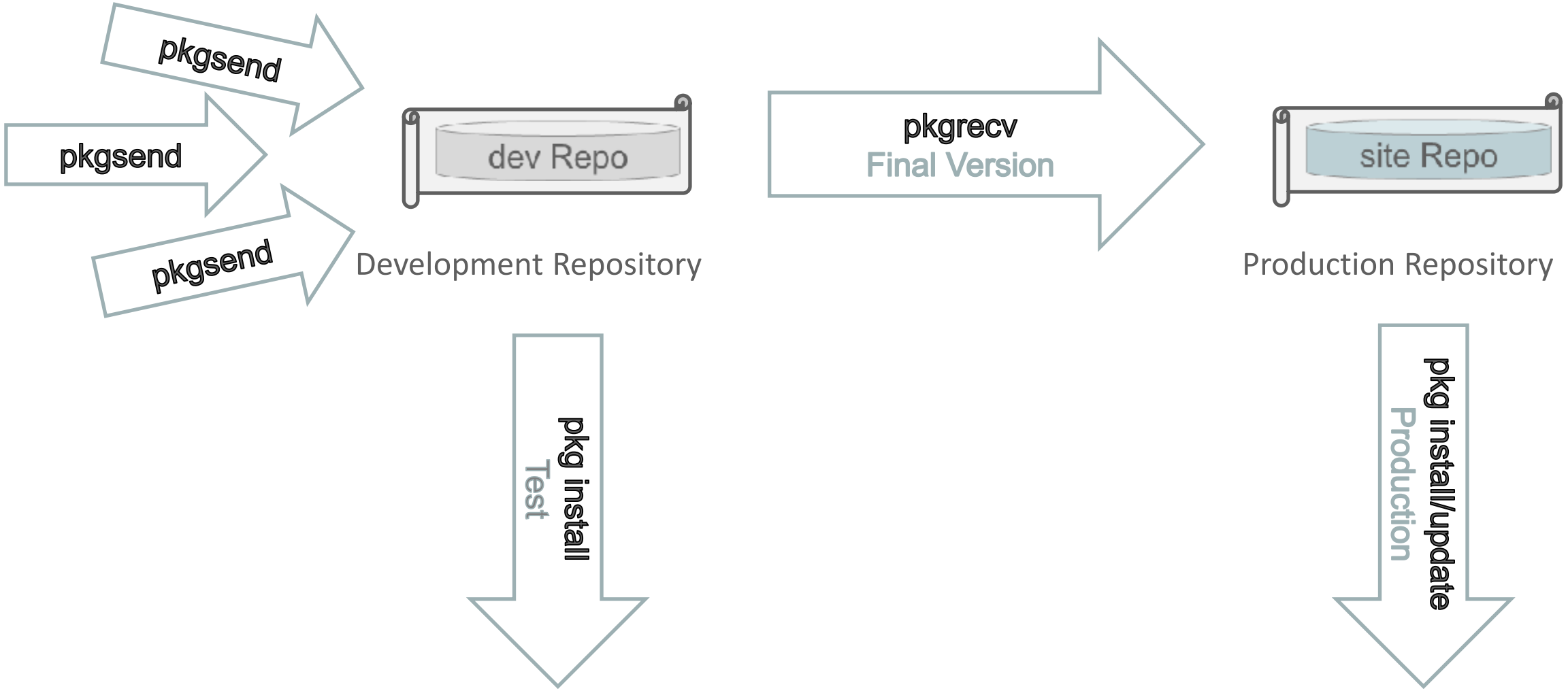
Repositories for IPS Development



Create a simple FBS-IPS Package

6. Create Development Repository

```
# pkgrepo create devrepo
# pkgrepo -s devrepo add-publisher site
```

Create a simple FBS-IPS Package

6. Create Site Repository

```
# zfs create repo/site
# pkgrepo create /repo/site
# pkgrepo –s /repo/site add-publisher site
# pkgrepo set –s /repo/site publisher/prefix=site

# svccfg –s pkg/server add site
# svccfg -s pkg/server:site setprop pkg/port=8888
# svccfg -s pkg/server:site setprop pkg/inst_root=/repo/site

# svcadm enable pkg/server:site

# pkgrepo -s http://repo-host:8888 info
PUBLISHER PACKAGES       STATUS         UPDATED
site              -                  -                    -
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

7. Create Package

```
# pkgsend publish -d ./proto -s ./devrepo fbs.p5m
pkg://site/fbs@1.0,5.11:20140522T092819Z
PUBLISHED

# pkgrepo list -s ./devrepo
NAME (PUBLISHER)                VERSION                 IFO
fbs (site)                      1.0                     ---
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

8. Test

```
# pkg set-publisher -g ./devrepo site
# pkg publisher

PUBLISHER                 TYPE     STATUS P LOCATION
solaris                   origin   online       F http://repo-host/s11.2/
site                      origin   online       F file:///net/srv/ipsdev/devrepo/
# pkg install -nv fbs

Packages to install:        1
Estimated space available: 10.05 GB
Estimated space to be consumed: 52.53 MB
Create boot environment:       No
Create backup boot environment:       No
Rebuild boot archive:       No
Changed packages:
site
 fbs
    None -> 1.0,5.11:20140522T092819Z
```

Create a simple FBS-IPS Package

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Create a simple FBS-IPS Package

9. Upload Package

- Transfer Package from Development into Production Repository

```
# pkgrecv -s ./devrepo -d /repo/site fbs@latest
# pkgrepo rebuild -s /repo/site
# svcadm restart pkg/server:site
```

- Clean-up

```
# pkgrepo remove -s ./devrepo fbs@<version> … or use …@latest
# pkgrepo rebuild -s ./devrepo
```

Summary

- First Boot Services help to automatically customize System Installations
- Preparation and planning is important
- General understanding helps a lot
- The real stuff is often just a small part

- But: Creating IPS packages and FBS is no magic

References

- Packaging and Delivering Software
  With the Image Packaging System in Oracle® Solaris 11.2

  https://docs.oracle.com/cd/E36784_01/html/E36856/index.html

- Installing Oracle® Solaris 11.2 Systems

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Q & A

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