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Oracle Solaris 11 Express – What You Do Differently

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Agenda

- What stays the same in Solaris 11 Express
- Interactive Installation
- Root File System
- Root User
- Day-to-Day Commands
- Packaging / Patching
- Network Installation
- Network Administration
- Zones

Solaris Roadmap

Maximizing Integration

"Oracle is committed to continued development and support of Solaris. The potential synergy between Oracle software and Solaris is obvious."

--Richard Fichera, Forrester

Solaris 10
Platform Support
Software Integration

Solaris 11 Update
Software Lifecycle
Scalability
Networking
Security

Solaris 11 Update
High Availability
Memory
Scalability
Virtualization

Solaris 11 Update
System Management
I/O Scalability

Solaris 11 Update
Core Scalability

2010

2011

2012

2013

2014

2015

T-Series
1-4 Socket
+2x Throughput

M-Series
1-64 Socket
+20%

T-Series
1-4 Sockets
+3x Single Strand

M-Series
8-64 Sockets
+6x Throughput
+1.5x Single Strand

T-Series
1-8 Sockets
+3x Throughput

M-Series
8-64 Sockets
+2x Throughput

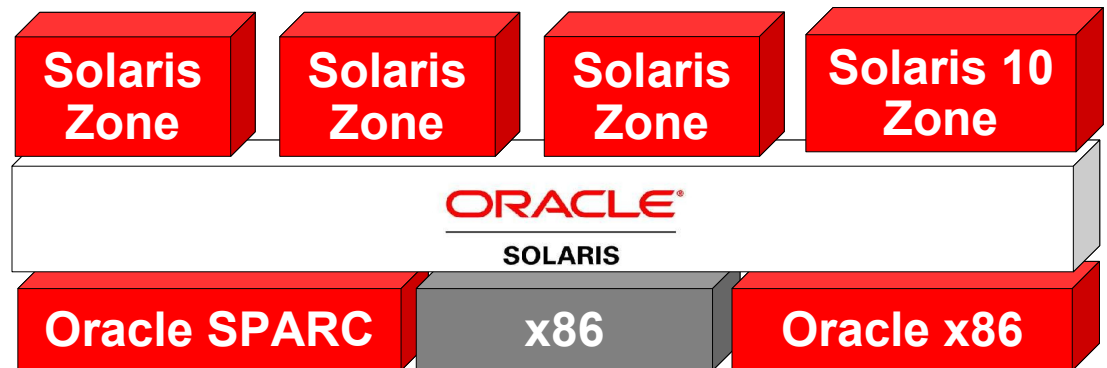
SPARC
1-64 Sockets
+2x Throughput
+1.5x Single Strand

Power, Reliability, Power Management Optimizations for Latest-Generation Intel Processors

Preserving Business Investments

Guaranteed Compatibility and Deployment Options

- Solaris Binary Application Guarantee Program
 - From 1997 forward
- Solaris Source Code Guarantee Program
 - Between SPARC and x86
- Solaris 10 Zones
 - Preserve existing environments



Who is Oracle Solaris 11 Express For?

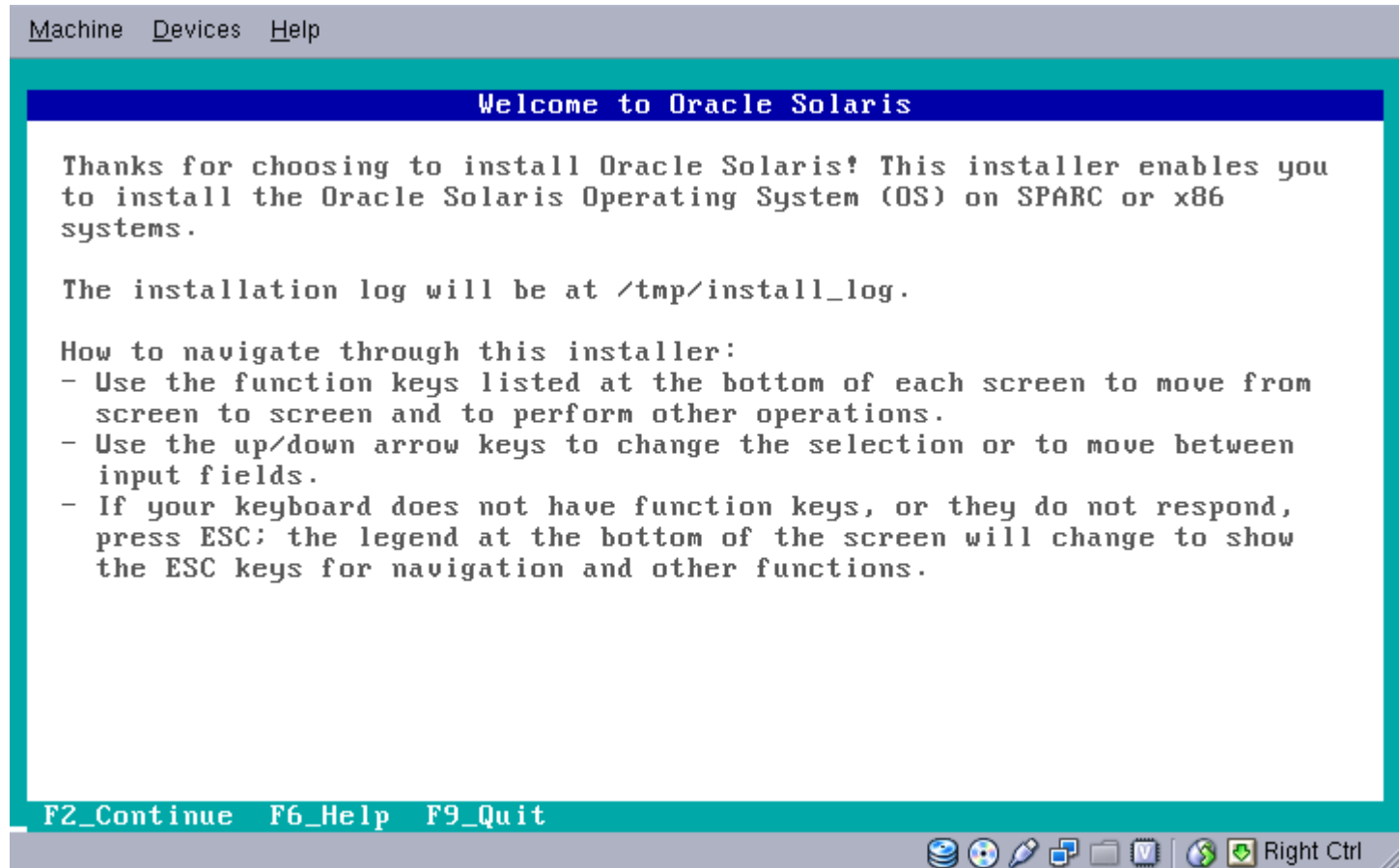
- Customers ready to **test** and **deploy** next-generation Oracle Solaris features
- Customers using **earlier Solaris Express** distributions today
- Software and hardware **partners**, and corporate **developers**
- Customers using other operating systems today



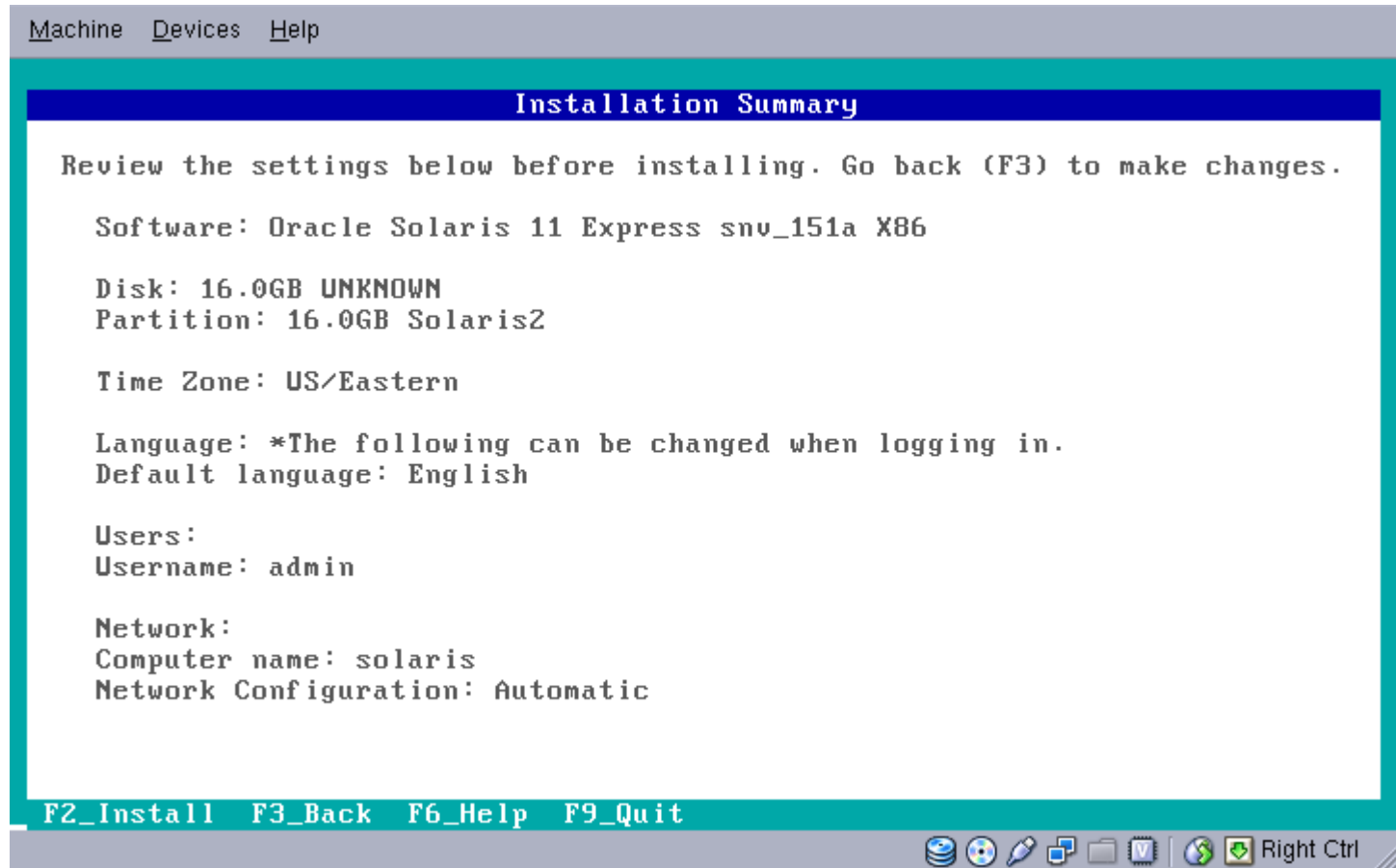
Interactive Installation

- Install / boot from ISO / DVD / USB
- LiveCD installation regardless of which is chosen
- Two interactive installation methods
 - Graphical Install – Installs a desktop environment, complete with windowing system, desktop tools, etc.
 - Text Install – Designed for servers. Uses text for installation, does not install graphical desktop
- Base system installed interactively.
 - Additional packages easily added later on either via pkg command or PackageManager

Interactive Installation



Interactive Installation



ZFS Root

- ZFS is the only file system supported for the OS in Solaris 11 Express
 - Packaging system relies on ZFS snapshots / clones
 - Other file systems supported outside core OS
- Same rules for root pool topology as in Solaris 10
 - Single drive or mirrored pair of drives
- Root pool created as a simple device in interactive installation.
 - Mirror can be added later on.
 - Non-interactive installation allows more control
- Dump & swap volumes placed on root pool
 - Could go elsewhere, have custom sizes

Root as a Role

- root is now a role rather than a login-user
 - Solaris recommendation since Solaris 8
 - root exists as a user still (UID 0 still)
- Uses Solaris Role Based Access Control (RBAC)
 - Recommended best practice since Solaris 8
- Administrative user created during installation
 - Granted role=root so this user can su to root
 - Required for single-user boot
- Controlled by /etc/user_attr

```
admin@solaris:~$ egrep ^root\|^admin /etc/user_attr
root:::min_label=admin_low;lock_after_retries=no;\
        auths=solaris.*,solaris.grant;type=role
admin:::roles=root
```

GNU Userland

- GNU userland included in base install
admin@solaris:~\$ echo \$PATH
/usr/gnu/bin:/usr/bin:/usr/sbin:/sbin
- Standard Solaris commands, with Solaris specifics in /usr/bin, e.g. /usr/bin/chmod includes full ACLs
- sudo delivered in base install
 - **Not** integrated into Solaris RBAC – standard sudo
 - Admin created during install has full access

Software Lifecycle Management

- Image Packaging System
 - Dependency checking, package versioning, updates not patches, OS minimization
- Network-based repositories
 - Get just what you need
 - Establish local repositories
 - Multiple repository support for updates
- Snapshot rollback
 - Oracle Solaris ZFS as root/boot filesystem
 - Safe online updates
 - Fast, “free”
- Distro Constructor, Automated Install

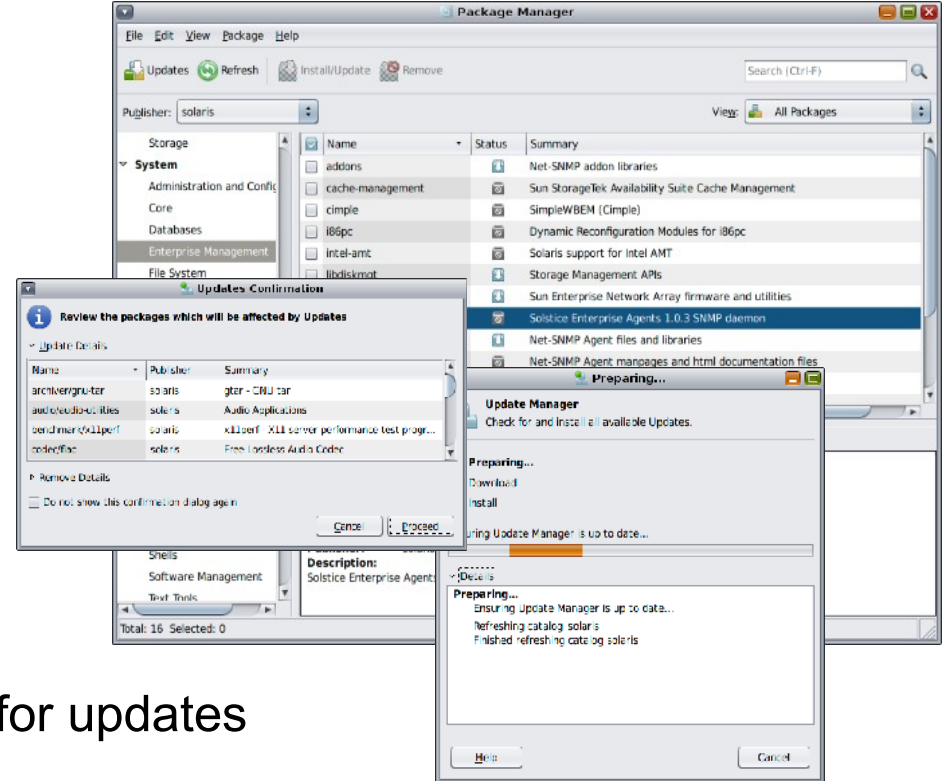


Image Packaging System

Principal Features

- Network-based software distribution – HTTP[S], NFS
- Automatically closes missing dependencies
- Package updating (patching) only downloads / installs differences between installed and desired version
- Multiple, customizable repositories & publishers
 - External or internal network, disk image, files
- Support for fat packages – include multiple variants
- Strong constraint / dependency management
- Leverage ZFS snapshot & clone for safe updates
- Remove chaos of arbitrary install scripts
 - Leverage SMF for scripting and configuration
 - Include standard actions as part of the package system

Image Packaging System

Packaging Basics

- Contents defined by a manifest
 - Manifest contains actions
 - Actions have additional attributes (name=value)
- Current actions include:
 - Files, directories, symlinks, hard links
 - Devices, users, groups
 - Set (generic package metadata)
 - Legacy (SVR4 compatibility information)
 - Dependencies
 - Signatures

Image Packaging System

Public Repositories

- Release Repository
 - Contains the main release tree for Solaris 11 Express
 - <http://pkg.oracle.com/solaris/release>
- Support Repository
 - Contains “patches”, SRU packages
 - Requires support contract
 - Download keys and install to access
 - <https://pkg.oracle.com/solaris/support>
- Other special purpose repositories as needed
 - Exadata / Exalogic repository

Practical examples

- Installing a package:

```
barts@cyber[18]; sudo pkg install gimp
```

```
    Packages to install:      1
  Create boot environment:    No
    Services to restart:     2
```

```
DOWNLOAD                                PKGS      FILES      XFER (MB)
Completed                               1/1      1713/1713   10.0/10.0
```

```
PHASE                                ACTIONS
Install Phase                        1896/1896
```

```
PHASE                                ITEMS
Package State Update Phase           1/1
Image State Update Phase              2/2
```

```
PHASE                                ITEMS
Reading Existing Index                8/8
Indexing Packages                     1/1
```

Practical examples

- Updating a package:

```
barts@cyber[18]; sudo pkg update pkg
          Packages to update:      1
          Create boot environment:  No
DOWNLOAD
Completed                                PKGS      FILES      XFER (MB)
                                         1/1       118/118    0.6/0.6

PHASE                                     ACTIONS
Update Phase                             240/240

PHASE                                     ITEMS
Package State Update Phase               2/2
Package Cache Update Phase               1/1
Image State Update Phase                 2/2

PHASE                                     ITEMS
Reading Existing Index                   8/8
Indexing Packages                        1/1
```

Practical examples

- Updating all the software:

```
barts@cyber[27]; sudo pkg update
```

```
    Packages to install:      1
    Packages to update:     795
    Create boot environment:  Yes
```

```
DOWNLOAD                                PKGS          FILES        XFER (MB)
Completed                               796/796       4754/4754    205.2/205.2
```

```
PHASE                                    ACTIONS
Removal Phase                           2561/2561
Install Phase                             3967/3967
Update Phase                              6277/6277
```

```
...
```

```
A clone of opensolaris-39 exists and has been updated and activated.
On the next boot the Boot Environment opensolaris-40 will be mounted on
'/'.
```

```
Reboot when ready to switch to this updated BE.
```

Practical examples

- Searching for Software:

```
barts@cyber[30]; pkg search /usr/bin/nmap
INDEX      ACTION VALUE      PACKAGE
path      file   usr/bin/nmap pkg:/diagnostic/nmap@5.21-0.151
path      file   usr/bin/nmap pkg:/diagnostic/nmap@5.21-0.151.0.1
```

- Listing installed packages

```
barts@cyber[32]; pkg list snort
pkg list: no packages matching 'snort' installed
```

```
barts@cyber[33]; pkg list nmap
NAME (PUBLISHER)                                VERSION      STATE      UFOXI
diagnostic/nmap (solaris)                       5.21-0.151  installed  u----
```

```
barts@cyber[34]; pkg list \*osnet*\*
NAME (PUBLISHER)                                VERSION      STATE      UFOXI
consolidation/osnet/osnet-incorporation         0.5.11-0.153 installed  u----
developer/opensolaris/osnet                     0.5.11-0.153 installed  u----
```

Boot Environment Management

- Live Upgrade notion built into packaging actions
- Create a stable copy (ZFS clone) of the boot environment
 - Apply changes to stable storage without requiring single-user boot
 - Minimize planned downtime.
 - Best practice from Solaris 10
- beadm combines the many LU commands into one
 - beadm create
 - beadm list
 - beadm destroy
 - beadm activate
 - beadm [u]mount

Managing Boot Environments

```
# df -k /
Filesystem          1K-blocks      Used Available Use% Mounted on
rpool/ROOT/solaris11-b149
                    27379824 14899915 12479909 55% /

# zfs list -r rpool/ROOT
NAME                                     USED    AVAIL    REFER    MOUNTPOINT
rpool/ROOT                              17.3G   11.9G    21K     legacy
rpool/ROOT/solaris11-b149                1.96M   11.9G   14.2G    /
rpool/ROOT/solaris11-b158                17.3G   11.9G   14.4G    /
rpool/ROOT/solaris11-b158@2011-03-12-13:51:38 2.86G    -       14.2G    -
```

Managing Boot Environments

```
# beadm list
```

```
BE           Active Mountpoint Space Policy Created
--           -
```

BE	Active	Mountpoint	Space	Policy	Created
solaris11-b149	N	/	81.66M	static	2010-10-13 14:07
solaris11-b160	R	-	27.74G	static	2011-03-11 10:14

```
# beadm destroy solaris11-b160
```

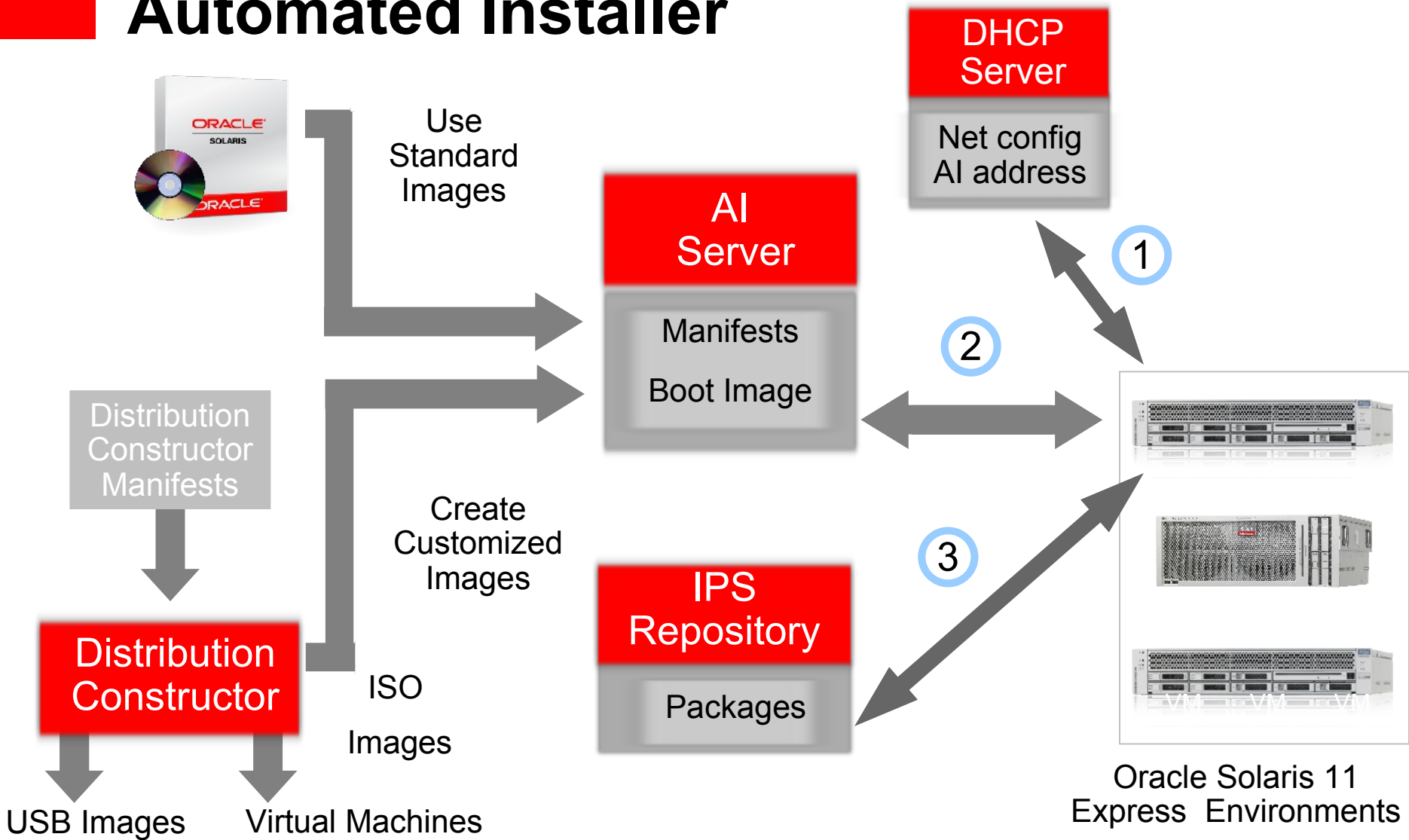
```
Are you sure you want to destroy solaris11-b160? This action
cannot be undone(y/[n]): y
```

```
# beadm list
```

```
BE           Active Mountpoint Space Policy Created
--           -
```

BE	Active	Mountpoint	Space	Policy	Created
solaris11-b149	R	/	20.15G	static	2010-10-13 14:07

Automated Installer



Automated (Network) Installation

- Carries on the philosophy of Jumpstart
 - Clients query network for IP address & Boot server
 - Boot server provides boot image & installation manifest
 - Content is acquired via packaging repositories
- No more RARP – DHCP used for x86 & SPARC
- Consistent features across hardware architectures
- Install content from multiple publishers
- Create custom deployments
- Manifest determines what is installed and how
- Same installation experience from network or from media

How AI Works

- Client hardware boot process gets IP address and boot file location from DHCP
- Boot file (pxegrub) and menu.lst are fetched via TFTP and loaded
- pxegrub gets microroot (boot archive) via TFTP and Solaris is loaded
- File system SMF service loads the rest of the net image – Solaris.zlib, Solarismisc,zlib
- AI SMF service does client discovery and find the install service (mDNS)
- Client fetches AI manifest from install service via http

What happens next?

- AI Install program runs with AI manifest to complete the installation
 - AI Manifest specifies how to set up disks, repositories to use, what packages to install from which publishers
 - SC manifest is embedded in AI. Specifies identity of initial admin user, root password, system name, sysidcfg sorts of parameters
 - SMF properties used to control first boot actions and finish scripting

Network Management

- ipadm consolidates many of the tasks of managing network interfaces, addresses, tunables
- Make persistent or temporary changes to network configuration without munging around in mystery files
- Sort of like the ip command in RHEL
- Manages addresses and tunables for physical and virtual interfaces – VIP, VLAN, VNIC
- Does not create the actual links themselves
 - dladm used to manage data links

ipadm Summary

```
ipadm create-if [-t] interface
ipadm delete-if interface
ipadm show-if [[-p] -o field[,...]] [interface]
ipadm disable-if -t interface
ipadm enable-if -t interface

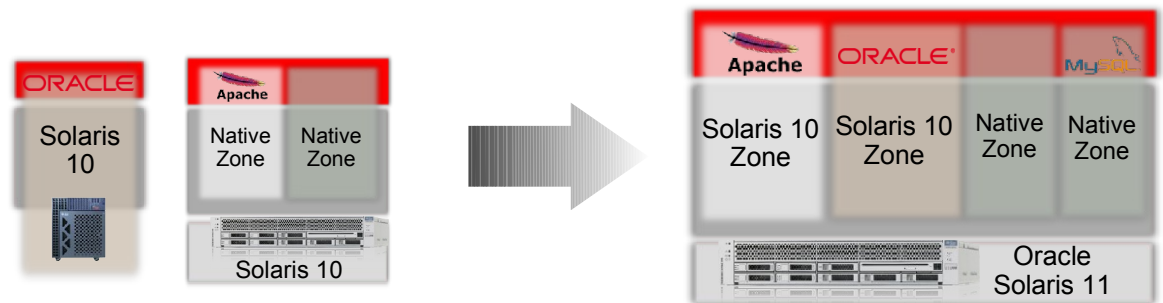
ipadm set-ifprop [-t] -m protocol -p prop=value[,...] interface

ipadm create-addr [-t] -T static [-d]
    -a {local|remote}=addr[/prefixlen],... addrobj
ipadm create-addr [-t] -T dhcp [-w seconds | forever] addrobj
ipadm create-addr [-t] -T addrconf [-i interface-id]
    [-p {stateful|stateless}={yes|no},...] addrobj

ipadm delete-addr [-r] addrobj
ipadm show-addr [[-p] -o field[,...]] [addrobj]
ipadm up-addr [-t] addrobj
ipadm down-addr [-t] addrobj

ipadm set-addrprop [-t] -p prop=value[,...] addrobj
ipadm show-addrprop [[-c] -o field[,...]] [-p prop[,...]] [addrobj]
```

Solaris Zones



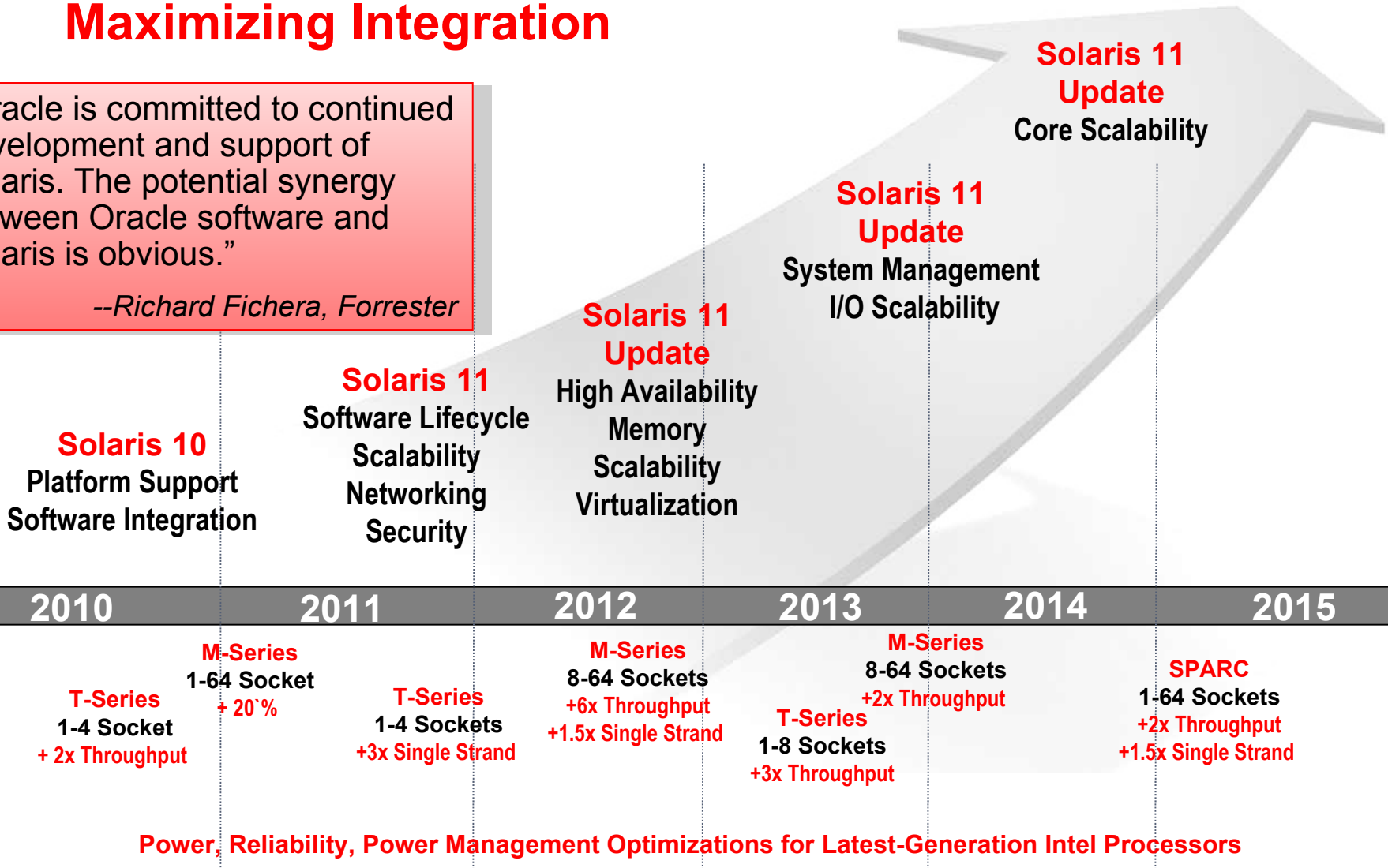
- Integrated with ZFS boot environments and IPS
 - Sync software instead of patch
 - Hybrid zone model preserves best of whole root, sparse root
- Delegated administration model per zone
- Enhanced observability within a zone
 - Memory and CPU utilization
 - Total utilization and per-zone breakdown
- Network virtualization and resource control
- Oracle Solaris 10 Zones for business continuity
 - Hosts Oracle Solaris 10 10/09 or later environments
 - Supports P2V and V2V, with “pre-flight checks”
 - Shared and exclusive IP stacks

Solaris Roadmap

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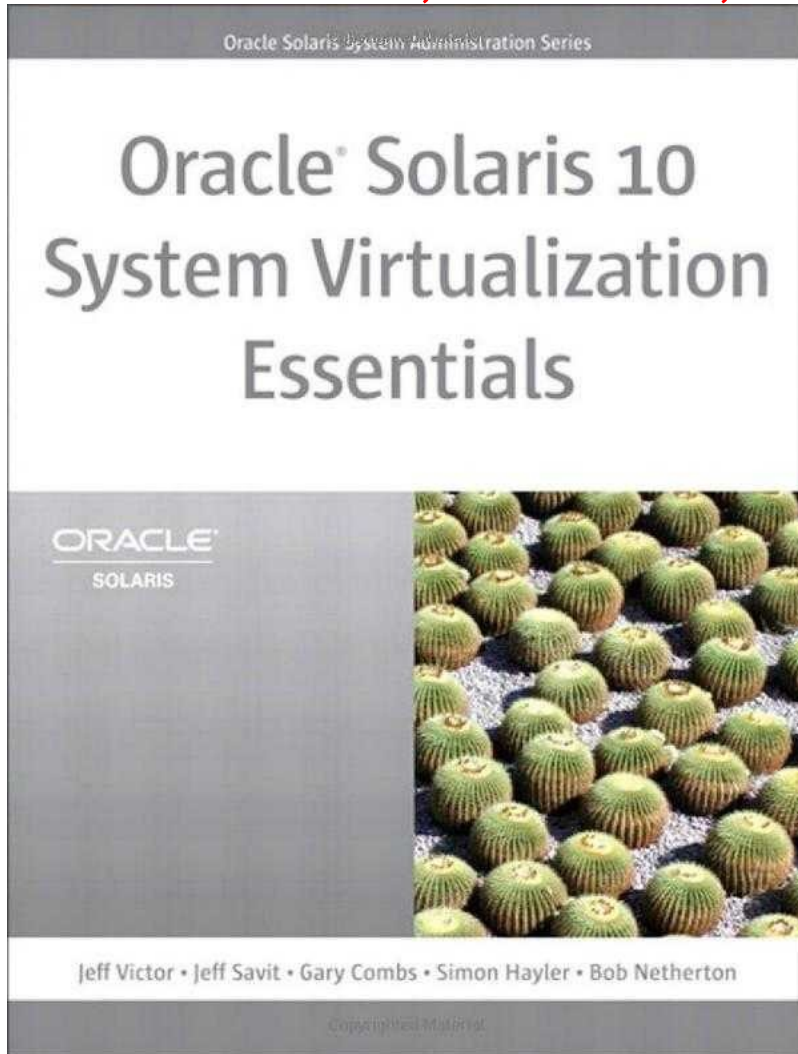


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Solaris 10 System Virtualization

Jeff Victor, Jeff Savit, Bob Netherton, et al



Covers all types of Solaris virtualization:

Zones

Oracle VM for SPARC

Oracle VM for x86

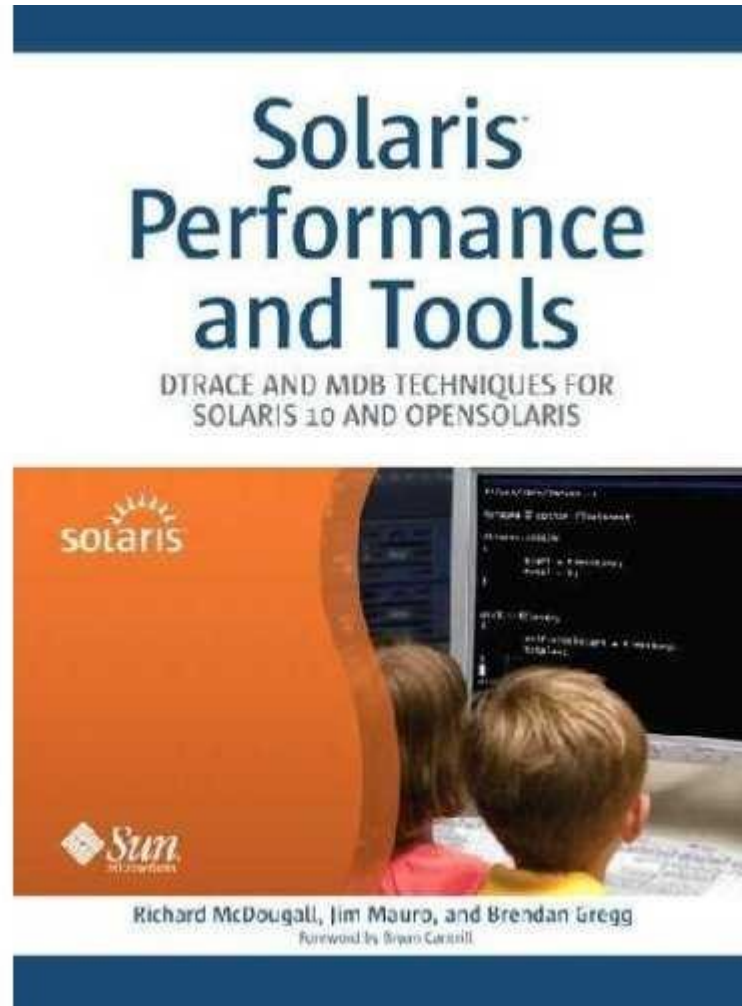
Oracle VM Virtualbox

Dynamic System Domains

Jeff Victor, Jeff Savit,
Gary Combs, Simon
Hayler, Bob Netherton,
plus a host of helpers

Solaris Performance & Tools

Rich McDougall, Jim Mauro, Brendan Gregg



DTrace

Brendan Gregg & Jim Mauro

