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Oracle Solaris 11 System Administration

Activity Guide
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Practices for Lesson 1: Introduction

Chapter 1

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Practices for Lesson 1: Introduction

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Practices for Lesson 1

Practices Overview

Your project assignment is divided into multiple phases, which are listed in the Test Activities' Checklist. The checklist topics are synchronized with the lesson practices.

Scenario

Your company plans to move to Oracle Solaris 11.2 during the next year. Because the company is a Fortune 500 company with thousands of internal and external users who rely on being able to access, submit, modify, and store data on an as-needed basis, it is imperative that the transition to the new operating system is seamless to the end-user community.

As a new system administrator who is responsible for administering the Oracle Solaris 11.2 OS, you are tasked with helping to test all aspects of the product's functionality. Your test activities range from installing the OS, to verifying network and zone configurations, and basic troubleshooting.

A list of the test activities is provided in the following checklist. Your senior system administrator will give you complete details about each test activity when it is time to complete each task.

Test Activities' Checklist	
	Install the Oracle Solaris 11 OS and test both the text installer and the Live Media installation options.
	Inspect the boot and shutdown of a system.
	Test the services functionality in Oracle Solaris 11.
	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Practices Infrastructure

This section presents an architectural view of the equipment and platforms for the course practices.

Multiple virtual machines (VMs) are configured on a private internal network (192.168.0). Each VM can communicate with other VMs only on the same private network (see Figure 1). Internet access is not configured from these VMs.

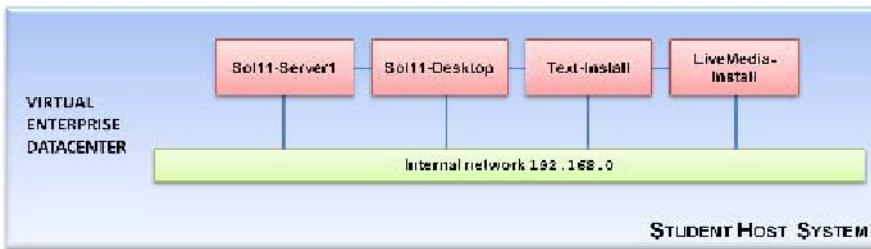


Figure 1: Practice Network Topology

Your practice environment is based on the Oracle VM VirtualBox virtualization software. VirtualBox is a cross-platform virtualization application. Figure 2 shows the configured virtual machines. The Oracle Solaris 11 OS is installed on all virtual machines, except the Text-Install and LiveMedia-Install VMs, because they are used for OS installation.

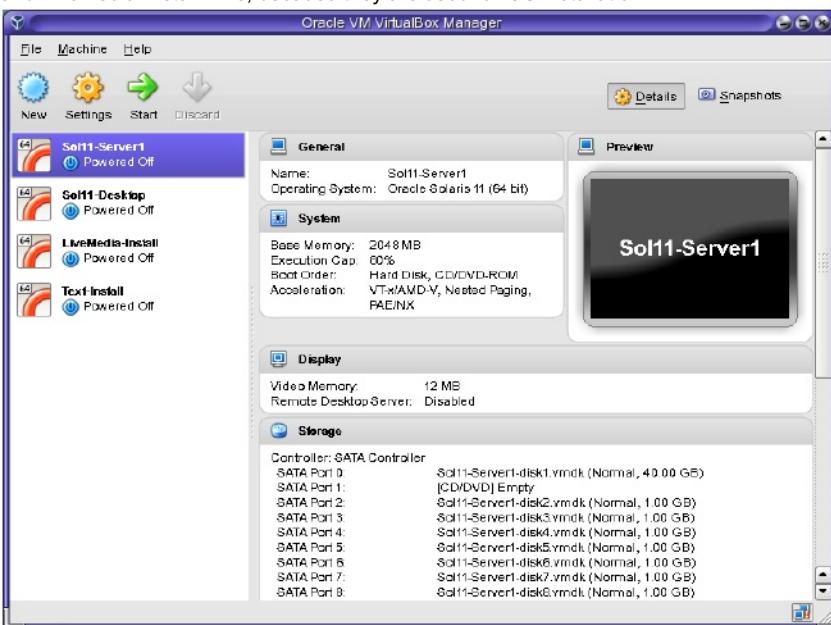


Figure 2: Oracle VM VirtualBox Manager

All VMs are configured with 2 GB of memory, except the Text-Install VM, which has 1 GB of memory.

Note: Most of the host machines have a total of 8 GB of RAM to work with. That is, you should not have more than three VMs running at any given time during the practices to avoid system overload.

The VirtualBox environment consists of the following VMs:

Name of the VM	Description
Sol11-Server1	This VM is installed with Oracle Solaris 11.2 Text Install for x86, and serves as a server. This VM provides the following: <ul style="list-style-type: none"> • IPS repository • DNS server
Sol11-Desktop	This VM is installed with Oracle Solaris 11.2 LiveMedia for x86, and is used as the IPS client machine. You will mostly use this VM to perform all the practices in this machine.
Text Install	This VM is used to install Oracle Solaris 11.2 Text Install OS for x86.
LiveMedia Install	This VM is used to install Oracle Solaris 11.2 LiveMedia OS for x86.

The VMs are further configured to communicate with the host machine through the shared directory. The shared directories are as listed in the following table:

Resource Name	Location	Description
Host share directory	/opt/ora	Includes various course files
Demo files	/opt/ora/demo	Contains the demonstration file that is used in the course
OVA files	/opt/ora/images	Contains a backup of all virtual machines used in the course If any virtual machine gets corrupt while a practice is being completed, you can delete the virtual machine and import the respective VM from this folder. But, after re-importing, you will have to perform the previous practices again to bring the VM to the required start state of the practice where the VM got corrupt.
ISO files	/opt/ora/iso	Contains the S11.2 GA ISO files required to perform practices

The details of the shared directories can be verified in the respective VM settings. Each VM has an entry in the /etc/vfstab file, which stores information about the mount points and related directories on the system.

Logging In to the Practice Environment

When you first log in to the practice environment, you are prompted to provide a login and password for the host system:

- **Userid:** root
- **Password:** oracle

After you have gained access to the host system, the user account and password for each virtual machine is:

- **User account:** oracle
- **Password:** oracle1
- **Administrator privileges:** As the oracle user, use su - to switch to the administrator (root) role. The password is oracle1. The oracle user switches to root because root is configured as a role by default. The first username that is created on the system (during OS installation) is the initial privileged user who can assume the administrator role. This can be verified in the /etc/user_attr file.
- The following students have been created for you on Sol11-Server1 and Sol11-Desktop to use in the practices: They all have oracle1 as the default password.

Account Name	UserID	Group	Name	Assigned Shell
jholt	60005	10	john holt	bash
jmoose	60006	10	jerry moose	bash
panna	60007	10	poly anna	bash
sstudent	60008	10	super student	sh (bourne shell)

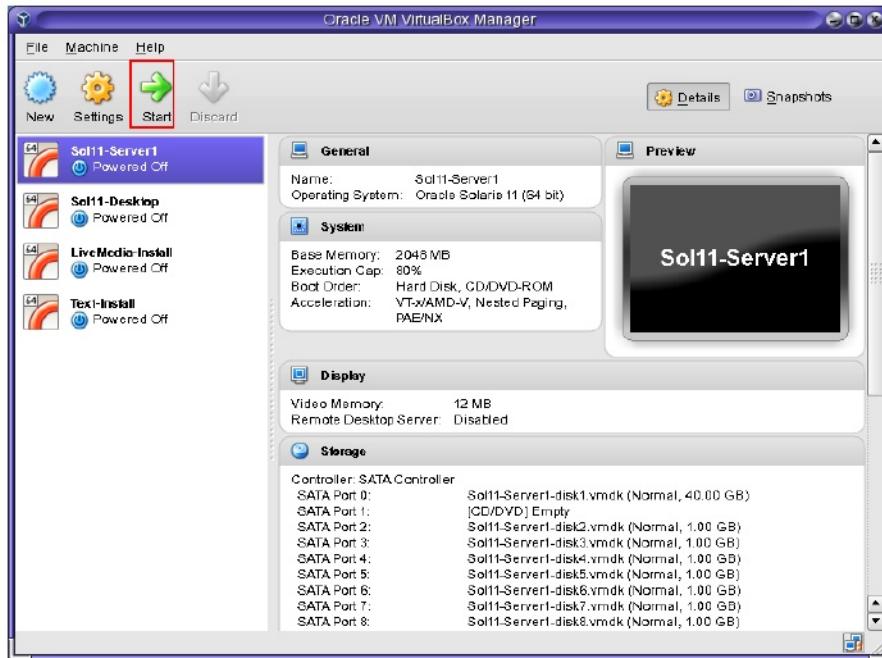
Note: The Sol11-Server1 VM must be started before the Sol11-Desktop VM is started. The Sol11-Server1 must always be running to perform the practices in this guide.

Task 1: Becoming Familiar with Your Practice Environment

1. On your host system, start the Oracle VM VirtualBox Manager by double-clicking its icon on your desktop.



2. In the Oracle VM VirtualBox Manager window, double-click the Sol11-Server1 virtual machine to start it. Alternatively, you can select the Sol11-Server1 VM and click the Start button.



3. After the Sol11-Server1 VM is powered on, at the command prompt, login as the user oracle with the password oracle1.

```
s11-server1 console login: oracle
Password: oracle1
oracle@s11-server1:~$
...
oracle@s11-server1:~$ su -
Password: oracle1
...
root@s11-server1:~#
```

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4. Start the Sol11-Desktop VM. When the Username login screen appears, enter oracle for the username and click the Log In button.

Note: It might take a few minutes for the Username login screen to appear.



5. When the Password begin screen appears, enter the password oracle1 and click the Log In button.

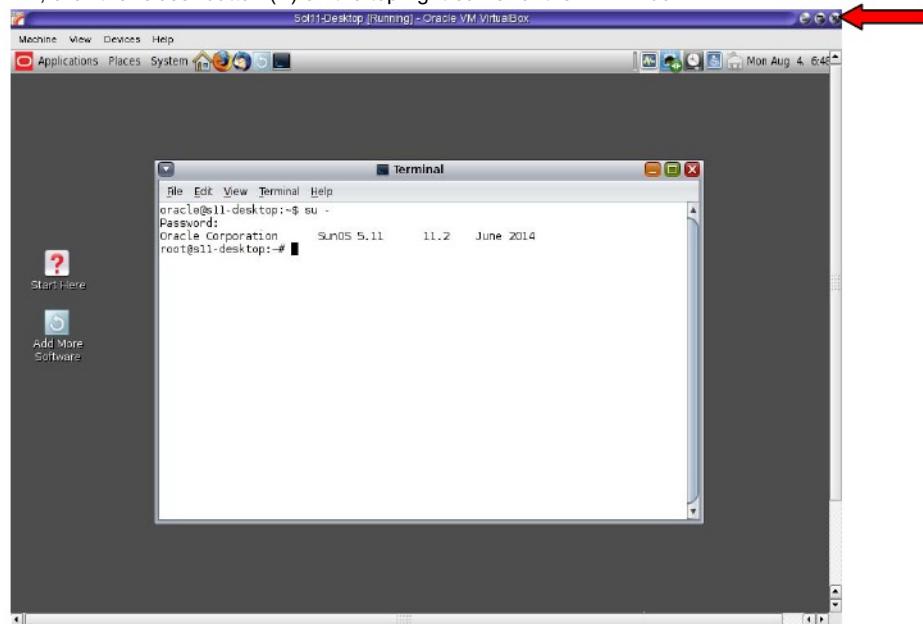


6. Open a terminal window by right-clicking on the desktop and selecting Open Terminal. In the terminal window, run the su - command to assume administrator privileges. The password is oracle1.

```
oracle@s11-desktop:~$ su -
Password: oracle1
Oracle Corporation      SunOS 5.11      11.2      June 2014
root@s11-desktop:~#
```

7. At times, you may need to power off a VM and close its window. You may also need to shut down a VM to comply with the maximum recommended number of VMs that can run simultaneously, which is currently limited to three VMs.

You now practice shutting down a VM by using the Sol11-Desktop VM. To shut down the VM, click the “close” button (X) on the top-right corner of the VM window.

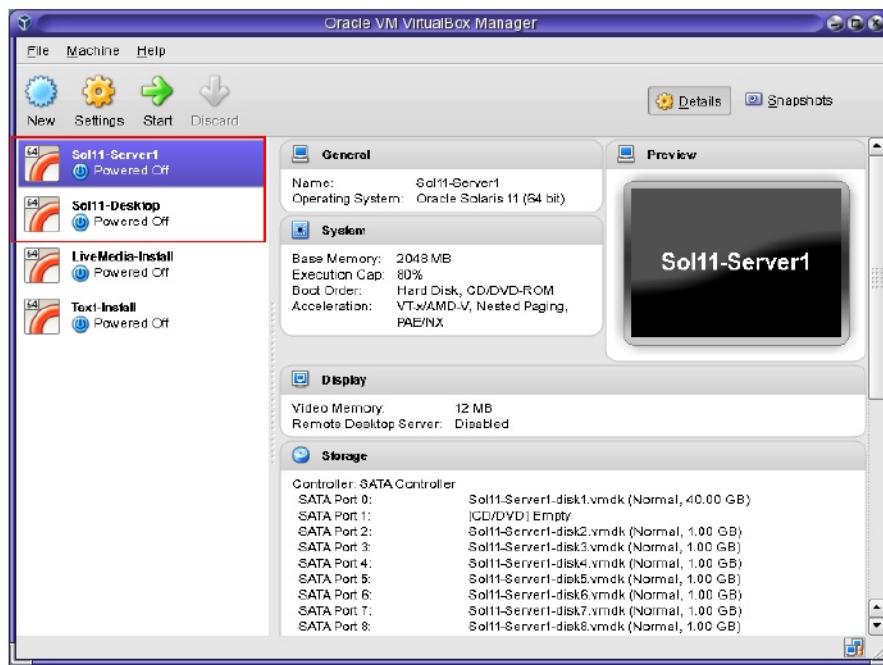


- When the Close Virtual Machine dialog box appears, select "Power off the machine" and click OK.



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Note: You can verify that the VM is shut down by checking the status that appears under the VM's name in the Oracle VM VirtualBox Manager. The status for the Sol11-Desktop and Sol11-Server1 should be "Powered Off."



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Practices for Lesson 2: Installing Oracle Solaris 11

Chapter 2

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Practices for Lesson 2: Installing Oracle Solaris 11

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Practices for Lesson 2

Practices Overview

In these practices, you are presented with a plan for installing the Oracle Solaris 11 operating system by using an interactive installer, and you then implement that plan. After completing the installation, you verify the operating system installation.

Your first test activity is to install the Oracle Solaris 11 OS on two test machines, both of which are x86-based. Because your system administration duties include supporting desktop users, you first test installing the OS on a host by using the Live Media installer. You then test installing the OS on a host by using the text installer. You verify the success of both the installations by checking the installation logs, and then reboot the system.

When you install the Oracle Solaris 11 OS by using the Live Media installer, you must first download the Oracle Solaris 11 Live Media installation image from the following location:

<http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html>

The Live Media installation download is in ISO image format, which can be burned to a CD/DVD or used directly within the Oracle VM Server or other virtualization software.

When you install the Oracle Solaris 11 OS by using the text installer, you must first download the Oracle Solaris 11 Text Install image from the following location:

<http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html>

The text installation download is in ISO image format, which can be burned to a CD/DVD or used directly within the Oracle VM Server or other virtualization software.

The following tasks have already been completed for you:

- The OS images have been downloaded and saved for both the installation types. You can find the ISO images in the /opt/ora/iso directory.
- System requirements have been checked and met.
- The device drivers have been verified.
- Disk c1t0d0 would be the boot disk. You install the OS on this disk.

Practice 2-1: Installing Oracle Solaris 11 by Using the GUI Installer on Live Media

Overview

In this practice, you install the Oracle Solaris 11 operating system by using the GUI installer on the Live Media VM. Your primary tasks are as follows:

- Launch the GUI.
- Install the OS.
- Verify the installation by reviewing the installation log.
- Reboot the system.
- Power off the VM.

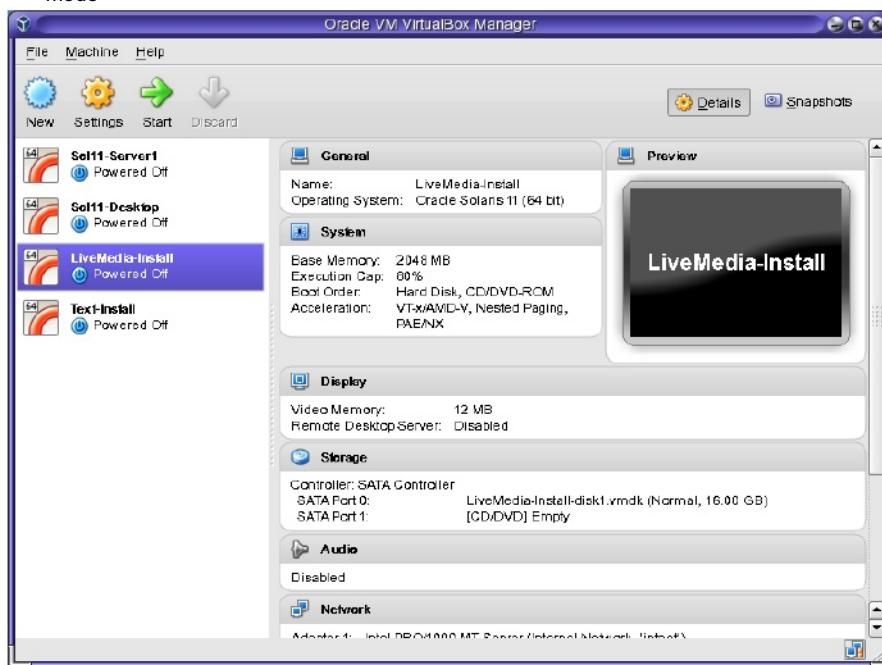
Live Media Installation Configuration Details

During the OS installation process, use the configuration data that follows to complete the Live Media installation. Note that the disk number may differ depending on your system's configuration.

- USB Keyboard layout: Use *your local keyboard layout*.
- Language: *Use your local language*
- Disk Discovery: *Local Disk*
- Disk Selection: **Use the whole disk**.
- Time Zone, Date and Time: *Click the city closest to your installation location*
- Users:
 - Real name: **oracle**
 - Login name: **oracle**
 - User password: **oracle1**
 - Computer name: **solaris-live**
- Support Registration: *Default options*

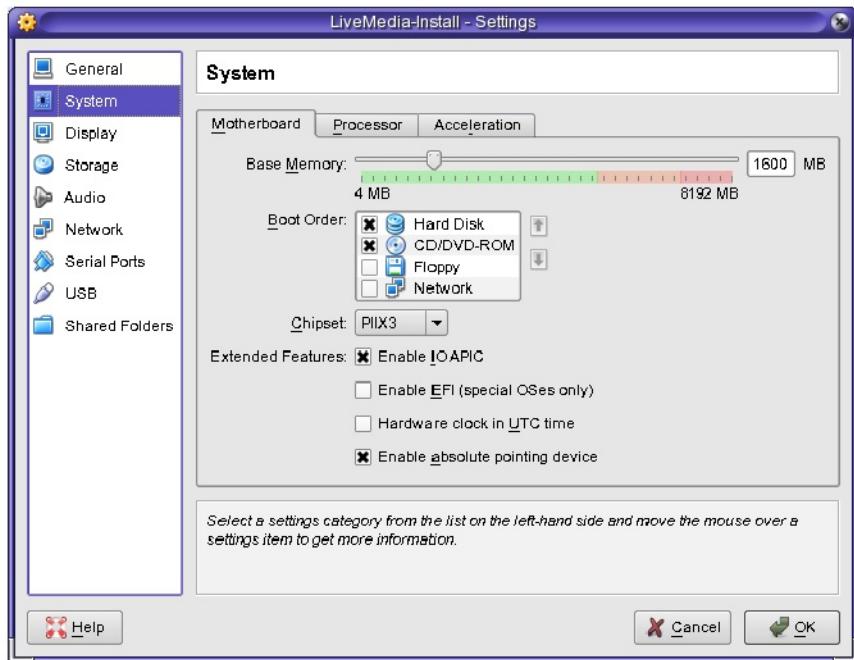
Tasks

1. Launch the Oracle VirtualBox Manager. You use the following VM for this task:
 - **LiveMedia-Install:** The VM for Oracle Solaris 11 installation by using the Live Media mode



2. In the Oracle VM VirtualBox Manager window, click the LiveMedia-Install virtual machine. It is important that the LiveMedia-Install VM be in the Powered Off state at this time.
3. Click the **Settings** button.

- Click the **System** tab. If the Base Memory is not 2048 MB, set it to 2048 MB and click the **OK** button.



- In the Oracle VM VirtualBox Manager window, verify that the LiveMedia-Install virtual machine is still selected, and then click the **Settings** button again.
 - Click the **Storage** tab. Verify that the `sol-11_2-live-x86.iso` ISO image is mounted on the DVD. If it is not mounted, select Empty Disk (CD/DVD), and then search for the ISO image in the `/opt/ora/iso` folder. Select the ISO image, and then click the **OK** button.
 - In the Oracle VM VirtualBox Manager window, click the **Start** button. This boots the LiveMedia-Install virtual machine from the Live Media installer on the DVD to begin the OS installation. When the GRUB Menu is displayed, the system automatically uses the highlighted default entry. You do not need to take any action.
 - After the Live Media image is prepared, you are asked to select the keyboard layout and language. Make the selections based on your local environment.
- Note:** When booting the Live Media image, the `solaris` console login is displayed. You need not provide any login details at this point. By default, the console accepts the username and password as `jack` and displays the Live Media desktop. This is useful when using Live Media as a troubleshooting tool. If you do log in by using the username and password as `jack`, the default root password is `solaris`. It takes several minutes for the system to configure devices and to launch the Live Media desktop GUI login screen.
- When the Live Media desktop is initialized, double-click the Install 'Oracle Solaris' icon on the desktop to begin the OS installation.

10. The Welcome screen appears. Read the welcome statement, and then click **Next** to continue.
Note: The **Release Notes** button is a link to the Oracle website. Do not click this button to access the Release Notes because you do not have access to the Internet.
11. The Disk discovery screen appears. You see Local Disks and iSCSI. Select "Local Disks."
12. The Disk selection screen appears. You see one available disk (16.00 GB), which is selected by default. Select "Use the whole disk" and click **Next**.
Note: Ignore the warning that appears when you select the "Use the whole disk" option.
13. The "Time Zone, Date and Time" screen appears. Select a city near you on the map or set your time zone below. Next, if necessary, set the date and time, and then click **Next**.
14. The Users page appears. Enter the following, and then click **Next**:
 - Real name: **oracle**
 - Log-in name: **oracle**
 - User password: **oracle1**
 - Computer name: **solaris-live**
15. The Support Registrations screen appears. Click **Next** to accept the default.
16. The Installation summary screen appears. Review the information and, if it is incorrect, click the **Install** button.
17. The Installing screen appears. The installation takes about 20 minutes to complete.
18. After the Live Media installation has completed, the Finished screen appears. Take a moment to review the Oracle Solaris installation log.
19. After you have reviewed the installation log, click **Reboot** to start the newly installed software. It might take a few minutes for the login screen to appear.
20. After the login screen has appeared, close the virtual machine by selecting the close button (x) on the top-right corner of the window.
21. When the Close Virtual Machine dialog box appears, select "Power off the machine" and click **OK**.

Practice 2-2: Installing Oracle Solaris 11 by Using the Text Installer

Overview

In this practice, you install the Oracle Solaris 11 operating system by using the text installer. Your primary tasks are as follows:

- Launch the installer.
- Manually configure the network.
- Install the OS.
- Verify the installation by reviewing the installation log.
- Reboot the system.

Text Installation Configuration Details

During the OS installation process, use the configuration data that follows to complete the Text Install installation.

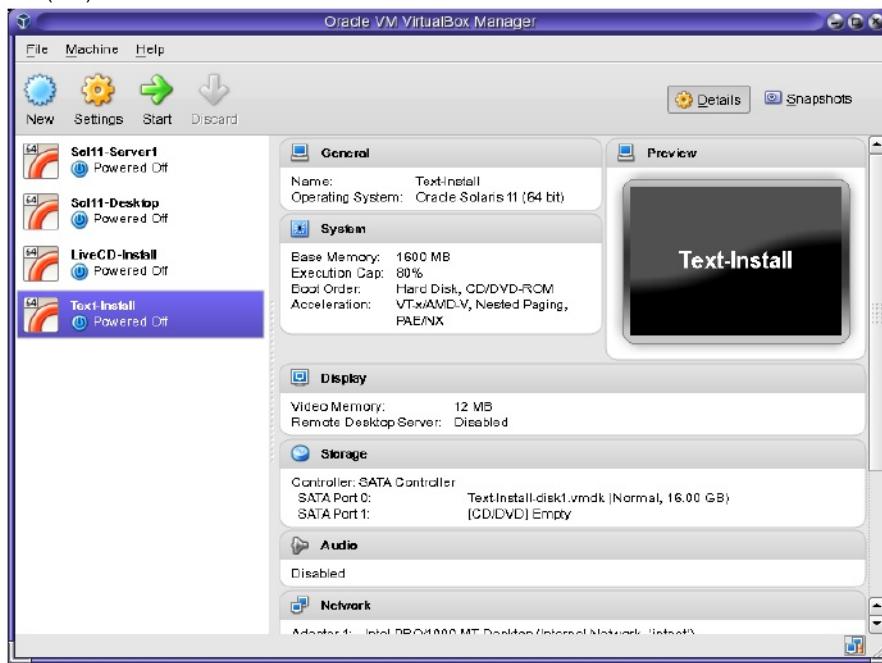
Note: The text installer program may direct you to use the F2 key to move to the next step in the installation process. If F2 does not work, try using the Esc-2 key.

- USB Keyboard layout: *Use your local keyboard layout*
- Language: *Use your local language*
- Oracle Solaris Installation menu: **Install Oracle Solaris**
- Discovery Selection: *Local Disks*
- GPT Partitions: *Use the entire disk*.
- System Identity: **solaris-text**
- Network:
 - Ethernet network configuration: **manually**
 - IP address: **192.168.0.250**
- DNS Name Service: **Do not configure DNS**
- Alternate Name Service: **None**
- Time zone: *Use your local region*
 - Region: *Use your region*.
 - Location: *Use your location*
 - Time zone: *Use your time zone*.
- Locale language: *Use your locale specific*.
- Local territory: *Use your locale specific*.
- Date and time: *Set to current date and time*
- Keyboard: *Set as per your local environment*.
- Root password: **oracle1**
- User information:
 - Your real name: *your name*
 - Username: **oracle**
 - User password: **oracle1**
- Support registration: *Default options*

- Support: Network Configuration: *Default (no proxy)*

Tasks

1. Launch the Oracle VM VirtualBox Manager. In this task, you use the following VM:
 - **Text-Install:** The VM for Oracle Solaris 11 installation in command-line interactive (CLI) mode



2. In the Oracle VM VirtualBox Manager window, click the Text-Install virtual machine. It is important that the Text-Install VM be in the Powered Off state at this time.
3. Click the **Settings** button.

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4. Click the **Storage** tab. Verify that the `sol-11_2-text-x86.iso` ISO image is mounted in the DVD. If it is not, under SATA Controller, select Empty Disk, and then search for the ISO image in the `/opt/ora/iso` folder. Select the ISO image, and then click the **OK** button.
5. In the Oracle VM VirtualBox Manager window, click the **Start** button. This boots the Text-Install virtual machine from the text installer on the DVD to begin the OS installation.
6. After the text installation image is prepared, you are asked to select the keyboard layout and language. Set these based on your local environment.
7. When the installation menu appears, select option #1, Install Oracle Solaris, to begin the OS installation.
8. The ‘Welcome to Oracle Solaris’ screen appears. Read the welcome statement, and then press F2 to continue.
9. The Discovery Selection screen appears. You see Local Disks and iSCSI. Select “Local Disks.”
10. The Disks screen appears. The device is selected by default. Press F2 to accept the default.
11. The GPT Partitions: 16.00 GB sata screen appears. The “Use the entire disk” option is selected by default. Press F2 to accept the default.
12. The System Identity screen appears. A part of the Computer Name is entered for you: solaris. After solaris, enter the following: -text. The Computer Name should read: solaris-text. Press F2 to continue.
13. The Network screen appears and “Automatically” is selected by default. With the help of the down arrow key, move the selection box to “Manually.” Press F2 to continue.
14. The Manually Configure: net0/v4 screen appears. Enter 192.168.0.250 for the IP address. Press F2 to continue.
15. The DNS Name Service screen appears. Select “Do not configure DNS” and press F2 to continue.
16. The Alternate Name Service screen appears. Ensure that None is highlighted, and then press F2 to continue.
17. The Time Zone: Regions screen appears. Select a region that contains your time zone, and then press F2.
18. The Time Zone: Locations screen appears. Select a location that contains your timezone, and then press F2.
19. The Time Zone screen appears. Select your timezone, and then press F2.
20. The Locale: Language screen appears. Select a language that is specific to your locale and press F2.
21. The Locale: Territory screen appears. Select the default territory that is specific to your locale and press F2.
22. The “Date and Time” screen appears. Edit the date and time as necessary, and then press F2.
23. The Keyboard screen appears. Select your keyboard based on your local environment.
24. The Users screen appears. Enter the following, and then press F2:
 - Root password: `oracle1`
 - Your real name: `your name`
 - Your username: `oracle`
 - User password: `oracle1`

25. The Support Registration screen appears. Accept the default option and press F2 to continue.
26. The Support Network Configuration screen appears. "NoProxy" is selected by default. Press F2 to continue.
27. The Installation Summary screen appears. Review the information and, if it is incorrect, press F2 to start the installation.
28. The Installing Oracle Solaris screen appears. The installation takes about 10 to 15 minutes to complete.
29. After the installation has completed, the Installation Complete screen appears. Press F4 to view the installation log. Check the log for error messages.
Notice that the installation log is available at /system/volatile/install_log. After reboot, it can be found at /var/log/install/install_log.
30. After you have reviewed the installation log and verified that the installation has completed successfully, press F3 to return to the Installation Complete screen.
31. When the Installation Complete screen appears, press F8 to reboot and start the newly installed software. The reboot takes a few minutes to complete.
Note: If the F8 key does not work, press the F9-Quit key. This returns you to the installation menu. From the menu, select option 5 to reboot. The system may display an `acm` service error message, which you can ignore.
32. When the console login prompt appears, close the virtual machine by selecting the close button (x) on the top-right corner of the window.
33. When the Close Virtual Machine dialog box appears, select "Power off the machine" and click **OK**.

Practice 2-3: Verifying the Operating System Installation

Overview

In this practice, you verify the operating system installation. Your primary tasks are as follows:

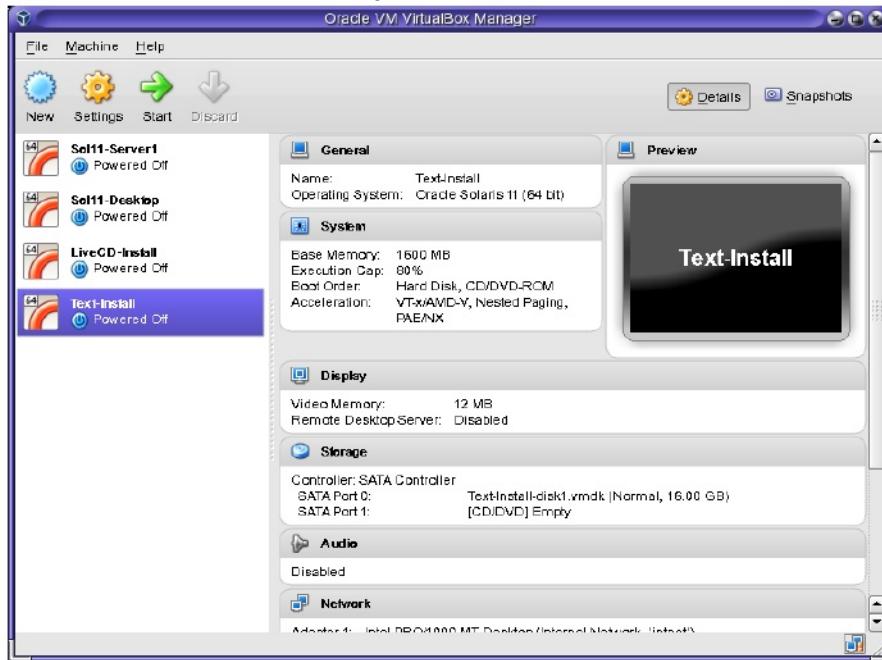
- Verify the login information.
- Verify the system's host name.
- Display basic system information.
- Display a system's release information.
- Display the boot disk configuration.
- Display installed memory size.
- Display network information.

Assumptions

You have successfully installed the operating system on the Text-Install machine.

Tasks

1. Launch the Oracle VM VirtualBox Manager.



2. In the Oracle VM VirtualBox Manager window, double-click the Text-Install virtual machine to start it.
3. Enter the username oracle and press Enter.

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Practices for Lesson 2: Installing Oracle Solaris 11

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- Enter the password `oracle1` and press Enter. The user prompt appears.
4. In the Oracle VM VirtualBox Manager window, double-click the Sol11-Desktop virtual machine to start it. Enter the username `oracle` and the password `oracle1`. Right-click on the desktop and open a terminal window.

```
oracle@s11-desktop:~$ su -  
Password:  
...  
Oracle Corporation SunOS 5.11 11.2 June 2014
```

Note: The system may display a sendmail message, which you can ignore.

5. Use the `ssh` command to log in to the Text-Install VM from the Sol11-Desktop VM. Use the `su -` command to log in as the root user. Use `oracle` as the password.

```
root@s11-desktop:~# svcs | grep ssh  
online 22:11:02 svc:/network/ssh:default
```

Note: If the ssh service is disabled, enable it by running the following command:

```
# svcadm enable svc:/network/ssh:default  
  
root@s11-desktop:~# ssh oracle@192.168.0.250  
The authenticity of host '192.168.0.250 (192.168.0.250)' can't  
be established.  
RSA key fingerprint is  
74:35:11:f9:c6:49:2d:a7:bc:6c:9b:3a:ea:eb:52:aa.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '192.168.0.250' (RSA) to the list of  
known hosts.  
Password: oracle1  
Last login: Sat Aug 2 22:20:26 2014  
Oracle Corporation SunOS 5.11 11.2 June 2014
```

6. Verify the host name. It should be `solaris-text`.

```
oracle@solaris-text:~$ hostname  
solaris-text
```

7. Verify the host ID.

```
oracle@solaris-text:~$ hostid  
00ca4949
```

8. Display basic information about the system.

```
oracle@solaris-text:~$ uname -a  
SunOS solaris-text 5.11 11.2 i86pc i386 i86pc
```

9. Display the operating system release information.

```
oracle@solaris-text:~$ cat /etc/release  
Oracle Solaris 11.2 X86
```

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10. Switch to the root role. Display the disk configuration information.

```
oracle@solaris-text:~# su -
Password: oracle1
root@solaris-text:~# format
Searching for disks...done
AVAILABLE DISK SELECTIONS:
0. c1t0d0 <ATA- VBOX HARDDISK-1.0-16.00GB>
  /pci@0,0/pci8086,2829@d/disk@0,0
Specify disk (enter its number): 0
selecting c1t0d0
[disk formatted]
/dev/dsk/c1t0d0s1 is part of active ZFS pool rpool. Please see
zpool(1M).

FORMAT MENU:
disk      - select a disk
type      - select (define) a disk type
partition - select (define) a partition table
current   - describe the current disk
format    - format and analyze the disk
fdisk    - run the fdisk program
repair   - repair a defective sector
label    - write label to the disk

analyze   - surface analysis
backup   - search for backup labels
verify   - read and display labels
inquiry   - show disk ID
volname  - set 8-character volume name
!<cmd>  - execute <cmd>, then return
quit
format> verify
Volume name = <           >
ascii name  = <ATA-VBOX HARDDISK-1.0-16.00GB>
bytes/sector = 512
sectors = 33554431
accessible sectors = 33554398
      Part      Tag     Flag   First Sector       Size    Last Sector
        0  BIOS_boot    wm          256    256.00MB      524543
        1      usr      wm        524544    15.74GB    33538014
        2 unassigned    wm          0        0            0
        3 unassigned    wm          0        0            0
        4 unassigned    wm          0        0            0
```

```

5 unassigned    wm          0      0      0
6 unassigned    wm          0      0      0
8 reserved      wm        33538015     8.00MB    33554398

format> q
root@solaris-text:~# exit
oracle@solaris-text:~#

```

11. Determine the amount of installed system memory.

```

oracle@solaris-text:~# prtconf | grep Memory
Memory size: 1024 Megabytes

```

12. Display the amount of disk space utilized by the file system.

```

oracle@solaris-text:~# df -h
Filesystem      Size   Used  Available Capacity  Mounted on
rpool/ROOT/solaris   15G   2.4G     11G   19%       /
/devices           0K    0K      0K    0%       /devices
/dev               0K    0K      0K    0%       /dev
ctfs               0K    0K      0K    0%       ctfs
/system/contract
proc               0K    0K      0K    0%       /proc
mnttab             0K    0K      0K    0%       /etc/mnttab
swap              945M   1.3M    944M   1%
/system/volatile
objfs              0K    0K      0K    0%       /system/object
sharefs             0K    0K      0K    0%       sharefs
/etc/dfs/sharetab
/usr/lib/libc/libc_hwcap1.so.1
fd                 14G   2.4G     11G   18%       /lib/libc.so.1
                  0K    0K      0K    0%       /dev/fd
rpool/ROOT/solaris/var
                     15G   236M     11G    3%       /var
swap              944M   0K     944M    0%       /tmp
rpool/VARSHARE     15G   42K      11G    1%       /var/share
rpool/export       15G   32K      11G    1%       /export
rpool/export/home  15G   32K      11G    1%       /export/home
rpool/export/home/oracle
                     15G   34K      11G    1%
/export/home/oracle
rpool              15G   4.6M     11G    1%       /rpool
rpool/VARSHARE/pkg 15G   32K      11G    1%       /var/share/pkg
rpool/VARSHARE/pkg/repositories
                     15G   31K      11G    1%
/var/share/pkg/repositories

```

Note: The output varies from system to system.

13. Display the network connection configuration service to verify that the network service is online.

```
oracle@solaris-text:~# svcs network/physical
STATE          STIME      FMRI
online          22:15:02  svc:/network/physical:upgrade
online          22:15:06  svc:/network/physical:default
```

Note: If any of the services are disabled, enable it by running the following command:

```
# svcadm enable <FMRI>
```

14. Display the network interface information.

```
oracle@solaris-text:~# ipadm show-addr
ADDROBJ        TYPE      STATE      ADDR
lo0/v4          static    ok        127.0.0.1/8
net0/v4          static    ok        192.168.0.250/24
lo0/v6          static    ok        ::1/128
net0/v6          addrconf  ok        fe80::a00:27ff:fe3c:543d/10
```

Note: The network interface net0/v4 has been assigned the IPv4 address 192.168.0.250/24. This is the IP address that you provided during the network configuration for the installation.

15. Exit the Text-Install machine and return to the desktop machine. Close the Text-Install virtual machine by selecting the close button (x) on the top-right corner of the window.
16. When the Close Virtual Machine dialog box appears, select "Power off the machine" and click **OK**.

You can now put a tick mark against the installation task that you just completed.

Test Activities' Checklist	
<input checked="" type="checkbox"/>	Install the Oracle Solaris 11 OS and test both the Text Installer and Live Media installation options.
<input type="checkbox"/>	Inspect the boot and shutdown.
<input type="checkbox"/>	Test the services functionality in Oracle Solaris 11.
<input type="checkbox"/>	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
<input type="checkbox"/>	Test the ZFS functionality of Oracle Solaris 11.
<input type="checkbox"/>	Inspect the Oracle Solaris 11 network configuration.
<input type="checkbox"/>	Inspect the Oracle Solaris 11 zones functionality.
<input type="checkbox"/>	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
<input type="checkbox"/>	Set up users and test the user administration features of Oracle Solaris 11.
<input type="checkbox"/>	Inspect system processes and test the task-scheduling functionality.

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Practices for Lesson 2: Installing Oracle Solaris 11

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Practices for Lesson 3: Managing Boot and Shut Down of Systems

Chapter 3

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Practices for Lesson 3: Managing Boot and Shut Down of Systems
Chapter 3 - Page 1

Practices for Lesson 3

Practices Overview

In these practices, you learn how to boot and shut down a system.

According to the test plan, you now need to test the boot and shutdown of the system. Because VirtualBox is an x86-based software, you are given a demonstration of the OpenBoot PROM commands that run on a SPARC machine. As part of the hands-on practice, you work with the boot and shutdown commands on an x86 host.

Check your progress on the checklist as you begin your work with services.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the Text Installer and Live Media installation options.
	Inspect the boot and shutdown of a system.
	Test the services functionality in Oracle Solaris 11.
	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Practices 3-1: Booting and Shutting Down a SPARC Host (Demonstration)

Overview

OpenBoot PROM (OBP) is a firmware that performs the following tasks:

- Basic testing of and initializing the hardware before booting
- Starting the operating system
- Giving you access to a set of tools to program and to debug

OBP can be helpful when booting, configuring, and performing diagnostics on SPARC hardware. OBP controls system operation before the kernel becomes available. It provides a user interface and firmware utility commands that include the boot commands, diagnostic

commands, and commands for modifying the default configuration.

Because VirtualBox is an x86-based software, a demonstration is given to help you understand the boot and shutdown procedures on a SPARC system. In this demonstration, you learn how to use the OpenBoot PROM and Oracle Solaris OS commands to set and view OBP parameters, create a new device alias, and boot the system by using the new alias.

Assumptions

Adobe Flash Player is already installed on the host machine before the demonstration is executed.

Special note for playing the demo in the virtual machine:

- To be able to view the demo controls in the browser, it is recommended that you switch to full screen.
- To switch to full-screen mode in the browser window, go to **View > Full Screen**.

Task

Perform the following steps on your host machine:

1. On your host machine, open a terminal window.
2. Change to the /opt/ora/demo/ directory.

```
# cd /opt/ora/demo
# ls
standard.js
OpenBoot_PROM_demo.htm
OpenBoot_PROM_demo.swf
```

3. Open the OpenBoot_PROM_demo.htm file in a web browser.

```
# firefox OpenBoot_PROM_demo.htm &
```

4. A browser window with the Flash demo is displayed.
5. Close the terminal window.
6. Close the web browser after you complete viewing the flash demo.

Practices 3-2: Booting and Shutting Down an x86/64 Host

Overview

In this practice, you work with the boot and shutdown procedures of an x86/64 host. During the boot process, all SMF services are brought up. When you shut down the system, all services are brought down.

Scenario

Your senior system administrator wants you to determine the services that are started in single-user mode. You are asked to create a tar bundle of all the service logs for review. Therefore, you boot into single-user mode, which is used for system maintenance or any other function that

you want to perform without users logged in.

Tasks

1. Verify that the Sol11-Desktop virtual machine is running.
If not, start the VM. Log in to the Sol11-Desktop virtual machine as the oracle user, and then run the su - command to assume administrator privileges.
2. Issue the command reboot to reboot the desktop.

```
root@s11-desktop:~# reboot -p  
root@s11-desktop:~#
```

3. When the GRUB menu is displayed, press the space bar to stop the clock.

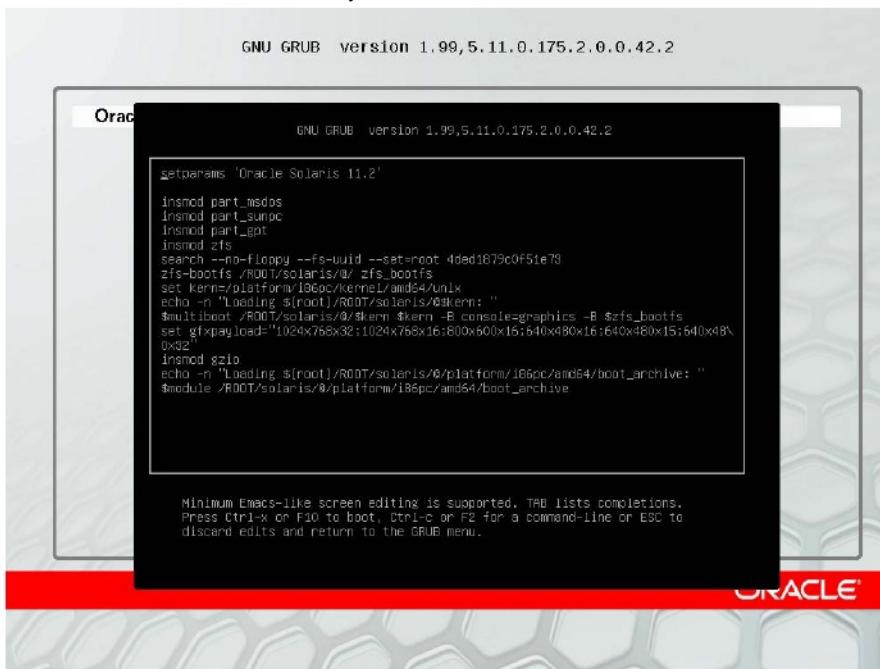


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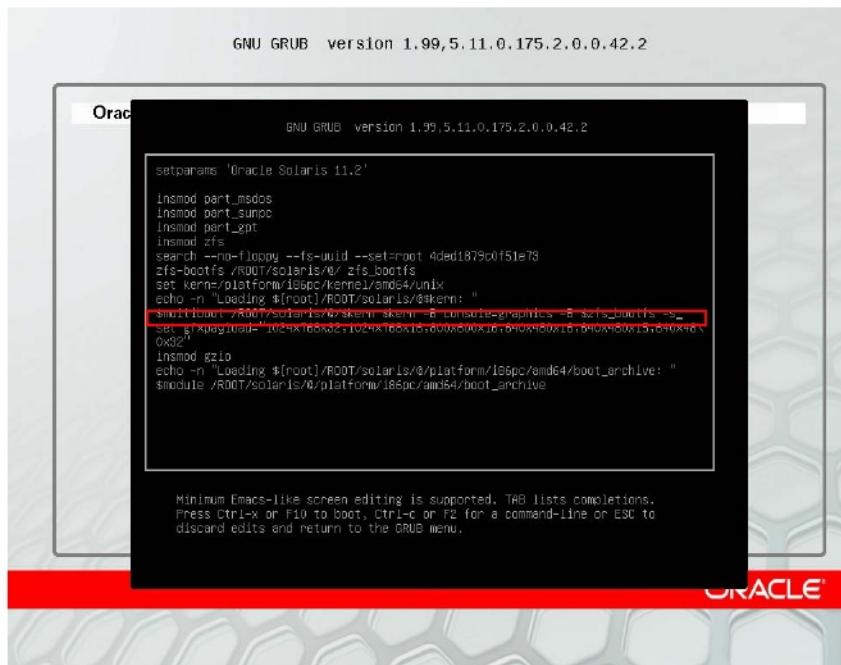
Practices for Lesson 3: Managing Boot and Shut Down of Systems
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- With the GRUB menu entry selected, enter **e** to edit the entry. Now the GRUB menu should look like the following screenshot. Using the down arrow key, move the cursor to the \$multiboot related kernel entry to edit it.



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5. At the end of the kernel command, enter a space and -s to boot into single-user mode. Press F10 to boot.



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6. From the GRUB menu, after you press F10 to boot, you view the command-line interface, which shows that you are in single-user mode.

```
WARNING: cpu0: failed to update microcode from version 0x0 to 0xa07

SunOS Release 5.11 Version 11.2 64-bit
Copyright (c) 1983, 2014, Oracle and/or its affiliates. All rights reserved.
Booting to milestone "milestone/single-user:default".
Hostname: s11-desktop
Requesting System Maintenance Mode
SINGLE USER MODE

Enter user name for system maintenance (control-d to bypass): ■
```

7. Enter the user ID root and password oracle1 to log in. After successful login, use the who -r command to view the current run levels.

```
root@s11-desktop:~# who -r
.    run-level S Aug 3 06:09      S      0  0
```

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8. Use the `tar` command to create a copy of the service logs.

```
root@s11-desktop:~# tar cvf log.tar /var/svc/log  
<output not shown>
```

Here, you created a `tar` bundle of all the system service logs. You booted the system into single-user mode so that you can determine the start state of the services running in single-user mode.

9. Press `Ctrl + D`. This step takes you into system maintenance mode. Press `Ctrl + D` again and wait for a few seconds. You see the console login prompt briefly, and then you are directed to the login screen.
10. On the login screen, use `oracle` and the password `oracle1` to log in.
11. Right-click on the desktop to open a terminal window, and then run the `su -` command.
12. Use the `who -r` command to verify that you are now in the multiuser-server milestone (init state 3).

```
root@s11-desktop:~# who -r  
. run-level 3 Aug 3 21:33 3 0 S
```

13. Use the command `who` to check the users currently on the system. If there are many users on the system, you may consider contacting them to have them log off the system. If it is okay to shut down the system, reboot the system.

```
root@s11-desktop:~# who  
oracle vt/2 Aug 3 21:34 (:0)  
oracle pts/1 Aug 3 21:35 (:0.0)  
root@s11-desktop:~# shutdown -y -i6 -g0  
<Output omitted>
```

Note that the option `-i6` is init state 6, which is used for rebooting the system. The option `-g0` refers to the grace period, which is zero seconds in this case. You can also use `init 6` to reboot the system.

From this point, the system reboots and returns you to the login prompt.

Practices for Lesson 4: Administering Services by Using SMF

Chapter 4

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Practices for Lesson 4: Administering Services by Using SMF
Chapter 4 - Page 1

Practices for Lesson 4

Practices Overview

In these practices, you learn how to administer the Service Management Facility (SMF) services.

According to the test plan, you now test the SMF services. You have been tasked with running several commands to test the SMF functionality. You also explore the service dependency relationships.

Check your progress on the checklist as you begin your work with services.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
	Test the services functionality in Oracle Solaris 11.
	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Practice 4-1: Administering Services

Overview

In this practice, you work with SMF services to accomplish the following tasks:

- Enable and disable services.
- Display the services.
- Explore the service dependencies.

Tasks

1. Verify whether the Sol11-Server1 virtual machine is running. Start it now if it is not running.
2. Log in to the virtual machine Sol11-Desktop as the oracle user. Use the password oracle. Right-click on the desktop, open a terminal window, and run su to assume administrator privileges.
3. Determine if the cron process and the cron service are running.

```
root@s11-desktop:~# pgrep -fl cron
 897 /usr/sbin/cron
root@s11-desktop:~# svcs cron
STATE      STIME      FMRI
online      14:23:46 svc:/system/cron:default
root@s11-desktop:~# svcs -p cron
STATE      STIME      FMRI
online      14:23:46 svc:/system/cron:default
                14:23:45          897 cron
root@s11-desktop:~#
```

Note: The -p option displays the processes included in the service.

4. Check the cron service dependencies. Determine what services cron is dependent on, as well as other services that are dependent on cron.

```
root@s11-desktop:~# svcs -d cron
STATE      STIME      FMRI
online      14:23:26 svc:/system/filesystem/local:default
online      14:23:50 svc:/milestone/name-services:default
```

Currently, both the required services system/local and name-services, are up.

```
root@s11-desktop:~# svcs -D cron
STATE      STIME      FMRI
online      14:24:04 svc:/milestone/multi-user:default
root@s11-desktop:~#
```

Note: The multi-user service is up and running.

5. Disable one of the services on which cron is dependent.

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Practices for Lesson 4: Administering Services by Using SMF

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```
root@s11-desktop:~# svcadm disable name-services
root@s11-desktop:~# svcs -d cron
STATE          STIME      FMRI
disabled       14:39:29  svc:/milestone/name-services:default
online         14:23:26  svc:/system/filesystem/local:default
root@s11-desktop:~#
```

Note: Observe that name-services is disabled.

6. Check the impact on the cron service.

```
root@s11-desktop:~# svcs -p cron
STATE          STIME      FMRI
online         14:23:46  svc:/system/cron:default
                14:23:45      897 cron
root@s11-desktop:~# svcadm refresh cron
root@s11-desktop:~# svcs -p cron
STATE          STIME      FMRI
online         14:41:02  svc:/system/cron:default
                14:23:45      897 cron
```

Note: Observe that the cron service is still online. In this case, refresh did not refresh the cron state.

```
root@s11-desktop:~# svcadm disable cron
root@s11-desktop:~# svcadm enable cron
root@s11-desktop:~# svcs -p cron
STATE          STIME      FMRI
offline        14:46:05  svc:/system/cron:default
```

Now you can observe the modified service state.

7. Obtain more details about the cron service.

```
root@s11-desktop:~# svcs -x cron
svc:/system/cron:default (clock daemon (cron))
State: offline since August 3, 2014 02:46:05 PM MDT
Reason: Service svc:/milestone/name-services:default is
disabled.
See: http://support.oracle.com/msg/SMF-8000-GE
See: cron(1M)
See: crontab(1)

See: /var/svc/log/system-cron:default.log
Impact: This service is not running.
```

You can obtain more details from this display as to why the cron service is offline.

8. Check the multi-user service as well.

```
root@s11-desktop:~# svcs multi-user
STATE          STIME      FMRI
online         14:24:04 svc:/milestone/multi-user:default
root@s11-desktop:~# svcs -p cron
STATE          STIME      FMRI
offline        14:46:05 svc:/system/cron:default
root@s11-desktop:~# svcadm disable multi-user
root@s11-desktop:~# svcadm enable multi-user
root@s11-desktop:~# svcs -p cron

STATE          STIME      FMRI
offline        14:46:05 svc:/system/cron:default
root@s11-desktop:~# svcs multi-user
STATE          STIME      FMRI
offline        14:48:53 svc:/milestone/multi-user:default
```

Note: The multi-user service is also offline.

9. Bring the services back up.

```
root@s11-desktop:~# svcadm enable name-services
root@s11-desktop:~# svcadm enable cron
root@s11-desktop:~# svcs cron
STATE          STIME      FMRI
online         14:50:40 svc:/system/cron:default
root@s11-desktop:~# svcadm enable multi-user

root@s11-desktop:~# svcs multi-user
STATE          STIME      FMRI
online         14:50:41 svc:/milestone/multi-user:default
root@s11-desktop:~#
```

This concludes the exercise about exploring the service dependencies.

Practice 4-2: Administering SMF Notifications

Overview

In this practice, you work with the Simple Mail Transfer Protocol (SMTP) service. This facility offers the convenience of getting notified in case a service changes state, for example, from enabled to disabled. This facility is very useful because a system administrator can resolve the problem with the service soon after being notified. The following tasks demonstrate the usefulness of this utility:

- Verifying the installation of required packages
- Configuring the SMF notification
- Examining a service in maintenance

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Close any open terminal and open a new terminal window. Use the `ssh` command to remotely connect to the Sol11-Server1 VM. Log in to the Sol11-Server1 virtual machine as the `oracle` user. Use `oracle1` as the password. Then log in as the `root` user and use `oracle1` as the password.

```
oracle@s11-desktop:~$ ssh oracle@192.168.0.100
Password: oracle1
Oracle Corporation      SunOS 5.11       11.2     June 2014
```

Note: If the RSA message is displayed, enter `yes` and proceed to log in.

```
oracle@s11-server1:~$ su -
oracle1
Password: Oracle Corporation      SunOS 5.11       11.2     June 2014
root@s11-server1:~#
```

3. Use the command `pkg info` to verify whether the required `smtp-notify` package is installed.

```
root@s11-server1:~# pkg info system/fault-management/smtp-notify
  Name: system/fault-management/smtp-notify
  Summary: Email Notification Daemon for System Events
  Description: smtp-notify is a small, lightweight daemon that
    subscribes to both software and FMA problem lifecycle
    events. Upon receipt of an event, it produces an email
    notification based on a set of notification
    preferences which are stored in the SMF service
    configuration repository.
  Category: System/Administration and Configuration
  State: Installed
  Publisher: solaris
  Version: 0.5.11
  Build Release: 5.11
  Branch: 0.175.2.0.0.42.2
```

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Practices for Lesson 4: Administering Services by Using SMF

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```
Packaging Date: June 24, 2014 06:51:39 PM
Size: 68.60 kB
FMRI: pkg://solaris/system/fault-management/smtp-
notify@0.5.11,5.11-0.175.2.0.0.42.2:20140624T18151139Z
root@s11-server1:~#
```

Note: Observe that the package is already in the installed state. It is always a best practice to check if the required package is already installed. This approach covers situations where you may have to install the package. In case the package is not installed, you can use the following command to install the package:

```
# pkg install system/fault-management/smtp-notify
```

4. Use the svcs and ps commands to verify that the smtp-notify service is online.

```
root@s11-server1:~# svcs smtp-notify
STATE          STIME      FMRI
online         18:43:16   svc:/system/fm/smtp-notify:default
root@s11-server1:~# ps -ef | grep smtp-notify
    root 2970 2955      0 18:44:34 pts/1    0:00 grep smtp-notify
noaccess 850      1      0 21:46:24 ?        0:00
/usr/lib/fm/notify/smtp-notify
```

These two commands confirm whether the smtp-notify service is up and running.

5. Use the svccfg command to configure the notify option on a global basis.

```
root@s11-server1:~# svccfg -s svc:/system/svc/global:default
setnotify -g from-online mailto:root@localhost
```

When you configure the notify option at the global level by using this global service, SMF notifies you (the administrator) if any service moves from the online state to any other state.

6. Use the pkg info command to verify that the apache-22 package is installed.

```
root@s11-server1:~# pkg info apache-22
Name: web/server/apache-22
Summary: Apache Web Server V2.2
Description: The Apache HTTP Server Version 2.2
Category: Web Services/Application and Web Servers
State: Installed
Publisher: solaris
Version: 2.2.27
Build Release: 5.11
Branch: 0.175.2.0.0.42.1
Packaging Date: June 23, 2014 02:28:11 PM
Size: 9.19 MB
FMRI: pkg://solaris/web/server/apache-22@2.2.27,5.11-
0.175.2.0.0.42.1:20140623T022811Z
```

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Practices for Lesson 4: Administering Services by Using SMF

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```
root@s11-server1:~#
```

Observe that when you attempt to verify the installation of the apache package, it shows that it is already installed on your system. In case the package is not installed, you can install it by using the following command:

```
# pkg install apache-22
```

You use the apache package to test the notify configuration.

- Verify that the apache22 service is up. If not, use the svcadm command to enable it.

```
root@s11-server1:~# svcs apache22
STATE          STIME      FMRI
disabled      21:4:07    svc:/network/http:apache22
root@s11-server1:~# svcadm enable apache22
root@s11-server1:~# svcs apache22
STATE          STIME      FMRI
online        18:49:21   svc:/network/http:apache22
```

- Use the pfedit editor to modify the indicated row in the apache service configuration file.

```
root@s11-server1:~# cd /etc/apache2/2.2
root@s11-server1:/etc/apache2/2.2# pfedit httpd.conf
...
...
...
# configuration directives that give the server its
instructions.
# See <URL:http://httpd.apache.org/docs/2.2> for detailed
information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.2/mod/directives.html>
# for a discussion of each configuration directive.
# configuration, error, and log files are kept.
#
...
...
#ServerRoot "/usr/apache2/2.2"
SrverRoot "/usr/apache2/2.2"
...
...
...
```

Comment out the srclinal ServerRoot setting. Add a line with the keyword SrverRoot misspelled as indicated. Note that you are deliberately corrupting the apache service configuration file so that it is moved from an online state to a maintenance state. This will enable you to test the notify mechanism.

9. Use the `svcadm` command and restart the `apache` service.

```
root@s11-server1:/etc/apache2/2.2~# cd  
root@s11-server1:~# svcadm restart apache22  
root@s11-server1:~# svcs apache22  
STATE          STIME      FMRI  
maintenance    18:51:02  svc:/network/http:apache22
```

When you restart the `apache22` service, SMF refreshes the corrupted configuration. Because the modified row has invalid settings, SMF places the `apache` service in maintenance state.

10. Use the `mail` command to read the mail that was sent to you as the administrator. You will see two sets of messages. The first message is about the `apache22` service moving to the maintenance state and the second message is from the `smtp` service with the service's "from-state" and "to-state" transition information. After viewing the first message, press the Enter key at the "?" to display the next message. To exit `mail`, use the `q` command.

```
root@s11-server1:~# mail  
From noaccess@s11-server1.mydomain.com Sun Aug 3 18:51:02 2014  
Date: Sun, 3 Aug 2014 18:51:02 -0600 (MDT)  
From: No Access User <noaccess@s11-server1.mydomain.com>  
Message-Id: <201408040051.s740p2lM001060@s11-  
server1.mydomain.com>  
Subject: Fault Management Event: s11-server1:SMF-8000-YX  
To: root@s11-server1.mydomain.com  
Content-Length: 776  
  
SUNW-MSG-ID: SMF-8000-YX, TYPE: defect, VER: 1, SEVERITY: major  
EVENT-TIME: Sun, 3 Aug 2014 18:51:02 MDT 2014  
PLATFORM: VirtualBox, CSN: 0, HOSTNAME: s11-server1  
SOURCE: software-diagnosis, REV: 0.1  
EVENT-ID: 473a1ae7-5619-ea1e-dd03-8da51db4fcee  
DESC: A service failed - a start, stop or refresh method failed.  
AUTO-RESPONSE: The service has been placed into the maintenance  
state.  
IMPACT: svc:/network/http:apache22 is unavailable.  
REC-ACTION: Run 'svcs -xv svc:/network/http:apache22' to  
determine the generic reason why the service failed, the  
location of any logfiles, and a list of other services impacted.  
Please refer to the associated reference document at  
http://support.oracle.com/msg/SMF-8000-YX for the latest service  
procedures and policies regarding this diagnosis.
```

? <Press Enter to see the second message>

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Practices for Lesson 4: Administering Services by Using SMF

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```
From noaccess@s11-server1.mydomain.com Sun Aug 3 18:51:02 2014
Date: Sun, 3 Aug 2014 18:51:02 -0600 (MDT)
From: No Access User <noaccess@s11-server1.mydomain.com>
Message-Id: <201408040051.s740p2cZ001056@s11-
server1.mydomain.com>
Subject: s11-server1: svc:/network/http:apache22 online-
>maintenance
To: root@s11-server1.mydomain.com
Content-Length: 263

HOSTNAME: s11-server1
TIMESTAMP: August 3, 2014 05:51:02 PM MDT
FMRI: svc:/network/http:apache22
FROM-STATE: online
TO-STATE: maintenance
DESCRIPTION: The indicated service has transitioned to the
maintenance state
REASON: a start, stop or refresh method failed

?q
root@s11-server1:~#
```

Now you can see that SMF (the SMTP service) sent this notification stating that the apache22 service has been moved from the online to offline state.

11. Use the svccfg command to display the configured notifications.

```
root@s11-server1:~# svccfg -s svc:/system/svc/global:default
listnotify
    Event: from-online (source: svc:/system/svc/global:default)
    Notification Type: smtp
    Active: true
    to: root@localhost
```

12. Use the svccfg command to delete the configured notifications. Confirm the deletion.

```
root@s11-server1:~# svccfg -s svc:/system/svc/global:default
delnotify -g all
root@s11-server1:~# svccfg -s svc:/system/svc/global:default
listnotify
```

Now there should be no notifications configured.

13. Use the pfedit command to modify the /etc/apache2/2.2/httpd.conf file and undo

the changes.

```
root@s11-server1:~# cd /etc/apache2/2.2/
root@s11-server1:/etc/apache2/2.2# pfedit httpd.conf
...
```

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Practices for Lesson 4: Administering Services by Using SMF

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```
...
...
# configuration directives that give the server its
instructions.
# See <URL:http://httpd.apache.org/docs/2.2> for detailed
information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.2/mod/directives.html>
# for a discussion of each configuration directive.
# configuration, error, and log files are kept.
#
ServerRoot "/usr/apache2/2.2"
...
...
...
...
...
```

Undo the change you made in step 10.

14. Use the `svcadm` command to restart the `apache22` service and disable it.

```
root@s11-server1:/etc/apache2/2.2# cd
root@s11-server1:~# svcadm restart apache22
root@s11-server1:~# svcadm disable apache22
root@s11-server1:~# svcs apache22
STATE          STIME      FMRI
disabled       18:59:12  svc:/network/http:apache22
```

You are disabling the `apache22` service because you will not need it.

15. Exit the SSH session.

Practices for Lesson 5: Administering Software Packages by Using IPS

Chapter 5

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Practices for Lesson 5: Administering Software Packages by Using IPS
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Practices for Lesson 5: Administering Software Packages by Using IPS

Practices Overview

After installing a new OS, in this practice, you learn how to configure a network client to access a local IPS repository, which is already set up on the server.

After you have completed configuring a network client, it is a common practice to ensure that you have the latest software updates (for example, packages) for the operating system. As part of your ongoing software management activities, your next task is to install new packages that were not part of the OS. These packages may address software bugs or add new functionality. You run through this management process by using both the command-line and Package

Manager (GUI) options. After you perform the software update, you verify that the new package is part of the OS on your machine and is available for use.

Note: In the lab environment, your virtual machine client cannot access the default repository on the Oracle website for software update services. For the purposes of training, the Sol11-Server1 virtual machine has been set up as a local repository.

Keep an eye on your progress by adding a tick mark against the corresponding activity in your Test Activities Checklist. Currently, you are configuring the IPS package repository and testing the package management functionality.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Notes

- The IPS repository ZP files were downloaded from <http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html> and installed on the Sol11-Server1 VM.
- Your output displays might differ slightly from those shown in the guide, especially the storage units, number of packages, and process information.

Practice 5-1: Configuring a Network Client to Access the Local IPS Server

Overview

To access the local package repository that is set up on the Sol11-Server1 virtual machine, you now configure the Sol11-Desktop virtual machine as a network client.

By default, clients are configured to use the publisher

<http://pkg.oracle.com/solaris/release/>. In this task, you reconfigure the client to access the <http://s11-server1.mydomain.com/> package publishersolaris.

Tasks

1. Verify that the Sol11-Desktop virtual machine is running. If it is not, start it.
2. Close any open terminal window. Right-click the desktop and open a new terminal window.
3. Run the su command to assume primary administrator privileges.

```
oracle@s11-desktop:~$ su -  
Password: oracle1  
Oracle Corporation SunOS 5.11 11.2 June 2014  
root@s11-desktop:~#
```

4. Verify that this client can access the DNS service by resolving the IPS server host name.

```
root@s11-desktop:~# nslookup s11-server1  
Server: 192.168.0.100  
Address: 192.168.0.100#53  
  
Name: s11-server1.mydomain.com  
Address: 192.168.0.100
```

5. Verify that this client can ping the IPS server.

```
root@s11-desktop:~# ping s11-server1  
s11-server1 is alive
```

6. List the current package publishers.

```
root@s11-desktop:~# pkg publisher  
PUBLISHER TYPE STATUS P LOCATION  
solaris srcin online F http://pkg.oracle.com/solaris/release/  
  
This is what you can expect to see on the job because this is the default srcin URI.
```

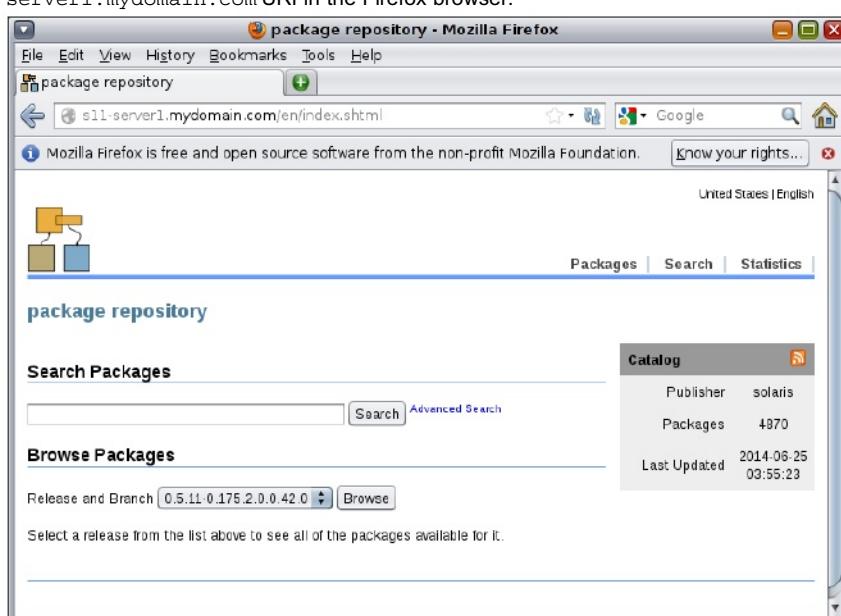
7. Remove the current publisher URI (<http://pkg.oracle.com/solaris/release/>) and add a new URI (<http://s11-server1.mydomain.com/>) to the publisher name solaris.

```
root@s11-desktop:~# pkg set-publisher -G '*' -g \  
http://s11-server1.mydomain.com/ solaris
```

8. Verify that the publisher is set to <http://s11-server1.mydomain.com/>.

```
root@s11-desktop:~# pkg publisher
PUBLISHER    TYPE      STATUS P LOCATION
solaris       srcin    online F http://s11-server1.mydomain.com/
```

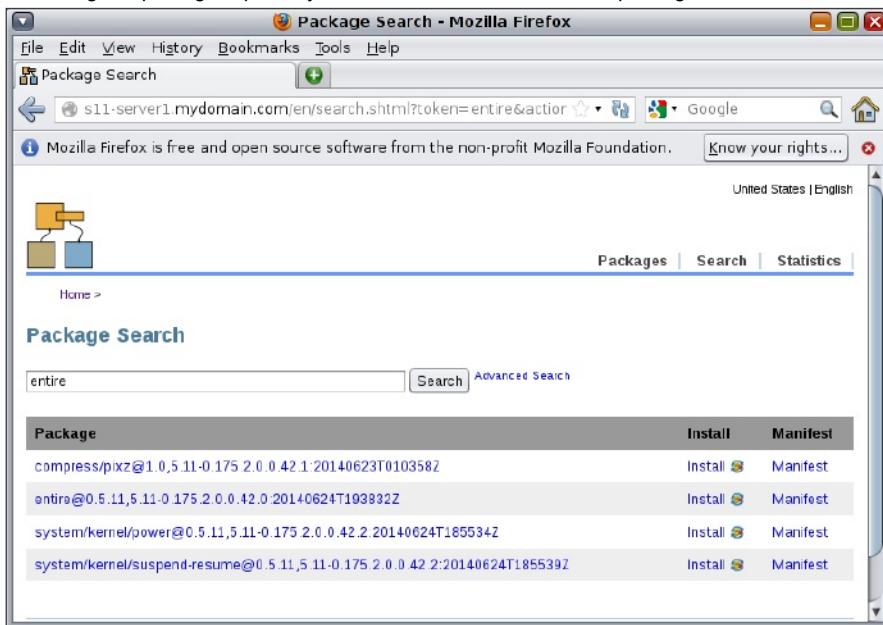
9. Test clientaccess to the IPS server by opening the <http://s11-server1.mydomain.com> URI in the Firefox browser.



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10. Using the package repository browser, search for the entire package.



11. Close the Firefox browser.

Practice 5-2: Managing Software Packages by Using the Command-Line Interface

Overview

In this practice, you work with the command-line interface (CLI) commands to perform common software package management tasks, such as adding, removing, and searching for packages. You also learn how to perform a “dry run” (or test run) on package installations where you see the changes that will occur on a system when a package is installed, without actually installing the package.

Your primary tasks are as follows:

- Search for a package.
- Perform a dry run on the package installation.
- Install a package.
- Verify the package installation.
- Display information about the package and its contents.
- Uninstall a package.

Your senior system administrator determined that your organization needs a utility package called `apptrace` to provide the tracing facility for multiple Oracle applications, for example, Oracle Financials. Now, you need to check if this package is already installed on your system. If it is not, you need to check if it is available in the local repository. When you know that it is available in the repository, you need to perform a dry run to make sure that it can be installed successfully. Then, you install the package and verify its installation. Later, you remove this package from the system because your organization decided to use another Oracle Solaris 11 utility called DTrace instead. Therefore, you uninstall the package.

Tasks

1. In the terminal window on the Sol11 Desktop virtual machine, determine if the `apptrace` software package is currently installed.

```
root@s11-desktop:~# pkg list apptrace
pkg list: No packages matching 'apptrace' installed
```

Observe that no output is displayed. This means that the `apptrace` package is not installed on the system.

2. Search the IPS package repository for the `apptrace` software package.

```
root@s11-desktop:~# pkg search apptrace
INDEX          ACTION VALUE
PACKAGE
pkg.description set    Apptrace utility for application tracing,
including shared objects pkg:/developer/apptrace@0.5.11-
0.175.2.0.0.42.2
...

```

Note that the `apptrace` package is available on the IPS server, which is Sol11-Server1 in your case.

3. Display detailed information about the `apptrace` package from the remote repository by using the `-r` option.

```
root@s11-desktop:~# pkg info -r apptrace
      Name: developer/apptrace
      Summary: Apptrace Utility
      Description: Apptrace utility for application tracing,
      including shared objects
      Category: Development/System
      State: Not installed
      Publisher: solaris

...
...
```

Note that the `apptrace` package is available on the remote repository because it shows the state as "Not installed."

4. Perform a "dry run" on the `apptrace` package installation.

```
root@s11-desktop:~# pkg install -nv apptrace
      Packages to install: 1
      Estimated space available: 31.94 GB
      Estimated space to be consumed: 19.83 MB
          Create boot environment: No
          Create backup boot environment: No
          Rebuild boot archive: No

...
...
```

The dry run shows that one package will be installed. The package installation will not affect the boot environment. No currently installed packages will be changed. Note that FMRI is the fault management resource identifier. FMRI is the identifier for this package. FMRI includes the package publisher, name, and version. The `pkg` command uses FMRIs, or portions of FMRIs, to operate on packages.

5. Install the `apptrace` package.

```
root@s11-desktop:~# pkg install apptrace
      Packages to install: 1
          Create boot environment: No
          Create backup boot environment: No

      DOWNLOAD          PKGS      FILES      XFER (MB)      SPEED
      Completed         1/1       10/10     0.1/0.1    105k/s

      PHASE              ITEMS
```

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Installing new actions	29/29
Updating package state database	Done
Updating package cache	0/0
Updating image state	Done
Creating fast lookup database	Done
Updating package cache	1/1

This shows that the package installation was successful.

- Verify the `apptrace` package installation.

PACKAGE	STATUS
<code>pkg://solaris/developer/apptrace</code>	OK

- Remove the `apptrace` package from the system image on your host.

PHASE	ITEMS
Removing old actions	25/24
Updating package state database	Done
Updating package cache	1/1
Updating image state	Done
Creating fast lookup database	Done
Updating package cache	1/1

Currently, your organization decided to use a different package instead. Therefore, you were asked to remove it from the system.

- Verify that the `apptrace` package has been removed.

root@s11-desktop:~# pkg list apptrace
pkg list: No packages matching 'apptrace' installed
Verification of package removal is complete.

Practice 5-3: Managing Software Packages by Using Package Manager

Overview

In this practice, you work with Package Manager to perform common software package management tasks, such as adding, removing, and searching for packages. You also learn how to perform a “dry run” on package installations, where you see the changes that will occur on the system when a package is installed, without actually installing the package.

Your primary tasks are as follows:

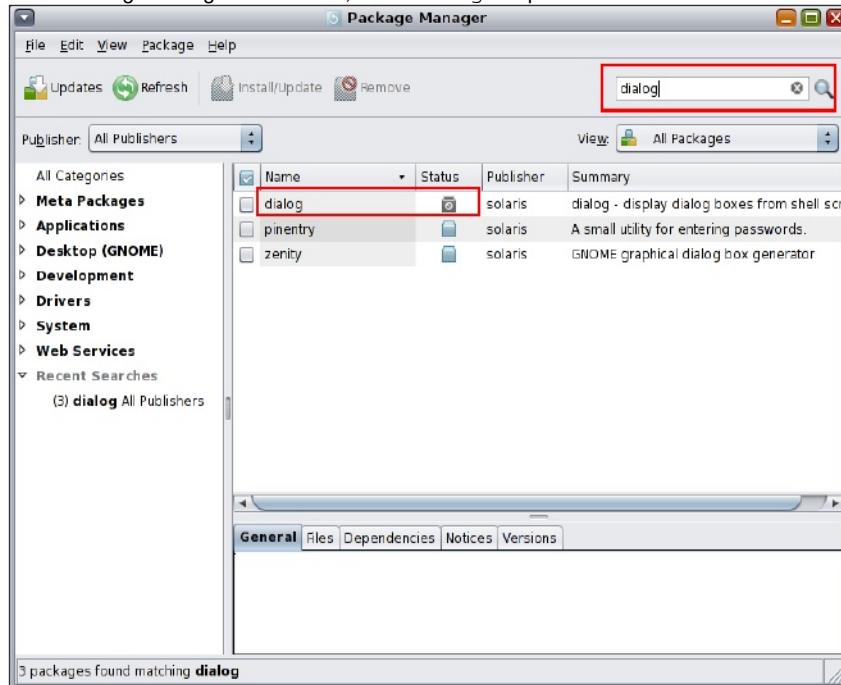
- Launch Package Manager.
- Search for a package.
- Perform a dry run on the package installation.
- Install a package.
- Verify the package installation.
- Display information about the package and its contents.
- Uninstall a package.

To prepare for a more comprehensive business application, your senior system administrator has asked you to install a package called `dialog`. After successfully installing the package, you are asked to verify its functionality.

Tasks

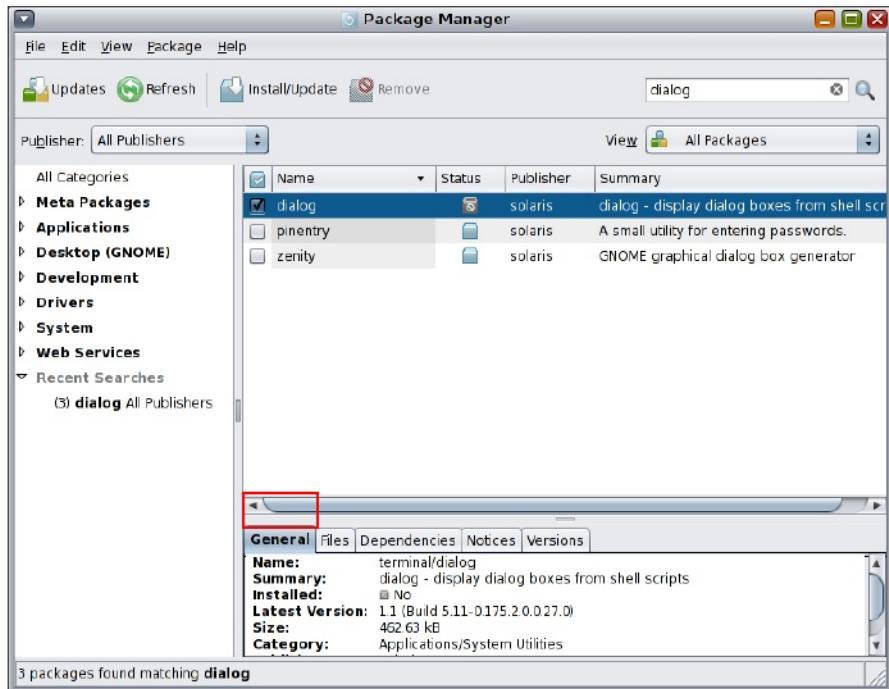
1. Verify that the Sol11-Server1 and Sol11-Desktop VMs are running.
2. On the Sol11-Desktop VM desktop, double-click the Add More Software icon.
3. From the File menu, select Manage Publishers.
4. In the Manage Publisher dialog box, verify that the package publisher that you configured in Practice 5-1 is enabled. Also, verify that Origin points to the IPS server. Click **OK**.

5. In the Package Manager search field, enter dialog and press Enter.



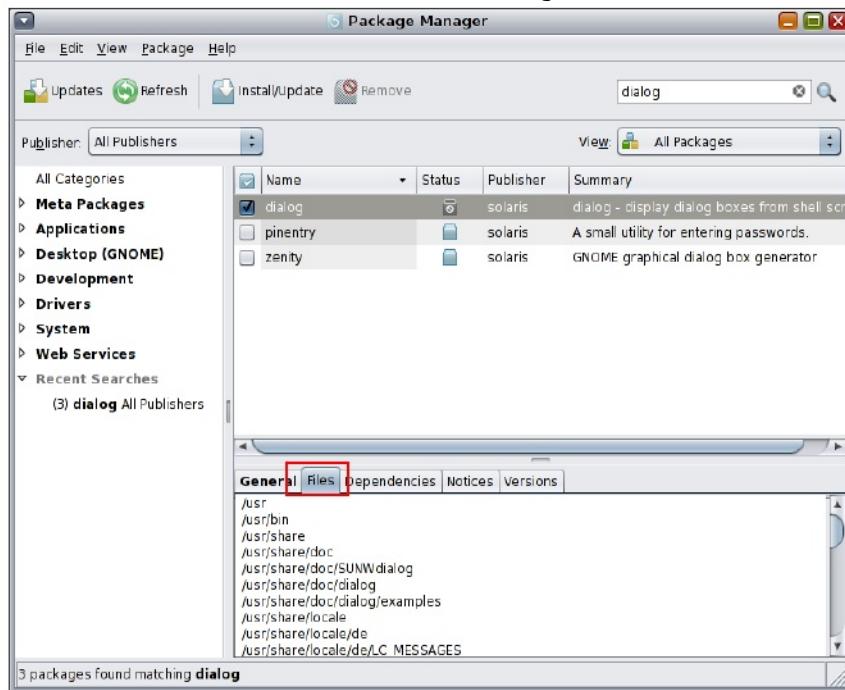
Note: The status icon indicates that the `dialog` package is not currently installed on this system.

6. Select the dialog package. Note the contents of the**General** tab at the bottom of the display. This information is derived from the dialog manifest.



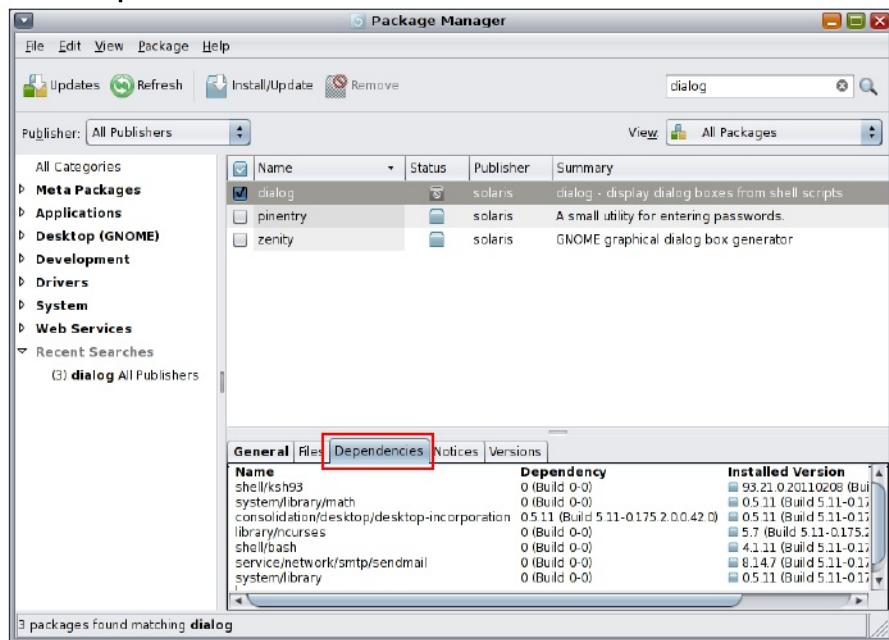
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7. Click the **Files** tab to view the files called out in the dialog manifest.



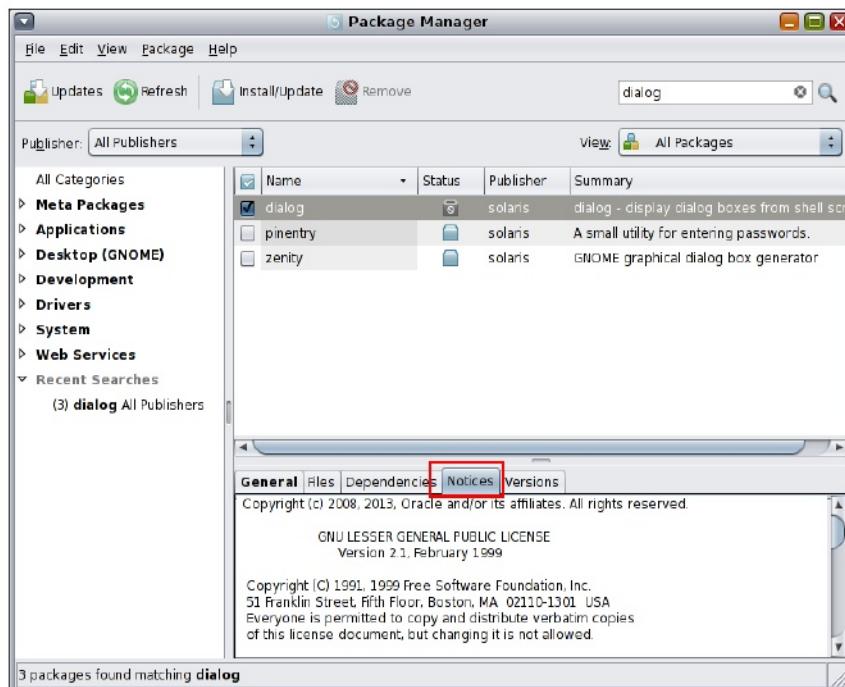
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8. Click the **Dependencies** tab.



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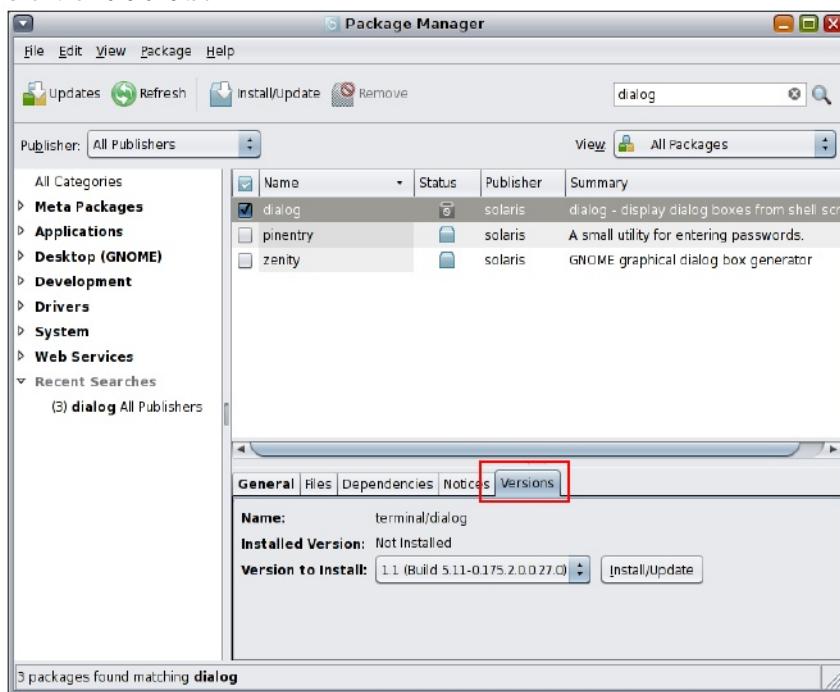
9. Click the **Notices** tab.



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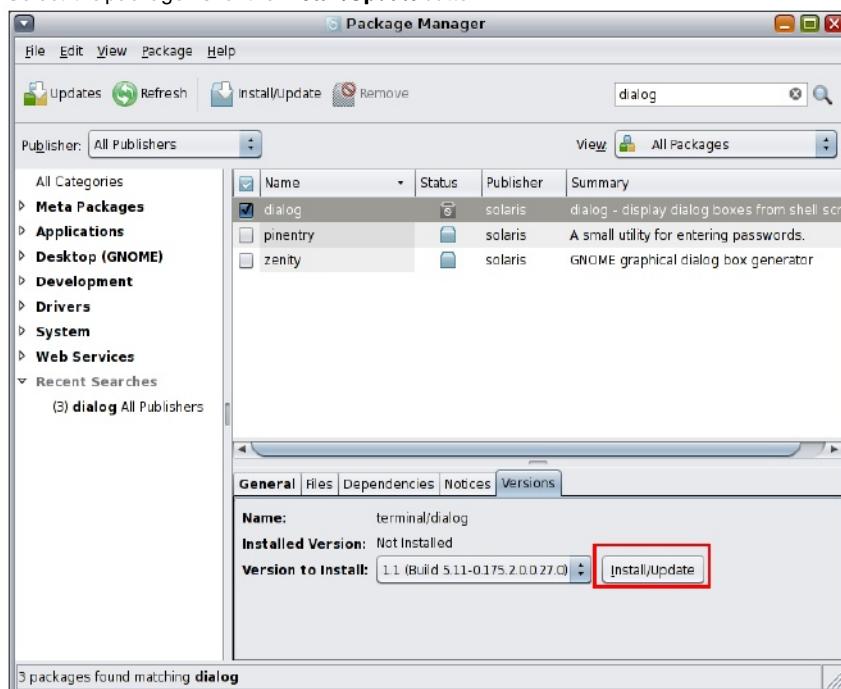
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10. Click the **Versions** tab.



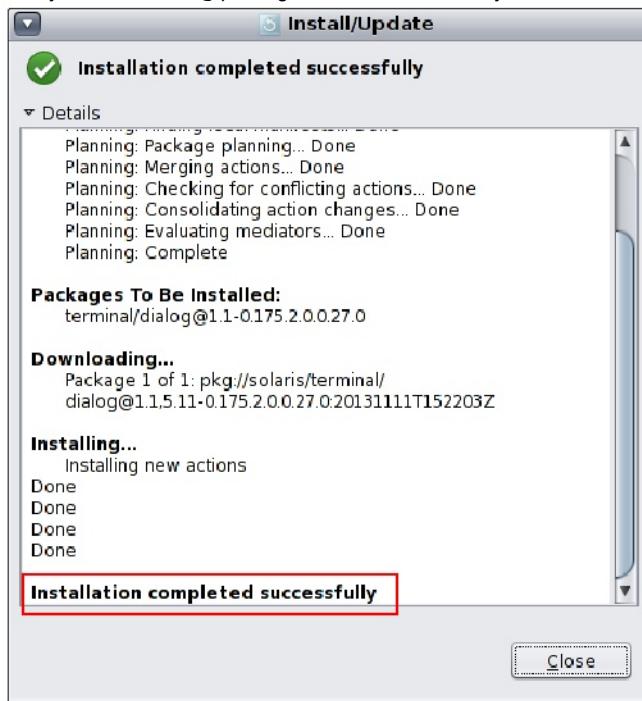
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11. Select the package. Click the **Install/Update** button.



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12. Verify that the dialog package installed successfully. Close the **Install/Update** dialog box.



13. Close Package Manager by clicking the x on the top-right corner.

14. Now you can use the `dialog` command to use the functionality of the `dialog` package.

```
root@s11-desktop:~# dialog
cdialog (ComeOn Dialog!) version 1.1-20100428
Copyright 2000-2007,2008 Thomas E. Dickey
This is free software; see the source for copying conditions. There
is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR
PURPOSE.

* Display dialog boxes from shell scripts *

Usage: dialog <options> { --and-widget <options> }
where options are "common" options, followed by "box" options

Special options:
  [--create-rc "file"]
Common options:
  [--ascii-lines] [--aspect <ratio>] [--backtitle <backtitle>]
```

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```
--begin <y> <x>] [--cancel-label <str>] [--clear] [--colors]
[--column-separator <str>] [--cr-wrap] [--date-format <str>]
[--default-item <str>] [--defaultno] [--exit-label <str>]
[--extra-button] [--extra-label <str>] [--help-button]
[--help-label <str>] [--help-status] [--ignore] [--input-fd <fd>]
[--insecure] [--item-help] [--keep-tite] [--keep-window]
[--max-input <n>] [--no-cancel] [--no-collapse] [--no-kill]
[--no-label <str>] [--no-lines] [--no-ok] [--no-shadow] [--nook]
[--ok-label <str>] [--output-fd <fd>] [---output-separator <str>]
[--print-maxsize] [--print-size] [--print-version] [--quoted]
[--scrollbar] [--separate-output] [--separate-widget <str>] [--shadow]
[--single-quoted] [--size-err] [--sleep <secs>] [--stderr] [--stdout]
[--tab-correct] [--tab-len <n>] [--time-format <str>] [--timeout <secs>]
[--title <title>] [--trace <file>] [--trim] [--version] [--visit-items]
[--yes-label <str>]
Box options:
--calendar      <text> <height> <width> <day> <month> <year>
--checkbox       <text> <height> <width> <list height> <tag1> <item1>
<status1>...
--dselect        <directory> <height> <width>
--editbox        <file> <height> <width>
--form           <text> <height> <width> <form height> <label1> <l_y1>
<l_x1> <item1> <i_y1> <i_x1> <flen1> <ilen1>...
--fselect        <filepath> <height> <width>
--gauge          <text> <height> <width> [<percent>]
--infobox        <text> <height> <width>
--inputbox        <text> <height> <width> [<init>]
--inputmenu       <text> <height> <width> <menu height> <tag1>
<item1>...
--menu           <text> <height> <width> <menu height> <tag1>
<item1>...
--mixedform      <text> <height> <width> <form height> <label1> <l_y1>
<l_x1> <item1> <i_y1> <i_x1> <flen1> <ilen1> <itype>...
--mixedgauge     <text> <height> <width> <percent> <tag1> <item1>...
--msgbox         <text> <height> <width>
--passwordbox    <text> <height> <width> [<init>]
--passwordform   <text> <height> <width> <form height> <label1> <l_y1>
<l_x1> <item1> <i_y1> <i_x1> <flen1> <ilen1>...
--pause          <text> <height> <width> <seconds>
--progressbox    <height> <width>
--radiolist      <text> <height> <width> <list height> <tag1> <item1>
<status1>...
--tailbox        <file> <height> <width>
--tailboxbg      <file> <height> <width>
```

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```
--textbox      <file> <height> <width>
--timebox      <text> <height> <width> <hour> <minute> <second>
--yesno       <text> <height> <width>

Auto-size with height and width = 0. Maximize with height and width =
-1.
Global-auto-size if also menu_height/list_height = 0.
root@s11-desktop:~#
```

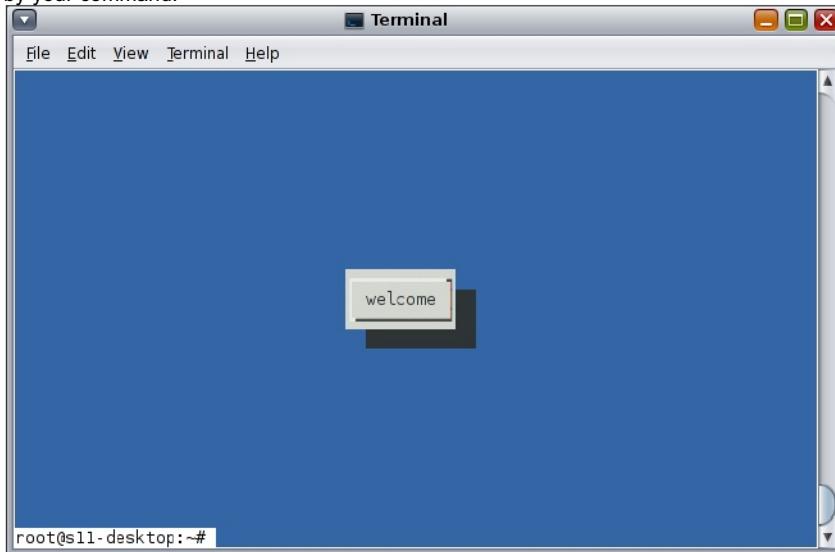
Note: This display tells you that you can use this package with many commands with the required options.

15. Use the `dialog` command.

```
root@s11-desktop:~# dialog --infobox welcome 3 11
```

Note: The package name is `dialog`. Here, you are creating a box with the text "welcome" in it. The size of the box is 3 characters high and 11 characters wide

16. After you press the Enter key, the following window is displayed. This window was created by your command.



17. Use the `clear` command to clear the screen.

The preceding steps have verified the functionality of the `dialog` package that you installed by using Package Manager.

Practices for Lesson 6: Managing Data by Using ZFS

Chapter 6

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Practices for Lesson 6: Managing Data by Using ZFS

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Practices for Lesson 6: Managing Data by Using ZFS

Practices Overview

In these practices, you are presented with a plan for managing data by using ZFS. These practices provide you an opportunity to work with ZFS facilities (for example, pools, file systems, snapshots, and clones). Although ZFS storage can be set up on a variety of storage media, only local storage is used in this class. You work with the following topics in the practices:

- Administering ZFS storage pools
- Administering ZFS file systems
- Administering ZFS snapshots and clones

As a supplementary topic, a practice is included to demonstrate ZFS operation with disk pools on individual slices.

Your company is very excited about the move to the ZFS storage system and its dynamic storage capabilities. The testing that you have been asked to do for this part of the plan will reveal how relatively simple it is to set up and manage data storage by using a variety of ZFS storage pool types and ZFS file systems.

Your organization uses the Oracle Enterprise Resource Planning (ERP) software. You are asked to create one pool for HR and one pool to store all Oracle Financials documentation. Within Oracle Financials, you create a subfile system for Accounts Receivable (AR) documentation. For AR, you create a snapshot backup as of Friday and a clone from this snapshot. The purpose of this clone is to allow you to make changes in your AR production file system because the snapshot is read-only. In addition, you do not want to modify the AR production file system directly.

Take a moment to see where you are in the Test Activities' Checklist. You are ready to test the ZFS functionality.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

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Practices for Lesson 6: Managing Data by Using ZFS

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Practice 6-1: Administering ZFS Storage Pools

Overview

In this practice, you work with ZFS storage pools in the following tasks:

- Creating different types of ZFS pools
- Querying pool attributes

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop VMs are running. If they are not, start them now.
2. Determine whether any ZFS pools exist already.

```
root@s11-desktop:~# zpool list
NAME      SIZE  ALLOC   FREE    CAP  DEDUP  HEALTH  ALTROOT
rpool    39.5G  6.68G  32.8G   16%  1.00x  ONLINE   -
root@s11-desktop:~#
```

Note: rpool is the default ZFS pool that is created during OS installation. The purpose of this pool is to provide ZFS as the root file system.

3. To determine the local disks that are available for new pools, display all the mount points.

```
root@s11-desktop:~# df -h
Filesystem      Size  Used Available Capacity  Mounted on
rpool/ROOT/solaris  39G  4.3G     32G   12%       /
/devices          0K   0K      0K   0%       /devices
/dev              0K   0K      0K   0%       /dev
ctfs              0K   0K      0K   0%       /system/contract
proc              0K   0K      0K   0%       /proc
mnttab            0K   0K      0K   0%       /etc/mnttab
swap              886M  1.6M    885M   1%       /system/volatile
objifs            0K   0K      0K   0%       /system/object
sharefs           0K   0K      0K   0%       /etc/dfs/sharetab
/usr/lib/libc/libc_hwcap1.so.1  36G  4.3G     32G   12%
/lib/libc.so.1
fd                0K   0K      0K   0%       /dev/fd
rpool/ROOT/solaris/var  39G  205M    32G   1%       /var
swap              949M  64M    885M   7%       /tmp
rpool/VARSHARE    39G  50K     32G   1%       /var/share
ora               426G 124G    302G  30%       /opt/ora
rpool/export      39G  32K     32G   1%       /export
rpool/export/home 39G  37K     32G   1%       /export/home
rpool/export/home/jholt 39G  35K     32G   1%       /export/home/jholt
rpool/export/home/jmoose 39G  35K     32G   1%       /export/home/jmoose
rpool/export/home/oracle 39G  102M    32G   1%       /export/home/oracle
rpool/export/home/panna 39G  35K     32G   1%       /export/home/panna
rpool/export/home/sstudent 39G  35K     32G   1%
/export/home/sstudent
rpool             39G  5.0M    32G   1%       /rpool
rpool/VARSHARE/zones 39G  31K     32G   1%       /rpool/zones
```

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```

ora          426G   124G      302G   30%   /mnt/sf_ora
rpool/VARSHARE/pkg    39G    32K      32G    1%   /var/share/pkg
rpool/VARSHARE/pkg/repositories 39G    31K      32G    1%
/var/share/pkg/repositories
root@s11-desktop:~#

```

Note: The output may vary from system to system.

- Check the disk being used by rpool.

```

root@s11-desktop:~# zpool status
  pool: rpool
  state: ONLINE
    scan: none requested
config:
  NAME      STATE      READ WRITE CKSUM
  rpool     ONLINE      0      0      0
            c1t0d0  ONLINE      0      0      0
errors: No known data errors
root@s11-desktop:~#

```

Notice that slice 0 of the disk c1t0d0 is being used by rpool. So you can assume that this disk is in use.

- You now find out which storage disks are available on your system.

```

root@s11-desktop:~# format
Searching for disks...done
AVAILABLE DISK SELECTIONS:
  0. c1t0d0 <ATA-VBOX HARDDISK-1.0-40.00GB>
    /pci@0,0/pci8086,2829@d/disk@0,0
  1. c1t2d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@2,0
  2. c1t3d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@3,0
  3. c1t4d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@4,0
  4. c1t5d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@5,0
  5. c1t6d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@6,0
  6. c1t7d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@7,0
  7. c1t8d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@8,0
  8. c1t9d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@9,0
Specify disk (enter its number): c

```

Because the `format` command lists all the local hard disks that are available, you can choose any disk except `c1t0d0` (because you determined it is being used by `pool`).

Note: The disk addresses on your virtual machine may differ from the ones shown in this example.

- Now you are ready to create some ZFS pools. Using the disk `c1t2d0`, create a simple pool with one disk.

```
root@s11-desktop:~# zpool create oraclehr c1t2d0
root@s11-desktop:~# zpool status oraclehr
  pool: oraclehr
    state: ONLINE
      scan: none requested
    config:

      NAME        STATE      READ WRITE CKSUM
      oraclehr    ONLINE     0       0       0
      c1t2d0      ONLINE     0       0       0

  errors: No known data errors
```

As demonstrated by the display, you can tell that the `oraclehr` pool is using the disk `c1t2d0`.

- Create a ZFS mirror pool by using the disks `c1t3d0` and `c1t4d0` if they are available. Note that you determined in step 8 that these disks are available.

```
root@s11-desktop:~# zpool create oracledocs mirror c1t3d0 c1t4d0
root@s11-desktop:~# zpool status oracledocs
  pool: oracledocs
    state: ONLINE
      scan: none requested
    config:

      NAME        STATE      READ WRITE CKSUM
      oracledocs  ONLINE     0       0       0
      mirror-0   ONLINE     0       0       0
      c1t3d0     ONLINE     0       0       0
      c1t4d0     ONLINE     0       0       0

  errors: No known data errors
root@s11-desktop:~#
```

Note: The purpose of creating a mirror pool is to provide data redundancy.

- Check the input/output activity of the `oraclehr` pool.

```
root@s11-desktop:~# zpool iostat oraclehr
               capacity  operations  bandwidth
```

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```
pool      alloc   free    read  write   read  write
-----  -----  -----  -----  -----  -----  -----
oraclehr     85K  1008M      0     3    5.47K 48.1K
root@s11-desktop:~#
```

Here you see the total storage for the pool, as well as the read/write operation information.

9. Create a raidz pool called oraclereq by using the next three available disks. Then view the status of the new pool.

```
root@s11-desktop:~# zpool create oraclereq raidz c1t5d0 c1t6d0c1t7d0
root@s11-desktop:~# zpool status oraclereq
  pool: oraclereq
    state: ONLINE
    scan: none requested
  config:
    NAME      STATE      READ WRITE CKSUM
    oraclereq  ONLINE      0      0      0
    raidz1-0  ONLINE      0      0      0
      c1t5d0  ONLINE      0      0      0
      c1t6d0  ONLINE      0      0      0
      c1t7d0  ONLINE      0      0      0
  errors: No known data errors
root@s11-desktop:~#
```

Here, you created the raidz pool, as indicated by the status command. The display shows raidz1-0 as the name of the virtual device in the pool. The redundancy is raidz1, meaning that raidz level 1 is maintaining single parity. The digit 0 represents the first virtual device.

The reason your HR analyst wanted you to create a raidz pool as opposed to a mirror pool is that raidz can provide redundancy at a lower cost compared to a mirrored pool. Note that writing to a raidz pool is slower because of calculating and writing parity data compared to mirroring.

Practice 6-2: Administering ZFS Pools by Using Disk Slices

Overview

In this practice, you work with ZFS storage pools in the following tasks:

- Formatting a disk
- Creating a ZFS pool
- Examining the pool's configuration
- Creating a ZFS file system
- Deleting the pool

Tasks

1. Use the `format` command to enter the disk-formatting process. Follow the directions to format the disk.

```
root@s11-desktop:~# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
 0. c1t0d0 <ATA-VBOX HARDDISK-1.0-40.00GB>
    /pci@0,0/pci8086,2829@d/disk@0,0
 1. c1t2d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@2,0
 2. c1t3d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@3,0
 3. c1t4d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@4,0
 4. c1t5d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@5,0
 5. c1t6d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@6,0
 6. c1t7d0 <ATA-VBOX HARDDISK-1.0-1.00GB>
    /pci@0,0/pci8086,2829@d/disk@7,0
 7. c1t8d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@8,0
 8. c1t9d0 <ATA-VBOX HARDDISK-1.0 cyl 1022 alt 2 hd 64 sec 32>
    /pci@0,0/pci8086,2829@d/disk@9,0

Select an available disk (with the exception of the first one, because it is the boot disk).
Enter its number (for example, 8).

Specify disk (enter its number): 8
selecting c1t9d0

[disk_formatted]
No Solaris fdisk partition found.

FORMAT MENU:
```

```
disk      - select a disk
type     - select (define) a disk type
partition - select (define) a partition table
current   - describe the current disk
format    - format and analyze the disk
fdisk     - run the fdisk program
repair    - repair a defective sector
label     - write label to the disk
analyze   - surface analysis
defect    - defect list management

backup   - search for backup labels
verify   - read and display labels
save     - save new disk/partition definitions
inquiry   - show disk ID
volname   - set 8-character volume name
!<cmd>  - execute <cmd>, then return
quit
```

Enter p to partition the disk.

```
format> p
WARNING - This disk may be in use by an application that has
          modified the fdisk table. Ensure that this disk is
          not currently in use before proceeding to use fdisk.
```

Note: Based on the type of label on the disk (for example, EFI), it may take you directly to the partitioning menu. In that case, you do not have to use fd for fdisk partitioning. Consult your instructor if needed.

Enter fd for fdisk partitioning.

```
format> fd
No fdisk table exists. The default partition for the disk is:
          a 100% "SOLARIS System" partition

Type "y" to accept the default partition, otherwise type "n" to
edit the partition table.
y
```

On x86 platforms, you can create multiple fixed disk partitions on which you can install different operating systems (for example, Windows, Linux, and Solaris).

Enter **p** to partition the disk.

```
format> p
PARTITION MENU:
    0      - change '0' partition
    1      - change '1' partition
    2      - change '2' partition
    3      - change '3' partition
    4      - change '4' partition
    5      - change '5' partition
    6      - change '6' partition
    7      - change '7' partition
select - select a predefined table
modify - modify a predefined partition table
name   - name the current table
print   - display the current table
label   - write partition map and label to the disk
!<cmd> - execute <cmd>, then return
quit
```

Enter **p** for print (the current table).

```
partition> p
Current partition table (default):
Total disk cylinders available: 1021 + 2 (reserved cylinders)
```

Part	Tag	Flag	Cylinders	Size	Blocks
0	unassigned	wm	0	0	(0/0/0) 0
1	unassigned	wm	0	0	(0/0/0) 0
2	backup	wu	0 - 1020	1021.00MB	(1021/0/0) 2091008
3	unassigned	wm	0	0	(0/0/0) 0
4	unassigned	wm	0	0	(0/0/0) 0
5	unassigned	wm	0	0	(0/0/0) 0
6	unassigned	wm	0	0	(0/0/0) 0
7	unassigned	wm	0	0	(0/0/0) 0
8	boot	wu	0 - 0	1.00MB	(1/0/0) 2048
9	unassigned	wm	0	0	(0/0/0) 0

Enter **m** for modify.

```

partition> m
Select partitioning base:
    0. Current partition table (default)
    1. All Free Hog

Enter 1 for All Free Hog to format the disk fresh.

Choose base (enter number) [0]? 1

Part     Tag      Flag      Cylinders      Size          Blocks
  0       root     wm        0              0             (0/0/0)        0
  1       swap     wu        0              0             (0/0/0)        0
  2       backup   wu        0 - 1020      1021.00MB    (1021/0/0) 2091008
  3 unassigned  wm        0              0             (0/0/0)        0
  4 unassigned  wm        0              0             (0/0/0)        0
  5 unassigned  wm        0              0             (0/0/0)        0
  6       usr      wm        0              0             (0/0/0)        0
  7 unassigned  wm        0              0             (0/0/0)        0
  8       boot    wu        0 - 0          1.00MB       (1/0/0)        2048
  9 alternates  wm        0              0             (0/0/0)        0

Do you wish to continue creating a new partition
table based on above table [yes]? <enter>

Press the Enter key to accept the default partition of 6 for any remaining un-allocated
space.

Free Hog partition[6]? <enter>

Enter size of partition '0' [0b, 0c, 0.00mb, 0.00gb]:200mb
Enter size of partition '1' [0b, 0c, 0.00mb, 0.00gb]:100mb
Enter size of partition '3' [0b, 0c, 0.00mb, 0.00gb]:200mb
Enter size of partition '4' [0b, 0c, 0.00mb, 0.00gb]:200mb
Enter size of partition '5' [0b, 0c, 0.00mb, 0.00gb]:200mb
Enter size of partition '7' [0b, 0c, 0.00mb, 0.00gb]:100mb

Part     Tag      Flag      Cylinders      Size          Blocks
  0       root     wm        1 - 200        200.00MB    (200/0/0) 409600
  1       swap     wu        201 - 300      100.00MB    (100/0/0) 204800
  2       backup   wu        0 - 1020      1021.00MB   (1021/0/0) 2091008
  3 unassigned  wm        301 - 500      200.00MB    (200/0/0) 409600
  4 unassigned  wm        501 - 700      200.00MB    (200/0/0) 409600
  5 unassigned  wm        701 - 900      200.00MB    (200/0/0) 409600
  6       usr      wm        901 - 920      20.00MB     (20/0/0)   40960
  7 unassigned  wm        921 - 1020     100.00MB   (100/0/0) 204800

```

```

8      boot    wu      0 - 0      1.00MB   (1/0/0)    2048
9 alternates   wu      0          0       (0/0/0)      0

Okay to make this the current partition table[yes]? <enter>
Enter table name (remember quotes): foster

Ready to label disk, continue? y
partition> p
Current partition table (foster):
Total disk cylinders available: 1021 + 2 (reserved cylinders)

Part     Tag    Flag    Cylinders      Size        Blocks
 0 unassigned    wu      1 - 200    200.00MB   (200/0/0)  409600
 1 unassigned    wu      201 - 300   100.00MB   (100/0/0)  204800
 2 backup        wu      0 -1020    1021.00MB  (1021/0/0) 2091008
 3 unassigned    wu      301 - 500   200.00MB   (200/0/0)  409600
 4 unassigned    wu      501 - 700   200.00MB   (200/0/0)  409600
 5 unassigned    wu      701 - 900   200.00MB   (200/0/0)  409600
 6 unassigned    wu      901 - 920   20.00MB    (20/0/0)   40960
 7 unassigned    wu      921 -1020   100.00MB  (100/0/0)  204800
 8      boot    wu      0 - 0      1.00MB   (1/0/0)    2048
 9 unassigned    wu      0          0       (0/0/0)      0

Use the q command to quit and return to the previous menu.
partition> q

FORMAT MENU:
  disk      - select a disk
  type      - select (define) a disk type
  partition - select (define) a partition table
  current   - describe the current disk
  format    - format and analyze the disk
  fdisk     - run the fdisk program
  repair    - repair a defective sector
  label     - write label to the disk
  analyze   - surface analysis
  defect    - defect list management
  backup    - search for backup labels
  verify    - read and display labels
  save      - save new disk/partition definitions
  inquiry   - show disk ID
  volname   - set 8-character volume name
  !<cmd>   - execute <cmd>, then return
  quit     - exit fdisk

```

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```
format> q
```

2. Using the zpool command, create a pool called slicepool with three disk slices.

```
root@s11-desktop:~# zpool create slicepool c1t9d0s0 c1t9d0s3
c1t9d0s4
vdev verification failed: use -f to override the following
errors:
/dev/dsk/c1t9d0s0 overlaps with /dev/dsk/c1t9d0s2
Unable to build pool from specified devices: device already in
use
```

You need to use the -f option to override the error. The reason for this error is that slice 2 is a copy of the whole disk.

```
root@s11-desktop:~# zpool create -f slicepool c1t9d0s0 c1t9d0s3
c1t9d0s4
'slicepool' successfully created, but with no redundancy;
failure of one device will cause loss of the pool.
```

3. Using the zpool status command, display the configuration of slicepool.

```
root@s11-desktop:~# zpool status slicepool
  pool: slicepool
  state: ONLINE
    scan: none requested
config:

  NAME        STATE     READ WRITE CKSUM
  Slicepool   ONLINE      0      0      0
    c1t9d0s0  ONLINE      0      0      0
    c1t9d0s3  ONLINE      0      0      0
    c1t9d0s4  ONLINE      0      0      0

  errors: No known data errors
root@s11-desktop:~# zpool list
NAME      SIZE  ALLOC   FREE  CAP  DEDUP  HEALTH  ALTROOT
oracledo  1008M  85K  1008M  0%  1.00x  ONLINE  -
oraclehr  1008M  85K  1008M  0%  1.00x  ONLINE  -
oraclereq  2.95G  176K  2.95G  0%  1.00x  ONLINE  -
rpool     39.5G  6.68G  32.8G  17%  1.00x  ONLINE  -
slicepool  585M  92.5K  585M  0%  1.00x  ONLINE  -
```

Note: The output may vary from system to system.

4. Using the `zfs` command, create a file system called `docs` in `slicepool`. Then verify the creation of the file system.

```
root@s11-desktop:~# zfs create slicepool/docs
root@s11-desktop:~# zfs list -r /slicepool
NAME          USED   AVAIL   REFER  MOUNTPOINT
slicepool     130K    553M    32K   /slicepool
slicepool/docs 31K    553M    31K   /slicepool/docs
```

5. Using the `pfedit` editor, create a file called `custlist` to contain the indicated data.

```
root@s11-desktop:~# cd /slicepool/docs
root@s11-desktop:/slicepool/docs# pfedit custlist
root@s11-desktop:/slicepool/docs# cat custlist
Fancy Motors Ltd
Superior TV Services
...
...
root@s11-desktop:/slicepool/docs# cd
```

Practice 6-3: Administering ZFS File Systems

Overview

In this practice, you work with creating ZFS file systems in the ZFS storage pools.

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop VMs are running. If they are not, start them now and assume primary administrator privileges.
2. Create a ZFS file system called financials within the oracledocs pool, and then view the file systems in the pool.

```
root@s11-desktop:~# zfs create oracledocs/financials
root@s11-desktop:~# zfs list -r oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs    124K  976M   32K   /oracledocs
oracledocs/financials  31K  976M   31K   /oracledocs/financials
root@s11-desktop:~#
```

You just created the file system called financials in the oracledocs pool as a descendent file system of oracledocs. Your company plans to store Oracle Financials application documentation in the oracledocs documentation pool.

3. Because the Oracle Financials application is large, you may want to create a separate file system for the Accounts Receivable documentation. You may call it ar. Create the file system, and then verify that it has been created.

```
root@s11-desktop:~# zfs create oracledocs/financials/ar
root@s11-desktop:~# zfs list -r oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs    164K  976M   32K   /oracledocs
oracledocs/financials  63K  976M   32K   /oracledocs/financials
oracledocs/financials/ar  31K  976M   31K   /oracledocs/financials/ar
root@s11-desktop:~#
```

Practice 6-4: Administering ZFS Snapshots and Clones

Overview

In this practice, you perform the following tasks:

- Creating ZFS snapshots
- Creating ZFS clones

Tasks

1. Use the `zfs snapshot` command to create a ZFS snapshot of the `ar` file system that you created in Practice 6-3, and then verify that it has been created. Then, verify that the `listsnapshots` property has been set to `on` for the `oracledocs` pool.

```
root@s11-desktop:~# zfs snapshot oracledocs/financials/ar@friday
root@s11-desktop:~# zfs list -rt all oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs      168K  976M   32K  /oracledocs
oracledocs/financials    63K  976M   32K  /oracledocs/financials
oracledocs/financials/ar  31K  976M   31K
/oracledocs/financials/ar@friday     0      -    31K  -
```

Note that a snapshot is created by appending the `@` sign to the file system name, together with the name of the snapshot. The best practice is to name it something meaningful (Friday, Nov11, TSmith, and so on) so that it reminds you of the backup day, date, or owner. The option `-t all` is used to include the snapshots in the displayed output. Without this option, the snapshots are not displayed. To see the results of not using this option, run the following command:

```
root@s11-desktop:~# zfs list -r oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs      168K  976M   32K  /oracledocs
oracledocs/financials    63K  976M   32K  /oracledocs/financials
oracledocs/financials/ar  31K  976M   31K
/oracledocs/financials/ar@friday     0      -    31K  -
```

Next, verify that the `listsnapshots` property is `ON`.

```
root@s11-desktop:~# zpool get listsnapshots oracledocs
NAME      PROPERTY      VALUE      SOURCE
oracledocs  listsnapshots  off      default
```

As displayed here, the `listsnapshots` property is `OFF` by default. Now, turn it `ON`.

```
root@s11-desktop:~# zpool set listsnapshots=on oracledocs
root@s11-desktop:~# zpool get listsnapshots oracledocs
NAME      PROPERTY      VALUE      SOURCE
```

```
oracledocs listsnapshots on local
```

When you display the descendent file systems of the `oracledocs` pool, the snapshots are included.

```
root@s11-desktop:~# zfs list -r oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs    170K  976M   32K   /oracledocs
oracledocs/financials  63K  976M   32K   /oracledocs/financials
oracledocs/financials/ar  31K  976M   31K   /oracledocs/financials/ar
oracledocs/financials/ar@friday  0     -     31K   -
root@s11-desktop:~#
```

Now you know two ways to display snapshots.

2. Use the `zfs clone` command to create a clone from the snapshot, and then verify that it is created.

```
root@s11-desktop:~# zfs clone oracledocs/financials/ar@friday \
oracledocs/financials/ardata
root@s11-desktop:~# zfs list -rt all oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs    212K  976M   32K   /oracledocs
oracledocs/financials  82K  976M   32K
/oracledocs/financials
/oracledocs/financials/ar  31K  976M   32K
/oracledocs/financials/ar
oracledocs/financials/ar@Friday  0     -     31K   -
oracledocs/financials/ar@Friday@ardata  18K  976M   31K
/oracledocs/financials/ardata
root@s11-desktop:~#
```

The snapshot `oracledocs/financials/ar@friday` is not mounted, as displayed in the `MOUNTPOINT` column. Because it is not mounted, it is not accessible. On the other hand, its clone `oracledocs/financials/ardata` is mounted, which makes it accessible.

The clone `ardata` is read/write, meaning that it is modifiable as opposed to the snapshot `oracledocs/financials/ar@friday`, which is read-only.

3. Compare the attributes of the snapshot and the clone.

```
root@s11-desktop:~# ls -ld /oracledocs/financials/ardata
drwxr-xr-x  2 root      root            2 Aug  3 19:53
oracledocs/financials/ardata
root@s11-desktop:~# ls -ld /oracledocs/financials/ar@friday
/oracledocs/financials/ar@friday: No such file or directory
root@s11-desktop:~# cd /oracledocs/financials/ardata
root@s11-desktop:/oracledocs/financials/ardata# touch newfile
root@s11-desktop:/oracledocs/financials/ardata# ls
```

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Practices for Lesson 6: Managing Data by Using ZFS

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```
newfile
```

The preceding commands demonstrate the major difference between the snapshot and the clone. The snapshot is not available and the clone is available, as well as modifiable.

4. Make some modification to the newfile file that you created in step 3 by using the pfedit command.

```
root@s11-desktop:/oracledocs/financials/ardata#pfedit newfile
Oracle Corporation

I am new to Oracle Solaris 11 system administration
~
~
~

:wq
root@s11-desktop:/oracledocs/financials/ardata#
```

5. Observe the space usage of the clone.

```
root@s11-desktop:/oracledocs/financials/ardata# cd
root@s11-desktop:# zfs list -r /oracledocs
NAME          USED  AVAIL REFER MOUNTPOINT
oracledocs    338K  976M   32K  /oracledocs
oracledocs/financials
/oracledocs/financials
oracledocs/financials/ar
/oracledocs/financials/ar
oracledocs/financials/ar@friday
/oracledocs/financials/ar@friday
oracledocs/financials/ardata
/oracledocs/financials/ardata
```

NAME	USED	AVAIL	REFER	MOUNTPOINT
oracledocs	338K	976M	32K	/oracledocs
oracledocs/financials	84.5K	976M	32K	
/oracledocs/financials				
oracledocs/financials/ar	31K	976M	32K	
/oracledocs/financials/ar				
oracledocs/financials/ar@friday	0	-	31K	-
/oracledocs/financials/ar@friday				
oracledocs/financials/ardata	20.5K	976M	31.5K	
/oracledocs/financials/ardata				

Observe the used column for the clone. The space utilization has gone up when compared to the same column in step 2. Because you created a file in the clone, it uses more storage to keep track of the new file.

6. Now you can proceed with replacing the main file system with the newly modified clone.

```
root@s11-desktop:# zfs promote oracledocs/financials/ardata
root@s11-desktop:# zfs list -r /oracledocs
NAME          USED  AVAIL REFER MOUNTPOINT
oracledocs    216K  976M   32K  /oracledocs
oracledocs/financials
/oracledocs/financials
oracledocs/financials/ar
/oracledocs/financials/ar
oracledocs/financials/ardata
/oracledocs/financials/ardata
oracledocs/financials/ardata@friday
```

NAME	USED	AVAIL	REFER	MOUNTPOINT
oracledocs	216K	976M	32K	/oracledocs
oracledocs/financials	84.5K	976M	32K	
/oracledocs/financials				
oracledocs/financials/ar	0	976M	32K	
/oracledocs/financials/ar				
oracledocs/financials/ardata	51.5K	976M	31.5K	
/oracledocs/financials/ardata				
oracledocs/financials/ardata@friday	20K	-	31K	-

If you do the calculation, the used space of the clone ardata now reflects the total of the space used by the main file system ar and the clone, which is, 31 KB + 20.5 KB = 51.5 KB. This means that the new file newfile in the clone is added to ardata.

7. Rename the main file system as arbackup and rename the clone to replace the main file system. Display the results.

```
root@s11-desktop:~# zfs rename oracledocs/financials/ar \
oracledocs/financials/arbackup
root@s11-desktop:~# zfs rename oracledocs/financials/ardata
oracledocs/financials/ar
root@s11-desktop:~# zfs list -r oracledocs
NAME          USED  AVAIL  REFER  MOUNTPOINT
oracledocs      217K   976M   32K  /oracledocs
oracledocs/financials    84.5K   976M   32K
/oracledocs/financials
oracledocs/financials/ar      51.5K   976M  31.5K
/oracledocs/financials/ar
oracledocs/financials/ar@friday    20K     -   31K  -
oracledocs/financials/arbackup      0    976M   32K
/oracledocs/financials/arbackup
```

Now you have the datasets that reflect the modified picture. If you need to go back to the previous version of ar, it is saved as arbackup.

This method is useful when you want to maintain the previous version of the data or overlay the production file system with modified data.

Practices for Lesson 7: Administering the Network

Chapter 7

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Practices for Lesson 7: Administering the Network

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Practices for Lesson 7

Practices Overview

In these practices, you are presented with a plan for administering the network. These practices provide you an opportunity to work with network facilities. The following activities are covered:

- Manually configuring the network interface
- Configuring a reactive network
- Creating a virtual network
- Verifying network operation
- Managing the virtual network data flow

Scenario

Your company wants you to examine the Oracle Solaris 11 network facilities. Based on the transaction volume of the business applications, you may have to modify the network configuration. To be able to accomplish this objective, you configure and administer the network components.

Now take a look at your progress in the Test Activities' Checklist.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
✓	Test the ZFS functionality of Oracle Solaris 11.
	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

Practice 7-1: Manually Configuring the Network Interface

Overview

In this practice, you work with the Oracle Solaris 11 network. This includes the following activities:

- Inspecting the datalinks
- Inspecting the network service
- Configuring the network interface
- Disabling the network interface
- Enabling the network interface

Task 1: Inspecting the Datalinks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
If the virtual machines are not running, start them now.
2. In the Sol11-Desktop virtual machine, close any open terminal window, open a new terminal window as the oracle user, and then assume administrator privileges.

```
oracle@s11-desktop:~$ su -  
Password:  
Oracle Corporation          SunOS 5.11           11.2       June 2014  
root@s11-desktop:~#
```

3. Use the `dladm` command to determine the physical links that are available.

```
root@s11-desktop:~# dladm show-phys  
LINK          MEDIA          STATE    SPEED  DUPLEX   DEVICE  
net1          Ethernet        unknown   0      unknown  e1000g1  
net2          Ethernet        unknown   0      unknown  e1000g2  
net3          Ethernet        unknown   0      unknown  e1000g3  
net0          Ethernet        up       1000   full    e1000g0
```

Note: The physical link names are prefixed with net automatically by a system as per the naming convention.

Is the net1 link up at this time? No, it is in the unknown state.

4. Use the `dladm` command to determine the datalinks that are available.

```
root@s11-desktop:~# dladm show-link  
LINK          CLASS          MTU    STATE    OVER  
net1          phys          1500   unknown  --  
net2          phys          1500   unknown  --  
net3          phys          1500   unknown  --  
net0          phys          1500   up      --
```

Note: The naming conventions followed for link names at the datalink layer are the same as at the physical layer.

5. Use the svcs network/physical command to verify that the network service is running.

```
root@s11-desktop:~# svcs network/physical
STATE          STIME      FMRI
online         18:25:16   svc:/network/physical:upgrade
online         18:25:24   svc:/network/physical:default
```

The default instance of the network/physical service is up and running.

Task 2: Configuring the Network Interface

1. Use the ipadm command to look at the IP interface information.

```
root@s11-desktop:~# ipadm show-if
IFNAME    CLASS     STATE    ACTIVE OVER
lo0       loopback  ok      yes     --
net0      ip        ok      yes     --
```

Note that net1 is not included in this display.

2. Use the ipadm command to display the IP addresses.

```
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE     STATE     ADDR
lo0/v4        static   ok      127.0.0.1/8
net0/v4        static   ok      192.168.0.111/24
lo0/v6        static   ok      ::1/128
```

Note that net1 is not included in this display.

3. Use the ipadm command to create a new interface net1. Display the results.

```
root@s11-desktop:~# ipadm create-ip net1
root@s11-desktop:~# ipadm show-if
IFNAME    CLASS     STATE    ACTIVE OVER
lo0       loopback  ok      yes     --
net0      ip        ok      yes     --
net1      ip        down    no      --
```

Is the newly created interface up? No

4. After creating the interface, use the ipadm create-addr command to assign an IP address to this interface. Display the interfaces.

```
root@s11-desktop:~# ipadm create-addr -T static \
-a 192.168.0.203/24 net1/v4
root@s11-desktop:~# ipadm show-if
IFNAME    CLASS     STATE    ACTIVE OVER
lo0       loopback  ok      yes     --
net0      ip        ok      yes     --
net1      ip        ok      yes     --
```

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Practices for Lesson 7: Administering the Network

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Note: The new net1 interface is up now.

5. Use the ipadm show-addr command to display the newly assigned IP address.

```
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE    STATE      ADDR
lo0/v4        static  ok        127.0.0.1/8
net0/v4        static  ok        192.168.0.111/24
net1/v4        static  ok        192.168.0.203/24
lo0/v6        static  ok        ::1/128
```

Note that the newly added IP address for net1 appears correctly in the list.

Task 3: Administering the Network Interface

1. With the help of the pfedit command, make an entry for server2 in the /etc/hosts file as indicated in bold in the following text:

```
root@s11-desktop:~# pfedit /etc/hosts
root@s11-desktop:~# cat /etc/hosts
#
# Copyright 2009 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# Internet host table
#
127.0.0.1 localhost loghost
192.168.0.111 s11-desktop.mydomain.com s11-desktop
192.168.0.100 s11-server1.mydomain.com s11-server1
192.168.0.203 s11-server2
~
~
~
:wq
root@s11-desktop:~#
```

2. Use the ping command to verify connectivity with s11-server2.

```
root@s11-desktop:~# ping s11-server2
s11-server2 is alive
```

Why are you able to ping the IP address 192.168.0.203 by using the alias s11-server2? Because the cross reference exists in the /etc/hosts file

Note: This file acts as a naming service.

3. Look at the current state of all the network interfaces.

```
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE   STATE    ADDR
lo0/v4       static  ok      127.0.0.1/8
net0/v4       static  ok      192.168.0.111/24
net1/v4       static  ok      192.168.0.203/24
lo0/v6       static  ok      ::1/128
```

4. Use the ipadm down-addr command to take the new interface out of service. Display the results.

```
root@s11-desktop:~# ipadm down-addr net1/v4
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE   STATE    ADDR
lo0/v4       static  ok      127.0.0.1/8
net0/v4       static  ok      192.168.0.111/24
net1/v4       static  down   192.168.0.203/24
lo0/v6       static  ok      ::1/128
```

In this instance, for training purposes, you are learning how to bring an interface down.

5. Use the ipadm up-addr command to bring up the new interface. Display the results.

```
root@s11-desktop:~# ipadm up-addr net1/v4
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE   STATE    ADDR
lo0/v4       static  ok      127.0.0.1/8
net0/v4       static  ok      192.168.0.111/24
net1/v4       static  ok      192.168.0.203/24
lo0/v6       static  ok      ::1/128
```

When you need to bring an interface up, this is how you do it.

This completes the network configuration procedure.

Practice 7-2: Administering Profile-Based Network Configuration

Overview

Reactive Network is a technology that simplifies and automates network configuration on Oracle Solaris 11. The key reactive network components are the network profiles, which allow you to specify various network configurations to be created depending on the current network conditions.

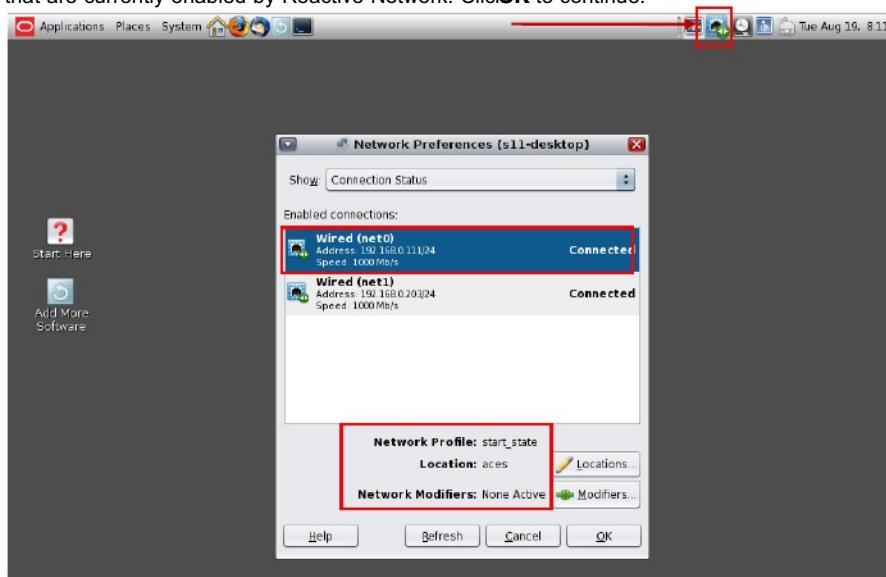
In this practice, you perform the following tasks:

- Assess the current Reactive Network configuration.
- Create and deploy a Reactive Network profile.

Task 1: Assessing the Current Reactive Network Configuration

Note: For Reactive Network to configure the host's network interface "auto-magically," the DHCP service must be available.

1. Click the Network Preferences icon to determine the NCPs and network interfaces (NCUs) that are currently enabled by Reactive Network. Click OK to continue.



2. Display the current network configuration for s11-desktop.

```
root@s11-desktop:~# ipadm show-addr
ADDROBJ          TYPE      STATE      ADDR
lo0/v4           static    ok        127.0.0.1/8
net0/v4           static    ok        192.168.0.111/24
net1/v4           static    ok        192.168.0.203/24
lo0/v6           static    ok        ::1/128
```

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3. List all available Reactive Network profiles and their current state.

```
root@s11-desktop:~# netadm list
TYPE      PROFILE      STATE
ncp       Automatic    disabled
ncp       DefaultFixed disabled
ncp       start_state  online
ncu:phys  net0         online
ncu:phys  net1         online
ncu:ip    net0         online
ncu:ip    net1         online
loc       Automatic    offline
loc       NoNet        offline
loc       DefaultFixed offline
loc       aces          online
```

4. List the Reactive Network `Automatic` profile.

```
root@s11-desktop:~# netadm list Automatic
TYPE      PROFILE      STATE
ncp       Automatic    disabled
loc       Automatic    offline
```

5. List the Reactive Network `start_state` profile.

```
root@s11-desktop:~# netadm list start_state
TYPE      PROFILE      STATE
ncp       start_state  online
ncu:phys  net0         online
ncu:phys  net1         online
ncu:ip   net0         online
ncu:ip   net1         online
```

6. List the Reactive Network location profiles.

```
root@s11-desktop:~# netadm list -p loc
TYPE      PROFILE      STATE
loc       Automatic    offline
loc       NoNet        offline
loc       DefaultFixed offline
loc       aces          online
```

7. List all the `phys` and `ip` network configuration units (NCUs) in the active network configuration profiles (NCPs).

```
root@s11-desktop:~# netadm list -c phys
TYPE      PROFILE      STATE
ncu:phys  net0         online
ncu:phys  net1         online
root@s11-desktop:~# netadm list -c ip
```

TYPE	PROFILE	STATE
ncu:ip	net0	online
ncu:ip	net1	online

8. List all the Reactive Network profiles and their auxiliary state.

```
root@s11-desktop:~# netadm list -x
TYPE PROFILE STATE AUXILIARY STATE
ncp Automatic disabled disabled by administrator
ncp DefaultFixed disabled disabled by administrator
ncp start_state online active
ncu:phys net0 online interface/link is up
ncu:phys net1 online interface/link is up
ncu:ip net0 online interface/link is up
ncu:ip net1 online externally managed
loc Automatic offline conditions for activation are unmet
loc NoNet offline conditions for activation are unmet
loc DefaultFixed offline conditions for activation are unmet
loc aces online active
```

9. Use the netcfg export command to create backups of the start_state and aces profiles.

```
root@s11-desktop:~# netcfg export -f start_state_ncp_backup ncp \
start_state
root@s11-desktop:~# netcfg export -f aces_loc_backup loc aces
root@s11-desktop:~# ls *backup
aces_loc_backup start_state_ncp_backup
```

10. Use the netcfg utility to select the start_state profile and list its NCUs.

```
root@s11-desktop:~# netcfg
netcfg> select ncp start_state
netcfg:ncp:start_state> list
ncp:start_state
    management-type reactive
NCUs:
    phys    net0
    phys    net1
    ip      net0
    ip      net1
```

11. Select the phys NCU and display its properties.

```
netcfg:ncp:start_state> select ncu phys net0
netcfg:ncp:start_state:ncu:net0> list
ncu:net0
    type          link
    class         phys
    parent        "start_state"
    activation-mode manual
    enabled       true
```

```
netcfg:ncp:start_state:ncu:net0> end
```

12. Select the ip NCU and display its properties.

```
netcfg:ncp:start_state> select ncu ip net0
netcfg:ncp:start_state:ncu:net0> list
ncu:net0
  type           interface
  class          ip
  parent         "start_state"
  enabled        true
  ip-version    ipv4
  ipv4-addrsrc  static
  ipv4-addr     "192.168.0.111/24"
netcfg:ncp:start_state:ncu:net0> end
netcfg:ncp:start_state> end
netcfg>
```

13. Select the aces location profile and list its properties.

```
netcfg> select loc aces
netcfg:loc:aces> list
loc:aces
  activation-mode      conditional-all
  conditions          "system-domain is
mydomain.com"
  enabled              true
  nameservices         dns
  nameservices-config-file "/etc/nsswitch.dns"
  dns-nameservice-configsrc manual
  dns-nameservice-domain "mydomain.com"
  dns-nameservice-servers "192.168.0.100"
netcfg:loc:aces> end
netcfg> exit
root@s11-desktop:~#
```

Task 2: Creating and Deploying a Reactive Network Profile

1. Create an NCP named oracle_profile.

```
root@s11-desktop:~# netcfg
netcfg> create ncp oracle_profile
```

2. Create a phys NCU for the net2 datalink.

```
netcfg:ncp:oracle_profile> create ncu phys net2
Created ncu 'net2'. Walking properties ...
activation-mode (manual) [manual|prioritized] > manual
mac-addr <Press Return>
autopush <Press Return>
```

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```
mtu> <Press Return>
netcfg:ncp:oracle_profile:ncu:net2> list
ncu:net1
    type          link
    class         phys
    parent        "oracle_profile"
    activation-mode manual
    enabled       true
netcfg:ncp:oracle_profile:ncu:net2> end
Committed changes

netcfg:ncp:oracle_profile> list
ncp:oracle_profile
    management-type reactive
NCUs:
    phys net2
```

3. Create an ip NCU for the net2 datalink.

```
netcfg:ncp:oracle_profile> create ncu ip net2
Created ncu 'net2'. Walking properties ...
ip-version (ipv4,ipv6) [ipv4|ipv6]> ipv4
ipv4-addrsrc [dhcp|static]> static
ipv4-addr> 192.168.0.111
ipv4-default-route> <Press Return>
netcfg:ncp:oracle_profile:ncu:net2> list
ncu:net2

    type          interface
    class         ip
    parent        "oracle_profile"
    enabled       true
    ip-version   ipv4
    ipv4-addrsrc static
    ipv4-addr     "192.168.0.111"
netcfg:ncp:oracle_profile:ncu:net2> verify
All properties verified
netcfg:ncp:oracle_profile:ncu:net2> commit
Committed changes
netcfg:ncp:oracle_profile:ncu:net2> end
netcfg:ncp:oracle_profile> list ncu ip net2
ncu:net2
    type          interface
    class         ip
    parent        "oracle_profile"
    enabled       true
```

```
ip-version      ipv4
ipv4-addrsrc   static
ipv4-addr      "192.168.0.111"
netcfg:ncp:oracle_profile> end
netcfg>
```

4. Create a location (loc) NCP named classroom.

```
netcfg> create loc classroom
Created loc 'classroom'. Walking properties ...
activation-mode (manual) [manual|conditional-any|conditional-all] > conditional-all

conditions> "system-domain is mydomain.com"
nameservices (dns) [dns|files|nis|ldap] > dns
nameservices-config-file ("/etc/nsswitch.dns") > <Press Return>
dns-nameservice-configsrc (dhcp) [manual|dhcp] > manual
dns-nameservice-domain > "mydomain.com"
dns-nameservice-servers > "192.168.0.100"
dns-nameservice-search > <Press Return>
dns-nameservice-sortlist > <Press Return>
dns-nameservice-options > <Press Return>
nfsv4-domain > <Press Return>
ipfilter-config-file > <Press Return>
ipfilter-v6-config-file > <Press Return>
ipnat-config-file > <Press Return>
ippool-config-file > <Press Return>

ike-config-file <Press Return>
ikev2-config-file <Press Return>
ipsecpolicy-config-file > <Press Return>
netcfg:loc:classroom> list
loc:classroom
    activation-mode           conditional-all
    conditions                "system-domain is mydomain.com"
    enabled                   false
    nameservices              dns
    nameservices-config-file "/etc/nsswitch.dns"
    dns-nameservice-configsrc manual
    dns-nameservice-domain   "mydomain.com"
    dns-nameservice-servers  "192.168.0.100"
netcfg:loc:classroom> verify
All properties verified
netcfg:loc:classroom> commit
Committed changes
netcfg:loc:classroom> end
```

```
netcfg> exit
```

5. Use the netcfg list command to display all the profiles that exist at the current scope.

```
root@s11-desktop:~# netcfg list
NCPs:
    Automatic
    DefaultFixed
    start_state
    oracle_profile
Locations:
    Automatic
    NoNet
    DefaultFixed
    aces
    classroom
```

6. Use the netcfg export command to create backups of your oracle_profile and classroom profiles.

```
root@s11-desktop:~# netcfg export -f oracle_ncp_backup ncp \
oracle_profile
root@s11-desktop:~# netcfg export -f classroom_loc_backup \
loc classroom
root@s11-desktop:~# ls *backup
aces_loc_backup      oracle_ncp_backup
classroom_loc_backup start_state_ncp_backup
```

7. Destroy the classroom profile and show the results.

```
root@s11-desktop:~# netcfg destroy loc classroom
root@s11-desktop:~# netcfg list
NCPs:
    Automatic
    DefaultFixed
    start_state
    oracle_profile
Locations:
    Automatic
    NoNet
    DefaultFixed
    aces
```

8. Recover the classroom profile from your backup and show the results.

```
root@s11-desktop:~# netcfg -f classroom_loc_backup
Configuration read.
root@s11-desktop:~# netcfg list
NCPs:
    Automatic
```

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Practices for Lesson 7: Administering the Network

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```
DefaultFixed  
start_state  
oracle_profile  
Locations:  
Automatic  
NoNet  
DefaultFixed  
aces  
classroom
```

9. Use the netadm enable command to enable the classroom and oracle_profile profiles.

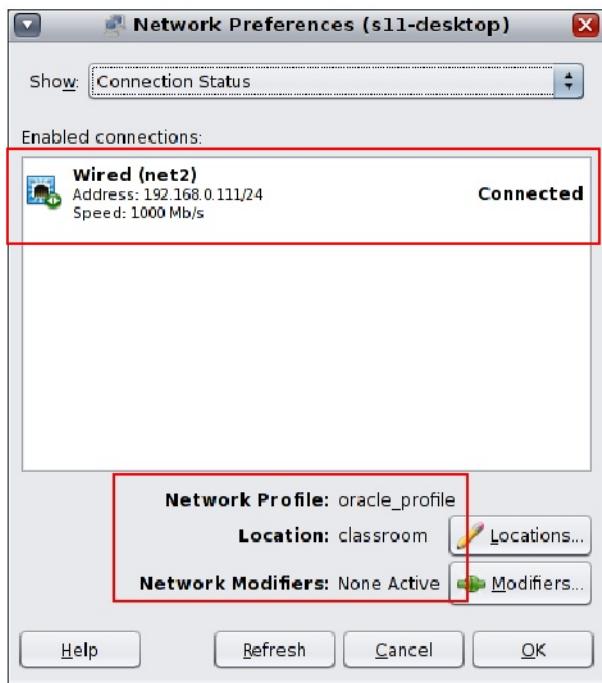
```
root@s11-desktop:~# netadm enable classroom  
Enabling loc 'classroom'  
root@s11-desktop:~# netadm enable oracle_profile  
Enabling ncp 'oracle_profile'
```

10. Reboot the system to verify that oracle_profile and classroom are the default Reactive Network profiles.

```
root@s11-desktop:~# init 6
```

11. After the system reboots, log in as oracle. Use oracle1 as the password.

12. Open the Network Preferences dialogbox. Click **OK** to continue.



Note: The net2 network interface is now connected to the network.

13. Open a terminal window and **su** to root. Use the **ping** command to verify communication with a remote host.

```
root@s11-desktop:~# ping s11-server1
s11-server1 is alive.
```

14. Revert to the **start_state** network profile and the **aces** location by using the **netadm enable** command.

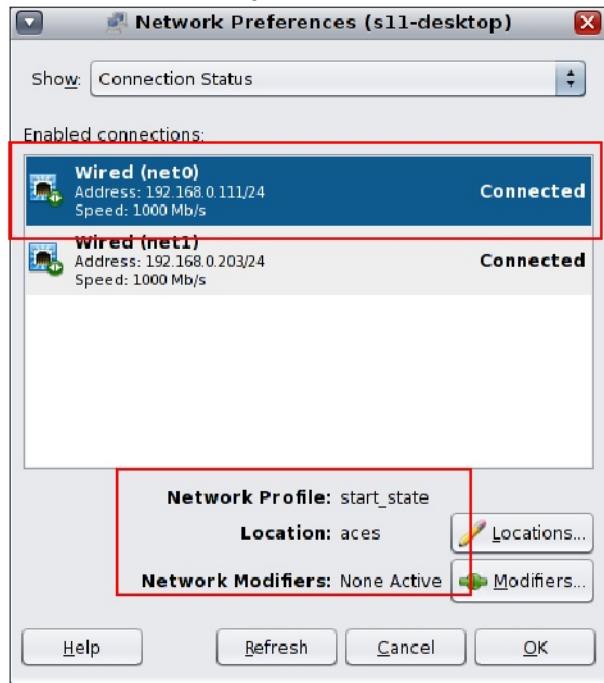
```
root@s11-desktop:~# netadm enable start_state
Enabling ncp 'start_state'
root@s11-desktop:~# netadm enable aces
Enabling loc 'aces'
```

15. Reboot the system to verify that **start_state** and **aces** are the default Reactive Network profiles.

```
root@s11-desktop:~# init 6
```

16. After the system reboots, log in as **oracle**. Use **oracle1** as the password.

17. Open the Network Preferences dialogbox. Click **OK** to continue.



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Practices for Lesson 7: Administering the Network

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Practice 7-3: Creating a Virtual Network

Overview

In this practice, you configure an Oracle Solaris 11 virtual network. To do this, you perform the following key tasks:

- Create a virtual network switch.
- Create the virtual network interfaces.
- Display the virtual network configuration.

Task:

1. Verify whether the Sol11-Server1 and Sol11-Desktop VMs are running. If they are not running, start them now and su to root.
2. On the Sol11-Desktop VM, run the dladm utility to create an etherstub named stub0. Confirm the creation of the etherstub by using the show-link command.

```
root@s11-desktop:~# dladm create-etherstub stub0
root@s11-desktop:~# dladm show-link
LINK          CLASS      MTU      STATE    OVER
net1          phys      1500     up       --
net2          phys      1500     unknown  --
net3          phys      1500     unknown  --
net0          phys      1500     up       --
stub0         etherstub 9000     unknown  --
```

Before you create the VNICs, you need to create a virtual network switch.

3. Use the dladm utility to create the vnic0, vnic1, and vnic2 VNICs. Attach these VNICs to the etherstub stub0.

```
root@s11-desktop:~# dladm create-vnic -l stub0 vnic0
root@s11-desktop:~# dladm create-vnic -l stub0 vnic1
root@s11-desktop:~# dladm create-vnic -l stub0 vnic2
```

Here vnic0 is required for the virtual switch stub0. The other VNICs are the virtual network interfaces that would be available for your use.

4. Show the results of the preceding step.

```
root@s11-desktop:~# dladm show-vnic
LINK      OVER      SPEED   MACADDRESS           MACADDRTYPE   VID
vnic0    stub0    40000   2:8:20:e0:97:e1  random        0
vnic1    stub0    40000   2:8:20:c8:8c:9   random        0
vnic2    stub0    40000   2:8:20:1c:4:49  random        0
```

All three VNICs have been created as displayed. Notice that each VNIC has a MAC address created. Now these VNICs are available for use as "physical" networks. You will use them in the next lesson titled "Administering Oracle Solaris Zones."

Practice 7-4: Verifying Network Operation

Overview

In this practice, you verify that the network is operational. This includes the following activities:

- Verifying connectivity between two hosts
- Checking connectivity to the DNS server
- Monitoring transaction traffic between two hosts
- Checking the traffic load on one network interface

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop VMs are running. If they are not, start them now.
2. Verify that you are in the `root` role in the Sol11-Desktop VM. If not, log in to the Sol11-Desktop VM as the `oracle` user. Use `oracle1` as the password and run the `su -` command to assume administrator privileges.
3. Check whether you have connection to the DNS server.

```
root@s11-desktop:~# nslookup 192.168.0.100
Server:  192.168.0.100
Address: 192.168.0.100#53

100.0.168.192.in-addr.arpa      name = s11-server1.mydomain.com.
```

In the current environment, DNS is defined for you on the Sol11-Server1 VM.
You learn more about the DNS server in the *Oracle Solaris 11 Advanced System Administration* course.

4. Check the network interfaces, IP addresses, and their current status.

```
root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE      STATE      ADDR
lo0/v4        static    ok        127.0.0.1/8
net0/v4        static    ok        192.168.0.111/24
net1/v4        static    ok        192.168.0.203/24
lo0/v6        static    ok        ::1/128
root@s11-desktop:~# ipadm show-if
IFNAME      CLASS      STATE      ACTIVE OVER
lo0         loopback  ok        yes     --
net0         ip         ok        yes     --
net1         ip         ok        yes     --
root@s11-desktop:~#
```

5. Check the connectivity from Sol11-Desktop to Sol11-Server1.

```
root@s11-desktop:~# ping -s 192.168.0.100
PING 192.168.0.100: 56 data bytes
```

```

64 bytes from s11-server1.mydomain.com (192.168.0.100):
icmp_seq=0. time=0.760 ms
64 bytes from s11-server1.mydomain.com (192.168.0.100):
icmp_seq=1. time=0.265 ms
64 bytes from s11-server1.mydomain.com (192.168.0.100):
icmp_seq=2. time=1.285 ms
^C
----192.168.0.100 PING Statistics---
3 packets transmitted, 3 packets received, 0% packet loss
...

```

Press Ctrl + C to stop the continuous display.

Assuming that your application analysts are using the Sol11-Desktop virtual machine and updating transactions on the Sol11-Server1 virtual machine(92.168.0.100), you can check the connectivity between the two machines. If you use thes option, you can also monitor sporadic connectivity problems.

- Check the network traffic on the net0 network interface.

```

root@s11-desktop:~# netstat -I net0 -i 5
      input    net0      output      input   (Total)      output
packets  errs  packets  errs  colls  packets  errs  packets  errs  colls
 879     0     854     0     0     1215     0     999     0     0
 1     0     1     0     0     2     0     2     0     0
 0     0     0     0     0     0     0     0     0     0
 0     0     0     0     0     0     0     0     0     0
 0     0     0     0     0     0     0     0     0     0
 3     0     3     0     0     3     0     0     3     0
 2     0     2     0     0     4     0     0     2     0
 0     0     0     0     0     0     0     0     0     0
^C
root@s11-desktop:~#

```

Press Ctrl + C to stop the continuous display.

- Verify the IP traffic on net0 by using the ipstat command.

Notes

- Before running the ipstat command on the Sol11-Desktop VM, go to the Sol11-Server1 VM and run theping -s 192.168.0.111 command.
- The output may vary from system to system. Wait for a few minutes for the output to be displayed.

```

root@s11-desktop:~# ipstat -l 5
 SOURCE        DEST        PROTO      INT      BYTES
s11-desktop.mydomain.com  s11-server1.mydomain.com  ICMP      net0      64.0
s11-server1.mydomain.com  s11-desktop.mydomain.com  ICMP      net0      64.0
s11-server1.mydomain.com  s11-desktop.mydomain.com  UDP       net0      39.0

```

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```
s11-desktop.mydomain.com s11-server1.mydomain.com UDP      net0      28.0
Total: bytes in: 103.0  bytes out: 92.0
(output truncated)
```

8. Verify the TCP and UDP traffic by using the `tcpstat` command.

Notes

- Before running the `tcpstat` command on the Sol11-Desktop VM, go to the Sol11-Server1 VM and run the `ping -s 192.168.0.111` command.
- The output may vary from system to system. Wait for a few minutes for the output to be displayed.

```
root@s11-desktop:~# tcpstat -l 5
ZONE   PID  PROTO  SADDR          SPORT  DADDR          DPORT  BYTES
global  1190  UDP    s11-server1.mydo 53    s11-desktop.mydo 58051 20.0
global  1190  UDP    s11-desktop.mydo 58051  s11-server1.mydo 53  7.0
global  1190  UDP    s11-desktop.mydo 60112  s11-server1.mydo 53  7.0
global  1190  UDP    s11-desktop.mydo 40138  s11-server1.mydo 53  7.0
global  1190  UDP    s11-server1.mydo 53    s11-desktop.mydo 60112 7.0
Total: bytes in: 34.0  bytes out: 23.0
```

Practice 7-5: Managing the Virtual Network Data Flow

Overview

The `flowadm` command is used to create, modify, remove, and show networking bandwidth and associated resources for a type of traffic on a particular link. It also allows users to manage networking bandwidth resources for a transport, service, or subnet. The service is specified as a combination of transport and local port. The subnet is specified by its IP address and subnet mask. The command can be used on any type of datalink, including physical links, virtual NICs, and link aggregations.

In this practice, you manage the virtual network data flow by first creating a VNIC and a flow, and then setting the flow to maximum bandwidth.

Tasks

- Verify that the Sol11-Desktop virtual machine is running and you have the `root` role.
- Use `dladm show-link` to determine the state of all the links that are currently configured in the system.

```
root@s11-desktop:~# dladm show-link
LINK          CLASS      MTU   STATE    OVER
net1          phys       1500  up      --
net2          phys       1500  unknown --
net3          phys       1500  unknown --
net0          phys       1500  up      --
stub0         etherstub  9000  unknown --
vnic0         vnic      9000  up      stub0
vnic1         vnic      9000  up      stub0
vnic2         vnic      9000  up      stub0
```

The same VNICs are available that you created in Practice 7-1.

- First create a new VNIC called `vnic3`, and then use the `flowadm` command to create a flow called `http1`. Define this traffic to port 80. Display the results.

```
root@s11-desktop:~# dladm create-vnic -l stub0 vnic3
root@s11-desktop:~# flowadm add-flow -l vnic3 -a \
transport=tcp,local_port=80 http1
root@s11-desktop:~# flowadm show-flow
FLOW      LINK      PROTO     LADDR      LPORT    RADDR      RPORT    DSFLD
http1    vnic3    tcp      --        80        --        --        --
```

In this case, the name of the new flow control is `http1` and it controls the `vnic3` configuration.

- Use the `flowadm` command to set the maximum bandwidth of the flow property to 100 Mbps on the `http1` flow. Show the results.

```
root@s11-desktop:~# flowadm set-flowprop -p maxbw=100M http1
root@s11-desktop:~# flowadm show-flowprop http1
FLOW      PROPERTY    PERM    VALUE      DEFAULT    POSSIBLE
```

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```
http1    maxbw      rw     100      --      --
http1    priority    rw   medium     medium    low,medium,high
http1    hwflow     r-   off      --      on,off
```

Note: Bandwidth capping is demonstrated here only for training purposes. On the job, you may also have to manage bandwidth by increasing or decreasing it. This would be based on the transactions that are running for your business application.

5. Use the `dladm` command to set the link property `priority` to `high` on the `vnic3` link.
Display the results.

```
root@s11-desktop:~# dladm set-linkprop -p priority=high vnic3
root@s11-desktop:~# dladm show-linkprop -p priority vnic3
LINK      PROPERTY          PERM VALUE     EFFECTIVE  DEFAULT  POSSIBLE
vnic3    priority          rw   high      high      high    low,medium,high
```

Practices for Lesson 8: Administering Oracle Solaris Zones

Chapter 8

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Practices for Lesson 8: Administering Oracle Solaris Zones

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Practices for Lesson 8: Administering Oracle Solaris Zones

Practices Overview

In these practices, you are presented with a plan for administering Oracle Solaris zones. These practices provide experience in working with a zone, which is an example of Oracle operating system-based virtualization. The following activities are covered:

- Configuring zones
- Determining an Oracle Solaris zone's configuration

Scenario

Your company would like to use Oracle virtualization techniques with the benefit of positioning their product testing in separate independent partitions. As part of your testing activities, you are asked to examine the Oracle Solaris zones configurations and evaluate their components. The purpose of a zone is to offer a test bed where all the quality assurance testing for your company can be performed.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
✓	Test the ZFS functionality of Oracle Solaris 11.
✓	Inspect the Oracle Solaris 11 network configuration.
	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

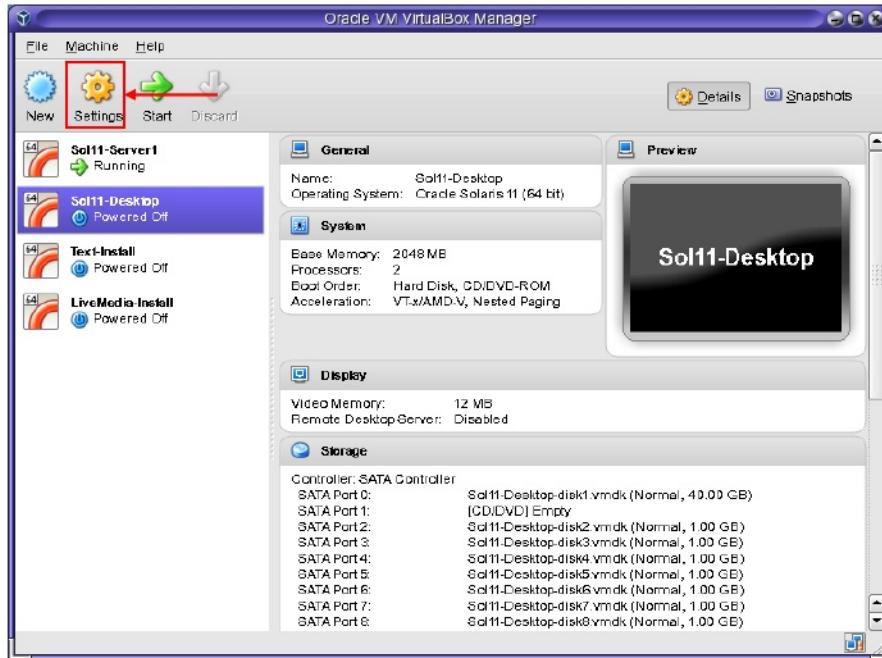
Preparation

This practice requires the Sol11-Desktop virtual machine to have two CPUs so that resource pools can be configured accordingly. To ensure that the Sol11-Desktop virtual machine has two CPUs in place, perform the following steps:

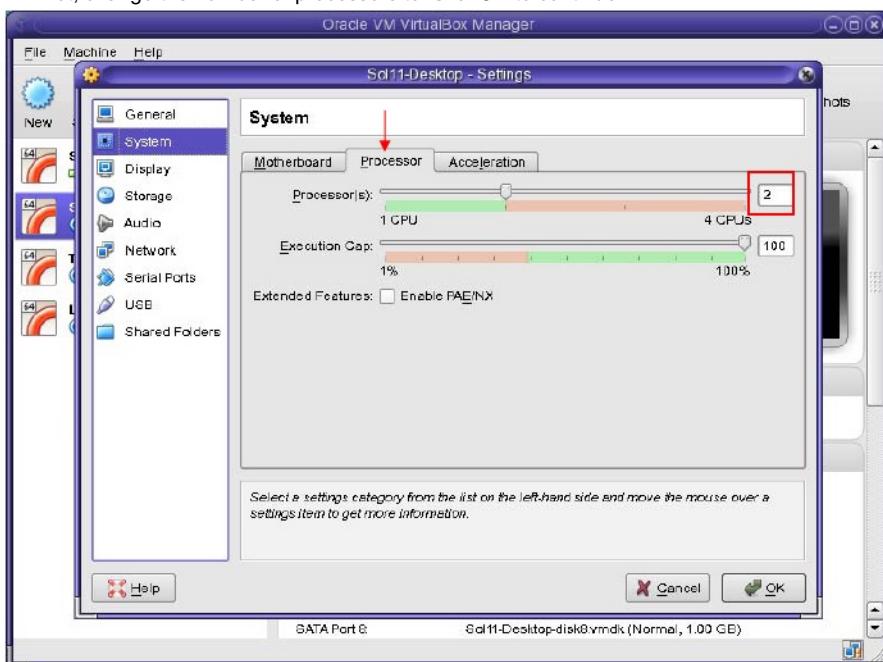
1. Shut down the Sol11-Desktop virtual machine.



2. Open the VirtualBox Manager GUI and click the Settings utility for the Sol11-Desktop virtual machine.



3. Under System settings, click the Processor tab and verify that the number of processors is 2. If not, change the number of processors to 2. Click OK to continue.



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Practices for Lesson 8: Administering Oracle Solaris Zones

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Practice 8-1: Configuring Zones

Overview

In this practice, you configure Oracle Solaris 11 zones and assign the virtual network interfaces that were created in the practice 7 titled “Administering the Network.” To do this, you perform the following key tasks:

- Configure three zones to use the VNICs that were configured in Practice 7 titled “Administering the Network.”
- Display the zone configuration, including the interfaces.

Tasks

Perform the following steps to configure two exclusive zones named grandmazone and choczone, and one shared zone named QAZone:

1. Verify that the Sol11-Server1 virtual machine is running. If the virtual machine is not running, start it now.
2. Start the Sol11-Desktop VM, log in to it as the oracle user. Use oracle1 as the password. Assume administrator privileges.
3. Verify that the IPS publisher is configured correctly and is operational.

```
root@s11-desktop:~# pkg search entire
INDEX          ACTION VALUE
PACKAGE

pkg.description set      Provides for power management support of
the entire operating system, including the configuration of the
maximum time allowed to reach both minimum and full capacity,
and whether or not to permit system suspend and resume if the
platform supports it.
pkg:/system/kernel/power@0.5.11-0.175.2.0.0.42.2
pkg.description set      Provides support for suspend and resume
of the entire operating system. When the system is suspended,
the entire system state is preserved either in RAM or non-
volatile storage until a resume operation is conducted. The
ability to suspend and resume is device dependent and not all
systems support the capability. pkg:/system/kernel/suspend-
resume@0.5.11-0.175.2.0.0.42.2
pkg.description set      pixz compresses and decompresses files
using multiple processors. If the input looks like a tar(1)
archive, it also creates an index of all the files in the
archive. This allows the extraction of only a small segment of
the tarball, without needing to decompress the entire archive.
pkg:/compress/pixz@1.0-0.175.2.0.0.42.1
pkg.fmri      set      solaris/entire
pkg:/entire@0.5.11-0.175.2.0.0.42.0
```

If the IPS publisher is configured incorrectly, change to an operational publisher. For example, if your current publisher is <http://pkg.oracle.com/solaris/release/>, you need to change it to <http://s11-server1.mydomain.com>. Run the following command:

```
root@s11-desktop:~# pkg set-publisher -G '*' \
-g http://s11-server1.mydomain.com/ solaris
```

Refer to "Practice 5: Administering Software Packages" for detailed IPS configuration. The objective is to access the IPS repository on the local system to speed up package transfer during the zone installation steps.

4. Create the rpool/zones ZFS file system so that the mount point is /zones.

```
root@s11-desktop:~# zfs create -o mountpoint=/zones rpool/zones
root@s11-desktop:~# zfs list rpool/zones
NAME          USED  AVAIL  REFER  MOUNTPOINT
rpool/zones    31K   31.9G   31K  /zones
```

The root file systems for the zones are stored in the rpool/zones file system.

5. Configure grandmazone and display the results.

```
root@s11-desktop:~# zonecfg -z grandmazone
Use 'create' to begin configuring a new zone.
zonecfg:grandmazone> create
create: Using system default template 'SYSdefault'
zonecfg:grandmazone> set zonepath=/zones/grandmazone
zonecfg:grandmazone> set autoboot=true
zonecfg:grandmazone> add net
zonecfg:grandmazone:net> set physical=vnic1
zonecfg:grandmazone:net> end
zonecfg:grandmazone> verify
zonecfg:grandmazone> commit
zonecfg:grandmazone> exit
```

6. Configure choczone.

```
root@s11-desktop:~# zonecfg -z choczone
Use 'create' to begin configuring a new zone.
zonecfg:choczone> create
create: Using system default template 'SYSdefault'
zonecfg:choczone> set zonepath=/zones/choczone
zonecfg:choczone> set autoboot=true
zonecfg:choczone> add net
zonecfg:choczone:net> set physical=vnic2
zonecfg:choczone:net> end
zonecfg:choczone> verify
zonecfg:choczone> commit
zonecfg:choczone> exit
```

7. Configure the QAzone zone.

```
root@s11-desktop:~# zonecfg -z QAzone
```

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```
Use 'create' to begin configuring a new zone
zonecfg:QZone> create -t SYSdefault-shared-ip
zonecfg:QZone> set zonepath=/zones/QZone
zonecfg:QZone> set autoboot=true
zonecfg:QZone> set ip-type=shared
zonecfg:QZone> add net
zonecfg:QZone:net> set address=192.168.0.200
zonecfg:QZone:net> set physical=net0
zonecfg:QZone:net> end
zonecfg:QZone> add rctl

zonecfg:QZone:rctl> set name=zone.max-lwps
zonecfg:QZone:rctl> add value
  (priv=privileged,limit=500,action=deny)
zonecfg:QZone:rctl> end
zonecfg:QZone> verify
zonecfg:QZone> commit
zonecfg:QZone> exit
root@s11-desktop:~#
```

8. Use the zoneadm command to display the configured zones.

```
root@s11-desktop:~# zoneadm list -cv
  ID NAME      STATUS     PATH          BRAND    IP
  0 global    running   /
- grandmazone  configured /zones/grandmazone  solaris  excl
- choczone    configured /zones/choczone    solaris  excl
- QZone       configured /zones/QZone      solaris  shared
```

All three zones are in the configured state. They need to be installed.

9. Use the sysconfig command to create a system configuration profile for grandmazone.

```
root@s11-desktop:~# sysconfig create-profile -o \
/opt/ora/data/gmconf
```

When the system configuration tool appears, follow the directions on the screen and provide appropriate information from the following:

- Computer name: grandmazone
- Ethernet network configuration: Manually
- Network Interface: vnic1
- IP Address: 192.168.1.100
- DNS: Do not configure DNS
- Alternate Name Service: None
- Time zone: *Use your local region.*
- Locale: *Use your local language.*
- Keyboard: *Use your region specific.*

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- Root password: oracle1
- Your real name: oracle
- Username: oracle
- User password: oracle1
- Support Registration: *Accept the default.*
- Support Network Configuration: *Accept the default.*

After you have reviewed the information on the System Configuration Summary screen, select F2_Apply.

SC profile successfully generated as:
/opt/ora/data/gmconf/sc_profile.xml

Exiting System Configuration Tool. Log is available at:
/system/volatile/sysconfig/sysconfig.log.2745
root@s11-desktop:~#

10. Display the SCprofile that you just created for grandmazone.

```
root@s11-desktop:~# more /opt/ora/data/gmconf/sc_profile.xml
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE service_bundle SYSTEM "/usr/share/lib/xml/dtd/service_bundle.dtd.1">
<!-- Auto-generated by sysconfig -->
<service_bundle type="profile" name="sysconfig">
  <service version="1" type="service" name="system/identity">
    <instance enabled="true" name="node">
      <property_group type="application" name="config">
        <propval type="astring" name="nodename" value="grandmazone"/>
      </property_group>
    </instance>
  </service>
  <service version="1" type="service" name="network/install">
    <instance enabled="true" name="default">
      <property_group type="application" name="install_ipv6_interfae">
        <propval type="astring" name="stateful" value="yes"/>
        <propval type="astring" name="address_type" value="addrconf"/>
        <propval type="astring" name="name" value="vnic1/v6"/>
        <propval type="astring" name="stateless" value="yes"/>
      </property_group>
      <property_group type="application" name="install_ipv4_interfae">
        <propval type="net_address_v4" name="static_address"
value="192.168.1.100/24"/>
        <propval type="astring" name="name" value="vnic1/v4"/>
        <propval type="astring" name="address_type" value="static"/>
      </property_group>
    </instance>
  </service>
  <service version="1" type="service" name="network/physical">
```

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```
<instance enabled="true" name="default">
    <property_group type="application" name="netcfg">
        <propval type="astring" name="active_ncp" value="DefaultFixed"/>
    </property_group>
</instance>
</service>
<service version="1" type="service" name="system/name-service/switch">
    <property_group type="application" name="config">
        <propval type="astring" name="default" value="files"/>
    </property_group>
    <instance enabled="true" name="default"/>
</service>
<service version="1" type="service" name="system/name-service/cache">
    <instance enabled="true" name="default"/>
</service>
<service version="1" type="service" name="system/keymap">
    <instance enabled="true" name="default">
        <property_group type="application" name="keymap">
            <propval type="astring" name="layout" value="US-English"/>
        </property_group>
    </instance>
</service>
<service version="1" type="service" name="system/timezone">
    <instance enabled="true" name="default">
        <property_group type="application" name="timezone">
            <propval type="astring" name="localtime" value="Asia/Kolkata"/>
        </property_group>
    </instance>
</service>
<service version="1" type="service" name="system/environment">
    <instance enabled="true" name="init">
        <property_group type="application" name="environment">
            <propval type="astring" name="LANG" value="en_US.UTF-8"/>
        </property_group>
    </instance>
</service>
...
...
root@s11-desktop:~# zoneadm -z grandmazone install -c
/opt/ora/data/gmconf/sc_profile.xml
The following ZFS file system(s) have been created:
    rpool/zones/grandmazone
Progress being logged to
/var/log/zones/zoneadm.20140804T033857Z.grandmazone.install
    Image: Preparing at /zones/grandmazone/root.

Install log: /system/volatile/install.3477/install_log
AI Manifest: /tmp/manifest.xml.wdaiXg
```

```
SC Profile: /opt/ora/data/gmconf/sc_profile.xml
Zonename: grandmazone
Installation: Starting ...

        Creating IPS image
Startup linked: 1/1 done
        Installing packages from:
                solaris
                    srcin: http://s11-server1.mydomain.com/
DOWNLOAD          PKGS      FILES  XFER (MB) SPEED
Completed       282/282    53274/53274 351.9/351.9 652k/s

PHASE           ITEMS
Installing new actions 71043/71043
Updating package state database Done
Updating package cache 0/0
Updating image state Done
Creating fast lookup database Done
Updating package cache 1/1

Note: Man pages can be obtained by installing
pkg:/system/manual

Done.

Done: Installation completed in 836.964 seconds.

Next Steps: Boot the zone, then log into the zone console
(zlogin -C)

        to complete the configuration process.

Log saved in non-global zone as
/zones/grandmazone/root/var/log/zones/zoneadm.20140804T033857Z.g
randmazone.install
root@s11-desktop:~#
```

The zone installation should take approximately 10 minutes.

11. Use the sysconfig command to create a system configuration profile for hoczone.

```
780t@s11:~# sysconfig create-profile -o \
```

When the system configuration tool appears, follow the directions on the screen and provide appropriate information from the following:

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- Computer name: choczone
- Ethernet network configuration: Manually
- Network Interface: vnic2
- IP Address: 192.168.1.200
- DNS: Do not configure DNS
- Alternate Name Service: None
- Time zone: *Use your local region.*
- Locale: *Use your local language.*
- Keyboard: *Use your region specific.*
- Root password: oracle1
- Your real name: oracle
- Username: oracle
- User password: oracle1
- Support Registration: *Accept the default.*
- Support Network Configuration: *Accept the default.*

After you have reviewed the information on the System Configuration Summary screen, select F2_Apply.

SC profile successfully generated as:
/opt/ora/data/chocconf/sc_profile.xml

Exiting System Configuration Tool. Log is available at:
/system/volatile/sysconfig/sysconfig.log.3566
root@s11-desktop:~#

root@s11-desktop:~# zoneadm -z choczone install -c \
/opt/ora/data/chocconf/sc_profile.xml

The zone installation should take approximately 10 minutes.

12. Using the sysconfig command, create a system configuration profile for QAzone.

```
root@s11-desktop:~# sysconfig create-profile -o \  
/opt/ora/data/QAzone
```

When the system configuration tool appears, follow the directions on the screen and provide appropriate information from the following:

- Computer name: QAzone
- Ethernet network configuration: Manually
- Network Interface: net0
- IP Address: 192.168.0.200
- DNS: Do not configure DNS
- Alternate Name Service: None

- Time zone: *Use your local region.*
- Locale: *Use your local language.*
- Keyboard: *Use your region specific.*
- Root password: oracle1
- Your real name: oracle
- Username: oracle
- User password: oracle1
- Support Registration:*Accept the default.*
- Support Network Configuration:*Accept the default.*

After you have reviewed the information on the System Configuration Summary screen, select F2_Apply.

SC profile successfully generated as:

```
/opt/ora/data/QAzone/sc_profile.xml
Exiting System Configuration Tool. Log is available at:
/system/volatile/sysconfig/sysconfig.log.4374
root@s11-desktop:~#
root@s11-desktop:~# zoneadm -z QAzone install -c \
/opt/ora/data/QAzone/sc_profile.xml
```

The zone installation should take approximately five minutes.

13. Show the results of the zone installations.

```
root@s11-desktop:~# zoneadm list -iv
 ID NAME      STATUS     PATH          BRAND    IP
  0 global    running   /
 - grandmazone  installed /zones/grandmazone  solaris  excl
 - choczone   installed /zones/choczone    solaris  excl
 - QAzone     installed /zones/QAzone     solaris  shared
```

All three zones are in the installed state.

14. Boot all zones and show the results.

```
root@s11-desktop:~# zoneadm -z grandmazone boot
root@s11-desktop:~# zoneadm -z choczone boot
root@s11-desktop:~# zoneadm -z QAzone boot
```

Note: For QAzone, you can ignore the warning message related to using the default subnet value of 255.255.255.0.

```
root@s11-desktop:~# zoneadm list -v
 ID NAME      STATUS     PATH          BRAND    IP
  0 global    running   /
  1 grandmazone  running  /zones/grandmazone  solaris  excl
```

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2 choczone	running	/zones/choczone	solaris	excl
3 QAzone	running	/zones/QAzone	solaris	shared

All three zones have an ID and are in the running state.

Practice 8-2: Determining an Oracle Solaris Zone's Configuration

Overview

In this practice, you work with an Oracle Solaris zone in the following activities:

- Examining the configuration of the current zones
- Determining the current zone resource utilization

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Use the zoneadm command to check the current zones on the system.

```
root@s11-desktop:~# zoneadm list -cv
  ID NAME      STATUS  PATH          BRAND IP
  0 global    running  /
  1 grandmazone running  /zones/grandmazone  solaris excl
  2 choczone   running  /zones/choczone    solaris excl
  3 QAzone     running  /zones/QAzone      solaris shared
```

Can you tell how many zones are running on the system? A total of four, including the global zone

Which zones are using a shared-IP? The global zone and QAzone

Which zone is using an exclusive (dedicated) network interface? The zones grandmazone and choczone

3. Use the zonecfg command to review the configuration of QAzone.

```
root@s11-desktop:~# zonecfg -z QAzone info
zonename: QAzone

zonepath: /zones/QAzone
brand: solaris
autoboot: true
autoshutdown: shutdown
bootargs:
file-mac-profile:
pool:
limitpriv:
scheduling-class:
ip-type: shared
hostid:
tenant:
fs-allowed:
[max-lwps: 500]
net:
  address: 192.168.0.200
  allowed-address not specified
  configure-allowed-address: true
```

```

physical: net0
defrouter not specified
rctl:
  name: zone.max-lwps
  value: (priv=privileged,limit=500,action=deny)

```

Observe the network interface configuration. Because the physical interface is shared with the global zone and specified in the zone configuration, the IP address is displayed here.

How many lwps (lightweight processes) are allowed to run in this zone? 500

- Log in to QAzone and check the following:

- Network configuration of the zone
- Host name
- OS release information
- Memory availability in the zone

```

root@s11-desktop:~# zlogin QAzone
[Connected to zone 'QAzone' pts/3]
Oracle Corporation      SunOS 5.11      11.2      June 2014

```

You are now logged in to QAzone.

Notes

- After issuing the following command, if nothing is displayed, wait a minute or two, and then repeat the command.
- If you receive a warning about no matching subnets found, you can ignore it.

```

root@QAzone:~# ipadm show-addr
ADDROBJ          TYPE        STATE        ADDR
lo0/?              inherited    ok           127.0.0.1/8
net0/?              inherited    ok           192.168.0.200/24
lo0/?              inherited    ok           ::1/128
root@QAzone:~# hostname
QAzone
root@QAzone:~# cat /etc/release
          Oracle Solaris 11.2 X86
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rights reserved.
Assembled 23 June 2014

```

Is the OS release information the same as the global zone? Yes

```

root@QAzone:~# prtconf | grep Mem
prtconf: devinfo facility not available

```

- Memory size: 2048 Megabytes
5. Exit the QAzone zone when you have finished inspecting its network configuration.

```
root@s11-desktop:~# exit
logout

[Connection to zone 'QAzone' pts/3 closed]
root@s11-desktop:~#
```

Note: Can you find the network interface and IP information for the QAzone zone? Yes. It is net0/? and it is configured with the 192.168.0.200 IP address.

6. Reboot QAzone to see any zone identification change. Log back in to the zone.

```
root@s11-desktop:~# zoneadm -z QAzone reboot
```

Note: If you receive a warning about no matching subnets found, you can ignore it.

```
root@s11-desktop:~# zoneadm list -v
ID NAME          STATUS     PATH                           BRAND    IP
 0 global        running   /
 1 grandmazone  running   /zones/grandmazone           solaris  excl
 2 choczone     running   /zones/choczone              solaris  excl
 4 QAzone        running   /zones/QAzone                solaris  shared
```

You are now in the new instance of QAzone. Note that the zone ID has been incremented.

```
root@s11-desktop:~# zlogin QAzone
[Connected to zone 'QAzone' pts/3]
Oracle Corporation      SunOS 5.11      11.2      June 2014
```

7. Examine the ZFS file systems that are available in the zone. When you have finished reviewing the data, exit QAzone.

```
root@QAzone:~# zpool list
NAME    SIZE  ALLOC   FREE    CAP  DEDUP  HEALTH  ALTROOT
rpool  39.5G  9.50G  30.0G   24%  1.00x  ONLINE  -
root@QAzone:~# zfs list
NAME                  USED  AVAIL  REFER  MOUNTPOINT
rpool                693M  29.3G  31K   /rpool
rpool/ROOT            692M  29.3G  31K   legacy
rpool/ROOT/solaris   692M  29.3G  648M  /
rpool/ROOT/solaris/var 39.5M  29.3G  38.6M  /var
rpool/VARSHARE        966K  29.3G  904K  /var/share
rpool/VARSHARE/pkg    63K   29.3G  32K   /var/share/pkg
rpool/VARSHARE/pkg/repositories 31K   29.3G  31K
/var/share/pkg/repositories
rpool/export          96.5K 29.3G  32K   /export
```

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```
rpool/export/home          64.5K 29.3G  32K /export/home
rpool/export/home/oracle    32.5K 29.3G 32.5K /export/home/oracle
root@QZone:~# exit
logout

[Connection to zone 'QZone' pts/4 closed]
```

Note that you have visibility to the root pool. What is the information about?

Details about the file systems /export and zone root (/)

- Halt QZone and boot it to check its status.

```
root@s11-desktop:~# zoneadm -z QZone halt
root@s11-desktop:~# zoneadm list -iv
  ID NAME      STATUS     PATH         BRAND    IP
  0 global    running    /
  1 grandmazone running   /zones/grandmazone  solaris  excl
  2 choczone   running   /zones/choczone    solaris  excl
  - QZone      installed  /zones/QZone      solaris  shared
```

Note that no zone ID is assigned to QZone, because it is halted.

```
root@s11-desktop:~# zoneadm -z QZone boot
```

Note: If you receive a warning about no matching subnets found, you can ignore it.

```
root@s11-desktop:~# zoneadm list -v
  ID NAME      STATUS     PATH         BRAND    IP
  0 global    running   /zones/grandma  solaris  shared
  3 choczone  running   /zones/choczone solaris  excl
  5 QZone      running   /zones/QZone    solaris  shared
```

After booting, QZone is moved to the running state and it has an ID.

- Review the configuration of the grandmazone zone.

```
root@s11-desktop:~# zonecfg -z grandmazone info | more
zonename: grandmazone
zonepath: /zones/grandmazone
brand: solaris
autoboot: true
autoshutdown: shutdown
bootargs:
file-mac-profile:
pool:
limitpriv:
scheduling-class:
```

```
ip-type: exclusive
hostid:
tenant:
fs-allowed:
net:
    address not specified
    allowed-address not specified
    configure-allowed-address: true
    physical: vnic1
    defrouter not specified

anet:
    linkname: net0
    lower-link: auto
    allowed-address not specified
    configure-allowed-address: true
    defrouter not specified
    allowed-dhcp-cids not specified
    link-protection: mac-nospoof
    mac-address: auto
    auto-mac-address: 2:8:20:90:80:8c
    mac-prefix not specified
    mac-slot not specified
    vlan-id not specified
    priority not specified
    rxrings not specified
    txrings not specified
    mtu not specified
    maxbw not specified
    rxfanout not specified
    vsi-typeid not specified
    vsi-vers not specified
    vsi-mgrid not specified
    etsbw-lcl not specified
    cos not specified
    pkey not specified
    linkmode not specified
    evs not specified
    vport not specified
```

Can you determine from this output whether the `grandmazone` zone is using a shared NIC or an exclusive NIC? *Exclusive NIC (as mentioned in the `ip-type` section)*

Note the net section. The physical NIC is defined as vnic1. This is an example of a virtual network interface created for the zone.

10. Review the configuration of the choczone zone.

```
root@s11-desktop:~# zonecfg -z choczone info | more
zonename: choczone
zonepath: /zones/choczone
brand: solaris
autoboot: true
autosshutdown: shutdown
bootargs:
file-mac-profile:
pool:
limitpriv:
scheduling-class:
ip-type: exclusive
hostid:
tenant
fs-allowed:
net:
    address not specified
    allowed-address not specified
    configure-allowed-address:true
    physical: vnic2
    defrouter not specified
anet:
    linkname: net0
    lower-link: auto
    allowed-address not specified
    configure-allowed-address: true
    defrouter not specified
    allowed-dhcp-cids not specified
    link-protection: mac-nospoof
    mac-address: auto
    auto-mac-address: 2:8:20:90:80:8c
    mac-prefix not specified
    mac-slot not specified
    vlan-id not specified
    priority not specified
    rxrings not specified
    txrings not specified
    mtu not specified
    maxbw not specified
```

```

rxfanout not specified
vsi-typeid not specified
vsi-vers not specified
vsi-mgrid not specified
etsbw-lcl not specified
cos not specified
pkey not specified
linkmode not specified
evs not specified
vport not specified

```

Can you determine from this output whether choczone is using a shared NIC or an exclusive NIC? *Exclusive NIC (as mentioned in the ip-type section)*

Note the net section. The physical NIC is defined as vnic2.

11. Examine the network configuration that is visible from the global zone.

```

root@s11-desktop:~# ipadm show-addr
ADDROBJ      TYPE     STATE      ADDR
lo0/v4        static   ok        127.0.0.1/8
lo0/zoneadmd-v4  static   ok        127.0.0.1/8
net0/v4        static   ok        192.168.0.111/24
net0/zoneadmd-v4  static   ok        192.168.0.200/24
net1/v4        static   ok        192.168.0.203/24
lo0/v6        static   ok        ::1/128
lo0/zoneadmd-v6  static   ok        ::1/128

```

In the global zone, no information is displayed about the links that you created. Why?
Because VNICs exist at the link level. They would be visible when you use the ladm commands as you did earlier.

Note the network interface name and the IP address for the QAZone zone. What is the name of the network interface created for the QAZone zone? *It is net0/? , which is a virtual interface to net0.*

Note that no vnic1 information is displayed for grandmazone because vnic1 is created at the datalink layer. You will be able to see this information from within the zone.

12. Log in to the grandmazone zone by using the zlogin command. Display the IP address by using the ipadm command. Exit grandmazone when you have finished.

```

root@s11-desktop:~# zlogin grandmazone
[Connected to zone 'grandmazone' pts/3]
Oracle Corporation SunOS 5.11       11.2       June 2014

```

Note: If nothing is displayed after you issue the preceding command, wait a minute or two, and then repeat the command.

```
root@grandmazone:~# ipadm show-addr
ADDROBJ          TYPE      STATE    ADDR
lo0/v4           static    ok       127.0.0.1/8
vnic1/v4         static    ok       192.168.1.100/24
lo0/v6           static    ok       ::1/128
vnic1/v6         addrconf  ok       fe80::8:20ff:fe0a:9710/10
```

Note the network interface name and the IP address for grandmazone. What is the name of the network interface that is created? It is vnic1/v4 with the IP address of

~~192.168.1.100.~~
This VNIC is part of the virtual network that is already created for this demonstration.

- From grandmazone, use the ping command to verify that the virtual network that connects grandmazone and choczone is operational.

```
root@grandmazone:~# ping 192.168.1.200
192.168.1.200 is alive
```

This demonstrates that you have connectivity with choczone because both zones are created on the same network.

- Exit to the global zone.

```
root@grandmazone:~# exit
logout

[Connection to zone 'grandmazone' pts/1 closed]
```

- Check the virtual network configuration in the choczone zone. It should be similar to grandmazone, except for the name of the network interface and the IP address.

- Check the connectivity to QZone from the global zone.

```
root@s11-desktop:~# ping 192.168.0.200
192.168.0.200 is alive

Success! You are able to connect to QZone from the global zone.
```

- Check the resource utilization of all the zones from the global zone by using the zonestat command to collect information during three intervals of five seconds each.

```
root@s11-desktop:~# zonestat -r summary 5 3
Collecting data for first interval...
Interval: 1, Duration: 0:00:05
SUMMARY          Cpus/Online: 2/2   PhysMem: 2047M  VirtMem: 3071M
                  ---CPU---  --PhysMem--  --VirtMem--  --PhysNet--
ZONE  USED %PART  USED %USED  USED %USED PBYTE %PUSE
[total]  0.21 10.6% 1323M 64.6% 1675M 54.5%  583 0.00%
[system]  0.06 3.05%  732M 35.7% 1003M 32.6%   -   -
global   0.14 7.34%  370M 18.0%  458M 14.9%  541 0.00%
QZone    0.00 0.08% 71.8M 3.50% 65.8M 2.14%   0 0.00%
```

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```

choczone 0.00 0.09% 75.0M 3.66% 74.4M 2.42% 0 0.00%
grandmazone 0.00 0.09% 73.9M 3.61% 72.6M 2.36% 42 0.00%
...
...
(Output truncated)
root@s11-desktop:~#

```

Here you see the total resource utilization of the system. Resource utilization is broken down by the individual zones and the system (general overhead). How much virtual memory is being used by the zone named grandmazone? 72.6M or 2.36% of the total

Which zone is using the most CPU? The global zone, which has 14.9% usage
Note: The output varies from system to system.

18. Check the per-zone statistics for the tmpfs and zfs file system types, for QAzone from the global zone by using the fsstat command:

```

root@s11-desktop:~# fsstat -A -z QAzone tmpfs zfs
      new name   name attr attr lookup rmdir  read read write write
      file remov chng  get   set   ops   ops bytes   ops bytes
      119K 117K 1.40K 1.21M 344 7.23M 190 2.54M 2.61G 2.03M 1.93G tmpfs
      33.8K 33.7K 35 334K 36 35.7K 4 795K 811M 642K 607M
tmpfs:QAzone
      452K 152K 434K 10.2M 472K 40.7M 97.3K 2.37M 5.11G 1.84M 5.85G zfs
      723 352 224 600K 131 1.32M 23.3K 334K 335M 23.6K 69.1M zfs:QAzone

```

Note: The output varies from system to system.

19. Check the per-zone statistics for the tmpfs and zfs file system types, for all the zones from the global zone by using the fsstat command:

```

root@s11-desktop:~# fsstat -A -Z tmpfs zfs
      new name   name attr attr lookup rmdir  read read write write
      file remov chng  get   set   ops   ops bytes   ops bytes
      119K 117K 1.41K 1.21M 344 7.23M 190 2.54M 2.61G 2.03M 1.93G tmpfs
      16.3K 15.2K 747 225K 220 7.12M 122 212K 232M 143K 149M tmpfs:global
      34.2K 33.8K 331 336K 44 38.4K 32 795K 810M 640K 604M tmpfs:grandmazone
      34.8K 34.5K 327 341K 44 39.0K 32 802K 817M 649K 613M tmpfs:choczone
      33.8K 33.7K 35 334K 36 35.7K 4 795K 811M 642K 607M tmpfs:QAzone
      452K 152K 434K 10.2M 472K 40.7M 97.3K 2.37M 5.11G 1.84M 5.85G zfs
      450K 151K 433K 8.37M 472K 36.7M 22.3K 1.33M 4.08G 1.76M 5.64G zfs:global
      840 428 261 639K 189 1.38M 25.8K 364K 361M 28.8K 73.8M zfs:grandmazone
      838 426 261 641K 185 1.39M 26.0K 365K 361M 28.8K 74.1M zfs:choczone
      723 352 224 600K 131 1.32M 23.3K 334K 335M 23.6K 69.1M zfs:QAzone

```

Note: The output varies from system to system.

20. Halt all three zones, uninstall them, and delete their configurations from the global zone.
 Confirm the results.

```

root@s11-desktop:~# zoneadm -z grandmazone halt
root@s11-desktop:~# zoneadm -z choczone halt

```

```
root@s11-desktop:~# zoneadm -z QAzone halt
```

Now, uninstall the zones. When the system prompts you for confirmation of zone uninstallation, indicate “y.”

```
root@s11-desktop:~# zoneadm -z grandmazone uninstall
root@s11-desktop:~# zoneadm -z choczone uninstall
root@s11-desktop:~# zoneadm -z QAzone uninstall
```

Now, delete the configuration of all the three zones from the global zone. When the

system prompts you for confirmation of zone deletion, indicate “y.”

```
root@s11-desktop:~# zonecfg -z grandmazone delete
root@s11-desktop:~# zonecfg -z choczone delete
root@s11-desktop:~# zonecfg -z QAzone delete
root@s11-desktop:~# zoneadm list -civ
```

ID	NAME	STATUS	PATH	BRAND	IP
0	global	running	/	solaris	shared

Only the global zone should be running now.

Practices for Lesson 9: Controlling Access to Systems and Files

Chapter 9

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Practices for Lesson 9

Practices Overview

In these practices, you are presented with a plan for controlling access to systems and files. In addition, these practices provide you experience in using Secure Shell. These practices cover the following activities:

- Controlling access to systems
- Controlling access to file systems
- Configuring and using Secure Shell

Scenario

Your company would like to evaluate the security functionality in Oracle Solaris 11. You are asked to explore access to the operating system and the file systems. In addition, you look at Secure Shell as the secure remote login method. Based on the nature of some business applications, you want to utilize this knowledge to configure security measures.

Now check your progress on the Test Activities' Checklist. You have completed working with the zones features.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI. Test the ZFS functionality of Oracle Solaris 11.
✓	Inspect the Oracle Solaris 11 network configuration.
✓	Inspect the Oracle Solaris 11 zones functionality.
	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

Practice 9-1: Controlling Access to Systems

Overview

In this practice, you work with monitoring user accounts, passwords, and the superuser. This practice includes the following activities:

- Securing logins and passwords
- Changing the password algorithm

Task 1: Securing Logins and Passwords

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
If the virtual machines are not running, start them now. Log in to the Sol11-Desktop virtual machine as the oracle user, and then assume the root role.

```
oracle@s11-desktop:~$ su -  
Password:  
Oracle Corporation          SunOS 5.11           11.2       June 2014  
root@s11-desktop:~#
```

2. Use the more command to check the default password aging policy that is defined in the /etc/default/passwd file.

```
root@s11-desktop:~# more /etc/default/passwd  
...  
...  
...  
#  
#  
MAXWEEKS=  
MINWEEKS=  
PASSLENGTH=6  
...  
...  
...
```

Note the default values of MAXWEEKS, MINWEEKS, and WARNWEEKS. Currently, they are all set to null. Refer to the lesson titled "Administering User Accounts" for definitions of these keywords. During the next step, add WARNWEEKS if it does not exist.

3. Use the pfedit command to modify MAXWEEKS, MINWEEKS, and WARNWEEKS to the values shown. Add the WARNWEEKS entry if it does not exist already.

```
root@s11-desktop:~# pfedit /etc/default/passwd  
...  
...  
...  
#  
#  
MAXWEEKS=10
```

```
MINWEEKS=8
WARNWEEKS=1
PASSLENGTH=6
...
...
...
```

4. Create an account for the new employee named Sandy Beach by using the useradd command, with the following attributes:

```
root@s11-desktop:~# useradd -u 1008 -g staff -d \
/export/home/sbeach -m -c "sandy beach" -s /bin/bash sbeach
80 blocks
root@s11-desktop:~# grep sbeach /etc/shadow
sbeach:UP:::::::
```

Note that sbeach's account is locked and no other information is populated. You learn more about creating user accounts in the lesson titled "Administering User Accounts."

5. Use the passwd command to create a password for sbeach. Review sbeach's password information in /etc/shadow.

```
root@s11-desktop:~# passwd sbeach
New Password: beach123
Re-enter new Password: beach123
passwd: password successfully changed for sbeach
root@s11-desktop:~# grep sbeach /etc/shadow
sbeach:$5$wRS0P8z2$sD50396mtPsHKo6bbUhLhx1wmtn.1BSEC7Co8JJmmmm.:1
6100:56:70:::
```

Now you see some password details. You know what 6100 is.

Note: Your output for this field may vary depending on when you create the user account.

What are the values 56, 70, and 7? Refer to your edits in /etc/default/passwd in step 3.

6. Use the logins command to inspect sbeach's login status.

```
root@s11-desktop:~# logins -x -l sbeach
sbeach      1008    staff        10    sandy beach
              /export/home/sbeach
              /bin/bash
              PS 102912 56 70 7
```

From a security perspective, you want to inspect the login details of one or more accounts. What does the PS line contain? Refer to the edits in step 3.

7. Use the `passwd` command to delete the password information for `sbeach`. Check the password status by using the `logins` command and the `/etc/shadow` file.

```
root@s11-desktop:~# passwd -d sbeach
passwd: password information changed for sbeach
```

This command deletes any password status recorded in the `/etc/shadow` file. Check whether there are any users whose password status information does not exist.

```
root@s11-desktop:~# logins -p
sbeach          1008      staff           10      sandy beach
root@s11-desktop:~# grep sbeach /etc/shadow
sbeach::16100:56:70:7:::
```

The `sbeach` account does not have a password, as displayed by the `-p` option of the `logins` command and verified by the contents of `/etc/shadow`.

Impact: Sandy will not be able to log in.

8. During a system maintenance window when you want to temporarily block any non-administrative users from logging in to the system, you can use the `init S` command to go into single-user mode. Switch to the `administrator` account by using the `init S` command. Then return to multiuser mode by using the `init 3` command.

```
root@s11-desktop:~# init S
svc.startd: The system is coming down for administration. Please
wait.

...
Enter user name for system maintenance (control-d to bypass):
root
Enter root password (control-d to bypass): oracle1
Single-user privilege assigned to root on /dev/console.
Entering System Maintenance Mode

Aug  3 01:13:44 su: 'su root' succeeded for root on /dev/console
Oracle Corporation      SunOS 5.11           11.2       June 2014
root@s11-desktop:~#
```

As you can see in the output, the `init S` command boots the system in single-user mode and only administrative users are allowed.

When you have finished performing your system administration tasks, you can enable general user login by issuing the `init 3` command, which returns the system to multiuser mode.

```
root@s11-desktop:~# init 3
After the system boots into multiuser mode, log in as the oracle user and open a
terminal window.
```

To verify that you are in multiuser mode, run the `who -r` command.

```
oracle@s11-desktop:~# who -r
.    run-level 3 Aug  3 21:46   3      1  S
```

In the output, you can see that the system is now in multiuser mode (run level 3).

9. In the Sol11-Server1 VM, create the `loginlog` file to monitor failed login attempts.

```
root@s11-server1:~# ls /var/adm/loginlog
/var/adm/loginlog: No such file or directory
root@s11-server1:~# touch /var/adm/loginlog
root@s11-server1:~# chmod 600 /var/adm/loginlog
root@s11-server1:~# chgrp sys /var/adm/loginlog
```

You created the `loginlog` file, changed the permissions for the owner to be able to read and edit the file, and changed the group to `sys`. These permissions and group assignment must be done so that the system can write to this file. You learn more about these permissions in the Practice 10-2 titled "Maintaining User Accounts."

10. You now test the functionality of the `loginlog` file by logging out completely, and then logging back in as the `jmoose` user five times with the wrong password. After the fifth failed login attempt, you log back in as the administrator and check the contents of the `/var/adm/loginlog` file.

```
root@s11-server1:~# exit
logout
oracle@s11-server1:~$ exit
logout
s11-server1 console login: jmoose
Password: [enter incorrect password]
Login incorrect
s11-server1 console login: jmoose
Password: [enter incorrect password]

<Repeat login steps with the incorrect password 3 more times>

Aug  3 22:09:30 s11-server1 login: REPEATED LOGIN FAILURES ON
dev/console, jmoose

s11-server1 console login:
```

As you see in the output, after five incorrect passwords, the system displays a `REPEATED LOGIN FAILURES` warning message, which means that now the system is writing to the `loginlog` file. Note that this will work only in a console window and will not work from the desktop login.

Now log in to the s11-server1 console by using oracle as the username and oracle1 as the password. Then usesu - to assume administrative privileges. After you are logged in, check the contents of the loginlog file.

```
root@s11-server1:~# cat /var/adm/loginlog
jmoose:/dev/console:Thu Aug  3 22:08:26 2014
jmoose:/dev/console:Thu Aug  3 22:08:43 2014
jmoose:/dev/console:Thu Aug  3 22:08:57 2014
jmoose:/dev/console:Thu Aug  3 22:09:06 2014
jmoose:/dev/console:Thu Aug  3 22:09:20 2014
```

11. Return to Sol11-Desktop. Now you configure the system to monitor all failed login attempts. You do this by modifying the /etc/default/login file as follows:

```
oracle@s11-desktop:~# su -
Password: oracle1
Oracle Corporation      SunOS5.11      11.2      June 2014
root@s11-desktop:~# pfedit /etc/default/login
...
...
...
SYSLOG=YES
...
...
...
#
#SYSLOG_FAILED_LOGINS=5
#SYSLOG_FAILED_LOGINS=0
...
...
...

```

You modify syslog_failed_logins to 0 so that these directives are enforced by the system.

```
root@s11-desktop:~# touch /var/adm/authlog
root@s11-desktop:~# chmod 600 /var/adm/authlog
root@s11-desktop:~# chgrp sys /var/adm/authlog
```

As you did with the loginlog file, you create the /var/adm/authlog file and grant appropriate permissions.

```
root@s11-desktop:~# cat /etc/syslog.conf | grep auth.notice
*.err;kern.notice;auth.notice          /dev/sysmsg
#auth.notice                           ifdef(`LOGHOST', /var/log/authlog, @loghost)
```

With the help of the `pfedit` command, add the `auth.notice` line with the `/var/adm/authlog` file so that the `syslogd` daemon can recognize this configuration and send notices to this destination.

Note: Use the Tab key to move the cursor to the correct space for the `/var/adm/authlog` entry.

```
root@s11-desktop:~# pfedit /etc/syslog.conf
...
...
auth.notice          /var/adm/authlog
#auth.notice        ifdef(`LOGHOST', /var/log/authlog,
@loghost)
...
...
:wq
root@s11-desktop:~# svcadm refresh system/system-log
```

Refresh the system log service to make the changes effective.

- Verify whether the failed login attempts are recorded in this file. Switch to the non-administrator account `jholt`, and then try to log in to the `jmoose` account with an incorrect password.

```
root@s11-desktop:~# su - jholt
Oracle Corporation      SunOS 5.11      11.2      June 2014
```

You must be a non-administrator user because if you `su` as an administrator user, the system will not prompt you for a password.

```
jholt@s11-desktop:~$ su - jmoose
Password: [enter incorrect password]
su: Sorry
jholt@s11-desktop:~$ exit
logout
root@s11-desktop:~# cat /var/adm/authlog
Aug  3 22:41:51 s11-desktop su: [ID 810491 auth.crit] 'su
jmoose' failed for oracle on /dev/pts/1
```

Do you see a message recorded in the `/var/adm/authlog` file for a failed login attempt? Yes, all the details are recorded

Task 2: Changing the Password Algorithm

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
If the virtual machines are not running, start them now. Log in to the Sol11-Desktop virtual machine as the oracle user, and then assume the root role.

```
oracle@s11-desktop:~$ su -  
Password:  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
root@s11-desktop:~#
```

2. Use the tail command to view the available password-encrypting algorithms in the /etc/security/crypt.conf file.

```
/etc/security/crypt.conf file.  
root@s11-desktop:~# tail /etc/security/crypt.conf  
#  
#ident      "%Z%%M%     %I%     %E% SMI"  
#  
# The algorithm name __unix__ is reserved.  
  
1   crypt_bsdmd5.so.1  
2a  crypt_bsdbf.so.1  
md5 crypt_sunmd5.so.1  
5   crypt_sha256.so.1  
6   crypt_sha512.so.1...
```

These are all the algorithms that are available for password encryption.

3. Use the pfedit command to comment out the current default entry and add another entry for CRYPT_DEFAULT=6.

```
root@s11-desktop:~# pfedit /etc/security/policy.conf  
root@s11-desktop:~# cat /etc/security/policy.conf | grep  
CRYPT_DEFAULT  
# and change CRYPT_DEFAULT= to another algorithm. For example,  
# CRYPT_DEFAULT=1 for BSD/Linux MD5.  
# the policy present in Solaris releases set  
#CRYPT_DEFAULT=__unix__,  
#CRYPT_DEFAULT=5  
CRYPT_DEFAULT=6
```

You modified the last entry

4. Inspect, and then change jholt's password to test the effects of the algorithm change in the previous step.

```
root@s11-desktop:~# grep jholt /etc/shadow  
jholt:$5$h1R9gHFn$AR7ALfuiGAJSb6jPFadjn3NQeaOsdr7HvLOCq1J74QB:16  
080:::::::
```

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In the password field, the second character informs you about the algorithm being used. Change jholt's password now that you have changed the algorithm in the previous step.

```
root@s11-desktop:~# passwd jholt
New Password: oracle1
Re-enter new Password: oracle1
passwd: password successfully changed for jholt
root@s11-desktop:~# grep jholt /etc/shadow
jholt:$5$1ZgUPkqe$2JBCy.WQA1KF1pUMNhA5oShifXOqly8mLXYSJHkG1yC:16
100:56:70:7:::
```

Looking at the first two characters of the encrypted passwords in the previous two password displays, did the encryption algorithm change? No, it still shows 5.
Did the password character string change? Yes

5. Use the passwd command to delete jholt's password and confirm its deletion. Again change the password and check the password contents in the /etc/shadow file.

```
root@s11-desktop:~# passwd -d jholt
passwd: password information changed for jholt
root@s11-desktop:~# grep jholt /etc/shadow
jholt:::16100:56:70:7:::
```

Does jholt have a password? No

```
root@s11-desktop:~# passwd jholt
New Password: Newpass1
Re-enter new Password: Newpass1
passwd: password successfully changed for jholt
root@s11-desktop:~# grep jholt /etc/shadow
jholt:$6$zr10uwdK$dLELWk3K815X3c0w393aDVy5hVYMc72aAMg1BFkfew1DTlCSz6fT
5/oOfYTccftnLw1shYvJt1Cy0N7aOKO7TTTask3.:16100:56:70:7:::
```

Did the encryption algorithm change this time? Yes
Why? Because there was no password and a new password was created. This time, the system utilized the new encryption algorithm that you specified.

6. Change the default encryption back to 5.

Practice 9-2: Controlling Access to File Systems

Overview

In this practice, you evaluate file permissions and any programs that pose a security risk, and inspect file access control. This practice includes the following activities:

- Protecting files with basic permissions
- Protecting programs with security risk

Task 1: Protecting Files with Basic Permissions

The following activities are included in this task:

- Displaying file permissions
- Changing file ownership
- Changing group membership
- Changing file permissions in symbolic mode
- Changing file permissions in absolute mode
- Setting special file permissions in absolute mode

1. Verify that the Sol11-Server1 virtual machine is running.
2. In the Sol11-Desktop virtual machine, log in as the `oracle` user, and then assume the `root` role.

```
oracle@s11-desktop:~$ su -
Password:
Oracle Corporation      SunOS 5.11      11.2      June 2014
root@s11-desktop:~#
```

3. Use the `ls -al` command to display the contents of the `/usr/sbin` directory.

```
root@s11-desktop:~# cd /usr/sbin
root@s11-desktop:/usr/sbin# ls -al | more
total 64974
drwxr-xr-x  4 root    bin          429 Jul 31 01:04 .
drwxr-xr-x 33 root    sys          45 Jul 31 23:30 ..
-r-xr-xr-x  1 root    bin        12772 Jun 24 21:20 6to4relay
lrwxrwxrwx  1 root    root        10 Jul 31 23:29 accept ->
cupsaccept
-r-xr-xr-x  1 root    bin        38436 Jul 31 21:17 acctadm
-r-xr-xr-x  2 root    sys        70512 Jun 24 21:19 add_drv
-r-xr-xr-x  1 root    bin        3126 Jun 24 21:21
addgnupghome
drwxr-xr-x  2 root    bin          37 Jun 24 23:29 amd64
-r-xr-xr-x  1 root    bin        2264 Jun 24 21:21
applygnupgdefaults
-r-xr-xr-x  1 root    bin        153 Jun 24 21:18 archiveadm
-r-xr-xr-x  1 root    bin        12660 Jun 24 21:20 arp
-r-xr-x---  1 root    bin        46589 Jun 24 21:20 asppp2pppd
```

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```
lrwxrwxrwx 1 root      root          27 Jun 24 23:29 asradm ->
./lib/fm/notify/asr-notify
...
...
root@s11-desktop:/usr/sbin# cd
root@s11-desktop:~#
```

Note: The output may vary from system to system.

As you learned in the lecture, this output displays the permissions on the subdirectories and files in the /usr/sbin directory.

What does x represent? It represents "execute."

4. Use the su command to switch to the jmoose account. Use the touch command to create a file called design. Confirm whether the file is created.

```
root@s11-desktop:~# su - jmoose
Oracle Corporation      SunOS 5.11      11.2      June 2014
jmoose@s11-desktop:~$ pwd
/export/home/jmoose
jmoose@s11-desktop:~$ touch design
jmoose@s11-desktop:~$ ls -l design
-rw-r--r--  1 jmoose  staff      0 Aug  3 23:48 design
jmoose@s11-desktop:~$
```

Can you tell who owns the new design file? The user jmoose owns the design file because it was created by jmoose.

5. Use the exit command to return to the administrator account and use the chown command to change the ownership of the design file from jmoose to jholt.

```
jmoose@s11-desktop:~$ exit
logout
root@s11-desktop:~# pwd
/root
root@s11-desktop:~# cd /export/home/jmoose
root@s11-desktop:/export/home/jmoose# chown jholt design
root@s11-desktop:/export/home/jmoose# ls -l design
-rw-r--r--  1 jholt  staff      0 Aug  3 23:48 design
```

What is the result of the chown command? The design file is owned by jholt now, and previously it was owned by jmoose.

6. Use the su command to switch to jmoose's account and try to edit the design file. This demonstrates the file ownership and permissions.

```
root@s11-desktop:/export/home/jmoose# su - jmoose
Oracle Corporation      SunOS 5.11      11.2      June 2014
jmoose@s11-desktop:~$ ls -l design
```

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```
-rw-r--r-- 1 jholt staff 0 Aug 3 23:48 design  
Can jmoose edit the design file that resides in the home directory? Test it by using  
pfedit.
```

```
jmoose@s11-desktop:~$ pfedit design  
pfedit: User jmoose is not authorized to edit the file  
/export/home/jmoose/design.
```

Because the file is now owned by jholt, the jmoose user cannot edit the file.

7. Return to the administrative account and check the available groups.

```
jmoose@s11-desktop:~$ exit  
logout  
root@s11-desktop:/export/home/jmoose# ls -l design  
-rw-r--r-- 1 jholt staff 0 Aug 3 23:48 design  
root@s11-desktop:/export/home/jmoose# groupadd -g 101 techgrp  
root@s11-desktop:/export/home/jmoose# tail /etc/group  
...  
...  
...  
pkg5srv::97:  
mlocate::95:  
vboxsf::100:  
techgrp::101:  
root@s11-desktop:/export/home/jmoose#
```

8. Use the chgrp command to change the group for the design file to techgrp. Confirm the change.

```
root@s11-desktop:/export/home/jmoose# chgrp techgrp design  
root@s11-desktop:/export/home/jmoose# ls -l design  
-rw-r--r-- 1 jholt techgrp 0 Aug 3 23:48 design  
root@s11-desktop:/export/home/jmoose#
```

Which group owns the design file now? *The techgrp group*

Option: As with the test of file ownership change, you may want to repeat those steps to test the access permissions of jmoose (not a member of the techgrp group).

Who has the execute permission? *Nobody*

9. Use the chmod command to change permissions in symbolic mode on the design file. Confirm the changes in permissions.

```
root@s11-desktop:/export/home/jmoose# chmod g+ws design  
-rw-rw-r-- 1 jholt techgrp 0 Aug 3 23:48 design
```

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What does the letterg represent in this context? It represents "group."

```
root@s11-desktop:/export/home/jmoose# chmod a+x design
root@s11-desktop:/export/home/jmoose# ls -l design
-rwxrwxr-x 1 jholt techgrp 0 Aug 3 23:48 design
```

Can you tell the result of the+ sign? Yes, it added the execute permission for the owner, group, and others.

```
root@s11-desktop:/export/home/jmoose# chmod o=rwx design
root@s11-desktop:/export/home/jmoose# ls -l design
-rwxrwxrwx 1 jholt techgrp 0 Aug 3 23:48 design
```

How did this option change the permission of others? The = sign substituted the new permissions.

10. Change permissions by using the chmod command in absolute mode. Confirm the changes in permissions.

```
root@s11-desktop:/export/home/jmoose# chmod 700 design
root@s11-desktop:/export/home/jmoose# ls -l design
-rwx----- 1 jholt techgrp 0 Aug 3 23:48 design
```

What permissions do techgrp and others have? None

```
root@s11-desktop:/export/home/jmoose# cd ..
```

Check the permissions on the jmoose directory.

```
root@s11-desktop:/export/home# ls -ld jmoose
drwxr-xr-x 2 jmoose staff 9 Aug 3 23:48 jmoose
root@s11-desktop:/export/home# chmod 754 jmoose
root@s11-desktop:/export/home# ls -ld jmoose
drwxr-xr-- 2 jmoose staff 9 Aug 3 23:48 jmoose
```

How did the 4 in 754 change the permissions on the directory? It changed the permissions to read-only.

11. Explore setting special file permissions in absolute mode. Create a new file called dbdesign in jmoose's account.

```
root@s11-desktop:/export/home# su - jmoose
Oracle Corporation SunOS 5.11 11.2 June 2014
jmoose@s11-desktop:~$ touch dbdesign
jmoose@s11-desktop:~$ ls -l dbdesign
-rw-r--r-- 1 jmoose staff 0 Aug 3 00:00 dbdesign
```

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```
jmoose@s11-desktop:~$ exit  
logout
```

12. Use the `chmod` command to set special permissions as indicated. Confirm the permissions.

```
root@s11-desktop:/export/home# cd jmoose  
root@s11-desktop:/export/home/jmoose# chmod 4555 dbdesign  
root@s11-desktop:/export/home/jmoose# ls -l dbdesign  
-r-sr-xr-x  1 jmoose  staff          0 Aug  3 00:05 dbdesign
```

In this case, you configured setuid permissions on `dbdesign` for `jmoose` (owner of the file). This special permission allows `jmoose` to gain the superuser privilege.

What digit in `chmod 4555` represents `s` in the owner's permission set? *Digit 4*

```
root@s11-desktop:/export/home/jmoose# chmod 2551 design  
root@s11-desktop:/export/home/jmoose# ls -l design  
-r-xr-s--x  1 jholt  techgrp        0 Aug  3 23:48 design
```

Similarly, you granted setgid permissions to `jholt`. In this case, the `techgrp` group members would be able to use the superuser privilege.

What does `2` represent in the `chmod` command? *It represents setgid, which is represented by `s` in the group permission set.*

```
root@s11-desktop:/export/home/jmoose# cd ..  
root@s11-desktop:/export/home# ls -ld jmoose  
drwxr-xr--  2 jmoose  staff          10 Aug  3 00:05 jmoose  
  
root@s11-desktop:/export/home# chmod 1777 jmoose  
root@s11-desktop:/export/home# ls -ld jmoose  
drwxrwxrwt  2 jmoose  staff          10 Aug  3 00:07 jmoose
```

Here you set the sticky bit on `jmoose`'s home directory. Because the directory contains critical files, no other user can delete the contents of this directory.

What represents the sticky bit in the display? *The letter `t` at the end of the permission sets*

```
root@s11-desktop:/export/home# cd
```

Task 2: Protecting Against Programs with Security Risk

The following activities are covered in this task:

- Finding files with special file permissions
- Disabling programs from using executable stacks

1. Use the `find` command to retrieve all files and directories with `setuid` turned ON. Use the `/var/tmp/suidrep` file to save the information.

```
root@s11-desktop:~# find / -perm -4000 -exec ls -ld {} \; > \
/var/tmp/suidrep
```

The preceding command might take a minute to execute. Ignore any messages related to `stat()`.

```
root@s11-desktop:~# more /var/tmp/suidrep | grep jmoose
-r-sr-xr-x  1 jmoose  staff          0 Aug  3 00:00
/export/home/jmoose/dbdesign
```

As part of a security check, you would like to inspect all the files and directories on the system with `setuid` permissions.

The `find` command here looks for permissions starting with 4 and as you know from the previous task, 4 represents `setuid`. Can you find the `dbdesign` file and its permission representation? *Yes, it is the s in the owner permission set.*

2. Modify the system directives in the `/etc/system` file so that the programs cannot execute with an executable stack.

```
root@s11-desktop:~# cp /etc/system /etc/system.src
```

Best practice: Always save a copy of the `/etc/system` file before making any changes to it.

```
root@s11-desktop:~# pfedit /etc/system
root@s11-desktop:~# cat /etc/system
...
...
*
*
*      set nautopush=32
*      set maxusers=40
*
*      To set a variable named 'debug' in the module named
'test_module'
*
*      set test_module:debug = 0x13

set noexec_user_stack=1
set noexec_user_stack_log=0
```

Modify the file to add the last two system directives.

This is an example of a security measure where programs should not request an executable stack in the first place.

```
root@s11-desktop:~# init 6
```

Reboot the system to make the configuration effective.

Practice 9-3: Configuring Secure Shell

Overview

In this practice, you work with Secure Shell configuration. This practice includes the following activities:

- Setting up host-based authentication
- Verifying host-based authentication for SSH
- Configuring SSH for public key authentication
- Using SSH with no password prompt

Task 1: Setting Up Host-Based Authentication

1. Verify that the Sol11-Server1 virtual machine is running.
2. Log in to the Sol11-Desktop virtual machine as the `oracle` user. Open two terminal windows.
3. In the first terminal window, run the `ssh` command to log in to the Sol11-Server1 VM from the Sol11-Desktop VM and assume the `root` role. Use `oracle1` as the password.

```
oracle@s11-desktop:~$ ssh oracle@192.168.0.100
Password: oracle1
Oracle Corporation      SunOS 5.11      11.2       June 2014
```

Note: For any RSA key-related message, type `yes`.

```
oracle@s11-server1:~# su -
Password: oracle1
Oracle Corporation      SunOS 5.11      11.2       June 2014
root@s11-server1:~#
```

4. In the second terminal window, run the `su -` command to log in as the `root` user and use `oracle1` as the password.

```
oracle@s11-desktop:~$ su -
Password: oracle1
Oracle Corporation      SunOS 5.11      11.2       June 2014
root@s11-desktop:~#
```

On the SSH Server Machine (s11-server1)

5. Enable host-based authentication by adding the following entries:

```
root@s11-server1:~# pfedit /etc/ssh/sshd_config
...
...
HostBasedAuthentication yes
:wq
root@s11-server1:~# cat /etc/ssh/sshd_config | grep \
HostBasedAuthentication
HostBasedAuthentication yes
```

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6. Add the SSH client's (s11-desktop) hostname in the /etc/ssh/shosts.equiv file.

```
root@s11-server1:~# pfedit /etc/ssh/shosts.equiv
s11-desktop
~
~
:wq
root@s11-server1:~# cat /etc/ssh/shosts.equiv
s11-desktop
```

If the /etc/ssh/shosts.equiv file does not yet exist, create it with the information specified in the preceding lines. Note that on s11-server1, this file should have only an s11-desktop entry.

7. Copy the SSH client's public key to the /etc/ssh/ssh_known_hosts file.

```
root@s11-server1:~# scp oracle@s11-
desktop:/etc/ssh/ssh_host_rsa_key.pub /var/tmp
Password: oracle1
ssh_host_rsa_key.pub 100% |*****| 398      00:00
```

If an RSA-related message is displayed, type yes and proceed to log in. When prompted for a password, provide the password of the oracle user.

```
root@s11-server1:~# cat /var/tmp/ssh_host_rsa_key.pub >>
/etc/ssh/ssh_known_hosts
root@s11-server1:~# cat /etc/ssh/ssh_known_hosts
ssh-rsa
AAAAB3NzaC1yc2EAAAQABiWAAAQEAwg5FUtUUv89zYyuxGt35dBEZP6ENkdbkxi0r
MG0ij7Oif+FL3o+g0leZGoIf7iuQ7Q/cudTOk2wKV6oXa8Mai0mehufzFRivf5Oj
7PlC1j9qFgh+1/MBmzHa417DScacjTENqLJ3P/308ifBoeLMBxz146vaNcXQVAvL
K35Vh9GojnJHJj/VOVYqpPH8113VC3KBbPmBkItlu2MjSOzC8faT/4EW7kGmggvw
ihIk4SF2bWdo8TuVm0FbISE50guj71fyW+doJSnkKNWUo266CGpD2GVKNbtPOEZL
UHDh8nGTk8qvRneu/KIrcbL8J/cZYJrZNp0Q+3pXnFQ63ULy8w==root@s11-
desktop
```

8. Add the SSH client's host name as the first field in the copied entry in the /etc/ssh/ssh_known_hosts file.

```
s11-desktop <copied entry>
```

9. Restart the ssh service to make the changes effective.

```
root@s11-server1:~# svcadm restart ssh
```

On the SSH Client Machine (s11-desktop)

10. Enable host-based authentication by adding the following entry in the /etc/ssh/ssh_config file.

```
HostBasedAuthentication yes
```

On Both the SSH Server and SSH Client Machine

11. Use the `grep` command to verify that the `jholt` account is available on the Sol11-Server1 and Sol11-Desktop virtual machines

```
root@s11-server1:~# getent passwd | grep jholt
jholt:x:60005:10:john holt:/export/home/jholt:/bin/bash
root@s11-desktop:~# getent passwd | grep jholt
jholt:x:60005:10:john holt:/export/home/jholt:/bin/bash
```

Task 2: Verifying Host-based Authentication for SSH

You can verify host-based authentication for SSH by trying to gain secure shell access to the Sol11-Server1 virtual machine as the `jholt` user.

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Open the third terminal window and use the `su` command to switch to the `jholt` user.

```
oracle@s11-desktop:~# su -
Password: oracle1
root@s11-desktop:~# su - jholt
Oracle Corporation      SunOS 5.11          11.2       June 2014
jholt@s11-desktop:~$
```

3. As the `jholt` user, use the `ssh` command to remotely log in to the Sol11-Server1 VM.

```
jholt@s11-desktop:~$ ssh s11-server1
The authenticity of host 's11-server1 (192.168.0.100)' can't be
established. RSA key fingerprint is
38:d3:8a:bb:be:d4:b8:93:08:7a:b5:99:5d:7f:04:40.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 's11-server1,192.168.0.100' (RSA) to
the list of known hosts.

Password: oracle1
Last login: Aug  4 08:17:26 2014 from s11-desktop.myd
Oracle Corporation SunOS 5.11          11.2       June 2014
jholt@s11-server1:~$
```

4. Exit the `jholt` user to return to Sol11-Desktop

```
jholt@s11-server1:~$ exit
Connection to s11-server1 closed.
jholt@s11-desktop:~$ exit
logout
oracle@s11-desktop:~#
```

Note: Disable host-based authentication on both the Sol11-Server1 and Sol11-Desktop machines before proceeding to the next task. Remove the entry made in the `/etc/ssh/hosts.equiv` file. Remove the host name that was added as the first field in `/etc/ssh/ssh_known_hosts`.

```
root@s11-server1:~# grep HostBasedAuthentication \
/etc/ssh/sshd_config
HostBasedAuthentication no
root@s11-server1:~# svcadm restart ssh
```

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```
root@s11-desktop:~# grep HostBasedAuthentication  
/etc/ssh/ssh_config  
HostBasedAuthentication no  
root@s11-server1:~# exit  
logout  
oracle@s11-server1:~#
```

5. Close the third terminal window.

Task 3: Configuring SSH for Public Key Authentication

The following activities are covered in this task:

- Configuring the private/public keys
 - Copying the public key onto the remote host (server)
 - Verifying Secure Shell (SSH) access
1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
 2. In Sol11-Server1, use the `su` command to switch to the `jholt` account. Use `oracle1` as the password.

```
oracle@s11-server1:~# su - jholt  
Password: oracle1  
jholt@s11-server1:~$  
Oracle Corporation          SunOS 5.11           11.2       June 2014
```

During SSH configuration for `jholt`, you will be moving back and forth between Sol11-Server1 and Sol11-Desktop. If you need to know which VM you are on, check the command prompt. In this example, it is the Sol11-Server1 machine. Alternatively, use the `hostname` command.

3. Create the `rsa` pair of public and private keys on your system.

```
jholt@s11-server1:~$ ssh-keygen -t rsa  
Generating public/private rsa key pair.  
Enter file in which to save the key  
(/export/home/jholt/.ssh/id_rsa): <Press Enter Key>  
Created directory '/export/home/jholt/.ssh'.  
Enter passphrase (empty for no passphrase): passphrase  
Enter same passphrase again: passphrase  
Your identification has been saved in  
/export/home/jholt/.ssh/id_rsa.  
Your public key has been saved in  
/export/home/jholt/.ssh/id_rsa.pub.  
The key fingerprint is:  
b6:87:0f:52:4a:af:a6:9c:28:b1:b9:db:4b:fe:9d:ed jholt@s11-  
server1  
jholt@s11-server1:~$ ls .ssh  
id_rsa  id_rsa.pub
```

You created the rsa private/public key pair to be used by ssh.
Can you find these keys? Yes, they are in the .ssh directory.

4. Copy your rsa public key to the remote system and store it in jholt's .ssh directory.

```
jholt@s11-server1:~$ scp .ssh/id_rsa.pub jholt@s11- \
desktop:id_rsa.pub
```

Note: Type yes for any RSA-related message.

```
Password: Newpass1
id_rsa.pub      100% |*****|   399      00:00
jholt@s11-server1:~$ ssh s11-desktop
Password: Newpass1
Last login: Mon Aug  4 18:34:41 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11      11.2      June 2014
jholt@s11-desktop:~$ ls
id_rsa.pub    ...
jholt@s11-desktop:~$ mkdir -p .ssh
jholt@s11-desktop:~$ cat ./id_rsa.pub >> .ssh/authorized_keys
jholt@s11-desktop:~$ rm ./id_rsa.pub
```

.pub means that it is the public key and it must be placed in the .ssh/authorized_keys file. This public key will be used by the Sol11-Desktop host to authenticate your incoming ssh connection.

5. Exit Sol11-Desktop and log back in by using the ssh command to see the rsa prompt.

```
jholt@s11-desktop:~$ exit
logout
Connection to s11-desktop closed.
jholt@s11-server1:~$ ssh s11-desktop
Enter passphrase for key '/export/home/jholt/.ssh/id_rsa':
passphrase
Last login: Mon Aug  4 18:36:23 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11      11.2      June 2014
jholt@s11-desktop:~$ exit
logout
Connection to s11-desktop closed.
```

This demonstrates that your rsa public key is functioning. It is supposed to ask you for the passphrase that you specified when you created the rsa key.

6. Repeat Steps 3–6 for the dsa pair of the private/public keys. These steps are listed here as a reminder.

```
jholt@s11-server1:~$ ssh-keygen -t dsa
Generating public/private dsa key pair.
```

```
Enter file in which to save the key
(/export/home/jholt/.ssh/id_dsa): <Press Enter Key>
Enter passphrase (empty for no passphrase): passphrase
Enter same passphrase again: passphrase
Your identification has been saved in
/export/home/jholt/.ssh/id_dsa.
Your public key has been saved in
/export/home/jholt/.ssh/id_dsa.pub.
The key fingerprint is:
db:e4:3e:50:19:cd:b2:85:bf:b6:ea:d7:25:81:c2:f2 jholt@s11-
server1
jholt@s11-server1:~$ scp ./ssh/id_dsa.pub jholt@s11-
desktop:id_dsa.pub
Enter passphrase for key '/export/home/jholt/.ssh/id_rsa':
passphrase
id_dsa.pub      100% |*****| 607
00:00
jholt@s11-server1:~$ ssh s11-desktop
Enter passphrase for key '/home/jholt/.ssh/id_rsa': passphrase
Last login: Mon Aug  4 18:44:25 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11          11.2       June 2014
jholt@s11-desktop:~$ ls
id_dsa.pub ...
jholt@s11-desktop:~$ cat ./id_dsa.pub >> .ssh/authorized_keys
jholt@s11-desktop:~$ rm ./id_dsa.pub
jholt@s11-desktop:~$ exit
Connection to s11-desktop closed.
```

Currently, you have created the RSA and DSA pairs of keys. The private keys are on your Sol11-Server1 system and the public keys have been transmitted and stored on the remote system for authentication.

7. Use the ssh command to log in to the Sol11-Desktop machine. When prompted for the RSA key passphrase, do not supply the value. Just press the Enter key, but provide the password for the DSA key prompt.

```
jholt@s11-server1:~$ ssh s11-desktop
Enter passphrase for key '/export/home/jholt/.ssh/id_rsa': Press
Enter Key
Enter passphrase for key '/export/home/jholt/.ssh/id_dsa':
passphrase
Last login: Mon Aug  4 18:46:03 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11          11.2       June 2014
jholt@s11-desktop:~$ exit
logout
Connection to s11-desktop is closed.
```

You exited from the ssh session to start the next task clean.

```
jholt@s11-server1:~$ exit  
logout  
oracle@s11-server1:~#
```

Now when you ssh to Sol11-Desktop, you are prompted for the rsa and the dsa passphrases.

Now you know that users can create their own ssh authentication keys and manage the authentication process by using passphrases.

Task 4: Using SSH with the No Password Prompt

The following activities are covered in this task:

- Bringing up ssh-agent
- Exploring the capability of ssh-agent
- Deleting the in-use keys
- Adding to the agent
- Verifying that a password is no longer needed

1. Verify that the Sol11-Server1 and Sol11-Desktop virtualmachines are running.
2. Use the su command to switch to the jholt account. Use oracle1 as the password.

```
oracle@s11-server1:~$ su - jholt  
Password: oracle1  
Oracle Corporation          SunOS 5.11      11.2       June 2014
```

3. Use the ssh-agent command to launch a new shell for no-password prompt configuration.

```
jholt@s11-server1:~$ ssh-agent bash  
jholt@s11-server1:~$ ps  
 PID TTY          TIME CMD  
 7678 pts/1        0:00 ps  
 7680 pts/1        0:00 bash  
 7674 pts/1        0:00 bash
```

How can you tell that the new bash shell was just launched for ssh-agent? The most recent PID is bash (except the echo of the ps command). PID 7680 is the most recent meaningful PID, which launched the bash shell.

4. Verify that ssh-agent is up and running.

```
jholt@s11-server1:~$ ps -ef | grep ssh-  
jholt  7679  7678  0 20:10:27 ?          0:00 ssh-agent bash  
  
jholt@s11-server1:~$ env | grep SSH  
SSH_AGENT_PID=7679  
SSH_AUTH_SOCK=/tmp/ssh-XXXXJqaWVf/agent.7678
```

Yes, it is up and running. Its environmental variables are also populated.

```
jholt@s11-server1:~$ ssh-add --?
ssh-add: illegal option -- ?
Usage: ssh-add [options]
Options:
 -l          List fingerprints of all identities.
 -L          List public key parameters of all identities.
 -d          Delete identity.
 -D          Delete all identities.
 -x          Lock agent.
 -X          Unlock agent.
 -t life     Set lifetime (seconds) when adding identities.
```

One way to display the available valid options is to specify an invalid option. You use some of these options in the subsequent steps.

- Using the ssh-add command, add two identities (rsa and dsa) to the authentication agent.

```
jholt@s11-server1:~$ ssh-add
Enter passphrase for /export/home/jholt/.ssh/id_rsa: passphrase
Identity added: /export/home/jholt/.ssh/id_rsa
(/export/home/jholt/.ssh/id_rsa)
Identity added: /export/home/jholt/.ssh/id_dsa
(/export/home/jholt/.ssh/id_dsa)
jholt@s11-server1:~$ ssh-add -l
2048 14:b0:17:4e:dd:68:ae:58:53:b3:f1:3d:94:3b:d4:a5
/export/home/jholt/.ssh/id_rsa (RSA)
1024 65:0e:3a:69:ff:b4:ef:2a:ce:c1:fa:1f:34:fa:ad:3d
/export/home/jholt/.ssh/id_dsa (DSA)
```

By listing the identities, you can confirm whether they are available with the authentication agent.

```
jholt@s11-server1:~$ ssh-add -D
All identities removed.
```

This is how you can delete the identities.

- Explore a few more options of ssh-add. Then add them back by using ssh-add.

```
jholt@s11-server1:~$ ssh-add -t 60
Enter passphrase for /export/home/jholt/.ssh/id_rsa: passphrase
Identity added: /export/home/jholt/.ssh/id_rsa
(/export/home/jholt/.ssh/id_rsa)
Lifetime set to 60 seconds
```

```
Identity added: /export/home/jholt/.ssh/id_dsa
(/export/home/jholt/.ssh/id_dsa)
Lifetime set to 60 seconds
```

Wait for 60 seconds before trying the next command. Because you specified 60 seconds as the lifetime for the identities, you must wait until they expire.

```
jholt@s11-server1:~$ ssh-add -l
The agent has no identities.
jholt@s11-server1:~$ ssh-add
Enter passphrase for /export/home/jholt/.ssh/id_rsa: passphrase
Identity added: /export/home/jholt/.ssh/id_rsa
(/export/home/jholt/.ssh/id_rsa)
Identity added: /export/home/jholt/.ssh/id_dsa
(/export/home/jholt/.ssh/id_dsa)
```

7. Verify that you can connect to s11-desktop by using the ssh command without a password prompt.

```
jholt@s11-server1:~$ ssh s11-desktop
Last login: Mon Aug  4 18:54:57 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11      11.2      June 2014
jholt@s11-desktop:~$ exit
logout
Connection to s11-desktop closed.
```

Yes, you can. Note that no password prompt is displayed. This also saves you time.

8. Use the ssh-add command to lock the authentication agent.

```
jholt@s11-server1:~$ ssh-add -x
Enter lock password: password
Again: password
Agent locked.
jholt@s11-server1:~$ ssh s11-desktop
Enter passphrase for key '/export/home/jholt/.ssh/id_rsa': passphrase
Last login: Mon Aug  4 20:19:37 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11      11.2      June 2014
```

Because the agent is locked, you are prompted for a passphrase.

```
jholt@s11-desktop:~$ exit
logout
Connection to s11-desktop closed.
jholt@s11-server1:~$ ssh-add -x
Enter lock password: password
```

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Agent unlocked.

By unlocking, you go back to the no-password/passphrase prompt.

```
jholt@s11-server1:~$ ssh s11-desktop
Last login: Mon Aug  4 21:22:40 2014 from s11-server1.myd
Oracle Corporation      SunOS 5.11      11.2      June 2014
jholt@s11-desktop:~$ exit
Connection to s11-desktop closed.
jholt@s11-server1:~$ exit
logout
jholt@s11-server1:~$ exit
logout
oracle@s11-server1:~# exit
logout
oracle@s11-desktop:~$
```

This completes the ssh configuration and its usage.

Practices for Lesson 10: Administering User Accounts

Chapter 10

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Practices for Lesson 10: Administering User Accounts

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Practices for Lesson 10

Practices Overview

In these practices, you are presented with a plan for setting up and administering user accounts. In addition, these practices provide you experience in working with the initialization files that are used to customize your environment. The following activities are covered:

- Setting up user accounts
- Maintaining user accounts
- Managing the site and user initialization files
- Exploring shell metacharacters and user quotas

Scenario

Your company would like to evaluate the user account functionality in Oracle Solaris 11. You are asked to create and manage new accounts. Two new employees have joined the IT department and you are asked to create accounts for them. Based on corporate conventions and personal preference, you modify their account attributes. Finally, you customize their environments to assist them with their preferences. You work with the two new groups listed in Table 10-1. Then you create and manage the two accounts as listed in Table 10-2.

Table 10-1: Group Specifications

Group Name	Group ID
support	110
itgroup	120

Table 10-2: User Specifications

User Account Name	Password	Shell	User ID	Primary Group	Secondary Group	Comments
dkumar	Mypass1	default	1002	support	itgroup	Undefined password
tshane	Mypass1 Newpass1	korn	1005	support		Set password at next login.

Now check your progress in the Test Activities' Checklist. You have completed setting up system and file system access controls.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
✓	Test the ZFS functionality of Oracle Solaris 11.
✓	Inspect the Oracle Solaris 11 network configuration.
✓	Inspect the Oracle Solaris 11 zones functionality.
✓	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

Practice 10-1: Setting Up User Accounts

Overview

In this practice, you create the new user accounts, work with their passwords, and verify the account attributes in the site-wide initialization files. This practice includes the following activities:

- Setting account defaults
- Adding a group
- Adding a user
- Mounting the user's home directory
- Setting a password to expire immediately
- Verifying the user account setup

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running. If the virtual machines are not running, start them now.
2. Close all the terminals and open a new terminal window in the Sol11-Desktop VM. Log in as the oracle user, and then assume primary administrator privileges.

```
oracle@s11-desktop:~$ su -  
Password:  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
root@s11-desktop:~#
```

3. Check whether the accounts default file exists. If it does not, create the account defaults by using the useradd -D command.

```
root@s11-desktop:~# ls /usr/sadm/defadduser  
/usr/sadm/defadduser: No such file or directory  
root@s11-desktop:~# useradd -D  
group=staff,10 project=default,3 basedir=/export/home  
skel=/etc/skel shell=/usr/bin/bash inactive=0  
expire= auths= profiles= roles= limitpriv=  
defaultpriv= lock_after_retries=
```

4. Modify the value of defshell to /bin/ksh. Display the current account defaults by using the useradd -D command.

The purpose of this step is to demonstrate to you that these defaults can be changed for the new users that you create.

```
root@s11-desktop:~# useradd -D -s /bin/ksh  
group=staff,10 project=default,3 basedir=/export/home  
skel=/etc/skel shell=/bin/ksh inactive=0  
expire= auths= profiles= roles= limitpriv=  
defaultpriv= lock_after_retries=
```

Can you tell what the previously available default shell was? It was /usr/bin/bash

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Practices for Lesson 10: Administering User Accounts

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5. Because the bash shell is more popular, useful, and feature-rich, by using the following commands, change the default shell value back to bash. The preceding steps were shown for demonstration purposes.

```
root@s11-desktop:~# useradd -D -s /usr/bin/bash
group=staff,10 project=default,3 basedir=/export/home
skel=/etc/skel shell=/usr/bin/bash inactive=0
expire= auths= profiles= roles= limitpriv=
defaultpriv= lock_after_retries=
```

6. Create the groups called support and itgroup according to the specifications.

```
root@s11-desktop:~# groupadd -g 110 support
root@s11-desktop:~# groupadd -g 120 itgroup
root@s11-desktop:~# grep support /etc/group
support::110:
root@s11-desktop:~# grep itgroup /etc/group
itgroup::120:
```

As you learned in the lecture for this lesson, the groups are added in /etc/group.

7. Now you are ready to create the users dkumar and tshane. Use the useradd command and specify the user attributes listed in the specifications.

```
root@s11-desktop:~# useradd -u 1002 -g support -G itgroup \
-d /export/home/dkumar -m -c "dileep kumar" dkumar
80 blocks
root@s11-desktop:~# useradd -u 1005 -g support \
-d /export/home/tshane -m -c "tom shane" -s /bin/ksh tshane
80 blocks
```

What shell is assigned to dkumar? *The default bash shell*

How do you know? *From the output of the command useradd -D (after you set it back to bash) in step 6*

8. Verify the creation of the dkumar and tshane users in the passwd database.

```
root@s11-desktop:~# getent passwd | grep dkumar
dkumar:x:1002:110:dileep kumar:/export/home/dkumar:/usr/bin/bash
root@s11-desktop:~# getent passwd | grep tshane
tshane:x:1005:110:tom shane:/export/home/tshane:/bin/ksh
```

Based on what you learned in the lecture, can you determine what these fields represent for each user? Yes

9. Check whether the new users have entries in /etc/shadow. Then create new passwords for the users based on the specifications provided at the beginning of this practice.

```
root@s11-desktop:~# grep dkumar /etc/shadow
dkumar:UP:::::::
root@s11-desktop:~# grep tshane /etc/shadow
tshane:UP:::::::
```

Note that when a new user is created, the account is flagged with UP for “undefined password.”

```
root@s11-desktop:~# passwd dkumar
New Password: Mypass1
Re-enter new Password: Mypass1
passwd: password successfully changed for dkumar

root@s11-desktop:~# passwd tshane
New Password: Mypass1
Re-enter new Password: Mypass1
passwd: password successfully changed for tshane
```

Check how the password entries for these users have changed in /etc/shadow.

```
root@s11-desktop:~# grep dkumar /etc/shadow
dkumar:$5$RYBDNHP.$.2h0B65AAxeeZ7g6zXx1IFNv2oOVNf.wl29u38yngkA:1
6101:56:70:7:::
root@s11-desktop:~# grep tshane /etc/shadow
tshane:$5$wdt.dnTS$JHlRzzI4k8s30CxJ69dfNkfhc6jakL8ejTM3roceDi5:1
6101:56:70:7:::
```

Now you see valid information for the users. One field is 6101 for both users. What does it represent? It represents the date that the password was last modified, which is recorded as the number of days from January 1, 1970, to the modification date.

10. Check the group membership for the users.

```
root@s11-desktop:~# getent group | grep support
support:110:
root@s11-desktop:~# getent group | grep itgroup
itgroup:120:dkumar
```

Looking at these displays, note that dkumar appears in itgroup, which was the secondary group that you specified for dkumar (or tshane for that matter) with the command usermod -G itgroup dkumar (or tshane). Where can you find an entry that associates dkumar (or tshane for that matter) with the primary group? Refer to step 8 for the answer.

```
root@s11-desktop:~# id -G dkumar
110 120
root@s11-desktop:~# id -G tshane
110
```

Here you can see very clearly the primary groups and the secondary groups (if any).

11. Using the zfs list command, verify the home directories of the new users.

```
root@s11-desktop:~# zfs list -r /rpool
NAME          USED  AVAIL  REFER  MOUNTPOINT
rpool          7.30G  31.6G  4.97M  /rpool
rpool/ROOT      5.08G  31.6G  31K    legacy
rpool/ROOT/solaris   5.08G  31.6G  4.14G  /
rpool/ROOT/solaris/var  894M  31.6G  708M  /var
rpool/VARSHARE     160K  31.6G  97.5K  /var/share
rpool/VARSHARE/pkg  63K   31.6G  32K   /var/share/pkg
rpool/VARSHARE/pkg/repositories  31K   31.6G  31K
/var/share/pkg/repositories
rpool/dump        1.03G  31.6G  1.00G  -
rpool/export      150M  31.6G  32K   /export
rpool/export/home  150M  31.6G  41K   /export/home
rpool/export/home/dkumar  35K   31.6G  35K   /export/home/dkumar
rpool/export/home/jholt  38.5K  31.6G  38.5K  /export/home/jholt
rpool/export/home/jmooose  760K  31.6G  760K  /export/home/jmooose
rpool/export/home/oracle  149M  31.6G  149M  /export/home/oracle
rpool/export/home/panna  35K   31.6G  35K   /export/home/panna
rpool/export/home/sbeach  35K   31.6G  35K   /export/home/sbeach
rpool/export/home/sstudent  35K   31.6G  35K   /export/home/sstudent
rpool/export/home/tshane  35K   31.6G  35K   /export/home/tshane
rpool/swap         1.03G  31.6G  1.00G  -
rpool/zones        31K   31.6G  31K   /zones
```

Note: These ZFS file systems (directories) were created for you automatically when you created the users.

12. Expire tshane's password. Due to this, on the next login tshane is forced to create a new password.

```
root@s11-desktop:~# passwd -f tshane
passwd: password information changed for tshane
```

The passwd command is the main command to manage passwords. Here, the **f** option is used to expire tshane's password. Check the impact of this command on the contents of the /etc/shadow file.

```
root@s11-desktop:~# grep tshane /etc/shadow
tshane:$5$ijM6uDL8$1C28YFeERBKOFkA.eE3JCJEjLKkp4r.HBdGqiA7Ql96:0
:56:70:7:::
```

Can you tell what information was changed in /etc/shadow? Yes, the "last change" date. It is set to zero, indicating that the password has expired.

Confirm it.

```
root@s11-desktop:~# su - oracle
Oracle Corporation      SunOS 5.11      11.2      June 2014
```

Note: If you try to log in to the tshane account as an administrator user, you are not prompted for a password. Therefore, you must first switch to a non-administrator user, that is, oracle.

Use the passwords listed in the specifications at the beginning of the practice.

```
oracle@s11-desktop:~$ su - tshane
Password: Mypass1
su: Password for user 'tshane' has expired
New Password: Newpass1
Re-enter new Password: Newpass1
su: password successfully changed for tshane
Oracle Corporation      SunOS 5.11      11.2      June 2014
tshane@s11-desktop:~$
```

Switch back to the oracle user and assume administrator privileges.

```
tshane@s11-desktop:~$ exit
oracle@s11-desktop:~$ exit
logout
root@s11-desktop:~#
```

How can you tell if tshane's password expired on the first login? By examining the first system message after login (for example, by using the `last` command, which is similar to logging in)

```
root@s11-desktop:~# grep tshane /etc/shadow
tshane:$5$w8ImUQGq$Rg2r0hYGMJrae1KhcvTyIntGir5faWw6C5ddEzefW1:1
6101:56:70:7:::
root@s11-desktop:~#
```

Do you see any change in tshane's entry in /etc/shadow? Yes. The "last change" date is modified

Practice 10-2: Maintaining User Accounts

Overview

In this practice, you administer the new accounts and groups. This practice includes the following activities:

- Modifying a user account
- Deleting a user account
- Modifying a group

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Use the `usermod` command to modify tshane's primary group to staff. Confirm the change.

```
root@s11-desktop:~# usermod -u 1005 -g staff tshane
root@s11-desktop:~# getent passwd | grep tshane
tshane:x:1005:10:tom shane:/export/home/tshane:/bin/ksh
```

What field in this entry was changed? *The group 10 for staff*
Where is this group defined? *In the /etc/group file*

3. Use the `usermod` command to modify dkumar's default shell to korn. Confirm the change.

```
root@s11-desktop:~# usermod -s /bin/ksh dkumar
root@s11-desktop:~# getent passwd | grep 1002
dkumar:x:1002:110:dileep kumar:/export/home/dkumar:/bin/ksh
```

Which field in this entry represents the modified shell? *The last field, /bin/ksh*

4. Delete the tshane account, because this employee has left the company.

```
root@s11-desktop:~# userdel -r tshane
```

You can use the `-r` option to delete tshane's home directory along with the account.

Note: Do not issue the following command. You are shown this command only for information purposes.

```
root@s11-desktop:~# userdel tshane
Found user in files repository.
```

This command deletes only the account and not its home directory. You can use this command if you want to preserve tshane's home directory. This would be the situation where Tom Shane has left the company and you want to save Tom's work in his home directory.

5. Modify the group name from itgroup to hitech based on an organizational change. Confirm the change.

```
root@s11-desktop:~# groupmod -n hitech itgroup
root@s11-desktop:~# getent group | grep itgroup
root@s11-desktop:~# getent group | grep hitech
```

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```
hitech::120:dkumar
root@s11-desktop:~# id -G dkumar
110 120
root@s11-desktop:~#
```

Is the new group in place? Yes, it is.

6. Delete the support group. Confirm whether it is deleted. Inspect its impact.

```
root@s11-desktop:~# groupdel support
root@s11-desktop:~# getent group | grep support
root@s11-desktop:~# getent group | grep 110
```

You confirmed whether the support group is deleted. However, when this group was active, the dkumar account was assigned to this group. Now check the impact on the dkumar account.

```
root@s11-desktop:~# id -G dkumar
110 120
```

Note that the system still shows dkumar as assigned to primary group 110 although group 110 is deleted.

```
root@s11-desktop:~# getent passwd | grep dkumar
dkumar:x:1002:110:dileep kumar:/export/home/dkumar:/bin/ksh
```

You see the same result in the /etc/passwd file.

```
root@s11-desktop:~# usermod -u 1002 -g 10 dkumar
```

Because the system was showing an invalid group, you want to change dkumar's assignment to a valid group. This time, you take this corrective action after deleting the group. The recommended practice is to reassign accounts to a valid group, and then delete the group.

```
root@s11-desktop:~# id -G dkumar
10 120
```

Is the system displaying a valid primary group for the dkumar account? Yes

Practice 10-3: Managing User Initialization Files

Overview

In this practice, you work with multiple types of initialization files. This practice includes the following activities:

- Setting up site initialization files
- Setting up user initialization files
- Customizing user work environments

Task 1: Setting Up System-Wide Initialization Files

- 1: Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
- 2: Use the `more` command to view the site initialization file `/etc/profile`.

```
root@s11-desktop:~# more /etc/profile
#
#
#
# Copyright (c) 1989, 2012, Oracle and/or its affiliates. All
rights reserved.
#
# The profile that all logins get before using their own
.profile.

trap "" 2 3
export LOGNAME PATH

if [ "$TERM" = "" ]
then
    if /bin/i386
    then
        TERM=sun-color
    ...
    ...
    ...
The purpose of this display is for you to become familiar with the contents of
/etc/profile.
```

- 3: Use the `pfedit` (or any other UNIX editor) to modify `/etc/profile` to add an alias entry at the end.

```
root@s11-desktop:~# pfedit /etc/profile
root@s11-desktop:~# cat /etc/profile
...
...
...
echo "You have mail."
```

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```
; ;  
    esac  
fi  
esac  
  
umask 022  
trap 2 3  
alias c=clear
```

You added the last line to define an alias called `c`. The standard command to clear the screen is `clear`, and you created an alias for it to save typing time.

4. Use the `source` command to have the system read this file and make the configuration available. Confirm whether it works by typing `c` to clear the screen.

```
root@s11-desktop:~# source /etc/profile  
Oracle Corporation      SunOS 5.11      11.2      June 2014
```

Alternatively, you can use `./etc/profile` to source the changes.

```
root@s11-desktop:~# c
```

This should clear the screen, demonstrating that the alias has been successfully configured in the site initialization file `/etc/profile`.

5. Log in as the `dkumar` user and use the `c` command to confirm whether it works for any user in any shell.

```
root@s11-desktop:~# su - dkumar  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
dkumar@s11-desktop:~$ c
```

Did the `c` command work for you as `dkumar`? Yes

Now run the `ps` command to see what shell `dkumar` is using.

```
dkumar@s11-desktop:~$ ps  
 PID TTY          TIME CMD  
5462 pts/2        0:00 ps  
5453 pts/2        0:00 ksh
```

As you can see from the output of the `ps` command, `dkumar` is using the `korn` shell (as compared to `administrator` using `bash`). By running the `c` command in both the `bash` and `korn` shells and as both an administrator and a user, you have verified that the alias is available to any user in any shell.

Return to the administrator account.

```
dkumar@s11-desktop:~$ exit  
root@s11-desktop:~#
```

Task 2: Setting Up User Initialization Files

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Log in to Dileep Kumar's account by using the `su` command. Modify `.profile` to add an alias to `cl`. This file resides in your home directory and can help you to customize only your environment. If this file does not exist, you can create it by using the `gedit` editor.

```
root@s11-desktop:~# su - dkumar  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
  
dkumar@s11-desktop:~$ id  
uid=1002(dkumar) gid=10(staff)  
  
You are signed in as dkumar.  
  
dkumar@s11-desktop:~$ ls -a  
.           .bashrc          .sh_history      local.login  
..          .profile         local.cshrc       local.profile
```

The `-a` option is used to check hidden files (files that start with `.`). For example, this could be `.profile`, which may or may not exist.

Now modify `.profile` by entering the contents shown by the following `cat` command:

```
dkumar@s11-desktop:~$ vi .profile  
dkumar@s11-desktop:~$ cat .profile  
...  
...  
...  
alias cl=clear  
export cl  
dkumar@s11-desktop:~$ source /export/home/dkumar/.profile  
dkumar@s11-desktop:~$ cl  
dkumar@s11-desktop:~$ exit  
root@s11-desktop:~#
```

Did the alias `cl` clear the screen for you? Yes

These are very similar steps, except that in this case, you modified `profile` instead of `/etc/profile`. The `.profile` resides in your home directory.

Experimental Note: Suppose that in your `.profile`, you defined the alias `c` to execute another command (other than `clear`), such as `ls`. Which alias `c` is executed in this case? This is something for you to experiment with.

Task 3: Customizing the User Work Environment

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Use the useradd -D command to display the defaults for new users.

```
root@s11-desktop:~# useradd -D
group=staff,10 project=default,3 basedir=/export/home
skel=/etc/skel shell=/bin/ksh inactive=0
expire= auths= profiles= roles= limitpriv=
defaultpriv= lock_after_retries=
```

Note: The skel keyword is pointing to /etc/skel as the default skeleton directory.

3. Examine the /etc/skel directory for its contents.

```
root@s11-desktop:~# cd /etc/skel
root@s11-desktop:/etc/skel# ls
local.cshrc local.login local.profile
root@s11-desktop:/etc/skel# more local.profile
#
# Copyright (c) 1991, 2012, Oracle and/or its affiliates. All
rights reserved.
#
#
#
stty sane
PATH=/usr/bin:/usr/sbin
export PATH
```

Because this file is supposed to serve as a default initial file for new users, it has very minimal configuration. The objective is to enable individual users to modify it and customize their environments.

4. Create a new user with a home directory.

```
root@s11-desktop:/etc/skel# cd
root@s11-desktop:~# useradd -u 1010 -g 10 \
-d /export/home/jpebble -m -s /bin/bash -c "jane pebble" \
jpebble
80 blocks
```

You created a new user jpebble with a home directory by using the -m option and by assigning bash as the default shell.

5. Check jpebble's home directory to see whether you have local.profile created.

```
root@s11-desktop:~# su - jpebble
Oracle Corporation      SunOS 5.11      11.2      June 2014
jpebble@s11-desktop:~$ pwd
/export/home/jpebble
```

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```
jpebble@s11-desktop:~$ ls  
local.cshrc local.login local.profile
```

Why is local.profile created for the jpebble account? Because local.profile is in the /etc/skel directory, which, as you saw in step 4, is the default directory for all new users.

6. Use the vi command to modify local.profile.

```
jpebble@s11-desktop:~$ vi local.profile  
jpebble@s11-desktop:~$ cat local.profile  
#  
# Copyright (c) 1991, 2012, Oracle and/or its affiliates. All  
rights reserved.  
#  
#  
#  
stty istrip  
PATH=/usr/bin:/usr/sbin  
export PATH  
alias p='echo $PATH'  
export p
```

```
jpebble@s11-desktop:~$ source local.profile
```

Add the last two lines to define an alias called p to display the contents of the PATH variable. Why do you have to export it? To make it available in your entire environment

Note: After issuing the source command, you may see the following message, which can be safely ignored: cannot read entire /usr/lib/locale/en_US.UTF-8/LC_CTYPE/ldterm.dat file.

7. Check whether your new alias works.

```
jpebble@s11-desktop:~$ p  
/usr/bin:/usr/sbin  
jpebble@s11-desktop:~$ echo $PATH  
/usr/bin:/usr/sbin  
jpebble@s11-desktop:~$ exit  
logout  
root@s11-desktop:~#
```

Do you have to source `local.profile`? Yes, this would make the changes effective.

How is this method of using `local.profile` different from using `.profile`? This method serves, quite similarly, the same purpose.

The advantage of using `local.profile` is that the system administrator can modify it in one place, that is, in the `/etc/skel` directory to include aliases, variables, and so on. It is effective for all new users. When a new user is created, the user does not have to customize `local.profile` too much.

Practice 10-4: Exploring Shell Metacharacters and User Quotas

Overview

In this practice, you work with Bash shell metacharacters, as well as create user storage quotas. This practice includes the following activities:

- Exploring shell metacharacters
- Creating disk quotas for users
- Monitoring the quotas

Task 1: Exploring Shell Metacharacters

- 1: Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
- 2: Check permissions on dkumar's home directory to see whether it is accessible by other users.

```
root@s11-desktop:~# ls -ld /export/home/dkumar
drwxr-xr-x  2 dkumar  staff   8 Aug  4 22:56
/export/home/dkumar
```

Yes, others have r-x permissions, meaning that they can cd into this directory.

Note: You must have an execute permission on a directory before you can cd into it.

3. Log in as jpebble. Use the cd ~/docs command to go directly to the docs directory.

```
root@s11-desktop:~$ su - jpebble
Oracle Corporation      SunOS 5.11      11.2      June 2014
jpebble@s11-desktop:~$ pwd
/export/home/jpebble
jpebble@s11-desktop:~$ mkdir docs
jpebble@s11-desktop:~$ cd ~/docs
jpebble@s11-desktop:~/docs$ pwd
/export/home/jpebble/docs
```

The purpose of this demonstration is to use the tilde- metacharacter, which represents the user's home directory path.

4. As the jpebble user, use the cd ~dkumar command to go to dkumar's home directory.

```
jpebble@s11-desktop:~/docs$ cd ~dkumar
jpebble@s11-desktop:export/home/dkumar$ pwd
/export/home/dkumar
```

You used the cd ~dkumar command as a shortcut to go directly to dkumar's home directory. This method saves time as compared to using the absolute directory path.

Return to jpebble's home directory.

```
jpebble@s11-desktop:export/home/dkumar$ cd
```

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- jpebble@s11-desktop:~\$

5. Use the cd - command to switch between two directories.

```
jpebble@s11-desktop:~$ pwd  
/export/home/jpebble  
jpebble@s11-desktop:~$ cd /tmp  
jpebble@s11-desktop:/tmp$ pwd  
/tmp  
jpebble@s11-desktop:/tmp$ cd -  
/export/home/jpebble  
jpebble@s11-desktop:~$ cd -  
/tmp  
jpebble@s11-desktop:/tmp$ cd -  
/export/home/jpebble  
jpebble@s11-desktop:~$
```

The cd - command is also a shortcut metacharacter. It can help you to switch between two directories.

6. Use the file substitution character * to find files that match the partial specifications.

```
jpebble@s11-desktop:~$ cd /usr/demo/SOUND/sounds  
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls s*  
spacemusic.au splat.au  
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls f*  
fastbusy.au flush.au  
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls *1.au  
touchtone.1.au
```

Notice how this works. You can use the * metacharacter to display matching files (for example, s* for all files starting with s).

7. Use the ? file-substitution metacharacter to find files that match the partial specifications.

```
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls touchtone.? .au  
touchtone.0.au touchtone.2.au touchtone.4.au touchtone.6.au touchtone.8.au  
touchtone.1.au touchtone.3.au touchtone.5.au touchtone.7.au touchtone.9.au
```

The ? metacharacter substitutes only one character.

8. Use the [] metacharacter to find files that match the partial specifications.

```
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls [cf]*  
chirp.au computer.au crash.au fastbusy.au  
clink.au cowbell.au cuckoo.au flush.au
```

Can you explain what this metacharacter does? *It matches files that start with c or f.*

9. Use the [] metacharacter to find files that match the partial specifications. After completion of the command, log out of the `jpebble` user account.

```
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ ls [c-f]*
chirp.au computer.au crash.au dialtone.au drip.au flush.au
clink.au cowbell.au cuckoo.au doorbell.au fastbusy.au
```

Can you explain what this metacharacter does? *It matches files that start with c through f.*

```
jpebble@s11-desktop:/usr/demo/SOUND/sounds$ exit
logout
root@s11-desktop:~#
```

Task 2: Creating Disk Quotas for Users

- Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
- Set a quota of 2 MB of storage for dkumar.

```
root@s11-desktop:~# zfs set quota=2M rpool/export/home/dkumar
root@s11-desktop:~# zfs get quota rpool/export/home/dkumar
NAME          PROPERTY  VALUE   SOURCE
rpool/export/home/dkumar  quota    2M     local
root@s11-desktop:~# zfs userspace rpool/export/home/dkumar
TYPE      NAME    USED   QUOTA
POSIX User  dkumar   8K    none
POSIX User  root    1.50K  none
```

Why does the QUOTA column for dkumar show none? *Because the quota is set at the directory level and not at the user level*

```
root@s11-desktop:~# zfs list /export/home/dkumar
NAME          USED   AVAIL  REFER  MOUNTPOINT
rpool/export/home/dkumar 35.5K  1.97M  35.5K  /export/home/dkumar
root@s11-desktop:~# df -h /export/home/dkumar
Filesystem      Size  Used Available Capacity Mounted on
rpool/export/home/dkumar
                2.0M   35K      2.0M       2%  /export/home/dkumar
```

Note the space available for dkumar as displayed by multiple commands.

- Switch to dkumar's account and create some files to test the storage limit.

```
root@s11-desktop:~# su - dkumar
Oracle Corporation      SunOS 5.11      11.2      June 2014
dkumar@s11-desktop:~$ /usr/sbin/mkfile 1m \
/export/home/dkumar/crmindex
```

Exit the dkumar user account to go back to the administrator account.

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```
dkumar@s11-desktop:~$ exit
root@s11-desktop:~# zfs list /export/home/dkumar
NAME          USED   AVAIL REFER MOUNTPOINT
rpool/export/home/dkumar  1.04M   986K  1.04M  /export/home/dkumar
root@s11-desktop:~# ls -l /export/home/dkumar/crmindex
-rw-----  1 dkumar      staff    1048576 Aug  4 00:11
/export/home/dkumar/crmindex
```

You needed to create a 1 MB file to store the CRM index information. The dkumar user is within the storage quota as monitored by the zfs and ls commands. As you can see, there are no issues in this case.

4. Create more files in dkumar's account to test the storage limit.

```
root@s11-desktop:~# /usr/sbin/mkfile 2m \
/export/home/dkumar/crmdoc
/export/home/dkumar/crmdoc: initialized 917504 of 2097152 bytes:
Disc quota exceeded
```

Here you have only 1 MB left in the quota. The system allocated the requested amount but initialized just enough storage to meet the quota. It can cause potential problems if you use up all the allocated space.

```
root@s11-desktop:~# ls -l /export/home/dkumar
total 4112
-rw-----  1 root      root    2097152 Aug  4 00:14 crmdoc
-rw-----  1 dkumar    staff    1048576 Aug  4 00:11 crmindex
...
...
...
root@s11-desktop:~#
```

5. Create another file in dkumar's account to test the storage limit.

```
root@s11-desktop:~# /usr/sbin/mkfile 2m \
/export/home/dkumar/crmreq
Could not open /export/home/dkumar/crmreq: Disc quota exceeded
```

This message is as expected.

```
root@s11-desktop:~# ls -l /export/home/dkumar
total 4112
-rw-----  1 root      root    2097152 Aug  4 00:14 crmdoc
-rw-----  1 dkumar    staff    1048576 Aug  4 00:11 crmindex
...
...
```

```
...
root@s11-desktop:~#  
  
There is no change in this display because no new files were created.
```

6. Remove the quota set on dkumar's home directory.

```
root@s11-desktop:~# zfs set quota=none rpool/export/home/dkumar
root@s11-desktop:~# zfs get quota rpool/export/home/dkumar
NAME          PROPERTY   VALUE    SOURCE
rpool/export/home/dkumar  quota     none    local
```

Now there is no quota set on dkumar's home directory.

Practices for Lesson 11: Administering System Processes and Scheduling System Tasks

Chapter 11

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Practices for Lesson 11: Administering System Processes and Scheduling System Tasks
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Practices for Lesson 11

Practices Overview

In these practices, you are presented with a plan for administering system processes. Additionally, these practices will provide you experience in working with scheduling the system and user tasks. The following activities are covered:

- Managing system processes
- Scheduling system tasks

Scenario

Your company would like to assess the system processes functionality in Oracle Solaris 11. You are asked to explore the various processes that are running on the operating system. Also, you look at the scheduling of periodically running system and user tasks. Based on the nature of some business applications, you would like to utilize this knowledge to manage the system or user processes.

Now check your progress against the Test Activities' Checklist. You have completed working with setting up users and testing the user administration features. Now you will work with system and user processes.

Test Activities' Checklist	
✓	Install the Oracle Solaris 11 OS and test both the text installer and Live Media installation options.
✓	Inspect the boot and shutdown of a system.
✓	Test the services functionality in Oracle Solaris 11.
✓	Configure the IPS package repository and test the package management functionality from both the command line and the GUI.
✓	Test the ZFS functionality of Oracle Solaris 11.
✓	Inspect the Oracle Solaris 11 network configuration.
✓	Inspect the Oracle Solaris 11 zones functionality.
✓	Set up system and file system access controls and SSH to test a subset of the Oracle Solaris 11 security features.
✓	Set up users and test the user administration features of Oracle Solaris 11.
	Inspect system processes and test the task-scheduling functionality.

Note: Your output displays might differ slightly from those shown in this guide, especially the storage units, number of packages, and process information.

Practice 11-1: Managing System Processes

Overview

In this practice, you learn how to manage various system and user processes. This practice includes the following activities:

- Listing system processes
- Verifying process status
- Terminating a process
- Controlling a process

Tasks

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.

If the virtual machines are not running, start them now. Log in to the Sol11-Desktop virtual machine as the oracle user and run the su - command to assume the root role.

```
oracle@s11-desktop:~$ su -
Password:
Oracle Corporation      SunOS 5.11      11.2      June 2014
root@s11-desktop:~#
```

2. Use the ps command to view the current process.

```
root@s11-desktop:~# ps
  PID TTY          TIME CMD
 4567 pts/1        0:00 su
 4568 pts/1        0:00 bash
 4572 pts/1        0:00 ps
```

What is the process that is displayed as the default? *The current shell is displayed (in this case, bash).*

Is there a ps process also running? *No, that is the echo command.*

3. Using the ps -ef command, display the processes one page at a time.

```
root@s11-desktop:~# ps -ef | more
UID  PID  PPID  C   STIME TTY          TIME CMD
root    0     0  0 18:41:10 ?
                  0:05 sched
root    5     0  0 18:41:10 ?
                  0:09 zpool-rpool
root    6     0  0 18:41:12 ?
                  0:00 kmem_task
root    1     0  0 18:41:12 ?
                  0:00
/usr/sbin/init
root    2     0  0 18:41:12 ?
                  0:00 pageout
root    3     0  0 18:41:12 ?
                  0:24 fsflush
root    7     0  0 18:41:12 ?
                  0:00 intrd
root    8     0  0 18:41:12 ?
                  0:00 vmtasks
...
...
```

The ps command with the -ef options displays a lot more details.
Are these all the processes running on the system? Yes

4. Using the same command, look for all processes that match the pattern bash.

```
root@s11-desktop:~# ps -ef | grep bash

root      1779  1771      0 20:31:33 pts/1          0:00 grep bash
root      1771  1770      0 20:32:12 pts/1          0:00 -bash
oracle    1769  1766      0 20:30:58 pts/1          0:00 /usr/bin/bash
```

What is the grep bash process that is displayed in the output? The echo command
Why do you see the other two bash processes? One process was launched by the oracle userid, and the second one was launched on switching to root.

5. Use the prstat command to display a dynamic output.

```
root@s11-desktop:~# prstat
  PID  USERNAME   SIZE   RSS STATE      PRI  NICE      TIME   CPU PROCESS/NLWP
 1019  oracle     71M   43M sleep      59     0  0:01:16  0.8% Xorg/3
 1874  oracle    128M   17M sleep      59     0  0:00:16  0.7% gnome-terminal/2
 1500  oracle    139M   77M sleep      59     0  0:19:10  0.7% java/23
 1496  oracle    13M 1064K sleep      59     0  0:05:18  0.2% VBoxClient/3
 2169  root       11M 3576K cpu0      59     0  0:00:00  0.1% prstat/1
 1950  root       141M   27M sleep      49     0  0:00:03  0.0% gedit/1
 1239  root       16M 3400K sleep      59     0  0:00:30  0.0% nscd/30
 1459  oracle    127M   15M sleep      59     0  0:00:05  0.0% metacity/1
  596  root       11M  644K sleep      59     0  0:00:30  0.0% VBoxService/7

 1507  oracle     63M   28M sleep      12    19  0:00:17  0.0% updatemanager/0
 1473  Oracle    134M   13M sleep      59     0  0:00:15  0.0% isapthon2.6/1
 1943  oracle    140M   41M sleep      49     0  0:00:05  0.0% nautilus/3
   47  root       4368K  752K sleep      59     0  0:00:21  0.0% dlmgmtd/12
 1526  oracle    14M 3392K sleep      59     0  0:00:09  0.0% xscreensaver/1
   15  root       21M 6440K sleep      59     0  0:01:50  0.0% svc.configd/28
 1488  oracle    128M   12M sleep      59     0  0:00:07  0.0% gnome-power-man/1
  941  root       100M 3504K sleep      59     0  0:00:10  0.0% fmd/32
 1449  oracle    130M   11M sleep      59     0  0:00:02  0.0% gnome-settings-/1
  230  root       13M   96K sleep      59     0  0:00:06  0.0% devfsadm/6
    5  root       OK     OK sleep     99   -20  0:00:09  0.0% zpool-rpool/137
  536  root       OK     OK sleep     99   -20  0:00:00  0.0% zpool-
oracledoc/137
Total: 115 processes, 1060 lwps, load averages: 0.08, 0.06, 0.05
```

Note: Press Ctrl + C to stop the continuous display of information. The output may vary from system to system.

Can you tell what the Total line at the bottom represents? Summary workload

What is the count of lwps? 1060

What are they? Lightweight processes

Why are they significant enough to be displayed? They can use up the CPU capacity.

6. Use the prstat command to display highest CPU usage every 10 seconds 10 times.

```
root@s11-desktop:~# prstat -s cpu 10 10
  PID USERNAME SIZE RSS STATE PRI NICE      TIME   CPU PROCESS/NLWP
 1500 oracle   139M 77M sleep    59   0  0:19:13 0.7% java/23
 1019 oracle   71M 43M sleep    59   0  0:01:19 0.6% Xorg/3
 1874 oracle   128M 17M sleep    59   0  0:00:17 0.5% gnome-terminal/2
 1496 oracle   13M 1064K sleep   59   0  0:05:18 0.2% VBoxClient/3
 1879 root     10M 2196K sleep   49   0  0:00:00 0.1% bash/1
 2196 root     11M 3576K cpul    59   0  0:00:00 0.1% prstat/1
 1459 oracle   127M 15M sleep    59   0  0:00:05 0.0% metacity/1
 1239 root     16M 3400K sleep   59   0  0:00:30 0.0% nscd/30
 596 root     11M 644K sleep    59   0  0:00:30 0.0% VBoxService/7
 1526 oracle   14M 3400K sleep   59   0  0:00:09 0.0% xscreensaver/1
 5 root       0K   OK sleep     99  -20 0:00:09 0.0% zpool-rpool/137
 1950 root     142M 27M sleep    49   0  0:00:05 0.0% gedit/1
 1507 oracle   63M 28M sleep    12  19 0:00:17 0.0% update manager/1
 1473 oracle   134M 13M sleep    59   0  0:00:15 0.0% isapython2.6/1
 1488 oracle   128M 12M sleep    59   0  0:00:07 0.0% gnome-power-man/1
 941 root     100M 3504K sleep   59   0  0:00:10 0.0% fmd/32
 1195 daemon   14M 824K sleep    59   0  0:00:04 0.0% nfsmapid/4
 1449 oracle   130M 11M sleep    59   0  0:00:02 0.0% gnome-settings-/1
 641 root     8028K 4876K sleep   59   0  0:00:03 0.0% haldd-addon-acpi/1
 230 root     13M 96K sleep     59   0  0:00:06 0.0% devfsadm/6
 47 root     4368K 752K sleep    59   0  0:00:21 0.0% dlmgmt/12
Total: 115 processes, 1060 lwp, load averages: 0.09, 0.07, 0.06
```

Which process is using the most CPU? The *java* process

Note: Your answer may vary.

7. Use the prstat command to display the process that is using the least amount of memory.

```
root@s11-desktop:~# prstat -s rss 10 10
  PID USERNAME SIZE RSS STATE PRI NICE      TIME   CPU
PROCESS/NLWP
  576 root     0K   OK sleep     99  -20 0:00:00 0.0%
zpool-oraclereq/137
  562 root     0K   OK sleep     99  -20 0:00:00 0.0%
zpool-oracledoc/137
  570 root     0K   OK sleep     99  -20 0:00:00 0.0%
zpool-oraclehr/137
  578 root     0K   OK sleep     99  -20 0:00:00 0.0%
zpool-slicepool/137
  9 root     0K   OK sleep     99  -20 0:00:00 0.0%
postwaitq/1
  8 root     0K   OK sleep     60   - 0:00:00 0.0%
vmtasks/3
```

```

      7 root          0K    0K sleep   60   -  0:00:00 0.0%
intrd/1
      6 root          0K    0K sleep   99  -20  0:00:01 0.0%
kmem_task/1
      5 root          0K    0K sleep   99  -20  0:00:07 0.0%
zpool-rpool/137
      537 root     8824K  484K sleep   59    0  0:00:00 0.0%
iscsid/2
      86 root     9760K  736K sleep   59    0  0:00:00 0.0%
in.mpathd/1
      615 root     2052K  744K sleep   59    0  0:00:00 0.0%
hotplugd/2
      185 daemon   2368K  860K sleep   59    0  0:00:00 0.0%
utmpd/1
      601 root     8968K  900K sleep   59    0  0:00:00 0.0%
cron/1
      93 root     2680K  920K sleep   59    0  0:00:00 0.0%
pfexecd/3
Total: 109 processes, 1055 lwp, load averages: 0.05, 0.06, 0.06
...
...
Which task is consuming the least amount of memory (RSS)?
zpool-oraclereq/137
Note: Your answer may vary.

```

8. Use the pgrep command to verify that the process is running.

```
root@s11-desktop:~# pgrep -l mail
1834 sendmail
1841 sendmail
```

Why is the pgrep command displaying two processes? Because you indicated the mail pattern, and pgrep works with a pattern. The pgrep command matched two processes.

9. Use the pkill command to kill both the processes.

```
root@s11-desktop:~# pkill sendmail
root@s11-desktop:~# pgrep -l mail
1834 sendmail
1841 sendmail
```

Did it kill both the processes? Yes

How can you tell? The process IDs are different from the display in step 9.

10. Display the current sendmail processes, and this time, use the kill command with the -9 option.

```
root@s11-desktop:~# ps -e | grep sendmail
1834 ?        0:00 sendmail
```

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```
1841 ? 0:00 sendmail
root@s11-desktop:~# kill -9 1834
root@s11-desktop:~# ps -e | grep sendmail
1857 ? 0:00 sendmail
1841 ? 0:00 sendmail
```

What is the meaning of the -9 option? *Abort the process right away.*

Was the sendmail process #1834 killed? Yes, and a new process was started.

Note: In the next few steps, you control a process. You pause it, and then resume it.

11. Create an infinitely running task by using the command newtask:

```
root@s11-desktop:~# newtask dd if=/dev/zero of=/dev/null&
[1] 1869
```

For training purposes, you are creating a dummy task to run forever. The dd command is copying zeros to nulls. Refer to the man pages for details.

```
root@s11-desktop:~# ps -ef | grep 1869
root 1869 1768 84 18:03:56 pts/1 0:41 dd if=/dev/zero of=/dev/null
```

You can see that process ID 1869 is running.

Note: Your process number will vary.

12. Use the pstop command to stop (pause) the process. Verify that it is stopped.

```
root@s11-desktop:~# pstop 1869
root@s11-desktop:~# ps -ef | grep 1869
root 1870 1768 0 18:04:00 pts/1 0:00 grep 1869
root 1869 1768 74 18:03:56 pts/1 0:53 dd if=/dev/zero
of=/dev/null
root@s11-desktop:~# ps -ef | grep 1869
root 1872 1768 0 18:04:36 pts/1 0:00 grep 1869
root 1869 1768 32 18:03:56 pts/1 0:53 dd if=/dev/zero
of=/dev/null
root@s11-desktop:~# ps -ef | grep 1869
root 1874 1768 0 18:05:12 pts/1 0:00 grep 1869
root 1869 1768 26 18:03:56 pts/1 0:53 dd if=/dev/zero
of=/dev/null
```

How can you tell that PID 1869 is stopped? *The time elapsed is not incrementing.*

13. Use the prun command to resume the process. Verify that it is running.

```
root@s11-desktop:~# prun 1869
root@s11-desktop:~# ps -ef | grep 1869
root 1869 1768 30 18:03:56 pts/1 0:58 dd if=/dev/zero
of=/dev/null
root@s11-desktop:~# ps -ef | grep 1869
root 1869 1768 47 18:03:56 pts/1 1:04 dd if=/dev/zero
of=/dev/null
```

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Practices for Lesson 11: Administering System Processes and Scheduling System Tasks

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How can you tell that PID 1869 is running? *The time elapsed is incrementing.*

14. Use the pkill command to kill the process. Verify that it is killed.

```
root@s11-desktop:~# pkill -9 dd
[1]+  Killed                  newtask dd if=/dev/zero
of=/dev/null
root@s11-desktop:~# ps -ef | grep 1869
      root 1881 1768 0 18:04:36 pts/1          0:00 grep 1869
root@s11-desktop:~#
```

How can you tell that PID 1869 is killed? *The ps command cannot find it.*

Practice 11-2: Scheduling System Tasks

Overview

In this practice, you evaluate the task-scheduling method for creating a repetitive task. For repetitive scheduling, you use the `cron` facility. This practice includes the following activities:

- Scheduling a repetitive task with the `cron` utility
- Scheduling a user task as the superuser

Task 1: Scheduling a Task with the `cron` Utility

Note: The time used in the `cron` files can be adjusted as required to see the desired output.

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
If the virtual machines are not running, start them now. Log in to the Sol11-Desktop virtual machine as the `oracle` user and run the `su -` command to assume the `root` role.

```
oracle@s11-desktop:~$ su -
Password:
Oracle Corporation      SunOS 5.11      11.2      June 2014
root@s11-desktop:~#
```

2. Before you start working with the `crontab` files, you must set the `EDITOR` variable to `vi`.

```
root@s11-desktop:~# EDITOR=vi
root@s11-desktop:~# export EDITOR
```

3. Using the `crontab -l` command, display the contents of the administrator's `crontab` file.

```
root@s11-desktop:~# crontab -l
#ident  "%Z%M% %I%      %E% SMI"
#
# Copyright 2007 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# The root crontab should be used to perform accounting data
collection
#
#
10 3 * * * /usr/sbin/logadm
15 3 * * 0 [ -x /usr/lib/fs/nfs/nfsfind ] &&
/usr/lib/fs/nfs/nfsfind
30 3 * * * [ -x /usr/lib/gss/gsscred_clean ] &&
/usr/lib/gss/gsscred_clean
30 0,9,12,18,21 * * * /usr/lib/update-manager/update-refresh.sh
root@s11-desktop:~#
```

What is the purpose of the `logadm` test? Refer to the man pages. It checks the logs for possible rotation.

When is this task scheduled to run? Ten minutes after 3 AM every day

4. Using the `tty` command, find the address of your terminal window.

```
root@s11-desktop:~# tty  
/dev/pts/1
```

5. Use the `crontab -e` command to edit the `crontab` file.

```
root@s11-desktop:~# crontab -e  
#ident  "%Z% %M% %I%      %E% SMI"  
#  
# Copyright 2007 Sun Microsystems, Inc. All rights reserved.  
# Use is subject to license terms.  
  
#  
# The root crontab should be used to perform accounting data  
collection  
#  
#  
10 3 * * * /usr/sbin/logadm  
15 3 * * 0 [ -x /usr/lib/fs/nfs/nfsfind ] &&  
/usr/lib/fs/nfs/nfsfind  
30 3 * * * [ -x /usr/lib/gss/gsscred_clean ] &&  
/usr/lib/gss/gsscred_clean  
30 0,9,12,18,21 * * * /usr/lib/update-manager/update-refresh.sh  
30 10 * * * /usr/bin/echo "time to take a break!" > /dev/pts/1
```

Hint: In place of 30 minutes after 10 AM, you can provide 10 minutes past your clock time to see the message immediately.

Here you have configured a cron job to display a reminder message.
What is the purpose of the `echo` command? *To display a message*
Where is the message displayed?*In your terminal window*

6. Use the `cat` command to check the users that are available for the subsequent steps.

```
root@s11-desktop:~# cat /etc/passwd  
...  
...  
...  
jholt:x:60005:10:john holt:/export/home/jholt:/bin/bash  
jmoose:x:60006:10:jerry moose:/export/home/jmoose:/bin/bash  
panna:x:60007:10:polly anna:/export/home/panna:/bin/bash  
sstudent:x:60008:10:super student:/export/home/sstudent:/bin/sh  
sbeach:x:1008:10:sandy beach:/export/home/sbeach:/bin/bash  
dkumar:x:1002:10:dileep kumar:/export/home/dkumar:/bin/ksh  
jpebble:x:1010:10:jane pebble:/export/home/jpebble:/bin/bash
```

Plan to use John Holt's account, `jholt`.

7. Using the vi editor, add an entry for jholt in the cron.deny file as indicated.

```
root@s11-desktop:~# cd /etc/cron.d  
root@s11-desktop:/etc/cron.d# vi cron.deny  
root@s11-desktop:/etc/cron.d# grep jholt cron.deny  
jholt
```

Is there anything else on the added line? No, just the login of the user

8. Grant everyone permission to write to /dev/pts/1 by using the chmod command.

```
root@s11-desktop:/etc/cron.d# ls -l /dev/pts/1  
crw--w---- 1 oracle  tty  203, 1 Aug 4 20:55 /dev/pts/1  
root@s11-desktop:/etc/cron.d# chmod a+rw /dev/pts/1  
root@s11-desktop:/etc/cron.d# ls -l /dev/pts/1  
crw-rw-rw- 1 oracle  tty  203, 1 Aug 4 20:55 /dev/pts/1
```

If this permission is not already granted, grant it now. This permission is crucial for a user to be able to write to the terminal window.

9. Log in as the jholt account, set the editor to vi, and attempt to list your crontab file.

```
root@s11-desktop:/etc/cron.d# su - jholt  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
jholt@s11-desktop:~$ crontab -l  
crontab: you are not authorized to use cron. Sorry.  
jholt@s11-desktop:~$
```

Were you able to view the contents of the crontab file? No, it looks like John Holt is not allowed to use any crontab facilities.

10. Exit to get back to the administrator account. Add the indicated users to the cron.allow file.

```
jholt@s11-desktop:~$ exit  
logout  
root@s11-desktop:/etc/cron.d# vi cron.allow  
root@s11-desktop:/etc/cron.d# cat cron.allow  
jmoose  
jholt  
panna
```

Now use Jerry Moose's account, jmoose, to see whether he can create a cron job.

11. As Jerry Moose, attempt to create an entry in his crontab file.

```
root@s11-desktop:/etc/cron.d# su - jmoose  
Oracle Corporation      SunOS 5.11      11.2      June 2014  
jmoose@s11-desktop:~$ EDITOR=vi  
jmoose@s11-desktop:~$ export EDITOR
```

```
jmoose@s11-desktop:~$ crontab -e
30 14 * * * /usr/bin/echo "time to go to a movie!" > /dev/pts/1
jmoose@s11-desktop:~$ crontab -l
30 14 * * * /usr/bin/echo "time to go to a movie!" > /dev/pts/1
jmoose@s11-desktop:~$
```

Were you able to create a cron job and display a simple message? Yes

12. Exit the jmoose account. As the administrator, using the cat command, display the contents of the cron.deny and cron.allow files.

```
jmoose@s11-desktop:~$ exit
logout
root@s11-desktop:/etc/cron.d# cat cron.deny
daemon
bin
nuucp
jholt
root@s11-desktop:/etc/cron.d# cat cron.allow
jmoose
jholt
panna
root@s11-desktop:/etc/cron.d#
```

Notice that John Holt's account, jholt, is duplicated in both the cron.deny file and the cron.allow file.

Will he be allowed to create the cron jobs? Refer to the next step.

13. As John Holt, attempt to create a cron job. Verify that you were able to create the job, and then exit the jholt account.

```
root@s11-desktop:/etc/cron.d# su - jholt
Oracle Corporation      SunOS 5.11      11.2      June 2014
jholt@s11-desktop:~$ EDITOR=vi
jholt@s11-desktop:~$ export EDITOR
jholt@s11-desktop:~$ crontab -e
jholt@s11-desktop:~$ crontab -l
30 14 * * * /usr/bin/echo "time to have a drink!" > /dev/pts/1
jholt@s11-desktop:~$ exit
logout
root@s11-desktop:/etc/cron.d# cd
root@s11-desktop:~#
```

Were you able to create a cron job and display a simple message? Yes

This demonstrates that as long as you have an entry in the cron.allow file, you can create and submit a cron job.

Task 2: Scheduling a User Task as Superuser

As a superuser, you create another user's crontab file in this task. This demonstrates that as a superuser, you do have authorization. In addition, you do not have to allow the superuser in the cron.allow file.

1. Verify that the Sol11-Server1 and Sol11-Desktop virtual machines are running.
2. Before you work with the crontab files, you must set up the editor variable to vi.

```
root@s11-desktop:~# EDITOR=vi  
root@s11-desktop:~# export EDITOR
```

3. Display the contents of the cron.allow and cron.deny files.

```
root@s11-desktop:~# cd /etc/cron.d# cat cron.allow  
jmoose  
jholt  
panna  
root@s11-desktop:/etc/cron.d# cat cron.deny  
daemon  
bin  
nuucp  
jholt  
root@s11-desktop:/etc/cron.d#
```

Currently, you have jmoose, jholt, and panna in the allow file. If your file output is different, modify it to make it look like this display.

4. Using the tty command, find the address of your terminal window.

```
root@s11-desktop:/etc/cron.d# tty  
/dev/pts/1
```

5. Use the crontab -e command to edit panna's crontab file as indicated. Display the results.

```
root@s11-desktop:/etc/cron.d# crontab -e panna  
root@s11-desktop:/etc/cron.d# crontab -l panna  
30 17 * * * /usr/bin/echo "have a nice day!" > /dev/pts/1
```

6. Verify that the cron job has been created.

```
root@s11-desktop:/etc/cron.d# cd /var/spool/cron/crontabs  
root@s11-desktop:/var/spool/cron/crontabs# ls -l  
total 20  
-rw----- 1 root      sys          184 Jun 24 14:24 adm  
-rw----- 1 root      staff        63 Aug  4 12:59 jholt  
  
-r----- 1 root      staff        44 Aug  4 12:59 jholt.au  
-rw----- 1 root      staff        63 Aug  4 23:48 jmoose  
-r----- 1 root      staff        44 Aug  4 23:48 jmoose.au  
-rw----- 1 root      root         57 Aug  4 13:16 panna
```

```
-r----- 1 root      root        44 Aug  4 13:16 panna.au
-rw----- 1 root      root       504 Aug  4 22:29 root
-r----- 1 root      root        44 Aug  4 22:29 root.au
-rw----- 1 root      sys        302 Aug  4 14:26 sys
root@s11-desktop:/var/spool/cron/crontabs# cat panna
30 17 * * * /usr/bin/echo "have a nice day!" > /dev/pts/2
root@s11-desktop:/var/spool/cron/crontabs#
```

Has the cron job been created? Yes, it has.

```
root@s11-desktop:/var/spool/cron/crontabs# cd
root@s11-desktop:~#
```