Sun Solaris 8 Certified Systems Administration II - Cramsession

Client-Server Relationship

List and define the types of servers used in the Solaris 8 Network I

- **Application servers** - Share software applications across the network with clie
- **Boot servers** - Provide startup configuration information to new clients bootinc network. Used with Jumpstart.
- **Installation servers** - Provide client software images to new computers bootin network. Also used with Jumpstart.
- **Database servers** - Provide a platform for running database applications and s with clients.
- **Mail servers** - Store and forward servers that allow access to email to local cli
- **License servers** - Manage application and system licenses using a special lic
- **Print servers** - Share locally attached or network-attached printers with clients
- **Name services server** - Host one of the many naming services provided by S NIS, NIS+).
- **home Directory servers** - Provide storage of 'exported' home directories in a

List and define the types of clients used in the Solaris 8 network e

Clients use the services provided by servers. A single client can request multiple serv servers, like shared files, printers and data from a database. A specialized example w jumpstart client, which requests configuration and installation information from a jump anticipation of a new operating system install.

Sun now has technology called SunRay™ that provides server based or thin-client co that have only keyboards, mice, display and simple CPUs.

Solaris Network Environment

Define the function of each layer within the seven-layer OSI model

SCSA Solaris 8 II
Citrix
CIW
IBM
Chauncey
SCO
SANS
SAIR
CNX
Adobe
Nortel
Java
NAX
Discussion Boards
Certifications
Training Locators
Find a Tech Job
Study Tips
Bookstore
Links
Reviews
Study Break

Global Navigation
Post/Edit Resume
Skill Assessment
Top Tech Sites
Discounts/Freebies
Newsletters
Tell-A-Friend
Email This Page!
Newsletter Archive
Advertising
Site Map
Help/Info

- **Application layer**
  Represents the user level. TELNET, FTP, SMTP, NFS.
- **Presentation Layer**
  Different computers interpret information in different ways. The presentation la
  encoding and decoding required between platforms. Examples would include A
  EBCDIC. XDR (external data representation) resides at this layer.
- **Session layer**
  The session layer manages services like authentication, dialog management a
  between connected clients. It also reestablishes interrupted connections.
- **Transport Layer**
  Handles transport-specific functions like flow-control and quality between two c
  stations.
- **Network Layer**
  The network layer addresses, routes and delivers data traffic on a network. Ro
  found at this layer.
- **Data Link Layer**
  This layer addresses the physical medium directly. This is the first location whe
  arranged into a recognizable format. Checksum error detection occurs here. M
  used here.
- **Physical Layer**
  Operating at the lowest level, this layer moves unstructured bit streams using e

Define the function of each layer in the five-layer TCP/IP model

Sun's implementation of the TCP/IP protocol stack includes five layers:

1. Application Layer
User accessed application programs and network services.

2. Transport Layer
Connection-oriented TCP and connectionless UDP data transfer.

3. Internet Layer
Here data is fragmented, addressed and routed.

4. Network Interface Layer
Error detection and packet framing. 802.3, 802.4, 802.5.

5. Hardware Layer
Contains electrical signals that move raw bits through the ether.

List the features and functions of the Ethernet

Ethernet is an implementation of **C**arrier **S**ense **M**ultiple **A**ccess with **C**ollision **D**etecti
Hosts that share a subnet (usually a Bus) transmit data to other hosts at random inter
transmit at the same time, a collision occurs, and one host must rebroadcast after a ra
Ethernet is popular because it is easy to add hosts, and performs rather well on lightly
Performance does begin to degrade as more hosts are added.

Describe the characteristics of RARP and ARP

ARP and RARP (ReverseARP) are protocols to match a host's unique MAC address (
the network interface card) with an assigned ethernet address (IP). To obtain a destin
Ethernet address, a host must send a broadcast alerting other hosts on the network to

ARP maps a 32-bit IP to a 48-bit MAC (or Ethernet) address.

RARP maps a 48-bit MAC address to a 32-bit IP address.

Identify the commands which display information about the local r interface

`ifconfig` – shows the status of configured interfaces. Includes information relating t address, Netmask, Broadcast address, and MAC address.

```
#ifconfig -a
lo0: flags=849 mtu 8232
        inet 127.0.0.1 netmask ff000000
le0: flags=863 mtu 1500
        inet 10.1.15.10 netmask ffffff00 broadcast 10.1.15.255
banner - shows the MAC of a system from the OBP (Open Boot Prom).
```

Describe the relationship between the RPC service and the rpcbin

A network service must use an agreed-upon unique port number. To eliminate the pro hosts and too many services to configure and maintain distinctive information for, Sur service that does not require predefined port numbers to be established at boot time.

A process, `rpcbind`, interprets incoming requests and sends them to the appropriate Using RPC, clients are given the actual port number at connection time by `rpcbind` (known port 111). RPC services register themselves with `rpcbind` when they start, ar available port number at that time. RPC services are named `rpc.<daemon>`.

Recall how to list registered RPC services

The configured ports for RPC are listed in `/etc/rpc`.

To see which services are currently running, use the `rpcinfo -p` command.

Identify the steps necessary to start and stop network services via line

`rpcinfo` can also start and stop network services. To reregister network services tha stopped, send a hangup (HUP) signal to the inetd process.

```
# pkill -HUP inetd
```

and then verify the network service is available using `rpcinfo -p`

To stop a network service, use rpcinfo in the following manner:

```
# rpcinfo -d mountd 1
```

Solaris Syslog

Identify the functions of syslog

`syslog` is a system of routing messages generated by the system (kernel) or system
appropriate, manageable log files. Messages can be sent to the console or a system
list of users logged on, or forwarded to other hosts on a network.

Recall the syntax of the syslog configuration file

The syslog configuration file is located in `/etc/syslog.conf`. The `syslogd` daemc
each time it is started.

Two fields of the `syslog` are: selector and action. The selector field is divided into tw
by a period: `facility.level`.

The following table contains the facility definitions:

user	kern	mail	daemon
auth	lpr	news	uucp
cron	local0 - 7	mark	*

The following table contains the severity levels (highest to lowest):

emerg
alert
crit
err
warning
notice
info
debug
none

Deduce syslogd behavior from its configuration file

The syslog configuration file appears like this:

```
The syslog configuration file appears like this:
#ident  "@(#)syslog.conf        1.5     98/12/14 SMI"   /* SunOS 5.0 */
#
# Copyright (c) 1991-1998 by Sun Microsystems, Inc.
# All rights reserved.
#
# syslog configuration file.
#
# This file is processed by m4 so be careful to quote (`') names
# that match m4 reserved words.  Also, within ifdef's, arguments
# containing commas must be quoted.
#
*.err;kern.notice;auth.notice                   /dev/sysmsg
*.info;mail.none;*.err;kern.debug;daemon.notice /var/adm/messages
mail.err;mail.info;mail.alert;mail.emerg;mail.notice   /var/log/maillog
*.alert;kern.err;daemon.err                     operator
*.alert                                         root
*.emerg                                         *
# if a non-loghost machine chooses to have authentication messages
# sent to the loghost machine, un-comment out the following line:
#auth.notice               ifdef(`LOGHOST', /var/log/authlog, @loghost)
mail.debug                ifdef(`LOGHOST', /var/log/maillog, @loghost)
local6.debug                   /var/log/tacacs.log
local7.emerg;local7.alert;local7.debug          /var/log/local7.log
```

```
#
# non-loghost machines will use the following lines to cause "user"
# log messages to be logged locally.
#
ifdef(`LOGHOST', ,
user.err                                        /dev/sysmsg
user.err                                        /var/adm/messages
user.alert                                      `root, operator'
user.emerg                                      *
)
```

Note that the syslog conf file is processed via the M4 macro processor. The `ifdef` s evaluated to determine where information is sent.

Configure syslog messages by increasing the logging severity lev login and telnet daemons.

Changing the severity level of the login daemons requires changing the level associat facility:

```
auth.info/var/adm/messages
```

to

```
auth.crit/var/adm/messages
```

Changing the severity level of the login daemons requires changing the level associat daemon facility:

```
daemon.info/var/adm/messages
```

to

```
daemon.crit/var/adm/messages
```

Use the command line to update the system log

The logger command updates entries in the system log.

```
logger [ -I ] [ -f file ] [ -p priority ] [ -t tag ] [ message
```

```
# logger -p user.err "System Restart"
```

This is useful functionality when writing scripts.

Disk Management

List the utilities used to create, check, and mount file systems

`newfs` is a utility to create the ufs filesystem on a new partition (remember that it is a to the more configurable `makefs` command).

`fsck` is the utility used to check a new file system. It detects and repairs inconsistenc

`mount` is the utility that is used to ‘attach’ a new file system to the existing hierarchy.

Solaris™ 8 provides a new feature for adding devices (reconfiguration) without reboot
`devfsadm` utility combines the functions of `drvconfig`, `disks`, and `devlinks` for c
in `/dev/` and `/devices/`.

Identify the logical path name differences between physical disks a disks

Typically, file systems on Solaris™ are limited to just one partition or slice. Using tools
DiskSuite™ or Sun StorEdge™ Volume Manager, an administrator can span a file sys
than one partition.

Using DiskSuite™, a virtual file system path would look like:

```
/dev/md/rdsk/d10
/dev/md/dsk/d10
```

Using Volume Manager, a virtual file system path would look like:

```
/dev/vx/rdsk/tools/binaries
/dev/vx/dsk/tools/binaries
```

List the advantages of a virtual disk management application

Using a virtual disk management application, a systems administrator can overcome
limitations, and improve performance and reliability by supporting various RAID config

Most virtual disk management utilities are in the form of GUIs that make system setup
easier.

Identify the characteristics and functions of Solstice DiskSuite and StorEdge Volume Manager

Disksuite™ combines disks that have been created using format. A collection of exist
partitions makes up a *metadevice*.

Volume manager manages disk space on *subdisks* by formatting into two initial partiti
private area that maintains information about the public file system. Slice 4 is used to
to create new volumes.

Solaris Pseudo File Systems and Swap Spac

State the characteristics of the Solaris pseudo file system types

A pseudo file system is a file-system that is entirely resident in memory while the oper
running. They provide an important increase in performance by using standard operat
semantics on data structures that are in faster physical memory, instead of on disk.

`procfs` - stores a list of active processes on the machine

`tmpfs` - a space for temporary system files that is cleared with each reboot

`fsfs` - maintains a list of file names and file descriptors for open files

`swapfs` - performs virtual addressing for the swap files on a disk

List and define the commands used to extract information from en the /proc directory

The proc file system contains a hierarchical directory structure for the state of each ac entry is a decimal number that corresponds with the process ID. Each directory conta the process. The owner of the process determines owner and group permissions.

```
# ps -ef
     UID   PID  PPID C    STIME TTY      TIME CMD
    root     0     0            0   Dec 02 ?        0:00 sched
    root     1     0            0   Dec 02 ?        0:01 /etc/init -
    root     2     0            0   Dec 02 ?        0:00 pageout
    root     3     0            0   Dec 02 ?       24:13 fsflush
    root   310     1  0   Dec 02 ?        0:00 /usr/lib/saf/sac -t300

  nobody  166     1  0   Dec 02 ?        0:59 /usr/local/sbin/iplog

    root    50     1  0   Dec 02 ?        0:00 /usr/.../devfsadmd
    root   143     1  0   Dec 02 ?        0:00 ipmon -sn
    root   179     1  0   Dec 02 ?        0:00 /usr/sbin/inetd -s
    root 26980     1  0   Dec 13 ?        0:03 /usr/sbin/syslogd
    root   199     1  0   Dec 02 ?        0:01 ntpd -A
    root 21479     1  0   Dec 11 ?        0:30 /usr/sbin/nscd
    root   194     1  0   Dec 02 ?        0:00 /usr/sbin/cron
    root   914   360  0 17:11:10 ?        0:00 /usr/local/sbin/sshd
    root   313   310  0   Dec 02 ?        0:00 /usr/lib/saf/ttymon
<...>
```

List the steps to create and add a swap file to the system swap spa

File space can be added to swap on the fly using `swap -a` command:

Find a partition that has free space.

```
# df -k
```

```
# mkfile 100m /export/home/myswap
```

```
# swap -a /export/home/myswap
```

This will be cleared at next reboot. Make it permanent by adding it to the `/etc/vfst`

NFS

State the functions of an NFS server and an NFS client

NFS stands for **N**etwork **F**ile **S**ystem, and provides a means of distributing files to clie network.

An NFS server stores the files or common programs on a local disk, and runs the app to share them across a network.

An NFS client mounts shared files or common programs from an NFS server across t process is almost transparent, in that files on an NFS share appear to be local to the

List the steps required to make resources available and unavailabl

mounting as a shared resource

Add an entry to the /etc/dfs/dfstab file to make a directory available

```
share /usr/share/man
```

Start the NFS daemons on the server

```
/etc/init.d/nfs.server start
```

On the NFS client, use the mount command to connect the resource

```
# mount <servername>:/usr/share/man /usr/share/man
```

To unmount the resource from the client, run

```
# umount /usr/share/man
```

To stop sharing on the server, run

```
# unshareall
```

or

remove the share entry from the DFS tab and stop/start the NFS server

Identify the command used in the /etc/dfs/dfstab file on an NFS se automatic sharing of resources

The /usr/sbin/share command makes files available for remote mounting.

```
share [ -F fs-type ] [ -o options ] [ -d description ] path_nam
```

```
# share -F nfs /export/home
```

will share out the /export/home directory. Data about the share is logged in the /etc/ file.

Running share with no arguments will display the current shared resources.

/etc/dfs/dfstab is similar to the /etc/vfstab, in the sense that it is a hard and shares to be shared out during the boot process, or by using commands like sharea contains a listing of share commands.

```
share -F nfs -o ro /export/updates
share -F nfs -o rw:sparty:beaumont /export/home
```

Explain how entries in the /etc/vfstab file can enable automatic mo resources on an NFS client

The /etc/vfstab file is read by the system startup scripts and is in charge of moun systems (including the standard /, /usr, /var, /opt, etc.) at boot time. Adding entri causes the server to attempt to mount the shared resources along with local mounts.

```
#device        device        mount       FS     fsck    mount   mount
#to mount      to fsck       point       type   pass    at boot options
#
#
sparty:/export/home -      /export/home   nfs     -       yes    bg
```

Note that the device to `fsck` contains a -, because NFS shares are never `fsck`ed. M in this case, and the option `bg` will specify 'background' mounting (the system will retr background if an initial attempt fails).

State the function of each of these commands: mountall, umounta and unshareall

`mountall`, when executed on a client machine, will mount all the shares specified in file as 'mount at boot'. When used with the `-r` option, only remote shares will be mou

```
# mountall -r
```

`unmountall` will unmount the current mounted file systems. When used with the `-r` remote shares will be umounted.

```
# umountall -r
```

`shareall` is run on a server machine to automatically share all the filesystems listed the `/etc/dfs/dfstab` file.

`unshareall` is run on a server machine to unshare all of the currently shared file sys from the `/etc/dfs/sharetab` file.

Explain the new NFS server logging

NFS server logging, new to Solaris™ 8, enables record-keeping of connections made systems. A daemon, `nfslogd`, is in charge of the logging.

The logs store ASCII output of IP/hostnames and User IDs of clients. A file called the stores file handle information about requested files so that it does not need to be re-id use.

The file `/etc/nfs/nfslog.conf` defines path, file name, and type of logging for `nf`

Logging for a particular file system is handled using the log option of share

```
# share -F nfs -o ro, log=global /export/home
```

`global` is the default value in the `nfslogd.conf` file

This file looks like:

```
#ident  "@(#)nfslog.conf        1.5     99/02/21 SMI"
#
# Copyright (c) 1999 by Sun Microsystems, Inc.
# All rights reserved.
#
# NFS server log configuration file.
#
#  [ defaultdir= ] \
```

```
#       [ log= ] [ fhtable= ] \
#       [ buffer= ] [ logformat=basic|extended ]
#
global  defaultdir=/var/nfs \
        log=nfslog fhtable=fhtable buffer=nfslog_workbuffer
```

AutoFS

List the benefits of using the automount utility

File mounts on demand – automatic mounts take place when referenced share is nee

A timeout feature can be configured to unmount shares that haven't been used.

A name service can be configured to manage NFS mounts in conjunction with automo

Handles load balancing and redundancy between servers when multiple servers shar systems.

State the purpose of each of the types of automount maps

There are four types of maps used by the autofs:

1. **Master Maps** – automount reads these maps to determine what other maps ar autofs environment
2. **Direct Maps** – contain the absolute pathnames to mount points
3. **Indirect Maps** – contain the relative pathnames to mount points
4. **Special Maps** – maps that point to the `/etc/hosts` file or to FNS

Identify the steps needed to set up automount to read a direct map

Share out data that is stored in an `/export/opt` directory

The `/etc/auto_master` map file must be modified to specify a new direct map file

```
+auto_master
/-                  auto_direct
/net                -hosts     -nosuid,nobrowse
/home               auto_home  -nobrowse
/xfn                -xfn
```

A new file called `/etc/auto_direct` must be created, and an entry containing the a pathnames to the shared data must be entered.

Note that the + symbol refers the automounter to NIS/+. Comment this out for local fil

```
/export/opt-rosparty:/export/opt
```

Re-run `automount` with the `-v` option to make sure the changes take effect. The aut also be stopped and started. This must be done when making changes to either the n direct maps.

```
# automount -v
```

Identify circumstances under which the automount daemon shoul

As stated above in the direct map example, the `automountd` daemons should be re
the master maps or direct maps are modified.

CacheFS

Given an existing client-server environment, explain how to config file system

CacheFS is available to speed up access to slow remotely mounted file systems or de
CDROMs. Basically, a local cache is created on the hard disk, and requests for the re
redirected to the cache.

CacheFS has three main terms to remember:

1. **Back File System** – the original source of the data, be it network or CDROM
2. **Front File System** – the mounted, cached local file system
3. **Consistency** – the synchronization status between the front and back systems

To create a CacheFS file system, use the `cfsadmin` utility:

```
# cfsadmin -c /export/c_home_dirs
# mount -F cachefs -o backfstype=nfs,cachedir=/slow_remote_syst
cacheid=remote_system_0930 server1:/export/home /export/c_home_
```

Where `server1` is the remote server sharing its `/export/home`, which is being cacl
in `/export/c_home_dirs`.

Use appropriate commands to check the status and consistency o system

Cachefsstat is the command that displays CacheFS status information, and cfsadmin
that verifies consistency.

```
# cachefsstat /slow_data

/slow_data
cache hit rate:                 100%       ( 3 hits, 0 misses )
consistency checks:  18         ( 18 pass, 0 fail )
modifies:                       0
garbage collection:  0
# cfsadmin -s /slow_data
```

invokes consistency checking. Note, consistency checking is not necessary for back f
not change (i.e., CDROM). Mounting these file systems with `demandconst` specified
disable consistency checking. The `cfsadmin` utility will force consistency check if it is
time.

Identify the steps to set up cache file system logging

CacheFS logging enters the picture when the size of the cache file system is being de
`cachefswssize` (whoa!) command will display the amount of space allocated to the
It obtains this information from the cacheFS system logs, configured like the following

```
# mkdir /var/cachelogs
```

```
# cachefslog -f /var/cachelogs/slow_data.log /slow_data
```

A file `slow_data.log` stores statistics about the `/slow_data` files being served.

```
# cachefslog /slow_data
/var/cachelogs/slow_data.log: /slow_data
```

displays the log file name for the cached file system.

```
total for cache
   initial size:              30720k
       end size:              4096k
high water size:              4096k
```

List the steps necessary to perform a check of the cache file syste

`fsck` can be used to verify the cache file system.

```
# umount /slow_data
```

```
# fsck -F cachefs -o noclean /cache/cache0
```

Remount using the mount command.

Identify the steps to dismantle and delete a cache file system

Determine the cache ID for the file system that is being removed.

```
# cfsadmin - l /cache/cache0
cfsadmin: list cache FS information
          maxblocks            45%
          minblocks            0%
          threshblocks         75%
          maxfiles             45%
          minfiles             0%
          threshfiles                      75%
          maxfilesize                      6MB
    remote_system_0930
```

umount the file system using the cached data

```
# umount /c_home_dirs
```

Delete the cache file system

```
# cfsadmin -d remote_system_0930 /cache/cache0
```

Naming Services

State the purpose of a name service

Name services act as intermediaries between the numerical addressing scheme that identify themselves on a network, and alphabetical host names that are easy for huma

Special software on clients and servers translate between the two on the fly. More co

services also share account information and machine configurations.

Naming services offer a single point of administration, consistency, and immediate up

List the different name services and compare their functionality

- **Domain Name Service (DNS)** - Globally supported naming system used on T(is hierarchical in nature, and supports local delegation.
- **Network Information Service (NIS)** - Centrally-managed, domain-based Sun maintaining configuration files for clients on a set of designated name servers. accounts, host names, file maps, etc. on many client computers.
- **Network Information Service Plus (NIS+)** - An updated version of NIS that su security, cross-domain support, and hierarchical naming.
- **Lightweight Directory Access Protocol (LDAP)** - Combines standard namin with a directory that can store custom information about objects in the informat objects can be queried in a number of ways.

Given a local area network with a need for a name service, identify appropriate name service switch process and determine which co use for your network

The name service switch is a file `(/etc/nsswitch.conf)` that controls how networl obtained. Each client on the network has a local copy of this file. Entries in the file det particular type of information is obtained (e.g., from NIS, NIS+, DNS, etc.)

Tables or objects are listed in the file and can be can be configured individually for ea and in which order those name services should be queried when a lookup is necessa

A network that uses DNS as a primary host resolver would specify DNS first in the list hosts (an entry is made in the `nsswitch.conf` file). By default, the file is configurec

Template files exist to make the configuration easier. For example, to enable NIS, sim the `/etc/nsswitch.nis` to `/etc/nsswitch.conf`.

The five templates in Solaris™ 8 are:

`/etc/nsswitch.files` - searches only local files for information
`/etc/nsswitch.dns` - searches local files for everything but hosts
`/etc/nsswitch.nis` - searches the local NIS database for information
`/etc/nsswitch.nisplus` - searches the local NIS+ databases for information
`/etc/nsswitch.ldap` - searches the LDAP database for information

NIS

List and define the processes and components of the NIS master s slave server, and NIS client

An NIS system is comprised of servers that act as repositories for configuration inforn shared with clients that are all members of the same domain.

There are five main processes in an NIS environment:

1. `ypserv` – answers ypbind requests
2. `ypbind` – binds to domain server and stores binding information

3. `rpc.ypcpasswdd` – accounts for password changes and updates appropriate
4. `ypxfrd` – transfers NIS maps within the domain
5. `rpc.ypupdated` – also transfers NIS maps within the domain

`ypserv` is found on master and slave servers. `ypbind` is run on master, slave and cl
`rpc.ypcpasswdd`, `ypxfrd` and `rpc.ypupdated` are all run on master servers only

The NIS master server is a single server that contains the master copies of configurat
network. These map files are built from special ASCII files and stored in the `/etc/` di
one server allows for a single configuration and control point for an entire domain. Re
server is a client of itself in the domain.

The NIS slave server receives map files from the master server in the domain. They a
the event that a master server becomes unavailable. In busy networks, their presence
serves as load balancing for map requests.

The NIS client does not contain any local maps. Processes on the client bind to the m
server for configuration information. In the event that the host it is bound to should be
it can dynamically rebind to another working server.

List the steps to configure an NIS master, slave, and client

For a master server:

1. Make sure the computer is configured for NIS
2. Set the domain name using the `domainname` command and editing the `/etc/`
file
3. Make sure the text files with configuration information are up to date in the `/et`
`ethers`, `bootparams`, `locale`, `timezone`, `netgroup` and `netmasks` files s
length)
4. Run `ypinit -m` and specify slave servers when asked
5. Start the NIS daemons: `/usr/lib/netsvc/yp/ypstart`

For a slave server:

1. Make sure the computer is configured for NIS
2. Set the domain name using the `domainname` command and editing `/etc/de`
3. Initialize the machine as a client: `ypinit -c`, enter in the names of the other
servers when prompted
4. Start the NIS daemons: `/usr/lib/netsvc/yp/ypstart`
5. Initialize the machine as a slave: `ypinit -s <master name>`
6. Stop and start the NIS daemons on the new slave server

For a client:

1. Make sure the computer is configured for NIS
2. Make sure the `/etc/hosts` file contains the master and slave servers
3. Set the local domain name by using the `domainname` command
4. Initialize as a client: `ypinit -c`, and enter in the names of the master and sla
prompted

Given an existing network using the NIS name service, list the step
new NIS map

Network Information System maps are created from source files. On the master serve

are created, it is a good practice to separate the source maps from the distribution ma directory. Choose an alternate location, maybe `/usr/<domain-name>/maps`, and c PWDIR to this new location in the `/var/yp/Makefile`.

NIS maps are built using the make utility. Make reads a file called `/var/yp/Makefi` macros and other instructions for creating *targets*, which are the final maps. When ad the name of the map file must be entered into the `Makefile` at the end of the `all:` t

The commands to build NIS maps are:

```
# /var/yp
# make all
```

Given an existing network using the NIS name service, list comma and propagate an NIS map

To change maps, first edit the files in the `/etc/` directory on the master server. Then the `/var/yp` directory to compile these changes into a map file.

To pull the map files to slaves, you must run the `ypxfr` command. For example, to re `ethers.byaddr` file, run:

```
# /usr/lib/netsvc/yp/ypxfr ethers.byaddr
```

Sun provides a few scripts to propagate maps for certain intervals. These can be sche `cron`. Examine, for example:

```
/usr/lib/netsvc/yp/ypxfr_1perhour
```

or

```
/usr/lib/netsvc/yp/ypxfr_2perday
```

Role-Based Access Control (RBAC)

State the purpose of the Role-Based Access Control (RBAC) with r Solaris security

Role-Based Access Control can be thought of as a way to delegate system tasks to a designated users and groups. The traditional UNIX model is one of a single computer shares its resources among multiple users. However, the management of the system 'superuser' because the rights of this special account give access to the entire system to problems of misuse or simply misunderstanding.

The RBAC system allows a subset of tasks that fall under 'root' access to be granted community, in the hopes that savvy users can correct their own problems, and daily a can be off-loaded by the (usually) very busy administrator.

Privileges are assigned to users and groups through roles. This role is really treated a account by the system. In fact, users, while in a role, execute commands in a special

Authorizations, as they are in NIS, are assigned rights that grant access to a particula

Execution profiles are a method of grouping commands and assigning them to users

Select the statements that describe RBAC database features

The main features of RBAC lie in the four ASCII database files that make it up.

/etc/user_attr is the extended user attributes database. The file contains users a authorizations and execution profiles.

In order to support roles, this file extends the `/etc/passwd` and `/etc/shadow` files role to a system user. The fields of this file look like:

```
username::::attribute
```

where `username` is the same as in the `/etc/passwd` file, and `attributes` are opti pairs that may be any of the keywords auths, profiles, roles and type. The colons deli the empty fields are not in use by Sun currently.

Example:

```
kchiotis::::type=normal;auths=solaris.system.date;roles=sysadmi
```

/etc/security/auth_attr is the authorization attributes database. All system au their attributes are listed here.

Programs determine if the appropriate rights are set by checking authorizations in the assigned to users or execution profiles. The file entries look like:

```
authname:::short-description:long-description:attributes
```

where `authname` is a short, unique string that defines the auth-type in the form prefix used `solaris` as the prefix in all of its implementations. Short description is meant to GUI titlebar, long description is a helpful sentence describing the authorization, and th key-value pair, most often the `help` keyword.

Example:

```
solaris.device.config:::Configure Device Attribs::help=DevConfi
```

note that this defined authorization would be assigned to the user using the 'auths' ke the `/etc/user_attr` file.

/etc/security/prof_attr is the execution profile attributes database. Profiles o defined here. Each profile has an associated authorization and help file.

Usually, the attribute just sets the UID to root (0).

profname:::description:attribute

where profname is the case-sensitive profile name. The description is a definition of t profile. The attributes is a key-value pair for the object; right now it can only be help o

Example:

```
Device Management:::Configure New \
```

```
Devices:auths=solaris.device.*;help=DevMgmt.html
```

/etc/security/exec_attr is the profile execution attributes database. This file is profile is linked to its delegated, privileged operation.

The execution attributes file is where the commands that are run when a user or role the system are defined.

```
name:policy:type:::id:attribute
```

where name is the name of the associated profile. Policy -- suser -- is the only valid in time. Type -- cmd -- is the only valid type at this time. Id is a string value that represer to be run, and can be a script that executes a succession of commands. Attribute is a assigns security attributes to the executing commands. Attributes can be `euid`, `uid`, Specifying euid or uid is the same as having setuid applied. Specifying egid or gid is t setgid applied.

Example:

```
Printer Management:suser:cmd:::/usr/lib/lp/lpsched:euid=0
Printer Management:suser:cmd:::/usr/lib/lp/lpshut:euid=0
Printer Management:suser:cmd:::/usr/sbin/lpadmin:euid=0
Printer Management:suser:cmd:::/usr/sbin/lpsystem:euid=0
```

where Printer Management is an assigned profile in the `prof_attr` database:

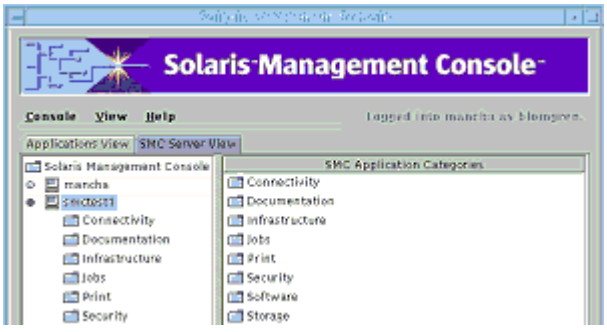
```
Printer Management:::Manage System Printing:help=Printmgt.html
```

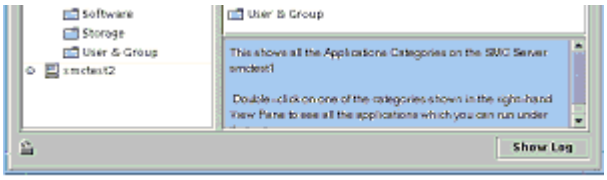
Solaris Management Console and Solstice AdminSuite

List the features of the Solaris Management Console

The Solaris™ management console lets administrators view and change attributes of network from any single console station. Applications can also be run and viewed fror another.

- *Centralized Administration*: Any Solaris administration tools can be integrated a location
- *Centralized Management*: Any server on a network can be managed centrally
- *Single Login*: Once a user is logged on using the SMC, credentials do not neec subsequent applications.
- *Instant access* to administration tools by running existing Solaris administratior
- *Secure communication* via Secure Sockets Layer (SSL) support





List the features of the Solaris AdminSuite

Solstice™ AdminSuite™ is a collection of GUI tools and commands used to perform a
tasks such as managing hosts, users, groups, system files, printers, disks, file system
modems. These tools and commands provide a graphical interface to the Solaris™ co
When using AdminSuite™, system files are automatically adjusted to eliminate manua
AdminSuite™ can also manage hosts remotely.

JumpStart-Automatic Installation

State the purpose of the JumpStart server

Jumpstart™ is built into Solaris™ 8 to allow administrators to quickly and consistently
the operating system on new or existing Sun computers.

Custom Jumpstart™ is a method to automatically install groups of identical systems.
Jumpstart™, a text file called *rules* must be created that lists one or more *profiles*. A *p*
that defines how Solaris™ is to be installed on a group of systems. Once these files a
are validated using the *check* script. In a non-networked environment, the validated fil
diskette in the *jumpstart* directory and the system is booted. Then the appropriate pro
direct the installation of Solaris™. In a networked environment, the *jumpstart* directory
network server.

Identify the main components of a Jumpstart server

Jumpstart™ requires the presence of certain servers for the process to work smoothly
components of these servers for setting up networks for automatic install are:

- Boot and client identification services.
  - The boot services answer RARP queries and serve files via TFTP
  - The boot server answers the questions as if a user were answering ther
    mode

- Installation services
  - Reside on a CDROM-equipped *install server* somewhere on the networ
    either copied to the server's hard disk or mounted and shared from the
  - If the *install server* is on a different subnet than the systems being instal
    is required to boot the systems.
  - It is a good idea to copy the OS to the disk, since the first CD of the two
    contains only Core and End User clusters.
- Configuration Services
  - Contains information about filesystems, partion sizes, and packages to i
  - Class and rules files will reside here.
  - If appropriate, the Solstice™ Host Manager is used to add network infor
    systems being installed to NIS or NIS+. Or, instead, the `add_install_`
    add network information to the */etc* files of the install or boot server.
  - If the systems being installed are diskless or Autoclients, an *OS* server
    provide the Solaris™ operating system.

Remember, any of the four default install methods for Solaris™ (and not just JumpSta
when installing over the network. A single server provide boot, install and configuratio
Jumpstart™.

List the parameters possible when using the add_install_client scr

Boot and install servers need clients added to them. Adding an install client involves r
`add_install_client` script.

```
# ./add_install_client -e Ethernet -i ip_addr -s install_svr:/d
-c config_svr:/config_dir -p config_svr:/config_dir client_name
client_arch
```

`-e` specifies the Ethernet address
`-i` specifies the IP address of the client
`-s` specifies the name of the install server and path to the install distribution
`-c` specifies the configuration server and the path to the config directory
`-p` specifies the path to the sysidcfg file

State the purpose of the boot service function on a subnet

The boot server contains information that the clients need to boot and contact other ir
configuration servers that exist on the network. Boot servers must be on the same sul
(because of the ARP nature of the clients' requests).

Identify the events that occur during the JumpStart Client boot se

When a client boots, it sends out a RARP packet that contains its MAC address. The
is on the same subnet as the client, will receive this message and match it to an entry
its `/etc/ethers` file. A valid installation IP address is returned to the client.

The client will then issue a TFTP request to obtain boot information from the server. T
a returned symlink that will correspond with the boot program appropriate to its archite
client has obtained the boot program, it executes it.

As the boot program runs, it sends out a `whoami` request that contains its hostname.
running `rpc.bootparamd` will look up the host name in `/etc/bootparam` and resp
with the location of its root and swap space.

Once the client receives the boot parameters and the root filesystem is mounted, the

and init begins and the client is redirected to the configuration server, where it runs sy
determine where the installation files directory is and starts SunInstall™ to load the op

List the files necessary to support the JumpStart boot operation

There are several files associated with the boot server.

/etc/ethers contains the MAC addresses of each client on the network. A lookup i
performed when a client RARP request is received. Without this information, the clien
to obtain a valid IP address.

```
08:00:a5:2d:90:3dsnarg
```

/etc/hosts contains the IP address to be associated with a client computer.

```
192.168.10.15snarg
```

/tftpboot is the directory that contains the binary files that contain the boot prograr
architecture of client. It is created when the `add_install_client` script is run. For
would look for a file called `inetboot.SUN4x.Solaris_8-1`. If the files in `/tftpbo`
the clients will fail to boot and no error will be displayed.

/etc/bootparams contains client specific information for each client that is going to
server. Information in the file is added via the `add_install_client` script. It would

```
snarg
root=bserver:/export/install/Solaris_8/Tools/Boot
install=bserver:/export/install
boottype=:in
sysid_config=bserver:/export/config
install_config=server1:/export/config
rootopts=:rsize=32768
```

`/etc/dfs/dfstab` is a listing of the local file systems that are going to share the ins
clients. It is also populated using options from the `add_install_client` script.

State the purpose of the sysidcfg file with and without name servic

Once the Jumpstart™ installation has begun, there must be a way to answer the ques
during the configuration identification setup. This is handled through the use of a `sys`
server specific to the client. If a name service does exist on a network, information like
provided by the name server If there is no name service, the `sysidconfig` file will pr
information to the client.

A `sysidcfg` file looks similar to the following:

```
system_locale=en_us
timezone=US/Pacific
terminal=vt100
timeserver=10.10.15.20
name_service=NONE
root_password=MPAdmhcDb4q
network_interface=hme0 (protocol_ipv6=no netmask=255.255.255.0)
```

The file location may be specified by the `-p` argument of the `add_install_client`

Select the statements that describe the steps necessary to set up a install server system to provide the Solaris 8 release software nec install a new system

1. Log in as root.
2. Mount the Solaris™ CD either by inserting it in the CD-ROM drive or mounting another system.
3. Change directory to the *Solaris_8/Tools* directory on the Solaris™ 8 CD 1 and `setup_install_server -b` command to boot the software from the Solari disk.

   ```
   # ./setup_install_server -b /export/install/
   ```

State the purpose of the add_to_install_server, modify_install_ser add_install_client scripts

Since Solaris™ 8 now requires two CDs for the full installation, a second script called `add_to_install_server` must be run to copy the second CD into the install direct the CD 2:

1. Change directory to the *Solaris_8/Tools* directory on the Solaris™ 8 CD 2 and

   ```
   # ./add_to_install_server /export/install/
   ```

2. To add install clients, cd to the client directory and run `add_install_client`

If the `add_to_install_server` script is not run, only Core and End User clusters w

The `modify_install_server` script will enable the Webstart style of Solaris™ 8 in you would do this for a jumpstart™ install is beyond me, because Webstart will requir answers.

Run the `add_install_client` script similar to the following:

```
# ./add_install_client -s bserver:/export/install -c \ bserver:
-p bserver:/export/config snarg sun4u
```

Given the appropriate software source, explain how to create a co server with a customized rules file and class files

The custom JumpStart™ files are accessed on the configuration servers via NFS or D custom JumpStart™ directory and files consists of:

1. Designating the JumpStart™ directory.
2. Create a rule for each group of systems in the *rules* file using the appropriate k syntax. Example rules file entries:

   ```
   network 10.10.16.0 && ! model 'SUNW, Sun 4_50' - class_net
   memsize 16-32 && arch sparc - class_admin_support -
   ```

   The rules classify machines on the network.
3. Create class files to categorize all the machines on the network, and specify ho will be installed using the appropriate keywords and syntax.
4. Create check scripts to verify that the rules and class files are valid. A `rules.`

when check scripts finish. The `rules.ok` file is what is actually read during a I
5. Create optional begin and finish scripts to allow for advanced configuration opt the 'power-save' feature of new systems.

Be able to recognize valid rule file and profile files.

Given an NIS name service network environment, explain how to c name service support for JumpStart

If NIS exists on the network, certain files required for Jumpstart™ installation can be t in the form of maps. These files include:

```
/etc/ethers
/etc/hosts
/etc/bootparams
```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site at
http://acm.cse.msu.edu/~kortasma