Apple Certified Specialist - Deployment ACS-DEP v10.6

NOTEBOOK

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Disclaimer

This notebook is intended for personal use only, it is a collection of questions and answers regarding the subjects concerning the ACS-DEP certification v10.6.

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The following content is an unofficial (my personal) guide to acquire knowledge to pass the certification exam Snow 302, it may be inaccurate and may contain mistakes, it is just the result of my studies and was intended to help myself in memorizing the main concepts learned reading the official books part of the Apple Training Series.

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Deployment Planning

Given a target audience, create policies regarding acceptable use of software and hardware

1. The larger the member of deployed system, the more rules need to be in place to keep problems under control.
2. Different types of users often require different usage policies.
3. Evaluate old policies for new deployments, technology changes and new features may not be addressed by old policies.
4. Consider the following policy categories:
   - Computer access: who has access to which computers.
   - Software: which applications are required and allowed.
   - Peripherals: which peripherals are allowed.
   - Storage: storage permissions and usage quotas, user's home folder location.
   - Network access: which users and computers have access to the network resources, to wireless networks, secure network via VPN connections.
     Regulations regarding how to deal with rogue network activity.
   - Shared network resources: file servers, internal websites, network printers, communication systems.

Identify manufacturers of hardware that can physically secure Macintosh computers and peripherals devices

1. Kensington, security locks.
2. Nobles, custom Mac locks for desktop tower Mac systems.
3. Bretford, security carts for Mac computers and iPods.

Given a document of software and hardware-use policies, develop a plan to distribute the policies to users

1. Make users to sign a paper contract before they are allowed to use the computer equipment.
2. Users may agree to usage policy electronically:
   - By a web page.
   - Through the login window.

Describe the issue regarding disposal of electronic equipment including compliance with local state and federal regulations, cost and the storage and transportation of potentially hazardous material.

1. Need to define a location to temporary sore the old hardware before it leaves your facility.
2. All local waste ore recycling services require special handling for any type of battery.
3. Computer equipment is highly toxic in traditional waste streams.
4. Computer equipment is highly desirable for recyclers that may give your organization some money return.

Given a list of equipment including computer and peripherals, calculate the equipment's total power required

1. Test one of your new computer using a pass-through electric monitor.
   You need to test the peak usage and averages.
2. Find the standard power usage of the equipment you are going to be using in your deployment.
   Power requirements are listed on the Apple website.
3. Calculate the number of `amps` required (`watts` ÷ `volts` = `amps`).
4. Calculate the power requirements of peripheral equipment.
5. Consider which outlets are tied into individual circuits.
   Try to keep lightening in a different circuit.
   Keep conditioners on a separate circuit.
6. Try to use uninterruptible power supplies (UPS).
7. Every amp used to power the computing equipment should be matched by another amp used to provide cooling.

Describe how a directory service system can be incorporated as part of a software deployment to enforce usage policies

Directory service permits to manage:

1. User accounts all over the network.
2. Home folder management, support for:
   - Network home folder.
   - Synchronized home folder.
   - External storage device.
3. Managed preferences through MCX Management Architecture.

Given a hardware deployment plan, modify the plan to include details on how to physically secure the hardware

1. Secure the location where your computers reside
    - Doors locks.
    - Alarm systems.
    - Surveillance systems.
    - Full-time lab attendant staff.
2. Use physical security mechanisms:
    - Locking mechanisms:
        - Kensington security locks for portables.
        - Nobles locks for tower Mac computers.
    - Storage carts for portable computers and devices

Define the following terms: ampere, watt and click matrix

1. Ampere (amp): to measure electric current.
2. Watt: to measure the amount of power.
3. Click matrix: is a check list that includes all the configurations and tasks that must be completed and validated before the system is deployed.

Given a plan for deployment of new hardware and list of hardware being replaced, modify the deployment plan to include instructions on how to properly dispose of the obsolete hardware

1. Back up or transfer user data.
2. Securely erase data from computer hard drives.
3. Take inventory, required for both internal accounting and for records of whomever is receiving your old computers.
4. Collect the equipment, and transport them to the disposal destination, usually handled by the same staff that delivers the new equipment.
5. Dispose of the old equipment, usually done by a specialized company.

Describe physical security features built into Macintosh computers

1. Kensington security slots on portable Macs.
2. Traditional locking mechanisms to restrict access to internal components on recent desktop tower Mac systems.

Identify context-appropriate considerations to take to physically secure the hardware

1. Open environments like computer labs or conference areas need hardware security measures.
2. Office environments and equipments rooms usually do not require more then locations security measures.
3. Open labs may need full-time lab attendant staff and/or security locks.

What five primary technologies in Mac OS X can be used to enforce policies

1. User account management.
2. Home folder management.
3. File system permissions.
4. Authorization management.
5. Managed preferences.

Given technical specifications for a Macintosh computer, identify appropriate temperature range for operation of the computer

1. 50° to 95° Fahrenheit.
2. 10° to 35° Celsius.

Given a list of installed hardware and a list software to be deployed create a testing matrix that covers the full range of installed hardware and software

SOFTWARE COMPUTERS	Software1	Software 2	Software 3
Computer1	V	X	V
Computer 2	V	X	V
Computer 3	X	V	V
Computer 4	X	V	X
Computer 5	X	V	X

List third-party solutions that can assist in testing images and packages prior to deployment

1. Command line automation via shell scripts.
2. Graphical automation via AppleScript and Automator.
3. Eggplant series of software via TestPlant.

Given one or more servers connected to a network, select a testing method for optimizing deployment server stream (bandwidth)

Select a small amount of computer and run the deployment test to verify the amount of bandwidth generated to have a rough idea of the bandwidth usage proportion for the deployment on the whole network.

Explain what a Service-Level Agreement is. Explain the role of a SLA in relationship to the deployment of Mac OS Systems

1. A Service-Level Agreement is a document or contract that ensures that the resulting technology solution meets agreed-upon expectations.
   It specifies:
   - What service is supported.
   - Times.
   - Locations.
   - Costs.
   - Performance.
   - Responsibilities of the parties involved.
2. SLAs help define details such as the following:
   - Services provided.
   - Performance measures.
   - Problem management.
   - User (or client) duties.
   - Warranties.
   - Disaster recovery policies.
   - Termination of agreement.

Deploying Individual Items and Containers

Define the following terms: resource fork, Mac OS X file system metadata, bundle, package, AppleDouble

1. Resource fork: it's a separate piece of data that compose a file in HFS that contains file system metadata.
2. Mac OS X file system metadata: is a part of the file system that includes additional attributes of an item for extended features.
3. Bundle: is a normal folder that is used to group related resources in on locations. Usually they are assigned with names similar to files (that include a period in the file name). Usually bundles are composed by a hierarchical directory structure containing an executable code and related resources.
4. Package: is a bundle with the bundle file attribute set to appear as a single opaque item in the Finder.
5. AppleDouble: is the practice of splitting files when using Mac OS X to copy files to any other third-party file system to separate the metadata to be store as a hidden file (when the file system do not natively supports metadata).

Give one or more files and the command line interface, create a .zip archive of the files

1. `$ zip new_archive.zip <list of files to be archived>`
2. `$ ditto -c -k src_directory ditto_archive.zip`

Describe the issues in distributing files with Mac OS X file system metadata

File system metadata may be lost when files are copied using traditional methods between different systems:

1. Ownerships can be lost or modified.
2. HFS attributes may be stripped away.
3. AppleDouble may be generated.

Given Terminal and a .zip archive, list the contents of the archive

1. `$ zip -sf <zip archive>`
2. `$ unzip -l <zip archive>`

List at least two methods for distributing files with Mac OS X file system metadata through mechanisms that don't support file system metadata

1. Archive File deployment.
2. Disk Image deployment.

Given an archived/zipped file and the CLI, retrieve the files from the archive

1. `$ unzip <zip archive>`
2. `$ ditto -kx <zip archive> <destination directory>`

Describe the issues in distributing bundles files

1. Bundles and packages are treated as normal folders by third-party systems and transfer mechanisms.
2. In many cases the bundle-bit attribute will be stripped away.
3. The once-opaque package will appear as a folder in the Finder.
4. The package will prevent to open as intended.
5. It confuses users because they will see a folder instead of an application icon.
6. Possible accidental partial copies.

Given an archived/zipped file and the Finder, retrieve the files from the archive

Double click the archive to obtain an uncompressed folder named like the archive, containing the files of the archive.

List methods for distributing bundled files to ensure that the bundle's contents are kept intact

1. Archive File deployment.
2. Disk Image deployment.

Given a collection of files, Apple Remote desktop and a Mac OS X computer configured to be managed by ARD, coup the files to the remote computer via Drag & Drop

1. Open the Remote Desktop application.
2. From the computer list in the sidebar select the target Mac.
3. Click the "Control" button from the toolbar.
4. The target Mac's screen will appear and there navigate to the intended destination folder.
5. From the Finder in the local Mac select the items you want to copy on the target Mac.
6. Drag & Drop the items to the intended destination on the target Mac's screen.
7. Close the target Mac's screen, the copy will proceed also if the screen is closed.

Describe the pros and cons of using each of the following methods for distributing a single file to a group of files

1. Drag & Drop:
   - Pros:
     - Doesn't require any encoding or decoding.
     - Doesn't require any special tools or any system.
     - Simple for inexperienced users.
   - Cons:
     - Mac OS X file elements may not be preserved if storing or transporting using third-party mechanisms.
     - Multiple items may not be transferred properly when using certain third-party mechanisms, as related items may became separated and lost during the transfer.
2. Archive File deployment:
   - Pros:
     - Mac OS X file elements are retained if encoded and decoded using the correct tools.
     - Multiple items contained in a single file that is easily transferable using any mechanism.
     - Compressed format saves storage space and bandwidth.
     - Uses zip or tar.gz format that can be decoded on nearly any system.
   - Cons:
     - Requires additional encoding and decoding steps.
     - No file checksums to verify content.
     - The Finder doesn't support the creation of encrypted archives.
     - The Finder doesn't support modifying existing archives.
3. Disk Image deployment:
   - Pros:
     - Mac OS X file elements are always retained.
     - Multiple items or even entire file systems can be contained in a single file that is easily transferable using any mechanism.
     - File checksum helps verifying content.
     - Optional compressed format saves storage space and bandwidth.
     - Optional encrypted format secures items from unauthorized access.
     - Optional read/write format allows easy modification and expansion of disk image contents.
     - Variety of advanced deployment uses beyond simple items.
   - Cons:
     - Requires additional creation, mounting and copying steps.
     - Host with third-party systems are not able to open the Mac OS X disk image format.
     - Can be complex for inexperienced users.

State the command-line utility appropriate to use for archiving files with Mac OS file system metadata

"ditto"

Given a folder or files and Disk Utility, create a disk image containing the files

1. Select File > New > Disk Image from folder, from the application menu.
2. Choose the source folder.
3. Cohos the destination folder and a disk image file name.
4. Choose the appropriate settings (disk image characteristics preferred), Save.

List the image formats available when using Disk Utility to create disk images in a Mac OS X computer

1. read/write disk images.
2. DVD/CD master.
3. Sparse disk image.
4. Sparse bundle disk image.

More formats are available via "hdiutil" command-line tool

Given a disk image and Disk Utility, resize the disk image so that additional files can be added to the contents

1. Select Images > Resize... from the application menu.
2. Select the read/write disk image to be resized.
3. Choose the new dimension and click Resize

Give a disk image and Disk Utility, convert a disk image of one type such as read-only, to another, such as compressed

1. Select Images > Convert... from the application menu.
2. Select the source disk image.
3. Select the new image format you want to covert the disk image to, and click Save

State the name of the CLI utility for manipulating and creating disk images

"hdiutil"

Given a disk image, modify the disk image to include a background image in the Finder window that provides the user with information about the content (such instructions to drag on application to the /Applications folder)

1. Mount the read/write disk image.
2. Right-click on the root of the disk image to make the contextual menu to appear.
3. Select '`Show View Options`' from the contextual menu.
4. Select 'Picture' as Background option.
5. Drag & Drop the copied image on the image well.
6. Rename the image with a leading period '.' so the file will be hidden in the Finder.
7. Close the '`View Option`' menu, and close the window showing the disk image content so the new view configuration will be saved.

List the advantages of using disk images over .zip files

Disk images are ideal if you need to deploy:

1. Any number of items from simple to complex.
2. Entire operating systems.
3. The content of an entire file system or even multiple file systems.

Disk images are also preferred if your environment requires:

1. A storage mechanism that is easily editable.
2. A storage mechanism where compression is optional but not required.
3. Data checksum to verify the integrity of deployed items.
4. Increased security through the use of password-protected and encrypted storage.

Given a disk image modify the disk image to include a file system link to a location on the user's system, such as "/Applications", to assist in the copy of files from the disk image to the correct location on the user's computer

1. Mount and open the read/write disk image.
2. In the Finder on the local computer browse to the directory you want to create the link to.
3. Drag & drop the directory to the disk image root (or any other contained destination) holding the key combination of `command + option`.

List the advantages of using .zip files over disk images

Archive files are ideal if you need to deploy:

1. A small number of items.
2. On both Mac OS X and third-party operating system.

Archives files are also preferred if your environment requires:

1. A file format that is easily accessible for novice users to store items.
2. Quick lossless compression.
3. A file format that is compatible with nearly any operating system.

Given a disk image, convert it to an internet enabled disk image

```
$ hdiutil internet-enable <disk image name>
```

Describe how an internet-enabled disk image functions differently than other disk image types

1. When downloaded the internet-enabled disk image is automatically mounted.
2. The visible content is copied on the same folder containing the disk image.
3. The volume is ejected.
4. The disk image is placed in the trash.

Given an extremely large disk image, segment the image so that it can be distributed as multiple smaller files

```
$ hdiutil segment -o <new_disk_image_files> [-segmentSize <size> |
-segmentCount <count>] <larg_disk_image_path>
```

Explain how a bundled sparse disk image functions differently than a standard sparse disk image

1. Bundled disk image files are automatically sized to fit the disk image content.
2. Bundled disk images are saved as a package containing multiple storage bands.
3. Storage bands default size is 8MB, up to 128MB.
4. As the disk image contents expand, new bands are added.
5. Bundled disk image is the format used for FileVault and Time Machine.

Given a list of the types of disk images that are supported on a Max OS X system identify all the image types that can be segmented

You can segment only `read-only` and `compressed` disk images

Deploying with Installation Packages

Define the following terms: installation package, metapackage, receipts

1. Installation package: it's a collection of compressed files and other information used to install software on Mac OS X. The entire contents of an installation package are contained within a single package bundle or package file, which has filename extension `.pkg`.
2. Metapackage: allows you to present multiple packages as a single installation package. It references other installation packages which perform the actual installation. It has `.mpkg` file extension.
3. Receipts: are items used to keep track of installation items. Generally there are two receipts files:
   - BOM, Bill Of Materials.
   - plist, a file containing general information about an installation.
4. Payload: are the items intended to deploy using an installation package. The payload is contained in the Archive.pax.gz file.

Describe the difference between the flat-file installation package format of Snow Leopard and the bundled format used in the earlier versions of the OS

FLAT-FILE	BUNDLED
• Package content is flattened to a single contiguous data file. • Signable with a certificate. • Items stored in the root of the package.	• Package content is in a bundled folder with the bundle flag active. • Not signable unless encapsulated in a disk archive or compressed package. • Has a package folder to contain the package items.
CONTAINS	CONTAINS
• BOM • Payload • Distribution • PackageInfo • Resources folder	• Archive.bom • Archive.pax.gz • Distribution • Info.plist • Resources folder

Describe the purpose and benefits of using installation packages for software distribution

1. Verify that certain version of the operating system is already installed.
2. Verify that certain components are already installed on the system.
3. Start and stop processes ad daemons.
4. Install software in multiple locations throughout the system.
5. Run custom scripts to automate administrative functions.
6. Present the users with documentation, policies or license information.
7. Allow the user to customize the installation.

State the versions of Mac OS X that support the new flat-file installation package

Mac OS X 10.5 or superior

Given a list of files within an unflatten installation package, describe purposes of each of the files

1. BOM: (Bill Of Materials) describes the contents of the installation package.
2. Payload: contains the actual content to be installed.
3. Distribution: script file to control the installation process, like Installer interface customization and installation requirements specification.
4. PackageInfo: property list which contains general installation information, such as whether the package requires the computer to be rebooted after installation.
5. Resources folder: contains additional resources that are used by the installation process such a background image, ReadMe files, license-agreement files.
6. Packages folder (only for bundle-based metapackages).

List three methods for distributing software via installation packages

1. Web server, or file server.
2. SSH.
3. ARD.
4. Third-party and commercial softwares.

Given one or more scripts and PackageMaker, create an installation package that executes scripts but does not install files (a payload-free package)

1. Drag an empty folder to the Contents list.
2. Disable the Empty folder to install (from the Contents pane).
3. Configure the actions and scripts.

It's best practice to set postinstall actions and scripts for payload-free installations so the scripts run only if the user chooses to complete the installation process.

List the types of scripts that can be added to an installation package

Flat packages	Bundle-base packages
	Preflight
Preinstall	Preinstall
	Preupgrade
Postinstall	Postinstall
	Postupgrade
	Postflight

Given PackageMaker, create a SnapShot installation package of files that had been installed or modified during a specific monitoring period

1. Select `Project > Add Snapshot Package` from the application menu.
2. Click the "Start" button to begin the 'watching" session.
3. Perform the software installation and any other configuration you want to be part of the package.
4. Check the 'Stop' button to end the 'watching' session and a new 'Choice' called 'Snapshot' will appear in the 'Contents' list.
5. Now proceed with the configuration of the package like it was a classic package.

Describe when each type of installation script is run

1. Preflight (BB only): run before all other scripts, before any upgrade take place.
2. Preinstall: run after the preflight script only if it's a new installation.
   In flat packages they run before the package they are associated to is installed.
3. Preupgrade (BB only): run after the preflight scripts only if the installation is an upgrade.
4. Postinstall: run after the initial installation.
   In flat packages they run after the associated package is installed.
5. Postupgrade (BB only): run after an upgrade installation.
6. Postflight (BB only): run after all other scripts.

List alternative third-party solutions for creating and modifying installation packages

1. Pacifist by CharlesSoft.
2. Composer by JAMF.
3. Iceberg by WhiteBox.
4. InstallEase from LANrev management suite.
5. VISE X 3 by Mind Vision.

Given the CLI and a flattened installation package expand the package to a directory

```
$ pkgutil --expand FlatInstallation.pkg <UnFlatInstallFolder>
```

Given an installation package, extract specific files from a package without installing all of the files in the package

1. Unflatten the flat package or locate and extract the payload archive of a bundle-based package, to a temporary directory.
2. Select manually the items you are interested in, and copy them in your favorite location.
3. Assign permissions to those items manually according to the BOM file included in the package.

Describe the importance of installation package inspection prior to installation/distribution

1. A poorly made installation package could destroy the software on your Mac.
2. A malicious installation package could perform an action that puts your personal information at risk or even violate the low.

List what files will be installed by an installation package

```
$ lsboom -p MUGsf /Path/Of/Installation/Package/BOM_File
```

Describe the purpose and benefit of checksumming with respect to package installers

1. It's used to verify that the download file is identical to the original.
2. It prevents you to install compromised packages due to connection failure or sabotage.

Given a receipt from a manually installed installation package list which files were installed by a pre-made package

1. Navigate to `/var/db/receipts` folder, in Mac OS X 10.6, to view the list of .bom files. Prior to Mac OS X 10.6 .bom files are stored in `/Library/Receipts/db` folder.
2. Use the command:
   ```
   $ lsbom -p MUGsf <bomfile.bom>
   ```

Describe how Mac OS X tracks the installation of installer packages

Immediately after an installation completes, a receipt entry is created for the installation package. Two files are generated, a '.bom' (Bill Of Materials) file that contains the list of installed files, and a '.plist' (Preferences List) file that contains general installation information (including when the item was installed).

Explain how Apple Remote Desktop can be used to open installation packages on one or more remote computers

1. Open the 'Remote Desktop' application.
2. Select the computers to which you want to deploy into the packages list.
3. Click the 'Install' button.
4. Configure the deployment conditions and schedule time for the deployment.
5. Click 'Install'.

Given an installation package and a Mac OS X computer, verify that the package properly installs files and runs the package's scripts

1. The Installer application will present an 'Install Succeeded" screen.
2. The `installer` CLI command will return "`installer: The install was successful`".
3. The ARD application will report 'Succeeded' in the History list.

Any installation will write information on "`/var/log/install.log`' that you can consult with the CLI toll `less` or the Console application.

Given SSH, an installation package and a remote Mac OS X computer, install the package on the remote computer

Working on the local computer:

1. `$ scp package.pkg ladmin@remotemac.local:/tmp/`
2. `$ ssh ladmin@remotemac.local`
3. `remotemac$ cd /tmp/`
4. `remotemac$ sudo installer -pkg /tmp/package.pkg -target /`

Given a Mac OS X computer, list the installation packages that have been installed in a Mac OS X system

```
$ pkgutil --pkgs
```

Explain the recommended format of an installation package's identifier

The format is the reverse URL notation like org.mozilla.firefox.

Given the command-line interface and a Mac OS X file system, repair permission issues caused by installation of an incorrectly-built installation package

```
$diskutil repairpermissions <path_to_the_target_volume_root (“/”)>
```

Given a Mac OS X computer list the installation package receipts that are used in correcting permissions

```
$ /usr/libexec/repair_packages --list-standard-pkgs
```

Define the term “installation action” as it applies to PackageMaker projects

1. Actions (and Scripts) allow an installation package to serve as a deployment mechanism for both files and administrative tasks.
2. Installation actions are very similar to the Automator actions and they can be part of an installation workflow.
3. You can set action for the installation product package ONLY, not per choice or package.

Given a Mac OS X computer and the pkgutil command, remove receipt data associated with an installed package

```
$ sudo pkgutil --forget org.mozilla.forget --volume /
```

Given a flat package and Flat Package Editor, display the contents of the flat package

1. Right-click on the flat-package icon.
2. Select `Open With > Flat Package Editor`

Given a PackageMaker project file and a list of minimum system requirements for the target computers, configure the project so that the final installation project will only install its contents on systems that meet the stated minimum requirements

1. You can set installation requirements that prevent the whole package to install if not met, selecting the Product Package and the Requirements pane where you can set up the conditions.
2. You can set installation requirements that prevent the installation of specific package choice selecting the choice from the Contents list and accessing the Requirements pane where you can setup the conditions.

Given a PackageMaker project, modify the project to include one or more installation actions

1. Select the product package title above the Contents list.
2. Click the Action tab.
3. Click the Edit button below either the Preinstall Actions list or the Postinstall Actions list.
4. A new dialog appears allowing you to create an installation action workflow.
5. Drag the desired actions from the actions list to the workflow area.
6. Configure the action inputs and click 'Save'.

Creating System Images

Given a deployment plan and a target audience, specify application and system configuration requirements for a custom image

1. You need to use the latest retail version of Mac OS X to be sure that the image is compatible with all the computers that respect the minimum requirements and all new Macs. Intermediate versions of Mac OS X shipped with the latest Macs may not have support for older computers.
2. You need to acquire and apply the latest Apple System updates to the image so you have not to repeat it for every single computer.
3. Check the latest version of third-party software and drivers.

State which files should be removed from a system before imaging a pre-configured system

1. Remove user-specific files:
   - `/Volumes/HD/Users/<username>/Send\ Registration`
   - `/Volumes/HD/Users/<username>/Desktop/*`
   - `/Volumes/HD/Users/<username>/Downloads/*`
   - `/Volumes/HD/Users/<username>/Library/Caches/*`
2. Remove computer-specific files:
   - `/Volumes/HD/Documentation/old_*`
   - `/Volumes/HD/Library/Caches/*`
   - `/Volumes/HD/System/Library/Caches/*`
   - `/Volumes/HD/Library/Managed\ Preferences/*`
   - `/Volumes/HD/Users/Shared/*`
   - `/Volumes/HD/private/etc/ssh_host*`
   - `/Volumes/HD/private/var/db/volinfo.database`
   - `/Volumes/HD/private/var/vm/swap*`
   - `/Volumes/HD/private/var/vm/sleepimage`
3. Reset the LKDC (Local Kerberos Distribution Center):
   - `/Volumes/HD/private/var/db/.configureLocalKDC`
   - `/Volumes/HD/private/var/db/krb5kdc`
   - `/Volumes/HD/private/etc/krb5.keytab`
   - `/Volumes/HD/Library/Keychains/System.keychain`

Given a Mac OS X computer connected to the internet, list the currently available software updates provided by Apple

1. Launch the Software Update application.
2. Go to www.apple.com/downloads.

State the minimum OS version that can be imaged using System Image Utility

Mac OS X 10.6

Given an image to be applied to one or more hardware system with software installed, identify applicable software updates that should be applied to the image

Install Combo Updates as they include system security updates too

State the image sources that can be used by System Image Utility for creating images

1. Mac OS X installation media.
2. Any System Volume that is not currently booted (also in for of a mounted disk image volume).

Configure the main administration account so that it is not visible from standard user accounts

1. Login to the model computer with an administrative account.
2. Choose 'Display login window as:', 'list of users' from the Login Options from the Account Preferences pane of System Preferences.
3. Create a new administrative account (do not activate FileVault for it).
4. Choose the advanced option for the new administrative account and assign it the user ID 499 and change the home directory location to any hidden path like '`/var/.hadmin/`'.
5. Move the original home folder to the new path and correct the ownership for the home folder items.
6. Remove the Public and Sites folders from the hidden administrator home folder.
7. Modify the `loginwindow` settings so the hidden administrator account and any account with user ID below `500` are not shown:
   - `$ sudo defaults write /Library/Preferences/com.apple.loginwindow Hide500Users -bool TRUE`
   - `$ sudo defaults write /Library/Preferences/com.apple.loginwindow HiddenUsersLists -array hadmin`
8. Delete your initial administrator account because it's not hidden.

Describe the underlying structure and format of Mac OS X Server's management client system (MCX)

It's XML

Given a Macintosh computer with a new copy of Mac OS X installed configure the system to either not play the startup video or play an alternative version

1. Create a .mov (video) and .mp3 (audio) files, optionally empty.
2. Copy those files into "`/System/Library/CoreServices/Setup Assistant.app/Contents/Resources/TransationSection.bundle/Contents/Resources`"

Given a Mac OS X computer bound to an Open Directory server, configure the desktop to display a locked image embedded with the acceptable use policy

1. Create the image you want to use as locked desktop.
2. Login into your model computer with and administrative account.
3. Place the image in a location that all users will be able to access "`/Library/Desktop Pictures`".
4. Open the Desktop & Screen Saver preferences and set the desktop background. Set also additional desktop background features.
5. Protect the desktop image file from modification (`755, chown root:wheel`).
6. Open Workgroup Manager (WGM).
7. Select the accounts you want to manage.
8. Click the Preferences button from the toolbar and select the Details tab.
9. Click the '+' button to activate the import dialog.
10. Select the file '`~/Library/Preferences/com.apple.desktop.plist`'.
11. Double-click the Desktop Picture preferences.
12. Select and delete al the items except for `Background > Default Image > Image Path`

Describe how System Image Utility uses Automator actions to create images

1. Included with SIU is a suite of Automator actions tailored o the creation of custom network disk images.
2. The Customize button will reveal the workflow mode of SIU where the actions 'Define Image Source' and 'Create Image' are always in place and have always to be respectively the first and last actions if any workflow in SIU.

Given a Mac OS X computer bound to an Open Directory server, configure the login window to deploy an organization specific message such as an acceptable use notice

1. Open WGM.
2. Select the computers accounts or groups you want to modify the login screen for.
3. Click the Preferences button from the toolbar.
4. Click the Login Preferences button.
5. Select the 'Manage', 'Always' tab.
6. Define the 'Message' you want to display, click 'Done'.

Describe the relationship between the inputs and outputs of Automator actions and how actions are combined together to create a workflow

Adjacent actions can communicate to one another through inputs and outputs.

Describe how other Automator actions can be used to enhance the creation of a Network Disk Image

You can use SIU specific actions directly in the Automator application.
In this case you have access to all the automator actions available in your system and you can create more advanced workflows to personalize your Network Disk Image.

Describe the features and benefits of Mac OS X Server's managed preferences system

1. You can choose to display managed preferences after you have deployed your system image.
2. The managed preferences service is a network directory service that the client computers are bound to.
3. You don't have to include configuration information as part of your system image.
4. You can easily change configuration settings after your initial deployment.
5. Define policy at four different account levels: user, group, computer, computer groups.
6. The management remains active even if the Mac is disconnected from the directory service (preferences are cached locally).

Given System Image Utility an image source and one or more installation packages, create NeBoot or NetRestore image that includes the packages

1. Click the 'add' ('+') button, to 'Create a New Workflow', click 'Agree'.
2. Drag & drop the action 'Add packages and Post-Install Script' between the actions 'Define Image Source' and ' Create Image'.
3. Drag & drop the installation packages you want to install in the new action.
4. Select NetBoot or NetRestore as image type in the 'Create Image' action.
5. Click 'Save' to save the workflow, and then 'Run' to create the image.

Describe the features and benefits of Mac OS X Servers preferences manifests

1. It is a file embedded inside an application bundle that describes the application's customizable preferences.
2. It often includes examples and plain-text description of the items.
3. WGM first scans the application looking for a manifest file.

Explain the alternative method to Disk Utility for create a cloned image of a Mac OS X

1. You can use the `hdiutil` CLI command.
2. You can use System Image Utility that brings the advantages of an automated method for creating deployable system images.

Describe how to determine the minimum version of Mac OS X that should be used to create an image for a Macintosh computer

Consult the Apple article HT1159 "Mac OS X versions (builds) included with Intel-based Macs" to determine the minimum version of Mac OS X that includes hardware support of a specific Mac model.

Given a disk image for a Mac OS X computer and Disk Utility, prepare the disk image for deployment

1. Choose `Images > Scan Image for Restore`.
2. Alternatively use the CLI command `asr` as follow:
   `$sudo asr imagescan --source cloned_image.dmg`

Describe the two methodologies for creating a deployment system image

1. Creating an image of a completely configured system:
   You create a cloned disk image an existing and configured system and prepare if for deployment removing specific files as the system has already been booted at least one time.
2. Applying installation packages to a base OS image:
   You create a Network Disk Image based on a new installation through a SIU (Automator) workflow that install applications and applies configurations with the use of personalized installation packages, in this case is not necessary to delete any file from the final image as the system is never booted before the deployment.

Given Terminal and a configured Mac OS Computer, create a disk image from a configured system

1. `$ sudo hdiutil create -srcdevice /Volume/<mounted System Volume> output.dmg`
2. `$ sudo asr imagescan --source output.dmg`
   (to prepare the image for deployment)

Compare the two methodologies for creating a deployment system image including the benefits of each method

1. Basic Images with System Image Utility:
   - Similar to when you create a cloned system image.
   - Created by setting up a model computer.
2. Modular Image:
   - Cleaner system image.
   - Easier upgrade path.
   - Easy to automate.
   - Built by applying multiple installation packages.

Given a disk image of a Mac OS X computer and Terminal prepare the disk image for deployment

`$ sudo asr imagescan --source disk_image.dmg`

Deploying System Images

Describe how a NetBoot Image ID is used by the NetBoot service to provide load balancing

1. The image ID is an index value which the client computers use to identify images hosted from NetBoot shares.
2. If multiple hosted images have the same index number, client assumes that the images are identical and displays only one entry.
3. The Client will attempt to connect the the least busy NetBoot server to get the best performance.
4. If a network disk image will be hosted on only a single server, it should be assigned an index value between 1and 4095.

Given a Mac OS X computer with Boot Camp partition, list methods for creating an image of the system

Use WinClone (third-party software) as Mac OS X doesn't include any built-in support for creating system images of a Mac Boot Camp partition containing the Windows operating system.

Include the WinClone dmg image as file inside a Mac OS X NetBoot disk image.

Try to restore a WinClone dmg image using scripts included in a '.pkg.' package in a modular NetBoot image.

Given System Image Utility and an image source, create a System Image Utility project that includes an Automator action to define system configuration settings

1. Click the 'add' ('+') button to create a New Workflow.
2. Drag & drop the 'Apply System Configuration Settings' action just before the 'Create Image' action.

Given a disk image of a Mac OS X system, Disk Utility and a target computer, restore the target computer with the given disk image

1. Start the target computer in 'Target' mode and connect it to your computer via FireWire.
2. In Disk Utility select Volume corresponding to the target computer startup volume.
3. Click the 'restore' tab.
4. Drag & drop the disk image in the 'Source' field.
5. Drag & drop the target computer volume in the 'Destination' field, click 'Restore'.

State the format of the `asr` command when used to multicast images across the network

```
$ sudo asr --server "Documents/asrconfig.plist" --source "/
Volumes/Storage/Image.dmg"
```

Given a disk image of a Mac OS X system, Terminal and a target computer, restore the target with the give disk image

```
$ sudo asr restore --source diskimage.dmg -target "/Volumes/
Target_Volume" --erase
```

Given a list of files contained within a network disk image, describe the purpose of each file

1. NBImageInfo.plist: contains most of the configuration settings.
2. NetBoot.dmg/NetInstall.dmg: read/write disk image containing the full system volume.
3. A folder named "i386": contains the fundamental core system files required to initiate the Mac OS X startup process in Intel-based Macs.
   Contains:
   - System Boot Loader 'booter'.
   - 32-bit Mac OS X kernel 'mach.macosx'.
   - 32-bit driver cache 'mach.macosx.mkext'.
   - A folder named 'x86_64' that contains similar items for booting in 64-bit kernel mode.
4. A folder named 'ppc' (only in older network disk images): contains the fundamental core system files required to initiate Mac OS X startup process on PowerPC-base Macs.

Describe how Apple's Custom Software Solutions (Apple CSS) service can be used to deploy software on new Apple hardware

1. The Apple CSS team can:
   - Deploy a customer's system image to new Macs at the factory.
   - Apply customer's asset tags at the factory and provide an asset report upon delivery.
2. For orders between 75 and 200 units the customer's submitted images are accepted.
3. For orders of more then 200 units the CSS team will work with the customer to create a modular system image deployment solution. This software components are chosen using a dedicated website portal.

Explain how ASR can be used to restore multiple computers simultaneously across the network

1. ASR system transmit the disk image data via a multicast network protocol, broadcasting the disk image data to the network in continuous loop.
2. Other Macs on the network can 'hook in' to this data stream and start restoring to load volume.
3. You can use ARD to kick off the restore process at the exact time on all the deployed systems.

List what protocols can be used when restoring an image via the 'Define NetRestore Service' Automator action

1. ASR.
2. http.

Given a network configuration, calculate the data rate and multicast IP address range values to be used by ASR when restoring computers caress the network

1. Data Rate:
   - Expressed in bytes per second. Variables to takes in consideration include:
     - Network speed.
     - Other network traffic.
     - Computer processor speed.
     - Destination drive speed.
   - Successful data rates between 2 Mbit/s and 20 Mbits,
     start testing from 6 Mbit/s on 100 Mbit networks,
     start testing from 12 Mbit/s on 1 Gbit networks.
2. Multicast Address:
   - Anywhere between 224.0.0.0 and 239.255.255.255.
   - ASR should always run on an isolated and dedicated subnet.

State the network requirements for using the NetBoot service to boot Macintosh computers

1. 100 Base-T Ethernet (Mac clients).
2. Apple USB Ethernet or built-in Airport (Mac Book Air only).
3. 100 Base-T switched networking for deployments between 10 or 50 clients.
4. 1 Gbit Ethernet is required to use the NetBoot service with 50 or more clients.

State the location on a server where NetBoot images should be stored so that they are recognized by the NetBoot service

`/Library/NetBoot/NetBootSP`*n*

Given a Mac OS X Server computer and Server Admin, specify which network ports are used by the NetBoot service

1. UDP port 67 for DHCP protocol.
2. UDP port 67 for BSDP protocol.
3. UDP port 69 fro TFTP protocol.
4. TCP port 80 for http protocol.
5. Various TCP/UDP ports for NFS protocol.

Describe how to configure NetBoot server and a network to allow the NetBoot service to be accessed across subnets

You need to forward BSDP broadcast traffic between subnets, that is the same configuration for using DHCP across your network

Given a Mac OS X Server computer and Server Admin, specify which volumes are used by the NetBoot service for the storage of images and client data

1. Select the 'NetBoot' service from the list.
2. Click the 'Settings' button.
3. Select the 'General' pane button.
4. In the 'Volumes' list check the boxes to define where to store images and client data.

Explain how and Automator workflow can be created in place of System Image Utility to create a Mac OS X deployment image

You can use Automator application to create a more complex workflow that generate a NetBoot image as the System Image Utility action are also available in the Automator Library inside the 'System' collection.

Give a Mac OS X Server computer configure as a NetBoot server, a NetBoot image stored on the server and Server Admin, configure the NetBoot service to allow the image to be used by client computers

1. Select the 'NetBoot' service from the list.
2. Click the 'Settings' button.
3. Select the 'Images' pane button.
4. In the list of available images click the 'Enable' box of the images to make it usable by client computers, then click 'Save'.

List third-party alternatives for system image creation and deployment, and the benefit of each

1. Deploy Studio, includes NetBoot, installation and ASR, tools for highly customizable deployment workflows.
   Supports BootCamp and Windows on standard PC systems.
2. InstaDMG is a series of reference UNIX scripts and documentation that will help to automate the modular system image build process.
3. PKGImage is a graphical modular system image build tool that is based on AppleScripts.
4. PSU Blast Image Config optimized system deployment tool that leverage ASR.
5. WinClone can create deployable bottom system images.

Given Mac OS X Server computer configured as a NetBoot Server, a NetBoot image stored on the server, Server Admin and a list of client computers, configure the NetBoot service to restrict access for specified image to specified computers

1. Select the 'NetBoot' service from the list.
2. Click the 'Settings' button.
3. Click the 'Images' pane button.
4. Double-click the image you want to configure the filters for.
5. Choose to filter by Model Property or Mac Address

List the methods for configuring Macintosh computers to boot from a network disk image

1. Startup pane of System Preferences (to select a specific NetBoot image).
2. Holding the 'N' key at boot time (`Option-N` to use the default NetBoot image instead of the last use NetBoot image).
3. Holding the '`Option`' key at boot time to start the Startup Manager.

Given a NetBoot server and Server Admin, display the log file for the NetBoot service

1. Select the 'NetBoot' service from the list.
2. Click the 'Log' button to display the `/var/log/system.log` filtered by 'bootpd' messages.

Given a Mac OS X Server configured as a NetBoot server and server Admin, list the addresses of computers currently booted using the NetBoot service

1. Select the 'NetBoot' service from the list.
2. Click the 'Connections' pane button.

Given a client computer that is unable to boot properly from a NetBoot server apply the troubleshooting techniques to troubleshoot the client computer and server

1. Rule to the network:
   - Verify that the computer can receive DHCP information.
   - Verify that you can see the network disk volumes from Startup Disk preferences.
2. Verify if you have a firmware password enable (pressing the Option key at start up) because it will prevent the computer to NetBoot pressing the 'N' Key.
3. Check the disk space on the server.
4. Check the NetBoot service filters.
5. Check your server firewall configuration: NetBoot service requires:
   - BSDP/DHCP
   - TFTP
   - NFS
   - AFP
   - HTTP
6. Check the `/var/log/system.log` for 'bootp' messages.
7. Stop and restart the `bootpd` daemon.
8. Check the NetBoot configuration `/etc/bootpd.plist`.
9. Move or delete the DHCP and NetBoot cache files in `/var/db/dhcp_clients` and `/var/db/bsdpd_clients`

Postimaging Deployment Considerations

List the basic server settings that are established during initial server setup

1. Server System language and keyboard layout.
2. Mac OS X Server serial number and license information.
3. Time zone and network time.
4. Local administrator account configuration.
5. Network configuration and network naming.
6. Users and Groups configuration.
7. OPTIONAL - Connect to a directory service.
8. OPTIONAL - Configure an Open Directory Master.
9. OPTIONAL - Initial setup of services including File Sharing, Address Book, Calendar, Instant Messaging, Mail and Web.

Given Server Assistant and an external storage volume such as an hard drive or a keychain drive, create a configuration file in the storage volume so that the file will be applied to a computer after Mac OS X Server has been installed

1. Start Server Assistant.
2. Complete each setup screen that appears by entering the appropriate server information for your server.
3. When you arrive at the Server Configuration screen select the encryption option for the pop-up menu.
4. Optionally set restrictions for this configuration selecting the check box and clicking the 'Edit' button.
5. Click the 'Save' button to name and place the file (configuration.plist).
6. Place the file in a folder named 'Auto Server Setup' on the root of the storage volume.

Describe the method for automatically configuring a fresh install on Mac OS X Server software

1. You need to create a configuration '.plist' file with Server Assistant.
2. Place this file in a folder named 'Auto Server Setup' placed in the root of any of the volumes available during the new system setup process (first boot).
3. You can protect the configuration file using password encryption. You will be requested to enter the password before start the configuration or you can place a '.pass' file containing the encryption password (in plain format) with a name matching the configuration file name.

Given ARD and a remote Macintosh computer, configure the system settings on the remote computer

1. In ARD select the name of the server you want to configure.
2. Use the options under the 'Manage' menu.

State what file extension must be used in order for a file to be recognized as an auto server setup file by Mac OS X Server

1. '.plist' for the configuration file.
2. '.pass' for the file containing the decryption password (optional).

Given a collection of application serial numbers and a remote computer, configure the applications on the remote computer with the given serial numbers

1. Locate the files responsible for storing the serial numbers.
2. Include a copy of those files in your deployment, a good idea is to create a '.pkg' file that install those files as a postimaging action.
3. Alternatively you can create a postimaging script that updates the '.plist' files with the serial number through the us of the `defaults` CLI command.

Describe how a file should be created to distribute a password to allow Mac OS X server to access an encrypted Auto Server Setup file

1. Create a file matching the name of the encrypted configuration file with '.pass' extension.
2. Place this file in any folder named 'Auto Server Setup' located at the root level of any volume available at the boot of a newly installed system.

Given one or more computers, apply system settings, such as static network values after a system has been installed

1. Inside ARD application select the computer you want to change the settings for.
2. Click the 'Manage > Send UNIX Command' menu.
3. Enter the following '`networksetup`' commands:
   - `$ sudo networksetup -setmanual "Ethernet" <IP address> <netmask> <default route>`
   - `$ sudo networksetup -setdnsservers "Ethernet" <dnsserver IP>`
   - `$ sudo networksetup -setsearchdomain "Ethernet" <domainname>`
4. Click 'Send' to apply the command.

Define the valid storage locations for saving auto configuration files

Any volume available (mounted) during the installation process can host in its root directory the 'Auto Server Setup' folder that may contain the configuration '.plist' or the password '.pass' files.

Given one or more remote computers create scripts to apply system configuration settings and set machine variables after the remote computers have been images

1. Use the '`systemsetup`' command inside the scripts.
2. Pack the scripts into one or more '.pkg.' file that will selectively run according to filters to differentiate the configuration in each computer.
3. Deploy the package files via ARD.

List third-party solutions to configure multiple remote computers after they have been imaged

1. Casper Suite by JAMF.
2. KACE systems management appliances.
3. FileWare suite.
4. LANDesk suite.
5. LANrev suite.

Given the Terminal application and a property list editor on a default installation of Mac OS X Server, create launchd item to launch a service on demand

1. Place the script in `/Library/Scripts`.
2. Create a launchd property file that reference your script and include the `KeepAlive` key.
3. Place the '.plist' file in a LaunchAgent folder.
4. Restart the computer or execute:
   ```
   $ sudo launchctl load -w file.plist
   ```

List the conditions that can be set to restrict an auto server setup file to specific computers in the order of precedence

1. Built-in hardware serial number of the server.
2. Ethernet (MAC) address of the first network port of the server.
3. IP address of the server.
4. Fully qualified DNS name of the server.
5. NONE of the above.

Create a launchd item to launch as service at the regular interval

Create a launchd configuration file with the `StartInterval` key configured.

Explain the function of byhost preferences and identify which computers they apply to

1. The ByHost preferences are set on a per-computer basis and by default apply only to a specific computer.
2. You can find these preferences in every user's home folder "`~/Library/Preferences/ByHost/`"
3. The preferences files in the folder are tied to a specific computer based on a unique identifier (UUID) included as part of the preferences file name.

Given `launchctl` on a default installation of Mac OS X Server, load a launchd job

```
$ sudo launchctl load -w file.plist
```

Describe the underlying structure and format of Mac OS X Server's property list architecture

1. Property list files come in two primary formats:
   - XML formatted plain-text.
   - XML binary (faster to load).
2. Preferences files are made up of Key/Values pairs.

Given the ARD Admin application on a default installation of Mac OS X Server and an inactive ARD client on a default installation of Mac OS X, configure the ARD client to activate the ARD agent using the `kickstart` tool from a remote machine

On the ARD Admin application choose `File > Create Client Installer` to create an installer that can be used to set up and enable the Remote Management service on any client Mac.

List the tools included with Mac OS X that are capable of altering preferences lists files

1. Property List Editor.
2. Workgroup Manager.

Given a Mac OS X system and a script, configure the operating system to execute the script every time a user logs in

1. Create a .plist file that refers to the script.
2. Pace it in the `/Network/Library/LaunchAgent` folder.

Describe the purpose, features and benefits of launchd and launchctl

1. The launchd process controls startup for all items in Mac OS X.
2. The launchd process looks to several specific folders for launchd property list configuration files.
3. A Launch Agent is a process started in behalf of a user and is only allowed to be active during the time the user is logged in the system.
4. Launch Daemons are processes automatically launched in behalf of the system and are allowed to run any time the system is running.
5. The `launchctl` command force `launchd` to load your configuration files without need to restart the computer.

Create a script that uses the `systemsetup` command to configure general system settings including date, time, computer name and energy settings

1. `$ systemsetup -setdate dd:mm:YY`
2. `$ systemsetup -settime hh:mm:ss`
3. `$ systemsetup -setcomputername "Marc's Computer"`
4. `$ systemsetup -setsleep "Never"` ("Off" or <minutes>)

List the valid locations for storing launchd items in a standard installation of Mac OS X

Launch Agents Folders:

1. `~/Library/LaunchAgents/`
2. `/Network/Library/LaunchAgents/`
3. `/Library/LaunchAgents/ (third-party agents for all users)`
4. `/System/Library /LaunchAgents/` (Apple-supplied agents for all users)

Launch Daemons:

1. `/Library/LaunchDaemons/` (third-party daemons)
2. `/System/Library/LaunchDaemons/` (Apple-supplied daemons)

Configure the network settings of the computer using the `networksetup` command

1. `$ sudo networksetup -setmanual "Ethernet" <ipaddress> <netmask> <default_route>`
2. `$ sudo networksetup -setdnsserver "Ethernet" <dns server ip>`
3. `$ sudo networksetup -setsearchdomains "Ethernet" domainname.com`

Enable ARD for a specific account using `kickstart` command

```
$ sudo /System/Library/CoreServices/RemoteManagement/ARDAgent.app/
Contents/Resources/kikstart -activate -configure -access -on -
users ladmin -privs -all -restart -agent -menu
```

List the common triggers `launchd` "understands" by default for launching jobs

1. StartOnMount
2. WatchPaths
3. QueueDirectories
4. StartIntervall
5. StartCalendarInterval

Configure computer settings using defaults

```
$ sudo defaults write <plist file> <key name> <key value>
```

List the common keys included in a `launchd` property list

1. KeepAlive
2. WorkingDirectory
3. EnvironmentVariables
4. UserName
5. StartOnMount

Explain what a "login hook" is

1. A login hook (LoginHook) is a key of the `loginwindow` preferences list that permit to hook a script to the execution of the user login via the `loginwindow` application.
2. `$ sudo defaults write com.apple.loginwindow LoginHook /Library/Scripts/loginscript`
3. `$ sudo defaults write com.apple.loginwindow LogoutHook /Library/Scripts/logoutscript`

Identify which Mac OS X command-line utility is used to configure general system settings

`systemsetup`

Identify the Mac OS X command-line utility that is used to configure network settings in SystemPreferences

`networksetup`

State which Mac OS X command-line utility is used to enable ARD Remote Management for a specific local administrator account

`kickstart`

Identify which Mac OS X command-line utility is the primary tool for reading and writing directory system data

`dscl`

Identify which Mac OS X command-line utility should be used to bind a Mac OS X system to an Active Directory service

`dsconfigad`

Identify which Mac OS X command-line utility should be used to bind a Mc OS X system to an LDAP service

`dsconfigldap`

System Maintenance

Given ARD and a number of Macintosh computers, configure ARD to monitor/track hardware and software

1. Configure one Mac computer to act as ARD Task Server.
2. Configure the administrative Mac computer to use a remote Task Server.
3. Activate the remote management in each other Mac you want to monitor/track.
4. From the administrative computer open ARD and select the computers you want to monitor.
5. Access the "Info" panel and select which data you want to monitor/track.

List available license and software tracking systems

1. Altins Asset Management Solution
2. Asset Trustee by FileWare
3. K2 by Sassafras
4. Recon Suite by JAMF

Define the following terms: Apple Remote Desktop, Task Server

1. ARD is the remote control, management, reporting and deployment tool for Mac OS X systems.
2. ARD Task Server is designed to act as an intermediary between the Remote Desktop administrator application and the Mac clients that are being managed.

Given a Mac OS X Server computer list all he currently available software updates provided by Apple

1. Open the Server Admin application.
2. Select the server name from the list of available servers.
3. Select the 'Software Update' service from the list.
4. Click the 'Updates' button from the tool bar to list all the current software updates published by Apple.

State how to configure a router to prevent Mac OS X computers on the local network from accessing and downloading updates from Apple's update servers

Block access to the domain name swscan.apple.com

State the default location where updates download from Apple are stored on a Software Update server

`/var/db/swupd`

State the preference file where you set the URL of the Software Update server to be accessed for software updates

`/Library/Preferences/com.apple.SoftwareUpdates`

State what process on a Mac OS X Server computer is used to synchronize updates between the server and Apple's software update servers

`swupd_syncd`

Identify which process is used to provide the software update service on a Mac OS X Server computer

`httpd` (executing as `_softwareupdate` user)

State which file should be modified to reconfigure the Software Update service on one Mac OS X Server to retrieve updates from a second Mac OS X Server computer

`/etc/swupd/swupd.plist`

Set up a test Software Update Server to test distribution of updates provided by Apple before enabling the updates on an organization's primary software Update server

1. Configure a Mac OS X Server for the Software Update service with internet access. Enable it to retrieve the software updates directly from Apple's servers and enable all the updates to 'Available' (or only the ones you want to test).
2. Configure a set of test Mac computers to retrieve their updates from the test server.
3. Configure the main Mac OS X Server for Software Update service to retrieve the list of available updates from the test server (not from Apple's servers).
4. Configure the production Mac computers to retrieve their updates from the main Mac OS X Server with Software Update service so they will be served with only a limited selection of software that have been previously tested.

Given a Mac OS X computer and a Mac OS X Server computer that is running the Software Update service, configure the preferences on the client computer to use the specific software Update service to access available updates

```
$ sudo defaults write /Library/Preferences/com.apple.SoftwareUpdate CatalogURL "http://
swupd.server.address:8088"
```

Given a Mac OS X Server computer that is managing the preferences on one or more Mac OS X computers and a Mac OS X Server computer that is running the Software Update service, configure the client computers to use the given Software Update service to access available updates

1. Open the Workgroup Manager application and authenticate as the directory administrator in the Directory Server.
2. Select the computer on the group of computers you want to manage the Software Update preferences for, from the accounts list.
3. Click the 'Preferences' button
4. Select the Software Update preference pane
5. Specify http://software.update.server:8088/index.catalog as "Software Update server to use"

Given a Mac OS X Server computer with the Software UPdate service not functioning correctly troubleshoot the server so that the client computers are able to access and download updates correctly

1. Ensure proper Software Update configuration in Server Admin: verify that the appropriate updates are downloaded and enabled.
2. Verify you can access these URL from the the troubleshooted computer and from another computer:
   - `http://swupd.server:8088/index.sucatalog`
   - `http://swupd.server:8088/index-leopard.merged-1.sucatalog`
   - `http://swupd.server:8088/index-leopard-snowleopard.merged-1.sucatalog`
3. Check the server's network configuration: make sure the firewall is not blocking 8088 port.
4. Check client's configuration: make sure the `CatalogURL` key in `/Library/Preferences/com.apple.SoftwareUpdate.plist` points to your local Software Update server.
5. Make sure the Software Update server can access the main servers or another computer running Software Update service.
6. Verify that the software update service is running on the server.
7. Check that the process responsible of the Software Update server are running in the Mac OS X Server such `swupd_sync` and httpd (running as `_softwareupdate` user)
8. Rebuild the Software Update server:
   - Stop the Software Update service.
   - Delete all items inside the `/etc/swupd` and `/var/db/swupd/html` folders.
   - Restart the Software Update service to rebuild the catalog and download again the updates.

Given a Mac OS X Server computer, configure the Software Update service to identify and download software updates provided by the Software Update service running on another Mac OS X Server computer

1. Edit the `/etc/swupd/swupd.plist` file manually.
2. Modify the `<key>metaIndexURL</key>` with the address of the Software Update server:
   ```
   <key>metaIndexURL</key>
   <string>http://second.swupd.server:8088/catalogs.sucatalog</string>
   ```

Given ARD 3 application on a default installation of Mac OS X, configure an Apple Remote Desktop task server

1. Open ARD 3 and select `Remote Desktop > Preferences` from the menu.
2. Click the 'Task Server' button.
3. Select 'Use Task Server in this computer' and check the box by 'Allow remote connections to this server'.

Given a deployment plan, modify the plan to incorporate steps to roll-back an update or software release should issues be encountered

1. Manually locate and remove the problematic items or prepare an automatic script to deploy via ARD.
2. Alternatively restore the system from your latest working system image.

Given a description for a target audience, create a policy permitting image modification

Use SIU to create modular system images, so every time a system receive an update it's possible to include this update in the workflow to generate the modular system image.