1.1.2 Configure Filesystem Partitions

Directories that are used for system-wide functions can be further protected by placing them on separate partitions. This provides protection for resource exhaustion and enables the use of mounting options that are applicable to the directory's intended use. Users' data can be stored on separate partitions and have stricter mount options. A user partition is a filesystem that has been established for use by the users and does not contain software for system operations.

The recommendations in this section are easier to perform during initial system installation. If the system is already installed, it is recommended that a full backup be performed before repartitioning the system.

Note:

-IF- you are repartitioning a system that has already been installed (This may require the system to be in single-user mode):

- Mount the new partition to a temporary mountpoint e.g. `mount /dev/sda2 /mnt`
- Copy data from the original partition to the new partition. e.g. `cp -a /var/tmp/* /mnt`
- Verify that all data is present on the new partition. e.g. `ls -la /mnt`
- Unmount the new partition. e.g. `umount /mnt`
- Remove the data from the original directory that was in the old partition. e.g. `rm -Rf /var/tmp/*` Otherwise it will still consume space in the old partition that will be masked when the new filesystem is mounted.
- Mount the new partition to the desired mountpoint. e.g. `mount /dev/sda2 /var/tmp`
- Update `/etc/fstab` with the new mountpoint. e.g. `/dev/sda2 /var/tmp xfs defaults,rw,nosuid,nodev,noexec,relatime 0 0`

1.1.2.1 Configure /tmp

The `/tmp` directory is a world-writable directory used to store data used by the system and user applications for a short period of time. This data should have no expectation of surviving a reboot, as this directory is intended to be emptied after each reboot.

1.1.2.1.1 Ensure /tmp is a separate partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `/tmp` directory is a world-writable directory used for temporary storage by all users and some applications.

- IF - an entry for `/tmp` exists in `/etc/fstab` it will take precedence over entries in systemd default unit file.

Note: In an environment where the main system is diskless and connected to iSCSI, entries in `/etc/fstab` may not take precedence.

`/tmp` can be configured to use `tmpfs`.

`tmpfs` puts everything into the kernel internal caches and grows and shrinks to accommodate the files it contains and is able to swap unneeded pages out to swap space. It has maximum size limits which can be adjusted on the fly via `mount -o remount`.

Since `tmpfs` lives completely in the page cache and on swap, all `tmpfs` pages will be shown as "Shmem" in `/proc/meminfo` and "Shared" in `free`. Notice that these counters also include shared memory. The most reliable way to get the count is using `df` and `du`.

`tmpfs` has three mount options for sizing:

- `size`: The limit of allocated bytes for this `tmpfs` instance. The default is half of your physical RAM without swap. If you oversize your `tmpfs` instances the machine will deadlock since the OOM handler will not be able to free that memory.
- `nr_blocks`: The same as size, but in blocks of PAGE_SIZE.
- `nr_inodes`: The maximum number of inodes for this instance. The default is half of the number of your physical RAM pages, or (on a machine with highmem) the number of lowmem RAM pages, whichever is the lower.

These parameters accept a suffix k, m or g and can be changed on remount. The size parameter also accepts a suffix % to limit this `tmpfs` instance to that percentage of your physical RAM. The default, when neither `size` nor `nr_blocks` is specified, is `size=50%`.

Rationale:

Making `/tmp` its own file system allows an administrator to set additional mount options such as the `noexec` option on the mount, making `/tmp` useless for an attacker to install executable code. It would also prevent an attacker from establishing a hard link to a system `setuid` program and wait for it to be updated. Once the program was updated, the hard link would be broken, and the attacker would have his own copy of the program. If the program happened to have a security vulnerability, the attacker could continue to exploit the known flaw.

This can be accomplished by either mounting `tmpfs` to `/tmp`, or creating a separate partition for `/tmp`.

Impact:

By design files saved to `/tmp` should have no expectation of surviving a reboot of the system. `tmpfs` is ram based and all files stored to `tmpfs` will be lost when the system is rebooted.

If files need to be persistent through a reboot, they should be saved to `/var/tmp` not `/tmp`.

Since the `/tmp` directory is intended to be world-writable, there is a risk of resource exhaustion if it is not bound to `tmpfs` or a separate partition.

Running out of `/tmp` space is a problem regardless of what kind of filesystem lies under it, but in a configuration where `/tmp` is not a separate file system it will essentially have the whole disk available, as the default installation only creates a single `/` partition. On the other hand, a RAM-based `/tmp` (as with `tmpfs`) will almost certainly be much smaller, which can lead to applications filling up the filesystem much more easily. Another alternative is to create a dedicated partition for `/tmp` from a separate volume or disk. One of the downsides of a disk-based dedicated partition is that it will be slower than `tmpfs` which is RAM-based.

Audit:

Run the following command and verify the output shows that `/tmp` is mounted. Particular requirements pertaining to mount options are covered in ensuing sections.

```
# findmnt -kn /tmp
```

Example output:

```
/tmp   tmpfs  tmpfs  rw,nosuid,nodev,noexec
```

Ensure that systemd will mount the `/tmp` partition at boot time.

```
# systemctl is-enabled tmp.mount
```

Example output:

```
generated
```

Verify output is not `masked` or `disabled`.
Note: By default, systemd will output `generated` if there is an entry in `/etc/fstab` for `/tmp`. This just means systemd will use the entry in `/etc/fstab` instead of its default unit file configuration for `/tmp`.

Remediation:

First ensure that systemd is correctly configured to ensure that `/tmp` will be mounted at boot time.

```
# systemctl unmask tmp.mount
```

For specific configuration requirements of the `/tmp` mount for your environment, modify `/etc/fstab`.
Example of using `tmpfs` with specific mount options:

```
tmpfs   /tmp    tmpfs     defaults,rw,nosuid,nodev,noexec,relatime,size=2G  0
0
```

Note: the `size=2G` is an example of setting a specific size for `tmpfs`.
Example of using a volume or disk with specific mount options. The source location of the volume or disk will vary depending on your environment:

```
<device> /tmp    <fstype>    defaults,nodev,nosuid,noexec   0 0
```

References:

1. https://www.freedesktop.org/wiki/Software/systemd/APIFileSystems/
2. https://www.freedesktop.org/software/systemd/man/systemd-fstab-generator.html
3. https://www.kernel.org/doc/Documentation/filesystems/tmpfs.txt
4. NIST SP 800-53 Rev. 5: CM-7

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	4.8 Uninstall or Disable Unnecessary Services on Enterprise Assets and Software Uninstall or disable unnecessary services on enterprise assets and software, such as an unused file sharing service, web application module, or service function.		●	●
v7	9.2 Ensure Only Approved Ports, Protocols and Services Are Running Ensure that only network ports, protocols, and services listening on a system with validated business needs, are running on each system.		●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.1.2 Ensure nodev option set on /tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/tmp` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/tmp`.

Audit:

- IF - a separate partition exists for `/tmp`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /tmp | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/tmp`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/tmp` partition.
Example:

```
<device> /tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/tmp` with the configured options:

```
# mount -o remount /tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: CM-7

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	4.8 Uninstall or Disable Unnecessary Services on Enterprise Assets and Software Uninstall or disable unnecessary services on enterprise assets and software, such as an unused file sharing service, web application module, or service function.		●	●
v7	9.2 Ensure Only Approved Ports, Protocols and Services Are Running Ensure that only network ports, protocols, and services listening on a system with validated business needs, are running on each system.		●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1022

1.1.2.1.3 Ensure nosuid option set on /tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/tmp` filesystem is only intended for temporary file storage, set this option to ensure that users cannot create `setuid` files in `/tmp`.

Audit:

- IF - a separate partition exists for `/tmp`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /tmp | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/tmp`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/tmp` partition.
Example:

```
<device> /tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/tmp` with the configured options:

```
# mount -o remount /tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.1.4 Ensure noexec option set on /tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `noexec` mount option specifies that the filesystem cannot contain executable binaries.

Rationale:

Since the `/tmp` filesystem is only intended for temporary file storage, set this option to ensure that users cannot run executable binaries from `/tmp`.

Impact:

Setting the `noexec` option on `/tmp` may prevent installation and/or updating of some 3rd party software.

Audit:

- IF - a separate partition exists for `/tmp`, verify that the `noexec` option is set.
Run the following command to verify that the `noexec` mount option is set.
Example:

```
# findmnt -kn /tmp | grep -v noexec

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/tmp`.
Edit the `/etc/fstab` file and add `noexec` to the fourth field (mounting options) for the `/tmp` partition.
Example:

```
<device> /tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/tmp` with the configured options:

```
# mount -o remount /tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1204, T1204.002	TA0005	M1022

1.1.2.2 Configure /dev/shm

The `/dev/shm` directory is a world-writable directory that can function as shared memory that facilitates inter process communication (IPC)

1.1.2.2.1 Ensure /dev/shm is a separate partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `/dev/shm` directory is a world-writable directory that can function as shared memory that facilitates inter process communication (IPC).

Rationale:

Making `/dev/shm` its own file system allows an administrator to set additional mount options such as the `noexec` option on the mount, making `/dev/shm` useless for an attacker to install executable code. It would also prevent an attacker from establishing a hard link to a system `setuid` program and wait for it to be updated. Once the program was updated, the hard link would be broken and the attacker would have his own copy of the program. If the program happened to have a security vulnerability, the attacker could continue to exploit the known flaw.

This can be accomplished by mounting `tmpfs` to `/dev/shm`.

Impact:

Since the `/dev/shm` directory is intended to be world-writable, there is a risk of resource exhaustion if it is not bound to a separate partition.

`/dev/shm` utilizing `tmpfs` can be resized using the `size={size}` parameter in the relevant entry in `/etc/fstab`.

Audit:

-IF- `/dev/shm` is to be used on the system, run the following command and verify the output shows that `/dev/shm` is mounted. Particular requirements pertaining to mount options are covered in ensuing sections.

```
# findmnt -kn /dev/shm
```

Example output:

```
/dev/shm   tmpfs   tmpfs   rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For specific configuration requirements of the `/dev/shm` mount for your environment, modify `/etc/fstab`.
Example:

```
tmpfs   /dev/shm        tmpfs
defaults,rw,nosuid,nodev,noexec,relatime,size=2G  0 0
```

References:

1. https://www.freedesktop.org/wiki/Software/systemd/APIFileSystems/
2. https://www.freedesktop.org/software/systemd/man/systemd-fstab-generator.html
3. NIST SP 800-53 Rev. 5: CM-7

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	4.8 Uninstall or Disable Unnecessary Services on Enterprise Assets and Software Uninstall or disable unnecessary services on enterprise assets and software, such as an unused file sharing service, web application module, or service function.		●	●
v7	9.2 Ensure Only Approved Ports, Protocols and Services Are Running Ensure that only network ports, protocols, and services listening on a system with validated business needs, are running on each system.		●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.2.2 Ensure nodev option set on /dev/shm partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/dev/shm` filesystem is not intended to support devices, set this option to ensure that users cannot attempt to create special devices in `/dev/shm` partitions.

Audit:

- IF - a separate partition exists for `/dev/shm`, verify that the `nodev` option is set.

```
# findmnt -kn /dev/shm | grep -v 'nodev'

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/dev/shm`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/dev/shm` partition. See the `fstab(5)` manual page for more information.
Example:

```
tmpfs /dev/shm    tmpfs     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/dev/shm` with the configured options:

```
# mount -o remount /dev/shm
```

Note: It is recommended to use `tmpfs` as the device/filesystem type as `/dev/shm` is used as shared memory space by applications.

References:

1. NIST SP 800-53 Rev. 5: AC-3, MP-2

Additional Information:

Some distributions mount `/dev/shm` through other means and require `/dev/shm` to be added to `/etc/fstab` even though it is already being mounted on boot. Others may configure `/dev/shm` in other locations and may override `/etc/fstab` configuration. Consult the documentation appropriate for your distribution.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1022

1.1.2.2.3 Ensure nosuid option set on /dev/shm partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Setting this option on a file system prevents users from introducing privileged programs onto the system and allowing non-root users to execute them.

Audit:

- IF - a separate partition exists for `/dev/shm`, verify that the `nosuid` option is set.

```
# findmnt -kn /dev/shm | grep -v 'nosuid'

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/dev/shm`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/dev/shm` partition. See the `fstab(5)` manual page for more information.
Example:

```
tmpfs /dev/shm    tmpfs     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/dev/shm` with the configured options:

```
# mount -o remount /dev/shm
```

Note: It is recommended to use `tmpfs` as the device/filesystem type as `/dev/shm` is used as shared memory space by applications.

References:

1. NIST SP 800-53 Rev. 5: AC-3, MP-2

Additional Information:

Some distributions mount `/dev/shm` through other means and require `/dev/shm` to be added to `/etc/fstab` even though it is already being mounted on boot. Others may configure `/dev/shm` in other locations and may override `/etc/fstab` configuration. Consult the documentation appropriate for your distribution.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1038

1.1.2.2.4 Ensure noexec option set on /dev/shm partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `noexec` mount option specifies that the filesystem cannot contain executable binaries.

Rationale:

Setting this option on a file system prevents users from executing programs from shared memory. This deters users from introducing potentially malicious software on the system.

Audit:

- IF - a separate partition exists for `/dev/shm`, verify that the `noexec` option is set.

```
# findmnt -kn /dev/shm | grep -v 'noexec'

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/dev/shm`.
Edit the `/etc/fstab` file and add `noexec` to the fourth field (mounting options) for the `/dev/shm` partition.
Example:

```
tmpfs /dev/shm    tmpfs     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/dev/shm` with the configured options:

```
# mount -o remount /dev/shm
```

Note: It is recommended to use `tmpfs` as the device/filesystem type as `/dev/shm` is used as shared memory space by applications.

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1204, T1204.002	TA0005	M1022

1.1.2.3 Configure /home

Please note that home directories can be mounted anywhere and are not necessarily restricted to `/home`, nor restricted to a single location, nor is the name restricted in any way.

Finding user home directories can be done by looking in `/etc/passwd`, looking over the mounted file systems with `mount` or querying the relevant database with `getent`.

```
for user in $(awk -F ':' '{print $1}' /etc/passwd); do echo "${user} - $(sudo
getent passwd ${user} | awk -F ':' '{print $NF}')"; done
```

1.1.2.3.1 Ensure separate partition exists for /home (Automated)

Profile Applicability:

- Level 2 - Server
- Level 2 - Workstation

Description:

The `/home` directory is used to support disk storage needs of local users.

Rationale:

The default installation only creates a single `/` partition. Since the `/home` directory contains user generated data, there is a risk of resource exhaustion. It will essentially have the whole disk available to fill up and impact the system as a whole. In addition, other operations on the system could fill up the disk unrelated to `/home` and impact all local users.

Configuring `/home` as its own file system allows an administrator to set additional mount options such as `noexec/nosuid/nodev`. These options limit an attacker's ability to create exploits on the system. In the case of `/home` options such as `usrquota/grpquota` may be considered to limit the impact that users can have on each other with regards to disk resource exhaustion. Other options allow for specific behavior. See `man mount` for exact details regarding filesystem-independent and filesystem-specific options.

As `/home` contains user data, care should be taken to ensure the security and integrity of the data and mount point.

Impact:

Resizing filesystems is a common activity in cloud-hosted servers. Separate filesystem partitions may prevent successful resizing or may require the installation of additional tools solely for the purpose of resizing operations. The use of these additional tools may introduce their own security considerations.

Audit:

Run the following command and verify output shows `/home` is mounted:

```
# findmnt -kn /home

/home   /dev/sdb   ext4   rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For new installations, during installation create a custom partition setup and specify a separate partition for `/home`.
For systems that were previously installed, create a new partition and configure `/etc/fstab` as appropriate.

References:

1. AJ Lewis, "LVM HOWTO", http://tldp.org/HOWTO/LVM-HOWTO/
2. NIST SP 800-53 Rev. 5: CM-7

Additional Information:

When modifying `/home` it is advisable to bring the system to emergency mode (so auditd is not running), rename the existing directory, mount the new file system, and migrate the data over before returning to multi-user mode.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1038

1.1.2.3.2 Ensure nodev option set on /home partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/home` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/home`.

Audit:

- IF - a separate partition exists for `/home`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /home | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/home`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/home` partition.
Example:

```
<device> /home    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/home` with the configured options:

```
# mount -o remount /home
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1038

1.1.2.3.3 Ensure nosuid option set on /home partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/home` filesystem is only intended for user file storage, set this option to ensure that users cannot create `setuid` files in `/home`.

Audit:

- IF - a separate partition exists for `/home`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /home | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/home`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/home` partition.
Example:

```
<device> /home    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/home` with the configured options:

```
# mount -o remount /home
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.4 Configure /var

The `/var` directory is used by daemons and other system services to temporarily store dynamic data. Some directories created by these processes may be world-writable.

1.1.2.4.1 Ensure separate partition exists for /var (Automated)

Profile Applicability:

- Level 2 - Server
- Level 2 - Workstation

Description:

The `/var` directory is used by daemons and other system services to temporarily store dynamic data. Some directories created by these processes may be world-writable.

Rationale:

The reasoning for mounting `/var` on a separate partition is as follows.

The default installation only creates a single `/` partition. Since the `/var` directory may contain world writable files and directories, there is a risk of resource exhaustion. It will essentially have the whole disk available to fill up and impact the system. In addition, other operations on the system could fill up the disk unrelated to `/var` and cause unintended behavior across the system as the disk is full. See `man auditd.conf` for details.

Configuring `/var` as its own file system allows an administrator to set additional mount options such as `noexec/nosuid/nodev`. These options limit an attacker's ability to create exploits on the system. Other options allow for specific behavior. See `man mount` for exact details regarding filesystem-independent and filesystem-specific options.

An example of exploiting `/var` may be an attacker establishing a hard-link to a system `setuid` program and waiting for it to be updated. Once the program is updated, the hard-link can be broken and the attacker would have their own copy of the program. If the program happened to have a security vulnerability, the attacker could continue to exploit the known flaw.

Impact:

Resizing filesystems is a common activity in cloud-hosted servers. Separate filesystem partitions may prevent successful resizing or may require the installation of additional tools solely for the purpose of resizing operations. The use of these additional tools may introduce their own security considerations.

Audit:

Run the following command and verify output shows `/var` is mounted.
Example:

```
# findmnt -kn /var

/var  /dev/sdb  ext4   rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For new installations, during installation create a custom partition setup and specify a separate partition for `/var`.
For systems that were previously installed, create a new partition and configure `/etc/fstab` as appropriate.

References:

1. AJ Lewis, "LVM HOWTO", http://tldp.org/HOWTO/LVM-HOWTO/
2. NIST SP 800-53 Rev. 5: CM-7

Additional Information:

When modifying `/var` it is advisable to bring the system to emergency mode (so auditd is not running), rename the existing directory, mount the new file system, and migrate the data over before returning to multi-user mode.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0006	M1022

1.1.2.4.2 Ensure nodev option set on /var partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/var` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/var`.

Audit:

- IF - a separate partition exists for `/var`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /var | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/var` partition.
Example:

```
<device> /var    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/var` with the configured options:

```
# mount -o remount /var
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1022

1.1.2.4.3 Ensure nosuid option set on /var partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/var` filesystem is only intended for variable files such as logs, set this option to ensure that users cannot create `setuid` files in `/var`.

Audit:

- IF - a separate partition exists for `/var`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /var | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/var` partition.
Example:

```
<device> /var    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/var` with the configured options:

```
# mount -o remount /var
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.5 Configure /var/tmp

The `/var/tmp` directory is a world-writable directory used for temporary storage by all users and some applications. Temporary files residing in `/var/tmp` are to be preserved between reboots.

1.1.2.5.1 Ensure separate partition exists for /var/tmp (Automated)

Profile Applicability:

- Level 2 - Server
- Level 2 - Workstation

Description:

The `/var/tmp` directory is a world-writable directory used for temporary storage by all users and some applications. Temporary files residing in `/var/tmp` are to be preserved between reboots.

Rationale:

The default installation only creates a single `/` partition. Since the `/var/tmp` directory is world-writable, there is a risk of resource exhaustion. In addition, other operations on the system could fill up the disk unrelated to `/var/tmp` and cause potential disruption to daemons as the disk is full.

Configuring `/var/tmp` as its own file system allows an administrator to set additional mount options such as `noexec/nosuid/nodev`. These options limit an attacker's ability to create exploits on the system.

Impact:

Resizing filesystems is a common activity in cloud-hosted servers. Separate filesystem partitions may prevent successful resizing or may require the installation of additional tools solely for the purpose of resizing operations. The use of these additional tools may introduce their own security considerations.

Audit:

Run the following command and verify output shows `/var/tmp` is mounted.
Example:

```
# findmnt -kn /var/tmp

/var/tmp   /dev/sdb ext4   rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For new installations, during installation create a custom partition setup and specify a separate partition for `/var/tmp`.
For systems that were previously installed, create a new partition and configure `/etc/fstab` as appropriate.

References:

1. AJ Lewis, "LVM HOWTO", http://tldp.org/HOWTO/LVM-HOWTO/
2. NIST SP 800-53 Rev. 5: CM-7

Additional Information:

When modifying `/var/tmp` it is advisable to bring the system to emergency mode (so auditd is not running), rename the existing directory, mount the new file system, and migrate the data over before returning to multi-user mode.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.5.2 Ensure nodev option set on /var/tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/var/tmp` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/var/tmp`.

Audit:

- IF - a separate partition exists for `/var/tmp`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /var/tmp | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/tmp`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/var/tmp` partition.
Example:

```
<device> /var/tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/tmp` with the configured options:

```
# mount -o remount /var/tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.5.3 Ensure nosuid option set on /var/tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/var/tmp` filesystem is only intended for temporary file storage, set this option to ensure that users cannot create `setuid` files in `/var/tmp`.

Audit:

- IF - a separate partition exists for `/var/tmp`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /var/tmp | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/tmp`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/var/tmp` partition.
Example:

```
<device> /var/tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/tmp` with the configured options:

```
# mount -o remount /var/tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.5.4 Ensure noexec option set on /var/tmp partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `noexec` mount option specifies that the filesystem cannot contain executable binaries.

Rationale:

Since the `/var/tmp` filesystem is only intended for temporary file storage, set this option to ensure that users cannot run executable binaries from `/var/tmp`.

Audit:

- IF - a separate partition exists for `/var/tmp`, verify that the `noexec` option is set.
Run the following command to verify that the `noexec` mount option is set.
Example:

```
# findmnt -kn /var/tmp | grep -v noexec

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/tmp`.
Edit the `/etc/fstab` file and add `noexec` to the fourth field (mounting options) for the `/var/tmp` partition.
Example:

```
<device> /var/tmp    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/tmp` with the configured options:

```
# mount -o remount /var/tmp
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1204, T1204.002	TA0005	M1022

1.1.2.6 Configure /var/log

The `/var/log` directory is used by system services to store log data.

1.1.2.6.1 Ensure separate partition exists for /var/log (Automated)

Profile Applicability:

- Level 2 - Server
- Level 2 - Workstation

Description:

The `/var/log` directory is used by system services to store log data.

Rationale:

The default installation only creates a single `/` partition. Since the `/var/log` directory contains log files which can grow quite large, there is a risk of resource exhaustion. It will essentially have the whole disk available to fill up and impact the system as a whole.

Configuring `/var/log` as its own file system allows an administrator to set additional mount options such as `noexec/nosuid/nodev`. These options limit an attackers ability to create exploits on the system. Other options allow for specific behavior. See `man mount` for exact details regarding filesystem-independent and filesystem-specific options.

As `/var/log` contains log files, care should be taken to ensure the security and integrity of the data and mount point.

Impact:

Resizing filesystems is a common activity in cloud-hosted servers. Separate filesystem partitions may prevent successful resizing, or may require the installation of additional tools solely for the purpose of resizing operations. The use of these additional tools may introduce their own security considerations.

Audit:

Run the following command and verify output shows `/var/log` is mounted:

```
# findmnt -kn /var/log

/var/log /dev/sdb ext4   rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For new installations, during installation create a custom partition setup and specify a separate partition for `/var/log` .
For systems that were previously installed, create a new partition and configure `/etc/fstab` as appropriate.

References:

1. AJ Lewis, "LVM HOWTO", http://tldp.org/HOWTO/LVM-HOWTO/
2. NIST SP 800-53 Rev. 5: CM-7

Additional Information:

When modifying `/var/log` it is advisable to bring the system to emergency mode (so auditd is not running), rename the existing directory, mount the new file system, and migrate the data over before returning to multiuser mode.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	8.3 Ensure Adequate Audit Log Storage Ensure that logging destinations maintain adequate storage to comply with the enterprise's audit log management process.	●	●	●
v7	6.4 Ensure adequate storage for logs Ensure that all systems that store logs have adequate storage space for the logs generated.		●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.6.2 Ensure nodev option set on /var/log partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/var/log` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/var/log`.

Audit:

- IF - a separate partition exists for `/var/log`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /var/log | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/var/log` partition.
Example:

```
<device> /var/log    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/log` with the configured options:

```
# mount -o remount /var/log
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1038

1.1.2.6.3 Ensure nosuid option set on /var/log partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/var/log` filesystem is only intended for log files, set this option to ensure that users cannot create `setuid` files in `/var/log`.

Audit:

- IF - a separate partition exists for `/var/log`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /var/log | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/var/log` partition.
Example:

```
<device> /var/log    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/log` with the configured options:

```
# mount -o remount /var/log
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.6.4 Ensure noexec option set on /var/log partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `noexec` mount option specifies that the filesystem cannot contain executable binaries.

Rationale:

Since the `/var/log` filesystem is only intended for log files, set this option to ensure that users cannot run executable binaries from `/var/log`.

Audit:

- IF - a separate partition exists for `/var/log`, verify that the `noexec` option is set.
Run the following command to verify that the `noexec` mount option is set.
Example:

```
# findmnt -kn /var/log | grep -v noexec

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log`.
Edit the `/etc/fstab` file and add `noexec` to the fourth field (mounting options) for the `/var/log` partition.
Example:

```
<device> /var/log    <fstype>     defaults,rw,nosuid,nodev,noexec,relatime  0
0
```

Run the following command to remount `/var/log` with the configured options:

```
# mount -o remount /var/log
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1204, T1204.002	TA0005	M1022

1.1.2.7 Configure /var/log/audit

The auditing daemon, `auditd`, stores log data in the `/var/log/audit` directory.

1.1.2.7.1 Ensure separate partition exists for /var/log/audit (Automated)

Profile Applicability:

- Level 2 - Server
- Level 2 - Workstation

Description:

The auditing daemon, `auditd`, stores log data in the `/var/log/audit` directory.

Rationale:

The default installation only creates a single `/` partition. Since the `/var/log/audit` directory contains the `audit.log` file which can grow quite large, there is a risk of resource exhaustion. It will essentially have the whole disk available to fill up and impact the system as a whole. In addition, other operations on the system could fill up the disk unrelated to `/var/log/audit` and cause `auditd` to trigger its `space_left_action` as the disk is full. See `man auditd.conf` for details.

Configuring `/var/log/audit` as its own file system allows an administrator to set additional mount options such as `noexec/nosuid/nodev`. These options limit an attacker's ability to create exploits on the system. Other options allow for specific behavior. See `man mount` for exact details regarding filesystem-independent and filesystem-specific options.

As `/var/log/audit` contains audit logs, care should be taken to ensure the security and integrity of the data and mount point.

Impact:

Resizing filesystems is a common activity in cloud-hosted servers. Separate filesystem partitions may prevent successful resizing or may require the installation of additional tools solely for the purpose of resizing operations. The use of these additional tools may introduce their own security considerations.

Audit:

Run the following command and verify output shows `/var/log/audit` is mounted:

```
# findmnt -kn /var/log/audit

/var/log/audit /dev/sdb ext4    rw,nosuid,nodev,noexec,relatime,seclabel
```

Remediation:

For new installations, during installation create a custom partition setup and specify a separate partition for `/var/log/audit`.
For systems that were previously installed, create a new partition and configure `/etc/fstab` as appropriate.

References:

1. AJ Lewis, "LVM HOWTO", http://tldp.org/HOWTO/LVM-HOWTO/
2. NIST SP 800-53 Rev. 5: CM-7

Additional Information:

When modifying `/var/log/audit` it is advisable to bring the system to emergency mode (so auditd is not running), rename the existing directory, mount the new file system, and migrate the data over before returning to multi-user mode.

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	8.3 Ensure Adequate Audit Log Storage Ensure that logging destinations maintain adequate storage to comply with the enterprise's audit log management process.	●	●	●
v7	6.4 Ensure adequate storage for logs Ensure that all systems that store logs have adequate storage space for the logs generated.		●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1499, T1499.001	TA0005	M1022

1.1.2.7.2 Ensure nodev option set on /var/log/audit partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nodev` mount option specifies that the filesystem cannot contain special devices.

Rationale:

Since the `/var/log/audit` filesystem is not intended to support devices, set this option to ensure that users cannot create a block or character special devices in `/var/log/audit`.

Audit:

- IF - a separate partition exists for `/var/log/audit`, verify that the `nodev` option is set.
Run the following command to verify that the `nodev` mount option is set.
Example:

```
# findmnt -kn /var/log/audit | grep -v nodev

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log/audit`.
Edit the `/etc/fstab` file and add `nodev` to the fourth field (mounting options) for the `/var/log/audit` partition.
Example:

```
<device> /var/log/audit    <fstype>
defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/var/log/audit` with the configured options:

```
# mount -o remount /var/log/audit
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1200, T1200.000	TA0005	M1022

1.1.2.7.3 Ensure nosuid option set on /var/log/audit partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `nosuid` mount option specifies that the filesystem cannot contain `setuid` files.

Rationale:

Since the `/var/log/audit` filesystem is only intended for variable files such as logs, set this option to ensure that users cannot create `setuid` files in `/var/log/audit`.

Audit:

- IF - a separate partition exists for `/var/log/audit`, verify that the `nosuid` option is set.
Run the following command to verify that the `nosuid` mount option is set.
Example:

```
# findmnt -kn /var/log/audit | grep -v nosuid

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log/audit`.
Edit the `/etc/fstab` file and add `nosuid` to the fourth field (mounting options) for the `/var/log/audit` partition.
Example:

```
<device> /var/log/audit    <fstype>
defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/var/log/audit` with the configured options:

```
# mount -o remount /var/log/audit
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1548, T1548.001	TA0005	M1022

1.1.2.7.4 Ensure noexec option set on /var/log/audit partition (Automated)

Profile Applicability:

- Level 1 - Server
- Level 1 - Workstation

Description:

The `noexec` mount option specifies that the filesystem cannot contain executable binaries.

Rationale:

Since the `/var/log/audit` filesystem is only intended for audit logs, set this option to ensure that users cannot run executable binaries from `/var/log/audit`.

Audit:

- IF - a separate partition exists for `/var/log/audit`, verify that the `noexec` option is set.
Run the following command to verify that the `noexec` mount option is set.
Example:

```
# findmnt -kn /var/log/audit | grep -v noexec

Nothing should be returned
```

Remediation:

- IF - a separate partition exists for `/var/log/audit`.
Edit the `/etc/fstab` file and add `noexec` to the fourth field (mounting options) for the `/var/log/audit` partition.
Example:

```
<device> /var/log/audit    <fstype>
defaults,rw,nosuid,nodev,noexec,relatime  0 0
```

Run the following command to remount `/var/log/audit` with the configured options:

```
# mount -o remount /var/log/audit
```

References:

1. See the fstab(5) manual page for more information.
2. NIST SP 800-53 Rev. 5: AC-3, MP-2

CIS Controls:

Controls Version	Control	IG 1	IG 2	IG 3
v8	3.3 Configure Data Access Control Lists Configure data access control lists based on a user's need to know. Apply data access control lists, also known as access permissions, to local and remote file systems, databases, and applications.	●	●	●
v7	14.6 Protect Information through Access Control Lists Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.	●	●	●

MITRE ATT&CK Mappings:

Techniques / Sub-techniques	Tactics	Mitigations
T1204, T1204.002	TA0005	M1022