Backup

To ensure against loss a system administrator may need to plan and implement a system that periodically backs up a system to another location.

This is effectively an insurance policy which represent time expended to prevent future losses. The backup should be performed at regular intervals and the backup media is stored safely and securely.

Only data that changes regularly requires regular backup e.g. software does not require regular backup (obviously there should be at least one backup copy available)

Backup

Should any thing go wrong it is important that backup should be available.

The frequency and cost of backup depends on the value of the data.

Some might run a backup daily others might maintain two systems with identical data – if one goes down and other starts immediately.

Backup considerations

- **What should be backed up?** Data which is constantly changing e.g. configuration files and user home directories.
- **Who backs up the files?**
- **Where, when and under what conditions should backups be performed?**
- **How often should backups be performed?**

Backup considerations (cont.)

- **How quickly does a missing or damaged file need to be restored?**
- **Where should backup media be stored?** Often on-line
- **Budget considerations?** How valuable is the data and what is the cost of the actual backup media, paying somebody to do it (much can be automated) and storage locations.
- Should be performed on idle systems if possible (e.g. overnight)
- How much backup media is required – one needs to consider both capacity and Input/Output transfer rates.

Backup: security

- Companies invest much in securing their systems.

- Whatever measures are used to secure the system, similar consideration should be given to securing the backup.

Linux: Archiving & Compression

Compression

- A means of making a file smaller
- Useful for long term storage and transportation
- More efficient to download a compressed file
- The file requires decompression later

Archiving & Compression

Compression

Linux provides two commands:

gzip

compress

Archiving & Compression

Compression Example:

consider the following file:

76 -rw-r--r-- 1 root root 75064 Oct 4 12:02 fileX

gzip fileX

ls -ls

4 -rw-r--r-- 1 root root 2232 Oct 4 12:02 fileX.gz

Archiving & Compression

Compression

- The size (number of blocks & bytes)
- The file name – the gz has been added.

Archiving & Compression

Compression

To decompress:

gzip –d fileX

ls -ls

76 -rw-r--r-- 1 root root 75064 Oct 4 12:02 fileX

No need to include the gz when decompressing, but is necessary every other time.

Archiving & Compression

Archiving

The joining together of many files to create a single file

Useful for storage & transportation – easier to download a single file instead of many

Has to be de-archived later

Archiving & Compression

Archiving

Linux provides a tool called tar

Archived files are commonly known as tar files.

Archiving & Compression

Archiving

tar works as follows:

```
tar cvf  tarFile file1 file2 file3
```

This creates a new file tarFile

tarFile is the name of the new file which the user can select

Archiving & Compression

Archiving

tar does not perform compression by default – sometimes the tar file can be larger than the combined size of the files archived.

An addition option can be added to the tar command to compress

Archiving & Compression

Archiving

Consider the following:

```
4 -rw-r--r-- 1 root root     8 Oct  4 12:24 file1
4 -rw-r--r-- 1 root root    48 Oct  4 12:25 file2
4 -rw-r--r-- 1 root root    32 Oct  4 12:25 file3
```

tar cvf tarFile file1 file2 file3

Archiving & Compression

Archiving

A more efficient way might be to use the wildcard * (which archives everything in the current directory)

```
tar cvf tarFile *
```

Archiving & Compression

Archiving

ls –ls

```
 4 -rw-r--r-- 1 root root     8 Oct  4 12:24 file1
 4 -rw-r--r-- 1 root root    48 Oct  4 12:25 file2
 4 -rw-r--r-- 1 root root    32 Oct  4 12:25 file3
12 -rw-r--r-- 1 root root 10240 Oct  4 12:25 tarFile
```

The tar file is considerable larger than the sum of the archived files

Archiving & Compression

Archiving

Remove archived files but keep the archive:

```
rm  f*
```

Deletes all files in current directory starting with f

Archiving & Compression

Archiving

To de-archive:

tar xvf tarFile

Archiving & Compression

Archiving

All files are retrieved:

file1, file2 & file3

Remove unwanted archive:

rm tarFile

Archiving & Compression

Archiving and compression are useful tools on their own.

They are far more useful when joined together.

This means creating a compressed archive.

Archiving & Compression

Other operating systems also provide tools for compressing and archiving

- winzip
- winrar
- 7-zip

Archiving & Compression

To create a compressed archive:

```
tar cvf tarFile *

gzip tarFile
```

Alternatively: tar cvfz tarFile *

Archiving & Compression

Example:

ls -ls

40 -rw-r--r-- 1 root root 40952 Oct 4 12:44 file1

36 -rw-r--r-- 1 root root 34168 Oct 4 12:44 file2

48 -rw-r--r-- 1 root root 47800 Oct 4 12:44 file3

Total number of blocks: 124

Archiving & Compression

Archive it: tar cvf tarFile *

ls –ls

```
 40 -rw-r--r-- 1 root root  40952 Oct  4 12:44 file1
 36 -rw-r--r-- 1 root root  34168 Oct  4 12:44 file2
 48 -rw-r--r-- 1 root root  47800 Oct  4 12:44 file3
132 -rw-r--r-- 1 root root 133120 Oct  4 12:49 tarFile
```

Total number of blocks: 256

Archiving & Compression

Remove original files:

rm f*

ls –ls

132 -rw-r--r-- 1 root root 133120 Oct 4 12:49 tarFile

This is larger than the combined size of the archived files.

Archiving & Compression

Compress the archive:

gzip tarFile

ls –ls

4 -rw-r--r-- 1 root root 3049 Oct 4 12:49 tarFile.gz

Archiving & Compression

Retrieving:

gzip –d tarFile	decompress
tar xvf tarFile	de-archive
rm tarFile	remove unwanted archive

Archiving & Compression

Compress archive example:

http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

The java development kit consists of a number of files of various sizes. It would not be practical to download each individually.

If you wish to download the java jdk environment for Linux, you might see the following:

Archiving & Compression

Product / File Description	File Size	Download
Linux ARM 32 Hard Float ABI	77.89 MB	jdk-8u144-linux-arm32-vfp-hflt.tar.gz
Linux ARM 64 Hard Float ABI	74.83 MB	jdk-8u144-linux-arm64-vfp-hflt.tar.gz
Linux x86	164.65 MB	jdk-8u144-linux-i586.rpm
Linux x86	179.44 MB	jdk-8u144-linux-i586.tar.gz
Linux x64	162.1 MB	jdk-8u144-linux-x64.rpm
Linux x64	176.92 MB	jdk-8u144-linux-x64.tar.gz
Mac OS X	226.6 MB	jdk-8u144-macosx-x64.dmg
Solaris SPARC 64-bit	139.87 MB	jdk-8u144-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	99.18 MB	jdk-8u144-solaris-sparcv9.tar.gz
Solaris x64	140.51 MB	jdk-8u144-solaris-x64.tar.Z
Solaris x64	96.99 MB	jdk-8u144-solaris-x64.tar.gz
Windows x86	190.94 MB	jdk-8u144-windows-i586.exe
Windows x64	197.78 MB	jdk-8u144-windows-x64.exe

Archiving & Compression

There are a number of options including rpm (can be installed with a package manager) and .exe (for windows)

Note the files ending with tar.gz and tar.Z – once downloaded can be decompressed and de-archived.

Note .Z requires use of the compress command.

Archiving & Compression

To install java

(e.g. from jdk-8u144-linux-x64.tar.gz)

gzip -d jdk-8u144-linux-x64.tar.gz

tar xvf jdk-8u144-linux-x64.tar

Archiving & Compression

Exercises:

Write scripts to do the following:

- Backup all home directories
- Retrieve the backup

Archiving & Compression

Exercises (cont.):

Write scripts to do the following:

- Prompt user to enter a directory for backup
- Retrieve the backup above