Lab 2.2 : Backups

Lab Name:

Systems Administration, Introduction to Packages (L2-CAT-02-02)

Overview:

This lab covers information surrounding backups, including the types of backups, implementation of backups on both Windows and Linux, and Cloud / External backups.

Prerequisites:

- Introduction to command-line
- Introduction to virtual machines (optional)

Materials:

- Computer with access to a terminal or command prompt
- Ubuntu Linux, either in a virtual machine or as the host operating system
- Windows 10, either in a virtual machine or as the host operating system
- Administrator privileges for certain tasks
- Internet connection (for accessing additional resources)

Learning Objectives:

- Explain what backups are and why they should be used
- Cover the various types of backups that can be performed, including full backups, incremental backups, differential backups, and a few others
- Walk through the process of how to backup a Linux machine using both command line and Timeshift
- Cover backing up Windows machines using their backup app, as well as through Powershell
- Discuss cloud and external machine backups with provided resources

Tasks: (Work in Progress)

1. Create a backup of a Linux machine
2. Create a backup of a Windows machine.
3. Pick and choose a cloud provider and explore their options for backup
4. Review questions

Deliverables:

- A PDF file with the given questions in the review category and your corresponding answers.
- Push the completed lab to your Git repository or submit through the designated method provided by your instructor.

Additional Resources:

- Types of backups - Red Hat
- AWS Backup Guide
- Azure Backup Guide
- Google Cloud Backup Guide
- Timeshift Guide
- Automate Powershell Scripts

Topic 1: Types of backups

Benefits and drawbacks to types of backup

TYPE	BENEFITS	DRAWBACKS
Full	■ Provides full copy of data set ■ Offers arguably best protection	■ Time-consuming ■ Requires lots of storage space
Incremental	■ Less time and storage space than full backup	■ Time-consuming to restore ■ Need all the backups in backup chain to restore
Differential	■ Shorter restore time than incremental	■ Can grow to much bigger size than incremental
Synthetic full	■ Reduced restore time ■ Less bandwidth usage	■ Newer, so not as well-known
Incremental-forever	■ Availability of data ■ Automated restoration process	■ Newer, so not as well-known ■ Need all the backups in backup chain to restore

[1]

Based on this table, think about the scenarios offered on the next page. What are you considering when it comes to your backup choices? Which backup type(s) are you implementing?

For more information on the types of backups, check out Red Hat's documentation under 'Additional Resources'.

What backup type do you think is best?

1. You have a static website that shows a list of country names.

2. You work for a small business with less than 10 employees that has an online shop connected to popular shopping sites.

3. You work for a medium sized company with over 50 employees that has an online portal for clients they run through a third party.

4. You work for a large company with over 200 employees that has a client portal, an intranet with the policies and procedures available to the employees, and they have their own servers to support these web services.

5. You are working for a government agency that wants to make its own version of AWS.

- When considering these scenarios, what are your first recommendations?
- Did you take cost into account?
- What about memory storage?
- What kind of protections would you like to see for each scenario? What concerns do you have?
- What kind of emergencies, disasters, or attacks could occur that would affect your solutions?
- What would the knowledge and cost of implementation look like?
- Are there different kinds of backups that came to your mind when reviewing the scenarios that would add to the table on the previous page?
- What is the methodology or strategy - if you combined more than one kind of backup - that you would use?
- Can you think of potential drawbacks to your solutions? If not, please take the time to search the internet for people who have implemented what you suggested. Do they exist? Why or why not? If they do, what pros and cons do they state?

One methodology that is fairly popular is the 3-2-1 method. This means 3 different copies in two different storage locations and one of those copies is stored off-site.

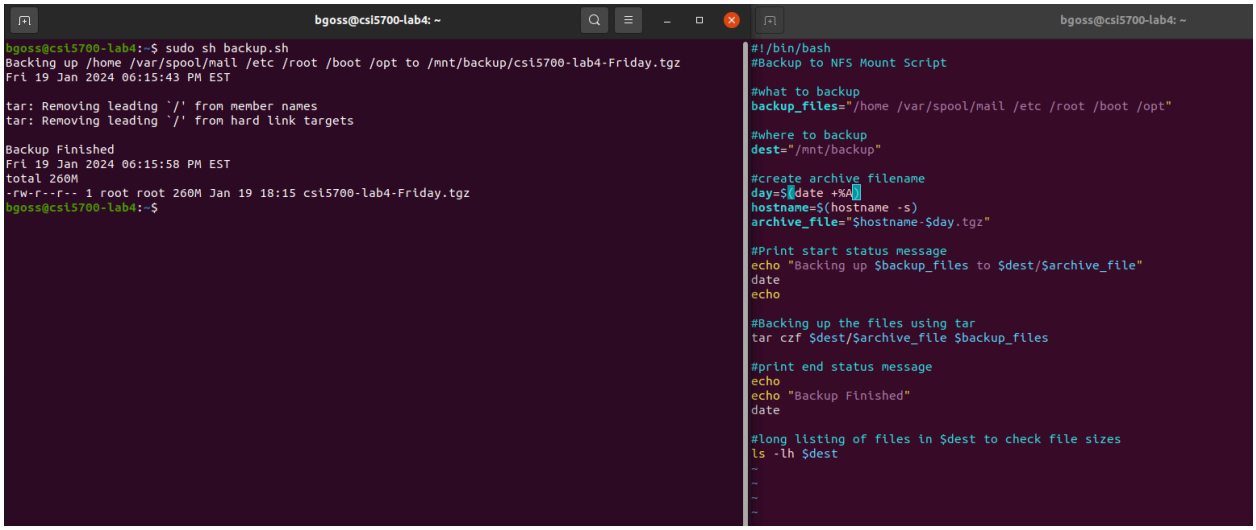
Can you think of potential vulnerabilities in this methodology?

Topic 2: Implementation of backups - Linux

There are a lot of different ways to create backups. There are quite a few tools and scripts that you can use based on whatever works best for you and your company. We will present a few different options for you to use.

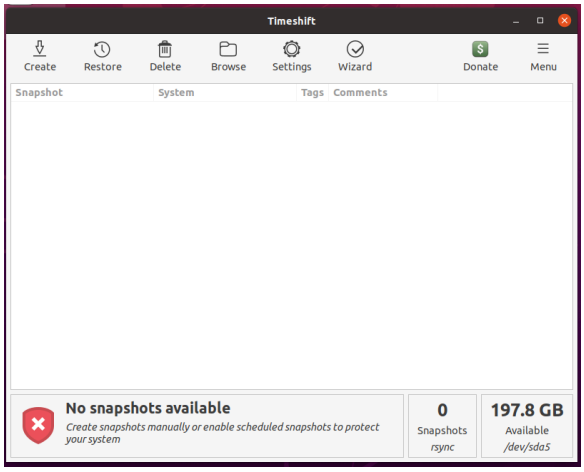
This script is one you can try to back up an Ubuntu virtual machine. Make sure you understand every command before running it, and look up what you don't know!

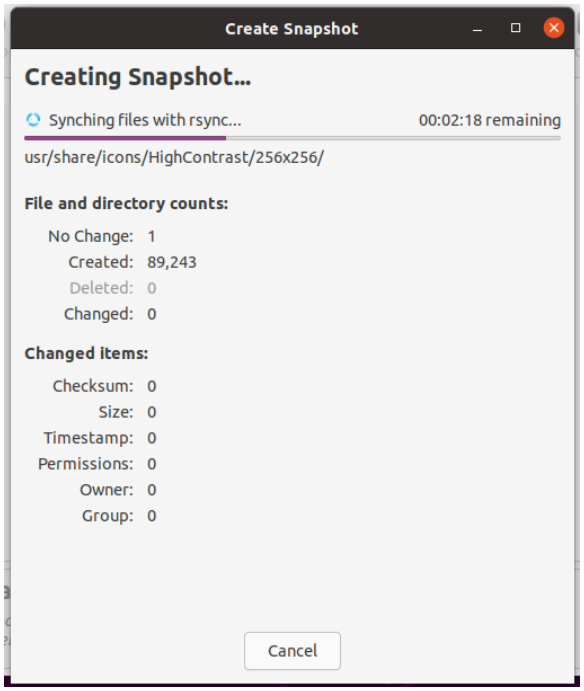
```
#!/bin/bash
# Backup to NFS mount script.

# What to backup.
backup_files="/home /var/spool/mail /etc /root /boot /opt"

# Where to backup.
dest="/mnt/backup"

# Create archive filename.
day=$(date +%A)
hostname=$(hostname -s)
archive_file="$hostname-$day.tgz"

# Print start status message.
echo "Backing up $backup_files to $dest/$archive_file"
date
echo

# Backup the files using tar.
tar czf $dest/$archive_file $backup_files

# Print end status message.
echo
echo "Backup finished"
date

# Long listing of files in $dest to check file sizes.
ls -lh $dest
```



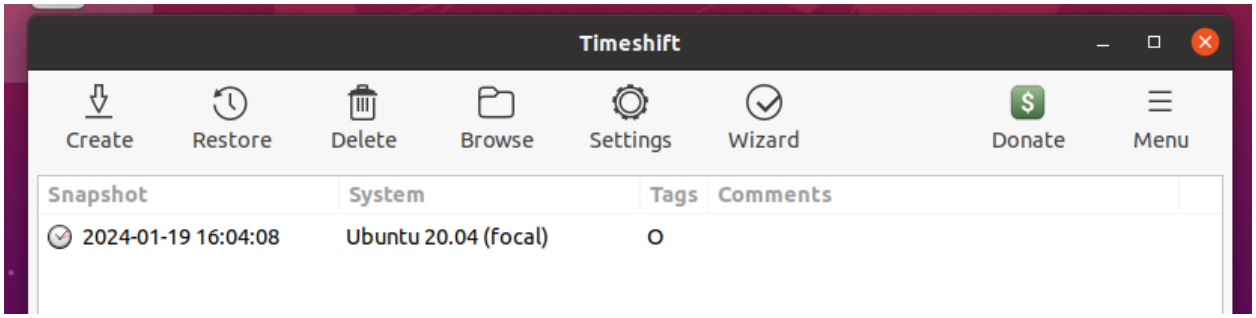
Another way to create a backup on a Linux distributions is by using an external utility such as [Timeshift]. The way Timeshift works is that it uses Ubuntu's copying tool rsync. It creates a snapshot of all system - level configurations and doesn't store user level files.

Make sure you use the correct file system snapshot **rsync**.
Then hit **create**.





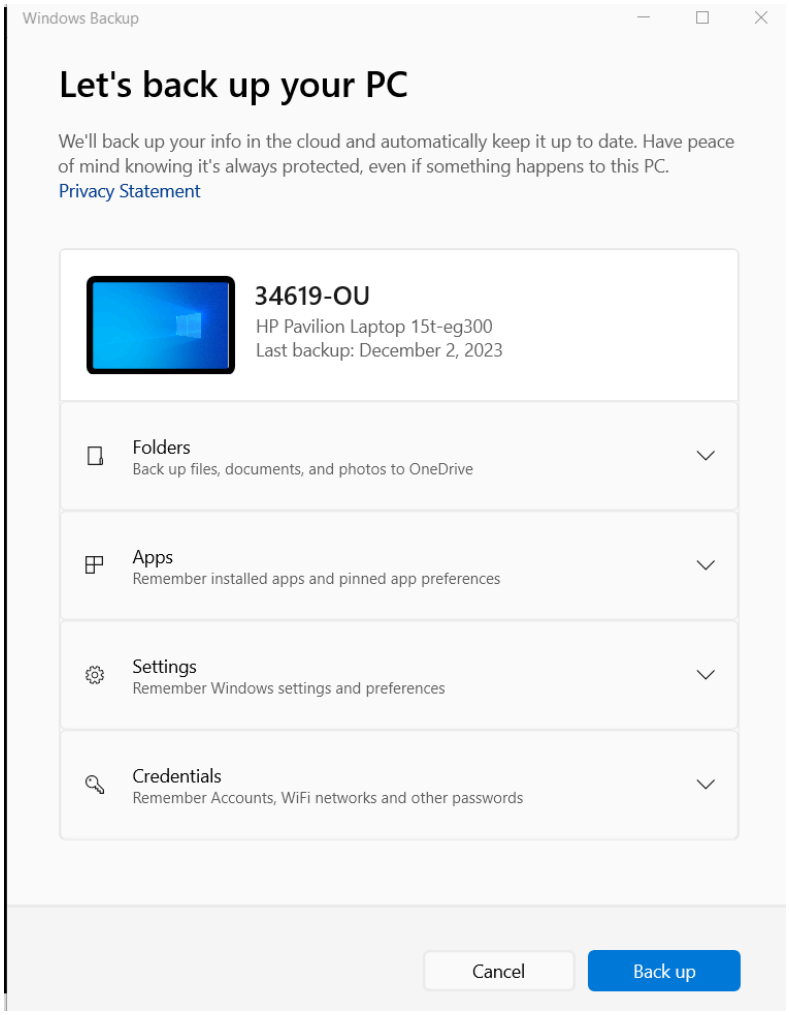
You can see your snapshot / backup like this afterwards



You can also schedule snapshots to be made.

Topic 3: Implementation of backups - Windows

Windows has their own backup app



Backing up with Powershell scripts gives you similar functionality to the backup app. Here is an example backing up the Documents folder.
First, you need to check your current execution policy restrictions while in Admin mode in Powershell.

Get-ExecutionPolicy

The default should be restricted, and make sure you change it back to restricted when you are done. Next, set the policy to unrestricted

```
PS C:\WINDOWS\system32> Get-ExecutionPolicy
Restricted
PS C:\WINDOWS\system32> Set-ExecutionPolicy unrestricted

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution policy might expose you to the security risks described i
at https:/go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "N"): A
```

Set-ExecutionPolicy unrestricted

You will get a prompt to confirm your choice, and you should select **A.**

Now it is time to back up the Documents folder.
The basic script is this

Copy-Item -Path pathName -Destiation destinationName -Recurse

Recurse will iterate through the folder to get all the items in the folder. If you run into the following error, no worries. It will make the back up regardless.

```
S C:\WINDOWS\system32> Copy-Item -Path C:\Users\bgoss\Documents -Destination C:\Users\bgoss\backups -Recurse
opy-Item : Access to the path 'C:\Users\bgoss\Documents\My Music' is denied.
t line:1 char:1
+ Copy-Item -Path C:\Users\bgoss\Documents -Destination C:\Users\bgoss\ ...
+ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
    + CategoryInfo          : PermissionDenied: (My Music:DirectoryInfo) [Copy-Item], UnauthorizedAccessException
    + FullyQualifiedErrorId : CopyDirectoryInfoItemUnauthorizedAccessError,Microsoft.PowerShell.Commands.CopyItemCommand

opy-Item : Access to the path 'C:\Users\bgoss\Documents\My Pictures' is denied.
t line:1 char:1
+ Copy-Item -Path C:\Users\bgoss\Documents -Destination C:\Users\bgoss\ ...
+ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
    + CategoryInfo          : PermissionDenied: (My Pictures:DirectoryInfo) [Copy-Item], UnauthorizedAccessException
    + FullyQualifiedErrorId : CopyDirectoryInfoItemUnauthorizedAccessError,Microsoft.PowerShell.Commands.CopyItemCommand

opy-Item : Access to the path 'C:\Users\bgoss\Documents\My Videos' is denied.
t line:1 char:1
+ Copy-Item -Path C:\Users\bgoss\Documents -Destination C:\Users\bgoss\ ...
+ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
    + CategoryInfo          : PermissionDenied: (My Videos:DirectoryInfo) [Copy-Item], UnauthorizedAccessException
    + FullyQualifiedErrorId : CopyDirectoryInfoItemUnauthorizedAccessError,Microsoft.PowerShell.Commands.CopyItemCommand
```

Now, change your execution policy back

```
Execution Policy Change
The execution policy helps protect you from scripts that you do not trust. Changing the execution poi
at https:/go.microsoft.com/fwlink/?LinkID=135170. Do you want to change the execution policy?
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "N"): A
PS C:\WINDOWS\system32> Get-ExecutionPolicy
Restricted
```

Topic 4: Cloud/External

If you'd like to have your backup stored on the cloud or onto another disk. There are different ways to handle this.

Windows servers have a vdi file and can be backed up similar to other virtual machines, but Windows Desktop Backup like the GUI used in Topic 3 does not offer this resource.

The three following resources walk you through how to upload an image/snapshot for backup purposes.

If you want to learn more about Cloud Services. Pick one you'd like to test out:

Note: they will require an account and could cost some money

AWS: Exporting an instance as a VM using VM Import/Export

Azure: Copy a snapshot to a storage account in another region using the CLI - Azure Virtual Machines | Microsoft Learn

Google Cloud: Export a custom image to Cloud Storage | Compute Engine Documentation

Topic 5: Review

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1. When should you do a full backup?
2. What kinds of backups did TimeShift allow you to do?
3. What kinds of backups did Windows Backup allow?
4. Are these kinds of backups sufficient? Why or why not?
5. If you had to recommend one of these cloud services to back up XYZ Corporation’s system, which one would you recommend and why?