

Project 3

Automated Backup and Rotation System with Google Drive Integration using Python and rclone

Batch

MCA 7 Feb 2025 &
DevOps 2 Jun 2025

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Project Title: Automated Backup and Rotation System with Google Drive Integration using Python and rclone

Objective:

The goal of this project is to automate the process of backing up important project folders.

It creates .zip files from a source folder, stores them locally, uploads them to Google Drive, and manages (deletes) old backups.

It also sends a notification to confirm the backup and writes a log for tracking.

This system runs daily using a cron job, and helps ensure that data is never

Lost.

Steps:

1. Create Project Folder Structure:

```
ubuntu@ip-172-31-41-228:~$ mkdir -p ~/backup_Gdrive/{logs,backups}
ubuntu@ip-172-31-41-228:~$ ls
backup_Gdrive
ubuntu@ip-172-31-41-228:~$ cd backup_Gdrive/
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ ls
backups  logs
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ |
```

Purpose:

logs/: Stores a log file showing all backup operations

backups/: Temporarily stores zipped files before uploading to Google Drive

2. Install Required Tools:

```
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ sudo apt update && sudo apt install -y python3 python3-pip zip unzip curl
```

1)python3, pip3: For running Python scripts

2)zip/unzip: For creating .zip files

3)curl: For uploading to webhook

4) python-dotenv is required for your script to read .env variables:

i) To enable python3 -m venv command

```
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ sudo apt install python3-venv python3-full
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

ii) python3 -m venv venv - To create isolated python environment

iii) source venv/bin/activate - To enter the environment

```
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ python3 -m venv venv
ubuntu@ip-172-31-41-228:~/backup_Gdrive$ source venv/bin/activate
(venv) ubuntu@ip-172-31-41-228:~/backup_Gdrive$ ls
backups logs venv
(venv) ubuntu@ip-172-31-41-228:~/backup_Gdrive$
```

iii) pip install python-dotenv - To read .env file in your script

v) venv folder – Keeps project clean and dependency-safe

```
(venv) ubuntu@ip-172-31-41-228:~/backup_Gdrive$ pip install python-dotenv
Collecting python-dotenv
  Downloading python_dotenv-1.2.1-py3-none-any.whl.metadata (25 kB)
  Downloading python_dotenv-1.2.1-py3-none-any.whl (21 kB)
Installing collected packages: python-dotenv
Successfully installed python-dotenv-1.2.1
(venv) ubuntu@ip-172-31-41-228:~/backup_Gdrive$ ls
backups logs venv
```

3. Install and Configure rclone:

Installed rclone (used to upload to Google Drive):

During rclone config:

- We created a remote called gdrive-backup
- Selected drive as the storage type (Google Drive)
- Logged in to Google to give rclone permission
- We skipped setting client ID/secret (left it empty)
- Chose full access scope
- Did not use service account or shared drive

Why:

rclone acts as the middleman to upload zipped backups to Google Drive

I) Using - "curl https://rclone.org/install.sh | sudo bash

ii) rclone config.

4. Create Configuration File:

We created the config file:

```
nano ~/.backup_config.env
```

```
GNU nano 7.2 /home/ubuntu/.backup_config.env
PROJECT_NAME=MyApp

SOURCE_DIR=/home/ubuntu/backup_project/my_backup.zip
BACKUP_DIR=/home/ubuntu/backup_project/backups
LOG_FILE=/home/ubuntu/backup_project/logs/backup.log

RETENTION_DAYS=7
RETENTION_WEEKS=4
RETENTION_MONTHS=3

RCLONE_REMOTE=gdrive-backup
RCLONE_FOLDER=MyAppBackups

WEBHOOK_URL=https://webhook.site/0747b12d-8847-4fb8-a889-6a9e2d7169a7
NOTIFY=true
```

*we get the webhook url from webhook website:

Why:

Stores values like source folder, backup location, retention policy, etc.

Helps make the Python script reusable and easy to change later

5. Write the python Backup Script:

We created the script:

```
nano ~/backup_project/backup_script.py
```

This script does the following:

- Loads variables from the .env file
- Creates a .zip file of the source directory
- Stores it in the backup folder with a timestamp
- Uploads the zip to Google Drive using rclone
- Sends a webhook notification (optional)
- Logs each operation
- Deletes old backups based on retention policy

We made it executable:

```
chmod +x ~/backup_project/backup_script.py
```

6. Test the Script:

We tested the script manually

```
ModuleNotFoundError: No module named 'dotenv'
ubuntu@ip-172-31-1-118:~/backup_project$ cd ~/backup_project
source venv/bin/activate
(venv) ubuntu@ip-172-31-1-118:~/backup_project$ python3 backup_script.py
[INFO] Creating backup: /home/ubuntu/backup_project/backups/2025/11/20/MyApp_20251120_175205.zip
[INFO] Uploading to Google Drive using rclone...
This URL has no default content configured. <a href="https://webhook.site/#!/edit/0747b12d-8847-4fb8-a88te/a>. [INFO] Webhook notification sent.
```

New zip file created inside backups/YYYY/MM/DD/

```
ubuntu@ip-172-31-1-118:~/backup_project/backups$ tree
.
└── 2025
    └── 11
        └── 20
            └── MyApp_20251120_175205.zip
4 directories, 1 file
ubuntu@ip-172-31-1-118:~/backup_project/backups$
```

iv) Notification seen on webhook.site

The screenshot shows a list of webhook logs. A specific POST request is highlighted with a green arrow pointing to its raw content. The raw content is a JSON object:

```
{
  "project": "MyApp",
  "date": "2025-11-20T17:52:05.976756",
  "status": "BackupSuccessful"
}
```

File was uploaded to Google Drive

The screenshot shows the Google Drive interface with the uploaded file 'MyApp_20251120_175205.zip' highlighted with a green box. The file details are as follows:

Name	Owner	File size	Location
MyApp_20251120_175205.zip	me	22 bytes	MyAppBa...

7. Automating the Script via Cron with Virtual

Environment:

Problem occurred when running cron job without shell script:

The cron job was not running the Python backup script properly, even though it worked when we ran it manually in the terminal.

Steps:

1) Create run_backup.sh Shell Script:

"nano ~/backup_project/run_backup.sh"

2) Make It Executable:

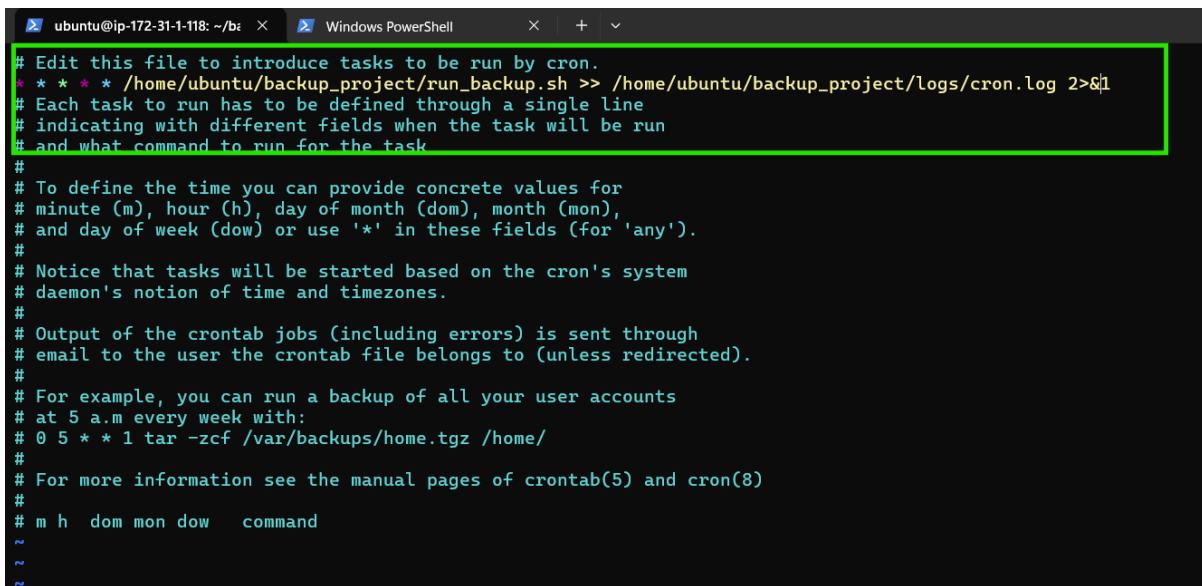
"chmod +x ~/backup_project/run_backup.sh"

3) Schedule It with Cron:

"crontab -e"

4) Add this line to run it every minute or you can modify it

according to you:



A screenshot of a terminal window titled "Windows PowerShell". The window contains the text of a crontab file. A green rectangular box highlights the first few lines of the file, which are the standard header for a crontab file. The rest of the file is the default help text provided by the cron daemon.

```
# Edit this file to introduce tasks to be run by cron.
# * * * * * /home/ubuntu/backup_project/run_backup.sh >> /home/ubuntu/backup_project/logs/cron.log 2>&1
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').
#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h dom mon dow   command
~ ~ ~ ~ ~
```

7. Automating the Script via Cron with Virtual Environment:

Problem occurred when running cron job without shell script:

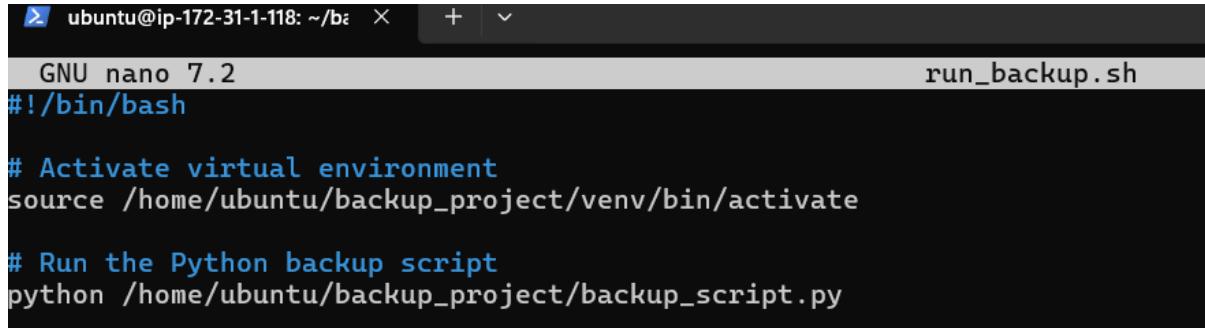
The cron job was not running the Python backup script properly, even though

it worked when we ran it manually in the terminal.

Steps:

- 1) Create run_backup.sh Shell Script:

```
"nano ~/backup_project/run_backup.sh"
```



```
ubuntu@ip-172-31-1-118:~/backup_project| + | ~
GNU nano 7.2
run_backup.sh
#!/bin/bash

# Activate virtual environment
source /home/ubuntu/backup_project/venv/bin/activate

# Run the Python backup script
python /home/ubuntu/backup_project/backup_script.py
```

What this does:

- Runs the backup automatically every 1 minute
- Saves any output (success/failure logs) into cron_output.log.

Output:

```
ubuntu@ip-172-31-1-118:~$ crontab -e
no crontab for ubuntu - using an empty one
crontab: installing new crontab
ubuntu@ip-172-31-1-118:~$ cd
ubuntu@ip-172-31-1-118:~$ ls
backup_project
ubuntu@ip-172-31-1-118:~$ cd backup_project/
ubuntu@ip-172-31-1-118:~/backup_project$ ls
backup_script.py backups logs run_backup.sh venv
ubuntu@ip-172-31-1-118:~/backup_project$ cd logs/
ubuntu@ip-172-31-1-118:~/backup_project/logs$ ls
backup.log
ubuntu@ip-172-31-1-118:~/backup_project/logs$ ls
backup.log
ubuntu@ip-172-31-1-118:~/backup_project/logs$ ls
backup.log cron.log
ubuntu@ip-172-31-1-118:~/backup_project/logs$ ls
backup.log cron.log
ubuntu@ip-172-31-1-118:~/backup_project/logs$ |
```

On google Drive uploaded

The screenshot shows the Google Drive interface with the 'Recent' tab selected. The left sidebar includes links for Home, My Drive, Computers, Shared with me, Recent (which is highlighted in blue), Starred, Spam, Trash, and Storage. The main area displays a table of recent files, with a green box highlighting the entries for 'Today'. The columns in the table are Name, Owner, File size, and Location. The 'Recent' section also includes a link to 'Earlier this month'.

Name	Owner	File size	Location
MyApp_20251120_183702.zip	me	22 bytes	MyAppBa...
MyApp_20251120_183601.zip	me	22 bytes	MyAppBa...
MyApp_20251120_175205.zip	me	22 bytes	MyAppBa...

Conclusion

This project provides a fully automated and reliable backup solution by combining directory compression, cloud synchronization, and intelligent retention policies. Using rclone, the system securely uploads timestamped backups to Google Drive, while automated rotation ensures efficient storage management across daily, weekly, and monthly cycles. The integration of a webhook notification system offers real-time status updates, and detailed logging makes the process transparent and easy to audit. With configuration handled through a simple .env file and execution scheduled via cron, the solution is both flexible and easy to maintain, ensuring consistent and dependable backups with minimal manual intervention.

Key Features:

- Environment-based Configuration (.env file)
- Timestamped Backup Zip Creation
- Google Drive Upload via rclone
- Retention Policy: Automatically deletes older backups (daily, weekly, monthly)
- Webhook Notification after successful backup
- Logging: Logs each action (success/failure/deletions)
- Automated Execution via Cron