Tutorial: File Management and Scripting on Arch Linux

Part 1: Drive Setup and Partitioning

1. **Identifying Drives and Partitions:**
   - Use `lsblk` or `fdisk -l` to list available drives (`/dev/sdX`). # X being the actual letter/number of your drive or replace sdX with the UUID or the name of the device
   - Example: `lsblk` showed `/dev/sdb` as the external drive.
2. **Partitioning with `fdisk`:**
   - Launch `fdisk` for partitioning:

     ```
     sudo fdisk /dev/sdb
     ```

   - Use `n` for new partition, `w` to write changes, `q` to quit.
3. **Formatting Partitions:**
   - Format with `mkfs` (e.g., `ext4`, `ntfs`, etc.):

     ```
     sudo mkfs.ext4 /dev/sdb1
     ```

4. **Mounting Drives:**
   - Create mount point and mount drive:

     ```
     sudo mkdir /mnt/newdrive
     sudo mount /dev/sdb1 /mnt/newdrive
     ```

5. **Adding to `/etc/fstab`:**
   - Automate mount on boot:

     ```
     UUID=<partition-UUID> /mnt/newdrive ext4 defaults 0 2
     ```

Part 2: Bash Script for File Organization

6. **Creating a Bash Script (`organize_files.sh`):**
   - Organize files by extension into categorized folders.

   Example script:

   ```
   #!/bin/bash

   SOURCE_DIR="/path/to/source"
   TARGET_DIR="/path/to/target"

   # Organize by extensions
   find "$SOURCE_DIR" -type f | while read file; do
   ```

```
    ext="${file##*.}"
    mkdir -p "$TARGET_DIR/$ext"
    mv "$file" "$TARGET_DIR/$ext/"
done
```

7. **Enhancing the Script:**
   - Extending the script to handle more file types and folders.

   Example:

```
#!/bin/bash

declare -A file_types=(
    [Images]="png jpg jpeg tiff"
    [Documents]="txt docx pdf odt"
    [Executables]="sh py exe"
    [Archives]="zip tar.gz"
)

for type in "${!file_types[@]}"; do
    mkdir -p "$TARGET_DIR/$type"
    for ext in ${file_types[$type]}; do
        mv "$SOURCE_DIR/*.$ext" "$TARGET_DIR/$type/"
    done
done
```

Part 3: Permissions and Ownership Management

8. **Changing Ownership and Permissions:**
   - Set ownership to user `paulgrey` for transferred files.

   Example:

```
sudo chown -R paulgrey:paulgrey "$TARGET_DIR"
```

9. **Checking and Adjusting Permissions:**
   - Ensure correct permissions for files and directories.

   Example:

```
sudo find "$TARGET_DIR" -type f -exec chmod 644 {} +
sudo find "$TARGET_DIR" -type d -exec chmod 755 {} +
```

Part 4: Troubleshooting and Optimization

10. **Troubleshooting `rsync` Issues:**
    - Debugging and optimizing `rsync` for efficient file synchronization.

    Example:

```
rsync -av --progress --exclude={.lost+found,.Trash-
        1000,lost+found,Trash-1000,venv,.venv,XynnLinux} /source
        /destination
```

11. **Preventing Duplicates with `rsync`:**
    - Using `--ignore-existing` to avoid copying existing files.

    Example:

    ```
    rsync -av --progress --ignore-existing /source /destination
    ```

12. **Optimizing `rsync` Performance:**
    - Adjusting process priority with `renice` for better performance.

    Example:

    ```
    ps aux | grep rsync | grep -v grep
    This command lists all running processes and filters out the rsync
            process.
    The grep -v grep part ensures that the grep command itself is not
            included in the results.
    Example Output
    user     12345  0.0  0.1  123456  7890 ?        S    12:34   0:00
            rsync -av --progress /source/directory/ /
            destination/directory/
    In this example, 12345 is the PID of the rsync process.
    sudo renice -n -10 -p <rsync-pid>
    ```

Conclusion

This tutorial has covered essential tasks and commands for managing drives, scripting file organization, handling permissions, and optimizing `rsync` for effective file synchronization on Arch Linux. Each step includes examples, explanations, and best practices to ensure efficient and reliable management of your files and storage devices.

By following these steps and understanding the commands involved, you can effectively organize, secure, and synchronize files across your Linux system. If you have any questions or need further assistance, feel free to ask for clarification or additional guidance!