Assignment 4

Task 1, 2 in separated files.

Task 3:

Symbolic Link (Symlink):

1. **Nature:** A symbolic link is a separate file that acts as a pointer to the target file or directory. It is essentially a text file containing the path to the target file.
2. **Size:** A symlink is small in size, just a few bytes.
3. **Cross-Filesystem:** Symbolic links can point to files or directories on different filesystems.
4. **Permissions:** Symlinks have their own permissions, and the user needs separate permission to access the symlink and the target file.
5. **Editing:** Editing the symlink's target path without affecting the target file.
6. **Dangling Links:** If the target file is deleted or moved, the symlink becomes a "dangling link" and points to a nonexistent file.

Hard Link:

1. **Nature:** A hard link is a reference to the same inode as the target file. Inodes store file metadata and data block pointers.
2. **Size:** Hard links don't consume extra space; they share the same space as the target file.
3. **Same Filesystem:** Hard links can only be created within the same filesystem as the target file.
4. **Permissions:** Hard links share the same permissions and ownership as the target file.
5. **Editing:** Editing the contents of a hard link actually modifies the contents of the target file, since they're the same inode.
6. **Deletion:** A file isn't truly deleted until the last hard link to it is removed. Therefore, the last hard link deletion deletes the actual file data.

Task4:

1. **Daemon Process:**
    - A daemon is a background process that runs without any direct user interaction.
    - Typically, daemons are started during system boot and continue running throughout the system's operation.
    - They perform various tasks, such as managing services, monitoring, and background jobs.

2. **Orphan Process:**
    - An orphan process is a child process that outlives its parent process.
    - This happens if the parent process terminates before the child.
    - Example: If a shell script starts a background process and then exits, the background process becomes an orphan.
3. **Zombie Process:**
    - A zombie process is a terminated process that hasn't been fully removed from the process table.
    - The process entry remains in the process table, containing information like exit status.
    - Zombies are created when a child process finishes execution, but its parent hasn't yet collected its exit status.
    - Zombies consume very few system resources but should be cleaned up to prevent resource waste.

Task5:

Multiprocessing is the simultaneous execution of multiple processes on a computer with multiple processors or cores. It boosts performance by running tasks concurrently, improving responsiveness and throughput. It's useful for tasks that require high computing power, like simulations and data analysis. Developers can design programs to run tasks in parallel for better efficiency.

Task6:

RAM (Random Access Memory) and ROM (Read-Only Memory) are both types of computer memory, but they serve different purposes and have distinct characteristics:

RAM (Random Access Memory):

- **Purpose:** RAM is a volatile memory used for temporary data storage during a computer's operation.
- **Read and Write:** Data can be read from and written to RAM. It's used for active programs and data that the CPU is currently processing.
- **Speed:** RAM is faster than most storage devices, allowing quick access to data.
- **Volatility:** RAM is volatile, meaning its contents are lost when the computer is powered off or restarted.
- **User Accessibility:** RAM is used by the operating system to manage active programs and data. Users don't directly interact with RAM.

ROM (Read-Only Memory):

- **Purpose:** ROM is non-volatile memory that stores permanent data that remains intact even when the computer is powered off.
- **Read-Only:** Data in ROM can only be read, not written. It contains essential firmware and software.
- **Speed:** ROM is usually slower to access compared to RAM.
- **Volatility:** ROM is non-volatile, ensuring that its contents are retained even when power is lost.
- **User Accessibility:** ROM stores critical system instructions, such as the computer's boot sequence and firmware. Users don't usually modify ROM contents.