Operating System Lab 3

Monitoring Process Activity

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Part 1: Introduction to Process Monitoring

Objective:

The objective of this lab is to teach students how to monitor and manage processes in a Unix-like operating system using ps and top, run processes in the background, and terminate processes by their PID.

What are Processes?

- A process is an instance of a program that is being executed. It contains the program code and its current activity.

Why Monitor Processes ?

- Importance of Process Monitoring:

  - System Performance Optimization: Resource Utilization, identify processes consuming excessive resources

  - Troubleshooting and Debugging: Identifying Issues, System Stability.

  - Security and Compliance: Intrusion Detection.

  - Resource Allocation and Management: Load Balancing, Capacity Planning.

* **Have you ever thought about what was the first process to run on Linux?**

Foreground and Background Processes:

- There are two types of process:

- **Foreground Processes:** A foreground process is one that runs directly under the control of the user's terminal. The terminal waits for the process to complete before it can accept new commands.

- **Background Processes:** A background process runs independently of the terminal. It allows the terminal to be used for other commands while the process continues to run.

- **Some differences between Foreground Processes and Background Processes:**

Characteristics	Foreground Processes	Background Processes
Initiation	Initiated by the user	Initiated by the user, often with an & at the end
Terminal Occupation	The terminal is occupied by the process until it finishes	The terminal is free to accept new commands immediately
Examples	Text editors, commands like ls, cat, etc.	Long-running scripts, downloads, etc.

Key Commands for Monitoring and Managing Linux Processes:

- **ps:**
  - The ps command displays information about active processes. It can provide detailed information such as the process ID (PID), user, CPU and memory usage.

- Example:

ps

- Examples:
  - To view all processes with detailed information → ps aux
  - To view processes for a specific user → ps -u username.
  - To view processes in a hierarchical format → ps -ejH

- **top:**

  - The top command provides a dynamic, real-time view of running processes, including CPU and memory usage.

- Example:

top

- While the top is running, you can type some commands to do a specific thing exampels:
  - To sort processes by memory usage at the top → press Shift + M.
  - To display only processes owned by a specific user in top → press u and type the username.
  - To Set refresh interval in top to 2 seconds → press d and then type 2.

- **kill:**

  - The kill command sends a signal to a process to terminate it. Common signals include SIGTERM (15) for graceful termination and SIGKILL (9) for forceful termination.

- Example:

kill [PID]

- Examples:
  - To gracefully terminate a process by its PID → kill -15 [PID]
  - To Forcefully terminate a process by its PID → kill -9 [PID]

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Part 2 : Let's Try

Let's try together:

- Now, I will solve one of the questions. Focus with me, and then it will be your turn.

- Question 1: Real-time Process Monitoring with ps and kill

  In this task, you will run a process in the background, find its PID using ps, and then terminate the process using its PID:

  - Run firefox in the background.
  - Use ps to find the PID of firefox
  - Kill the firefox process using its PID

Now it's your turn:

- **Solve the following Question and then go to the eLearning website to submit your solution.**

- Question 2: Real-time Process Monitoring with top

  In this task, you will run a process in the background, monitor it using top, sort tasks by user, and then terminate the process:

  - Run firefox in the background.
  - Use top to monitor processes:
    - Sort processes by user in top.
    - Arrange processes according to CPU usage. How much CPU does the Firefox process consume?
    - Find the Firefox PID at the top by using CTRL O and searching for COMMAND= firefox-esr
    - Kill the firefox process.

Best Wishes