Navigating Linux System Commands

A guide for beginners to the Shell and GNU coreutils

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Disclaimer

This document is a companion activity book for the System Commands (BSSE2001) course taught by **Prof. Gandham Phanikumar** at **IIT Madras BS Program.** This book contains resources, references, questions and solutions to some common questions on Linux commands, shell scripting, grep, sed, awk, and other system commands.

This was prepared with the help and guidance of the course instructors:

Santhana Krishnan and **Sushil Pachpinde**

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Colophon
This document was typeset with the help of KOMA-Script and LaTeX using the kaobook class.
The source code of this book is available at:
`https://github.com/sayan01/se2001-book`
(You are welcome to contribute!)

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UNIX is basically a simple operating system, but you have to be a genius to understand the simplicity.

– Dennis Ritchie

Preface

Through this work I have tried to make learning and understanding the basics of Linux fun and easy. I have tried to make the book as practical as possible, with many examples and exercises. The structure of the book follows the structure of the course *BSSE2001 - System Commands*, taught by **Prof. Gandham Phanikumar** at **IIT Madras BS Program.** .

The book takes inspiration from the previous works done for the course,

- Sanjay Kumar's Github Repository
- Cherian George's Github Repository
- Prabuddh Mathur's TA Sessions

as well as external resources like:

- Robert Elder's Blogs and Videos
- Aalto University, Finland's Scientific Computing - Linux Shell Crash Course

The book covers basic commands, their motivation, use cases, and examples. The book also covers some advanced topics like shell scripting, regular expressions, and text processing using `sed` and `awk`.

This is not a substitute for the course, but a companion to it. The book is a work in progress and any contribution is welcome at `https://github.com/sayan01/se2001-book`

Sayan Ghosh

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1.1 What are processes?

Definition 1.1.1 (Process) A process is an instance of a program that is being executed. It contains the program code and its current activity. Depending on the operating system (OS), a process may be made up of multiple threads of execution that execute instructions concurrently. Several processes may be associated with the same program; for example, opening up several instances of the same program often means more than one process is being executed. Each process has its own 'process id' or **PID** to uniquely identify it.

Whenever we run an application, or even a command on the linux shell, it spawns a process. Processes are always created by an already existing process [1] This creates a tree-like structure of processes, where each process has a parent process and can have multiple child processes. When the parent of a process dies, the child processes are adopted by the **init** process. **init** is thus the root of the process tree.

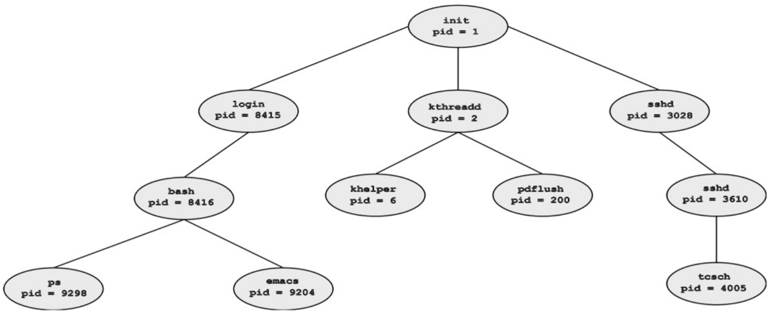

Figure 1.1: Example of a process tree

Question 1.1.1 How to get a snapshot of all the processes running? What are the commonly used flags used with it?

Answer 1.1.1 The **ps** command is used to get a snapshot of all the processes running.

- **ps** will get a snapshot of all the processes running.
- **ps -e** will show all the processes.
- **ps -f** will show full format listing.
- **ps -l** will show long format listing.
- **ps -u** will show user-oriented format listing.
- **ps -x** will show processes without controlling terminals.
- **ps -a** will show all processes with a terminal.
- **ps -A** will show all processes
- **ps aux** is a common command to see all processes
- **ps –forest** will show the processes in a tree form

[1] Other than the very first process, which is always the **init** process. In most distributions, this is done by systemd, which is an init system that does a lot of other things as well. You can learn more about systemd and what all it does here.

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