# Linux Commands Patterns

## Introduction

In Linux, command-line tools such as grep, awk, and sed provide powerful text-processing capabilities. These tools help search, manipulate, and process text efficiently. Understanding patterns and parameters in basic commands allows users to automate tasks, extract information, and modify files dynamically.

### Key Tools:

* **grep**: Searches for text patterns in files.
* **awk**: A programming language for pattern scanning and text processing.
* **sed**: A stream editor used for modifying files and streams.

# Common Practical Examples

## 1. Searching Patterns with grep

### Find a word in a file

grep "error" /var/log/syslog

### Search case-insensitively

grep -i "warning" /var/log/syslog

### Show line numbers with matches

grep -n "fail" /var/log/auth.log

### Search recursively in directories

grep -r "TODO" /home/user/projects

### Display only matching words

grep -o "[0-9]\{3\}-[0-9]\{3\}-[0-9]\{4\}" phonebook.txt

## 2. Text Processing with awk

### Print the second column from a file

awk '{print $2}' data.txt

### Filter and display lines where the value in column 3 is greater than 50

awk '$3 > 50' data.txt

### Print lines containing a specific pattern

awk '/error/ {print}' logs.txt

### Sum values in a specific column

awk '{sum+=$2} END {print sum}' sales.txt

### Extract usernames from /etc/passwd

awk -F: '{print $1}' /etc/passwd

## 3. Modifying Text with sed

### Replace a word in a file

sed 's/error/fixed/' logs.txt

### Replace all occurrences of a word

sed 's/error/fixed/g' logs.txt

### Delete blank lines from a file

sed '/^$/d' file.txt

### Remove the first column from a CSV file

sed 's/^[^,]\*,//' data.csv

### Insert a line after a specific pattern

sed '/pattern/a\New Line Here' file.txt

# Additional Notes

* grep, awk, and sed are fundamental for log analysis, data extraction, and text manipulation.
* Regular expressions enhance pattern-matching efficiency.
* sed is useful for in-place file modifications.
* awk is powerful for field-based data processing.
* Use grep -E for extended regular expressions.