UNIX Systems Programming Cheatsheet

- **Common UNIX Commands:**
    - **`ls`**: List directory contents
      ```
      ls -l          # Detailed listing
      ls -a          # List all files, including hidden
      ```
    - **`cd`**: Change directory
      ```
      cd /path/to/directory
      ```
    - **`pwd`**: Print working directory
      ```
      pwd
      ```
    - **`mkdir`**: Create a new directory
      ```
      mkdir new_directory
      ```
    - **`rmdir`**: Remove an empty directory
      ```
      rmdir directory
      ```
    - **`rm`**: Remove files or directories
      ```
      rm file.txt            # Remove file
      rm -r directory        # Remove directory and its contents
      ```
- **File Permissions:**
    - **`chmod`**: Change file permissions
      ```
      chmod 755 file         # rwxr-xr-x
      chmod u+x file         # Add execute permission for user
      ```
    - **`chown`**: Change file ownership
      ```
      chown user:group file
      ```

Bash Resources

- **Basic Shell Commands:**
    - **`echo`**: Display a line of text
      ```
      echo "Hello, World!"
      ```
    - **`cat`**: Concatenate and display file content
      ```
      cat file.txt
      ```
- **Bash Scripting Basics:**
    - **Shebang Line:** `#!/bin/bash` at the top of a script
    - **Variables:**
      ```
      bash
      name="John"
      ```
    - ```
      echo "Hello, $name"
      ```
    - **Conditionals:**
      ```
      if [ condition ]; then
      ```
    - ```
          # commands
      elif [ condition ]; then
          # commands
      else
          # commands
      fi
      ```
    - **Loops:**
      ```
      for i in {1..5}; do
      ```
    - ```
          echo $i
      done
      ```
    -
    - ```
      while [ condition ]; do
          # commands
      done
      ```

Advanced Bash Scripting

- **Functions:**
  ```
  function_name() {
  ```
- ```
      # commands
  }
  ```
- **Command Substitution:**
  ```
  result=$(command)
  ```
- ```
  echo $result
  ```
- **Process Substitution:**
  ```
  diff <(command1) <(command2)
  ```
- **File Handling:**
  ```
  # Read file line by line
  ```
- ```
  while IFS= read -r line; do
      echo "$line"
  done < file.txt
  ```

Pipes and Redirection

- **Redirect Output:**
  ```
  command > file.txt       # Overwrite file
  ```
- ```
  command >> file.txt      # Append to file
  ```
- **Redirect Error Output:**
  ```
  command 2> error.log
  ```

- **Pipe Output:**
  `command1 | command2`

Regular Expressions and `grep`

- **Basic Usage of `grep`:**
  `grep 'pattern' file.txt`

- `grep -i 'pattern' file.txt`
  `# Case-insensitive search`
- `grep -n 'pattern' file.txt`
  `# Show line numbers`
- `grep -v 'pattern' file.txt`
  `# Invert match`

- **Regular Expression Patterns:**
  - **`.`**: Matches any single character
  - **`*`**: Matches zero or more characters
  - **`^`**: Matches the beginning of a line
  - **`$`**: Matches the end of a line
  - **`[abc]`**: Matches any one of the characters inside the brackets
  - **`[a-z]`**: Matches any one character in the range

- **Navigating the Filesystem:**
  - **`ls`**: List files and directories
  - **`cd`**: Change directory
  - **`find`**: Search for files
    `find /path -name filename.txt`

- **Filesystem Hierarchy:**
  - **`/`**: Root directory
  - **`/home`**: User home directories
  - **`/etc`**: Configuration files
  - **`/var`**: Variable data files (logs, databases)

Introduction to Python

- **Basic Python Syntax:**
  - **Print Output:**
    `print("Hello, World!”)`
  - **Variables:**
    `name = "John"`
  - `print(name)`

- **Control Structures:**
  - **Conditionals:**

    `if condition:`
  - `    # code`
  - `elif condition:`
  - `    # code`
  - `else:`
  - `    # code`

  - **Loops:**
    `for i in range(5):`
  - `    print(i)`

  - `while condition:`
  - `    # code`

- **Functions:**
  `def function_name(parameters):`

- `    # code`
- `    return value`

Permissions are often expressed as octal numbers:

4 readable, 2 writable, 1 executable, 5 readable + executable, 6 readable + writable, 0 nothing, 7 all