Open Source compliance: Technical must-knows for legal experts

Open Source Automation Development Lab (OSADL) eG

The terminal
Shell command line
Directory tree

What is a terminal?

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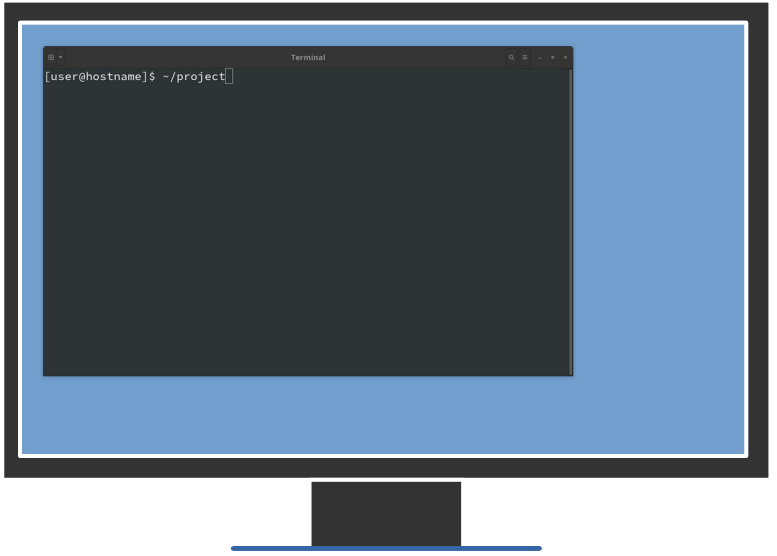
A terminal is a software for communicating with the computer via text commands.

Examples:

- Linux: Terminal, XTerm, Konsole
- Apple: MacOS Terminal
- Windows: Git Bash or wsl



Characteristics of a terminal

- The terminal is the generic interface to enter commands to a computer (=command-line interface or short CLI).
- The program that manages text input and program execution is called **shell**.
- In addition, many low-level text-oriented programs are best executed from command line. This includes programs to investigate licensing and module interdependency.

How is the shell used?

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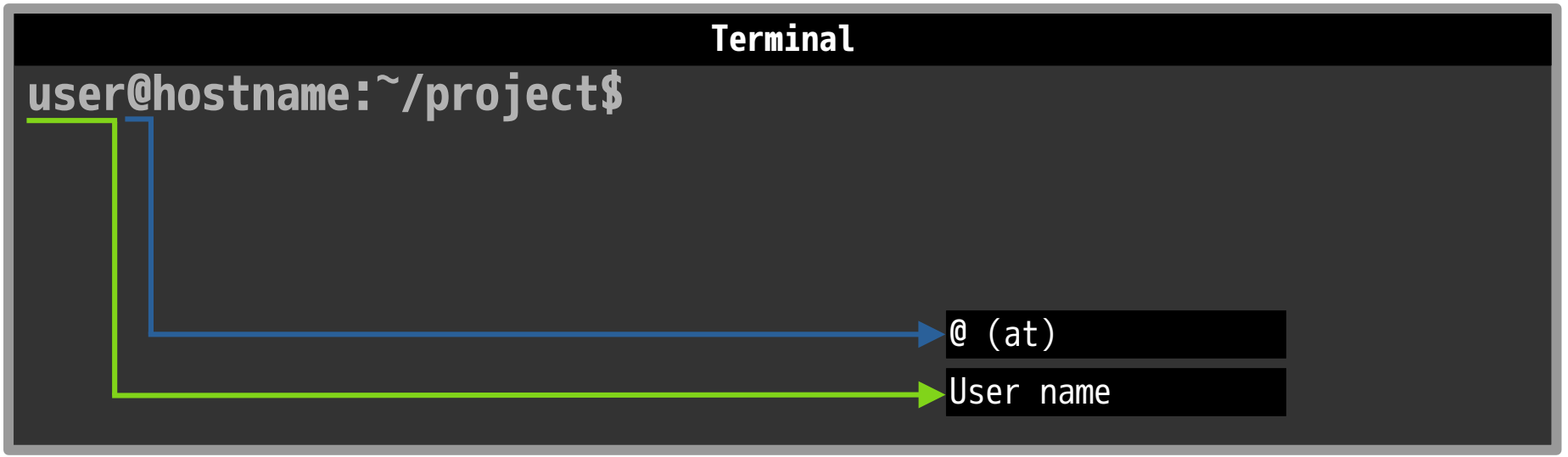

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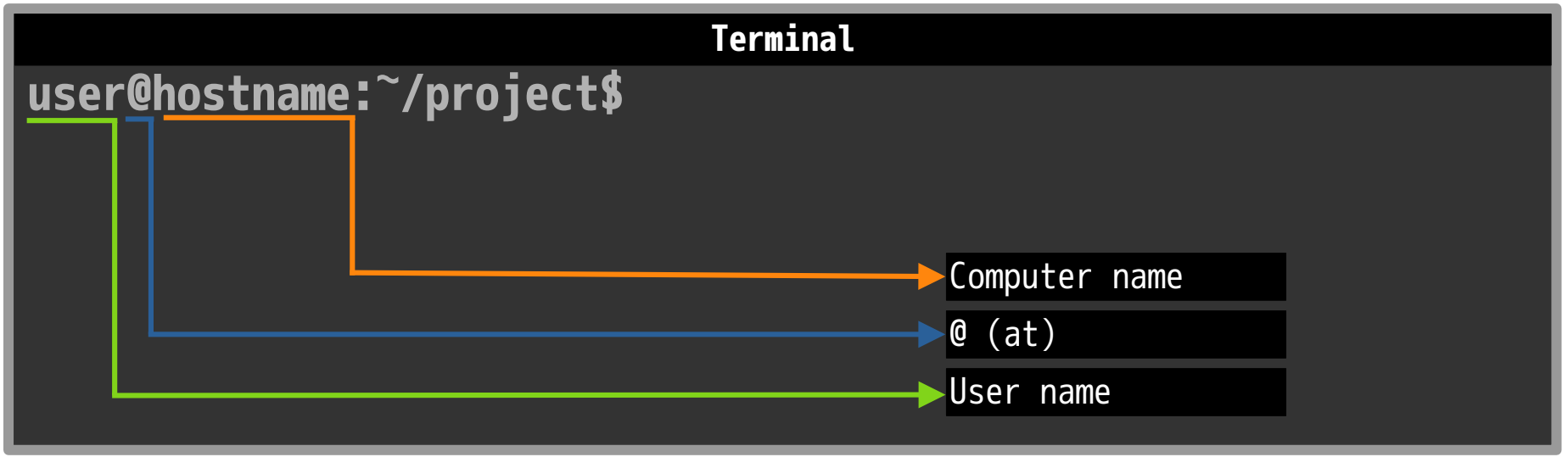

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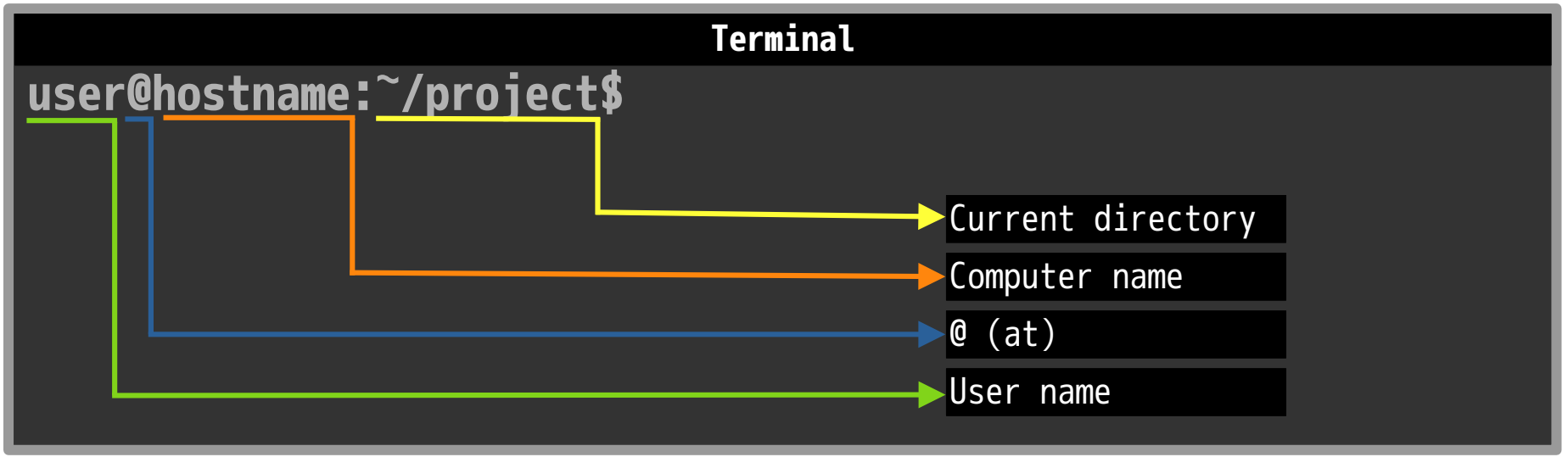

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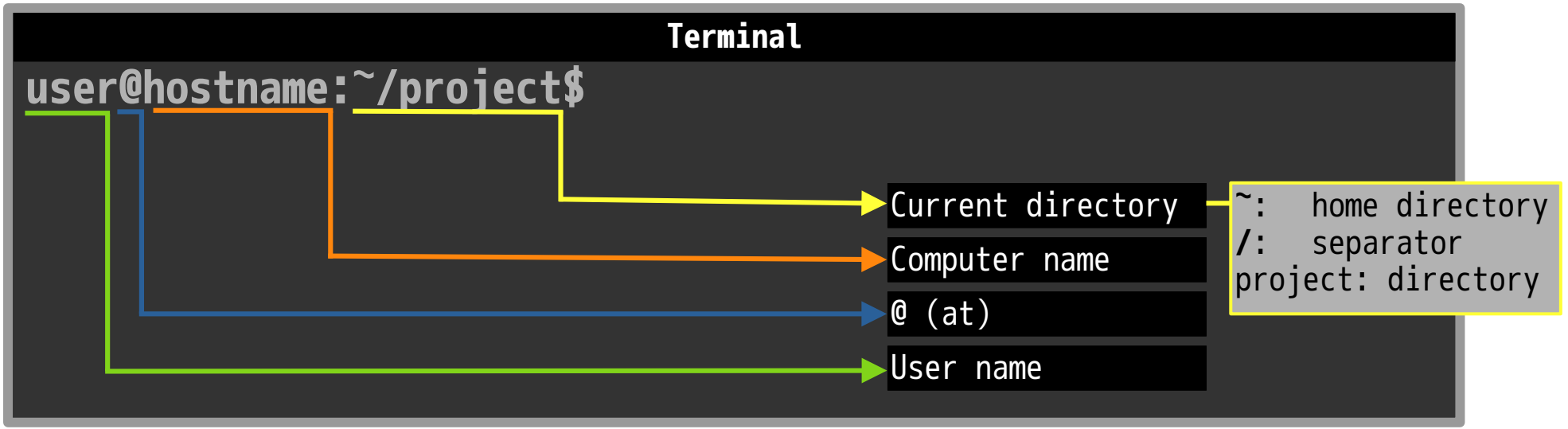

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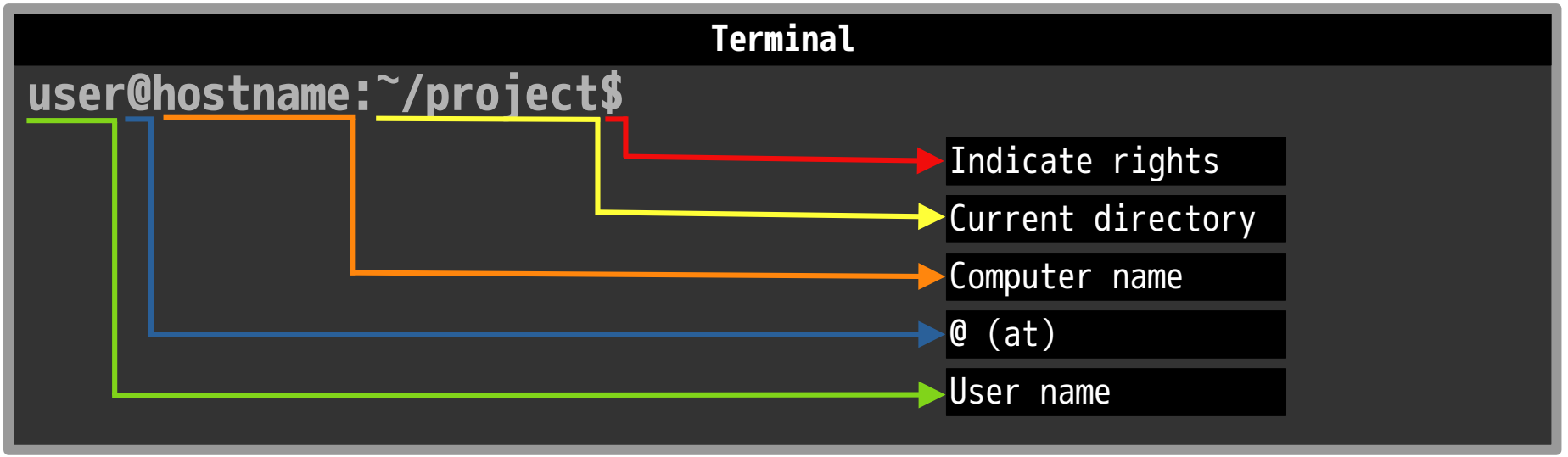

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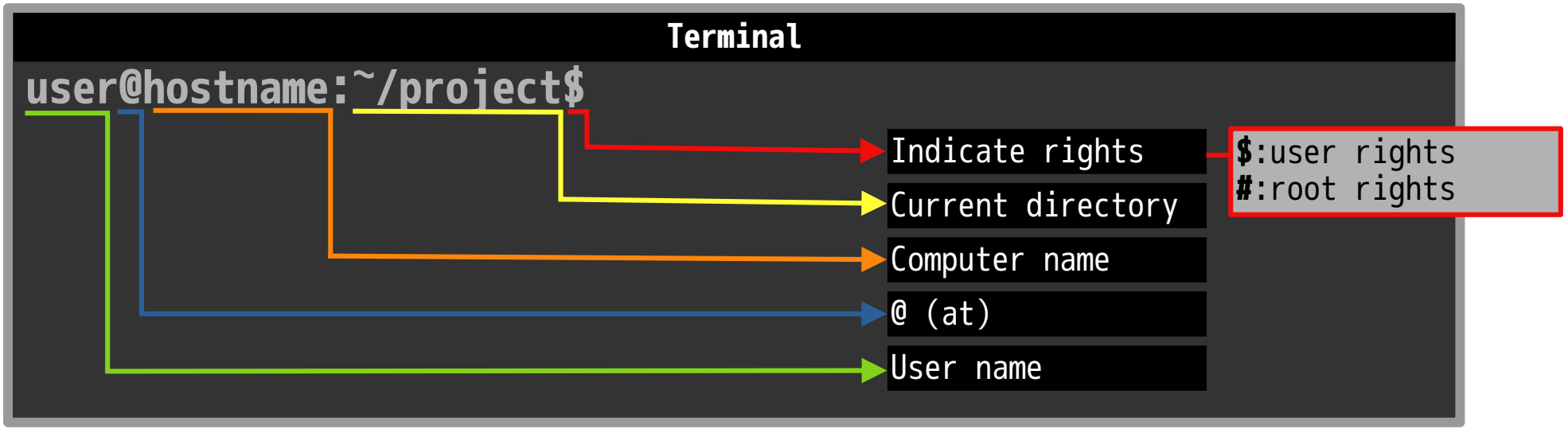

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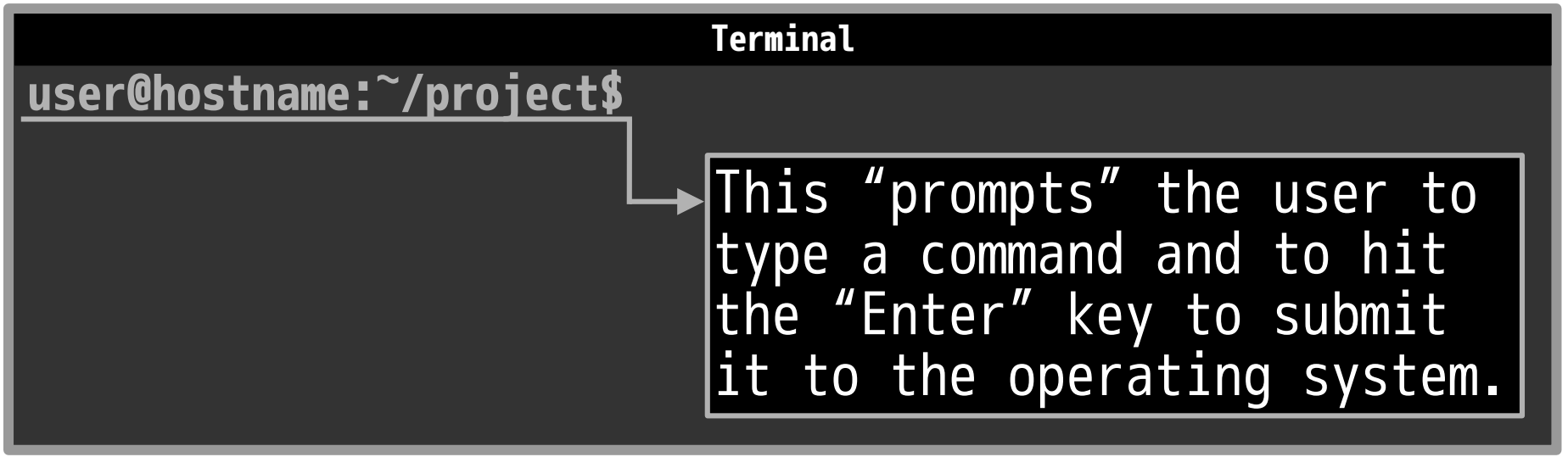

Command execution in the shell

- **"Built-in" commands** are executed internally by the shell itself, enabling resource-saving and fast execution without the need for external binaries (=programs).
  - Examples: **cd, pwd, echo, exit, read, help**
- **External commands** are executable files stored in the file system. Whenever a command is entered that is not available as built-in command, the shell tries to find a program with the name of the command and executes it if found.
  - Examples: **ls, grep, cat, cp, mkdir, mv, date**

Syntax of the commandline

The general syntax of a command is as follows:

```
Terminal
user@hostname:~/project$ command [options] [arguments]
```

- **command:** The program or command to be executed (e.g. ls, echo, cd).
- **options:** Additional modifiers that change the behavior of the command
- **arguments:** File-/dirname or data to which the command is applied

Example:

```
user@hostname:~/project$ ls -l /home/user
```

→Displays files and directories in the /home/user directory in long format.

“Built-in” commands

- **cd** Change directory
  - cd → change to users home directory
  - cd [dir] → change to directory [dir]
  - cd .. → change to parent directory
- **pwd** Print current working directory
- **echo** Write arguments to the standard output
  - echo text → text
- **exit** Exit the shell
- **read** Read from the standard input and split it into fields
- **help** Display information about builtin commands

External commands

- **ls** — List information about the FILEs
  - ls -l → use long listing format
  - ls -t → sort by time, newest first
  - ls -tr → sort by time, newest last (reverse sorting)
- **mkdir DIR** — Create the directory DIR
- **cp SRC DST** — Copy SRC to DST
- **mv SRC DST** — Rename SRC to DST
- **cat FILE** — Print the content of the file FILE
- **grep PTN FILE** — Searches for patterns PTN in each FILE
- **man CMD** — Display manpage of CMD

File redirection, execution separators and piping

- The output of a command may be redirected to a file using one of the following redirection symbols:
  - **`>file`** Send output to *file*, create new or overwrite it
  - **`>>file`** Append output to *file*, create new if it does not exist
- Several commands can be entered in one command line:
  - separated by **`;`** to indicate sequential execution
  - or by **`&`** to indicate parallel execution
- A pipe (**`|`**) can be used to connect commands in Bash
  - command1 **`|`** command2
  - The output of a command1 is used directly as input for command2

Navigating in the directory tree

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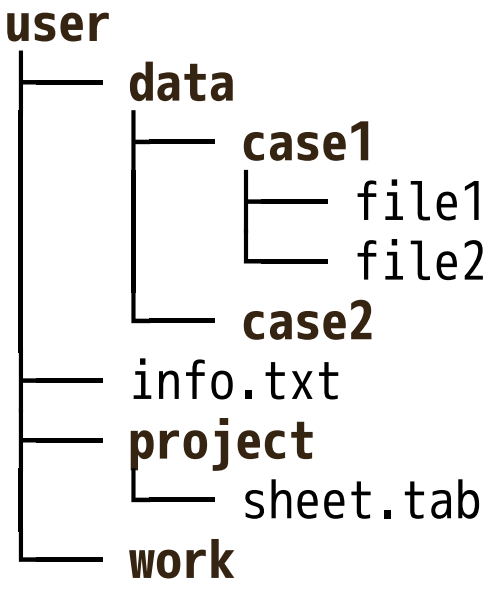

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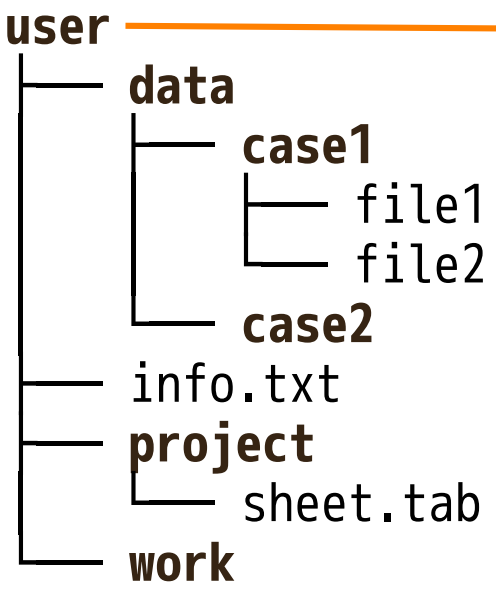

Parent directory of **data**, info.txt, **project** and **work**

Navigating in the directory tree