Managing Files in the Terminal

Organizing Data Science Projects

Your Workspace / Project 1

| File | Edit | Code | View | Plots | Session | Build | Debug | Profile | Tools | Help |

Go to file/function   Addins ▾

Console **Terminal** × ⬅

/cloud/project/ ⇗

```
R version 3.4.4 (2018-03-15) -- "Someone to Lean On"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.
```

○

Your Workspace / Project 1

| File | Edit | Code | View | Plots | Session | Build | Debug | Profile | Tools | Help |

Go to file/function   Addins

Console   **Terminal** ✕

Terminal 1 ▾   rstudio-user@713890268ae0: /cloud/project

rstudio-user@713890268ae0:/cloud/project$ █ Type commands here
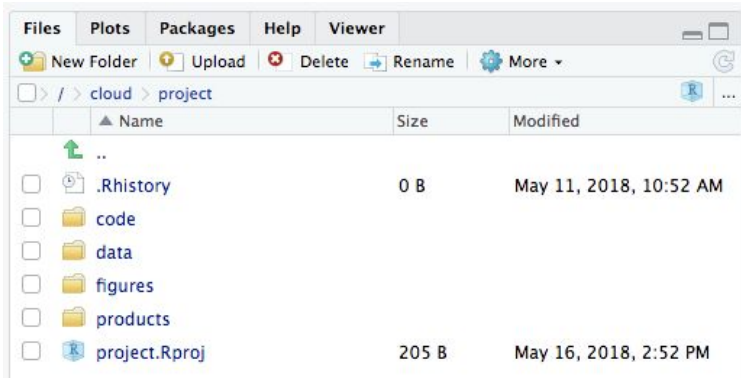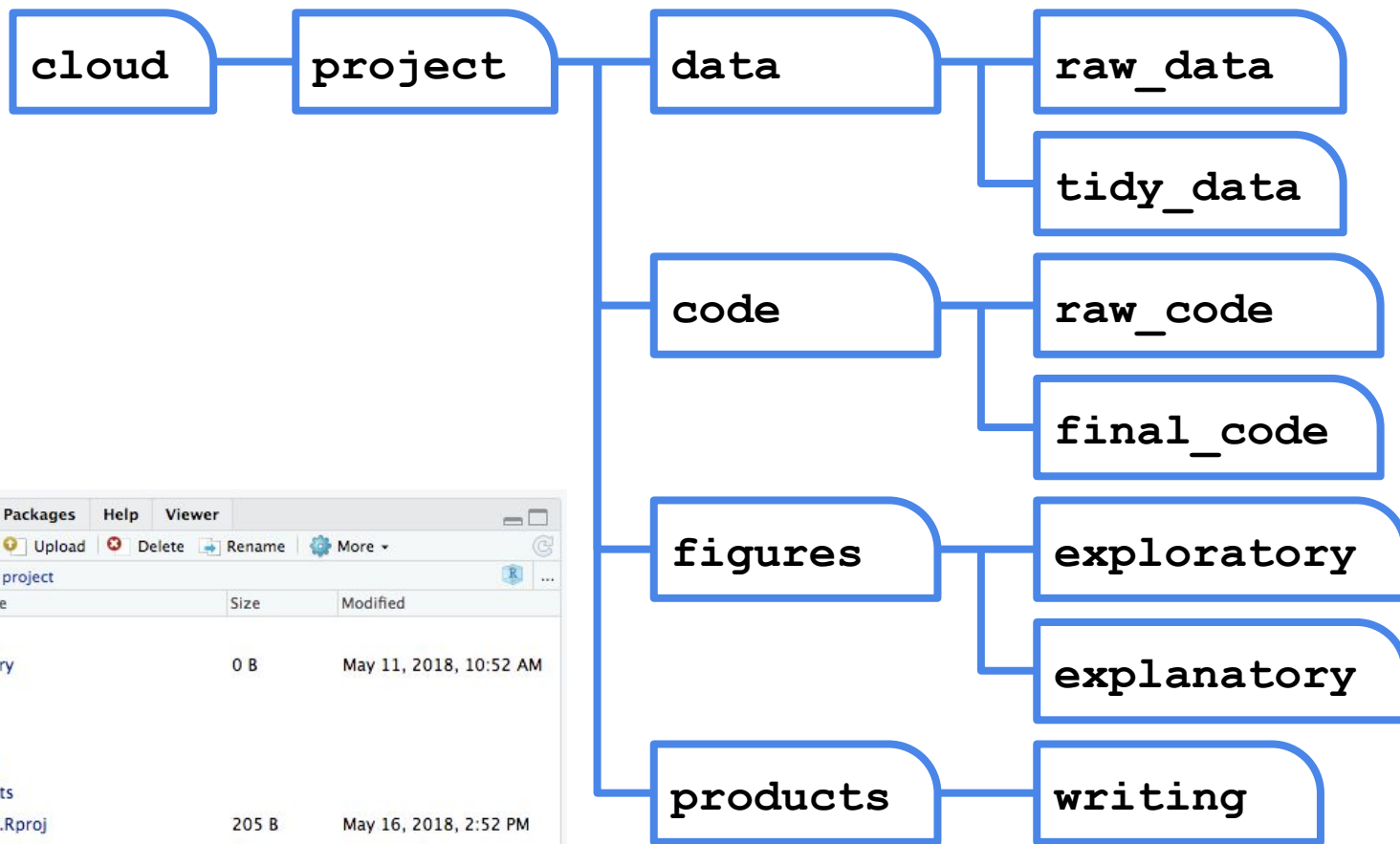
Terminal prompt
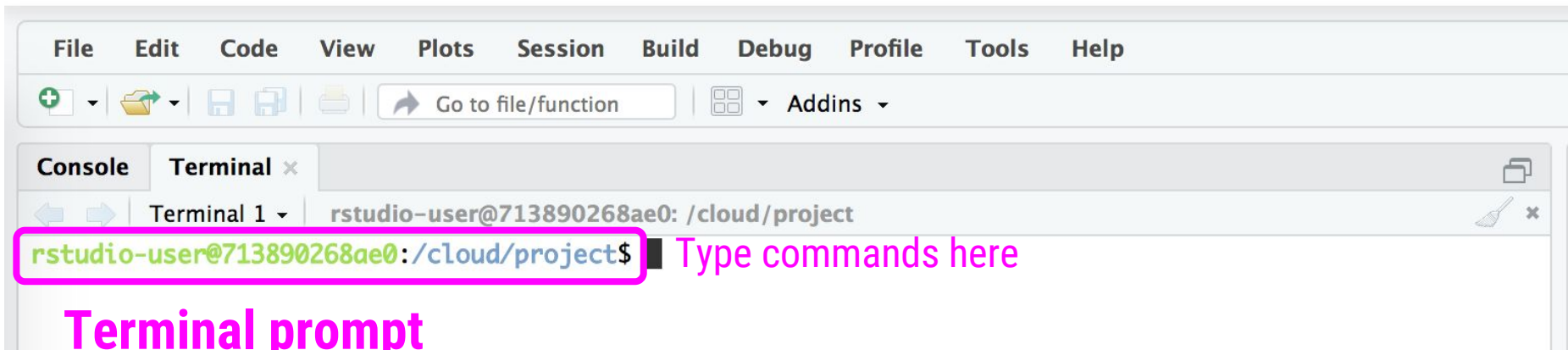
Why manage files in the Terminal?

Non-Terminal
A lot of clicking and typing

Terminal
Few short commands

```
cloud — project ─┬─ data ─┬─ raw_data
                 │        └─ tidy_data
                 │
                 ├─ code ─┬─ raw_code
                 │        └─ final_code
                 │
                 ├─ figures ─┬─ exploratory
                 │           └─ explanatory
                 │
                 └─ products ── writing
```

Files	Plots	Packages	Help	Viewer			

New Folder | Upload | Delete | Rename | More ▾

/ > cloud > project

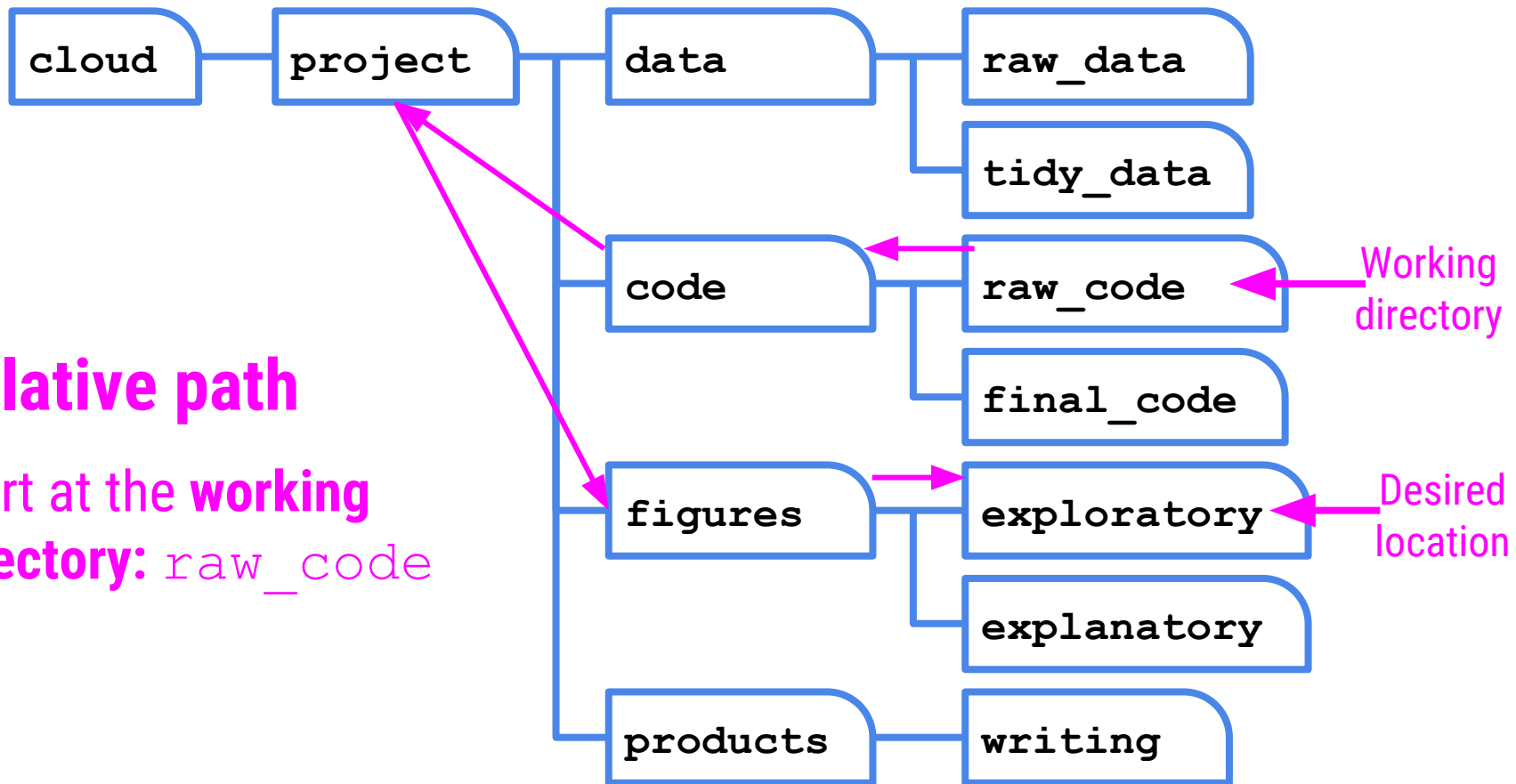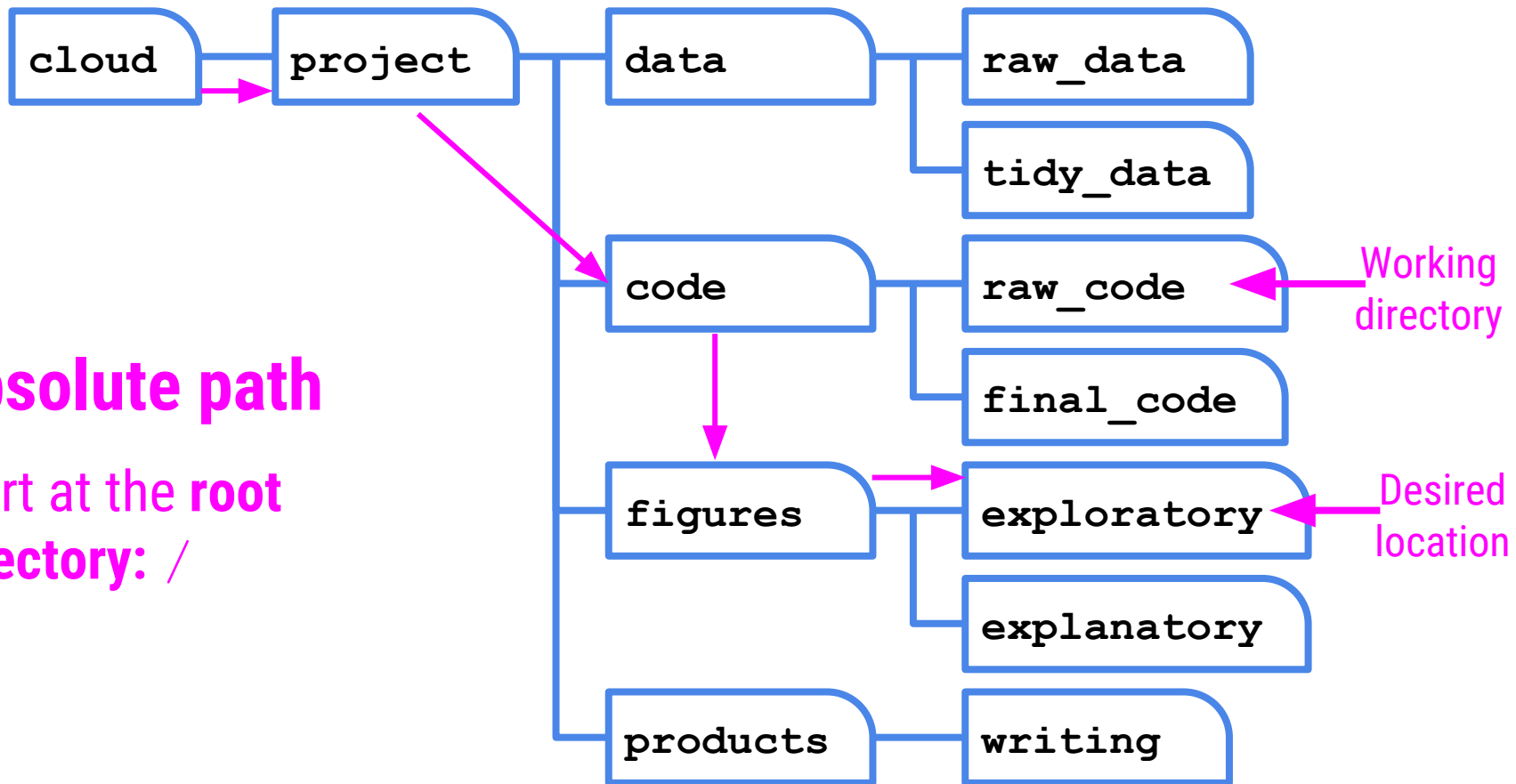|	▲ Name	Size	Modified
	..		
☐	.Rhistory	0 B	May 11, 2018, 10:52 AM
☐	code		
☐	data		
☐	figures		
☐	products		
☐	project.Rproj	205 B	May 16, 2018, 2:52 PM

Path: sequence of folders separated by /'s (possibly ending in a file name)

Working directory: current location

cloud — **project** — **data** — **raw_data**

tidy_data

code — **raw_code** ← Working directory

final_code

figures — **exploratory** ← Desired location

explanatory

products — **writing**
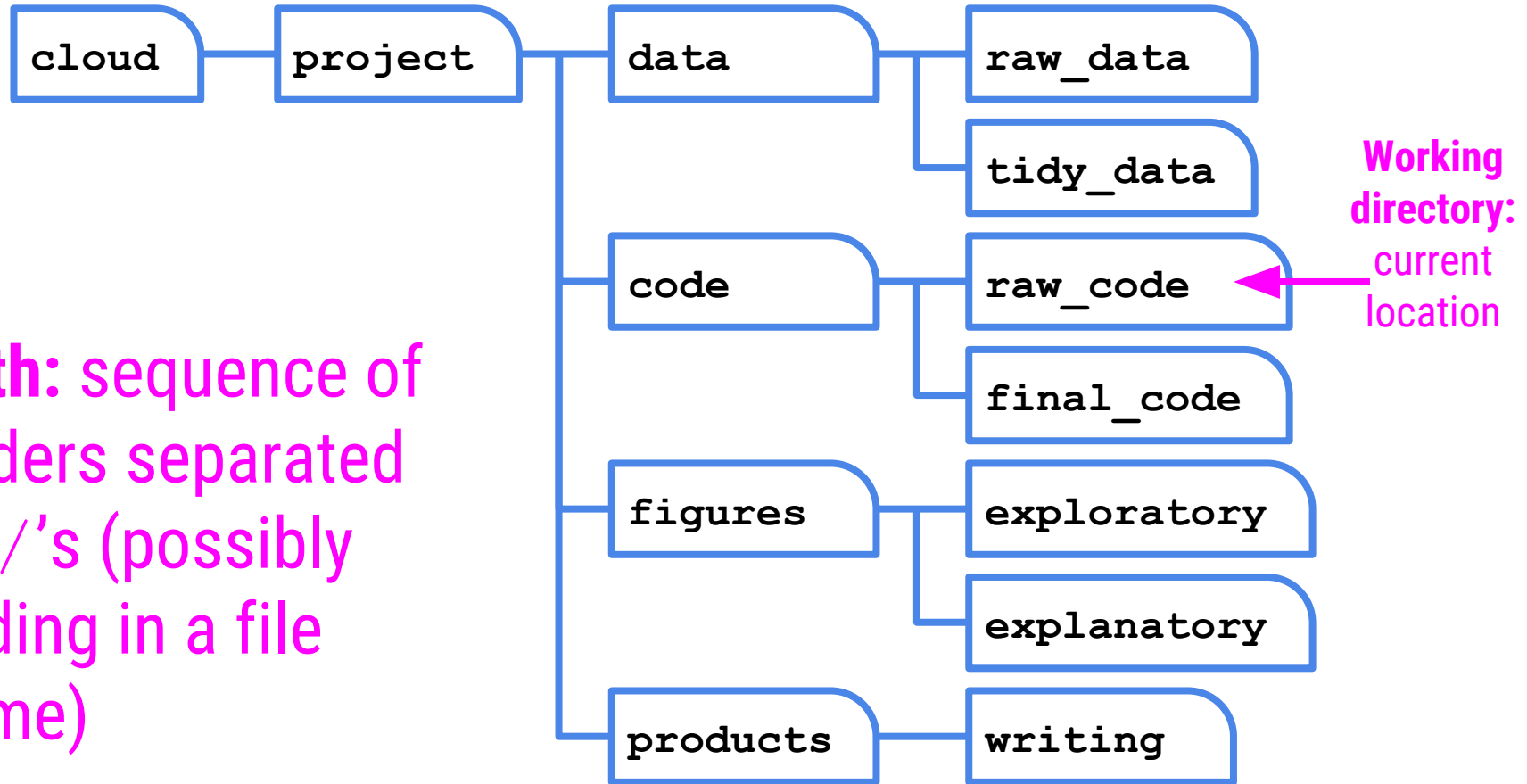
Relative path

Start at the **working directory:** `raw_code`

Absolute path

Start at the **root directory:** /

cloud → project

data → raw_data, tidy_data

code → raw_code (Working directory), final_code

figures → exploratory (Desired location), explanatory

products → writing

	In the Terminal	**In town**
Root directory	/	Town square
Working directory	`raw_code`	Library
Destination	`exploratory`	Bakery

Absolute path: "We're at the library but pretend you are at the town square. Turn left, then right."
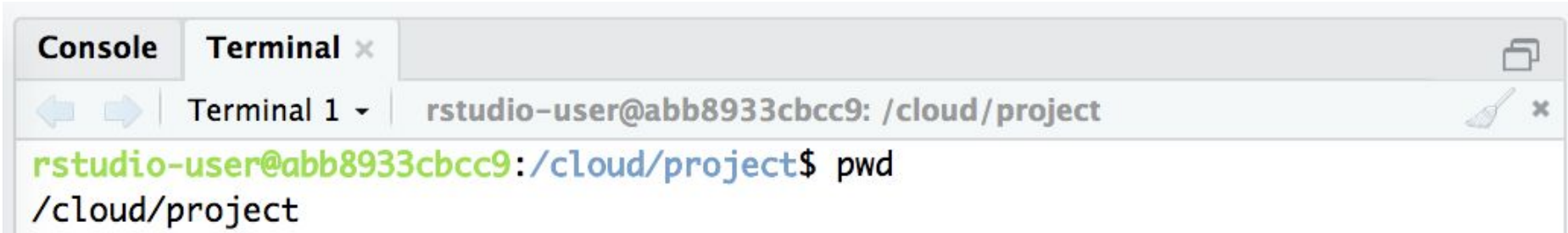
Relative path: "Turn right, then right again."
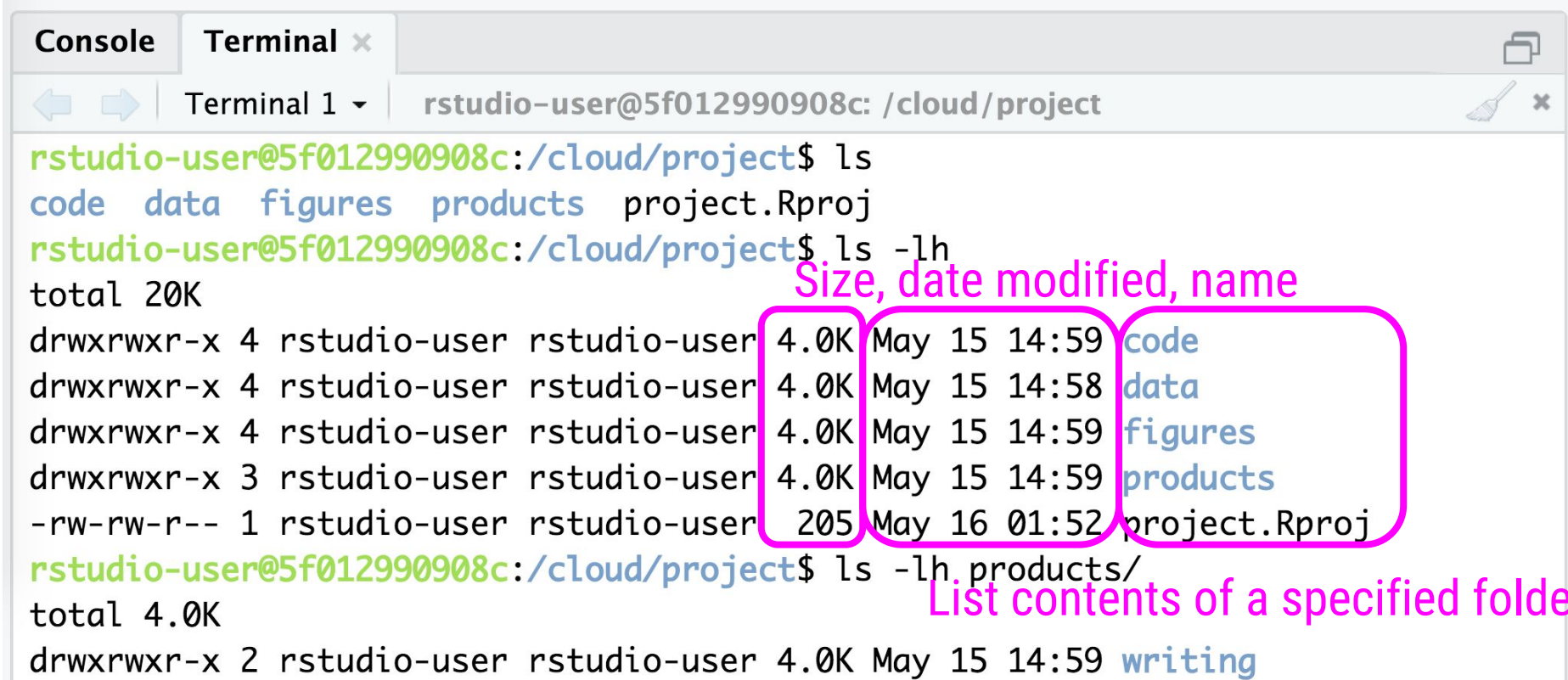
Important Commands

Where am I?   `pwd`

```
Console    Terminal ×

   ←  →  │  Terminal 1 ▾  │  rstudio-user@abb8933cbcc9: /cloud/project

rstudio-user@abb8933cbcc9:/cloud/project$ pwd
/cloud/project
```
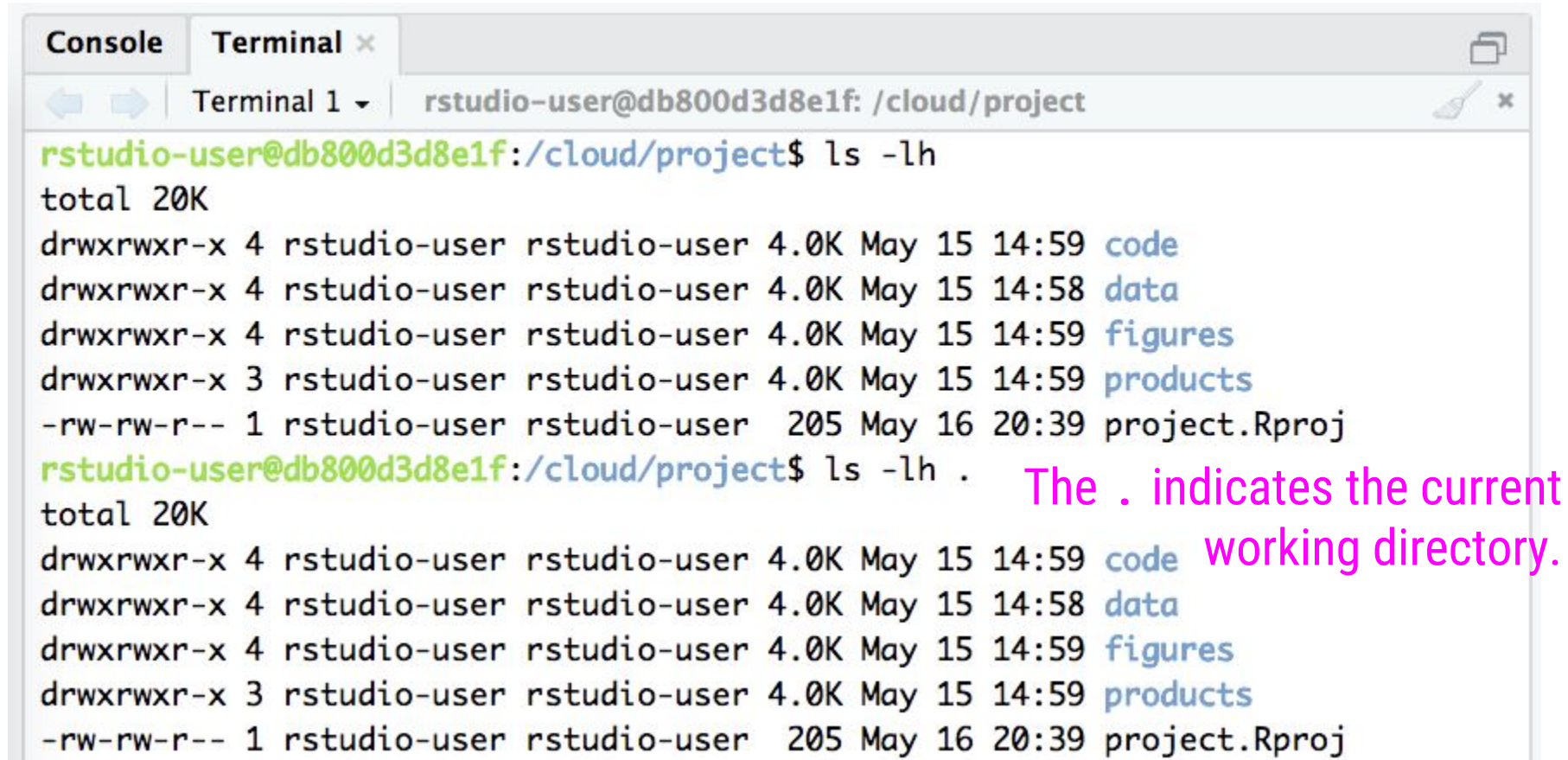
What is in this folder? `ls`


```
rstudio-user@5f012990908c:/cloud/project$ ls
code    data    figures    products    project.Rproj
rstudio-user@5f012990908c:/cloud/project$ ls -lh
total 20K
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 code
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:58 data
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 figures
drwxrwxr-x 3 rstudio-user rstudio-user 4.0K May 15 14:59 products
-rw-rw-r-- 1 rstudio-user rstudio-user  205 May 16 01:52 project.Rproj
rstudio-user@5f012990908c:/cloud/project$ ls -lh products/
total 4.0K
drwxrwxr-x 2 rstudio-user rstudio-user 4.0K May 15 14:59 writing
```

Size, date modified, name

List contents of a specified folder
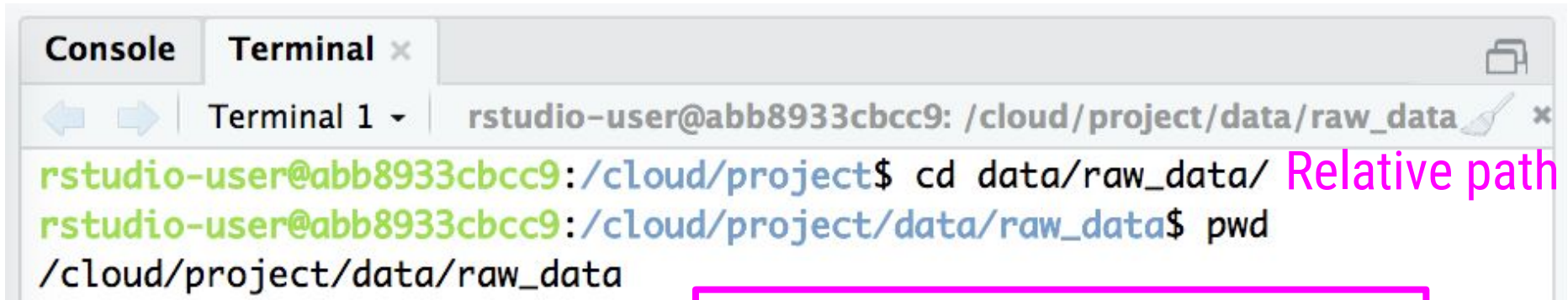
What is in this folder?   `ls`


```
Console   Terminal ×

Terminal 1 ▼    rstudio-user@db800d3d8e1f: /cloud/project

rstudio-user@db800d3d8e1f:/cloud/project$ ls -lh
total 20K
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 code
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:58 data
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 figures
drwxrwxr-x 3 rstudio-user rstudio-user 4.0K May 15 14:59 products
-rw-rw-r-- 1 rstudio-user rstudio-user  205 May 16 20:39 project.Rproj
rstudio-user@db800d3d8e1f:/cloud/project$ ls -lh .
total 20K
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 code
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:58 data
drwxrwxr-x 4 rstudio-user rstudio-user 4.0K May 15 14:59 figures
drwxrwxr-x 3 rstudio-user rstudio-user 4.0K May 15 14:59 products
-rw-rw-r-- 1 rstudio-user rstudio-user  205 May 16 20:39 project.Rproj
```

The `.` indicates the current working directory.

Change directory `cd`

Pro tip! Tab completion saves typing time!

Change directory `cd`
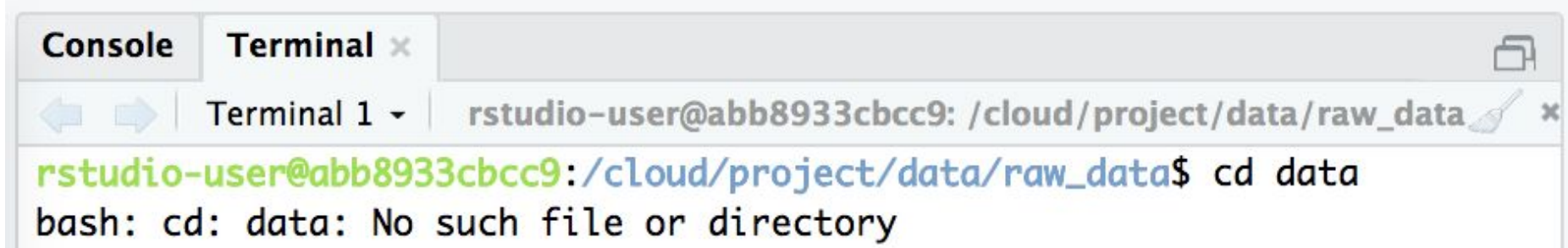
Console | Terminal ×

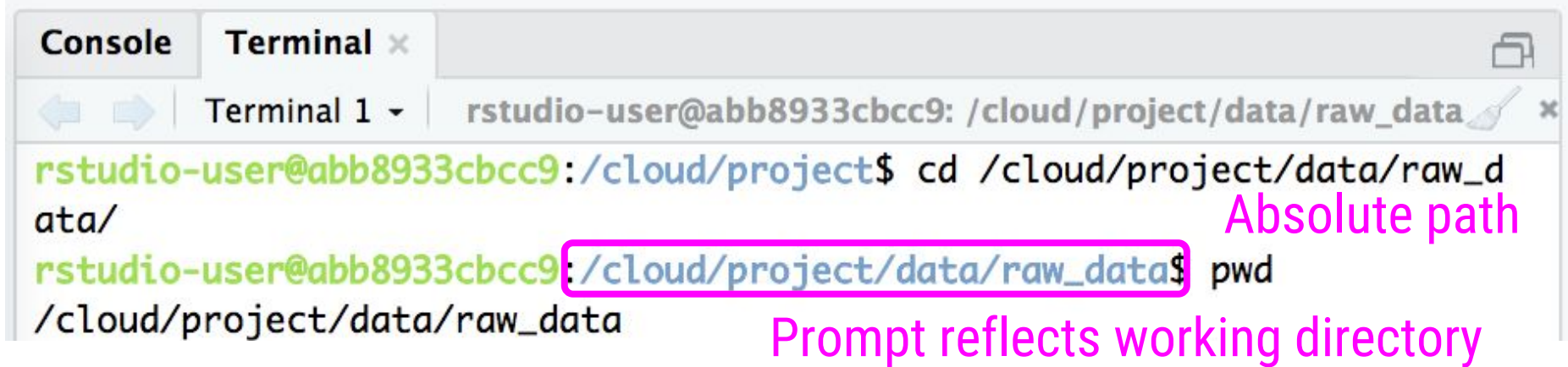Terminal 1 ▾ | rstudio-user@abb8933cbcc9: /cloud/project/data/raw_data

```
rstudio-user@abb8933cbcc9:/cloud/project$ cd /cloud/project/data/raw_d
ata/
rstudio-user@abb8933cbcc9:/cloud/project/data/raw_data$ pwd
/cloud/project/data/raw_data
```

Absolute path

Prompt reflects working directory

Change directory   cd


```
rstudio-user@abb8933cbcc9:/cloud/project/data/raw_data$ cd data
bash: cd: data: No such file or directory
```

Error when you try to change to a nonexistent directory

Different folders than `cloud` and `project`
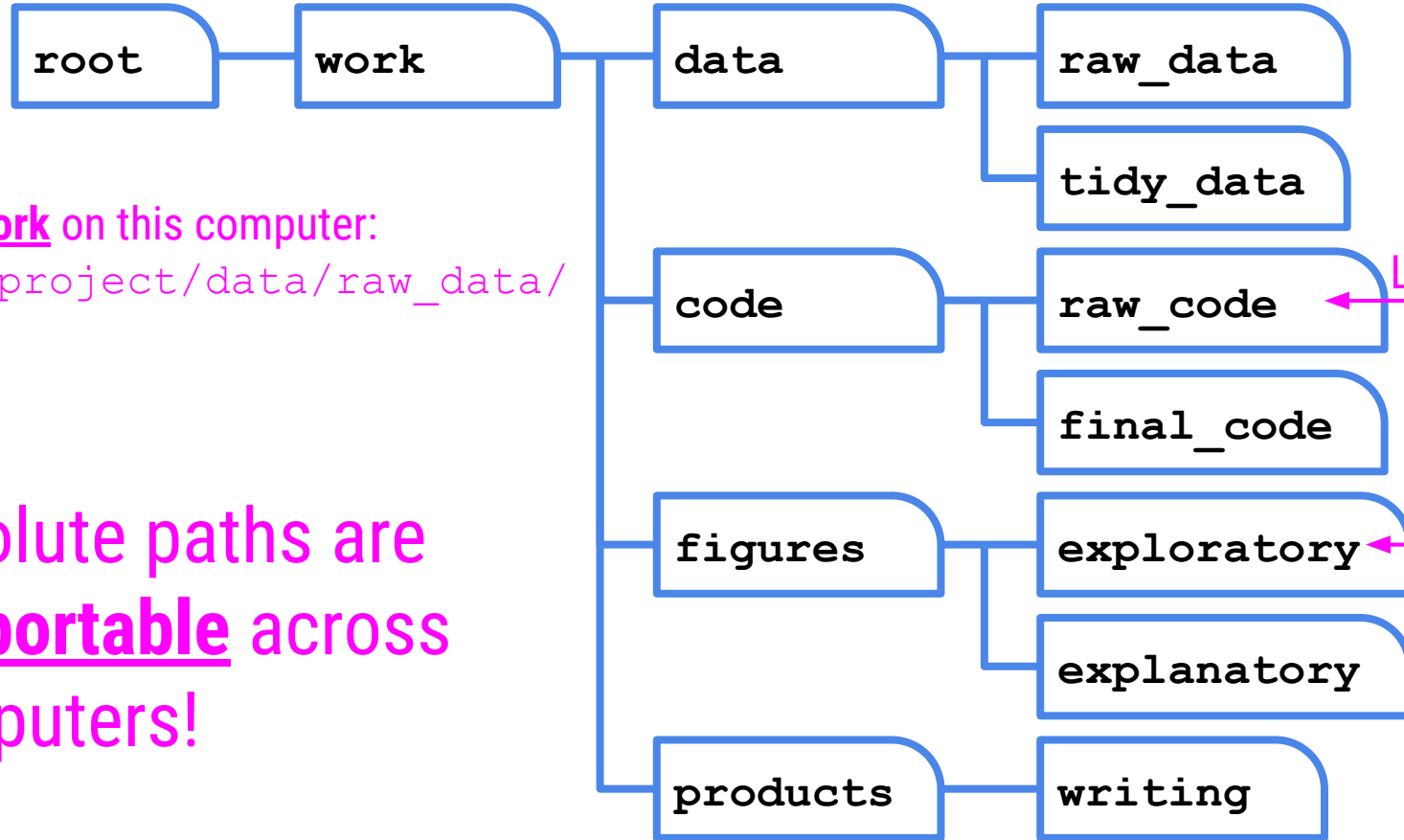
Will **not work** on this computer:
`/cloud/project/data/raw_data/`

Absolute paths are **not portable** across computers!

```
root ── work ──┬── data ──┬── raw_data
               │          └── tidy_data
               │
               ├── code ──┬── raw_code          ← Location of code file
               │          └── final_code
               │
               ├── figures ──┬── exploratory    ← Desired location
               │             └── explanatory
               │
               └── products ── writing
```

Different folders than `cloud` and `project`

`root` — `work` — `data` — `raw_data`

`tidy_data`

`../`
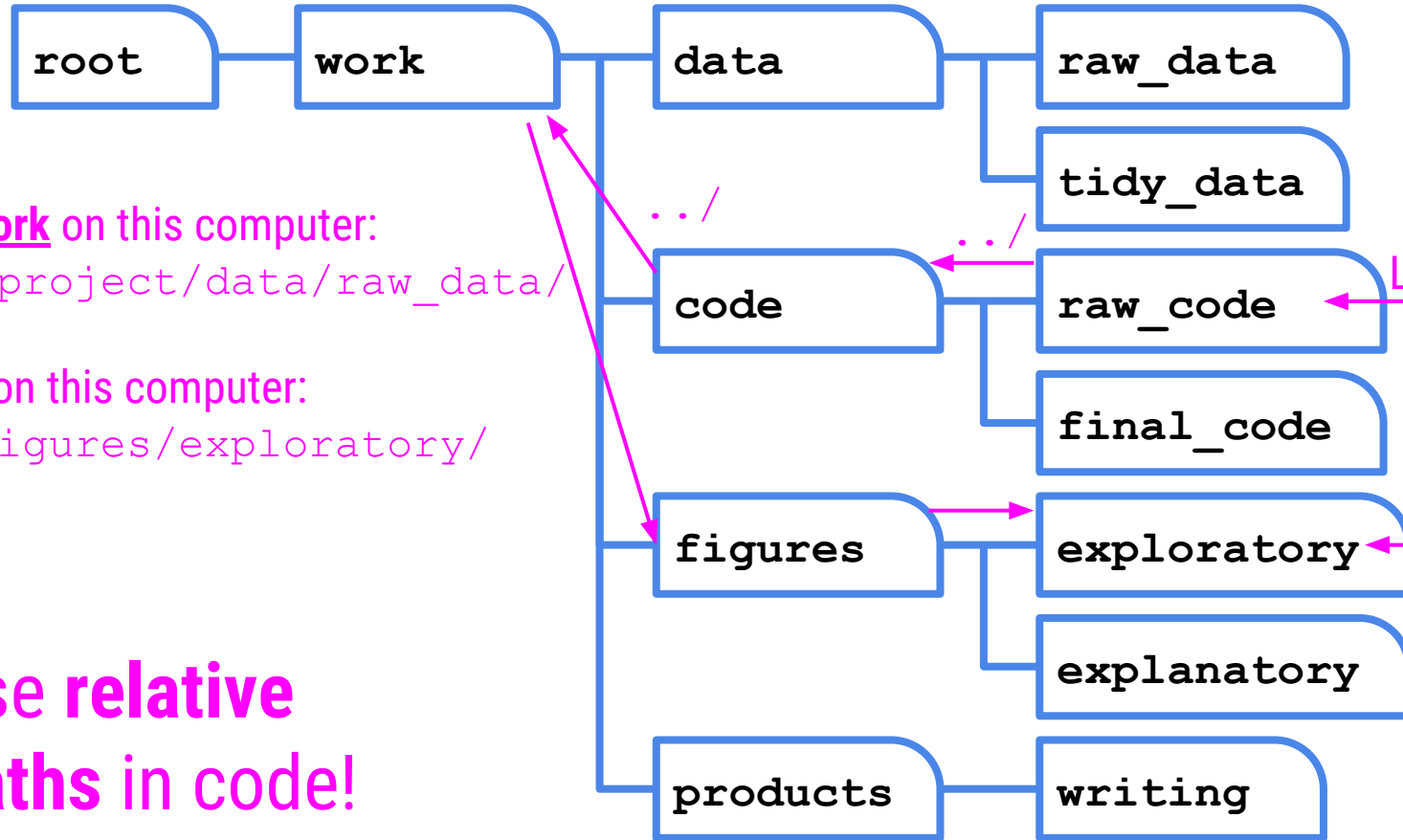
Will **not work** on this computer:
`/cloud/project/data/raw_data/`

Will **work** on this computer:
`../../figures/exploratory/`

`../`

`code` — `raw_code`

Location of code file

`final_code`

`figures` — `exploratory`

Desired location

`explanatory`

Use **relative paths** in code!

`products` — `writing`

root — **work** — **data** — **raw_data**

../

tidy_data

../

Correct relative paths:
`../final_code/`
`../../code/final_code/`
`../../../work/code/final_code/`

First is most understandable!

code — **raw_code**

../

final_code

figures — **exploratory**

explanatory

products — **writing**

Current working directory

Desired location
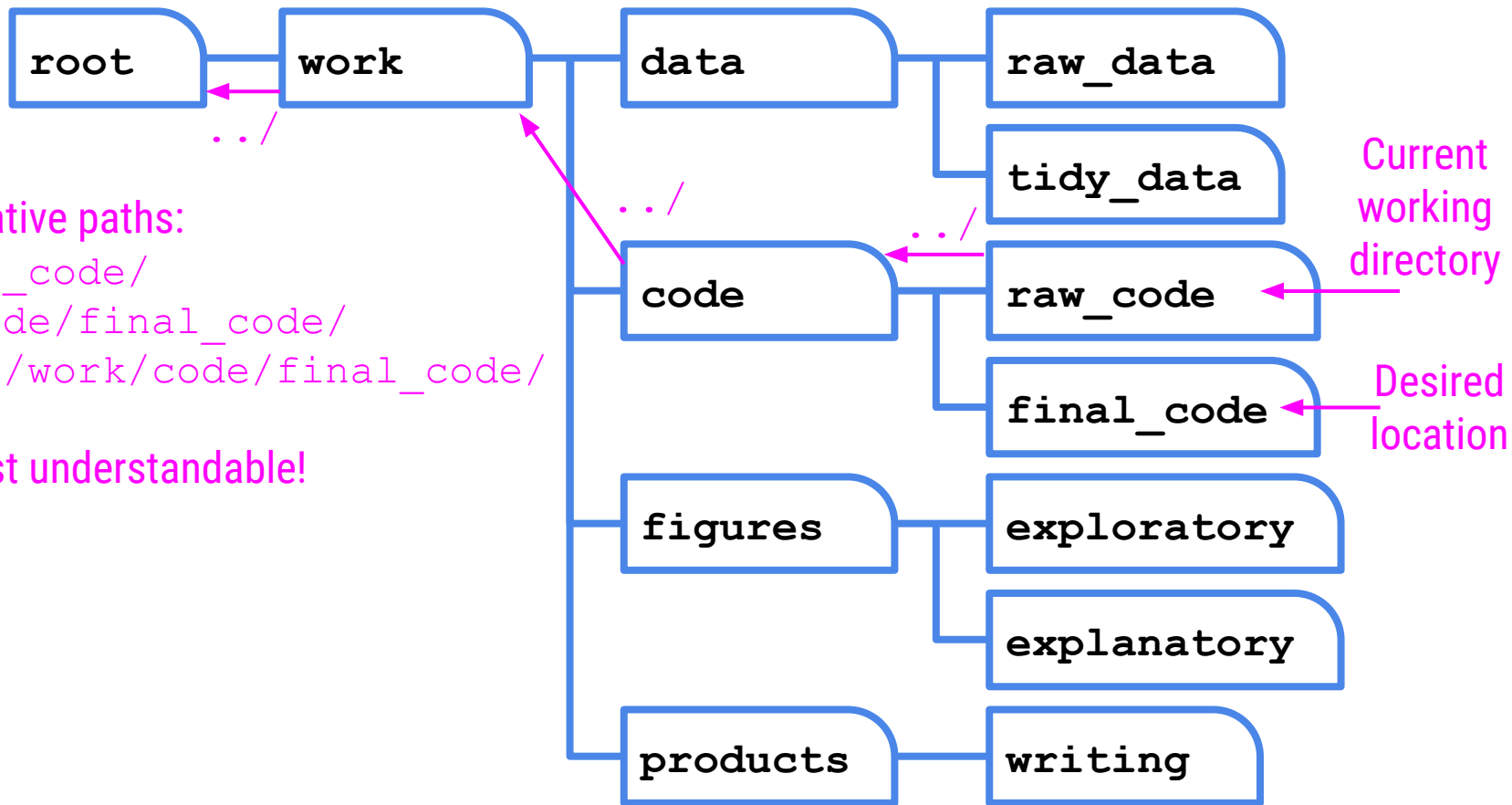
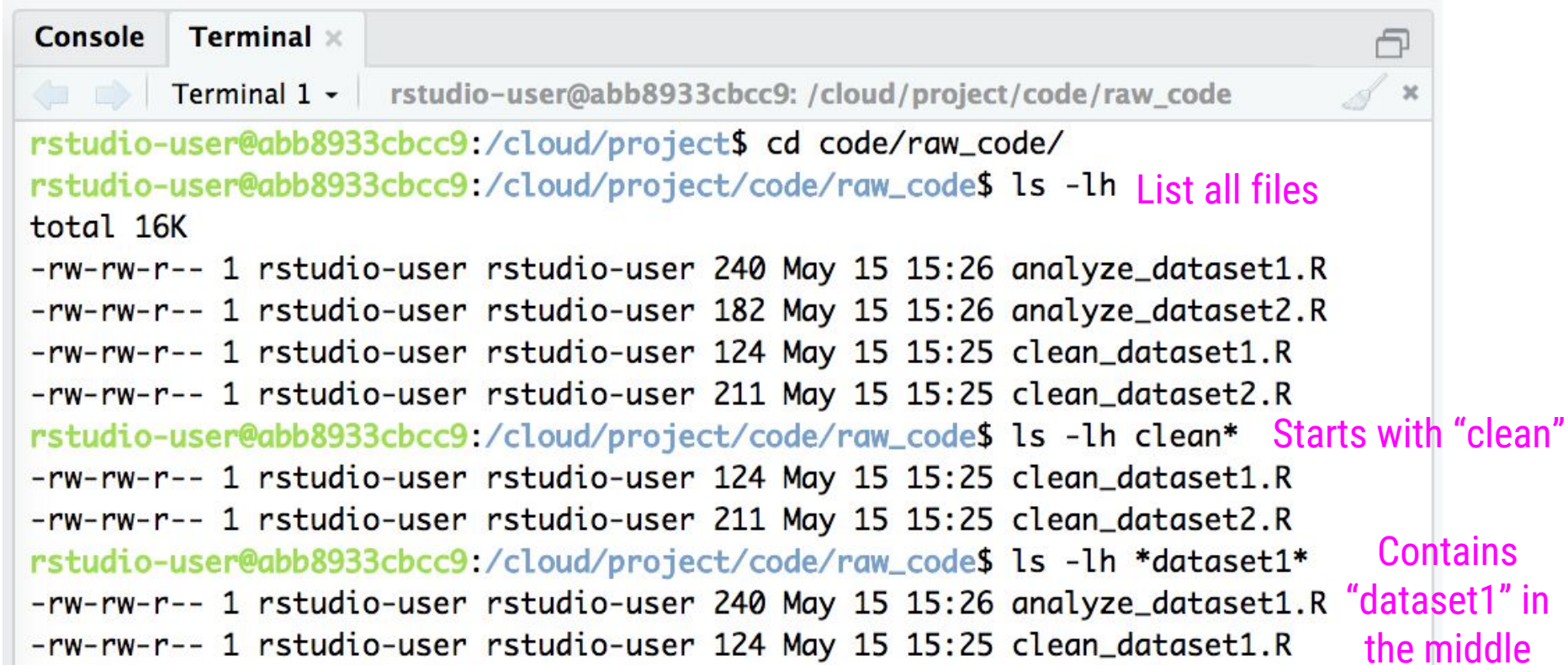**Pro tip!**

Use the up and down arrow keys to cycle through previously typed commands quickly!

The wildcard operator   *

Console   Terminal ✕
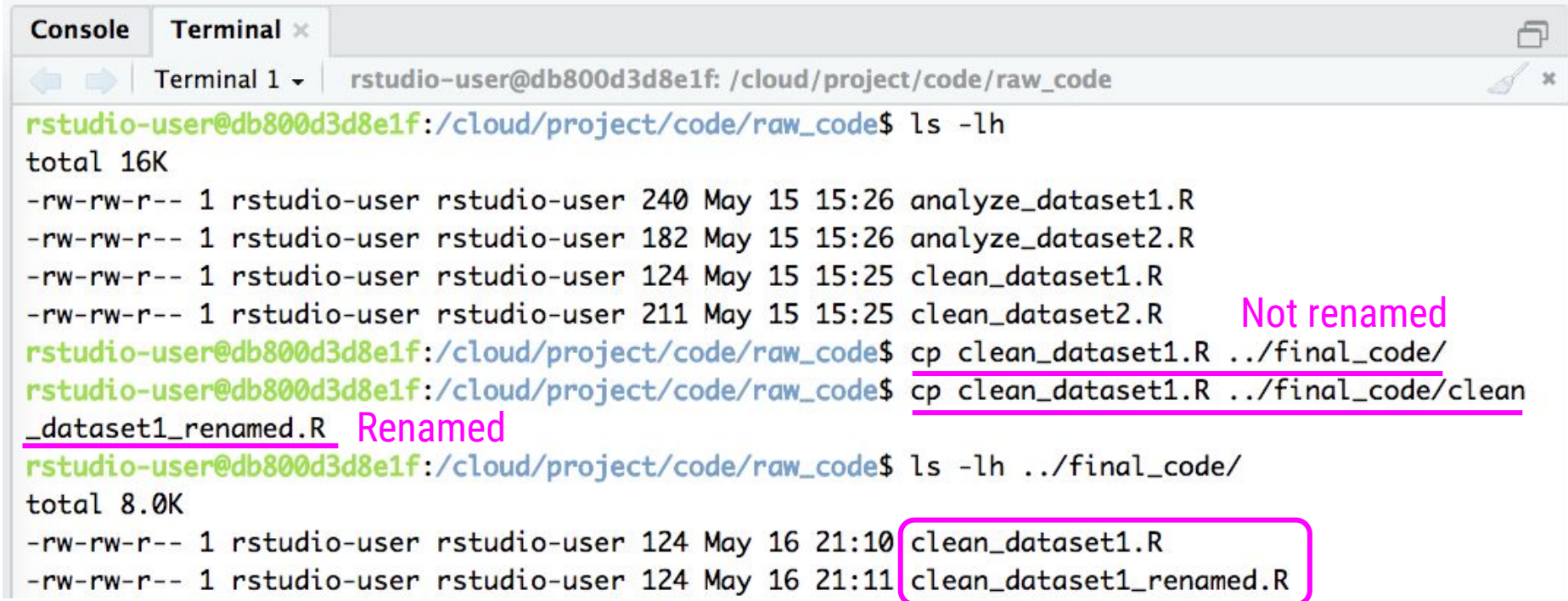
Terminal 1 ▾   rstudio-user@abb8933cbcc9: /cloud/project/code/raw_code

```
rstudio-user@abb8933cbcc9:/cloud/project$ cd code/raw_code/
rstudio-user@abb8933cbcc9:/cloud/project/code/raw_code$ ls -lh    List all files
total 16K
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 15 15:26 analyze_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 182 May 15 15:26 analyze_dataset2.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 clean_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 211 May 15 15:25 clean_dataset2.R
rstudio-user@abb8933cbcc9:/cloud/project/code/raw_code$ ls -lh clean*    Starts with "clean"
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 clean_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 211 May 15 15:25 clean_dataset2.R
rstudio-user@abb8933cbcc9:/cloud/project/code/raw_code$ ls -lh *dataset1*    Contains
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 15 15:26 analyze_dataset1.R    "dataset1" in
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 clean_dataset1.R    the middle
```

Copying files `cp`

`cp  path_to_original_file  path_to_new_file`
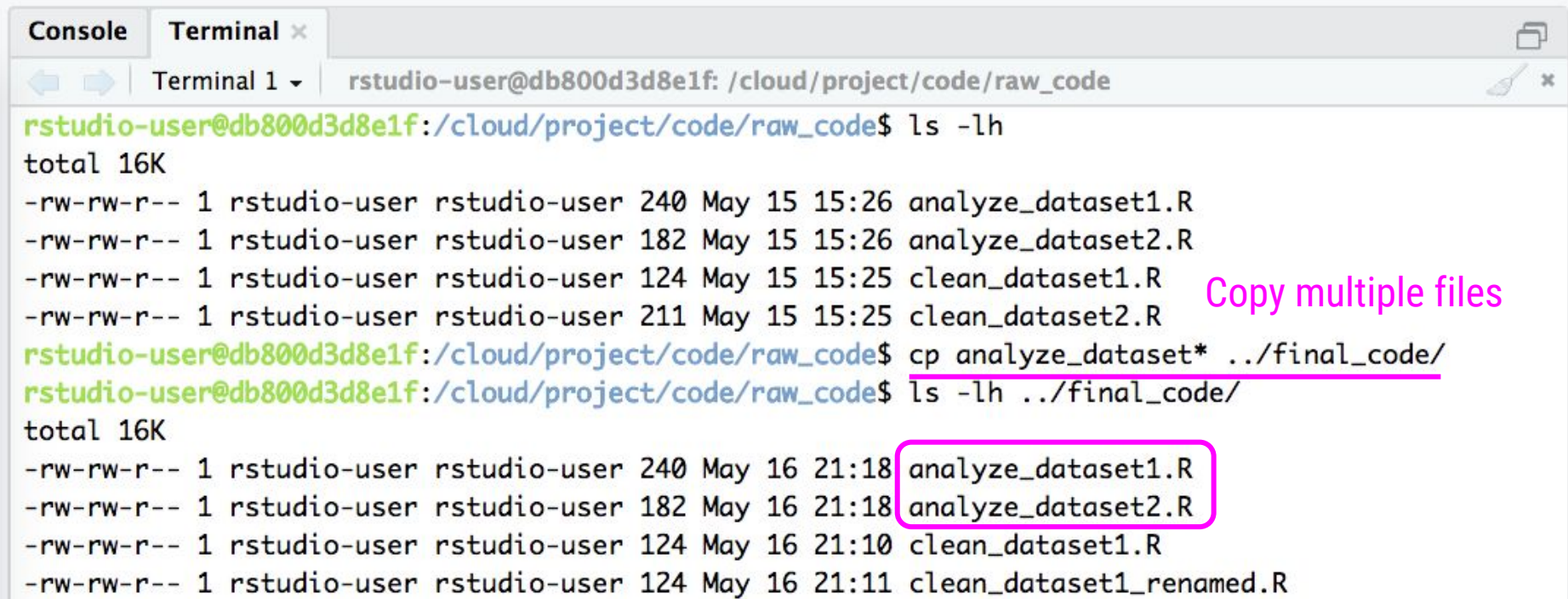
Copying files   `cp`

Console | Terminal ×

Terminal 1 ▾   rstudio-user@db800d3d8e1f: /cloud/project/code/raw_code

```
rstudio-user@db800d3d8e1f:/cloud/project/code/raw_code$ ls -lh
total 16K
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 15 15:26 analyze_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 182 May 15 15:26 analyze_dataset2.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 clean_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 211 May 15 15:25 clean_dataset2.R
rstudio-user@db800d3d8e1f:/cloud/project/code/raw_code$ cp analyze_dataset* ../final_code/
rstudio-user@db800d3d8e1f:/cloud/project/code/raw_code$ ls -lh ../final_code/
total 16K
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 16 21:18 analyze_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 182 May 16 21:18 analyze_dataset2.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 16 21:10 clean_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 16 21:11 clean_dataset1_renamed.R
```

Copy multiple files

Could also have used:
`cp analyze_dataset1.R analyze_dataset2.R ../final_code/`

Copying a folder `cp`

```
Console   Terminal ×

Terminal 1 ▾   rstudio-user@db800d3d8e1f: /cloud/project/code

rstudio-user@db800d3d8e1f:/cloud/project/code/raw_code$ cd ..
rstudio-user@db800d3d8e1f:/cloud/project/code$ ls
final_code   raw_code
rstudio-user@db800d3d8e1f:/cloud/project/code$ cp final_code/ publication_code
cp: omitting directory 'final_code/'
rstudio-user@db800d3d8e1f:/cloud/project/code$ ls
final_code   raw_code
rstudio-user@db800d3d8e1f:/cloud/project/code$ cp -r final_code/ publication_code
rstudio-user@db800d3d8e1f:/cloud/project/code$ ls
final_code   publication_code   raw_code
rstudio-user@db800d3d8e1f:/cloud/project/code$ ls final_code/
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1.R   clean_dataset1_renamed.R
rstudio-user@db800d3d8e1f:/cloud/project/code$ ls publication_code/
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1.R   clean_dataset1_renamed.R
```
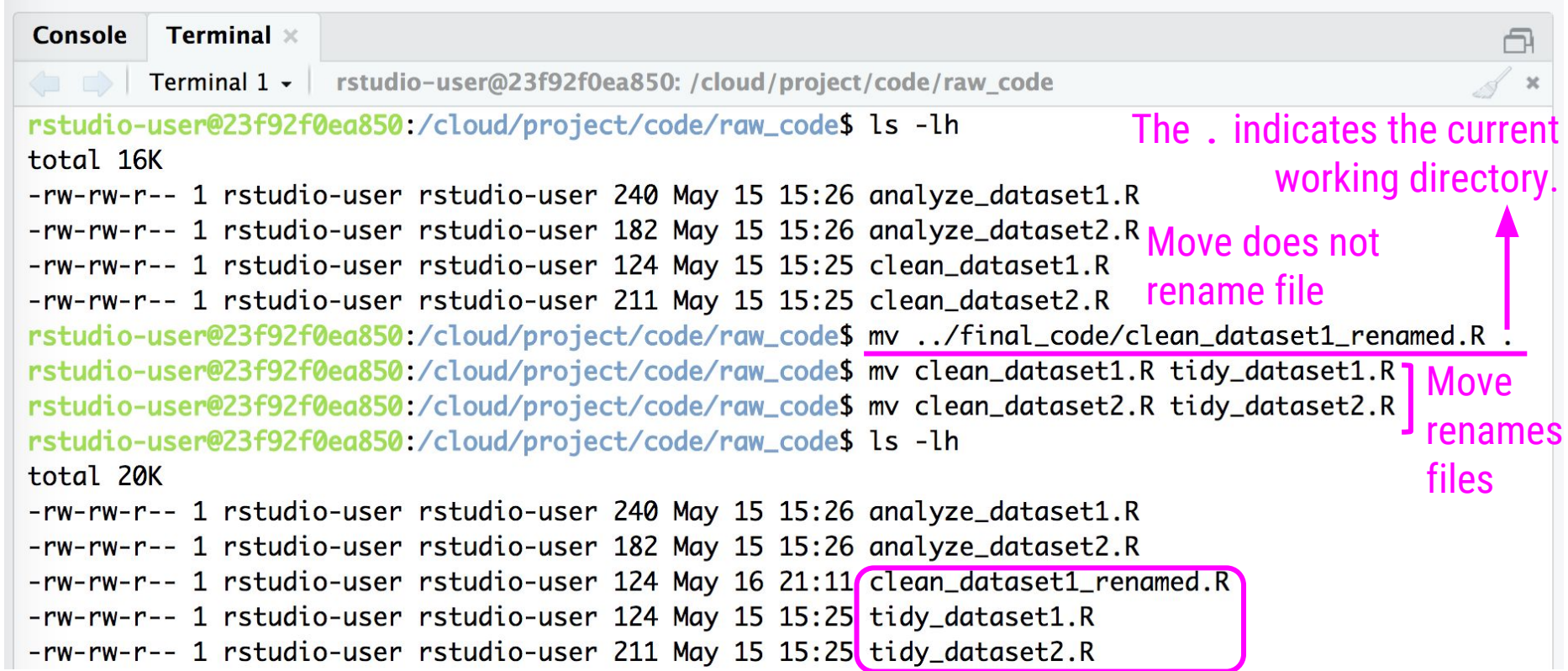
Doesn't work...

...the same two folders are here

Works with the recursive option `-r`

Same files in both folders

Moving files `mv`

`mv   path_to_original_file   path_to_new_file`

```
Console  Terminal ×                                                                      

  Terminal 1 ▾    rstudio-user@23f92f0ea850: /cloud/project/code/raw_code          ✎ ×

rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ ls -lh
total 16K
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 15 15:26 analyze_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 182 May 15 15:26 analyze_dataset2.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 clean_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 211 May 15 15:25 clean_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ mv ../final_code/clean_dataset1_renamed.R .
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ mv clean_dataset1.R tidy_dataset1.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ mv clean_dataset2.R tidy_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ ls -lh
total 20K
-rw-rw-r-- 1 rstudio-user rstudio-user 240 May 15 15:26 analyze_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 182 May 15 15:26 analyze_dataset2.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 16 21:11 clean_dataset1_renamed.R
-rw-rw-r-- 1 rstudio-user rstudio-user 124 May 15 15:25 tidy_dataset1.R
-rw-rw-r-- 1 rstudio-user rstudio-user 211 May 15 15:25 tidy_dataset2.R
```
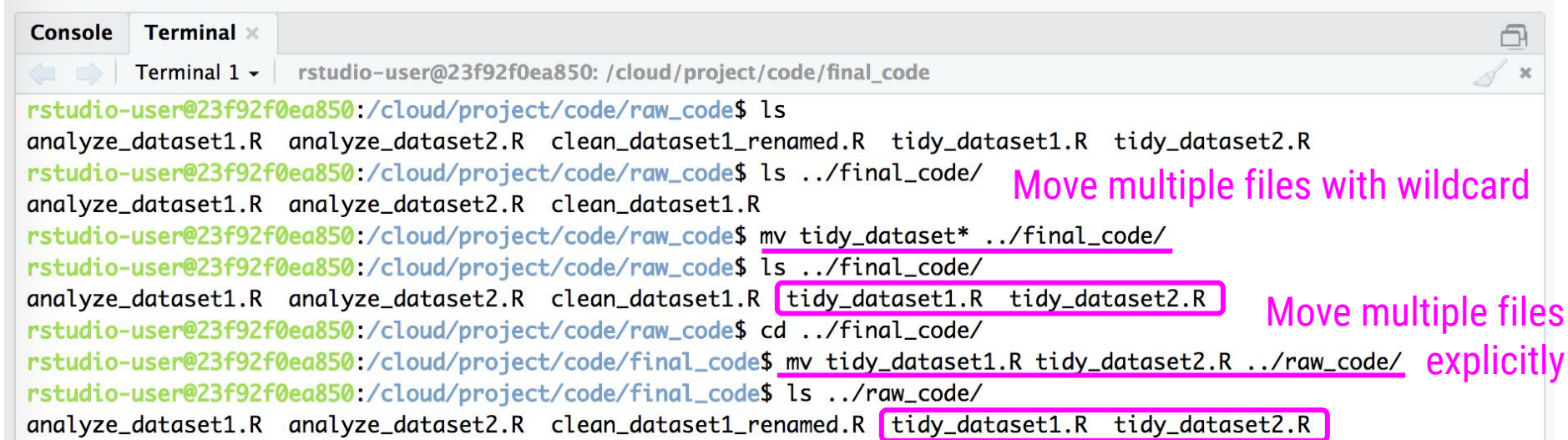
The . indicates the current working directory.

Move does not rename file

Move renames files

Moving files `mv`

Console **Terminal** ✕

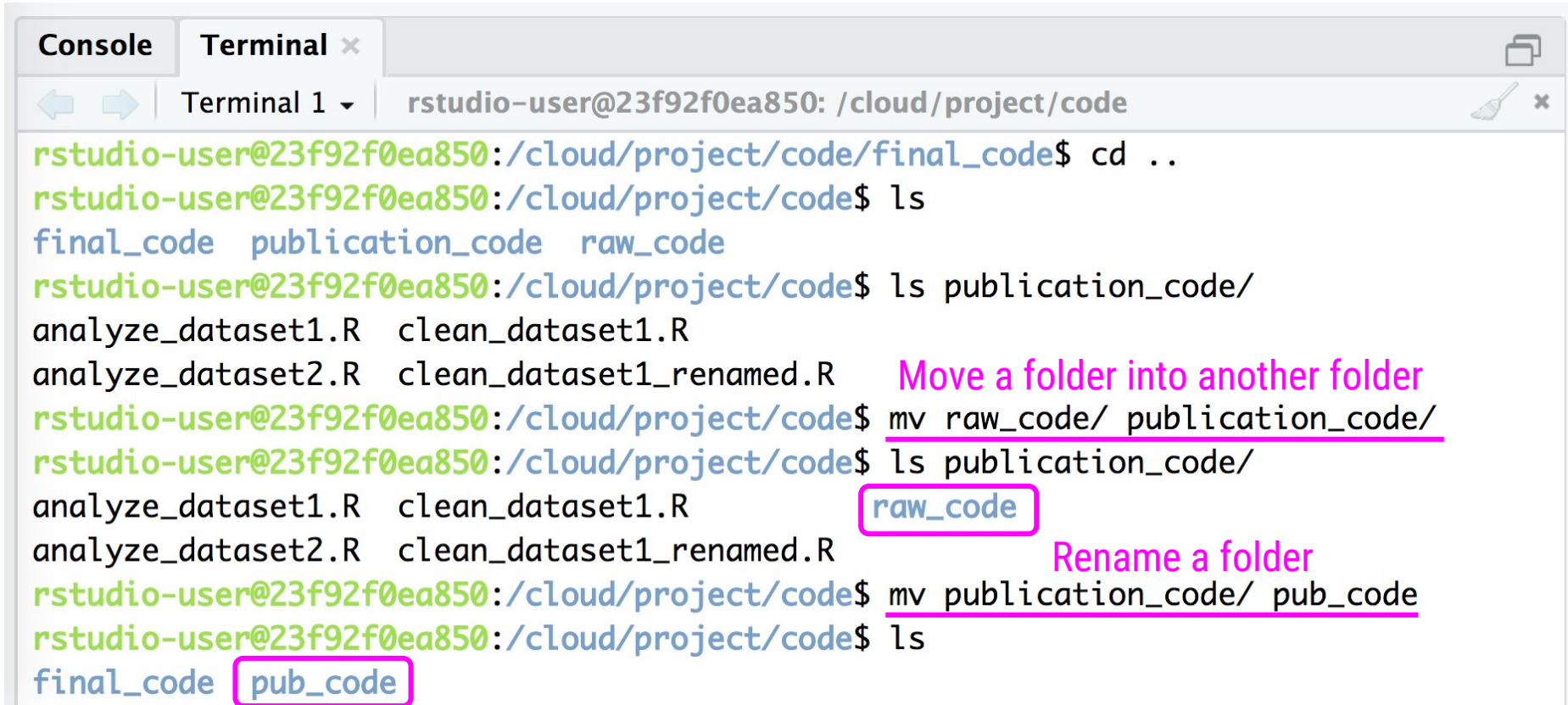Terminal 1 ▾ rstudio-user@23f92f0ea850: /cloud/project/code/final_code

```
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ ls
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1_renamed.R  tidy_dataset1.R  tidy_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ ls ../final_code/
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ mv tidy_dataset* ../final_code/
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ ls ../final_code/
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1.R  tidy_dataset1.R  tidy_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code/raw_code$ cd ../final_code/
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ mv tidy_dataset1.R tidy_dataset2.R ../raw_code/
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ ls ../raw_code/
analyze_dataset1.R  analyze_dataset2.R  clean_dataset1_renamed.R  tidy_dataset1.R  tidy_dataset2.R
```

Move multiple files with wildcard

Move multiple files explicitly

Moving a folder `mv`

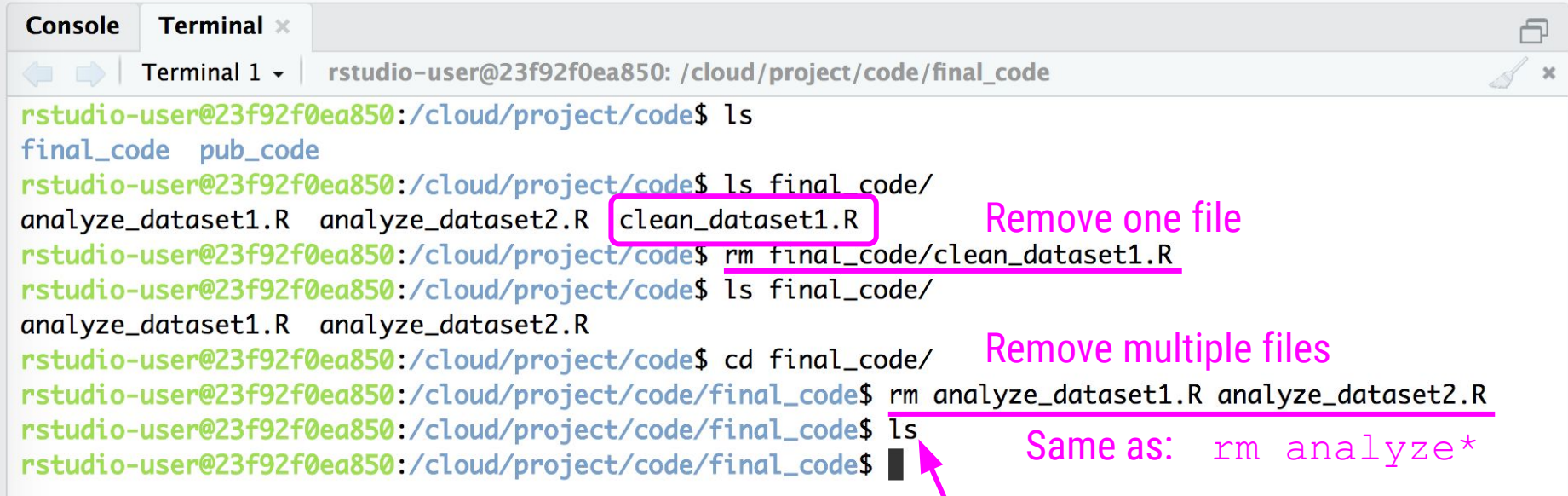Terminal 1 ▾   rstudio-user@23f92f0ea850: /cloud/project/code

```
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ cd ..
rstudio-user@23f92f0ea850:/cloud/project/code$ ls
final_code   publication_code   raw_code
rstudio-user@23f92f0ea850:/cloud/project/code$ ls publication_code/
analyze_dataset1.R   clean_dataset1.R
analyze_dataset2.R   clean_dataset1_renamed.R
```

Move a folder into another folder

```
rstudio-user@23f92f0ea850:/cloud/project/code$ mv raw_code/ publication_code/
rstudio-user@23f92f0ea850:/cloud/project/code$ ls publication_code/
analyze_dataset1.R   clean_dataset1.R           raw_code
analyze_dataset2.R   clean_dataset1_renamed.R
```

Rename a folder

```
rstudio-user@23f92f0ea850:/cloud/project/code$ mv publication_code/ pub_code
rstudio-user@23f92f0ea850:/cloud/project/code$ ls
final_code   pub_code
```

Deleting files `rm`

`rm   path_to_file_to_delete`

Console **Terminal** ✕

Terminal 1 ▾ | rstudio-user@23f92f0ea850: /cloud/project/code/final_code

```
rstudio-user@23f92f0ea850:/cloud/project/code$ ls
final_code   pub_code
rstudio-user@23f92f0ea850:/cloud/project/code$ ls final_code/
analyze_dataset1.R   analyze_dataset2.R   clean_dataset1.R
rstudio-user@23f92f0ea850:/cloud/project/code$ rm final_code/clean_dataset1.R
rstudio-user@23f92f0ea850:/cloud/project/code$ ls final_code/
analyze_dataset1.R   analyze_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code$ cd final_code/
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ rm analyze_dataset1.R analyze_dataset2.R
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ ls
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ █
```

Remove one file

Remove multiple files

Same as: `rm analyze*`

Folder is empty

Deleting a folder `rm`


```
rstudio-user@23f92f0ea850:/cloud/project/code/final_code$ cd ..
rstudio-user@23f92f0ea850:/cloud/project/code$ ls
final_code   pub_code
rstudio-user@23f92f0ea850:/cloud/project/code$ rm final_code/
rm: cannot remove 'final_code/': Is a directory
rstudio-user@23f92f0ea850:/cloud/project/code$ rm -r final_code/
rstudio-user@23f92f0ea850:/cloud/project/code$ ls
pub_code
```

Pro tip: Be careful with `rm` and wildcards - especially `rm *`. Check wildcard patterns with `ls` commands.
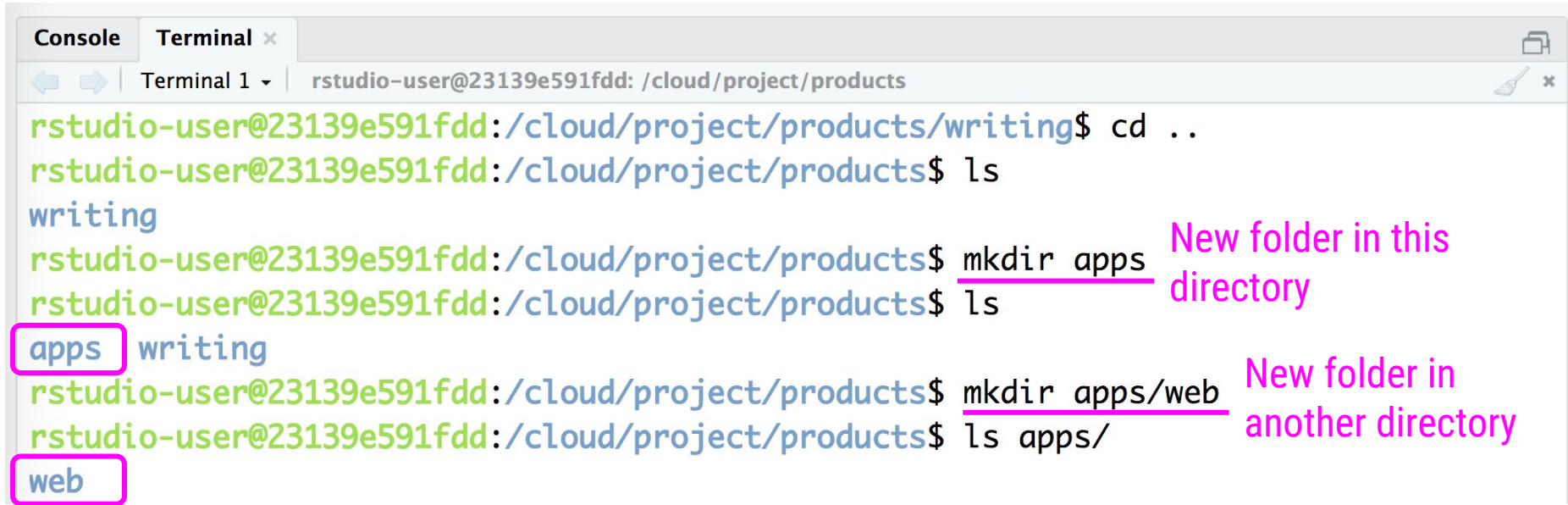
Create an empty file `touch`

```
rstudio-user@23139e591fdd:/cloud/project/code$ cd ../products/writing/
rstudio-user@23139e591fdd:/cloud/project/products/writing$ ls    Empty folder
rstudio-user@23139e591fdd:/cloud/project/products/writing$ touch references.txt
rstudio-user@23139e591fdd:/cloud/project/products/writing$ ls -lh
total 0
-rw-rw-r-- 1 rstudio-user rstudio-user 0 May 18 00:39 references.txt
```

File is empty - size is
zero bytes

Create a new directory `mkdir`


```
rstudio-user@23139e591fdd:/cloud/project/products/writing$ cd ..
rstudio-user@23139e591fdd:/cloud/project/products$ ls
writing
rstudio-user@23139e591fdd:/cloud/project/products$ mkdir apps
rstudio-user@23139e591fdd:/cloud/project/products$ ls
apps   writing
rstudio-user@23139e591fdd:/cloud/project/products$ mkdir apps/web
rstudio-user@23139e591fdd:/cloud/project/products$ ls apps/
web
```

New folder in this directory

New folder in another directory

Summary

- Terminal is an interface for efficiently managing files and for using Git (next course).
- `pwd`: prints current working directory
- `cd`: changes directory
- `ls`: lists files and folders
  - When used with the wildcard operator `*`, lists patterns of files
  - Useful for "testing" wildcard patterns
- `cp`: copies files and folders (possibly renaming)
- `mv`: moves files and folders (possibly renaming)
- `rm`: deletes files and folders
- `touch`: creates empty files
- `mkdir`: creates new folders

Additional resources

- The ls command: https://shapeshed.com/unix-ls/
- The cp command: https://shapeshed.com/unix-cp/
- The mv command: https://shapeshed.com/unix-mv/
- The rm command: https://shapeshed.com/unix-rm/