

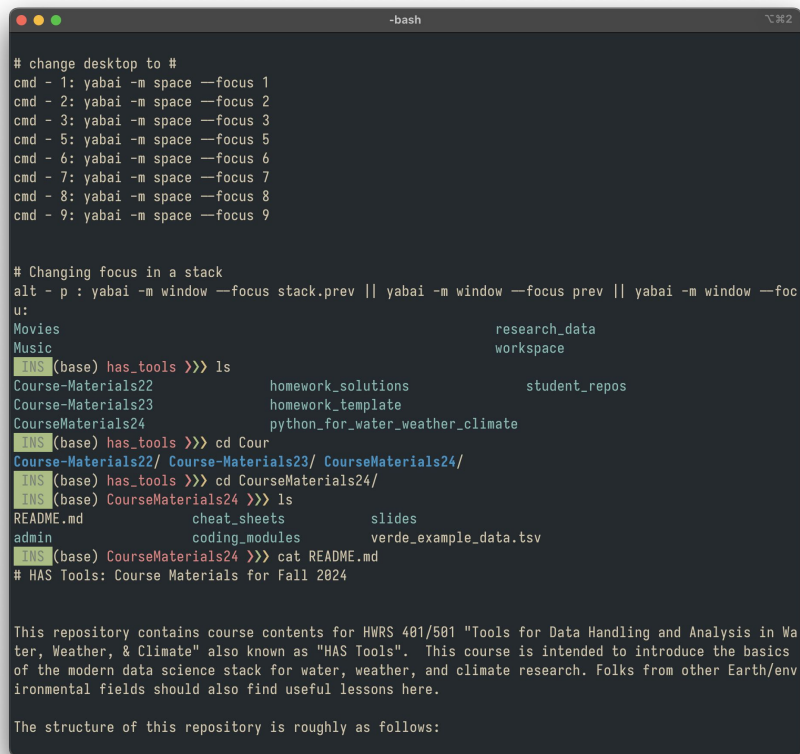
HAS Tools:

The command line

October 30, 2024

What is the command line, and how do we use it?

- The command line is a text interface for typing commands to the computer.
- The terminal is a program that lets you use the command line.
- Our codespaces have a terminal built-in
- Bash is a Unix shell and command language.
- The shell is a program that interprets commands.
- Bash is the default shell in most Linux distributions and macOS.



```
# change desktop to #
cmd - 1: yabai -m space --focus 1
cmd - 2: yabai -m space --focus 2
cmd - 3: yabai -m space --focus 3
cmd - 5: yabai -m space --focus 5
cmd - 6: yabai -m space --focus 6
cmd - 7: yabai -m space --focus 7
cmd - 8: yabai -m space --focus 8
cmd - 9: yabai -m space --focus 9

# Changing focus in a stack
alt - p : yabai -m window --focus stack.prev || yabai -m window --focus prev || yabai -m window --focus
u:
Movies                                     research_data
Music                                     workspace

(base) has_tools >>> ls
Course-Materials22      homework_solutions      student_repos
Course-Materials23      homework_template
CourseMaterials24       python_for_water_weather_climate

(base) has_tools >>> cd CourseMaterials24/
Course-Materials22/ Course-Materials23/ CourseMaterials24/
(base) CourseMaterials24 >>> ls
README.md      cheat_sheets      slides
admin          coding_modules    verde_example_data.tsv

(base) CourseMaterials24 >>> cat README.md
# HAS Tools: Course Materials for Fall 2024

This repository contains course contents for HWRS 401/501 "Tools for Data Handling and Analysis in Water, Weather, & Climate" also known as "HAS Tools". This course is intended to introduce the basics of the modern data science stack for water, weather, and climate research. Folks from other Earth/environmental fields should also find useful lessons here.

The structure of this repository is roughly as follows:
```

Why learn how to use the command line?

- Automation: The command line makes it easy to automate repetitive tasks and processes.

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- Integration: The command line makes it easy to combine multiple tools. Shell scripts are the “glue” of scientific computing!

Why learn how to use the command line?

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- Portability: Easy to transfer your processes/scripts from one computer to another.
- Flexibility: The command line comes with many tools and can be customized to suit almost any task.
- Integration: The command line makes it easy to combine multiple tools. Shell scripts are the “glue” of scientific computing!
- Make you look cool: People will think you are an elite hacker when they see you using the command line.

Quick overview

To begin with, let's just get familiar with the layout and progression of the terminal interface, commonly called at text user interface (TUI)

```
-bash ㉿#2
INS (base) CourseMaterials24 >>> cowsay "So, how do we use the terminal anyway? Let's start with soe
common commands, and discuss what the overall layout of this terminal looks like."

/ So, how do we use the terminal anyway? \
| Let's start with some common commands, |
| and discuss what the overall layout of |
\ this terminal looks like. /

      ^__^
      (oo)\_______
      (__)\       )\/\
          ||----w |
          ||     ||

INS (base) CourseMaterials24 >>> pwd
/Users/bzq/has_tools/CourseMaterials24
INS (base) CourseMaterials24 >>> ls .
README.md          cheat_sheets       slides
admin              coding_modules     verde_example_data.tsv
INS (base) CourseMaterials24 >>> cd coding_modules/
INS (base) coding_modules >>> ls
module_1_intro_to_python    module_4_geospatial_data
module_2_numpy_and_matplotlib  module_5_data_visualization
module_3_pandas_and_data_handling
INS (base) coding_modules >>> cd modul
module_1_intro_to_python/    module_4_geospatial_data/
module_2_numpy_and_matplotlib/  module_5_data_visualization/
module_3_pandas_and_data_handling/
INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
1_customizing_matplotlib.ipynb
INS (base) module_5_data_visualization >>> cd ../../
INS (base) CourseMaterials24 >>> ls
README.md          cheat_sheets       slides
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# ----- WARNING -----
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```


Quick overview

This repeated pattern is the “prompt”. It contains a couple of pieces, and mine is customized here.

Anything to the left of the **»»»** is part of the prompt, anything to the right is part of the command to be run

```
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/ So, how do we use the terminal anyway? \
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\                                         /

      ^__^
      (oo)\_______
      (__)\       )\/\
      ||----w |
      ||     ||

INS (base) CourseMaterials24 >>> pwd
/Users/hzo/hso/tools/CourseMaterials24

INS (base) CourseMaterials24 >>> ls .
README.md          cheat_sheets       slides
admin              coding_modules     verde_example_data.tsv

INS (base) CourseMaterials24 >>> cd coding_modules/
INS (base) coding_modules >>> ls
module_1_intro_to_python  module_4_geospatial_data
module_2_numpy_and_matplotlib  module_5_data_visualization
module_3_pandas_and_data_handling

INS (base) coding_modules >>> cd module_1_intro_to_python/
INS (base) module_1_intro_to_python >>> ls
1_customizing_matplotlib_in_python

INS (base) coding_modules >>> cd module_4_geospatial_data/
INS (base) module_4_geospatial_data >>> ls
1_customizing_matplotlib_in_python

INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
1_customizing_matplotlib_in_python

INS (base) module_5_data_visualization >>> cd ../../
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Quick overview

In this example I start with a “cowsay” command, which isn’t installed in the codespaces, but is fun

```
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/ So, how do we use the terminal anyway? \  
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```

```
  ^__^  
  (oo)\_____  
  (_____)  )\/  
    ||----w |  
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```

```
INS (base) CourseMaterials24 >>> pwd  
/Users/bzq/has_tools/CourseMaterials24
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README.md          cheat_sheets        slides  
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```
INS (base) CourseMaterials24 >>> cd coding_modules/
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module_1_intro_to_python    module_4_geospatial_data  
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INS (base) coding_modules >>> cd module_1_intro_to_python/  
module_1_intro_to_python/    module_4_geospatial_data/  
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module_3_pandas_and_data_handling/
```

```
INS (base) coding_modules >>> cd module_5_data_visualization/
```

```
INS (base) module_5_data_visualization >>> ls
```

```
1_customizing_matplotlib.ipynb
```

```
INS (base) module_5_data_visualization >>> cd ../../
```

```
INS (base) CourseMaterials24 >>> ls
```

```
README.md          cheat_sheets        slides  
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```

```
INS (base) CourseMaterials24 >>> head verde_example_data.tsv
```

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Quick overview

In this example I start with a “cowsay” command, which isn’t installed in the codespaces, but is fun

When run, it makes the cow say the message I typed!

```
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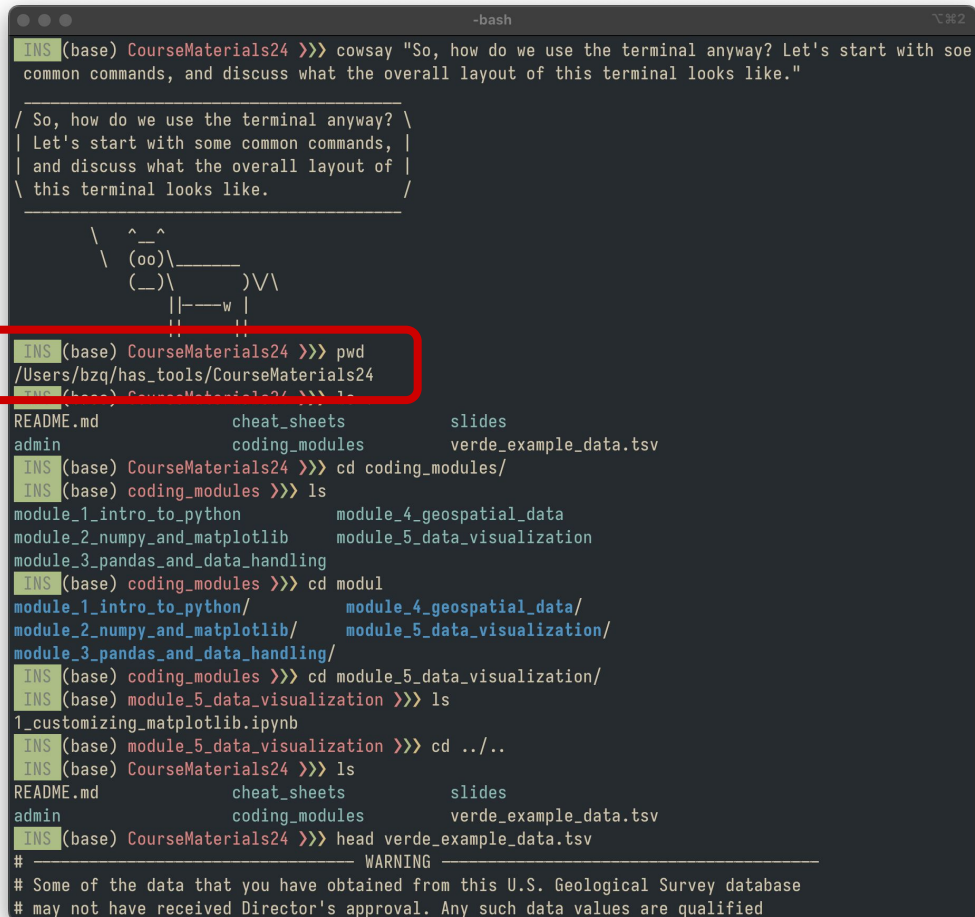
INS (base) CourseMaterials24 >>> pwd
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Quick overview

The first real command we will use is ``pwd``, which stands for “print working directory”

It just shows you where on the system you currently are.

I am on my laptop, in the CourseMaterials24 repo



```
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Quick overview

If I want to know what's in my current directory/folder, I can use the `ls` command.

It just lists out all of the files and folders inside.

Note folders here are highlighted in blue and regular files are just white

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\                                         /

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      (oo)\_____
      (_____)  )\
      ||----w |
      ||     ||

INS (base) CourseMaterials24 >>> pwd
/home/isaac/anaconda3/envs/coursematerials24

INS (base) CourseMaterials24 >>> ls .
README.md          cheat_sheets       slides
admin              coding_modules     verde_example_data.tsv

INS (base) CourseMaterials24 >>> cd coding_modules/

INS (base) coding_modules >>> ls
module_1_intro_to_python      module_4_geospatial_data
module_2_numpy_and_matplotlib module_5_data_visualization
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INS (base) coding_modules >>> cd module_1_intro_to_python/
INS (base) module_1_intro_to_python >>> ls
1_customizing_matplotlib.ipynb

INS (base) module_1_intro_to_python >>> cd ../../
INS (base) coding_modules >>> cd module_5_data_visualization/
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If you want to move to a new location you can use the ``cd`` command to “change directory”

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```

- bash
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      (_____)\/
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/Users/bzq/has_tools/CourseMaterials24
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admin          coding_modules  verde_example_data.tsv
INS (base) CourseMaterials24 >>> cd coding_modules/
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module_1_intro_to_python      module_4_geospatial_data
module_2_numpy_and_matplotlib  module_5_data_visualization
module_3_pandas_and_data_handling
INS (base) coding_modules >>> cd modul
module_1_intro_to_python/      module_4_geospatial_data/
module_2_numpy_and_matplotlib/ module_5_data_visualization/
module_3_pandas_and_data_handling/
INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
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```


Quick overview

If you want to move to a new location you can use the ``cd`` command to “change directory”

Here I go into the ``coding_modules`` directory

Which is then shown in my status line as my current location

```
-bash
INS (base) CourseMaterials24 >>> cowsay "So, how do we use the terminal anyway? Let's start with some common commands, and discuss what the overall layout of this terminal looks like."

/ So, how do we use the terminal anyway? \
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module_1_intro_to_python/  module_4_geospatial_data
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INS (base) coding_modules >>> cd module_1_intro_to_python/
module_1_intro_to_python/  module_4_geospatial_data/
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module_3_pandas_and_data_handling/
INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
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Quick overview

If you aren't sure of the exact names, you can type a partial name and then hit <tab> to get completions

If only one option exists, bash will automatically fill it in when you hit <tab>

Otherwise it will show you a list of options below

```
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README.md          cheat_sheets       slides
admin              coding_modules     verde_example_data.tsv

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INS (base) coding_modules >>> ls
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INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
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Quick overview

To go up directories (or back) you can use `..` in your `cd` command.

Each `..` goes up one directory.

Since directories are separated by `/` you can do `cd ../../` to go back 2 levels

```
-bash
INS (base) CourseMaterials24 >>> cowsay "So, how do we use the terminal anyway? Let's start with some common commands, and discuss what the overall layout of this terminal looks like."

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          ||     ||

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/Users/bzq/has_tools/CourseMaterials24
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README.md      cheat_sheets   slides
admin          coding_modules verde_example_data.tsv
INS (base) CourseMaterials24 >>> cd coding_modules/
INS (base) coding_modules >>> ls
module_1_intro_to_python  module_4_geospatial_data
module_2_numpy_and_matplotlib  module_5_data_visualization
module_3_pandas_and_data_handling
INS (base) coding_modules >>> cd module_1_intro_to_python/
INS (base) module_1_intro_to_python >>> ls
module_1_intro_to_python/  module_4_geospatial_data/
module_2_numpy_and_matplotlib/  module_5_data_visualization/
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INS (base) coding_modules >>> cd module_5_data_visualization/
INS (base) module_5_data_visualization >>> ls
README.md      cheat_sheets   slides
admin          coding_modules verde_example_data.tsv
INS (base) CourseMaterials24 >>> cd ../../
INS (base) CourseMaterials24 >>> ls
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Quick overview

And of course there are other commands that you can use.

We won't cover all of them here, but here are some additional resources:

<https://linuxjourney.com/lesson/the-shell>

<https://www.kea.nu/files/textbooks/humblesec/thelinuxcommandline.pdf>

```
-bash
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      ^__^
      (oo)\_____
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      ||--w |
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/Users/bzq/has_tools/CourseMaterials24
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README.md      cheat_sheets    slides
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INS (base) coding_modules >>> cd module_1_intro_to_python/
INS (base) module_1_intro_to_python >>> ls
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INS (base) coding_modules >>> cd module_5_data_visualization/
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