

# Module 3 Cheat Sheet - Introduction to Shell Scripting

## Bash shebang

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```
#!/bin/bash
```

## Get the path to a command

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```
which bash
```

## Pipes, filters, and chaining

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Chain filter commands together using the pipe operator:

```
ls | sort -r
```

Pipe the output of manual page for ls to head to display the first 20 lines:

```
man ls | head -20
```

Use a pipeline to extract a column of names from a csv and drop duplicate names:

```
cut -d "," -f1 names.csv | sort | uniq
```

## Working with shell and environment variables:

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List all shell variables:

```
set
```

Define a shell variable called `my_planet` and assign value `Earth` to it:

```
my_planet=Earth
```

Display value of a shell variable:

```
echo $my_planet
```

Reading user input into a shell variable at the command line:

```
read first_name
```

**Tip:** Whatever text string you enter after running this command gets stored as the value of the variable `first_name`.

List all environment variables:

```
env
```

Environment vars: define/extend variable scope to child processes:

```
export my_planet
export my_galaxy='Milky Way'
```

## Metacharacters

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Comments #:

```
# The shell will not respond to this message
```

**Command separator ;:**

```
echo 'here are some files and folders'; ls
```

**File name expansion wildcard \*:**

```
ls *.json
```

**Single character wildcard ?:**

```
ls file_2021-06-???.json
```

## Quoting

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**Single quotes '' - interpret literally:**

```
echo 'My home directory can be accessed by entering: echo $HOME'
```

**Double quotes "" - interpret literally, but evaluate metacharacters:**

```
echo "My home directory is $HOME"
```

**Backslash \ - escape metacharacter interpretation:**

```
echo "This dollar sign should render: \$"
```

## I/O Redirection

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**Redirect output to file and overwrite any existing content:**

```
echo 'Write this text to file x' > x
```

**Append output to file:**

```
echo 'Add this line to file x' >> x
```

**Redirect standard error to file:**

```
bad_command_1 2> error.log
```

**Append standard error to file:**

```
bad_command_2 2>> error.log
```

**Redirect file contents to standard input:**

```
$ tr "[a-z]" "[A-Z]" < a_text_file.txt
```

**The input redirection above is equivalent to:**

```
$cat a_text_file.txt | tr "[a-z]" "[A-Z]"
```

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## Command Substitution

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**Capture output of a command and echo its value:**

```
THE_PRESENT=$(date)
```

```
echo "There is no time like $THE_PRESENT"
```

**Capture output of a command and echo its value:**

```
echo "There is no time like $(date)"
```

## Command line arguments

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```
./My_Bash_Script.sh arg1 arg2 arg3
```

## Batch vs. concurrent modes

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**Run commands sequentially:**

```
start=$(date); ./MyBigScript.sh ; end=$(date)
```

**Run commands in parallel:**

```
./ETL_chunk_one_on_these_nodes.sh & ./ETL_chunk_two_on_those_nodes.sh
```

## Scheduling jobs with cron

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**Open crontab editor:**

```
crontab -e
```

**Job scheduling syntax:**

```
m h dom mon dow command
```

(minute, hour, day of month, month, day of week)

**Tip:** You can use the \* wildcard to mean "any".

Append the date/time to a file every Sunday at 6:15 pm:

```
15 18 * * 0 date >> sundays.txt
```

Run a shell script on the first minute of the first day of each month:

```
1 0 1 * * ./My_Shell_Script.sh
```

Back up your home directory every Monday at 3:00 am:

```
0 3 * * 1 tar -cvf my_backup_path\my_archive.tar.gz $HOME\
```

Deploy your cron job:

Close the crontab editor and save the file.

List all cron jobs:

```
crontab -l
```

## Conditionals

**if-then-else syntax:**

```
if [[ $# == 2 ]]
then
  echo "number of arguments is equal to 2"
else
  echo "number of arguments is not equal to 2"
fi
```

'and' operator &&:

```
if [ condition1 ] && [ condition2 ]
```

'or' operator ||:

```
if [ condition1 ] || [ condition2 ]
```

## Logical operators

Operator	Definition
==	is equal to
!=	is not equal to
<	is less than
>	is greater than
<=	is less than or equal to
>=	is greater than or equal to

## Arithmetic calculations

Integer arithmetic notation:

```
$(( ))
```

Basic arithmetic operators:

Symbol	Operation
+	addition
-	subtraction
*	multiplication
/	division

Display the result of adding 3 and 2:

```
echo $((3+2))
```

**Negate a number:**

```
echo $((-1*-2))
```

## Arrays

**Declare an array that contains items 1, 2, "three", "four", and 5:**

```
my_array=(1 2 "three" "four" 5)
```

**Add an item to your array:**

```
my_array+="six"  
my_array+=7
```

**Declare an array and load it with lines of text from a file:**

```
my_array=($(echo $(cat column.txt)))
```

## for loops

**Use a for loop to iterate over values from 1 to 5:**

```
for i in {0..5}; do  
    echo "this is iteration number $i"  
done
```

**Use a for loop to print all items in an array:**

```
for item in ${my_array[@]}; do  
    echo $item  
done
```

Use array indexing within a `for` loop, assuming the array has seven elements:

```
for i in {0..6}; do  
    echo ${my_array[$i]}  
done
```

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