Boosted Bespoke

Bare Bones Bash

Brought By Blissfully Baffled Bioinformaticians

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    - Get more familiar with text modification with bash

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    - *Simple* text modification with `sed` (i.e. witchcraft)
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Preparation!

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$ cd ~/BareBonesBash
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Since it is a zip file we need to unzip it, which command should we use?

```
$ unzip Boosted-BBB.zip
```

Make sure to cd back to ~/BareBonesBash now!

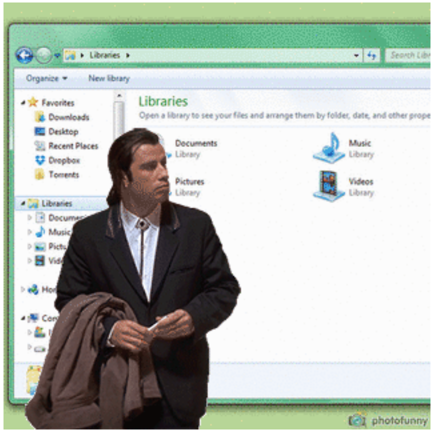
Outline

- Where is my stuff??
- Concept: for loops
- How to rename stuff
- Concept: Regular expressions
- While loop: to infinity and beyond!
- Conditionals: IF/ELSE
- Modifying files: SED, PASTE

Where is my stuff??

```
$ find # Don't run yet!
```

How can you search for files and directories hidden in layers and layers (of your very organised 😉) directories?



Where is my stuff??

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$ find Boosted-BBB/  # Don't run yet!
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- **First** part of the `find` command: *the place to look from*
  - e.g. `.` to indicate 'here'

Where is my stuff??

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- **First** part of the `find` command: *the place to look from*
    - e.g. `.` to indicate 'here'
    - Could also use `~/`

Where is my stuff??

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$ find Boosted-BBB/  # Don't run yet!
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- **First** part of the `find` command: *the place to look from*
  - e.g. . to indicate 'here'
  - Could also use `~/`
  - Could use absolute path e.g. `/home/aida/`

> ***Question*** *What is the difference between `Boosted-BBB/` and `/home/aida/Boosted-BBB/`?*

Where is my stuff??

```
$ find Boosted-BBB/ -type f # Don't run yet!
```

- **First** part of the find command: *the place to look from*
    - e.g. . to indicate 'here'
    - Could also use ~/
    - Could use absolute path e.g. /home/james/
- **Second** part of the find command: *what type of things to look for?*
    - Use -type to define the filetype:
        - **f**ile
        - **d**irectory

Where is my stuff??

```
$ find Boosted-BBB/ -type f -name  # Don't run yet!
```

- **First** part of the `find` command: *the place to look from*
    - e.g. `.` to indicate 'here'
    - Could also use `~/`
    - Could use absolute path e.g. `/home/james/`
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    - Use `-type` to define the filetype:
        - **f**ile
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- **Third** part of the `find` command: *what to look in*?
    - Use `-name` to say 'look in *names* of things'

Where is my stuff??

```
$ find Boosted-BBB/ -type f -name '*JPG*'  # Now GO!
```

- **First** part of the `find` command: *the place to look from*
  - e.g. `.` to indicate 'here'
  - Could also use `~/`
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    - **f**ile
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- **Third** part of the `find` command: *what to look in*?
  - Use `-name` to say 'look in *names* of things'
- **Finally** after `-name` we give the the 'strings' to search for
  - Use wildcards (`*`) for maximum laziness!

Where is my stuff??

We are looking for all files with the suffix JPG.

Let's first set the suffix we want to a variable, so we can easily change it in the future.

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We can now call on this variable in our search. Try the following command:

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$ find Boosted-BBB/ -type f -name '*$suffix*'
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$ find Boosted-BBB/ -type f -name '*$suffix*'
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That found no files!! Our original find command confirms that these files exist!

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We are looking for all files with the suffix `JPG`.

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Now look at the command below:

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What has changed here? Run the second command.

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Cleaning up the filenames

It seems that wherever the files are from have completely mangled the file names (.JPG.MP3.TXT... WHAT?!)

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So, How do I **repeat** a command multiple times on a list of things?

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Does Greece have lovely food? Yes
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- Let's clean up the file names with a for loop!

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We first show an example that uses `cut` and `rev`.

Any guesses what these commands might do?

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We first show an example that uses `cut` and `rev`.

Any guesses what these commands might do?

- `rev`: reverses a character string
- `cut`: cuts a string into multiple pieces

Cleaning up filenames

Let's try this out!

```
$ echo "aBcDeF 654321" | rev
```

```
123456 FeDcBa
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`cut` needs some arguments.

- `-d` specifies the field **d**elimiter we are using. Here it is space (" ").
- `-f` specifies which **f**ield we wish to cut out (the second one).

```
$ echo "aBcDeF 654321" | cut -d " " -f 2
```

```
654321
```

Cleaning up filenames

Using these tools, we can start cleaning up the desired filenames like this:

```
$ for file in $(find Boosted-BBB/ -type f -name "*$suffix*"); do
>   new_name=$(echo $file | rev | cut -d "." -f 2-999 | rev)
>   echo $file $new_name
>   #mv $file $new_name
> done
```

Use echo to make a 'dry-run', and when you're happy with the proposed output uncomment the mv command and re-run the for loop.

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Use `echo` to make a 'dry-run', and when you're happy with the proposed output uncomment the `mv` command and re-run the `for` loop.

BUT WAIT! This code is cumbersome to write, read and understand.

Wait, what just happened?

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We `rev`erse the filename:

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We cut the string at each -delimiter (.), and keep everything after the first delimiter (-fields 2-999):

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We reverse what is left back to its original orientation:

```
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```

We then rename the file to the new filename with `mv`.

Writing pretty code

It is a good idea to avoid clunky code like what you just saw.

How to make this code simpler? **Do not run this code!**

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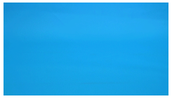
Result: **0.051s** versus **0.003s** when running echo!



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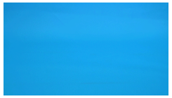
When sure it works, remove the comment in the 2nd



Almost done!

We now have all the files named similarly, but some things are still a bit off. The file suffix `JPG` is conventionally written in lowercase characters (`jpg`).

Let's change all filename suffixes to be in lowercase letters!

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- Regex is an important concept. You will find them in most programming languages.
- Syntax can vary from language to language, but here's how they work in bash.

Concept: Regular expressions

- Special strings and characters that define a 'search pattern'
- Used in 'Search' or 'Search/Replace' functions e.g. in excel!
- You have already used them!

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To prepare, download the following file

```
$ wget git.io/Boosted-BBB-regex
$ mv Boosted-BBB-regex regex.txt
```

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- Special strings and characters that define a 'search pattern'
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```
$ wget git.io/Boosted-BBB-regex
$ mv Boosted-BBB-regex regex.txt
```

Let's also look at the contents.

```
$ cat regex.txt
```

Regex Basics

Three regex special character 'categories'

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- [], (), (etc.): range, grouping, or 'capturing' matching regex within **brackets**

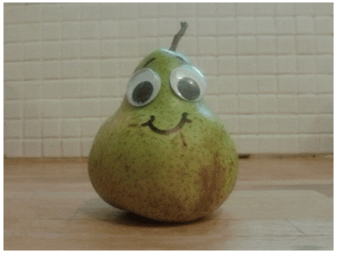
pear
pier
pir
per
par
pur
bear
beer
br
ber
be*r
rear

Regex Basics

```
$ grep '.ear' regex.txt
```

> *Finds strings containing: any character + ear*

- . : match any character



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Regex Basics

```
$ grep 'p[iea]r' regex.txt
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> *String starting with p+ one of i or e or a +r*

- . : match any character
- []: match range of characters within []

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Regex Basics

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$ grep 'p[^iea]r' regex.txt
```

> *String starting with p+ any character except i, e or a+r*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket

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Regex Basics

```
$ grep 'be*r' regex.txt
```

> *String that starts with b+ zero or multiple 'e' +r*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket
- *: match 0 or more of the preceding items

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Regex Basics

```
$ grep 'be\*r' regex.txt
```

> *String 'be*r'*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket
- *: match 0 or more of the preceding items
- \: do not interpret next character

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$ grep 'be\+r' regex.txt
```

> *String starting with b+ one or multiple 'e'+r*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket
- *: match 0 or more of the preceding items
- \: do not interpret next character
- \+: match 1 or more of the preceding items

pear

pier

pir

per

par

pur

bear

beer

br

ber

be*r

rear

Regex Basics

```
$ grep 'be\?r' regex.txt
```

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- \?: match 0 or 1 of the preceding items

pear
pier
pir
per
par
pur
bear
beer
br
ber
be*r
rear

Regex Basics

```
$ grep '^[rb]\+' regex.txt
```

> *Lines starting with one or multiple of: r or b*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket
- *: match 0 or more of the preceding items
- \: do not interpret next character
- \+: match 1 or more of the preceding items
- \?: match 0 or 1 of the preceding items
- ^: the beginning of the line

pear
pier
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per
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ber
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rear

Regex Basics

```
$ grep 'r$' regex.txt
```

> *Lines ending with r*

- . : match any character
- []: match range of characters within []
- [^]: match range of characters except the ones in the bracket
- *: match 0 or more of the preceding items
- \: do not interpret next character
- \+: match 1 or more of the preceding items
- \?: match 0 or 1 of the preceding items
- ^: the beginning of the line
- $: the end of the line

> *This can be intimidating, however there are lots of resources on the internet (reminder: Google everything!) to help, such as: https://regex101.com/. Note that regex's can be slightly different per shell and language!*

```
pear
pier
pir
per
par
pur
bear
beer
br
ber
be*r
rear
```

Regex example

```
fanta.JPG
BydgoszczForest.JPG
snore.JPG
Bubobubo.JPG
giacomo.JPG
netsukeJapan.JPG
nomnom.JPG
pompeii.JPG
AlopochenaegyptiacaArnhem.JPG
exhibitRoyal.JPG
stretch.JPG
weimanarer.JPG
excited.JPG
licorne.JPG
angry.JPG
```

Which Regex would you use to find all the files ending with .JPG??

Regex example

```
fanta.JPG
BydgoszczForest.JPG
snore.JPG
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stretch.JPG
weimanarer.JPG
excited.JPG
licorne.JPG
angry.JPG
```

Which Regex would you use to find all the files ending with .JPG??

```
$ find Boosted-BBB/ -type f -name '*.JPG'
```

rename

rename lets you apply a regex to the name of files to rename them.

To convert all suffixes in the directory to lowercase characters:

```
$ find Boosted-BBB/ -type f -name '*.JPG' | rename 's/\.JPG$/.jpg/'
```

> *Check with find whether the names are now as you expect!*

rename

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To convert all suffixes in the directory to lowercase characters:

```
$ find Boosted-BBB/ -type f -name '*.JPG' | rename 's/\.JPG$/.jpg/'
```

> *Check with find whether the names are now as you expect!*

No for loop needed (yay for pipes!)!

The expression given to rename has three parts, separated by /

- First, we define we want to **s**ubstitute the regex matches for another string

rename

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To convert all suffixes in the directory to lowercase characters:

```
$ find Boosted-BBB/ -type f -name '*.JPG' | rename 's/\.JPG$/.jpg/'
```

> *Check with `find` whether the names are now as you expect!*

No `for` loop needed (yay for pipes!)!

The expression given to `rename` has three parts, separated by `/`

- First, we define we want to **s**ubstitute the regex matches for another string
- Second, we define the regex to query. `\.JPG$`

rename

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```
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No for loop needed (yay for pipes!)!

The expression given to rename has three parts, separated by /

- First, we define we want to **s**ubstitute the regex matches for another string
- Second, we define the regex to query. \.JPG$

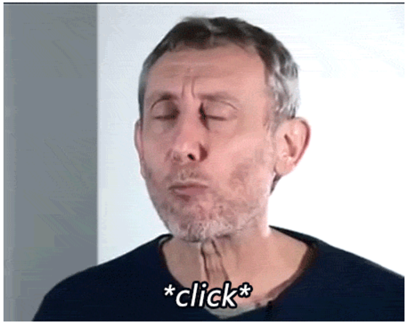
> *Remember: to escape a character (so read as an actual character, not as a regex), use \ before it*

- Finally, we specify what we want to substitute matches with, which is .jpg

Onwards!

Ok, so we can now use find to see all the new and pretty filepaths:

```
$ suffix="jpg"
$ find Boosted-BBB/ -type f -name "*${suffix}"
```



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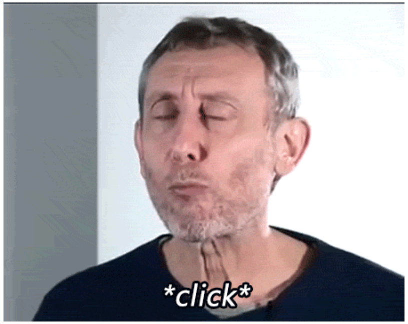

We can finally start sorting the pictures into categories!

To do that, we need to keep track of all the file names. We can easily gather this information using a **redirect**!

Let's redirect!

We can get a list of all the file names by redirecting the stdout of the find command.

```
$ suffix="jpg"
$ find Boosted-BBB/ -type f -name "*${suffix}" > File_names.txt
```

Let's redirect!

We can get a list of all the file names by redirecting the stdout of the find command.

```
$ suffix="jpg"
$ find Boosted-BBB/ -type f -name "*${suffix}" > File_names.txt
```

This time, nothing was printed on your screen, because you redirected that output into a file.

You can cat the resulting file to see that everything worked.

Getting parts of a filepath

Before moving on, there are two useful commands you should know.

`basename` will tell you the file name, while stripping the path to the file.

```
$ basename Boosted-BBB//Having/the/time/of/your/life/bubobubo.JPG.MP3.TXT
```

```
bubobubo.JPG.MP3.TXT
```

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```

```
bubobubo.JPG.MP3.TXT
```

`dirname` does the opposite. It will tell you the path to the directory that a file is in, while omitting the name of the file.

```
$ dirname Boosted-BBB//Having/the/time/of/your/life/bubobubo.JPG.MP3.TXT
```

```
Boosted-BBB//Having/the/time/of/your/life
```

Reading from a file

Ok, so you now have a file with all the paths to the images we need. But the folder structure is still a mess. It's time to read the contents of the file with a `while` loop!

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A `while` loop is a special type of repeating code that keeps going until it is interrupted.

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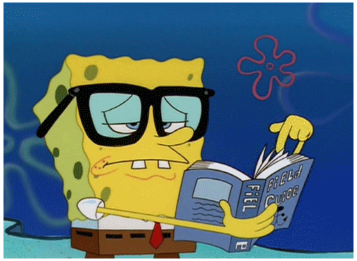
A while loop is a special type of repeating code that keeps going until it is interrupted.

We will also use read. This command takes the contents of the file and loads them into a specified variable.



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We will also use read. This command takes the contents of the file and loads them into a specified variable.

```
$ mkdir images
$ while read filepath; do
>   echo "${filepath}" images/$(basename ${filepath})
>   # mv ${filepath} images/$(basename ${filepath})
> done < File_names.txt
```

When you're ready, uncomment the mv command to move each file from the original location into the new location!

> *Question: in this context, why do you have to use 'basename' for the target directory?*

Concept: While Loops

We have previously seen the concept of for loop:

```
$ for file in file1 file2 file3 file4; do
>   echo "${file}"
> done
```

For loops repeat a set of code for a set of items, by changing the value of a variable in each iteration.

Concept: While Loops

For loops are finite, they go through your list and stop when they run out of things.

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$ while [statement]; do     #means while statement is true do
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> done
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An easy **pseudocode** example:

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```
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>   [whatever you want to do]
> done
```

An easy **pseudocode** example:

```
$ n=3
$ while n > 0; do
>   echo $n
>   n=$n - 1
> done
```

```
3
2
1
```

Concept: While Loops

Didn't you say while loop are infinite? **Pseudocode**:

```
$ n=3
$ while n < 5; do
>   echo $n
>   n=$n - 1
> done
```

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Didn't you say while loop are infinite? **Pseudocode**:

```
$ n=3
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```

- Always include a stop!
    - i.e. ensure your condition will eventually become 'false'!
- Emergencies: Ctrl + C (cancel the loop)

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```

- Always include a stop!
  - i.e. ensure your condition will eventually become 'false'!
- Emergencies: Ctrl + C (cancel the loop)

Following our example from the beginning...

```
$ while read filepath; do
>   echo "${filepath}" images/$(basename ${filepath})
>   # mv ${filepath} images/$(basename ${filepath})
> done < File_names.txt
```

...the condition read filepath becomes false when there are no more lines in the file File_names.txt (i.e. 'EOF')

Pasting things side by side!

As you remember from the beginning, we downloaded a metadata file, which includes different metadata categories for each file.

Lets look in the file!

```
$ cat Boosted-BBB-meta.tsv
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You can use paste to paste the two lists together, and save the results!

```
$ ls -1 images/* | paste - Boosted-BBB-meta.tsv # > Annotations.txt
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```

```
images/alopochenaegyptiacaArnhem.jpg    alopochenaegyptiacaArnhem    C    Funny
images/angry.jpg    angry    B    Artwork
images/bubobubo.jpg    bubobubo    C    Normal
...
images/snore.jpg    snore    B    Normal
images/stretch.jpg    stretch    B    Funny
images/weimanarer.jpg    weimanarer    A    Normal
```

> *Disclaimer: literally pastes columns, no matching done. Only works if both columns are in the corresponding order.*

Editing text with sed

To share these images with your internet friends, you need to properly specify the category names.

Let's add the actual category names to the Annotations.txt.

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You can use sed, short for **s**tream **ed**itor, with a regex to edit the contents of a datastream on-the-fly.

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$ sed 's/A/dog/' Annotations.txt
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...
images/snore.jpg    snore    B    Normal
images/stretch.jpg    stretch    B    Funny
images/weimanarer.jpg    weimanarer    dog    Normal
```

Uh-oh!

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```

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$ sed 's/\tA\t/\tdog\t/' Annotations.txt
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images/angry.jpg	angry	B	Artwork
images/bubobubo.jpg	bubobubo	C	Normal
...
images/snore.jpg	snore	B	Normal
images/stretch.jpg	stretch	B	Funny
images/weimanarer.jpg	weimanarer	dog	Normal
```

> *On Macs, `sed` does not recognise `\t`.You will need to type in a tab character.*

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...
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images/stretch.jpg	stretch	B	Funny
images/weimanarer.jpg	weimanarer	dog	Normal
```

> *On Macs, `sed` does not recognise `\t`.You will need to type in a tab character.*

Use `-e` to provide multiple regular **e**xpressions to `sed`.

```
$ sed -e 's/\tA\t/\tdog\t/' -e 's/\tB\t/\tcat\t/' -e 's/\tC\t/\tbird\t/' Annotations.txt
```

Editing text with sed

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$ sed 's/\tA\t/\tdog\t/' Annotations.txt
```

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images/alopochenaegyptiacaArnhem.jpg    alopochenaegyptiacaArnhem    C    Funny
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```
$ sed -e 's/\tA\t/\tdog\t/' -e 's/\tB\t/\tcat\t/' -e 's/\tC\t/\tbird\t/' Annotations.txt
```

When you are happy with the results, it is time to save the edits.

sed can edit a file **i**n place, with the -i option.

```
$ sed -i -e 's/\tA\t/\tdog\t/' -e 's/\tB\t/\tcat\t/' -e 's/\tC\t/\tbird\t/' Annotations.txt
```

Cleanin' up my closet

Lets actually organise our into descriptive folders based our metadata file!

For this, we need to use conditionals. This is a comparison of two things, and if they are the same something happens, if different, something else happens.

The most basic conditional is an if else statement.

Cleanin' up my closet

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For this, we need to use conditionals. This is a comparison of two things, and if they are the same something happens, if different, something else happens.

The most basic conditional is an if else statement.

The basic syntax is like this

```
$ if [[ ${my_variable} == "banana" ]]; then
>   echo "Monkey takes a banana and runs away happy."
> else
>   echo "Monkey doesn't want that."
> fi
```

You can have sequential conditions too with elif, short for **el**se **if**.

```
$ if [[ ${my_variable} == "banana" ]]; then
>   echo "Monkey takes a banana and runs away happy."
> elif [[ ${my_variable} == "mango" ]]; then
>   echo "Monkey takes a mango and eats it while staring at you."
> else
>   echo "Monkey doesn't want that."
> fi
```

Conditions of conditionals

- [[behaves different to [. Usually, [[is what you want. [*Long story, trust us.*]

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Conditions of conditionals

- [[behaves different to [. Usually, [[is what you want. [*Long story, trust us.*]
- You can evaluate mathematical equations with ((

```
$ if (( 5 - 2 == 3)); then
>   echo "YES"
> fi
```

```
YES
```

Conditions of conditionals

- `[[` behaves different to `[`. Usually, `[[` is what you want. [*Long story, trust us.*]
- You can evaluate mathematical equations with `((`
- `!` can be used as a "not".

Conditions of conditionals

- [[behaves different to [. Usually, [[is what you want. [*Long story, trust us.*]
- You can evaluate mathematical equations with ((
- ! can be used as a "not".

```
$ if (( 5 - 2 == 3)); then
>   echo "YES"
> fi
```

```
YES
```

```
$ if ! (( 5 - 2 == 3)); then
>   echo "YES"
> else
>   echo "NO"
> fi
```

```
NO
```

Conditions of conditionals

- Some options can be used to check if files exist, or is a variable has non-zero length.

Conditions of conditionals

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```
$ if [[ -f Annotations.txt ]]; then
>   echo "File exists."
> fi

$ if [[ -n ${banana} ]]; then
>   echo "Variable is set."
> else
>   echo "Variable is NOT set."
> fi
```

```
File exists.
Variable is NOT set.
```

Conditions of conditionals

- You can even combine multiple conditionals
  - `&&`: 'AND' - both must evaluate true
  - `||`: 'OR' - at least one must evaluate true

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- You can even combine multiple conditionals
  - &&: 'AND' - both must evaluate true
  - ||: 'OR' - at least one must evaluate true

```
$ LifeUniverseEverything=42
$ hitchhikers="awesome"
## AND
$ if [[ ${LifeUniverseEverything} == 42  && ${hitchhikers} == "awesome" ]]; then
>   echo "Don't panic!"
> fi
```

Conditions of conditionals

- You can even combine multiple conditionals
  - &&: 'AND' - both must evaluate true
  - ||: 'OR' - at least one must evaluate true

```
$ LifeUniverseEverything=42
$ hitchhikers="awesome"
## AND
$ if [[ ${LifeUniverseEverything} == 42  && ${hitchhikers} == "awesome" ]]; then
>   echo "Don't panic!"
> fi
```

```
$ LifeUniverseEverything=41
$ hitchhikers="awesome"
## OR
$ if [[ ${LifeUniverseEverything} == 42  || ${hitchhikers} == "awesome" ]]; then
>   echo "Still don't panic!"
> fi
```

> *Play around with the variables to get a feel!*

Sorting the images by category

We now want to create a directory for each category, and move images into each.

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```
$ cd ~/Boosted-BBB/

## Parse the annotations file into variables
$ while read line; do
>   image_name=$(echo "${line}" | cut -f1)
>   animal=$(echo "${line}" | cut -f3)
>
>   echo "${image_name}	${animal}"
>
> done < Annotations.txt
```

```
images/alopochenaegyptiacaArnhem.jpg	bird
images/angry.jpg	cat
images/bubobubo.jpg	bird
images/bydgoszczForest.jpg	bird
[...]
images/pompeii.jpg	dog
images/snore.jpg	cat
images/stretch.jpg	cat
images/weimanarer.jpg	dog
```

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>   animal=$(echo "${line}" | cut -f3)
>
>   # echo "${image_name}    ${animal}"
>
>   ## Make a new directory for each animal, if one doesn't exist.
>   mkdir -p images/${animal}
>
>
>
>
>
>
>
>
>
>
```

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>
>   # echo "${image_name}    ${animal}"
>
>   ## Make a new directory for each animal, if one doesn't exist.
>   mkdir -p images/${animal}
>
>   ## If animal matches one of the three, move the image.
>   if [[ ${animal} == "cat" ]]; then
>     mv ${image_name} images/cat/
>   elif [[ ${animal} == "dog" ]]; then
>     mv ${image_name} images/dog/
>   elif [[ ${animal} == "bird" ]]; then
>     mv ${image_name} images/bird/
>   fi
>
```

Housekeeping

Let's see if everything moved where we wanted.

```
$ find ~/BareBonesBash/Boosted-BBB/images/ -type f -name "*jpg"
```

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```
$ find ~/BareBonesBash/Boosted-BBB/images/ -type f -name "*jpg"
```

```
~/BareBonesBash/Boosted-BBB/images/cat/snore.jpg
~/BareBonesBash/Boosted-BBB/images/cat/giacomo.jpg
~/BareBonesBash/Boosted-BBB/images/cat/excited.jpg
~/BareBonesBash/Boosted-BBB/images/cat/angry.jpg
~/BareBonesBash/Boosted-BBB/images/cat/stretch.jpg
~/BareBonesBash/Boosted-BBB/images/dog/licorne.jpg
~/BareBonesBash/Boosted-BBB/images/dog/fanta.jpg
~/BareBonesBash/Boosted-BBB/images/dog/weimanarer.jpg
~/BareBonesBash/Boosted-BBB/images/dog/pompeii.jpg
~/BareBonesBash/Boosted-BBB/images/dog/nomnom.jpg
~/BareBonesBash/Boosted-BBB/images/bird/alopochenaegyptiacaArnhem.jpg
~/BareBonesBash/Boosted-BBB/images/bird/bubobubo.jpg
~/BareBonesBash/Boosted-BBB/images/bird/netsukeJapan.jpg
~/BareBonesBash/Boosted-BBB/images/bird/bydgoszczForest.jpg
~/BareBonesBash/Boosted-BBB/images/bird/exhibitRoyal.jpg
```

Good! Everything moved into the correct subfolder!

I have to do this every day!

We are already being lazy by getting the computer to loop through each file.

But what do you do if you have to do the same thing EVERYDAY?

Do you really wanna write all the commands every time?!

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But what do you do if you have to do the same thing EVERYDAY?

Do you really wanna write all the commands every time?!

The ultimate goal of anyone working on the command line is to make a program which you can run with a single command and it does all the work for you.

That program is called a ***script***.

What's a script?

Similar to a play/movie script that tells actors what to do and the sequence in which they should do it, a computer script is a file containing all the commands that you want the computer to perform in a given order.

So let's start writing your first script `first_script.sh`! Open a text editor, we will use `nano`

```
$ nano first_script.sh
```

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```
$ nano first_script.sh
```

element.clientHeight + 0.02 *
window.scroll(0, scrollHeight);
}

Your first script!

The first thing you almost always need to do with any script is to specify which language the script is using. This is done with a 'shebang'

It consists of a #! to indicate it's a shebang, then a path to a list that *unix stores locations of all programs in.

On the first line of your text editor window, type:

```
#! /usr/bin/env bash
```

Your first script!

For your first script we want the program to print "Hello world!"

How did we told bash to print something in screen?

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save the file by presing **Ctrl+X**, press **"Y"** to confimr you want to save and press enter to save it as `first_script.sh`.

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That's it! You've made your first script!

How do you run a script?

Now to run the script, we do:

```
$ bash ./first_script.sh
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```
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```

```
Hello world
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Input Variables

So now we want to change our script to instead of saying `Hello world`, it say `Hello <your_name>`

So our script looked like:

```
#! /usr/bin/env bash

echo "Hello world"
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We can use variables for the arguments passed to a script.

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It is a user supplied value that the script will use to perform the tasks

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In Bash, the arguments passed on the command line can be called ${1},${2} ...

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In Bash, the arguments passed on the command line can be called `${1}`,`${2}` ...

`${1}` is the first argument

`${2}` is the second argument

`${3}` is the third argument

and so on.

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and so on.

Let's go back to our script and change the printing message

Input Variables

This is our script from before:

```
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echo "Hello world"
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echo "Hello world"
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Then, we want to print out "Hello < name >" instead of "Hello World".

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The script now needs an argument to run, so we will run:

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```

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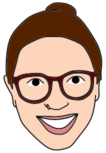
```
$ bash ./first_script.sh Aida
```

```
Hello Aida
```



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- Try to have all bash variables in ${}. This helps distinguish them visually and ensures all variables are interpreted correctly.
- Keep the code simple: try to simplify your code instead of having 1,000 lines
    - Avoid duplicating code.

Good coding practices

Add a help message. In our basic script, we could add the following:

```
#! /usr/bin/env bash

name=${1}

if [[ ${name} == "--help" || ${name} == "-h" ]]; then
  ## Print help message
  echo "This script prints Hello <your_name> into screen."
  echo "To run it type: bash ./first_script.sh <your_name>"
else
  ## Printing Hello and the specified variable into screen
  echo "Hello ${name}"
 fi
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```

You will often go back to old scripts and not remember the options and arguments they need.

Having help text will make it easier to remember.

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  - Simplify your code
- Explain your code to someone else! Talking through the logic of it will often make the problem obvious.
  - This is called the Rubber ducky approach, as many programmers have a rubber duck on their desk to explain their code to.

Things to keep in mind

- Code for the same task can be written in multiple ways
    - Some code is more **efficient** -> a.k.a runs faster.
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- Practice makes perfect: the more you do it, the more you learn.

Quiz time!

Time to practice!

Your task now will be to generate a script to perform the image sorting that we have shown you in this presentation **and email it to us**.

BUT: This time you will need to make **an extra subdirectory within each of the categories** with the secondary description of the images!

> *That is column 3 of the metadata file. (Artwork, Baby, Funny, Historical, Normal)*

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For this, please make a new directory and download the data again:

```
$ mkdir ~/Boosted-BBB_scripting
$ cd ~/Boosted-BBB_scripting

## Get images zip and metadata file
$ wget git.io/Boosted-BBB-images # On Mac: `curl -LO`
$ wget git.io/Boosted-BBB-meta # On Mac: `curl -LO`

## Unzip image folders and rename metadata file
$ unzip Boosted-BBB-images
$ mv Boosted-BBB-meta  \
~/Boosted-BBB_scripting/Boosted-BBB-meta.tsv
```

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```

You are set up to start now!

Today I learned...

- find to locate files or directories
- What is a for loop
- Regular expressions for weird and wonderful pattern matching
- rename for renaming files
- While loops (reading contents of files)
- sed for on-the-fly string manipulation *within* files
- If statements and conditionals (if this, then do that, else do this)
- Scripts and arguments (now you're a programmer! Yes, you!)

Rerun: Enter the janitor!

Despite being lazy - you should ALWAYS keep your room tidy.

- This stops losing files
- Prevents getting lost in a maze of directories
- Accidentally permanently deleting a days worth of work

[*don't ask how many times this has happened.*]

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Lets remove:

- the Boosted-BBB directory
- **all of its contents**.

```
$ cd ~     # Don't delete a directory
         # while we are still in it!
$ rm -r Boosted-BBB*
```

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```

There is more!

- This was a reduced version of previous BBB series
- You can find all the slides and walkthroughs here: https://barebonesbash.github.io/#/

Thanks to...

- Stephan Schiffels
    - for giving support and advice on cluster setup in our initial runs of BBB
- James Fellows Yates
    - Creator of many of those slides for the BBB courses we've given
- Zandra Färgenas
    - for the wonderful images of ourselves <3
- Google
    - Pretty much teaching all of this
- giphy, tenor
    - For procrastination
- fontawesome.com
    - for icons for making the logo