Lab #6

More Loops, Functions, & GitHub

BINF 2111, Fall 2023

IMPORTANT!

Your midterm is in 2 weeks!

I will send out a **poll** to see where everyone's current comprehension level resides.

I will also post a **study guide** and hold a **review session** (maybe multiple) before the midterm.

Terminology

Increment

The process of increasing a numeric value by another value, usually by 1 with num++

Function

Self contained modules of code that accomplish a specific task, usually taking in data, processing it, and returning a result

Argument

A special kind of variable used in a function to refer to one of the pieces of data provided as input to the function

Loops - while

- Do something **while** a condition is **true**

```
while [[ condition ]]; do
    commands
done
```

- Can use the same conditions as if statements
- Opposite of until loops
- Common Uses
  - Using a counter (increment/decrement)
  - Reading files line by line
  - Infinite loops
  - Writing information into a file

Loops - while

- **Using a counter (increment with ++ and decrement with --)**
- While a is less than 10, print a and increment by 1

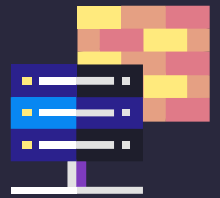
Initialize a to 0

Use a conditional to check if a is less than 10

```
a=0
while [[ $a -lt 10 ]]
do
    echo $a
    ((a++))
done
```

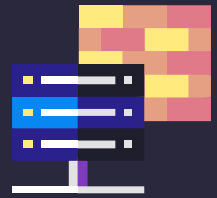
Print a

Increment a by 1 with ++



Loops - while

- **Reading files line by line**
- Read each line in example2.fasta, find the character count of that line, add it to the sum, and print it all out.



Use `read` to read files in

`line` is the variable for each line in the file

```
while read line
do
    chars=$(echo $line | wc -c)
    sum=$((sum+chars))

    echo The sum of all the characters in the file is $sum
done < example2.fasta
```

Count the characters in each line with `wc -c`

Add the character amount to `sum` and set it equal to `sum`

Print it out

Use `example2.fasta` as input

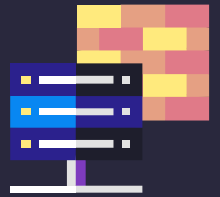
Loops - while

- **Infinite loops**
- Press Ctrl+C to get out of the loop/end the script

Use : to make the loop infinite by not checking for a condition

```
while :
do
  echo "An Infinite loop"
done
```

Print a statement that will repeat forever



Loops - while

- **Writing information into a file**
- Press Enter, Ctrl-D when you are done typing the file contents

Print a prompt statement

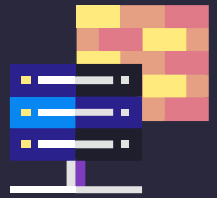
Use read to read in the user's input and store it as filename

```
echo -n "Enter the filename to create: "
read filename

while read line
do
    echo $line >> $filename
done
```

Use read to read in the user's input for the file's contents and store each line as line

Print the line into the file



Loops - until

- Do something **until** a condition is **false**

```
until [[ condition ]]; do
    commands
done
```

- Can use the same conditions as if statements
- Opposite of while loops
- Common Uses
  - Using a counter (increment/decrement)
  - Reading files line by line
  - Infinite loops
  - Writing information into a file

Loops - until

- **Using a counter (increment/decrement)**
- Until a is NOT less than 10, print a and add 1

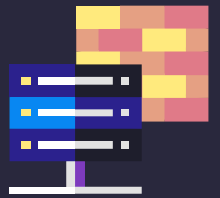
Initialize a to 0

Use a conditional to check if a is NOT less than 10

```
a=0
until [[ ! $a -lt 10 ]]
do
    echo $a
    ((a++))
done
```

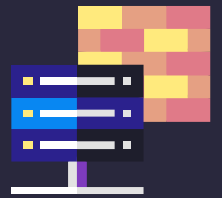
Print a

Increment a by 1 with ++



Loops - until

- **Reading files line by line**
- Read each line in example2.fasta, find the character count of that line, add it to the sum, and print it all out.
- Does the same thing as the while loop shown before



```
until ! read line
do
    chars=$(echo $line | wc -c)
    ((sum+=chars))

    echo The sum of all the characters in the file is $sum
done < example2.fasta
```

Use `! read` to read files in

`line` is the variable for each line in the file

Count the characters in each line with `wc -c`

Add the character amount to `sum` and set it equal to `sum`

Print it out

Use `example2.fasta` as input

Loops - until

- **Infinite loops**
- Until condition is true, print the iteration number, increment the iteration number, and wait 1 second
- This loop will never end since the condition is hard coded to false. Press Ctrl-C to end the loop

Set con to false and itnum to 0

```
con=false
itnum=0
until $con
do
    echo "Iteration no : $itnum"
    ((itnum++))
    sleep 1
done
```

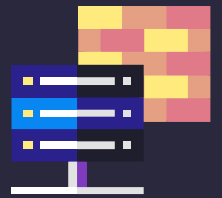
Run until con is false (forever)

Print itnum and increment by 1

Wait 1 second before continuing

Loops - until

- **Writing information into a file**
- Press Enter, Ctrl-D when you are done typing the file contents
- Does the same thing as the while loop shown before



Print a prompt statement

Use read to read in the user's input and store it as filename

```
echo -n "Enter the filename to create: "
read filename

until ! read line
do
    echo $line >> $filename
done
```

Use read to read in the user's input for the file's contents and store each line as line

Print the line into the file

Functions

- Self contained modules of code that accomplish a specific task, usually taking in data, processing it, and returning a result
- Two ways to set it up (you choose!):

```
function_name() {
    commands
}
```

Includes **parentheses** after the function's name

OR

```
function function_name {
    commands
}
```

No parentheses and the word "**function**" before the function's name

- Run functions by "**calling**" them:

```
function_name
```

Functions - Examples

- Function names should be meaningful and relate to the functionality of the function!

```
method1() {
    echo This is a function
}

function method2 {
    echo This is also a function
}

# Calling both functions
method1
method2
```

First method contains parentheses after the function's name

Second method contains "function" before the function's name

Run the functions by calling them (use the function's name)

Functions With Arguments

- Arguments are set similar to parameters
- Each argument is specified by a dollar sign and the argument number
  - $1, $2, etc

```
function_name() {
    echo $1
    echo $2
}
```

- Call the function to set the arguments:

```
function_name arg1 arg2
```

Functions With Arguments

- Similar to parameters, arguments can be set equal to variables

Create a function called summation

Take in the first parameter with $1

Take in the second parameter with $2

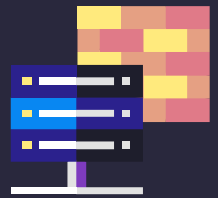
Add them together and set it equal to sum

```
summation() {
    echo Adding $1 to $2
    sum=$(($1 + $2))
    echo $sum
}

summation 2 6   # will add 2+6
summation 3 0   # will add 3+0
```

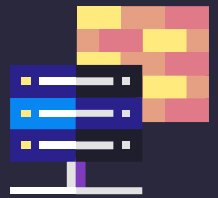
$1 $2

Call the function, changing the arguments each time you call it



Example Scripts

- Example scripts contain everything we went over and then some!
- **loops.sh**
  - Arrays in for loops
  - While loops and various uses (infinite loop commented out)
  - Until loops and various uses (infinite loop commented out)
- **functions.sh**
  - Basic functions
  - Functions with arguments
  - Return values
  - Variable scope
  - Parameters in scripts vs arguments in functions



GitHub

- A code hosting platform for version control and collaboration.
- Things you'll do today:
  - Make a new repository (sometimes called a repo)
  - Add directories within the repo
  - Make and edit readmes
  - Upload files
- An example repository: https://github.com/madelinebellanger/BINF2111/
- Tutorial time!