Programming Merit Badge

TOOLS

To complete the C++ program you will need:

- A “Text” editor
  - Recommended: VS Code
    - https://code.visualstudio.com
- A C/C++ compiler
  - Windows:
    - Visual Studio
      - https://visualstudio.microsoft.com
    - GCC (MingW)
      - http://www.mingw.org

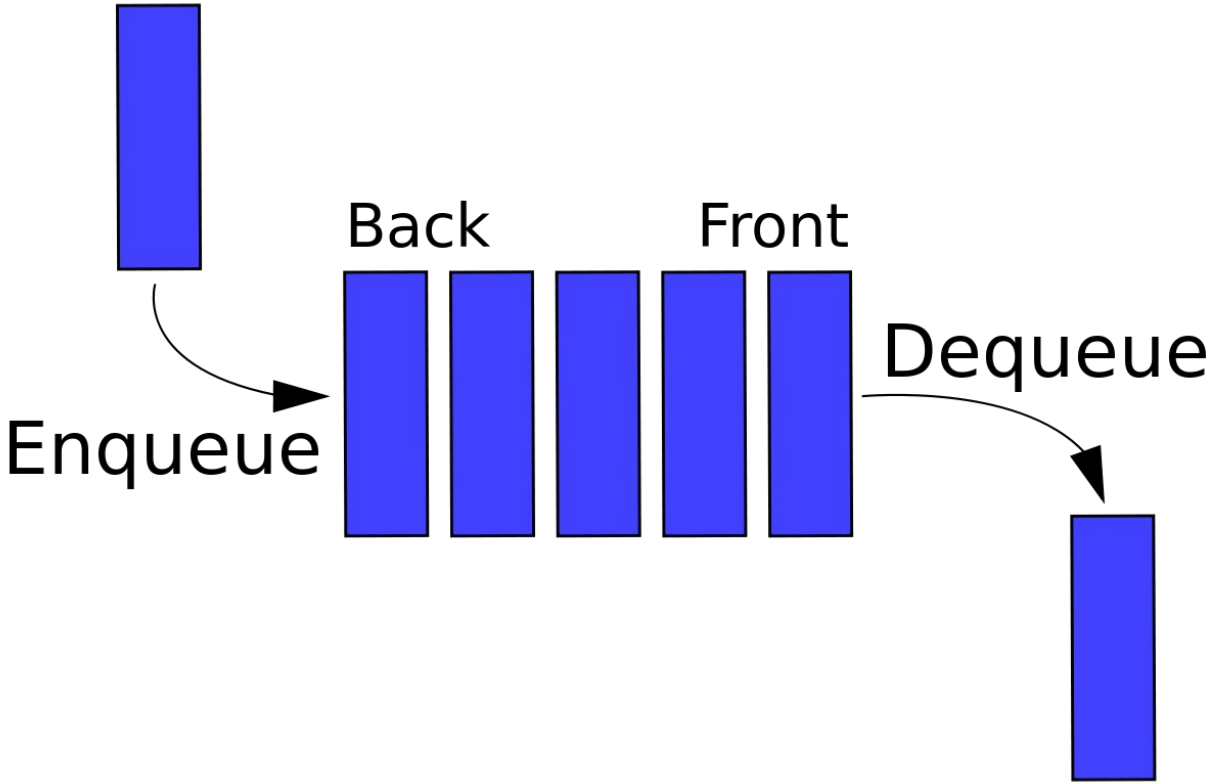
TOOLS

Sample programs and homework problem:

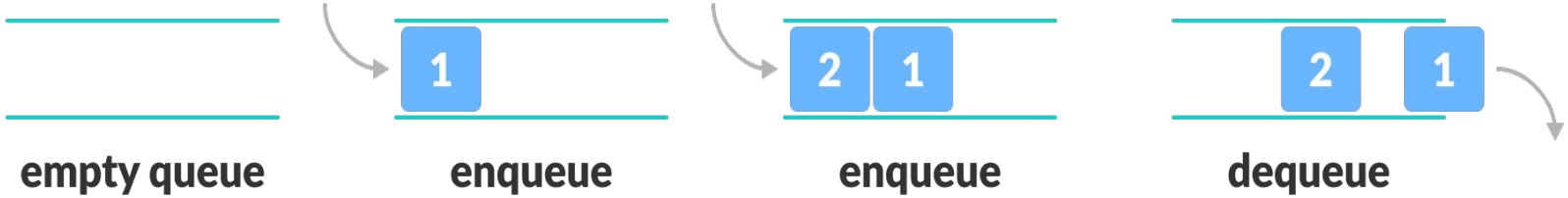
https://github.com/johneegeek/pmb

Data Structure: QUEUES

Data Structure: QUEUES



Data Structure: QUEUES



“Push”

“Push”

“Pop”

I’ve been thinking of this for a while actually….

Data Structure: QUEUES

FIFO – an acronym for first in, first out – in computing and in systems theory, is a method for organising the manipulation of a data structure – often, specifically a data buffer – where the oldest (first) entry, or 'head' of the queue, is processed first.

Language #2: Java

To complete the Java program you will need:

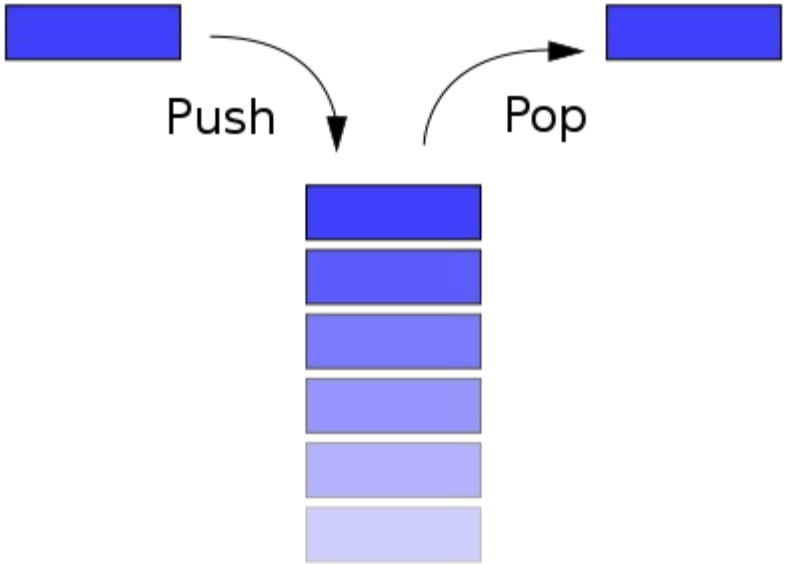
- A “Text” editor (We’ll use the same one we used before)
  - Recommended: VS Code
    - https://code.visualstudio.com
- A JAVA “Development Environment”
  - Java JDK:
    - https://www.oracle.com/sg/java/technologies/javase-downloads.html

Java - Hello World

```java
/**
 * My hello world in Java
 */

 // Class definition: The name of your main 'class' needs
 // to match the name of your file.
public class hello
{
     public static void main(final String[] args)
     {
          System.out.println("Hello World");
     }
}
```

Data Structure: STACK

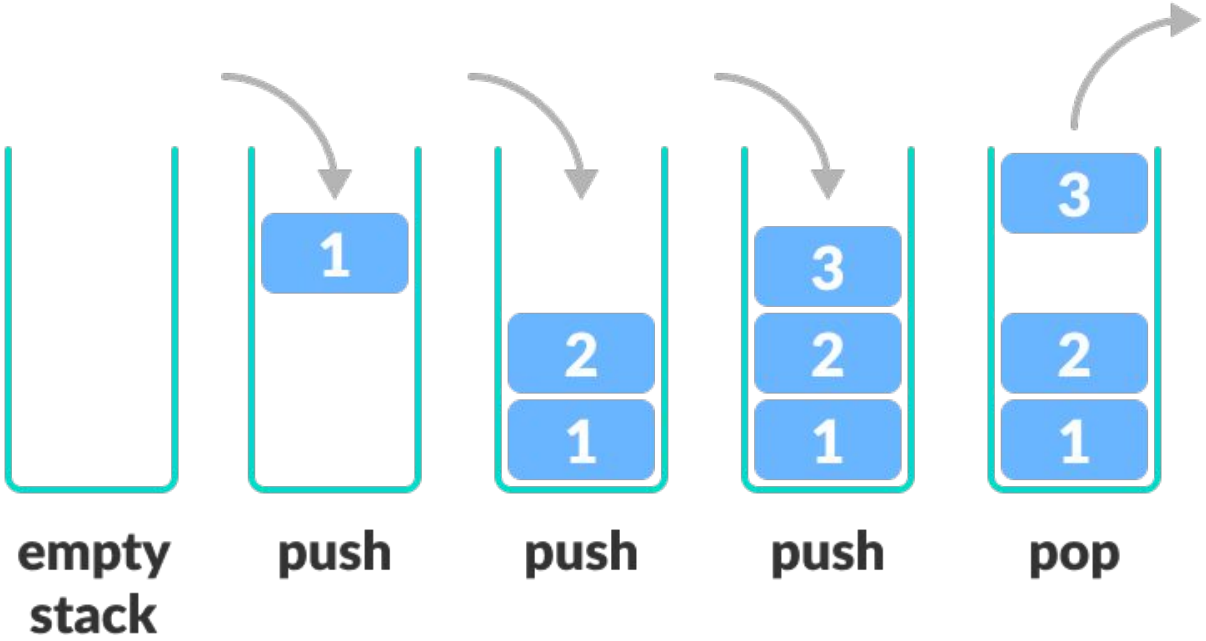
Data Structure: STACK



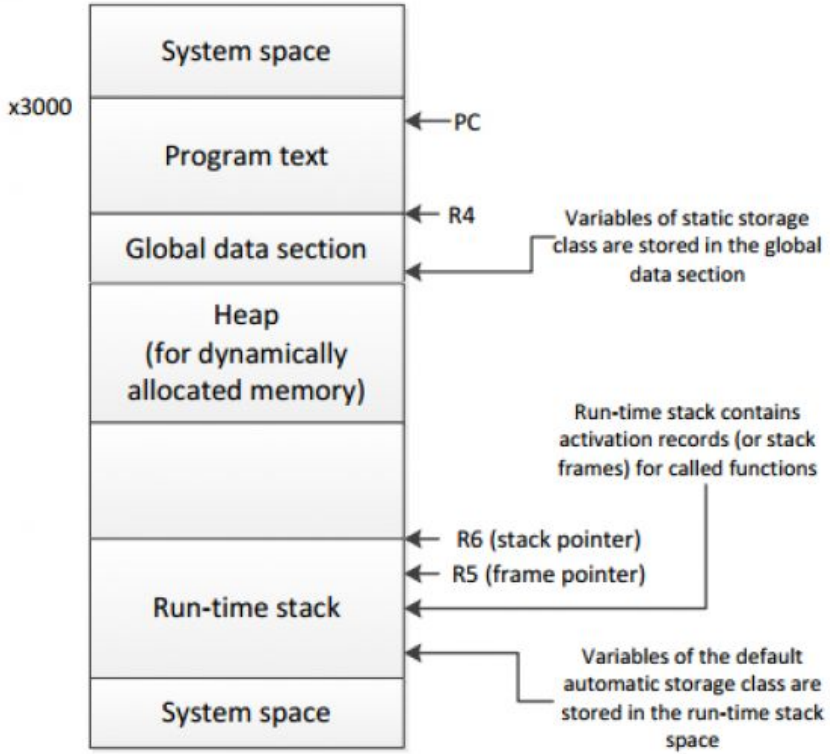
Data Structure: STACK

LIFO – an acronym for last in, first out – in computing and in systems theory, is a method for organising the manipulation of a data structure – often, specifically a data buffer – where the last entry, or top of the stack, is processed first.

Data Structure: STACK



Data Structure: STACK



HOMEWORK PROBLEM #2

Reverse String

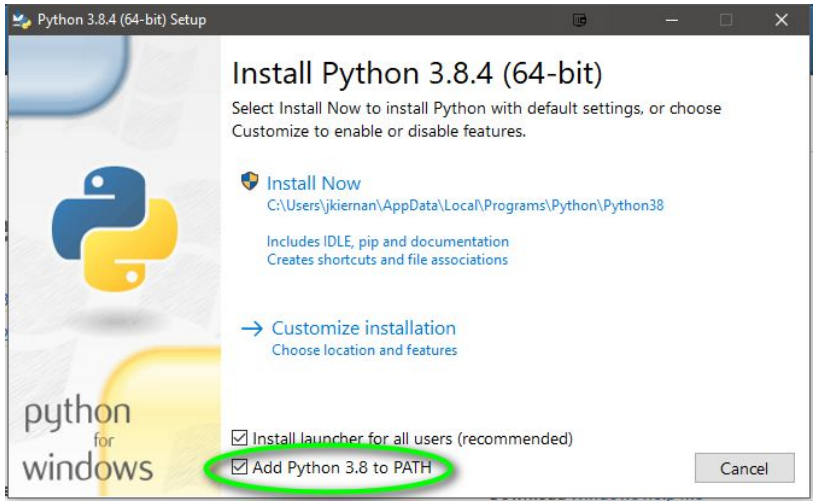
Language #3: Python

File extension: *nnnn*.**py**

To complete the Python program you will need:

- A “Text” editor (We’ll use the same one we used before)
  - Recommended: VS Code
    - https://code.visualstudio.com
- A Python Interpreter
  - From Python.org:
    - https://www.python.org/downloads/
    - IMPORTANT: Make sure, when installing, you check option:

      `Add Python 3.x to PATH`



Python

> *Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.*

There are really 2 versions of Python: Version 2.x.x and Version 3.x.x.
They are not completely compatible with each other and version 2 is officially discontinued, so USE Version 3.x.x

Python: Hello World

```
print(‘Hello world’)
```

Python: Conditional Statements

```
if <expr>:
    <statement(s)>
else:
    <statement(s)>
```

```
if a < b:
   print('a is less than b.')
   c = b

print('Done with all of this')
```

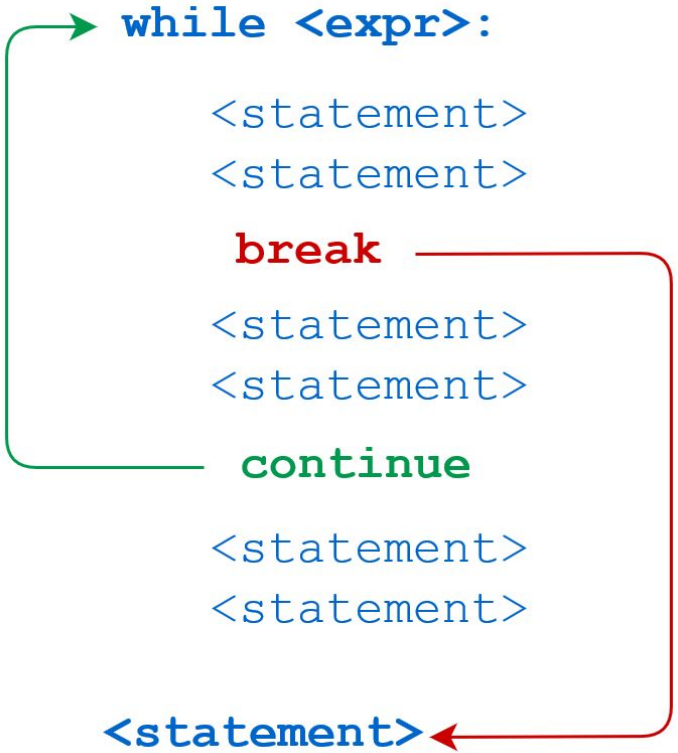
Python: Conditional Statements

Notice the Indentation!

(No braces, brackets or parentheses)


```
if a < b:
    print('a is less than b.')
    c = b

print('Done with all of this')
```

Python: While Loops




```
a = ['rock','paper','scissors','table saw']

while a:
    s = a.pop()
    print(s)
```

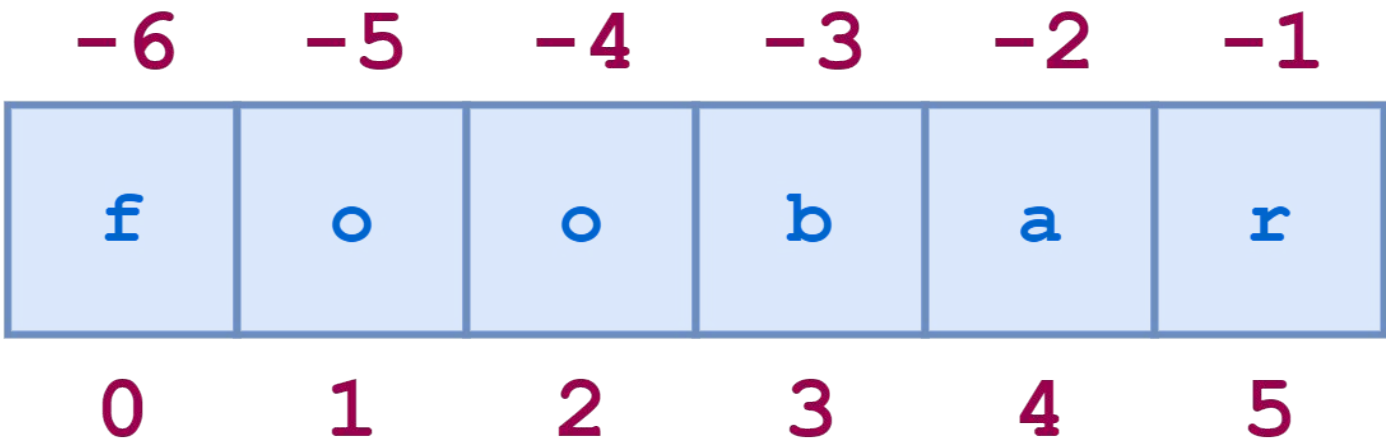
Python: For Loops

```
for <var> in <iterable>:
    <statement(s)>
```

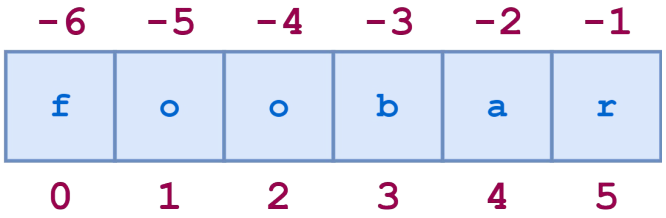
```
a = ['rock','paper','scissors','table saw']

# Loop through values in a list
for i in a:
    print(a)


# Loop a number of times
for b in range(0,10):
    print(b)
```

Python: STRINGS

```
s = 'foobar'
```



Python: String Slicing



Python also allows a form of indexing syntax that extracts substrings from a string, known as string slicing. If s is a string, an expression of the form **s[m:n]** returns the portion of s starting with position ***m***, and up to but not including position ***n***:

```
>>> s = 'foobar'
>>> s[2:5]
'oba'
```

Python: LISTS

```
a = [‘cat’, ‘dog’, ‘hamster’,  ‘grizzly bear’]

b = [1,2,3,4,’rabbit’,42]
```

- Lists are ordered.
- Lists can contain any arbitrary objects.
- List elements can be accessed by index.
- Lists can be nested to arbitrary depth.
- Lists are mutable.
- Lists are dynamic.