Programming, Problem Solving, and Algorithms

CPSC203, 2019 W1

Announcements

Lab this week: git (source code control) and PIL (Python Imaging Library)

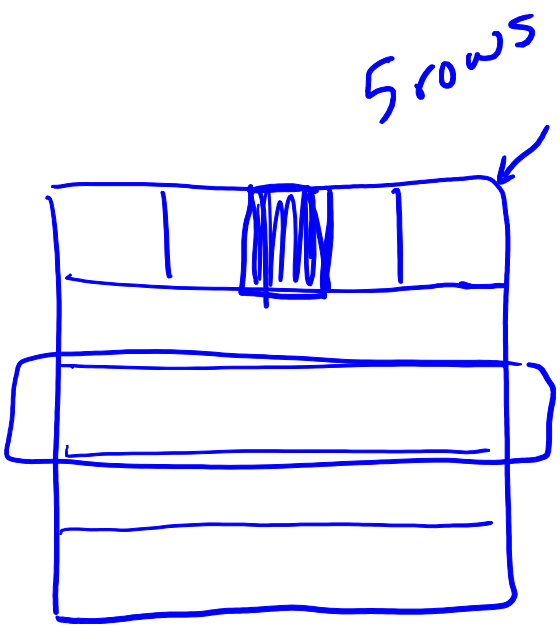
“Problem of the Day” starts today! (really)

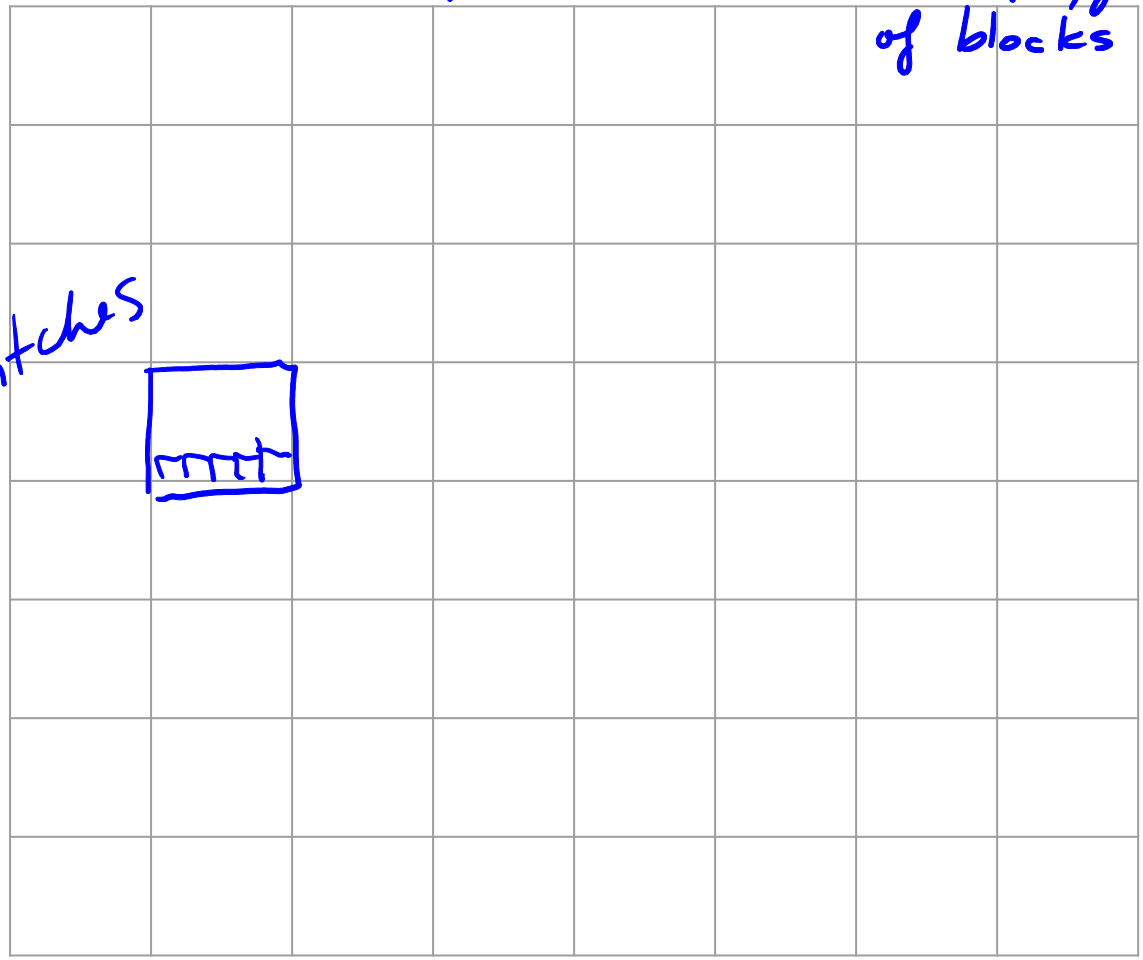
Today:

Designing and Implementing object functionality via member functions

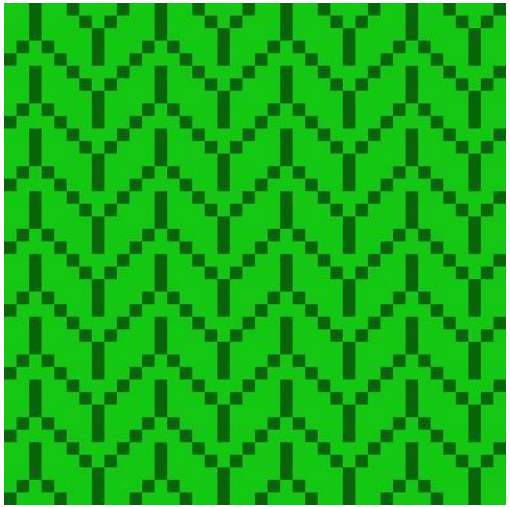
POTD

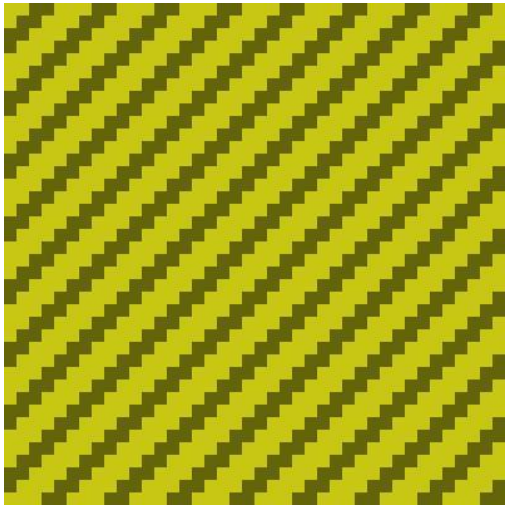
Where are we?

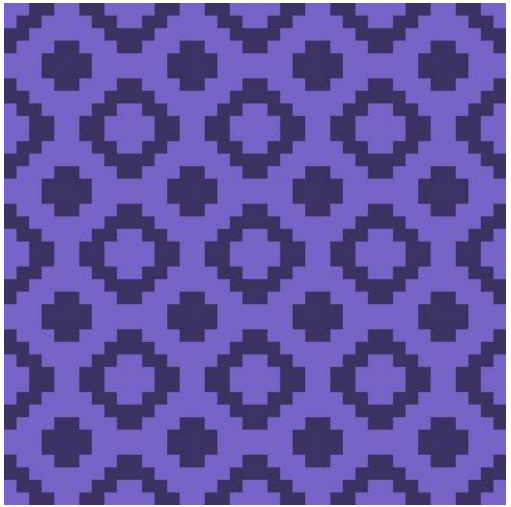




Program Design







A handcraft is a collection of _____, each of which has a _____.

Every _____ is a collection of rows. Every row is a collection of _____.

Every _____ is either “knit” or “purl.”

Classes in Python

Mechanism for creating user-defined types.

Used to identify attributes with an object.

Associates functionality with the relevant objects.

Ex:

```
 8   @dataclass
 9   class color:
10       """
11       color: simply gathers color components
12       """
13       red: int = 120
14       green: int = 120
15       blue: int = 120
```

Design Strategies

1. Decompose a problem into classes
2. List the data associated with each class
3. Write the “driver” code that illustrates the functionality you expect from each class.
4. Implement the functions you expect.
5. Run the driver code to test your functionality.

Demo & Reflection

https://repl.it/@ckh205/knittingSkeleton

Review the code we've written and make 3 observations:

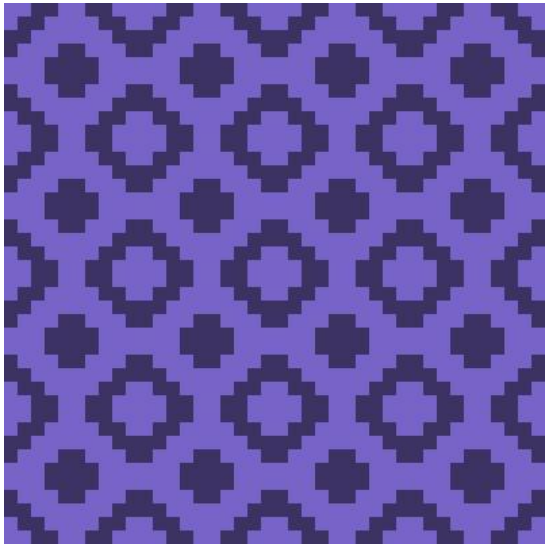
1. Line ___: _____
2. Line ___: _____
3. Line ___: _____

Was our decomposition necessary? Why not just use a 2d array of rectangles?

Abstraction/Encapsulation:

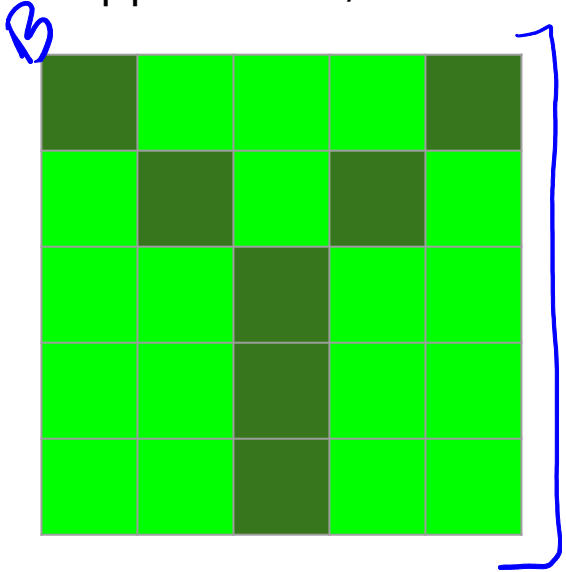
Adding Functionality

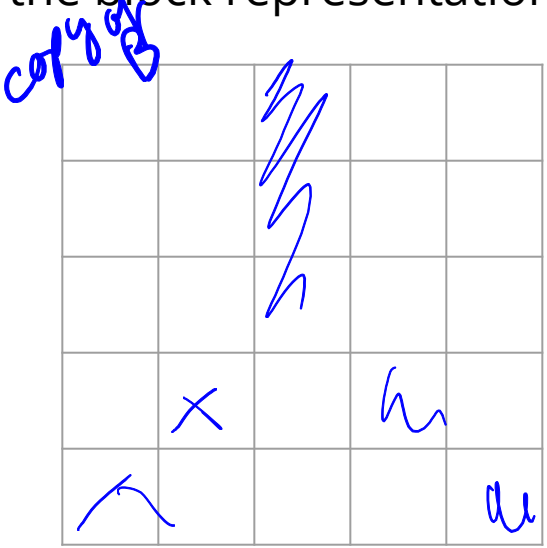
Creating blocks is an arduous task. We'd like a way to make new blocks out of old ones! How many different kinds of blocks are found in this image? How are they related to one another?



Flip Vertical

Suppose we want to create a new block which is just the vertical reflection of a given block. Sketch the new block. Describe how you would accomplish the flipped block, in terms of the block representation in our code (list of rows).





1. make a new list of rows as a copy of old
2. reverse the new list
3. use that list of rows to build a new block
4. Return new block.

Flip Vertical

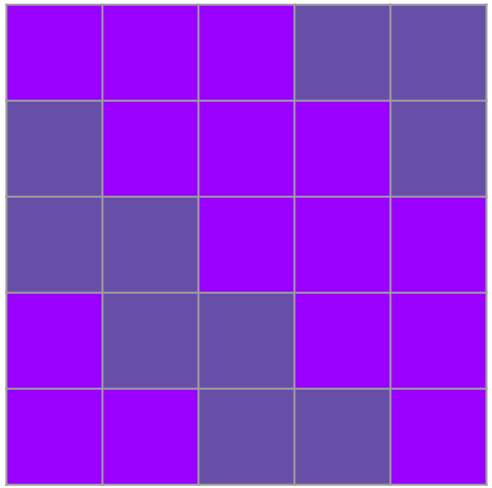
https://repl.it/@ckh205/knittingSkeleton

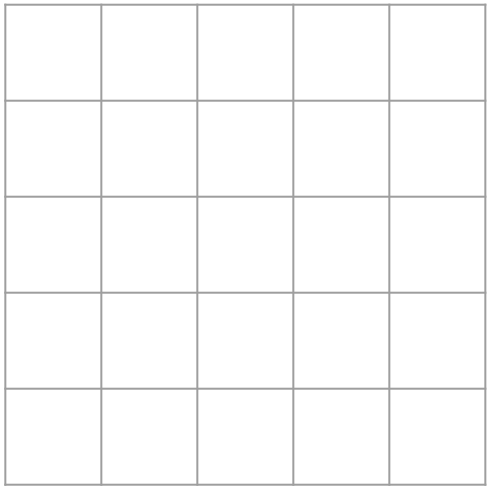
Review the code we've written and make 3 observations:

1. Line ___: _____
2. Line ___: _____
3. Line ___: _____

Flip Horizontal

Suppose we want to create a new block which is just the horizontal reflection of a given block. Sketch the new block. Describe how you would accomplish the flipped block, in terms of the block representation in our code.





1.

2.

3.

4.

Flip Horizontal

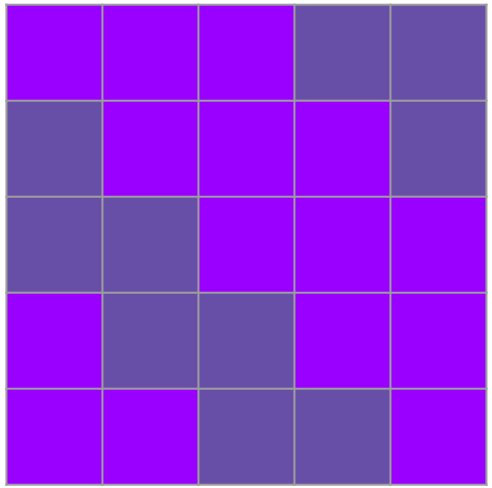
https://repl.it/@ckh205/knittingSkeleton

Review the code we've written and make 3 observations:

1. Line ___: _____
2. Line ___: _____
3. Line ___: _____

Rotate 180

Suppose we want to create a new block which is a 180 degree rotation of a given block. Sketch the new block. Describe how you would accomplish the flipped block.



1.

2.

3.

4.

Rotate 180

https://repl.it/@ckh205/knittingSkeleton

Review the code we've written and make 3 observations:

1. Line ___: _____
2. Line ___: _____
3. Line ___: _____

POTD #1 Tue

https://repl.it/@ckh205/POTD01

Describe any snags you run into:

1. Line ___: _____
2. Line ___: _____
3. Line ___: _____
4. Line ___: _____
5. Line ___: _____

ToDo for next class...

POTD: Wed practice (repl.it), Thu with flow, Fri for real. practice.

Reading: TLACS Ch 4 (intro to turtle graphics and iteration)

Play: https://www.google.com/search?q=color+picker

Adapt: Use today's demo to create a handcraft of your own! Upload your creation to https://bit.ly/2ly0z8Q (please make unique file names)

References:

TLACS Ch 17

https://docs.python.org/3/library/dataclasses.html