CRC Cards (Class-Responsibility-Collaboration Cards)

CRC cards are a design tool used in object-oriented software design. Here are some important features:

- A **class** makes a blueprint for **objects** of that class-type and is usually described by a noun (eg. point, rectangle, playing card, song, etc)
- A class also has **responsibilities** (i.e. both things it must remember and things it can do.)
    - ***a class variable*** is a thing a class must remember which WILL NOT change during a particular instance life. These are defined in the class scope, but do not start with `self`.
    - ***an instance variable*** is a thing a class must remember which MAY change from instance to instance, but which must be remembered between instance calls. In Python, these typically begin with `self`. (e.g., `self.x` in the Point class).
    - ***a method*** implements a single action or a single operation which the class can undertake. Typically, these change the state of the object in some way.
- A class may or may not rely on **collaborations** with other classes. (e.g., A playing card may be a member of a deck class, a student is a person, and a person may be a member of an organization.)

Below are two cards:

1. **a sample CRC card**
2. **a blank CRC card for you to use as a template.**

CRC Example

Below is an example of the CRC card for `point.py`

Open `point.py` in PyCharm, so you can compare the code with the CRC design.

Class name: Point	
Class Attributes:	**Class Collaborations (other classes):**
• self.x # instance variable which holds the x value • self.y # instance variable which holds the y value • self.turtle # instance variable which is initially set to `None` until `draw_point()` is called.	• Turtle class
Class Methods:	**Class Collaborations (other classes):**

• `__init__()`:
  ○ Creates a new point at x, y. If no x, y are given, the point is created at (0, 0)
• `__str__()`:
  ○ Makes the `str()` function work with Points.
• `distance_from_origin()`:
  ○ Function to compute a Point's distance from the origin.
• `user_set()`:
  ○ Allows the user to change the x and y value of a Point.
• `draw_point()`:
  ○ Instantiates a Turtle object and draws the Point on the Screen.
	• Turtle class

The above CRC card and the `point.py` code are matched.

Blank CRC Card

Class name: Student	
Class Attributes:	**Class Collaborations (other classes):**
• self.pin = self.retrieve_pin() • self.name = self.retrieve_name()	•
Class Methods:	**Class Collaborations (other classes):**

• `__init__()`:
  ○ Creates a student object and retrieves the values from the database
• retrieve_pin():
  ○ Gets the PIN from the database and returns it
• add_course():
  ○ Adds a course to the database
• remove_cours():
  ○ Removes a course to the database
• retrieve_courses():
  ○ Returns a list of courses from the database
	• Courses class