MRT Assignment-1

OOPs it's Python

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The aim of this assignment is to give you guys some hands-on experience with Python and introduce Object Oriented Programming concepts to you. The goal of this assignment is to create an interface that an operator and a swarm of rovers would use to interact.

The assignment is not objective, you have freedom of choice, whether it is data types to use (try to be logical with what data type would suit the use) or the variable names :P You may find a lot of technical terms used all over the assignment, please look them up and try to get familiar with them.

The assignment might seem ambiguous at a lot of places, but it's to see how you come up with solutions ! And as always feel free to approach us for any doubts.

Exercise 1: Create a Class with instance attributes

Create a class "Rover" with Swarm ID, Rover ID and Rover Location as instance attributes. Add Rover Geometry (l,w,h) as a class attribute (an attribute that is shared among all instances of the class)

Add a function to print out Rover's location along with its Swarm ID and Rover ID

Exercise 2: Create Class Methods

Now to add functionality to your class, add a method that would receive a message containing Swarm ID, Rover ID and how much the rover should move by, this method would decide whether the rover should act on the message or not depending on the Swarm ID, Rover ID of the message received. Example - A rover with Swarm ID 5 and Rover ID 1 shouldn't act on a message sent to Swarm ID 2 Rover ID 2.

Based on the decision taken by the previous method, invoke a method that would change the "Rover location" instance attribute

Exercise 3: Create a child class

We also happen to have a smaller rovers we call Daughter Rovers. Create a child class "Daughter Rover" that inherits from the "Rove" class. Daughter Rover being a smaller version has half the dimensions of the "Rover" class.

The daughter rover being smaller also modifies the method to move you would have created in the previous exercise. Due to constraints, the daughter rover can only move half the distance it has been instructed to move.

Exercise 4: Create a User Class

Create a class "User" that would command the rovers. The user class would have User ID as an instance variable and a method that prints the User ID. It should also keep a track of all the Swarm IDs and Rover IDs of the rovers being used.

Create Child Classes "Scientist", "Operator" and "Manager" and the relevant methods. Scientists can only view the rover location and are denied access to move the rover or add/remove rovers being controlled if they try to do so. Similarly, Operators can freely move the rover and Managers can add/remove rovers being controlled and are denied to all other methods.

Remember, the message you send as an Operator should be compatible with the format the rover checks for !

Exercise 5: Add your own functionality and features !

Add at least 1 new feature to the system we have designed. It could be an interface class that would take inputs from user and pass it to the rovers or it could be some sort of sensor on the rover. Be creative !

Happy Learning :)