

1. Mimicking a News Website:

- a. Consider a setup of a News class and an Article class. Each news class has attributes (AgencyName, TotalViewsSoFar, TotalPublicationsSoFar, ListOfPublications). Each article has the following attributes (Title, Date of Publication Day:HH:MM, Views, Agency) where Day:HH:MM is the day of the week and hour and minute when the given news agency published the article. Your aim is to keep track of the total views and publications metrics garnered by the agency so far. Additionally, print the ListOfPublications of a given news agency sorted by any of the three as desired by the viewer.
  - i. Title of the post, i.e., alphabetical sorting
  - ii. Time of publication, i.e., chronological sorting, the most recent article first.
  - iii. Based on popularity, i.e., highest views first.
- b. Let us extend the above setup to have a new class called Writer. Multiple writers can contribute to the same article. One Writer can be associated with multiple news agencies. However, one article will belong to only one news agency. In the News class, we now have an additional attribute (ListOfAssociatedWriters) and Article class with (ContributedBy) and a Writer class, which is (Name, ListOfArticlesContributedTo). Note: A writer is not directly associated with the News class but indirectly connected to it via the Article class. Our task here would be to print, the list of articles a Writer has contributed to. Given a writer name input by the user, return the title of articles and corresponding news agency that the writer has contributed to.

2. Mimicking an IMDB review system: Consider a movie review system consisting of 3 classes Movie, Artist, and Review. The Review class consists of (Comments, Ratings, MovieName). The Artist class consists of (Name, SuccessRate). The Movie class consists of (MovieName, Plot, ListOfArtists, AverageRating). The average rating of a movie is given as the average overall rating from the comments for the respective movie. A user can give a rating from 1 to 5 with higher the score, the better. The success rate of an artist is determined by the percentage of their movies that receive an average rating of at least 3. Once your review system has been populated, a user can input either a movie name or an artist name by specifying the prefix M or N as M:Name or A:Name in input. Your system should return Moviewname, NumberofReviews, AverageRating, ListofArtisits for the movie. For an artist, return ArisitName, ListofMovies, SuccessRate.

3. Mimicking National Census system: A nation follows the hierarchy of Nation > State > City > Pincode.
- The Nation class consists of variables (Name, List of States). The nation also has two functions, FindMost() and FindLeast(), which the state, city and pincode classes inherit. State class has attributes (Name, List of Cities), and City class has attributes (Name, List of Pincode). The pincode class stores the following information (PinCode, Count of number of people for different parameters enlisted below.
- Education level: Can be either No, Primary School, High School, Bachelors, Postgraduate.
- Age level: 0-5, 5-10, 10-18, 18-40, 40-60, 60+
- Employment status: Not employed, Employed

Now to obtain the number of people belonging to each level, we conduct a survey of the population. The census agency also records individual persons via the Person class consisting of variables (Adhar ID, Employment status, education level, age level, residential pincode). We first populate the person class and then aggregate the pincode level information from the person class.

Once aggregated at the pincode class, we aggregate the information at the City, State, and National levels.

A census admin can then pose the following questions:

1. Return the aggregated stats at the national, state, city, or pincode level as requested.

2. Print the most populated and least populated pin code, the most and least populated city, and the most and least populated states. Note, the most populated pincode does not mean the respective city and state are also the most populated.
3. Can we extend 2 to print K most or least populated region (pincode or city or state) as requested by the admin.
4. Return the most or least metric for a state, city, or pincode as requested. The metric can be either age, employment, or education. For example the city with the youngest population or the state with the most edest population.

For this part, make use of the inherited functions FindMost() and FindLeast()

4. Plant Taxonomy: Using the image below, build parent classes and inherited classes to store the information of an incoming plant so that common properties are not written again and again and can be obtained from the parent classes themselves.

For example, if 'Ferns' is inserted into the collection, we first have a class Plant that stores Plant Name and Scientific Name. The rest of its properties are derived from class cryptogram.

If asked to print properties of Ferns, we will list Plantname, Scientific Name, and whether it has seed or not. Similarly, for other plants, add appropriate hierarchy wherever required.

