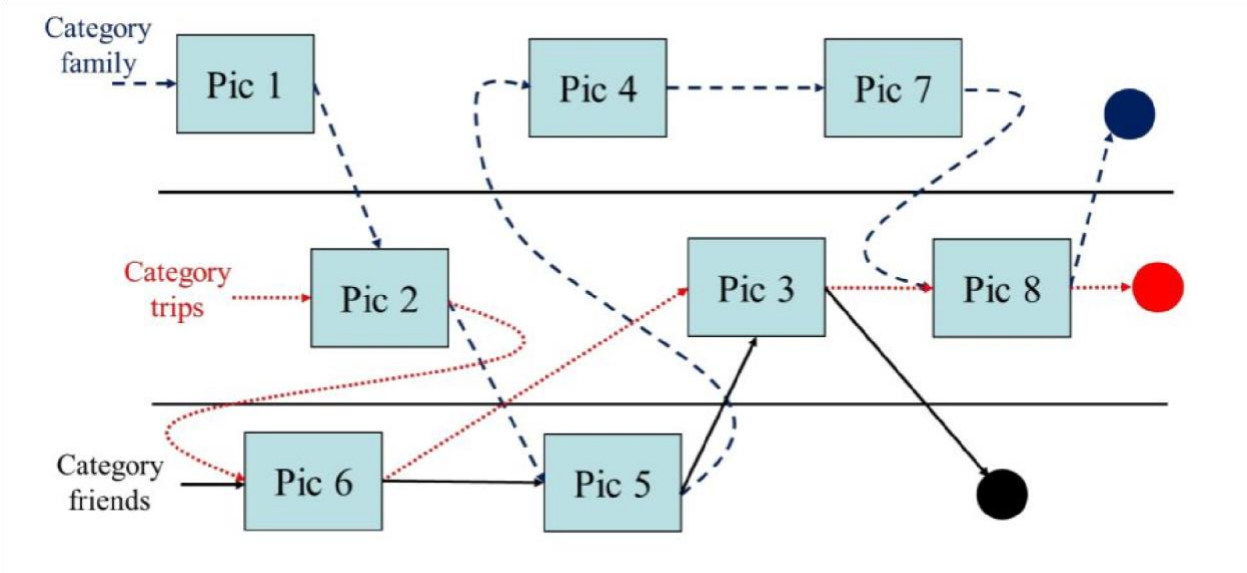
Data Structures and Algorithm Analysis

Note: Do this project in group of 02. Don't share your file with anyone in class. Bonus marks will be awarded for the good presentation.

You love to keep a collection of memories in the form of photographs. You have decided to take advantage of your programming skills in order to keep your memories organized. You want to develop an application to keep track of your photos. You have decided to assign categories to photos as i) friends, ii) family and iii) trips. You also don't want these categories to be fixed; you want to start gym soon and you will be adding some more categories like sports and fitness etc. Some of your photos can belong to more than one category like a trip with friends will go to both Friends and trips.



You have decided to use a **s ingly linked list, Doubly Linked list** for each category in order to keep track of your photos. Each photo in your software should have only one node. A photo node should be accessible (i.e., pointed) by the linked lists of all categories assigned to that photo (check above attached picture). Moreover, each photo has a default category named as "uncategorized" (not shown in the above picture).

A photo node is a data structure containing at least the following data members:

1. Title of the photo
2. Filename along with the path information, i.e, name and absolute or relative path of the folder on the hard disk where the photo is located.
3. Date of the creation of the photo
4. Categories assigned to the photo
5. List of next pointers to enable inclusion of the photo node in the linked lists of multiple categories. For example, a photo belonging to two categories will have two next pointers one for the linked list of each category.

Operations

1. **Add/delete category:** If a category is removed then the corresponding links are also destroyed. Remember each photo has only one node so the nodes belonging to multiple categories must not be deleted. Moreover, the default category of the photos cannot be removed.
2. **Add/delete photo:** If a photo is deleted then the linked list of all categories (associated with the deleted photo) must be updated. In contrast, if a photo is added, then it must be added to the link of all categories it belongs. On deletion the photo is removed from the default category as well.
3. **Add/Remove categories of a photo:** You have to update the linked lists of categories appropriately.For example, if a photo is assigned a category “friend” then you have to add the node of that photo to the linked list of category friends by establishing the pointers appropriately. Remember, every photo has only one node and therefore assigning a new category only requires adjusting next pointers. The default category cannot be removed.