



Computer Science Degree
Data Structures & Algorithms, Group 89M, 2014/2015
12th March 2015

Name and Surname:

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PROBLEM 1 (1 point) – Object Oriented Programming

A company is interested in developing an online store to sell different types of contents. All products have the following properties:

- Name or title of the content.
- Supplier. The company producing the content.
- Age rate. Minimum age to be able to consume this content
- Price. The amount to be paid by users wanting the content.

There can be different types of contents: e-books, music, films and applications. Only registered users can get access to the online store. Each user has the following features:

- Email
- Name
- Surname
- Identification Number (DNI in Spain)
- Collection of titles of contents acquired by this user

Provide the needed data structures to represent these elements. More specifically:

1. Provide all needed classes and constructors for them
2. Define and implement a method 'acquire' to register a new acquisition by a given user. The method

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It be designed under the Object Oriented Paradigm principles, that is,

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pursuing robust, reusable and adaptable software.

Notes:

- If needed, you can use any of the ADTs studied. Their code must not be provided.
- It is not needed to implement getters and setters.
- A main method or Test class is not needed.

Solution:

```
public class Content {

    public enum ContentType { APP, EBOOK, FILM, MUSIC};

    String title; //Name or title
    String supplier; //Supplier
    int age_rate; // Minimum age to be able to consume this content
    double price; //Price
    ContentType type; //The type of the content

    public Content(){
        title = "";
        supplier = "";
        age_rate=-1;
        price=-1;
        type = null;
    }

    public Content(String title, String supplier, int age, double price, ContentType
        type){

        this.title = title;
        this.supplier = supplier;
        this.age_rate=age;
        this.price=price;
        this.type = null;
    }

}

public class User {

    String email;// email
    String name; // Name
    String surname; // Surname
    String identification_number; // NIF in Spain
```

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```

public void acquire(Content content){
    if(content != null){
        collection.addFirst(content.title);
    }
}

}

public class SetOfUsers {

    DList<User> list_of_users;

    public SetOfUsers(){
        list_of_users = new DList<User>();
    }

    public DList<String> searchBuyers(String title){

        DList<String> result = new DList<String>();

        for(int i=0; i < list_of_users.getSize(); i++){
            User user = list_of_users.getAt(i);
            DList<String> user_contents = user.collection;
            if(user_contents != null){
                for(int j=0; j < user_contents.getSize(); j++){
                    String current_title = user_contents.getAt(j);
                    if(current_title.equals(title))
                        result.addFirst(user.surname);
                }
            }
        }
        return result;
    }
}
}

```



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PROBLEMA 2 (1 point)- Implementing a double ended queue.

Given the following classes:

```
public class DNode<E> {
    DNode<E> previousNode = null;
    DNode<E> nextNode = null;

    E elem;

    public DNode<E> getPreviousNode() {
        return previousNode;
    }

    public DNode<E> getNextNode() {
        return nextNode;
    }

    public E getElement() {
        return elem;
    }

    public void setElement(E e) {
        this.elem = e;
    }

    public DNode(E elem) {
        this.elem = elem;
    }
}

public class DQueue<E> implements IDQueue<E> {
    DNode<E> header;
    DNode<E> tailer;

    public DQueue() {
        header = new DNode<E>(null);
        tailer = new DNode<E>(null);
        header.nextNode = tailer;
        tailer.previousNode = header;
    }

    public boolean isEmpty() {
        return (header.nextNode == tailer);
    }
}
```

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```

public int size() {
    int size = 0;
    for (DNode<E> nodeIt = header.nextNode; nodeIt != tailer; nodeIt =
                                                nodeIt.nextNode) {
        ++size;
    }
    return size;
}

public void addFirst(E elem) {
    DNode<E> newNode = new DNode<E>(elem);
    newNode.nextNode = header.nextNode;
    newNode.previousNode = header;
    header.nextNode.previousNode = newNode;
    header.nextNode = newNode;
}

public E getLast() {
    if (isEmpty()) {
        System.out.println("DQueue: Queue is empty");
        return null;
    }
    return tailer.previousNode.getElement();
}

public E removeLast() {
    if (isEmpty()) {
        System.out.println("DQueue: Queue is empty");
        return null;
    }
    E e=getLast();
    tailer.previousNode = tailer.previousNode.previousNode;
    tailer.previousNode.nextNode = tailer;
    return e;
}

```



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