Theory ISW

Theory Evaluation

Retake

09-02-2024

3h 30 min

Norms:

- **Do not open the exam** until it is indicated by a lecturer in the classroom.
- Write your answers using the attached pages (no extra sheets will be given).
- Submission:
  - The student will identify him(her)self when delivering the exam answers.
  - The exam text and answers will be introduced in a box available.
  - The submission will be carried out in an orderly way. One student only will be delivering the exam at a time.

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Group: _____

Software Engineering

Informatics School

DSIC – UPV

Year 2023-2024

Time: 3 hours 30 minutes

Questions *(1,75 points)*

1. (1 *point*) In a software product that follows a closed layered architecture, what strategy would you follow for the communication between layers? Illustrate your answer with an example. What are the benefits of your solution (cite 2 at least)?

2. (*0,75 points*) Indicate (and explain briefly) at least 4 differences between agile and traditional methodologies.

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Problems *(8.25 points)*

(4 points) Obtain the UML class diagram (2 points) and the use cases model (context and structured diagrams) (2 points) for the following system. *(Class diagram: give name to all relationships, do not define class methods nor attribute types).*

The company IIProjects dedicated to industrial engineering projects has asked ISWSoft the development of a web application for the management of project offers for their customers. IISProjects is specialized in several engineering areas such as the treatment of surfaces (industrial painting), thermal protection, radiologic protection, etc. For all these areas, the offers coordination department is in charge of managing project offers. This department has salespeople who are specialized in each one of the areas and who prepare offers to potential customers. One of the salespeople acts as a director of offers coordination who is in charge of giving the final authorization to an offer. For the projects, the department has technicians specialized in the different areas and, in the same way, one of them plays the role of director. All of them are registered with their dni, name, address and years of experience. For salespeople the system also records the assigned geographic area and for technicians the system records their area of expertise.

A company (potential customer), using the web application, may register itself with its name, address, phone number and may request the services of several engineering areas. For each request made in an area, a service request is generated and it is stored in the system with a date and a description. Given the services requests, that may be consulted by salespeople at any moment, the offers are generated. For a given service request a salesperson will generate an offer, the salesperson becomes then the responsible person for the offer. The offer may be created when the service request is consulted (if the salesperson wants to do it) or at any other moment. The offer is for a concrete service of an area and the offer will contain the products to be used (name, description and cost for each product), the total cost and the VAT cost. All offers must be approved by the director of offers coordination. To ease this task, at the end of the day, the system must send a notification to the director of offers coordination with the set of new recorded offers (pending approval). In any case, the director may consult all the offers at any moment. When an offer is approved, the salesperson will arrange a meeting with the company (customer). The meeting is recorded in the system in the agenda of the department with a date and a time. Each salesperson will have a partial view of the agenda with his/her meetings with companies and he/she will be able to update the agenda when needed.

When the director of coordination reviews an offer, an evaluation must always be emitted, approving, rejecting or leaving it in state “under review” so that the offer is updated considering the additional comments provided by the director. Each salesperson must consult everyday his/her offers so that he/she may modify those that are in “under review” state. If an offer is not approved a meeting may not be arranged with the company.

The company (potential customer) may consult its services requests. When the salesperson visits the company, the customer may accept or reject the offer presented in the meeting. If the offer is accepted the salesperson will generate a project associated to the offer with an Id, starting date and total cost. The director of offers coordination assigns to the project created a set of participant technicians and a responsible technician. The company (customer) may consult the requests made, the offer made for each service request and the projects (if they have been created).

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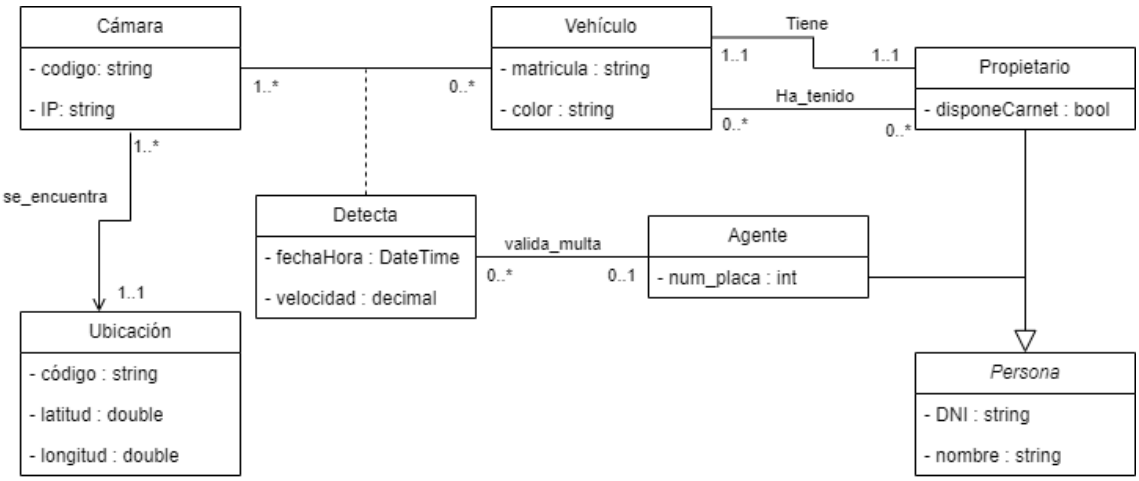
3. *(2.25 points)* Given the following class diagram



Hint: Persona is an abstract class and there is a navigation restriction between Cámara and Ubicación.

a) *(1 point)* Obtain the C# design following the design guidelines (do not indicate class methods).

b) *(0.5 points)* Obtain the C# design for all parameter-based constructors (only the header, do not implement them, do not define the constructors without parameters).

c) *(0.75 points)* Using the constructors from the previous question, implement the necessary code to create an object of each class. The objects must conform to the given class diagram model.

4. (*1.25 points*) Obtain the test cases for the following code fragment using the basic path testing technique. Draw the flow graph, calculate the cyclomatic complexity, obtain the independent paths and the associated test cases.

The method `SelectJoke` belongs to class `Elf`, that among others has the following attributes:

- `MAX_CHILD`: max age of the jokes of the elf.
- `jokes`: a list of `Joke` objects that is always initialized.

The method `Next`(maxValue) of the `Random` class gives a random number that is positive and less than MaxValue.

To design the test cases, you may consider that for a MAX_CHILD value of 17, a valid Joke would be {description: “Wrapping the stair rail with toilet paper”, age:8}

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```
public Joke SelectJoke(int childAge)
        {
             if (jokes.Count == 0)
                throw new InvalidOperationException("No jokes
available.");

            if (childAge <= 0 || childAge > MAX_CHILD)
                throw new ArgumentOutOfRangeException("Incorrect
child age.");

            Joke selectedJoke = null;
            bool selected = false;
            Random rnd = new Random();
            int jokePos;
            while (!selected)
            {
                jokePos = rnd.Next(jokes.Count);
                selectedJoke = jokes.ElementAt(jokePos);
                selected = true;
                jokes.Remove(selectedJoke);
            }
            return selectedJoke;
        }
```

5. *(0.75 points*) Apply the black box equivalence partition technique to obtain a table with the numbered equivalence classes. The table must have the following four columns: input considered, valid classes, invalid classes, applied heuristic. In addition, indicate **the number of valid and invalid test cases** that would be obtained but **DO NOT write the tests**.

A module must be tested that searches contents uploaded to the platform UPVTube. The module will filter contents according to several search criteria:

- Owner`s Nick: a string with maximum size 8 that may contain characters and digits.
- Upload date: a date before or equal to the current date with format DD/MM/YYYY.
- Subscriptors' score: string that represents a numeric value between 1 and 5.

The module returns a list with the contents IDs that conform to the search criteria: owner, date equal or after the given date and score equal or greater than the given score. None of the given criteria may be empty. The module returns the following value:

- S1: Number of contents found
- S2: The Nick format is incorrect
- S3: The Nick does not correspond to any member
- S4: Inexistent date of format incorrect
- S5: The upload date must be equal or before the current date
- S6: The score must be a number beween 1 and 5

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