Textbook Assignment 5

1. List and describe at high level the steps involved in the software requirements engineering process.

- Elicitation: collecting the requirements of a system from users, customers, and other stakeholders. The requirements analyst must probe and understand the business rationale and justification for the software or the software project.
- Analysis: after the elicitation, we analyze the requirements.

  The 2 main tasks that the analysis made of are
  - Documentation and definition. This is an activity that comes after or overlapping with the requirements analysis. It should be looked at as a set of iterative activities within the broader context of analysis. Definition includes formally spelling out the requirements.
  - Categorizing or clustering the requirements and prioritizing them. It enables us to identify inconsistencies across groups of requirements and possible incompleteness in requirements
- Prototyping: creating prototypes of software applications. It typically simulates only a few aspects of the final product and may be completely different from it.
- Specification: after analyzing and reviewing the requirements, we should put them into a requirements specification document. The more complex the requirements, the more we need to specify them formally and completely.
- Review and validation: reviewing the requirements with the users and customers is an important part of the requirements analysis and prototyping.

- Agreement and acceptance: this activity closes the requirements phase and provides a formal baseline for the requirements specifications. This agreement may be formal or informal.

2. What are the three main items that must be planned prior to conducting requirements engineering? Why these three items are important for requirements engineering?

- Process (for requirements engineering) to be used: this is important because users and customers need to be involved because requirements represent their needs and desires. Management must also be involved because resources are required to perform the activities.
- Resources needed: The management from both the users' side and the software development side must be willing to commit the resources.
- Schedule for completing the requirements activities: schedule for the requirements engineering activities must be reviewed and agreed on by all the participants. There have been situations where prototype development, reviews, and changes to the user-interface requirement alone have taken such a significant portion of the software development resources and schedule that the project was doomed for a later schedule crunch and cost overrun.

3. What are the six main dimensions of requirements that you need to address when eliciting requirements? Briefly explain each dimension. Use your team project as example, give an example requirement for each dimension.

a. Business flow: how and in which order tasks take place. Makes sure the business goals are attained and customers are served. In our team project: users registering and then uploading their music collections.
b. Data, formats, and information needs: must be gathered with great attention to detail. One of the focuses of this category is what will the system take as input, and why, and produce as output. In our team project, we will first gather the user data and then the data of the music collections they own.
c. Other constraints such as performance, reliability, and security: integrates all the other groups and displays the essential non-functional requirements to the system. In our team project, privacy of the users who choose to have a private account.
d. User interfaces: nowadays mostly GUIs. However, different options should be taken into consideration depending on the customer's needs. In our team project, a search bar in which users can put keywords to search for music and profiles that have that collection.
e. Systems with other interfaces: internal (back end) interfaces, how different parts of the program interacts with itself. These interfaces must be addresses and pointed out with simplicity and great clarity. In our team project, how the system takes the keywords input from the search bar and then eventually returns the results with the matching keywords.
f. Individual functionality: the customers are asked about their problems so that each function will be created with the right functionality. In our team project, how to add a music collection, how to update one, how to delete one. Basically serve as a music collection library.

4. List four items that are included in the description of a high-level business profile. Explain each item.

- Opportunity and needs: state what high-level problems the software suppliers have been brought in to address. This is usually a business-oriented problem.
- Justification: the solution and cost need to be justified. To do that there must be some type of business payback.

- Scope: The customer may state that the inventory and customer orders are the two top problems that need to be solved as soon as possible. These statements establish the limits and scope of the software project
- Major constraints: One of the major constraints is likely to be the allotted budget for the software project. Major constraints are something a requirements analyst must understand clearly. Another major business constraint is the schedule.

5. List and describe three items that you will need to consider when prioritizing requirements. Explain why these items and their priority order are important in prioritizing requirements.

a. Current customer demands: This is what the engineers will need to fulfill at the moment.
b. Immediate sales advantage: companies will need to make profit to reinvest in the project.
c. Future customer needs: we need to be able to forecast what the future customers will need done and do it.

6. What is viewpoint-oriented requirements definition method used for? Explain your answer.

Viewpoint-oriented requirements definition (VORD) is a requirement analysis method based on the understanding that requirements are not viewed the same by all the different stakeholders. It is also both a requirements elicitation and a requirements analysis methodology.

The Viewpoint Oriented Requirements Definition (VORD) method is used in requirement analysis process and V to identify the different user classes and their viewpoints.

Objectives of Viewpoint Oriented Requirement

- Explain the notion of viewpoints in requirement engineering.
- Explain the notion of viewpoints in structured analysis.
- Introduce new approaches in requirement engineering.

7. Consider the situation where you have the following four requirements for an employee information system:

    a. R1: Response time for short queries must be less that 1 second.

    b. R2: In defining an employee record, the user must be able to enter the employee name and be prompted for all the remaining employee attributes that are needed for the employ record.

    c. R3: Employee information may be searched using either the employee number or the employee's last name.

    d. R4: Only an authorised search (by the employee, manager of his or her chain of command, or human resource department personnel) will show employee salary, benefits, and family information.

    Perform an analytical hierarchy process and rank these based on your choices. Explain your analysis approach and result and ranking.

Objective - Employee information system.

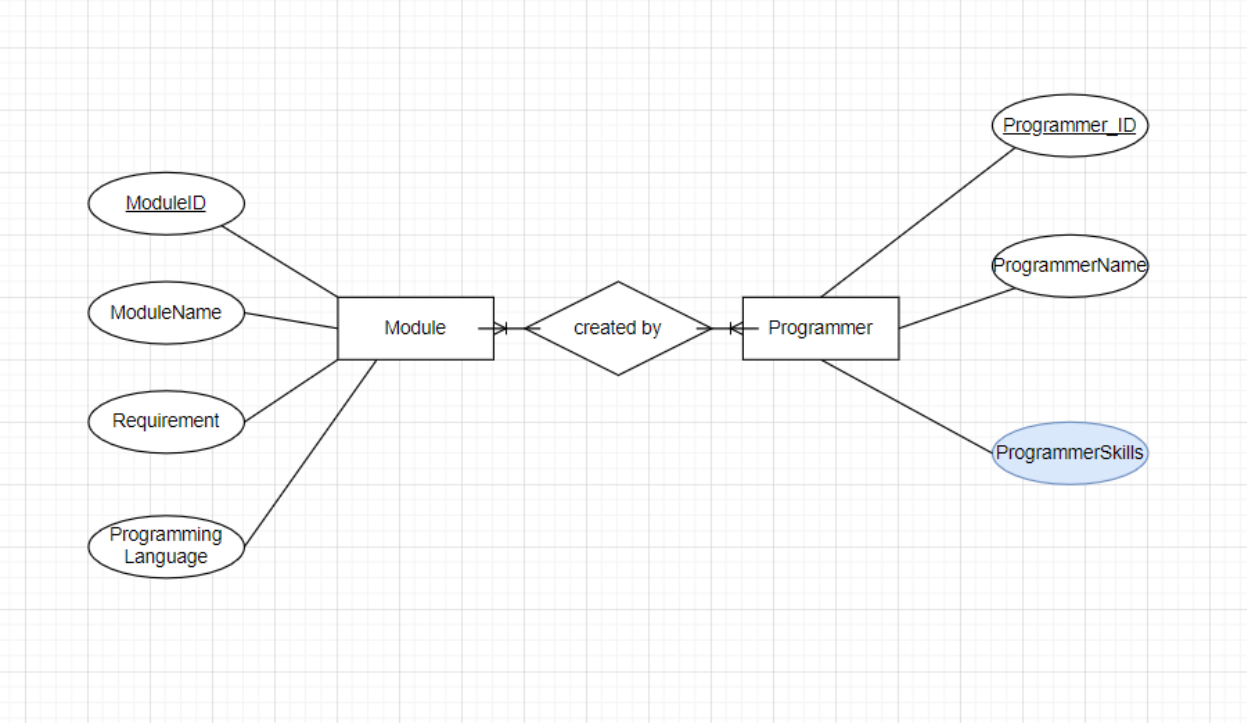
We need to set our criteria based on our requirements. This case is subjective and will change. In my point of view, the highest priority the security of the system rather than its speed.

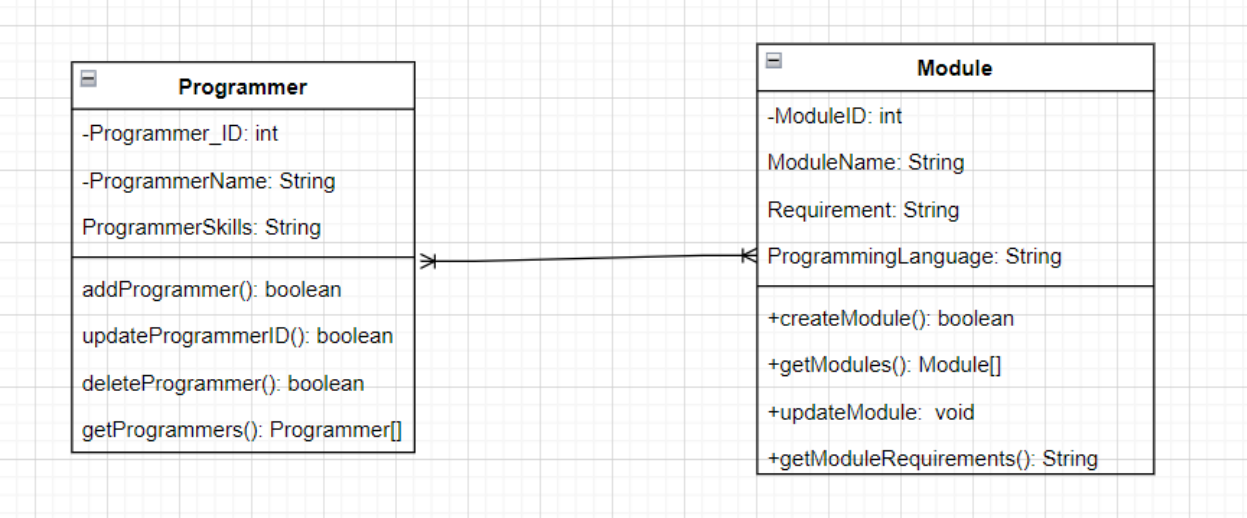
	Req 1	Req2	Req3	Req4
Security	1	4	1	9
Speed	9	1	1	1
Search	1	4	9	7

Ranks:

1- Only an authorised search (by the employee, manager of his or her chain of command, or human resource department personnel) will show employee salary, benefits, and family information.
2- Response time for short queries must be less that 1 second.
3- Employee information may be searched using either the employee number or the employee's last name.
4- In defining an employee record, the user must be able to enter the employee name and be prompted for all the remaining employee attributes that are needed for the employ record

8. Draw an ER diagram and a UML class diagram to show the relationship between programmers and modules where a programmer may write several modules and each module may also be written by several programmers.





9. What are the four types of requirements traceability? Explain each type.

1- Backward from traceability: Links the requirement to the document source or the person who created it.

2- Forward from traceability: Links the requirement to design and implementation.

3- Backward to traceability: Links design and implementation back to the requirements.

4- Forward to traceability: Links documents preceding the requirements to the requirements

10. In Agile methodologies, there is no formally documented requirements. Describe 3 advantages and 3 disadvantages of doing this.

Advantages:

1. The development process can start with minimum requirements from the customer which leads to early development of the software.

2. When requirements are added after the starting phase, the development team becomes familiar with the reason the new requirements were added by getting the complete idea of the requirements.

3. It makes the requirements traceability process more flexible; the team can add new requirement at any point of development.

Disadvantages:

1- The project timeline estimation might fail because the team does not know all the requirements.
2- The development team might develop an implementation that is not needed by customer and vice-versa (the development team does not develop an implementation needed by the customers).
3- In later phases, some requirements may be implemented incorrectly leading to re-writing, modifying, and changing the functionalities of the code because of the lack of formal documentation of the requirements.

11. During analysis of requirements, we often have to categorize and then prioritize items. Why we would need to do these activities.

Categorizing and clustering is very useful as it helps us identify inconsistencies across groups of requirements and possible incompleteness in requirements. Some requirements may not be developed because of limited resources, limited time, or limited technical capabilities.

Prioritizing the requirements is needed so that the higher priority ones are developed and released to the customers first.

12. What purpose does the final signing off of the requirements specification document serve? What are the potential problems that may arise if there is no such process?

The purpose is to close the requirements phase and provides a formal baseline for the requirements specifications and to control or closely monitor future changes. The potential problems: Uncontrolled requirements changes represent a major problem and are a critical cause for many software project failures

13. Consider the UNB Course Registration system. “Student” is one of the actors of the system, and you as an instance of Student actor.

a) Identify 3 or more use cases of the Course Registration system which Student actor uses. For each identified use case, write its use-case specification, based on your experience of using the use case.

b) Identify 5 or more data or entities used in the Course Registration system. For each identified entity, give a name and 3 or more attributes. Draw a UML class diagram to show relationships between the entities, give a name to each relationship. Note that you can use RSAD to draw the diagram and copy/paste it to your answer file.

c) Assume that the UNB Course Registration system was developed by UNB ITS by the request of UNB Management. Also assume that there are following stakeholders of the UNB Course Registration system:

- UNB Management
- UNB ITS
- UNB Student
- UNB Registrar Office Staff
- UNB Professor

For each of the above stakeholders, give your priority ranking for the following 5 quality attributes as non-functional requirements for the Course Registration system. Justify your ranking for each stakeholder.

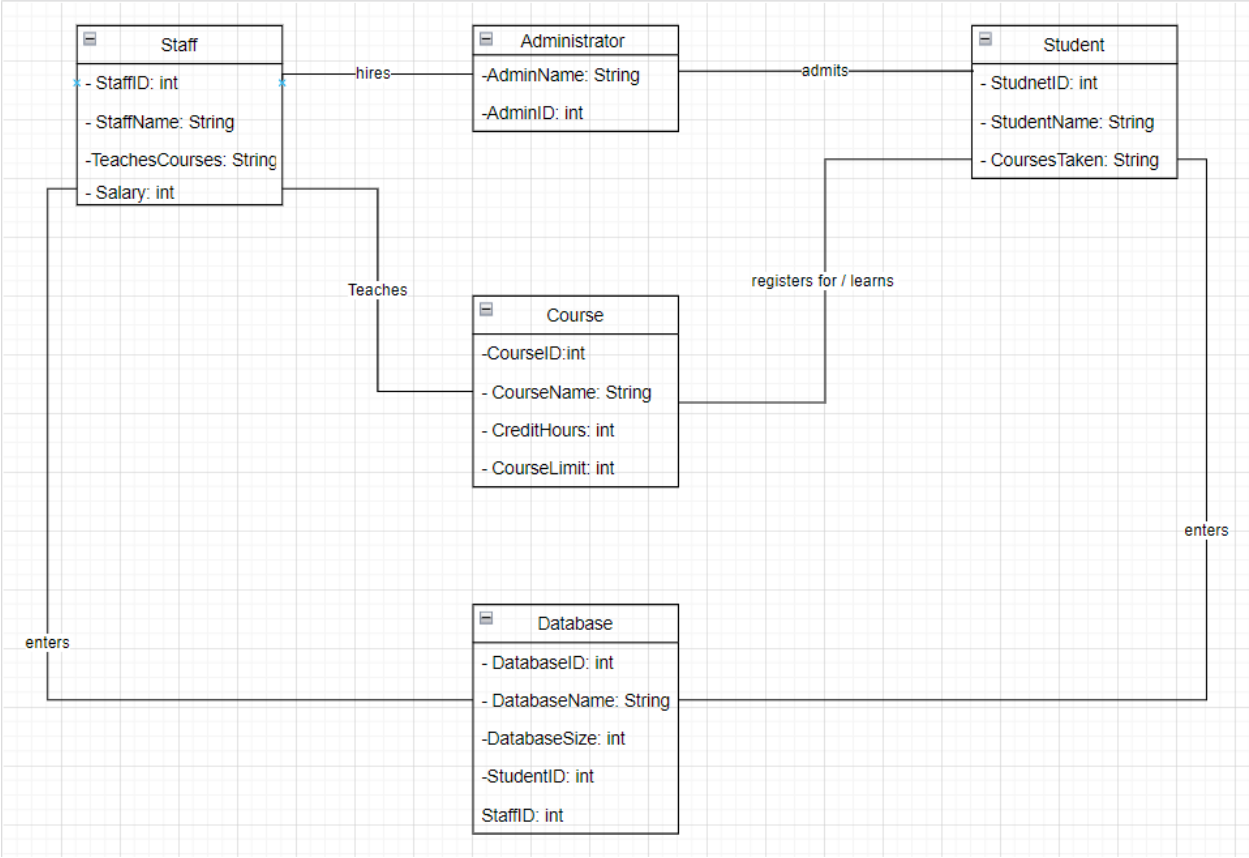
- Availability/Reliability
- Modifiability

- Performance
- Security and privacy
- Usability

a.

1. register_for_Course: The student could register for the required courses using the Student ID and name.
2. drop_course: The student withdraws from a course if the student is not interested.
3. search_for_courses: The student can search for courses for various purposes ranging from registration to curiosity.

b. Student
Administration
Staff (including professors)
Course
Database



c. 1. UNB Management: Since they are the headmasters of the idea of the course system, they have access to the modifiability, security and privacy, and performance.
2. UNB ITS: They only helped in the creation of the system using their technical skills, they have access to security and privacy, performance, and availability / reliability. They have access to availability / reliability to ensure that there are no errors within the system to make the user experience as seamless and smooth as possible.
3. UNB Registrar Office Staff: They appoint other staff members and students, so they have access to security and privacy and usability.
4. UNB Staff: They only need access to the usability.
5. UNB Students: They also only need access to the usability.