National University of Computer & Emerging Sciences, Karachi Fall-2019 CS-Department Mid-Term 01 25 February 2020 Course Code: CS-303 Course Name: Software Engineering Instructor Name / Names: Student Roll No: Section No: Max Marks:25 Time Limit: 1 Hour

Question#01: a) List functional and Non-Functional Requirements of the given project scenario.
Scenario:
The problem is that currently there are no applications dedicated to students in universities. Students want to participate in university courses and see announcements in these courses, but have this information spread out on multiple websites, which are hard to find. They want to find fellow students with the same interests and share their opinion about courses and course material, however this is not possible yet. They also want to discuss exam questions and find the right place where the exam takes place without searching on Google. The required app has to be developed in java. Arjun, an incoming student from India, is studying computer science at TUM. He has business administration as minor subject and is already used to visit the courses in the computer science building. The business administration courses however, are located in a lecture hall in another building in the city center of Munich. He never visited the other building before, so he does not know how to find the lecture halls for his minor subject. He browses through the courses in the course catalog of the University App and finds the course "Foundations of Business Administration" with course times and the location of the lecture hall on a map. While he is attending the course, he makes contact with fellow students who also attend the course and reads their comments. He requests friendship with Jenny and adds a new comment about exam questions from earlier exams. While he is browsing, Jenny is notified about the friend request and accepts it. Arjun, in turn, is notified that Jenny has accepted his request and now browses through all the courses that Jenny is visiting.

Functional Requirements:

1. **Course Information: The application should display course information, including course times and locations, for all university courses.**
2. **Announcements: The application should display announcements from professors and administrators for each course.**
3. **Student Communication: The application should allow students to communicate with each other regarding courses and course material.**
4. **Exam Information: The application should provide information about the location of exams and directions to the exam location.**
5. **User Registration: The application should allow users to create an account and login to access their course information and communicate with other students.**
6. **Search Functionality: The application should allow users to search for specific courses or announcements.**

Non-Functional Requirements:

1. **User Interface: The application should have a user-friendly interface that is easy to navigate.**
2. **Security: The application should be secure and protect user information and communications.**
3. **Performance: The application should have fast load times and be responsive to user inputs.**
4. **Compatibility: The application should be compatible with all major platforms and devices.**
5. **Scalability: The application should be designed to handle a large number of users and course information.**
6. **Accessibility: The application should be accessible to users with disabilities.**

b) How can developers make sure that a software's non-functional requirements are verifiable? Give example using any non-functional requirement

Non-functional testing is done to verify the non-functional requirements of the application like Performance, Usability, etc. It verifies if the behavior of the system is as per the requirement or not.

Non Functional Requirements Examples

- **Each page must load within 2 seconds.**
- **The process must finish within 3 hours so data is available by 8 a.m. local time after an overnight update.**

Question#02: 2.5+2.5 a) Let's say there is a solution company that basically expert in developing a particular HR management system in big retailers. So let's say company X need to develop a well-known HR management system for a big retailers headquarter. And they have done this kind of project many times before. So the question is, which process model would be best suited in this situation? Justify your answer by citing characteristics of the process model you think is best suited.

b) Draw diagram for V-Model and using the diagram as reference, clearly explain how each quality assurance activity relates to each development activity.

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  Development Phase
  (Requirements, Design, Implementation, Integration)

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Quality Assurance Phase
 (Verification, Testing, Validation, Acceptance)
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Question#03: 5 a) show how given below scenario might be portrayed in WBS format.
Scenario:
Suppose you and your friends is planning a camping trip there are some activities you need to address for a successful trip. Firstly, you need to prepare a camping site so that it's got protected from animal visit and rainy stormy weather and also protection from criminal's activities, after that arrangement for supplies and equipment to provide necessary medical first aid and food items for survival. Make sure you camp should be mosquito free, now it time to pack your suitcase and list down all the necessary work packages.

Work Breakdown Structure (WBS) for the Camping Trip:

Camping Site Preparation
1.1 Secure the Campsite
1.1.1 Set up perimeter fencing
1.1.2 Install CCTV cameras for security
1.1.3 Install alarms for early warning
1.2 Protect from Weather
1.2.1 Choose a location with natural protection
1.2.2 Pitch tents in a sheltered area
1.2.3 Set up tarpaulins or shelters
1.3 Mosquito Control
1.3.1 Set up mosquito nets around tents
1.3.2 Use insect repellent

1. **1.3.3 Burn mosquito coils or citronella candles**

Supplies and Equipment
2.1 Food and Water
2.1.1 Plan and prepare menu
2.1.2 Purchase food items
2.1.3 Purchase and transport water
2.2 Medical Supplies
2.2.1 Prepare first aid kit
2.2.2 Purchase necessary medical supplies
2.2.3 Arrange for transportation of medical supplies
2.3 Camping Gear
2.3.1 Prepare list of required gear
2.3.2 Rent or purchase gear

2. **2.3.3 Transport gear to the campsite**

Packing and Preparation
3.1 Suitcase Packing
3.1.1 Prepare packing list
3.1.2 Pack personal items
3.1.3 Ensure all necessary items are included
3.2 Work Packages
3.2.1 Create a list of work packages
3.2.2 Assign tasks to individuals

3. **3.2.3 Ensure everyone is aware of their responsibilities**

By breaking down the project into smaller, more manageable tasks, the WBS helps to ensure that all aspects of the camping trip are addressed and nothing is overlooked.

Question#04: 5+5 a) With the help of “The Scrum Sprint Cycle” describe what is sprint, types of backlogs and type of meetings that’s the ritual of Scrum.

The Scrum Sprint Cycle is a framework used in agile software development. It involves a series of time-boxed iterations called sprints, which are typically two to four weeks

long. Each sprint cycle consists of several rituals, including Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective. The Scrum Sprint Cycle can be broken down into the following stages:

1. Sprint Planning: This is the first stage of the Scrum Sprint Cycle. The team meets to discuss and plan the work that will be done in the upcoming sprint. The team decides on the goals for the sprint and identifies the product backlog items that will be worked on.
2. Sprint Backlog: Once the team has identified the items that will be worked on during the sprint, they create a Sprint Backlog. The Sprint Backlog is a prioritized list of items that will be worked on during the sprint.
3. Daily Scrum: This is a daily meeting where the team comes together to discuss the progress of the work. The Daily Scrum is time-boxed to 15 minutes, and each team member answers three questions: what they worked on yesterday, what they plan to work on today, and if there are any impediments that are preventing them from making progress.
4. Sprint Execution: This is the stage where the team works on the items in the Sprint Backlog. The team members collaborate to complete the work and ensure that the sprint goals are met.
5. Sprint Review: At the end of each sprint, the team holds a Sprint Review meeting. During this meeting, the team presents the work that was completed during the sprint to stakeholders and receives feedback.
6. Sprint Retrospective: This is the final stage of the Scrum Sprint Cycle. During the Sprint Retrospective, the team reflects on the sprint and identifies ways to improve their process in the next sprint.

There are two types of backlogs in Scrum:

1. Product Backlog: The Product Backlog is a prioritized list of features, enhancements, and bug fixes that need to be addressed. The Product Owner is responsible for maintaining the Product Backlog, and the team pulls items from the backlog to work on during sprints.
2. Sprint Backlog: The Sprint Backlog is a list of items that the team commits to completing during a sprint. The Sprint Backlog is created during the Sprint Planning meeting and is owned by the Development Team.

There are three types of meetings that are part of the Scrum framework:

1. **Sprint Planning: The Sprint Planning meeting is held at the beginning of each sprint. During this meeting, the team decides on the goals for the sprint and identifies the Product Backlog items that will be worked on.**
2. **Daily Scrum: The Daily Scrum is a daily meeting that lasts for 15 minutes. During this meeting, the team members discuss their progress and any impediments that are preventing them from making progress.**
3. **Sprint Review: The Sprint Review is held at the end of each sprint. During this meeting, the team presents the work that was completed during the sprint to stakeholders and receives feedback.**

b) State Agile principles and describe how XP support these principles?

The Agile Manifesto outlines four values and twelve principles that serve as a guide for Agile software development. The four values are:

1. **Individuals and interactions over processes and tools.**
2. **Working software over comprehensive documentation.**
3. **Customer collaboration over contract negotiation.**
4. **Responding to change over following a plan.**

Extreme Programming (XP) is an Agile software development methodology that supports these principles by providing a set of practices for software development. Here are some ways XP supports the Agile principles:

1. **Individuals and interactions over processes and tools: XP emphasizes teamwork and communication through pair programming, where two developers work together on the same codebase, and continuous integration, where all team members integrate their code multiple times a day.**
2. **Working software over comprehensive documentation: XP values working software that meets the customer's needs over exhaustive documentation. The practice of Test-Driven Development (TDD) is used to ensure the code meets the acceptance criteria, reducing the need for comprehensive documentation.**
3. **Customer collaboration over contract negotiation: XP encourages continuous customer involvement through frequent releases and constant feedback. XP**

teams involve the customer in the development process by including them in planning meetings and product demonstrations.

4. Responding to change over following a plan: XP recognizes that requirements change over time, and the methodology is designed to support changing requirements. XP practices like Continuous Integration and Continuous Delivery help the team to respond quickly to changes in requirements and feedback from the customer.

In summary, XP supports the Agile principles by providing a set of practices that prioritize working software, customer collaboration, and responding to change. It values individuals and interactions over processes and tools and emphasizes continuous communication and teamwork.