

What is software requirement engineering, and why is it important in software development?  
What is the difference between functional and non-functional requirements? Give examples.  
What are the main steps in the requirements engineering process?  
What techniques are used for eliciting requirements from stakeholders?  
How do you ensure that requirements are complete and unambiguous?  
What is a requirement specification document, and what are its key components?  
What is the role of a stakeholder in the requirement engineering process?  
How do you prioritize requirements, and why is prioritization necessary?  
What is requirements traceability, and why is it important?  
How can requirements change during the project, and how should these changes be managed?  
What is the difference between a use case and a user story? Provide examples of each.  
What are common challenges in requirement engineering, and how can they be addressed?  
How do you validate and verify software requirements?  
What is prototyping, and how does it help in requirement engineering?  
What are some tools commonly used for requirement management?  
What is a feasibility study, and what are its components in the context of requirement engineering?  
What role do diagrams (like UML diagrams) play in requirement engineering?  
How do you deal with conflicting requirements from different stakeholders?  
What is an agile approach to requirement engineering, and how does it differ from traditional methods?  
What are quality attributes of good requirements, and how can you measure them?

**1. What is software requirement engineering, and why is it important in software development?**

- **Answer:** Software requirement engineering is the process of gathering, analyzing, documenting, and managing the needs and specifications of a software system. It is important because it ensures that the final product meets the needs of the stakeholders and functions as intended. Proper requirement engineering helps avoid misunderstandings and reduces the risk of costly changes later in development.

**2. What is the difference between functional and non-functional requirements? Give examples.**

- **Answer:**
  - **Functional Requirements:** Describe what the system should do. They specify the functions or features that the system must provide. *Example:* "The system should allow users to log in using a username and password."
  - **Non-Functional Requirements:** Describe how the system performs a function. They are related to the system's quality attributes like performance, security,

and usability. *Example:* "The system should load the login page within two seconds."

### 3. What are the main steps in the requirements engineering process?

- **Answer:** The main steps include:
  1. **Requirement Elicitation:** Gathering requirements from stakeholders.
  2. **Requirement Analysis:** Evaluating and prioritizing requirements.
  3. **Requirement Specification:** Documenting the requirements clearly and precisely.
  4. **Requirement Validation:** Checking if the requirements are correct and meet stakeholder needs.
  5. **Requirement Management:** Handling changes to the requirements over time.

### 4. What techniques are used for eliciting requirements from stakeholders?

- **Answer:** Common techniques include:
  - **Interviews:** Talking to stakeholders to understand their needs.
  - **Surveys/Questionnaires:** Distributing questions to gather feedback from a larger audience.
  - **Workshops:** Conducting sessions where stakeholders and developers collaborate.
  - **Observation:** Watching how users interact with existing systems.
  - **Prototyping:** Creating models of the system to help users visualize features.
  - **Document Analysis:** Reviewing existing documentation for relevant information.

### 5. How do you ensure that requirements are complete and unambiguous?

- **Answer:** To ensure requirements are complete and unambiguous:
  - Use clear, simple, and precise language.
  - Avoid jargon unless necessary and define any technical terms used.
  - Include all necessary information, such as inputs, outputs, and system behavior.
  - Use diagrams or models to complement textual descriptions.
  - Review the requirements with stakeholders for feedback and understanding.

### 6. What is a requirement specification document, and what are its key components?

- **Answer:** A requirement specification document describes what the software should do and outlines the system's features. Key components include:
  - **Introduction:** Purpose and scope of the document.
  - **System Overview:** General description of the system.
  - **Functional Requirements:** Detailed features the system must have.
  - **Non-Functional Requirements:** Performance, security, and usability criteria.

- **Use Cases or User Stories:** Scenarios describing how users interact with the system.
- **Assumptions and Constraints:** Limitations and assumptions made during development.

## **CASE-STUDY SCENARIO**

### **Case Study 1: Online Bookstore**

**Description:** An online bookstore wants to allow customers to search for books, read reviews, make purchases, and track orders. The bookstore also wants a feature to recommend books based on users' past purchases.

#### **Questions and Answers:**

**Identify three functional requirements for the online bookstore.**

#### **Answer:**

**Users should be able to search for books by title, author, or genre.**

**Users should be able to add books to a shopping cart and make secure online payments.**

**Users should be able to track the status of their orders through a user dashboard.**

**What is a non-functional requirement for the bookstore's payment system?**

**Answer:** The payment system should process transactions securely and complete them within 3 seconds.

**What technique would you use to elicit requirements for the book recommendation feature, and why?**

**Answer:** I would use interviews with frequent users to understand their preferences and expectations, as well as prototyping to give them a visual idea of the recommendation feature and gather their feedback.

### **Case Study 2: Hospital Management System**

**Description:** A hospital management system is being developed to manage patient records, doctor appointments, and billing. The system should also generate reports on patient visits and treatment histories.

**Questions and Answers:**

List two functional requirements for managing patient records.

**Answer:**

The system should allow authorized staff to create, update, and delete patient records.

The system should automatically generate treatment history reports for patients.

What non-functional requirement is important for the security of patient data?

**Answer:** The system should encrypt all patient data to ensure data privacy and meet healthcare compliance standards.

How would you resolve a conflict if doctors want a feature that nurses think will complicate their workflow?

**Answer:** I would hold a stakeholder meeting to discuss both sides, find common ground, and possibly develop a compromise or solution that meets the needs of both parties while keeping the system efficient.

**Case Study 3: Smart Home System**

**Description:** A company is designing a smart home system that controls lighting, heating, and security through a mobile app. The system should also support voice commands for hands-free control.

**Questions and Answers:**

What is a key functional requirement for the mobile app?

**Answer:** The app should allow users to turn lights on and off, adjust the thermostat, and arm or disarm the security system.

What non-functional requirement is crucial for the voice command feature?

**Answer:** The voice command feature should recognize and process voice inputs with an accuracy rate of at least 95% under normal conditions.

Which requirement elicitation technique would be effective for understanding user preferences for the app interface?

**Answer:** User surveys would be effective for gathering a wide range of preferences, while prototyping would help visualize and refine the interface based on user feedback.

**Case Study 4: E-Learning Platform**

**Description:** An e-learning platform is being built to offer video courses, quizzes, and a discussion forum. The platform should allow students to track their progress and receive certificates upon course completion.

**Questions and Answers:**

What are two functional requirements related to course tracking?

**Answer:**

The platform should keep a record of completed lessons and quizzes for each student.

The platform should automatically generate certificates for students who complete a course.

Mention one non-functional requirement for video playback.

**Answer:** Video playback should work smoothly with minimal buffering, even on a moderate internet connection.

How would you handle a situation where teachers want more interactive features, but developers are concerned about implementation time?

**Answer:** I would conduct a feasibility study to analyze the impact of adding interactive features on project timelines and discuss options for phased implementation to balance teachers' needs and developers' concerns.

#### **Case Study 5: Banking System**

**Description:** A bank wants a new system to manage customer accounts, handle online transactions, and generate financial reports. The system must also alert customers of suspicious activities on their accounts.

**Questions and Answers:**

List two functional requirements for handling online transactions.

**Answer:**

The system should allow customers to transfer funds between accounts securely.

The system should log all transaction details and provide a summary report to the customer.

What non-functional requirement is critical for alert notifications?

**Answer:** Alerts should be delivered to customers within 30 seconds of detecting suspicious activity.

What requirement validation technique would you use to ensure the system meets security standards?

**Answer:** I would use security audits and penetration testing to validate that the system complies with security standards and protects customer data.

#### **Case Study 6: Fitness Tracking App**

**Description:** A fitness app tracks users' activities, like running and cycling, and provides insights such as calories burned, average speed, and heart rate monitoring. The app should also allow users to set goals and join fitness challenges.

**Questions:**

Identify three functional requirements for the app.

What non-functional requirement is necessary for heart rate monitoring?

What elicitation technique would be useful for understanding how to motivate users to join challenges?

**Case Study 7: Online Grocery Store**

**Description:** An online grocery store wants to allow users to shop for groceries, schedule delivery times, and track the delivery in real-time. The system should also notify users when products they often buy are on sale.

**Questions:**

List two functional requirements for the delivery scheduling feature.

Mention a non-functional requirement for real-time delivery tracking.

How would you validate that the notifications feature is not annoying to users?

**Case Study 8: Event Management System**

**Description:** An event management platform helps users plan and manage events by sending invitations, tracking RSVPs, and providing seating arrangements. The system should also handle payments for ticketed events.

**Questions:**

What are three functional requirements related to event invitations?

What non-functional requirement is essential for the payment feature?

How would you gather requirements for the seating arrangement module?

**Case Study 9: Weather Forecasting App**

**Description:** A weather forecasting app provides real-time updates, forecasts for the week, and severe weather alerts. The app should also display weather maps and offer customization options for notifications.

**Questions:**

What functional requirement is important for severe weather alerts?

What non-functional requirement relates to the accuracy of weather data?

What technique would you use to understand user preferences for notification customization?

**Case Study 10: Hotel Booking System**

**Description:** A hotel booking system allows guests to search for available rooms, make reservations, and check in online. The system should also manage special requests, like early check-in or room upgrades.

**Questions:**

Name two functional requirements for the reservation feature.

What non-functional requirement is important for online check-in?

How would you resolve a conflict between the hotel management and housekeeping staff about room availability updates?

**Case Study 11: Digital Library**

**Description:** A digital library offers access to e-books, audiobooks, and research papers. Users should be able to bookmark pages, leave notes, and create personal reading lists.

**Questions:**

What are three functional requirements for managing personal reading lists?

What non-functional requirement should be considered for e-book loading speed?

How would you validate that the bookmarking feature works as expected?

**Case Study 12: Ride-Sharing App**

**Description:** A ride-sharing app connects drivers and passengers. It should provide features like booking a ride, fare estimation, real-time tracking, and in-app payments.

**Questions:**

Identify two functional requirements for booking a ride.

What non-functional requirement is important for fare estimation accuracy?

How would you gather feedback on the user experience of the ride-tracking feature?

**Case Study 13: Language Learning App**

**Description:** A language learning app offers interactive lessons, quizzes, and pronunciation practice. It should also provide progress reports and let users compete with friends on a leaderboard.

**Questions:**

What is a functional requirement for pronunciation practice?

What non-functional requirement affects the responsiveness of interactive lessons?

Which elicitation method would you use to design the leaderboard feature?

**Case Study 14: Online Banking System**

**Description:** An online banking system allows users to view account balances, transfer money, pay bills, and apply for loans. The system should also provide robust security features, like two-factor authentication.

**Questions:**

List two functional requirements related to money transfers.

What non-functional requirement is crucial for account balance updates?

How would you ensure that the two-factor authentication feature is secure and user-friendly?

**Case Study 15: Food Delivery App**

**Description:** A food delivery app enables users to order food from nearby restaurants, track the delivery status, and provide feedback. The app should also support different payment methods and offer promotional discounts.

**Questions:**

What functional requirement is necessary for tracking delivery status?

What non-functional requirement should be met for payment processing?

How would you collect requirements for the promotional discount feature?

**Case Study 16: Movie Streaming Platform**

**Description:** A movie streaming platform offers movies and TV shows on demand. Users should be able to create watchlists, rate content, and download videos for offline viewing.

**Questions:**

What are two functional requirements related to watchlists?

What non-functional requirement should be considered for video quality?

What method would you use to understand users' expectations for offline viewing?

**Case Study 17: Smart City Traffic Management System**

**Description:** A smart city traffic system monitors and controls traffic lights based on real-time traffic data. The system should also provide updates on traffic conditions to drivers.

**Questions:**

What functional requirement is key for traffic light control?

What non-functional requirement should be considered for real-time traffic data updates?

How would you gather requirements from both drivers and traffic authorities?

**Case Study 18: Online Education Platform**

**Description:** An online education platform supports live classes, course materials, and discussion forums. The system should also provide tools for teachers to grade assignments and give feedback.

**Questions:**

Identify three functional requirements related to live classes.

What non-functional requirement is critical for video streaming during live classes?

How would you validate that the grading system meets teachers' needs?

**Case Study 19: Customer Support Chatbot**

**Description:** A customer support chatbot helps users with product questions, tracks orders, and handles complaints. The chatbot should understand natural language and provide useful answers.

**Questions:**

What is a functional requirement for handling complaints?

What non-functional requirement should be met for natural language understanding?

How would you test if the chatbot accurately answers user questions?

**Case Study 20: Warehouse Management System**

**Description:** A warehouse management system helps staff keep track of inventory, automate restocking, and manage shipments. It should also generate reports on inventory levels and order fulfillment.

**Questions:**

Name two functional requirements related to inventory management.

What non-functional requirement is necessary for generating real-time inventory reports?

How would you gather requirements from warehouse staff and managers?

**Case Study 21: Travel Planning App**

**Description:** A travel app helps users book flights, hotels, and activities. It should offer personalized travel suggestions and alert users to changes in their itinerary.



**Questions:**

What are two functional requirements for booking flights?

What non-functional requirement affects the reliability of itinerary alerts?

How would you validate that the personalized suggestions are helpful?

**Case Study 22: Health Monitoring System**

**Description:** A health monitoring system tracks patients' vital signs and alerts doctors if readings are abnormal. It should also store patient records securely and allow remote access for authorized medical staff.

**Questions:**

List two functional requirements related to vital sign tracking.

What non-functional requirement is crucial for data storage security?

How would you test the system's alert feature to ensure reliability?

**Case Study 23: Restaurant Reservation System**

**Description:** A restaurant reservation system lets users book tables, view menus, and pre-order food. The system should also notify users about reservation status changes.

**Questions:**

What is a functional requirement for booking tables?

What non-functional requirement relates to menu loading speed?

How would you ensure the pre-order feature works smoothly?

**Case Study 24: Home Security System**

**Description:** A home security system uses cameras, sensors, and an app to alert homeowners of suspicious activity. It should also allow remote control of locks and alarms.

**Questions:**

What are two functional requirements for the camera monitoring feature?

What non-functional requirement should be met for the app's responsiveness?

How would you gather user feedback on the remote control features?

**Case Study 25: E-commerce Analytics Tool**

**Description:** An analytics tool for e-commerce stores provides data on sales, customer behavior, and product performance. The tool should allow custom report generation and data export.

**Questions:**

What is a functional requirement for custom report generation?

What non-functional requirement relates to data export speed?

How would you ensure the tool meets the needs of e-commerce managers?

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Directory:  
Template: C:\Users\Abdullah\AppData\Roaming\Microsoft\Templates\Normal.dot  
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Subject:  
Author: Abdullah  
Keywords:  
Comments:  
Creation Date: 11/18/2024 5:31:00 PM  
Change Number: 1  
Last Saved On:  
Last Saved By:  
Total Editing Time: 5 Minutes  
Last Printed On: 11/18/2024 5:36:00 PM  
As of Last Complete Printing  
Number of Pages: 9  
Number of Words: 2,834 (approx.)  
Number of Characters: 16,160 (approx.)