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SOFTWARE ENGINEERING
CO301 Assignment I

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Q.1.1 (a) Define System, its characteristics, components and types.

Ans (a) A system is an organised collection of components or elements that work together to achieve a specific objective. It can be a set of interacting or interdependent entities that form an integrated whole. It includes software, hardware, data and users that interact together to perform operations.

Characteristics of System:

- (1) Organisation: The structure of the system that defines its components and their relationship.
- (2) Interaction: Components interact with each other to perform a function.
- (3) Interdependence: Each component depends on others for system effectiveness.
- (4) Integrated: Each component depends on others for system effectiveness.
- (5) Integration: Various parts of a system are united to function as a whole.
- (6) Central Objective: All systems are designed to achieve a goal or purpose.
- (7) Modularity: A system is divided into smaller, manageable modules or subsystems.
- (8) Purpose: Systems are designed to achieve specific objectives or functions, making them goal oriented.

Components of a System.

- ① Data: Information processed by the system, which can include user inputs, databases & system outputs.
- ② User: End users or administrators who interact with system.
- ③ Hardware: The physical components like computers, servers and networks required for the system functioning.
- ④ Software: Programs and applications that process data, manage system resources and provide functionalities.
- ⑤ Procedures: Methods and policies used to operate and maintain the system.
- ⑥ Communication Networks: The connection that enables the components to communicate and exchange data, such as network, API etc.

Types of System in Software Engineering.

- ① Open System: Interacts with its environment, exchanging data and resources.
- ② Closed System: Does not interact with its environment, operating in isolation.
- ③ Embedded System: Designed to control devices and operate as part of a larger system.
- ④ Distributed System: Systems where components are shared across multiple machines, connected by a network and work together to perform tasks.
- ⑤ Real Time System: System that processes data and provides responses within a strict time frame, essential for time-sensitive operation.

⑥ Expert System: System that use artificial intelligence to make decisions based on data inputs, mimicking humans.

⑦ Transaction processing systems (TPS)

System designed to handle large number of transactions like order processing, banking and reservation systems.

⑧ Management Information Systems (MIS)

used to generate reports for managing organisational operations and decision making.

(b) What are the phases of SDLC? Explain.

Software Development life Cycle, is a structured process that is used to design, develop and test good-quality software. The goal of SDLC life cycle model is to deliver high quality manageable software that meets the user's requirement.

SDLC is a process followed for software building within a software organization.

Stages of Software Development Life Cycle

Stage 1 : Planning and Requirement Analysis

Planning is a crucial step in everything, just as in software development. Requirement analysis is also performed by the developers of the organization. This is attained from customer's inputs and sales / department / surveys. This information from this analysis forms the building blocks of a basic project.

Stage 2 : Defining Requirements

In this stage, all the requirements for target software are specified. These requirements gets approval from customers, market analysts and stakeholders. This is fulfilled by utilizing SRS.

This is a document that specifies all those things that need to be defined and created during entire project cycle.

Stage 3 : Designing Architecture

SRS is a reference for software designers to come up with best architecture for the software. Hence, with the requirement defined in SRS, multiple designs for the product architecture are present in Design Document Specification (DDS).

Stage 4 : Developing Product

At this stage, the fundamental development of the product starts. For this, developers use a specific programming code as per the design in DDS. Hence, it is important for the coders to follow the protocols set by the association.

Stage 5 : Product Testing and Integration

After the development of product, testing of the software is necessary to ensure its smooth execution. Although, minimal testing is conducted at every stage of SDLC. Therefore, at this stage, all the probable flaws are tracked, fixed and released.

Stage 6 : Developing, Deployment & Maintenance of Product

After detailed testing, the conclusive product is released in phases as per the organization strategy. Then it is tested in a real industrial environment. It is important to ensure its smooth performance. If it performs well, the organization sends out the product as a whole.

Q.2) (a) "System Analyst acts as a psychologist", explain how? What should be the attributes of good system analyst?

A) (a) A system analyst plays a role similar to that of a psychologist in understanding user needs, behaviour and motivations.

(1) Understanding needs: A system analyst must deeply understand the needs of users, clients and stakeholders to create systems that solve their problems effectively.

(2) Interpersonal skills: Psychologists excel in communication and building rapport which helps people express their concerns.

(3) Problem Solving Approach: Psychologist analyse problems and suggest interventions to help clients.

(4) Listening and Empathy: A psychologists listen empathetically to understand emotional and behavioral patterns.

(5) Conflict Resolution: Both psychologists and systems analyst deal with conflicting interests or perspectives.

Attributes of a Good System Analyst

① Analytical skills: A good system analyst must have strong analytical abilities to understand complex business processes and convert them into system requirements.

- ② Problem Solving Ability: System Analysts need to think critically and creatively to find effective solutions to business challenges through IT systems
- ③ Interpersonal Skills: The ability to challenge and collaborate with various stakeholders, mediate conflicts and maintain a positive working relationship is critical.
- ④ Attention to Detail: A good analyst must be detail-oriented ensuring that no requirements or processes are overlooked during system analysis and design.
- ⑤ Project Management: System Analysts often manage multiple tasks and deadlines, so they must possess good project management and organizational skills.

(b) What is the study importance of feasibility study in SDLC?

In the software development life cycle, a feasibility study is crucial because it assesses the practicality of a proposed project. Its importance includes:

- (1) Risk Assessment: Identifies potential risks and challenges, helps to avoid costly mistakes and ensuring that the project is viable.
- (2) Resource Evaluation: Determines whether the necessary resources are available.
- (3) Scope Definition: Clarifies the project's objectives, scope and deliverables, ensuring that all stakeholders have a shared understanding.
- (4) Cost Benefit Analysis: Evaluates the financial feasibility by comparing the project's costs with its anticipated benefits.
- (5) Technical Feasibility: Addresses whether the technology required for the project is available and suitable.

(6) Operational feasibility: Ensures that the project can be effectively integrated into the existing operational environment.

(7) Legal and Ethical Considerations: Reviews compliance with legal regulatory and ethical standards.

Ques 3 Differentiate b/w RAD and JAD.

RAD (Rapid Application Development)

- ① A software development methodology focused on quick development and iteration.
- ② Speed of development & prototyping
- ③ Iterative and incremental development with user feedback.
- ④ Requirements planning, user design construction cut over.
- ⑤ Continuous involvement throughout development.
- ⑥ Minimal focuses and prototypes and working solutions.
- ⑦ Emphasises on rapid development and iterative improvement.
- ⑧ Suitable for projects where requirements evolve or are unclear

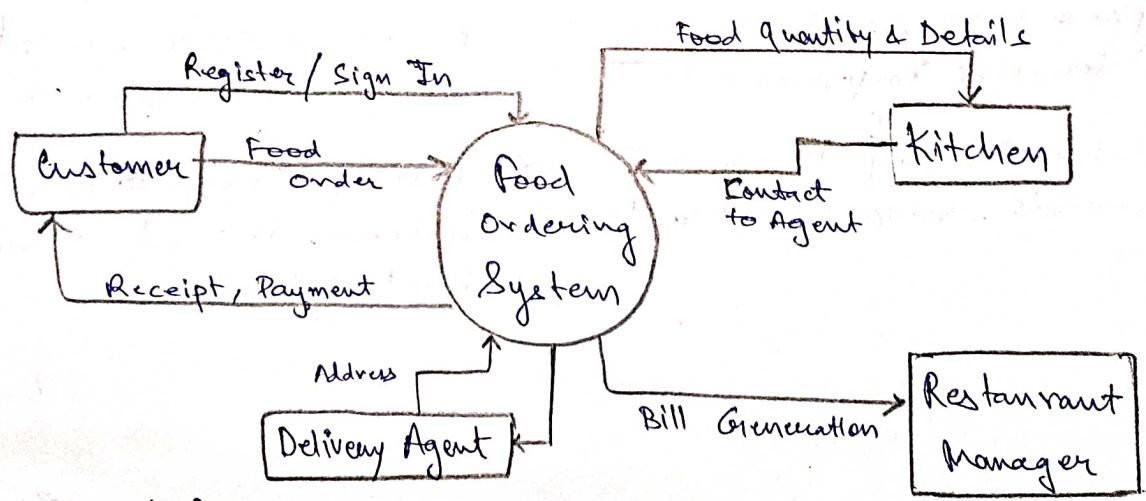
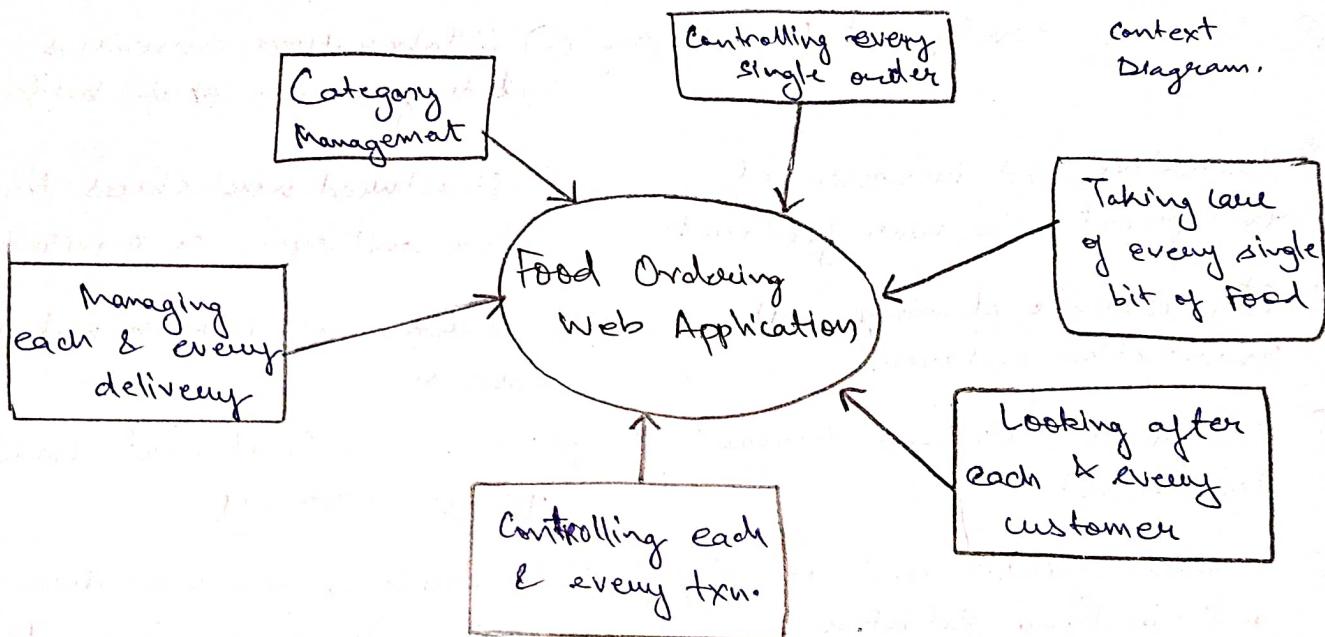
JAD (Joint Application Development)

- ① A facilitated workshop method for gathering requirements and making decisions
- ② Collaboration consensus building among stakeholders.
- ③ Structured workshops to define and agree on requirements
- ④ Workshops, decision making sessions.
- ⑤ Intensive involvement during specific workshop.
- ⑥ Detailed, focuses on documented agreements & requirements.
- ⑦ Focuses on clear, agreed upon requirements before development
- ⑧ Best for projects where requirements need clear, upfront definition.

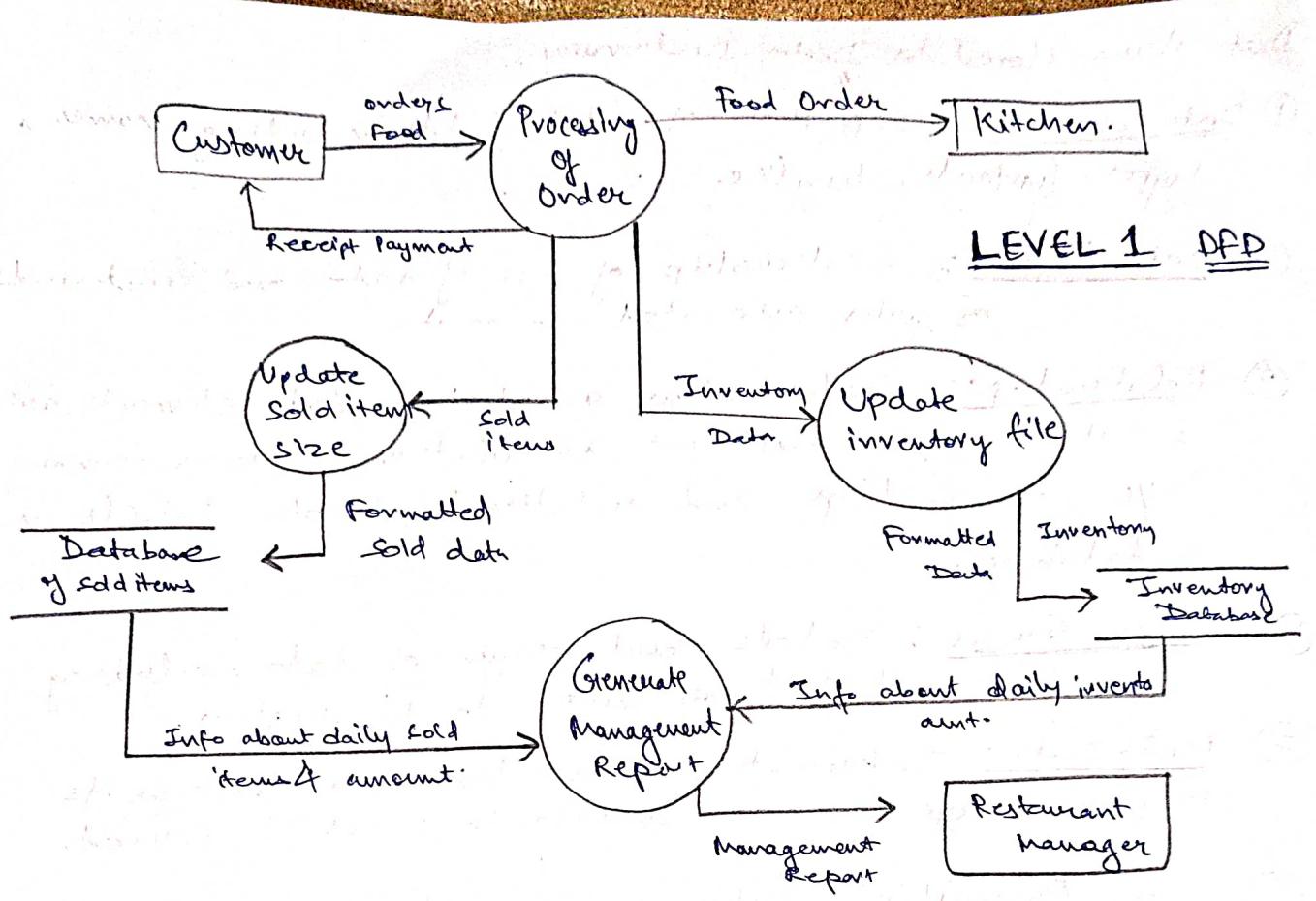
⑤ Draw DFD diagram for a food chain company like swiggy upto atleast a level. Zero level DFD of online food ordering system.

A) Entities at the highest level of online food ordering system and the flow of processes:

- (1) Controlling every single order
- (2) Taking care of every single bit of food
- (3) Looking after each and every customer.
- (4) Controlling each and every transaction.
- (5) Managing each and every delivery.

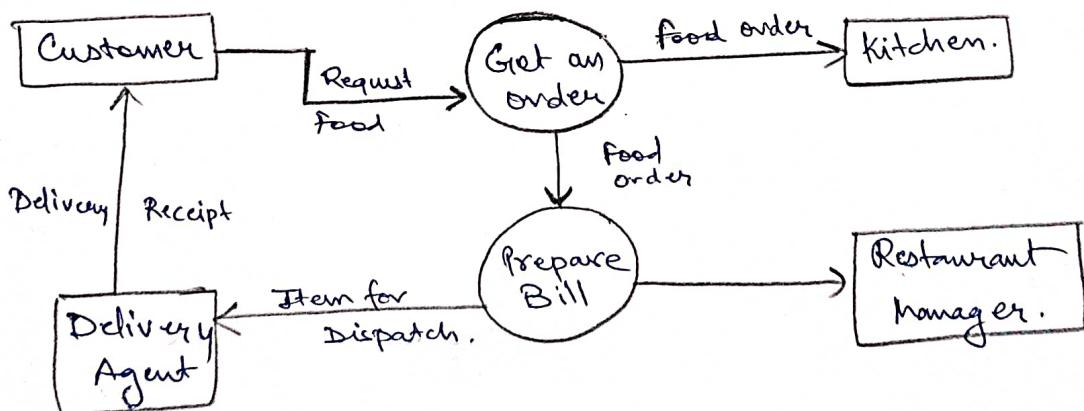


Level 0 DFD



Level 2 DFD

more info of processing of order.



Q.4) (a) Explain different types of readers of SRS?

A software requirements specification document is intended for various stakeholders who have different needs & interests.

- ① Project Managers: Focuses on overall project goals, deliverables timelines and resource allocation. Ensuring that the project scope is well-defined and manageable within given constraints.
- ② Business Analyst: Focus on functional requirements, business rules and user needs. Understanding the requirements to ensure they align with business objectives and can be translated into functional specifications.
- ③ Software Developers: Focuses on detailed functional and non-functional requirements, technical constraints and system design aspects. Understanding how to implement the requirement and ensuring system architecture and design align with SRS.
- ④ Quality Assurance (QA) Testers: Focuses acceptance criteria, test cases, system behavior. Developing test plans and cases that will verify if the system meets the specified requirement.
- ⑤ End Users: Focuses on user requirements, usability and functionality. Ensuring that the system meets their needs and expectations as described in SRS.
- ⑥ System Architect: Focuses on system design, architecture, integration requirements. Understanding high level requirements to design an appropriate system architecture.
- ⑦ Customer Representatives: Focuses on product features, user experience and overall functionality. Verifying that the requirements align with customer expectations and contractual agreements.

- ⑧ Maintenance & Support Teams: Focuses on system functionality, known issues and potential areas for future improvements. Understanding how the system works and functions for effective support & maintenance.

Q.4.) b) Explain different tools and features used for process modelling. What data items are stored in data dictionary?

Tools used for process modelling.

- Ans
- ① Flowcharts: Visual diagrams that use symbols to represent processes, decisions, inputs & outputs.
 - ② Business Process Model and Notation (BPMN): A standardised method for modeling business processes. BPMN diagrams use a set of symbols to represent different elements of a process, such as tasks, events & gateways.
 - ③ Unified Model Language (UML): A set of diagrams used for modelling various aspects of systems, including use case diagrams, activity diagrams and sequence diagrams.
 - ④ DFD (Data Flow Diagram): Diagrams that represent flow of data within a system. They show how data moves from input to processing and finally to output, highlighting the data state and processes involved.
 - ⑤ ER Diagrams: Used to model data structure of system by showing entities, attributes and relationship b/w them.
 - ⑥ System Modelling Language: An extension of UML used for system engineering. SysML includes diagrams for requirements, behaviour, structure and parametrics, providing holistic view of complex system.

Data items stored in Data Dictionary.

- ① Data Elements: Definition of data fields including names, types, formats, lengths.
- ② Data Types: Relationship of type of data and constraints or rules associated with it.
- ③ Relationships: Information about how data elements are related or interact with one another, such as primary keys, foreign keys and relationships b/w tables in a database.
- ④ Data Sources: Details about origin of data, including where it is collected or input into the system.
- ⑤ Meta Data: Information about the data, such as its origin, usage and the context in which it is used.
- ⑥ Data Ownership: Information about who is responsible for managing and maintaining the data.