ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

COLLEGE OF ENGINEERING

DEPARTMENT OF SOFTWARE ENGINEERING

COURSE: software component design

Title: Incremental model

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Incremental Model

The Incremental Model is a software development approach where the system is built and delivered in increments or small parts. Each increment adds functionality to the system until the final product is complete. This model is often used when requirements are well understood but can evolve over time, allowing for flexibility and iterative improvement.

Characteristics of Incremental Model

1. Iterative Development:
   - The project is divided into smaller modules or increments that are developed and delivered in iterations.
   - Each iteration refines and extends the functionality of the previous one.

2. Functional Increments:
   - Every increment provides a functional part of the product, which is tested and validated.
   - Earlier increments act as a base for future additions.

3. Risk Management:
   - Risks can be identified and mitigated early in the development process due to its iterative nature.

Features of Incremental Model

1. Progressive Delivery:
   - The system is delivered in parts, allowing customers to use and evaluate functional components before the full system is completed.

2. User Feedback:
   - Early increments can be reviewed by users, and feedback can be incorporated into future iterations, improving the final product's quality.

3. Prioritized Requirements:
   - Core and critical features are delivered in initial increments, while less critical features are deferred to later phases.

Advantages of the Incremental Model

- Provides a working product early in the process.
- Easier to test, debug, and maintain due to modularity.
- Reduces risks by addressing high-priority requirements first.
- Adapts to changes in user needs over time.

Disadvantages of the Incremental Model

- Requires careful planning and design for smooth integration of increments.
- Incremental delivery may not work well for systems with tightly coupled components.
- The final system architecture may not be well-defined at the outset.

The Incremental Model is ideal for projects requiring flexibility, where early delivery and iterative improvement are valuable. It is widely used in software engineering due to its balance between structure and adaptability.

Real-Time Scenario: Online Food Ordering System

Why This Scenario?

It's widely used and relatable (like Zomato, Uber Eats, etc.).
It can be broken into logical increments with clear functionality.
It demonstrates how incremental delivery adds value step-by-step.

Demonestration

System Requirements for an Online Food Ordering System

Functional Requirements

User Management

1. User registration and login with email or social media.
2. User profile management.
3. Password recovery functionality.

Restaurant Management

1. Restaurant onboarding and profile creation.
2. Menu management with categories, items, and prices.
3. Promotions and discount configuration.

Order Management

1. Search and filter restaurants by location, cuisine, or rating.
2. Add/remove items to/from the cart.
3. Place orders and view order history.
4. Real-time order tracking for customers.

Payment Processing

1. Integration with payment gateways for online payments.
2. Support for multiple payment methods (credit/debit cards, UPI, wallets).
3. Secure payment processing and receipt generation.

Delivery Management

1. Real-time order assignment to delivery personnel.
2. Delivery status updates for customers and restaurants.
3. Delivery personnel location tracking.

Notifications

1. Email/SMS/Push notifications for order confirmations, status updates, and promotions.

Ratings and Reviews

1. Customers can rate and review restaurants and delivery services.
2. Restaurants can respond to reviews.

Admin Panel

1. Manage users, restaurants, orders, and payments.
2. Generate analytics and reports for system performance.
3. Resolve disputes and customer queries.

Non-Functional Requirements

Scalability

1. Support for a large number of concurrent users.

Performance

1. Fast response times for searching restaurants and placing orders.

Security

1. Secure storage and transmission of sensitive data (e.g., passwords, payment info).
2. Role-based access control for different users (customers, restaurants, admins).

Availability

1. High system uptime with minimal downtime.
2. Fault tolerance and disaster recovery mechanisms.

Usability

1. User-friendly interface with easy navigation.
2. Accessibility compliance for differently-abled users.

Maintainability

1. Modular and well-documented codebase.
2. Easy to deploy updates and patches.

Break the Online Food Ordering System into functional increments:

Increment 1: Restaurant Listing and Menu Viewing

- ✓ Users can view available restaurants.
- ✓ Users can browse restaurant menus (food items with prices).

Increment 2: User Account Management

- ✓ Users can register and log in.
- ✓ Basic profile management (e.g., name, address).

Increment 3: Adding to Cart and Order Placement

- ✓ Users can add food items to a cart.
- ✓ Users can place an order with basic confirmation.

Increment 4: Payment Integration

- ✓ Users can choose payment methods (e.g., Cash on Delivery, Card Payment).
- ✓ Simulate payment processing.

Increment 5: Order Tracking and Notifications

- ✓ Users can track the status of their order (e.g., "Order Confirmed,""Out for Delivery").
- ✓ Basic notifications via the interface.

Working system and feature of each incremental system

Increment 1
a basic interface displaying a list of restaurants and their menus.

This increment establishes the foundation of the system by defining the core data models for restaurants and menus, and providing a user-friendly interface for interaction.

Increment 2:

user login and registration functionality.

users can now interact with the system as registered members.

Increment 3:

Implement the cart and order placement. This is where users add food items to the cart and place an order.

Increment 4:

Integrate a payment simulation where the user selects a payment option.

Increment 5:

Show order tracking status updates (e.g., "Preparing,""Out for Delivery").
Simulate notifications displayed on the screen.

Conclusion

The incremental model is a highly effective software development approach that emphasizes the gradual delivery of a project through smaller, manageable increments. This methodology allows teams to focus on specific functionalities, enabling early testing and validation of each component. By incorporating user feedback at every stage, the incremental model fosters a collaborative environment where stakeholders can influence the development process, ensuring that the final product aligns closely with user needs and expectations.