Subject: SECD2613 System Analysis and Design

Task: Project Phase 1 (Proposal)

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1.0 Introduction

The **Online Food Delivery System (OFDS)** aims to create a cutting-edge platform for consumers to conveniently order food from a wide variety of local restaurants, get real-time updates on deliveries, and make secure payments. This system is designed to overcome common problems with current food delivery systems, such as long delivery times, complicated user interfaces, limited payment options, and lack of transparency.

The main goal of this system is to provide a seamless and efficient experience for customers, restaurants, and delivery personnel by integrating the latest technology, including mobile app development, real-time tracking, and payment gateway integrations. Additionally, this system will scale effectively as demand increases.

Key Features of the Proposed System:

Customer Mobile Application: A responsive, cross-platform application for Android and iOS that allows customers to browse restaurant menus, place orders, track deliveries in real-time, and make payments securely.

Restaurant Management Dashboard: A backend system where restaurant owners can manage their menus, view orders, track customer feedback, and optimize their operations.

Delivery Management System: Real-time tracking and route optimization for delivery personnel, ensuring faster and more efficient deliveries.

Multiple Payment Gateways: Secure payment integration with popular methods such as credit/debit cards, mobile wallets, and cash on delivery.

By integrating these features, the system aims to provide a robust solution for all stakeholders while ensuring scalability and high performance.

2.0 Background Study

2.1 Organizational Background

The online food delivery industry has become one of the fastest-growing sectors within e-commerce due to the increasing demand for convenience in today's fast-paced world. Industry leaders like **UberEats**, **GrabFood**, and **FoodPanda** dominate the market, but many of these platforms face significant challenges that undermine customer satisfaction. These include:

Delayed Deliveries: Longer-than-expected wait times lead to frustration.

Complex User Interfaces: Complicated app designs that hinder easy food ordering.

Limited Payment Options: Customers are sometimes restricted to a single payment method.

These issues are compounded by operational inefficiencies in managing orders, deliveries, and payments, making it crucial to design a new system that can address these pain points while offering an exceptional user experience.

2.2 System Scope and Challenges

Scope: The project will create a food delivery system that includes:

Customer Interaction: Enabling users to place orders, track deliveries, and make payments.

Restaurant Management: Allowing restaurants to update their menus, process orders, and monitor customer feedback.

Delivery Logistics: Optimizing the delivery process through route planning and live updates.

Payment Integration: Offering multiple secure payment methods.

Exclusions:

Restaurant Inventory Management: Inventory and stock management are not within the scope.

Employee Management: Restaurant staff scheduling and HR management are excluded.

2.3 Market Research

Customer Preferences: A survey of potential users shows that **over 60%** of customers consider the speed of delivery and the simplicity of the ordering process as their top priorities.
Restaurant Needs: According to feedback from restaurant owners, **75%** expressed interest in a platform that helps them manage orders more efficiently, gain insights into customer preferences, and handle payments more securely.
Competitive Analysis: Competitors like UberEats have faced backlash due to frequent delivery delays, inefficient routing for delivery drivers, and payment fraud issues. This project will address these inefficiencies with real-time tracking, optimized delivery routes, and multiple payment options.

3.0 Problem Statement

The **Online Food Delivery System** aims to address several critical issues faced by both customers and businesses in the current market:
Delayed Deliveries: Customers frequently experience longer-than-expected delivery times, especially during peak hours. This results in customer dissatisfaction and lost business opportunities.
Poor User Interface: Existing platforms are often cluttered, with a poor user experience that makes the process of ordering food complicated and time-consuming.
Limited Payment Methods: Users often face restrictions on payment options, which can be frustrating for customers who prefer digital wallets or other modern payment methods.
These problems cause a significant reduction in customer loyalty, which negatively impacts the businesses using these platforms. By addressing these issues, we can create a better system that enhances operational efficiency and increases customer satisfaction.

4.0 Proposed Solutions

To address the key challenges faced by the existing online food delivery systems, we propose the design and implementation of a new platform that integrates state-of-the-art technology to enhance user experience, streamline restaurant operations, and optimize delivery logistics. The proposed solutions include technical, operational, and economic aspects that will make the system efficient, scalable, and profitable for all stakeholders.

4.1 Technical Feasibility

The technical feasibility of the proposed system has been carefully evaluated to ensure that the project can be executed within the given constraints of time, budget, and technology.

Mobile Application Development:

The customer-facing mobile application will be developed using **Flutter** or **React Native** to ensure compatibility across both Android and iOS platforms. These frameworks provide rapid development and ease of maintenance, reducing long-term development costs.

The app will feature an intuitive design to enhance the user experience. It will include functionalities such as **restaurant search**, **order placement**, and **secure payment options**.

Backend Development:

The backend of the system will be developed using **Node.js** and **Express.js** for handling API requests and managing server-side operations. The database will use **MongoDB**, ensuring flexibility and scalability for handling growing amounts of data such as customer profiles, restaurant menus, and order histories.

Real-time communication will be powered by **WebSockets** or **Socket.IO**, enabling live updates for customers and delivery personnel.

Real-Time Tracking and Route Optimization:

The integration of **Google Maps API** or **Mapbox** will enable real-time GPS tracking of orders and deliveries, providing accurate status updates to customers and delivery personnel.

The system will incorporate **dynamic routing algorithms** to minimize delivery times by factoring in variables like traffic conditions and delivery urgency.

Payment Gateway Integration:

Multiple payment gateways, including **Stripe**, **PayPal**, **local e-wallets (e.g., GrabPay, Touch ‘n Go)**, and **Cash on Delivery (COD)**, will be integrated into the system to cater to a wide range of customers and enhance transaction flexibility.

4.2 Operational Feasibility

The operational feasibility of the system ensures that the platform can handle the expected volume of users, restaurants, and deliveries, providing a seamless experience for customers, restaurants, and delivery personnel.

Scalability:

The system will be built on **cloud-based infrastructure** (e.g., **AWS** or **Google Cloud**) to handle increasing demand as the platform scales. This will ensure that the system remains performant, even during peak hours, by dynamically adjusting resources.

The app will be optimized to handle high user traffic without compromising on performance, guaranteeing a reliable service during busy periods.

User Roles and Permissions:

Customers will be able to browse restaurants, place orders, track deliveries, and provide feedback.

Restaurants will have a dashboard where they can manage menus, process orders, track customer reviews, and gain insights through analytics.

Delivery Personnel will be able to view assigned deliveries, optimize routes, and communicate with customers for more efficient deliveries.

Admins will have full access to manage system operations, monitor user activities, and resolve any issues that arise.

Customer Support and Maintenance:

A dedicated **customer support team** will be available to handle queries, complaints, and feedback from customers. This will ensure high levels of satisfaction and quick resolutions to any issues.

Ongoing maintenance of the app and backend infrastructure will be carried out to ensure smooth operation, software updates, and security patches.

Security and Data Protection:

The system will ensure compliance with data protection regulations (such as **GDPR**) to protect user information. Secure payment gateways and encrypted data storage will be implemented to safeguard sensitive data.

Regular **penetration testing** and vulnerability assessments will be conducted to ensure the system is protected against potential threats.

4.3 Economic Feasibility

The economic feasibility of the proposed system focuses on evaluating the potential costs and benefits to determine if the project is financially viable. The following factors outline the estimated costs and benefits, as well as the assumptions that support the analysis.

- **Estimated Costs:**

  Development Costs:

1.Hardware Costs:

- Server and Hosting Infrastructure
  - Software Costs:
- Mobile App Development (Cross-Platform)
- Backend Development (Node.js, Express.js, MongoDB)
- Payment Gateway Integration
- Testing and Quality Assurance Tools

  Training Costs:
- Internal Staff Training
- User Training Materials

  Consulting Costs:
- Consultation for System Architecture and Design
- Consultation for Security and Compliance

2.Production Costs (Ongoing):

- Hosting and Maintenance (Cloud Infrastructure)
- Marketing and User Acquisition
- Customer Support/Salary

3.Estimated Benefits:

- Increased Revenue/Sales for Restaurants
- Cost Savings from Optimized Delivery Routes:
- Inventory Savings

Assumptions:

Discount Rate: 10% for calculating the present value of future costs and benefits.

Sensitivity Factor (Costs): 1.1, meaning costs could increase by 10% more than estimated.

Sensitivity Factor (Benefits): 0.9%, indicating that actual benefits might be 10% lower than expected.

Annual Change in Production Costs: 7%, accounting for an increase in costs such as server hosting, maintenance, and development.

Annual Change in Benefits: 5%, reflecting moderate annual growth in revenue generation and savings.

Assumptions	
Discount Rate	10%
Sensitivity Factor (Costs)	1.1
Sensitivity Factor (Benefits)	0.9%
Annual Change in production c	7%
Annual Change in benefits	5%

Estimated costs	
Hardware	RM 18,000
Software	RM 19,000
Training	RM 17,000
Consulting	RM 13,000
Maintenance	RM 10,000 Per Year
Marketing	RM 9,000 Per Year
Salary	RM 40,000 Per Year

Estimated Benefits	
Increase Sales	RM 1,200 Per Week
Savings	RM 1,500 Per Week

Costs	Year 0	Year 1	Year 2	Year 3
Development course				
Hardware	19,800			
Software	20,900			
Training	18,700			
Consulting	14,300			
Total	**73,700**			
Production Costs				
Maintenance		11,000	11,770	12,594
Marketing		9,900	10,593	11,335
Salary		44,000	47,080	50,376
Annual Production Costs		**64,900**	**69,443**	**74,304**
Present Value		59,000	57,391	55,826
Accumulated Costs		**132700**	**190,091**	**245,917**

Benefits	Year 0	Year 1	Year 2	Year 3
Increase Sales		56,160	58,968	61,916
(Present Value)		51,055	48,734	46,519
Savings		70,200	73,710	77,396
(Present Value)		63,818	60,917	58,148
Accumulated Benefits (Present Value		**114,873**	**224,524**	**329,191**
Gain or Loss		-17,827	34,433	83,274
Profitability Index	**1.13**			

5.0 Objectives

General Objective:

To design and implement a highly efficient, user-centric online food delivery system that reduces delivery time, enhances the user interface, and integrates a variety of payment options.

Specific Objectives:

Develop a Mobile Application: Build a user-friendly mobile app that simplifies the food ordering process for customers.

Implement Real-Time Order Tracking: Use GPS tracking to provide live updates for customers and delivery personnel.

Integrate Secure Payment Methods: Enable a wide range of payment options to cater to all customers.

Provide Restaurant Management Tools: Create a dashboard for restaurants to manage orders and monitor performance.

6.0 Scope of the Project

Inclusions:

User Experience:

A mobile app that provides customers with a smooth experience from browsing menus to placing orders.

Restaurant Dashboard:

A portal for restaurants to manage menus, process orders, and track sales.

Delivery Management:

Optimized routing and tracking for delivery personnel to ensure faster deliveries.

Payment System:

Secure integration of multiple payment methods, including cards, e-wallets, and COD.

Exclusions:

Inventory Management:

The system will not include features for restaurant inventory management.

Employee Scheduling:

Staff management and scheduling for restaurants are outside the scope.

7.0 Project Planning

7.1 Human Resources

Since our team consists of **three members**, we will distribute tasks based on individual strengths and expertise to optimize productivity. The roles and responsibilities are as follows:

Team Member	Role & Responsibilities
Aswini	System Analyst – Conducts feasibility study, designs system specifications, and ensures operational efficiency.
Leavinish	Software Developer – Implements coding, database management, and integration of functionalities.
Arvin	Project Manager – Oversees timeline, resource allocation, stakeholder communication, and report documentation.

7.2 Work Breakdown Structure (WBS)

The WBS categorizes project tasks into manageable units, ensuring clarity in execution:

System Analysis & Feasibility Study

- Conduct background research on existing platforms
- Identify challenges and propose solutions
- Perform cost-benefit analysis (CBA)

System Design

- Draft system architecture and workflow
- Define database structure and security measures
- Design UI/UX components

Development & Implementation

- Code the food delivery platform (front-end & back-end)
- Conduct initial testing and debugging
- Integrate payment gateways and tracking features

Evaluation & Optimization

- ❖ Perform user testing and collect feedback
- ❖ Optimize system for efficiency and security
- ❖ Prepare documentation for final project submission

TASK	DESCRIPTION	PREDECESSOR	DURATION (DAYS)
A	Conduct background research	NONE	4
B	Identify challenges and propose solutions	A	2
C	Perform cost-benefit analysis	B	3
D	Draft system architecture	C	5
E	Define database structure	C	4
F	Design UI/UX components	C	6
G	Code back-end	D, E	10
H	Code front-end	F	8
I	Integrate front-end and back-end	G, H	4
J	Conduct testing	I	5
K	Optimize system	J	3
L	Integrate payment gateways	I	4
M	Conduct security testing	L	2
N	Final user testing	K, M	3
O	Prepare documentation	N	2

1. Research & Analysis

A: Conduct background research

B: Identify challenges and propose solutions

C: Perform cost-benefit analysis

2. Planning & Design

D: Draft system architecture

E: Define database structure

F: Design UI/UX components

3. Development

G: Code back-end

H: Code front-end

L: Integrate payment gateways

4. Integration

I: Integrate front-end and back-end

5. Testing

J: Conduct testing

K: Optimize system

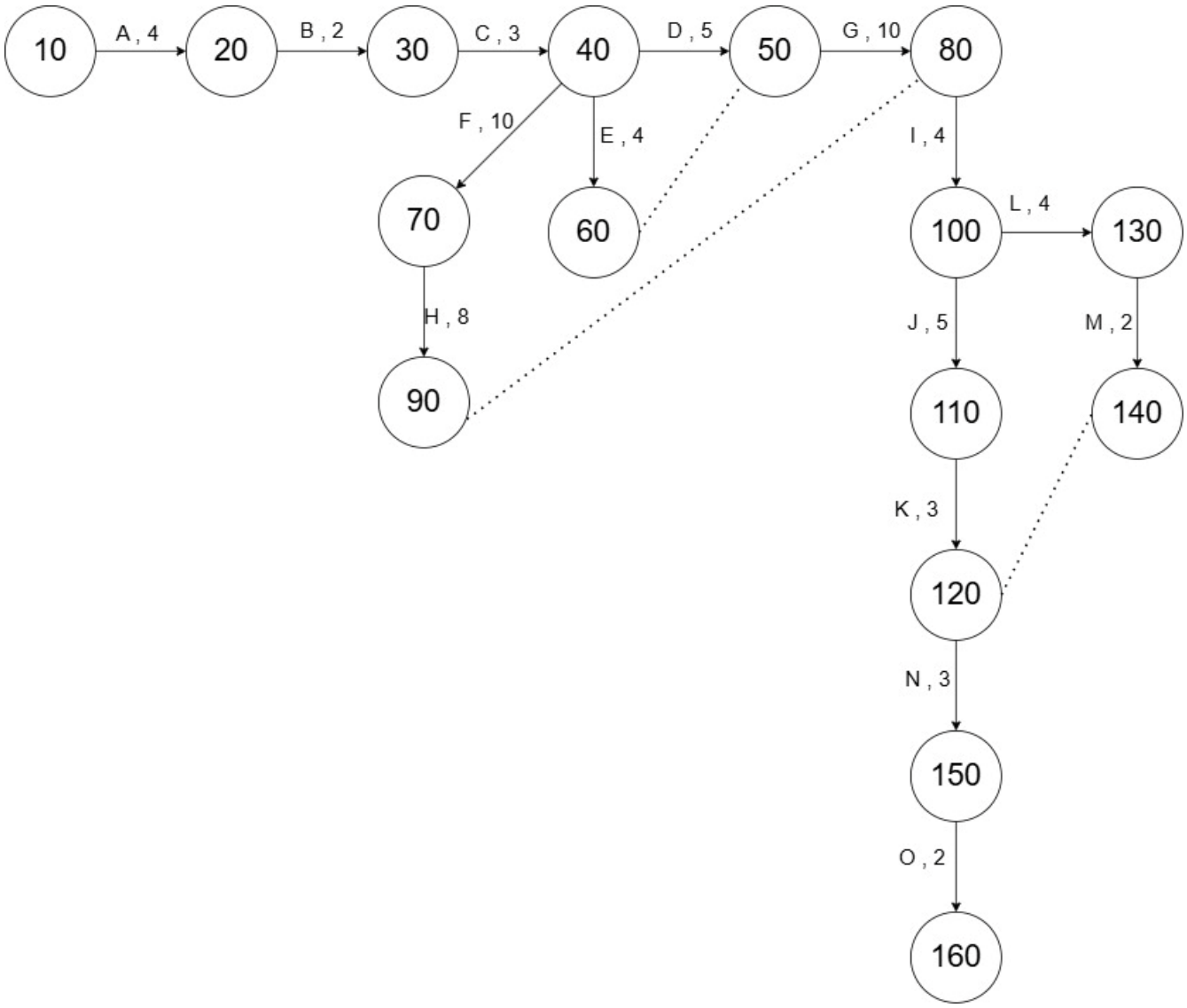
M: Conduct security testing

N: Final user testing

6. Documentation

O: Prepare documentation

7.3 PERT Chart



i) A → B → C → D → G → I → J → K → N → O
4+2+3+5+10+4+5+3+3+2=41

ii)A → B → C → E → G → I → J → K → N → O
4+2+3+4+10+4+5+3+3+2=40

iii)A → B → C → F → H → I → J → K → N → O
4+2+3+6+8+4+5+3+3+2=40

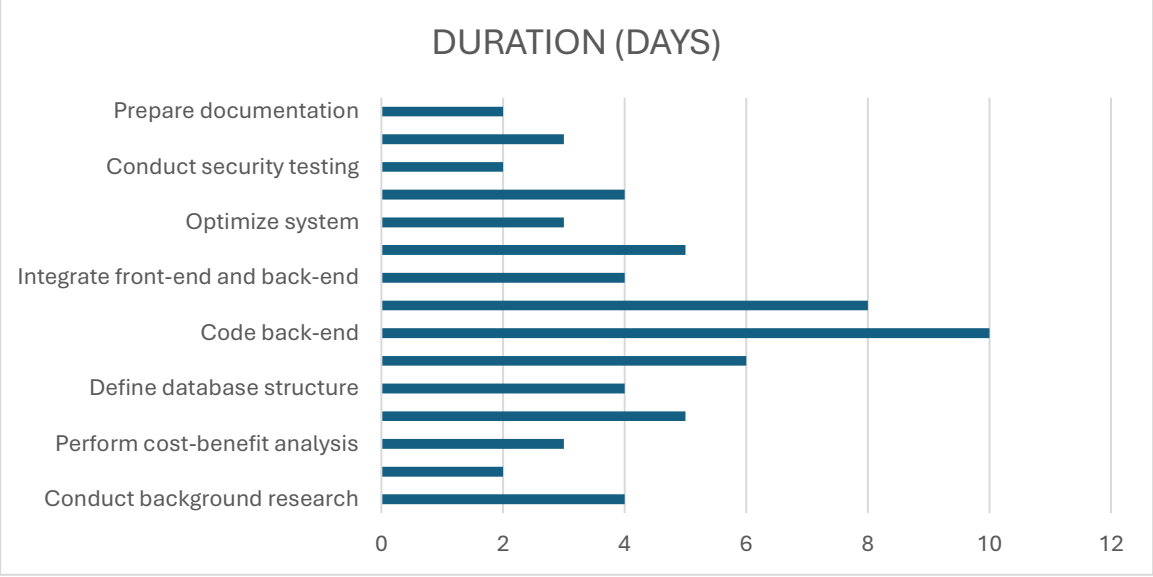
iv)A → B → C → F → H → I → L → M → N → O
4+2+3+6+8+4+4+2+3+2=38

v)A → B → C → E → G → I → L → M → N →O
4+2+3+4+10+4+4+2+3+2=38

Critical path:

1. A → B → C → D → G → I → J → K → N → O (4+2+3+10+5+3+3+2=41)

7.4 Gantt Chart



8.0 Benefit and Overall Summary of Proposed System

Key Benefits

For Customers: Enjoy a faster and more reliable way to order and receive your favourite meals. Choose from a variety of secure payment options for a smooth and safe checkout experience.

For Restaurants: Gain better visibility, streamline order management, and connect more easily with customers to boost satisfaction and repeat business.

For Delivery Personnel: Benefit from smarter route planning and clearer communication, making deliveries quicker and more efficient.

Overall Summary

The Online Food Delivery System is built to make life easier for everyone—customers, restaurants, and delivery partners. With its user-friendly design, reliable performance, and room to grow, it's the ideal solution for today's fast-paced and ever-expanding food delivery world.