American International University-Bangladesh (AIUB)

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SOFTWARE DEVELOPMENT PROJECT MANAGEMENT

Section: A

Group No-4

Grocery Store Management System

A Report submitted

By

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1.0 Introduction:

This document serves as a comprehensive guide to the objectives and functionalities of the Grocery Store Management System developed by Brain Station 23. It is intended for developers, business analysts, and project stakeholders, providing a primary reference for understanding the project's purpose and scope. By establishing clear communication and unified goals, we aim to facilitate seamless development and implementation, ensuring collaboration among stakeholders to achieve the desired outcomes efficiently.

2.0 Project Management approach:

Brain Station 23 adopts a structured approach to project management for the development of the Grocery Store Management System. The project team comprises skilled developers, business analysts, and project stakeholders who collaborate to ensure the success of the project.

Roles and Authority:

- Project Manager: Responsible for overseeing the project's progress, coordinating resources, and ensuring adherence to timelines and budget.
- Development Team: Comprised of developers and business analysts who are tasked with implementing the system's functionalities according to the project requirements.
- Stakeholders: Provide input, feedback, and support throughout the development process.

Resource Providers:

- Brain Station 23: Provides development resources, including skilled personnel and infrastructure, for the project.

Resource Constraints:

- Budget: The project operates within the allocated budget for development and implementation.
- Timeframe: The project adheres to predefined timelines for completion.

Decision Making:

- The Project Manager holds authority for decisions related to project scope, timelines, and resource allocation.
- Major decisions requiring additional funding or changes to project scope will be authorized by the project sponsor in consultation with the Project Manager.

This structured approach ensures effective project management, clear communication, and accountability among team members, leading to the successful delivery of the Grocery Store Management System.

3.0 Project Title: **Grocery Store Management System.**

4.0 Justification:

The Grocery Store Management System is justified as it addresses critical business needs. It's like a superhero for businesses because it tackles important stuff they need. It helps everyone do their job safely and keeps all the important information safe too. Plus, it helps bosses make smart decisions based on data, making sure the store runs smoothly and makes the most money. Customers also get to enjoy shopping more with a simple and easy-to-use system. They even get perks like discounts and loyalty rewards! This system can grow as the store grows, keeping everything organized and saving money by avoiding mistakes. It's a smart move for any store looking to grow, gain trust, and be super-efficient in the ever-changing world of retail.

5.0 Objects and project scopes:

5.1 Objective and subobjectives:

I. **User management*:***
   - *Subobjective 1.1:* Develop Admin functionalities for user addition, modification, and removal.
   - *Subobjective 1.2:* Implement Manager roles for product and staff management.
   - *Subobjective 1.3:* Enable Staff with read-only access to stock details and order fulfillment responsibilities.

II. **product and stock management*:***
   - *Subobjective 2.1:* Allow Admin and Manager to create, modify, and manage product details.
   - *Subobjective 2.2:* Enable allocation of products to specific racks and sub-racks.
   - *Subobjective 2.3:* Provide Staff with real-time stock monitoring for order fulfillment.

III. **transactions and billing*:***
   - *Subobjective 3.1:* Grant Admin and Manager access to transaction reports and analytics.
   - *Subobjective 3.2:* Empower Staff to process customer transactions and provide receipts.

IV. **Security and Data Protection:**
   - *Subobjective 4.1:* Develop a secure login system for Admin, Manager, and Staff.
   - *Subobjective 4.2:* Integrate functionalities for blocking users, applying discounts, and loyalty programs.

V. User Experience and Interface:

- *Subobjective 5.1*: Implement systems for user feedback, product reviews, and ratings.
- *Subobjective 5.2*: Develop a robust search system for customer navigation.
- *Subobjective 5.3*: Implement functionalities for returns, refunds, and comprehensive reporting

VI. Additional Feature management:

- *Subobjective 6.1*: Enable Admin to add and manage Managers and Staff.
- *Subobjective 6.2*: Implement resource allocation functionalities.
- *Subobjective 6.3*: Provide a centralized view of resources for Admin and Manager.
- *Subobjective 6.4*: Incorporate features for customer details, payments, and payment history.

5.2 Scopes:

- Admin:
  - Full system control and management.
- Manager:
  - Product and staff management, sales monitoring.

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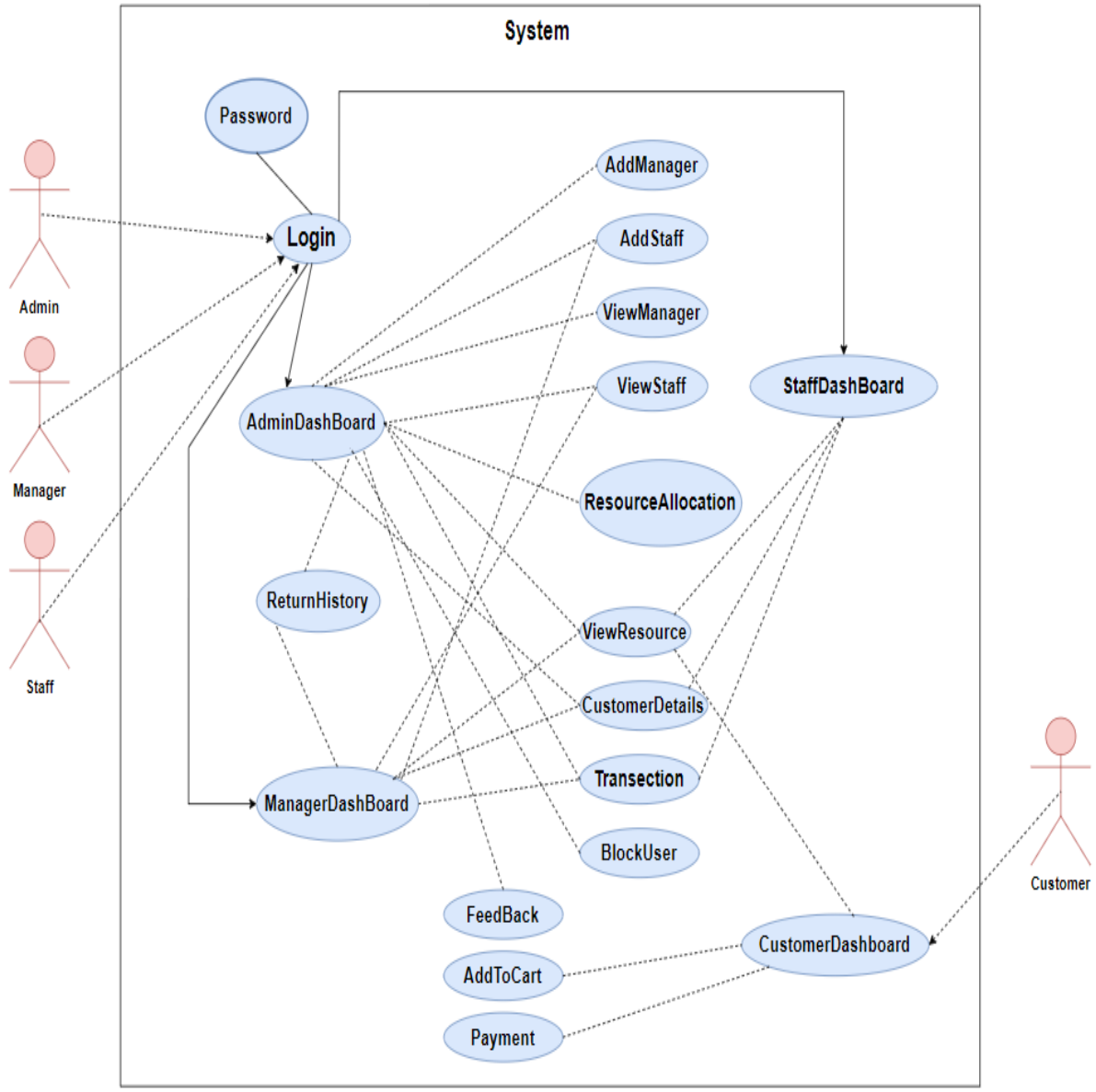
- Staff:
  - Stock details, order fulfillment.
- Customer:
  - Seamless product selection and purchase experience.
- User Management:
  - Admin-controlled user roles and permissions.
- Product and Stock Management:
  - Efficient control and monitoring of products and stock.
- Transaction Processing:
  - Streamlined customer transactions.
- Additional Features:
  - Enhancements beyond core functionalities

6.0 Overview of the project:

6.1 Overview:

The proposed Grocery Store Management System is a comprehensive solution designed to streamline and optimize the operations of a grocery store. This system aims to provide efficient management, enhanced user experiences, and data-driven decision-making through role-based access control and a robust set of features tailored specifically for grocery store operations.

6.2 Use Case:



7.0 Stakeholder Analysis:

Primary Stakeholders:

1. **Admins:**
   - ***Role:*** Holders of full control over the system.
   - ***Interest:*** System efficiency, security, and comprehensive reporting.

2. **Managers:**
   - ***Role:*** Responsible for product and staff management.
   - ***Interest:*** Efficient product allocation, sales monitoring, and streamlined staff roles.
3. **Staff:**
   - ***Role:*** Involved in day-to-day operations, focusing on stock and customer interactions.
   - ***Interest:*** Access to accurate stock details and smooth order fulfillment.
4. **Customers:**
   - ***Role:*** End-users interacting with the system during purchases.
   - ***Interest:*** Seamless product selection, smooth transactions, and satisfactory user experience.

Secondary Stakeholders:

1. **Developers and IT Support Teams:**
   - ***Role:*** Responsible for system development, maintenance, and support.
   - ***Interest:*** Successful implementation and continuous system functionality.

2. **Product Suppliers:**
   - ***Role:*** External entities providing the store with products.
   - ***Interest:*** Efficient inventory management to ensure timely product restocking.

3. **Business Analysts:**
   - ***Role:*** Analyzing system performance and providing insights.
   - ***Interest:*** Accurate data for analysis, system efficiency, and impact on business operations.

8.0 Milestone List:

Milestone	Description	Date
Complete SRS	• Meeting with customers. • Identify needs and project constraints. • Product statement	6 weeks
Complete Requirement Analysis	• Functional Specification • Technical Specification • Non-Functional Specification	12 weeks
Complete Planning	• Define Scope and Objective • Project plan, timeline • Resource Allocation • Review Planning	15 weeks
Design	• System UI, Database Scheme Generation • High level UI Design Architecture • Development of User Interface	22 weeks
Complete Coding	• Define system functionality. • Define behavior. • Customer module • Admin module • Manager module • Staff module • Product module • Integrate all modules. • Integrate database. • Integrate additional component	37 weeks
Complete Management	• Isolation Software Elements • Represent IN • Store in GitHub	42 weeks
Complete Testing	• Functional and Non-functional testing • System Testing • Evaluate technical checking. • Evaluate all function and module	47 weeks
Deployment and Installation	• Deploy the system in server. • User acceptance testing Customer • Reviews	50 weeks

9.0 Process Model to be followed:

For the Grocery Store Management System project, we have chosen the DSDM (Dynamic System Development Method) process model. DSDM offers the advantage of faster project completion compared to other models, thanks to its flexibility. This flexibility is crucial for our project, which may require frequent updates to adapt to changing market demands and customer needs. With DSDM, we aim to deliver the system within 4-5 months, utilizing its iterative approach to accommodate evolving requirements efficiently.

While considering alternative process models such as waterfall, V model, FDD, and SCRUM, we found that they didn't suit our project's requirements. The waterfall model lacks flexibility and backtracking capability, making it unsuitable for accommodating changes during development. FDD is better suited for large-scale projects, while SCRUM's limitations in incorporating new requirements during development phase made it less suitable for our dynamic project. Therefore, we opted for the DSDM model, which allows variation in functionality and requirements while maintaining fixed time and resources for efficient project delivery.

10.0 Work Breakdown Structure:

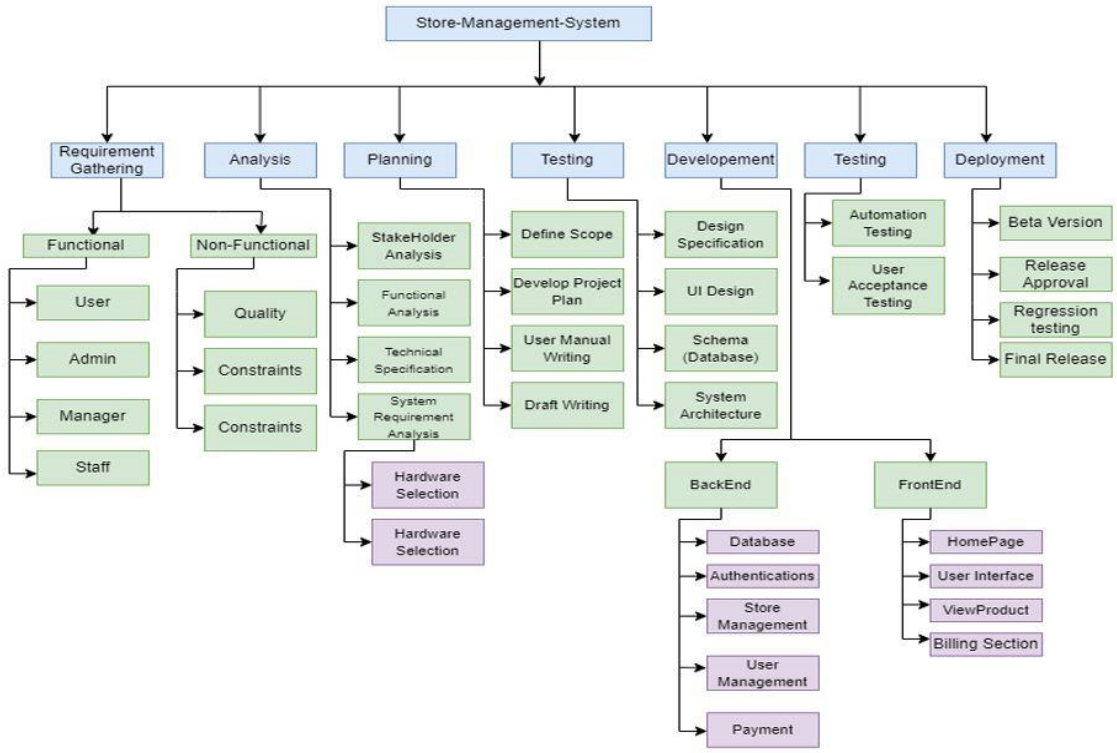


FIGURE: WORK BREAK DOWN STRUCTURE OF STORE MANAGEMENT SYSTEM.

Activity Diagram:

Activity	Duration (Week)	Precedence
A. Requirement Gathering	4	-
B. Requirement Analysis	4	**A**
C. Planning	5	**B**
D. Hardware Selection	1	**C**
E. Software Selection	1	**C**
F. Design	7	**C**
G. File Creation	5	**C**
H. Write User Manual	10	**C**
I. Development	15	**D, E, F**
J. Testing	7	**I**
K. Deployment	2	**G, H, J**

TABLE: ACTIVITY CHART OF STORE MANAGEMENT SYSTEM

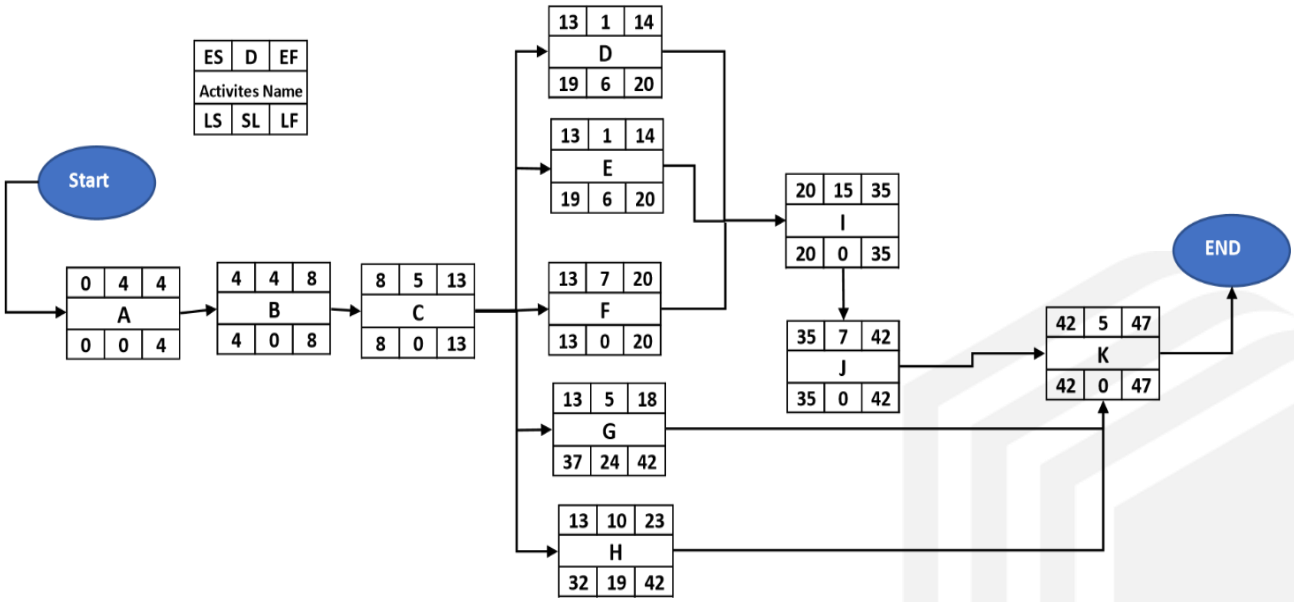


FIGURE: ACTIVITY DIAGRAM OF STORE MANAGEMENT SYSTEM FROM

This diagram we get:

- **PATH 1:** A+B+C+F+I+K= (4+4+5+7+15+7+5) = 47
- **PATH 2:** A+B+C+D+I+J+K= (4+4+5+1+15+7+5) = 41
- **PATH 3:** A+B+C+E+I+J+K= (4+4+5+1+15+7+5) = 41
- **PATH 4:** A+B+C+G+K = (4+4+4+5+5) = 22
- **PATH 5:** A+B+C+H+K = (4+4+4+10+5) = 27

After finding all the path we can say that **PATH 1** is the Critical Path.

11.0 Estimation:

Constructive Cost-Model:

SLOC =10000 lines
Project Type: Organic
Co-Efficient: 2.4 [a=2.4, b=1.05, c=2.5, d=0.38]
Person Month, PM= Coefficient< effort Factor>*(SLOC/1000) ^P
= 2.4*(17000/1000) ^1.05
= 47.00
Development Time, DM= (2.5*47.00*.38*)
= 10.79
= 11 Months
= 44 Weeks (22 Working Days per Month)
= 1549 Hours

Working Hour Required People ST= PM/DM
=41.22/11
= 3.75
= 4 people

Budgeting:

Developer Salary for 12 Months:
Per Developer Salary Per Working Hour =1000Tk
Total Developer Salary = 1000*1549
= 1,549,000 Tk

Project Manager Salary for 12 Months:

Project Manager Per Month Salary = 100000 Tk

Project Manager Total Salary = 100000*11
= 1100,000 Tk

Requirement Analysis:

Time Needed: 1 Month (22 working Days= 176 Working Hour) Requirement Analysis Person's Hourly Wage = 700 Tk

Total Requirement Analysis Expense = 700*176= 123,200 Tk Transportation Cost Estimation = 30,000 Tk

Training and Hardware Expenses Estimation= 1,70,000 Tk

Rent Expense:

Room Per month = 30000 Tk For 11 Months = 30000*11
= 330,000Tk

Total Utilities in 11 Months: 100,000 Tk

Maintenance (Till 10 Months After Delivery):
Time for Maintenance Per Month = 12 Hours Expense Per Hour = 1000 Tk
Total Estimated Time needed For Maintenance = 120 hours Total Estimated Maintenance Cost = 1000*120
= 120,000 Tk

Marketing Expense: 50,000 TK

Web Hosting Expenses for 1 year: 7000Tk

Backup Storage Cost for 1 year: 15000 Tk

Hardware Expense: 200,000 TK
Consultant Expense: 100,000 Tk

Total Estimated Expense:

1,549,000+11,000+123,200 +30,000 +1,70,000 +3,30,000+120,000 +50,000 +7000+15000+200,000+100,000
=3,705,200

Profit:
30% Of Total Estimated Expense= 3,705,200*30%
= 1,111,560 Tk
Total Estimated Expense = 873,720+2,912,400
=1,111,560+3,705,200 Tk

Total Project Budget: 4,816,760 Tk

12.0 Resource Requirement:

12.1 Software Requirements:

i. **Development Tools:**

- Integrated Development Environments (IDEs) such as Visual Studio for .NET development and PHP Storm for PHP development.
- Version control system (e.g., Git) for code management and collaboration.
- Testing frameworks for automated testing, such as Selenium for web application testing.

ii. **Operating Systems:**

- Windows 10-11, Linux, macOS for development and deployment environments.

iii. **Database Management System:**

- Microsoft SQL Server for data storage and management.

iv. **Security Software:**

- Antivirus software to protect against malware and security threats.
- Firewall for network security.

v. **Integration Software:**

- Middleware for integrating external services and APIs with the Store Management System.

12.2 Hardware Requirements:

i. **Servers:**

- Centralized server with at least 16GB RAM, Quad Core processor, and SSD storage for hosting the database and application backend.

ii. **Workstations:**

- Standard office computers with a minimum of 8GB RAM and Core i3 processors for Admin, Manager, and Staff access.

iii. **Point of Sale (POS) Terminals:**

- Dedicated POS terminals for customer interactions, including barcode scanners and receipt printers.

iv. **Networking Equipment:**

- Network switches for connecting workstations, servers, and POS terminals within the LAN.

12.3 Human resource Requirements:

i. **Developers:**

- Frontend developers proficient in HTML5, CSS3, and JavaScript.
- Backend developers experienced in .NET Core and PHP.

ii. **IT Staff:**

- System administrators for server maintenance, security, and database management.
- Network administrators for LAN setup and management.

iii. **Training Personnel:**

- Trainers to conduct user training sessions for store staff on using the new system effectively.

iv. **Project Managers:**

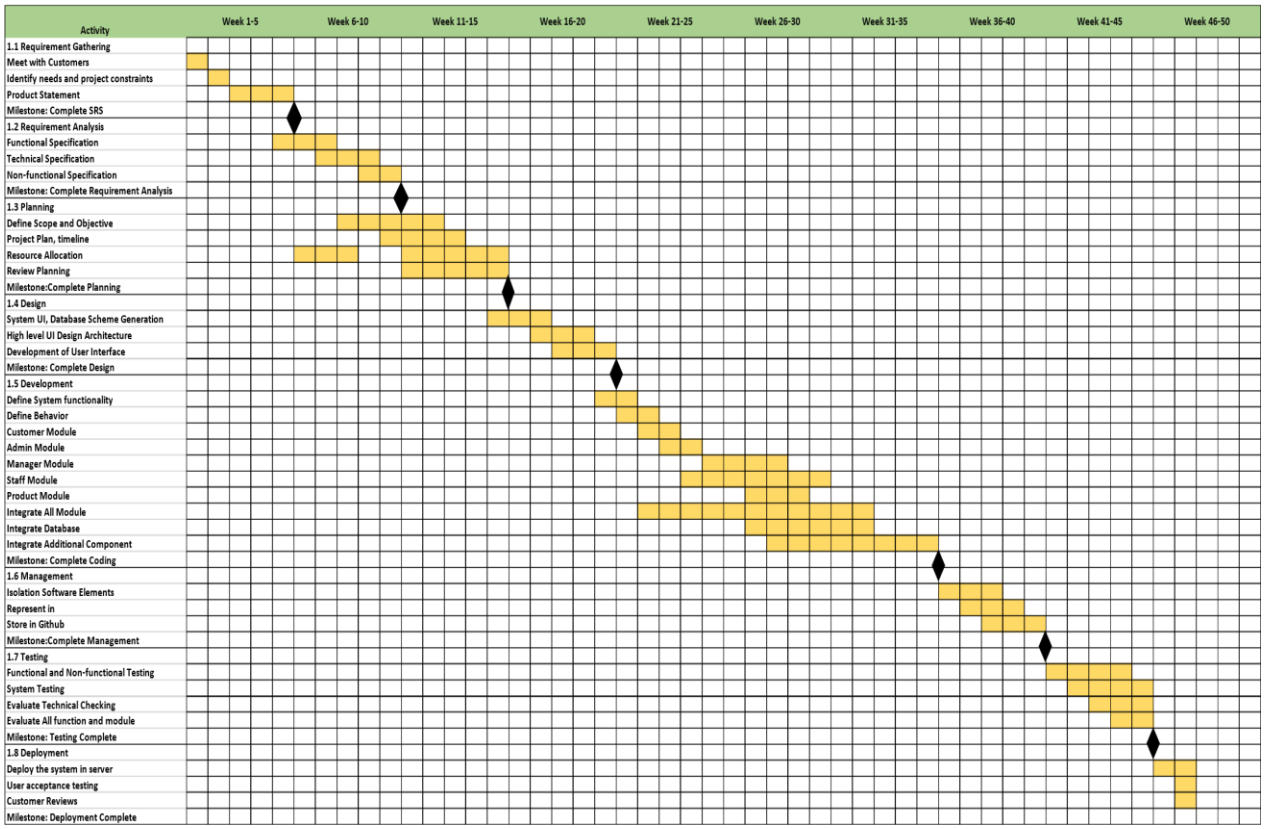
- Project managers to oversee the development process, coordinate tasks, and ensure project goals are met within the specified timeline and budget.
- Change management specialists to handle organizational changes and ensure smooth adoption of the new system by stakeholders.

v. **Data Analysts:**

- Data analysts to analyze store data and provide insights for optimizing inventory management, sales strategies, and customer engagement

13.0 Project Schedule:

Gantt Chart:



14.0 Delivery Plan:

Based on the chosen DSDM (Dynamic System Development Method) process model, the delivery plan for the Grocery Store Management System will be structured around iterative increments to ensure rapid development and adaptation to changing requirements. Here's the schedule:

Increment 1: Basic System Framework

- **Duration:** 1 month
- **Features:**
    - User authentication
    - Product catalog display
    - Shopping cart functionality

Increment 2: Enhanced Frontend and Backend

- **Duration:** 1 month
- **Features:**
    - Improved user interface (UI) design
    - Integration of HTML5, CSS3, and JavaScript for frontend
    - Backend development with .NET and PHP
    - Initial database setup with Microsoft SQL Server

Increment 3: Core Functionality Expansion

- **Duration:** 1.5 months
- **Features:**
    - Implementation of additional features such as order management, inventory tracking, and customer management
    - Integration of real-time data synchronization for external services

Increment 4: Performance Optimization and Load Testing

- **Duration:** 1 month
- **Features:**
    - Performance optimization for scalability
    - Load testing to ensure system stability during peak hours
    - Server configurations for load balancing

Increment 5: Refinement and User Acceptance Testing

- **Duration:** 1 month
- **Features:**
    - Bug fixes and improvements based on user feedback
    - Comprehensive user acceptance testing (UAT) to ensure system reliability and usability

Increment 6: Finalization and Deployment

- **Duration:** 2 weeks
- **Features:**
    - Final system review and adjustments
    - Deployment of the system to production environment
    - Monitoring and support setup for post-deployment phase

Throughout each increment, there will be continuous collaboration with stakeholders, including client feedback sessions and regular demonstrations to ensure alignment with business goals and user needs. Additionally, adjustments may be made to the plan based on project progress and emerging requirements.

15.0 Risk Analysis:

ID	Description	Risk Categories	Probability	Cost	RE	Utility Policy
1	Human errors in development environment	Development Environment	5	8	40	Ensure resource certainty
2	Late changes in requirements	Project Size	5	7	35	Timely changes handling
3	Difficulty in ensuring data privacy	Business Impact	6	10	60	Secured data
4	Underestimation of project size	Project Size	7	6	42	Accurate size estimation
5	System taking more time for certain data	Project Size	6	8	48	Optimize system performance
6	Lack of necessary customer interactions	Project Size	4	9	36	Ensure customer interactions.
7	Lack of training in computer operations	Development Environment	5	6	30	Ensure adequate training
8	High rate of staff turnover	Stuff Size	9	7	63	Aim for a low staff turnover

TABLE: RISK ANALYSIS CHART OF STORE MANAGEMENT SYSTEM

16.0 Quality Control Plan:

1. Requirement Verification:

- Ensure all functional and non-functional requirements are clearly defined and documented.
- Conduct regular reviews with stakeholders to verify requirements understanding.

2. Code Review:

- Establish a code review process to ensure adherence to coding standards and best practices.
- Use automated tools for static code analysis to detect potential bugs and vulnerabilities.

3. Testing:

- Develop comprehensive test cases covering all system functionalities, including UI, backend processes, and integrations.
- Perform unit testing, integration testing, and system testing to ensure each component works individually and collectively.

4. Security Measures:

- Implement security measures such as encryption for sensitive data transmission and storage.
- Regularly update security patches and monitor for vulnerabilities.

5. Scalability and Performance:

- Test the system's performance under different user loads to ensure scalability.
- Implement load balancing and optimize server configurations to handle peak operational hours effectively.

6. Data Integrity and Backup:

- Implement data validation checks to ensure data integrity.
- Implement data recovery procedures to restore the system to its previous state in case of unexpected errors or crashes.

7. Customer Feedback and Continuous Improvement:

- Use feedback to identify areas for improvement and implement necessary changes.
- Continuously monitor system performance and user satisfaction to ensure ongoing quality improvement.

By implementing this quality control plan, we aim to deliver a robust and reliable Grocery Store Management System that meets the highest standards of quality, security, and usability.

17.0 Budget:

17.1 Developer Costs:

Project development time = 11 Months
Number of developers will work = 5
Working days= 5 Day
Working hour per day= 8 Hours
Working hour in 1 week= (5*8) = 40 Hours
Charge for each developer per hour = 300 TK
Charge for each developer
Per week = (300*40) = 12,000 TK
For a month = (12000*4) = 48,000 TK
For 11 months = (48000*11) = 528,000 TK
Charge for 6 developers for 11 months = (528,000 * 5) = 2,640,000 TK
Total Developer Cost: 2,640,000 TK

17.2 Management and Other Employee Costs:

Project manager charge for 11 months = (11*60000) = 660,000 TK
Other employees charge for 11 month = 300,000 TK
Total Management Cost: 960,000 TK

17.3 Infrastructure Costs:

Office rent for 11 months= (11*30000) = 330,000 TK
Server and Hosting for 1 years = 200,000 TK
Electricity and other bills = 200,000 TK
Total infrastructure Cost: 730,000 TK

17.4 Software and Licensing:

Development Tools = 60,000 TK
Third-Party APIs = 100,000 TK
Software Licenses = 50,000 TK
Total Software and Licensing Cost: 210,000 TK

17.5Total Estimated Budget:

Total Estimated Cost = Developer Cost + Management Cost + Infrastructure Cost + Software/Licensing Cost
= 2,640,000 TK + 960,000 TK + 730,000 TK + 210,000 TK
= 4,540,000 TK
Total Estimated Budget: 4,540,000 TK

18.0 Conclusion:

This document outlines the comprehensive framework for developing the Grocery Store Management System by Brain Station 23. By defining project goals, user roles, and features, stakeholders can work together to achieve the system's objectives. The justification emphasizes how the system meets critical business needs, improving efficiency, decision-making, and customer satisfaction in the grocery retail sector. Stakeholder analysis ensures collaboration, while technical and financial feasibility studies confirm the system's viability and importance. In conclusion, the Grocery Store Management System will be a cornerstone for operational excellence, growth, and trust-building in grocery retail, streamlining operations and enhancing customer experiences.