American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

AIUB Smart-Dine: Modernizing Campus Dining

A Software Engineering Project Submitted
By

Semester: Fall_22_23		**Section: A**	**Group Number:**	
SN	Student Name	Student ID	Contribution (CO1+CO3)	Individual Marks
1	Ashik Ahamed	21-45368-2	19%	
2	Srabone Raxit	21-45038-2	19%	
3	Ahnaf Abdullah Zayad	21-45019-2	19%	
4	Zarin Tasnim	21-44898-2	19%	
5	Mahmudul Hasan Shishir	20-43881-2	19%	
6	Mir Mahinuzzaman	21-44809-1	5%	

The project will be Evaluated for the following Course Outcomes

CO1: *Analyze* the impact of software engineering models over various contexts of software development to assess societal, health, safety, legal and cultural issues.	Total Marks	
Project Background Analysis and feasibility (needs, goal, benefits, etc.)	[5 Marks]	
Analysis the impact of societal, health, safety, legal and cultural issues	[5Marks]	
Review of existing Studies and Relevant Example	[5Marks]	
CO3: *Explain* appropriate software engineering model, project management roles and their skills in the context of professional engineering practice and solutions to complex engineering problems in a software development environment.	Total Marks	
Appropriate Process Model Selection and Argumentation with Evidence	[5Marks]	
Evidence of Argumentation regarding process model selection	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar, and Organization of the Project report	[5Marks]	

Description of Student's Contribution in the Project work

Student Name: Ashik Ahamed
Student ID: 21-45368-2
Contribution in Percentage (%):21%
Contribution in the Project:

- Project Proposal
- Process model
- Functional Requirements
- Use case Diagram.
- UI/UX Design
- Test Case
- Timeline Chart 1
- Timeline Chart 2
- Eva Analysis
- Risk Management

_____
Signature of the Student

Student Name: Srabone Raxit
Student ID: 21-45038-2
Contribution in Percentage (%):21%
Contribution in the Project:

- Project Proposal
- Process model
- Functional Requirements
- State chart diagram
- UI/UX Design
- Test Case
- WBS
- Timeline Chart 2
- Eva Analysis

_____
Signature of the Student

Student Name: Ahnaf Abdullah Zayad
Student ID: 21-45019-2
Contribution in Percentage (%):21%
Contribution in the Project:

- Project Proposal
- Functional Requirements
- State chart diagram
- Class Diagram
- UI/UX Design
- Test case
- Timeline Chart 1
- Timeline Chart 2
- Eva Analysis

_____
Signature of the Student

Student Name: Zarin Tasnim
Student ID: 21-44898-2
Contribution in Percentage (%):21%
Contribution in the Project:

- Project Proposal
- Functional Requirements
- State-Chart Diagram
- Class Diagram
- UI/UX Design
- Effort Estimation
- Timeline Chart 1
- Timeline Chart 2
- WBS
- Risk Management

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Signature of the Student

Student Name: Mahmudul Hasan Shishir
Student ID: 20-43881-2
Contribution in Percentage (%):16%
Contribution in the Project:

- Project Proposal
- Functional Requirements
- Activity diagram
- Risk Management

_____
Signature of the Student

Student Name: Mir Mahinuzzaman
Student ID: 21-44809-1
Contribution in Percentage (%): 0%
Contribution in the Project:

_____
Signature of the Student

1. Project Proposal

1.1 Background to the Problem

In recent years, the traditional landscape of AIUB campus dining has faced countless challenges that have disturbed the need for modernization. Campus dining facilities have long been a base of the university experience, where students come together to grab a quick meal, socialize, and recharge during their busy academic schedules. However, the outdated and often inefficient nature of these dining services has become clear, need a reevaluation of the status quo.

Several factors contribute to this problem:

i. Overcrowding and Lack of Discipline: One of the most significant issues faced by students in campus canteens is overcrowding. The rush during meal hours often results in chaos and a lack of discipline.

ii. Cash-Only Payments: AIUB canteen still relies solely on cash payments, which is inconvenient for students who prefer digital payment methods.

iii. Limited Seating Capacity: Inadequate seating capacity is a persistent issue in the campus canteen. Students often struggle to find a place to sit and enjoy their meals.

iv. Food Wastage: Leftover food from students' plates goes unaccounted for and is discarded, contributing to both financial and environmental waste.

v. Health and Well-being: Campus dining must adapt to provide nutritious choices while also addressing dietary restrictions, allergies, and other issues.

In addition, students suffer due to the inefficiencies and challenges in the campus canteen, enduring frustration and inconvenience caused by overcrowding, lack of discipline, cash-only payments, limited seating, and food wastage. These issues lead to a compromised dining experience, hindering their well-being, productivity, and overall satisfaction on the campus.

The importance of problem specification is underscored by the fact that the existing issues in the campus canteen, such as long wait times and the potential need for students to forgo meals due to time constraints, can have adverse effects on students' health and academic performance. By clearly defining these problems, it becomes evident that addressing the students through a ‘Smart Canteen System’ is not only essential for enhancing the overall campus experience but also for mitigating health risks and ensuring that students have access to nutritious meals during their busy academic schedules. This problem specification serves as a critical driver for the development and implementation of effective solutions that prioritize students' well-being and academic success.

In conclusion, the challenges faced by students in the campus canteen are multi-faceted and impact their overall campus experience. By addressing these issues through the implementation of a Smart

Canteen System, AIUB canteen can create a more pleasant, efficient, and inclusive dining environment for students, enhancing the overall quality of campus life.

1.2 Solution to the Problem

The objective of this project is to enhance the dining experience for students at AIUB by addressing the recurring issues in the campus canteen. Our goal is to design and implement a Smart Canteen System that solves problems related to overcrowding, cash-only payments, limited seating, food wastage, and the risk of students missing meals.

Proposed Solutions are-

i. Queue Management and Seating Optimization:

- Implement a token-based queue management system where students receive digital tokens upon entering the canteen and they can access offline food orders and tokens through a scanner system.
- Utilize state-of-the-art algorithms to efficiently manage queues, ensuring orderly access to food counters.

These solutions improve orderliness, reduce wait times, maximize seating capacity, address overcrowding and seating issues.

ii. Digital Payment Integration:

- Introduce digital payment methods such as mobile Bkash, Nagad, and card system to expedite transactions that promote digital payments through clear signage and notifications.

Digital payments enhance efficiency, promote financial literacy, and align with modern payment trends.

iii. Mobile App for Canteen Services:

- Develop a user-friendly mobile app that allows students to pre-order meals, view the menu, check queue status, and receive notifications when their order is ready, and provide nutritional information and special promotions of food through the app.

The app enhances convenience, transparency, and user engagement.

iv. Food Wastage Prevention:

- Implement measures to discourage food wastage, such as offering smaller portion sizes, redistributing surplus food to those in need and apply charges if needed.

This promotes sustainability, reduces financial waste, and addresses food wastage concerns.

The Impact of Social, Health, safety, Legal and Cultural issues:

The project's impact extends across multiple dimensions, benefiting AIUB students and the campus community. It fosters a harmonious campus environment by improving social interactions, enhances health by ensuring timely access to nutritious meals, bolsters safety through efficient queue management, adheres to legal standards regarding digital payments and food safety, and aligns with contemporary cultural trends by embracing digitalization and convenience in daily life.

Review of existing Studies and Relevant Example:

Numerous studies have explored the benefits and applications of smart canteen systems. These include:

1. Educational Institutions: Smart canteen systems in schools and universities, offering features like cashless payments and automated menu management.
2. Digital Ordering: Research on the convenience and efficiency of mobile apps for food ordering and payment.
3. Sustainability: Studies focusing on reducing food waste and promoting eco-friendly practices through real-time inventory management.
4. User Satisfaction: Assessing user experiences, with factors like ease of use and access to nutritional information.
5. Data Analytics: Exploring how data collected from smart canteen systems can inform decision-making.

Relevant Example of a Smart Canteen:

One relevant example is the "Sodexo MyWay" platform, used in universities and corporate cafeterias. It offers mobile ordering, cashless payments, nutritional information, menu customization, user feedback, and data analytics to enhance service quality.

Target Group of Users and Benefits-

i. AIUB Students & Faculties: They will benefit from reduced wait times, improved access to seating, the convenience of digital payments, and a reduction in food wastage.

ii. Canteen Staff: The system will streamline operations, making it easier for staff to serve customers efficiently.

iii. AIUB Administration: The data collected can inform decisions related to canteen management and resource allocation.

iv. Canteen Management Team: They can easily get access to all resources, and it will help in profit calculations, problem solving, raw materials management, budget issues etc.

This project advances scientific knowledge by implementing a comprehensive, technology- driven solution to real-world canteen challenges. It sheds light on the effectiveness of queue management, digital payments, food waste reduction, and mobile apps in enhancing campus dining. While existing software solutions exist (e.g., digital payment apps), our solution stands out by integrating these elements into a user-friendly ecosystem tailored to AIUB's specific needs, offering a more efficient and holistic dining experience for students, and enhancing their campus life.

2. Selection of Suitable Process Model for the Software Systems

The Waterfall process model is the suitable process model for our project. According to our requirements our project “AIUB Smart-Dine” is a small project and the requirements for our project are also fixed. That is why we think “Waterfall Model” is suitable for our project. The choice to use the waterfall model for our project, given its small scale, is advantageous due to its

simplicity, low complexity, and suitable for projects with stable and well-defined requirements. The linear, structured approach minimizes costly changes and scope creep while ensuring clear documentations, and transparent phases. Although the waterfall model has its limitations, it aligns well with the project characteristics, promoting efficient management and control.

The decision to opt for the Waterfall model for the AIUB Smart-Dine project, rather than alternative methodologies like Agile, V-Model, Incremental, Prototype, Scrum, XP, SDLC, or FDD, is primarily driven by the project's characteristics. With a small scale and well-defined, stable requirements, Waterfall's linear and structured approach fits well. Additionally, Waterfall minimizes costly changes and promotes thorough documentation, which can be crucial for a project like Smart-Dine. While other models offer flexibility and adaptability, Waterfall's simplicity and cost-effectiveness make it a suitable choice, ensuring efficient management and alignment with the project's specific needs.

In the Waterfall process model for the AIUB Smart-Dine project, various roles and responsibilities can be assigned as follows:

Project Manager: Responsible for overall project planning, execution, and successful delivery.

Business Analyst: Primarily involved in requirement elicitation.

System Architect: Tasked with designing the system based on the defined requirements.

Developers: Responsible for coding and programming the system according to the design specifications.

Quality Assurance (QA) Analysts: In charge of rigorous testing and quality assurance at each project phase.

Client or Stakeholder: Engaged at the project's beginning to define requirements and at the project's end to provide formal approvals.

Project Coordinator: Assists the Project Manager in coordinating tasks, communication, and schedules, helping to ensure that the project progresses smoothly.

Risk Management Team: Identifies potential risks and develops mitigation plans.

These roles and responsibilities within the Waterfall model ensure that each aspect of the "AIUB Smart-Dine" project is systematically managed and that tasks are clearly defined, leading to a well-structured, controlled, and documented project progression.

3. Functional Requirements of The Software Systems

1. Smart Card Access

1.1. Smart Card Authentication

- The system shall verify the Smart Card's authenticity and link it to the user's account.
- Upon successful authentication, the user shall gain access to the canteen system.

1.2. Optional Account Lockout (Security Feature)

(Optional) The system may include a feature to temporarily block the user account's login if he/she has a due amount of more than 3 months (3 times).

1.3. Users can have 2 guardians in registration and guardians can use the user's card.

Priority Level: High

Pre-condition: Users must have a valid Smart Card linked to their AIUB University ID.

2. Software Login

2.1. Allow users to create accounts by providing essential information such as username, email, or phone number, and set up a password.

2.2. Enforce to the users to password security measures, including password strength requirements (e.g., length, complexity)

2.3. Provide a password recovery mechanism, allowing users to reset their passwords through email or other verification methods.

2.4. Offer security questions and answers as an additional method for account recovery.

2.5. Set a reasonable session timeout to automatically log users out after a period of inactivity.

2.6. Send notifications to users when suspicious or unauthorized login attempts are detected.

Priority Level: High

Pre-condition: Users must have AIUB University ID, valid user id and password.

3. Digital Payment

3.1. BKash/Nagad/Card popup application launched from home screen.

3.2. The user is prompted to enter a valid AIUB id as reference and valid BKash/Nagad/Card number from which the payment will be made.

3.3. The information is sent to the server and stored in a database.

3.4. The user will be prompted to enter a pin code for the transaction.

3.5. The user cannot proceed until a valid Pin code is entered.

3.6. The application must ensure that the user's information is encrypted and safely stored.

Priority level: Moderate

Pre-condition: None

4. Option for Dine In /Takeout

4.1. The software will let users choose if they want to book a seat and dine in, or just take the food to go.

4.2. The user will get an option to choose to dine in / take out after choosing their meal from the menu.

4.3. If they choose to dine in, software will redirect the user to see the available seats.

4.4. If there are no seats available, the software will suggest the user to take out their meal or wait for available seats.

Priority Level: High

Pre-condition: Must have an account.

5. Suggestive Food

5.1. Develop a recommendation algorithm that considers user preferences, past orders, and behavior to suggest food options. EX: Collaborative filtering, content-based filtering, and hybrid recommendation techniques can be employed.

5.2. Use machine learning models to analyze user data and predict food preferences. Consider factors like time of day and weather when making suggestions.

5.3. Implement filters and options for users to specify dietary restrictions such as vegetarian, vegan, gluten-free, and low-carb.

5.4. Incorporate a feedback mechanism for users to provide input on food recommendations and report any issues.

5.5. Maintain a history of users' orders, allowing them to easily reorder their favorite items.

Priority level: Low

Pre-condition: Must have an account.

6. Pre- order

Implementing a pre-order option with both time and meal customization in a food app adds complexity to the system but can enhance user experience significantly.

6.1. In our app we must have to pre-order options for food.

6.2. Display the restaurant's menu with detailed descriptions, images, prices, and availability times for pre-orders.

6.3. Implement mealtime options (e.g., breakfast, lunch, dinner)

6.4. Enable users to customize their pre-orders by selecting food items, specifying portion sizes, adding special instructions, and making dietary requests.

6.5. Provide real-time updates on the status of pre-orders, including confirmation, preparation, and estimated pickup or delivery times.

6.7. Send order confirmation notifications to users once their pre-order is successfully placed.

6.8. Allow users to apply promotional codes and discounts to their pre-orders.

Priority level: High

Pre-condition: Must have an account.

7. Calorie Count with Menu Items

7.1. The software will allow users to see the calorie count of the food items they chose from the menu.

7.2. The software integrates with the canteen’s menu database, ensuring that each menu item has associated calorie information.

7.3. When users browse the menu, each item is accompanied by its calorie count, prominently displayed next to the item name or description. So that users can easily identify and choose menu items that align with their health and fitness goals, whether it is weight management, balanced nutrition, or specific dietary needs.

7.4. Users can track their calorie intake and progress toward their dietary goals, making it easier to achieve and maintain a healthy lifestyle.

Priority Level: Low

Pre-condition: None

8. Allergen and Dietary Restriction

Implementing allergen and dietary restriction options in a food app is essential for providing a safe and enjoyable dining experience for users with specific dietary needs.

8.1. Allow users to set their dietary preferences and allergens in their profile settings.

8.2. Display allergen and dietary information clearly to help users quickly identify suitable food options.

8.3. Enable users to customize their food orders to accommodate their dietary needs, such as removing or substituting certain items.

8.4. Provide alerts or warnings when a selected menu item contains allergens or dietary ingredients that the user has specified as restrictions.

8.5. Ensure that allergen and dietary restriction information is available offline to assist users when they have limited internet connectivity.

Priority level: Moderate

Pre-condition: Must have an account.

9. Reward Points

9.1. After completing an order there will be some points and these will be added as rewards.

9.2. Students can avail themselves of discounts by the rewarded points.

Priority Level: Moderate

Preconditions: Must have at least 5 orders.

10. Customer Support

10.1. A comprehensive help center, or FAQ section is available within the software. It contains answers to frequently asked questions, troubleshooting guides, and other helpful resources for users to find solutions independently.

10.2. Users can submit support tickets in the AIUB Canteen in a designated box detailing their issues or concerns. Each ticket is assigned a unique reference number, and customers can track the status and progress of their inquiries.

10.3. Provide a dedicated customer support phone line for users who prefer to speak directly with a support agent for more complex or urgent matters.

10.4. Users can send detailed inquiries or feedback via email, and support staff respond promptly with assistance or information.

Priority level: High

Pre-condition: Must have an account.

11. Real Time Feedback & Review

Implementing a real-time feedback and review option in a food app allows users to share their experiences, provide feedback, and rate their interactions with restaurants and delivery services

quickly.

11.1. Require users to log in or create an account to leave feedback and reviews.

11.2. Design a user-friendly interface that allows users to easily find and access the feedback and review feature.

11.3. Allow users to leave several types of reviews, such as ratings for food quality, delivery time, service, and overall experience.

11.4. Provide a text comment section for users to write detailed reviews and share specific feedback.

11.5. Allow users to upload photos of their food, packaging, or dining experience to accompany their reviews.

11.6. Implement a rating system (e.g., star ratings) to summarize user feedback quickly.

11.7. Allow users to report reviews that violate community guidelines or contain false information.

11.8. Provide users with options to post reviews anonymously or with their usernames.

11.9. Notify users when a restaurant responds to their review and Allow users to access their review history and edit or delete their reviews if needed.

Priority level: Moderate

Pre-condition: Must have an account.

12. Token

12.1. Create a method for generating unique tokens for each food order. Tokens can be in the form of paper tickets.

12.2. Assign tokens to each customer's order at the time of ordering, including the order number and any special instructions.

12.3. Notify customers when their food order is ready for pickup, using the assigned token. This can be done through voice announcements and digital displays.

12.4. If there is a queue for food pickup, implement a system for managing and displaying the order of tokens in the queue.

12.5. Define rules for token expiration, specifying the time limit within which customers must pick up their orders.

12.6. Protect customer information and token data to maintain privacy and security.

Priority level: Moderate.

Pre-condition: None.

13. Software Logout

13.1. The user clicks on Logout to terminate their session.

13.2. The system shall provide a mechanism for logged-in students to log out of the software.

13.3. When logging out a user the system shall invalidate the cookie storing the session data.

13.4. When logging out a user the session data will be removed.

Priority level: High

Precondition: Must log in first.

14. Account Remove

Implementing an account removal option, also known as account deletion.

14.1. Implement a two-step verification process to confirm the user's deleted account. This may involve sending a confirmation email or text message with a unique verification code.

14.2. Send a confirmation email or notification to the user once their account has been successfully removed.

14.3. If users do not log in in their account, the account will be deleted automatically.

Priority level: High

Precondition: Must have an account first.

4. Diagrams

4.1 Use Case Diagram

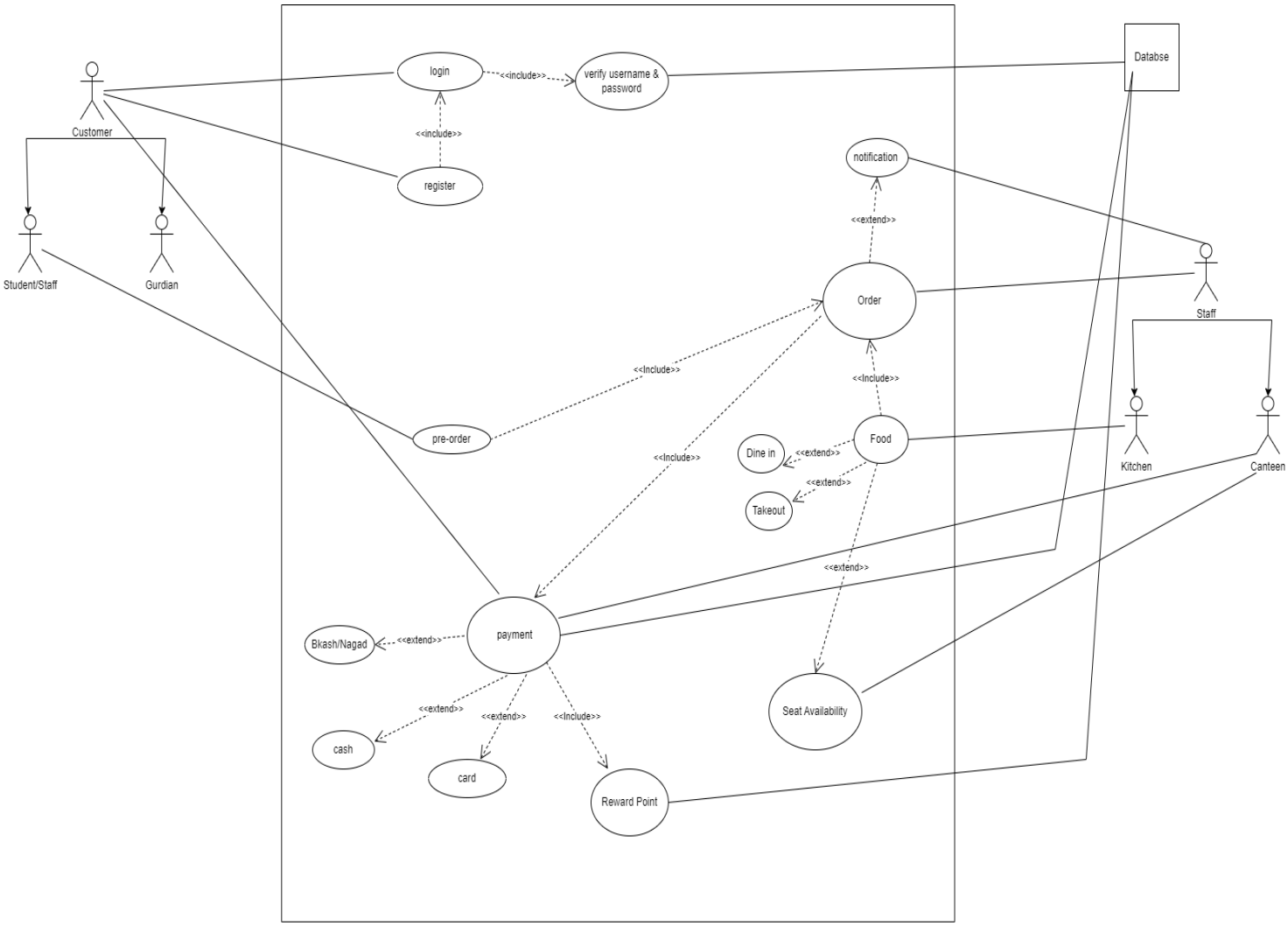


Figure 4.1.1: Visual View of AIUB Smart-Dine in Use Case Diagram

4.2 Class Diagram

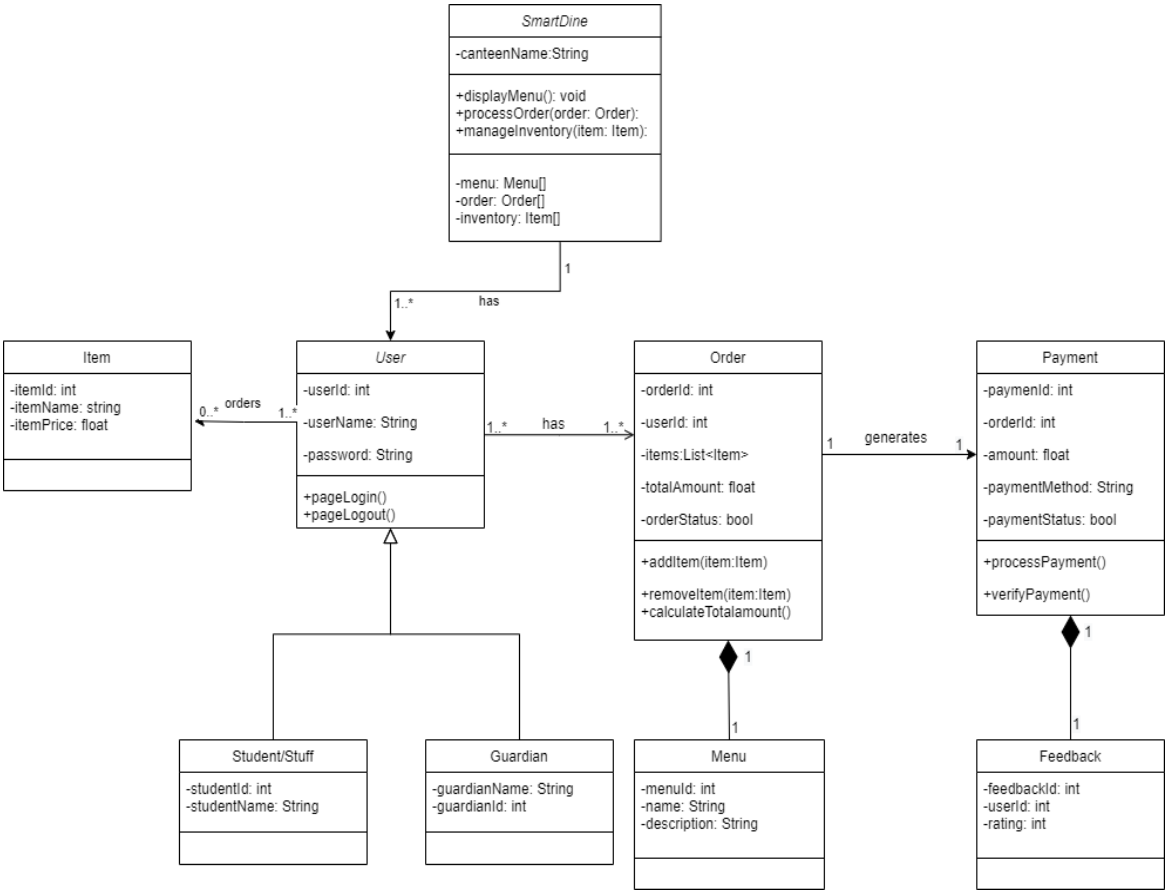


Figure 4.2.1: Visual View of AIUB Smart-Dine in Class Diagram

4.3 Activity Diagram

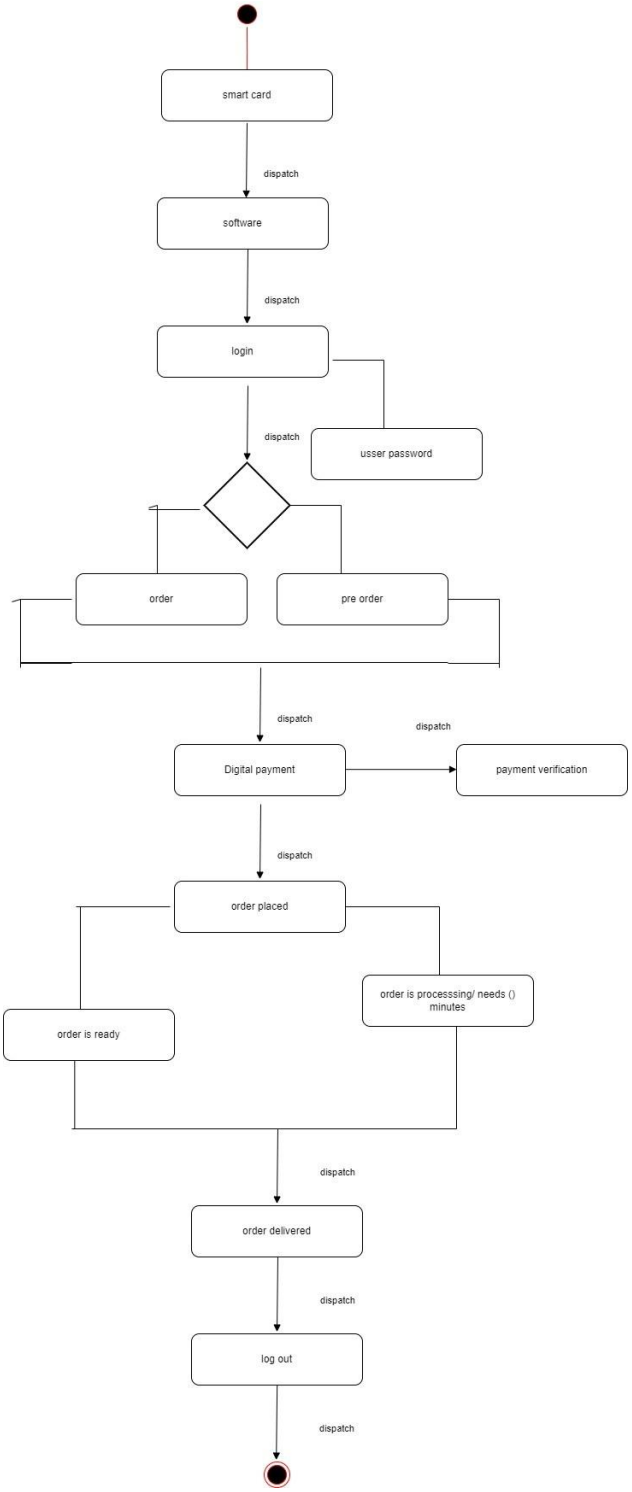


Figure 4.3.1: Visual View of AIUB Smart-Dine in Activity Diagram

4.4 State-chart Diagram

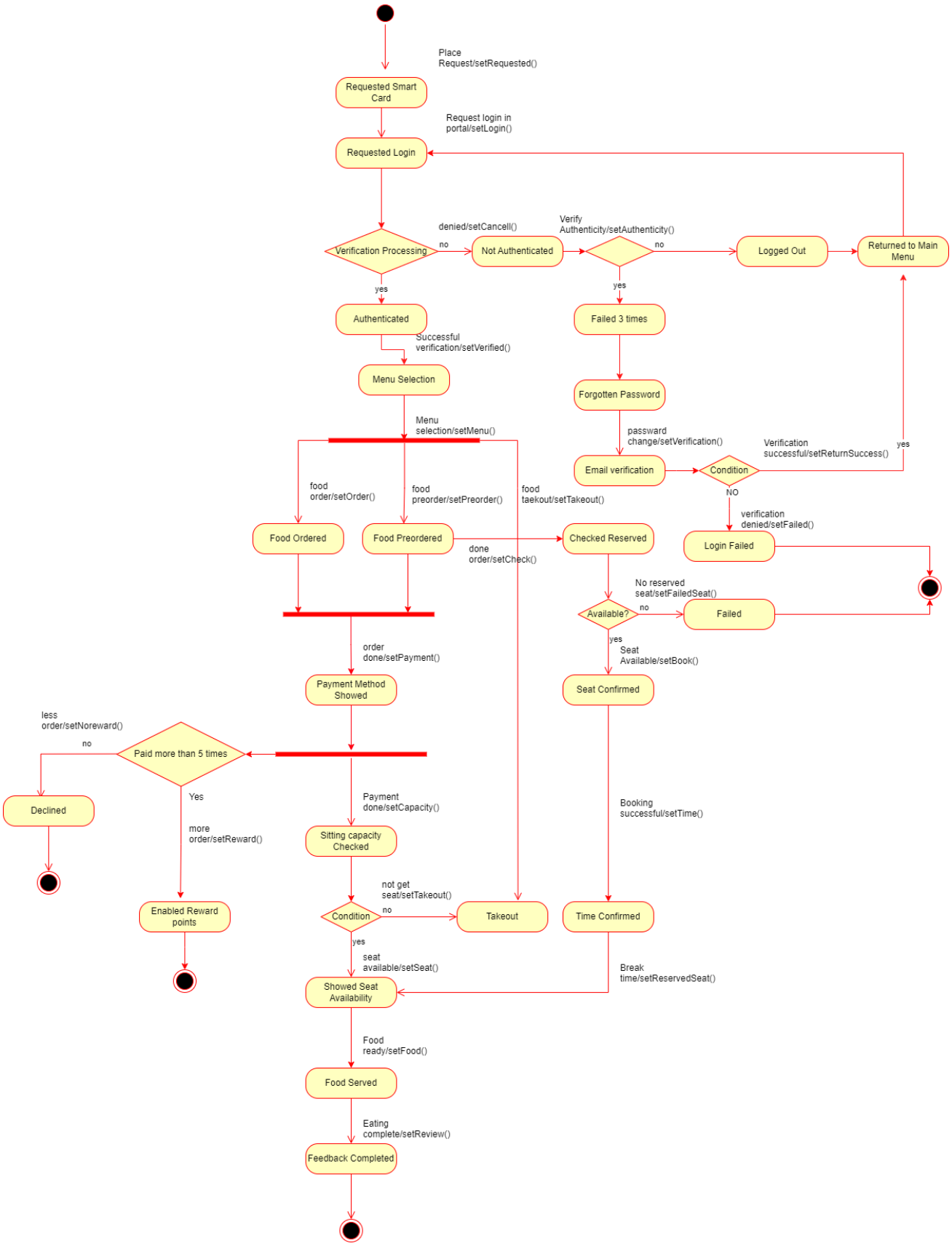
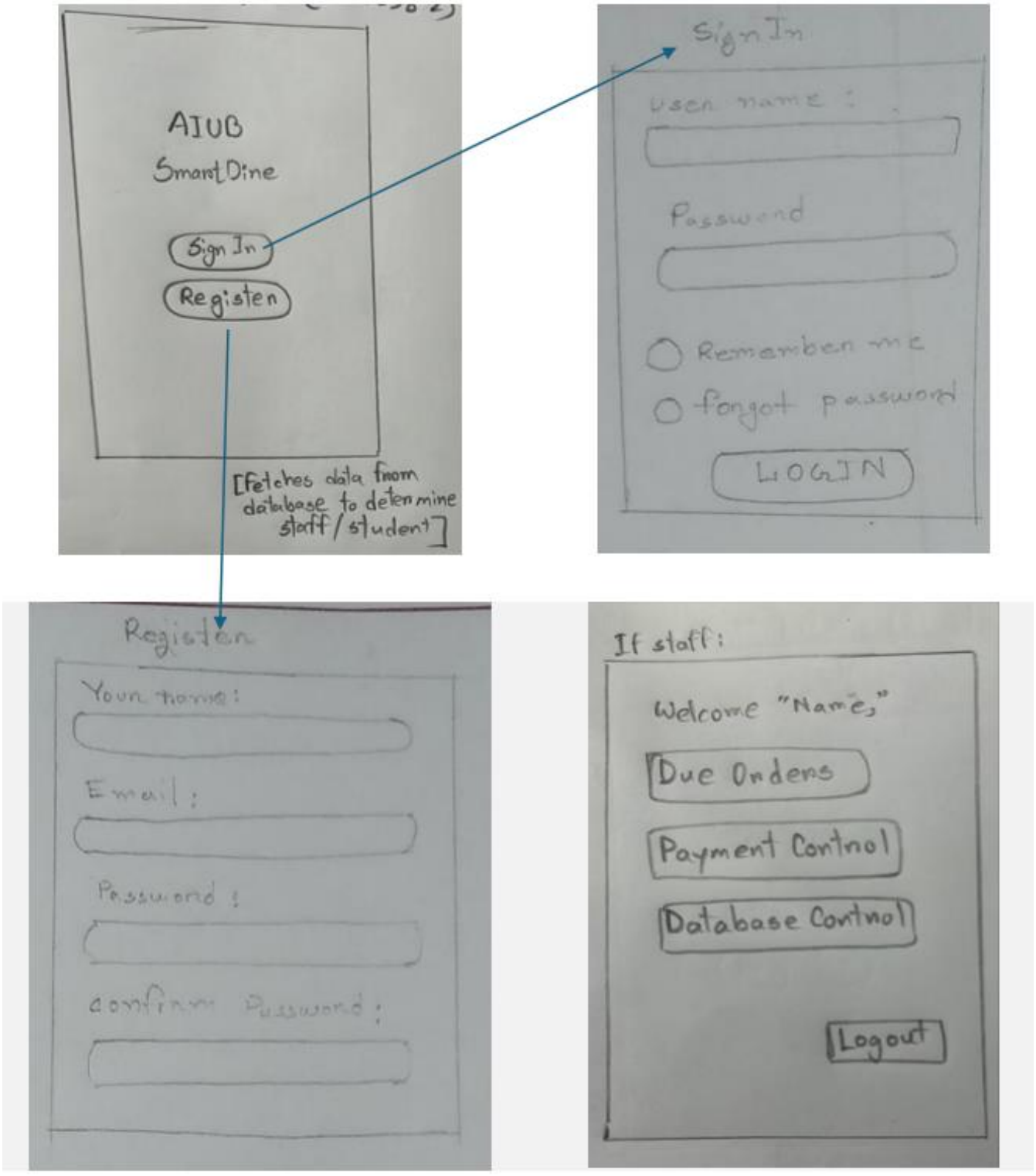
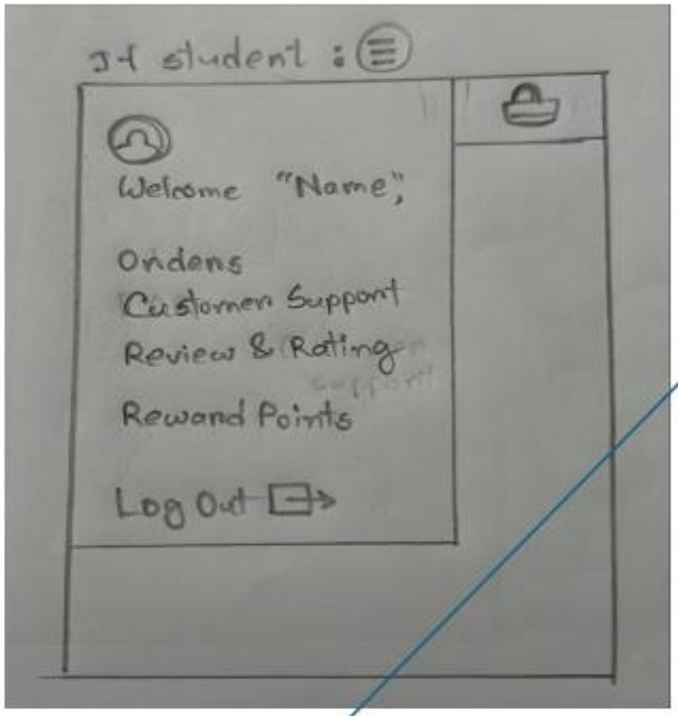
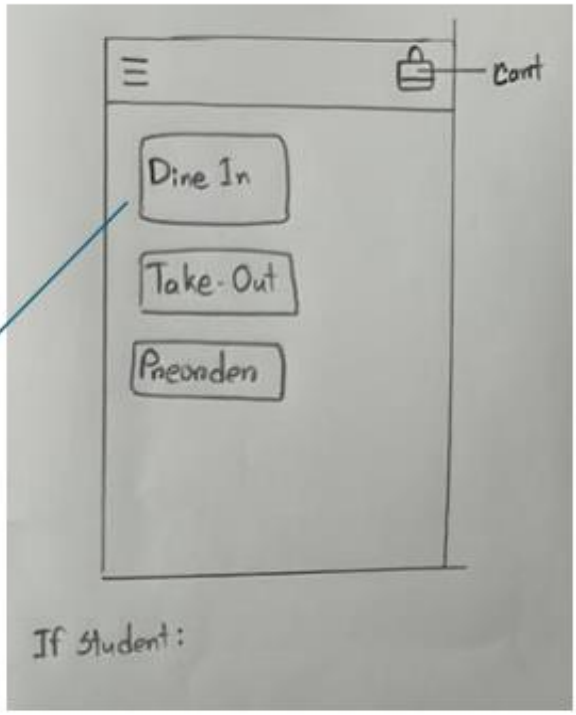


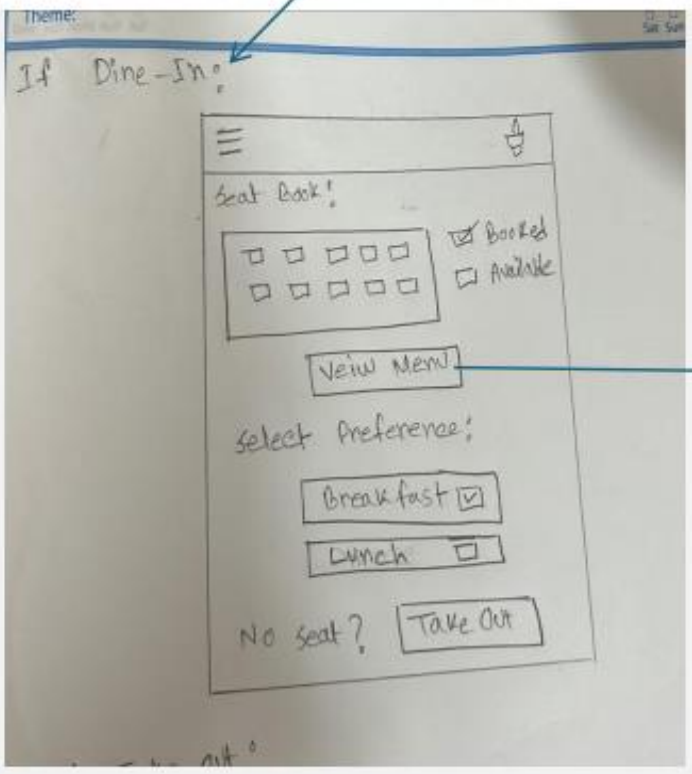
Figure 4.4.1: Visual View of AIUB Smart-Dine in State-Chart Diagram

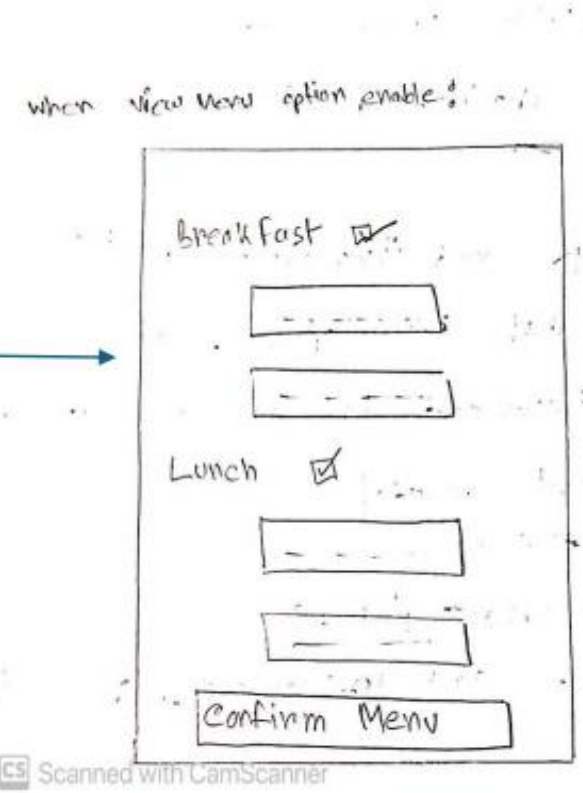
5. Ux/ UI Design

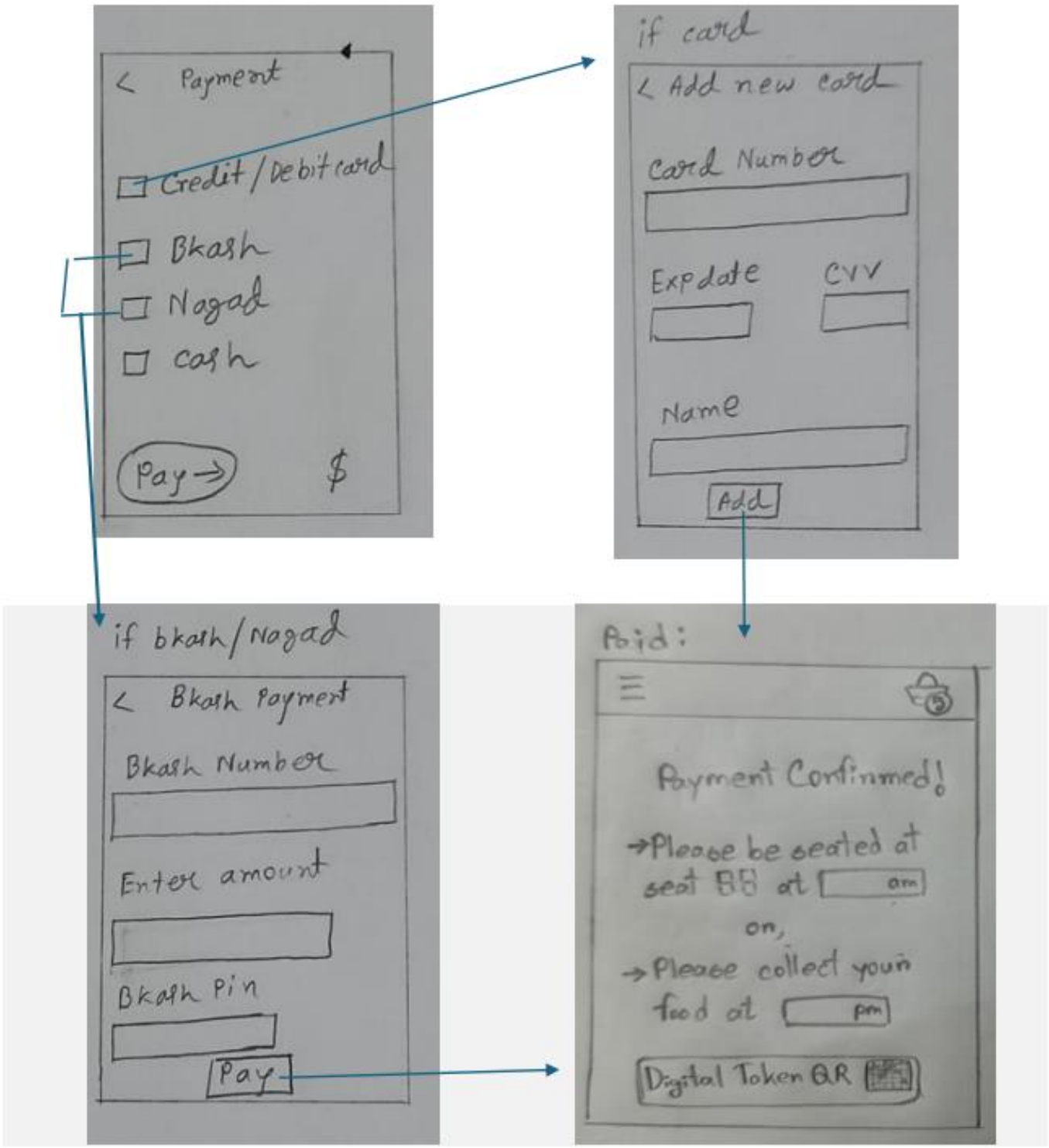








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on,
→ Please collect your food at [pm]
Digital Token QR

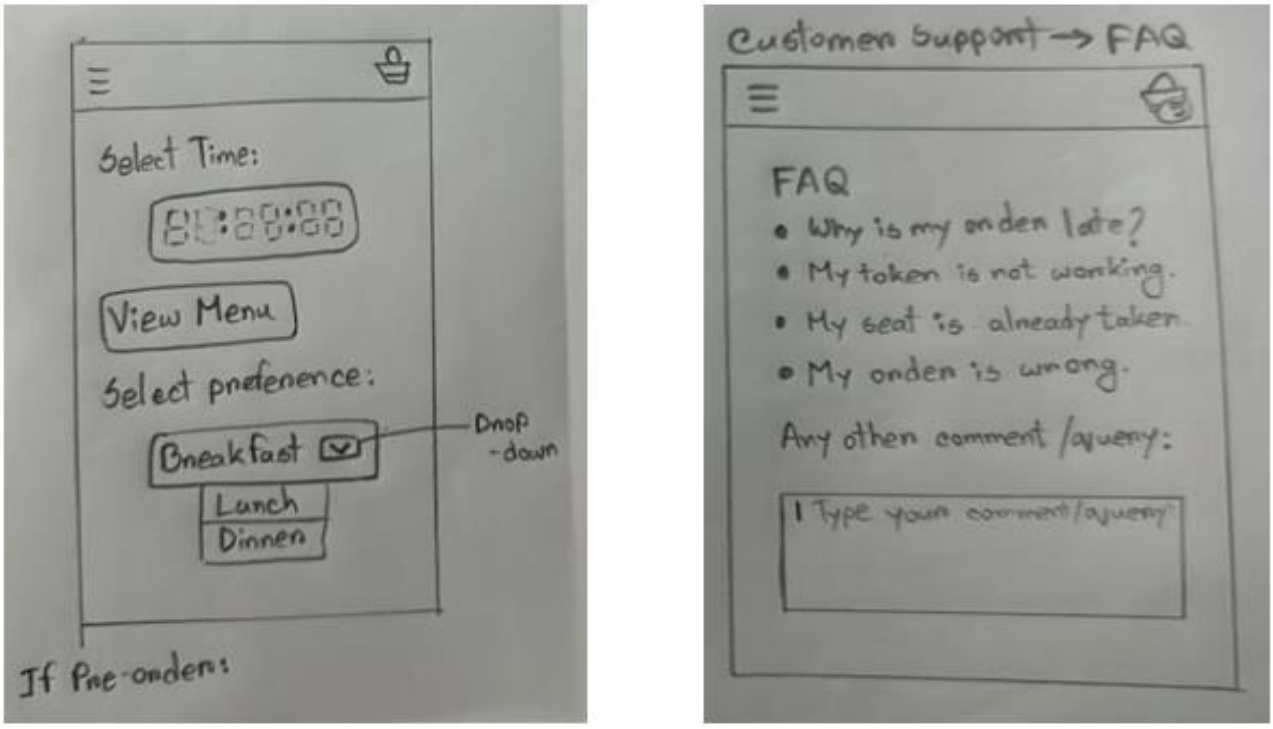


Figure 5.1: User Interface of Smart-Dine

6. Test Automation

6.1.

Project Name: **Software Login**			Test Designed by: Ashik	
Test Case ID: FR_1			Test Designed date:12-12-23	
Test Priority (Low, Medium, High): HIGH			Test Executed by: Zayad	
Module Name: Login Session			Test Execution date:12-11-23	
Test Title: verify login with valid username and password				
Description: Test software login with username and password				
Precondition (If any): User must have valid ID				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the software 2. Enter username 3. Enter password 4. Click ENTER	Username: password Password: 111	User should login into the application	As expected,	Pass
Post Condition: User is validated with database and successfully login to account. The account sessiondetails are logged into the database.				

6.2.

Project Name: **Smart Card Access**	Test Designed by ashik
Test Case ID: FR_2	Test Designed date: 12-12-23
Test Priority (Low, Medium, High): high	Test Executed by:zayad
Module Name: Access session	Test Execution date: 12-12-23
Test Title: login for payment the bill	
Description: Test smart card access for payment	
Precondition (If any): Users must have a valid Smart Card linked to their AIUB University ID.	

Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the payment 2. Enter card number 3. Enter password 4. Click submit	Username: 25172651 Password: 1222	User should access the card for payment	As expected,	Pass
Post Condition: User is validated with database and successfully login to account. The account sessiondetails are logged into the database.				

6.3.

Project Name**: Software Logout**			Test Designed by: Ashik	
Test Case ID: FR_1			Test Designed date: 12-12-23	
Test Priority (Low, Medium, High): High			Test Executed by: Zayad	
Module Name: Logout Session			Test Execution date: 12-12-23	
Test Title: logout with valid username and password				
Description: Test software logout option				
Precondition (If any): User must have valid ID				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the logout option 2. Enter username 3. Enter password 4. Click submit	Username: 99999999999 Password: 321	User should logout form the application	As expected,	Pass
Post Condition: User is validated with database and successfully logout from account.				

6.4.

Project Name: **Account Remove**			Test Designed by ashik	
Test Case ID: FR_1			Test Designed date: 12-12-23	
Test Priority (Low, Medium, High): high			Test Executed by:zayad	
Module Name: Remove season			Test Execution date: 12-12-23	
Test Title: Remove account				
Description: Test software for remove an account				
Precondition (If any): User must have valid id with username and password				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the application 2. Go to the delete account option 3. Enter username 4. Enter password 5. Click submit	Username: 99999999999 Password: 321	should delete an id from application	As expected,	Pass
Post Condition: Nothing				

6.5.

Project Name: **Pre Order**	Test Designed by: Ahnaf
Test Case ID: FR_1	Test Designed date: 12-nov-23
Test Priority (Low, Medium, High): High	Test Executed by: Ahnaf
Module Name: Pre-order Session	Test Execution date: 12-nov-23
Test Title: verify pre order option with time and meal customization	
Description: Test app pre order page	

Precondition (If any): User must have an account				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the application pre order option. 2. Enter mealtime option. 3. Select food. 4. Select payment option. 5. Apply promotional code. 6. Click apply	Mealtime: Lunch Food: Fried Rice Payment Method: Bkash	User should get a confirmation message	As expected,	Pass
Post Condition: Nothing				

6.6.

Project Name: **Digital Payment**			Test Designed by: Ahnaf	
Test Case ID: FR_2			Test Designed date: 12-nov-23	
Test Priority (Low, Medium, High): High			Test Executed by: Ahnaf	
Module Name: Payment session			Test Execution date: 12-nov-23	
Test Title: Verify payment option with Bkash payment				
Description: Test Payment Page				
Precondition (If any):				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)

1. Select payment option. 2. Enter AIUB id. 3. Enter Amount 4. Enter pin code. 5. Select make payment	Payment option: Bkash AIUB id: 21-45019-2 Amount: 320 Pin code: 41561	User should get a Transaction message	As expected,	Pass
Post Condition: Nothing				

6.7.

Project Name: **Feedback and Review**			Test Designed by: Ahnaf	
Test Case ID: FR_3			Test Designed date: 12-nov-23	
Test Priority (Low, Medium, High): Medium			Test Executed by: Ahnaf	
Module Name: Feedback and Review Session			Test Execution date: 12-nov-23	
Test Title: Verify Feedback and review of the food after mealtime				
Description: Test Feedback and Review page				
Precondition (If any): User must have an account				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the Feedback and Review option. 2. Enter Review in the text comment box. 3. Click Enter.	Review: Food was good	User should get a Thank you message	As expected,	Pass
Post Condition: Nothing				

7. WBS (Work Breakdown Structure)

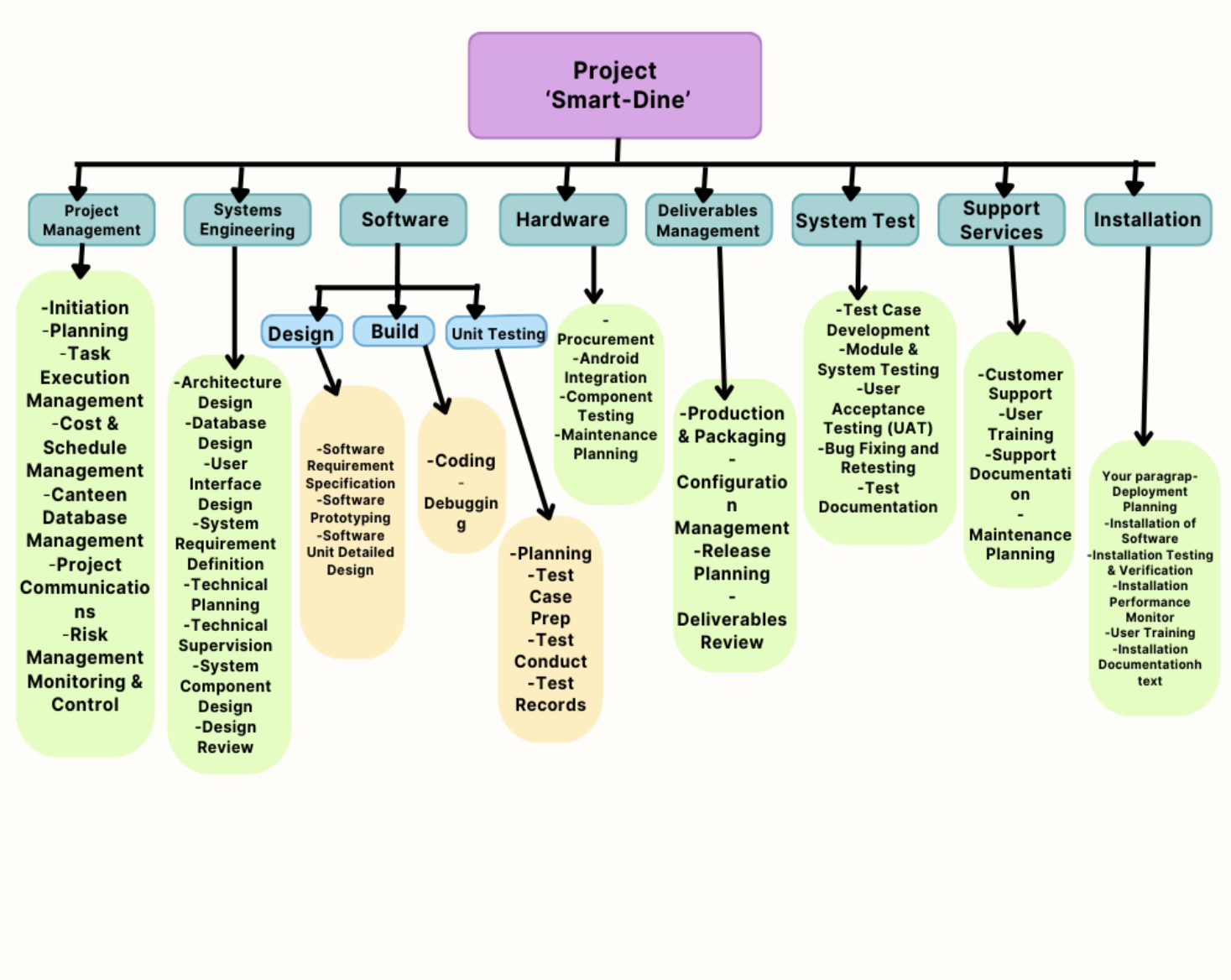


Figure 7.1: WBS for our Smart-Dine Project

8. Effort Estimation for Smart Dine

As our project is an organic type of project,

SLOC (source lines of code) = 7000

P (project complexity) = 1.05

T: (SLOC-dependent coefficient) = 0.38

Now,

Effort = PM (person-months needed for project (labor working hours))

= Coefficient$_{<\text{Effort Factor}>}$*(SLOC/1000) ^P

= 2.4 * (7000 / 1000) ^1.05

= 18.517

DM (development duration time in months for project (weekdays))

= 2.50*(PM)^T

= 2.50 * (18.517) ^0.38

= 7.579

ST (average staffing necessary)

= PM/DM

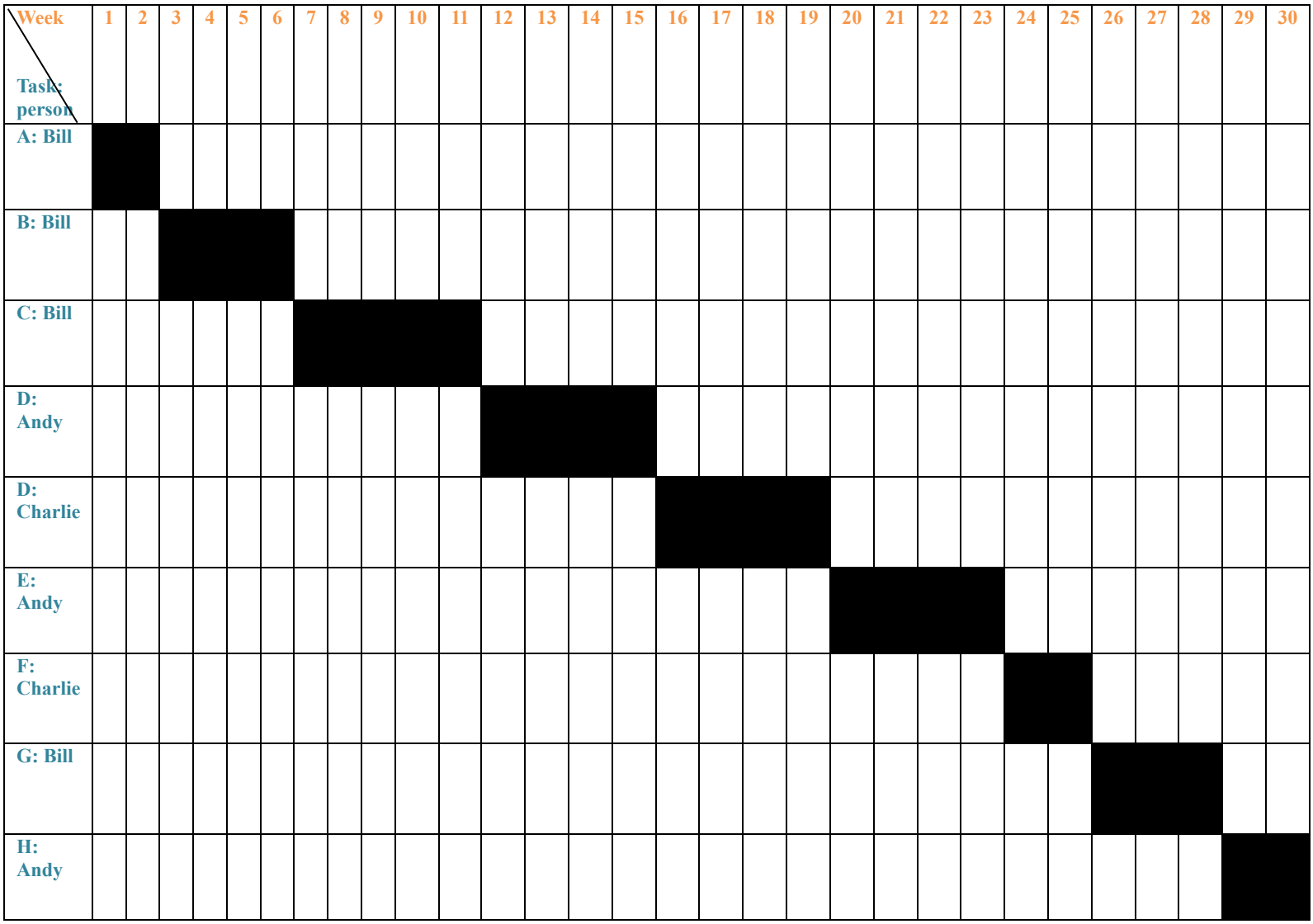
= 18.517 / 7.579

= 2.443

= 3

9. Timeline Chart

9.1. Timeline Chart-1:



A: Requirements modeling

B: Architectural design

C: Component design

D: Code generation

E: Unit testing

F: Integration testing

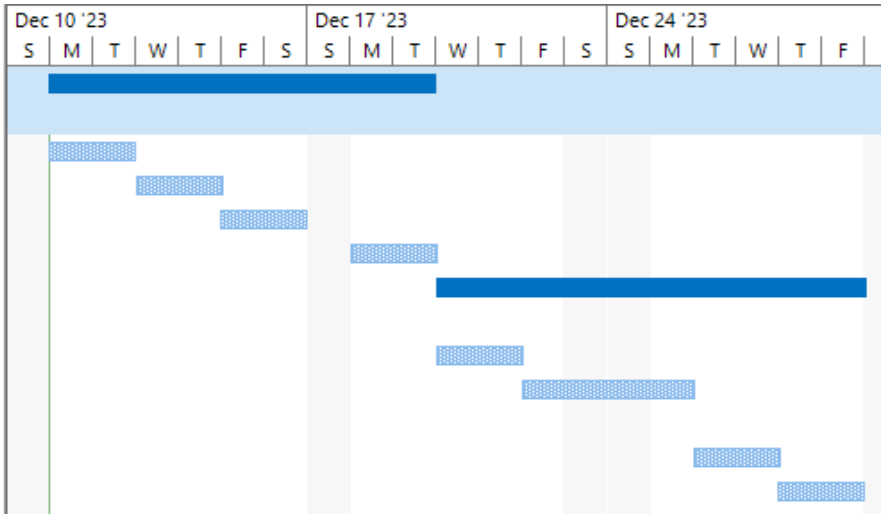
G: System testing

H: Acceptance testing

9.2. Timeline Chart-2:

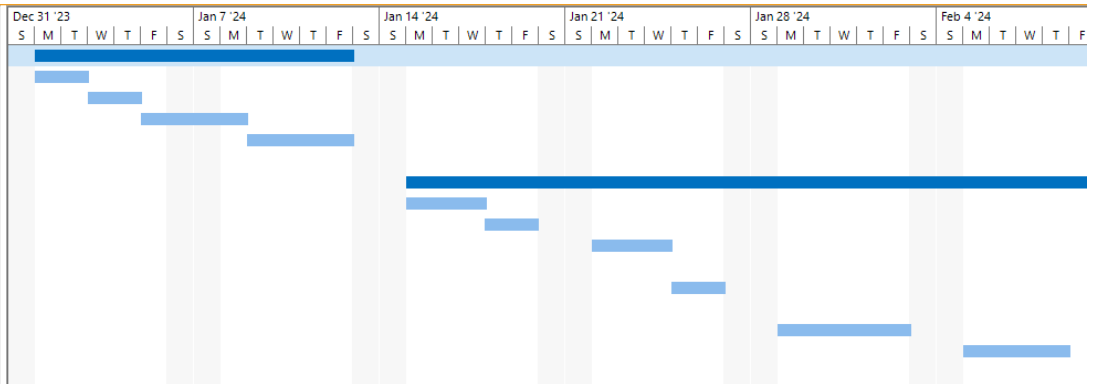
- Requirement Modeling & Architectural Design:

Task Mode	Task Name	Duration
	Requirement Modeling	8 days
	Use case Diagram	2 days
	Class Diagram	2 days
	Activity Diagram	2 days
	State chart Diagram	2 days
	Architectural Design	8 days
	Sign in/ Register	2 days
	Menu/Order placement	2 days
	Payment Method	2 days
	Customer Support	2 days



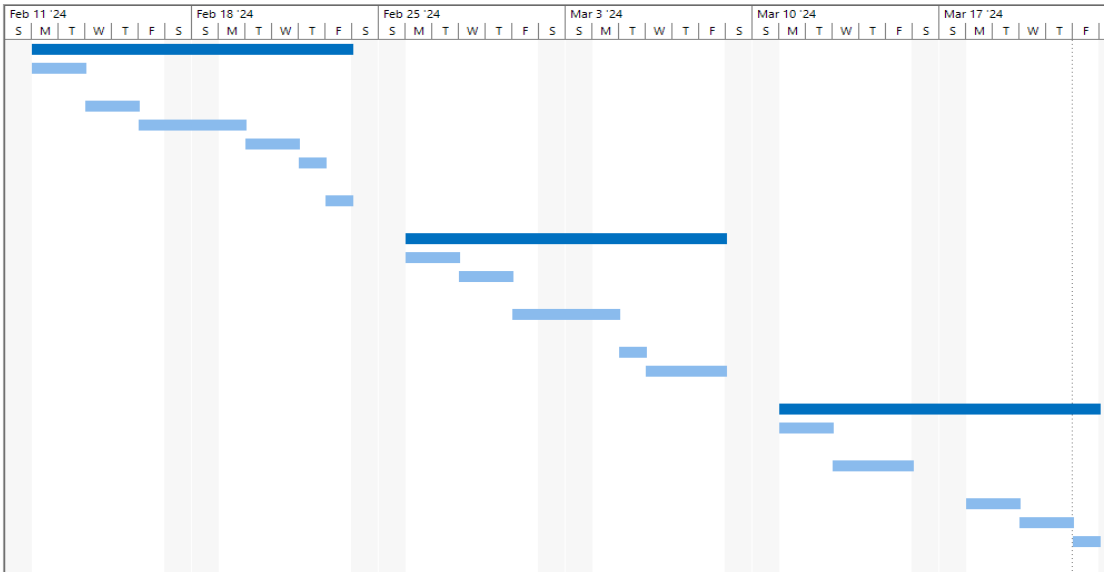
- Component Design & Code Generation:

Task Mode	Task Name	Duration
	Component Design	10 days
	Component 1	2 days
	Component 2	2 days
	Component 3	2 days
	Component integration	4 days
	Code Generation	20 days
	API configuration	3 days
	System Integation	2 days
	IOS and Andoid integrration	3 days
	Transaction processing	2 days
	User Inteface	5 days
	Database implementation	4 days



- Unit Testing, Integration Testing & System Testing:

Task Mode	Task Name	Duration
	Unit Testing	10 days
	Login Session testing	2 days
	Bill Payment testing	2 days
	Logout Testing	2 days
	Deletion testing	2 days
	Pre order page testing	1 day
	Feedback and review testing	1 day
	Integration testing	10 days
	All pairs testing	2 days
	Bounday value analysis	2 days
	Cause and effect graph	2 days
	Error guessing	1 day
	State transition Technique	3 days
	System Testing	10 days
	Functionality testing	2 days
	Performance testing	3 days
	Scalability Testing	2 days
	Reliability testing	2 days
	Configuration testing	1 day



10. EVA Analysis

Task	Planned Effort	Actual Effort
1	15	16
2	15	17
3	15	15
4	15	11
5	15	12
6	6	4
7	13	15
8	15	12
9	12	15
10	12	13
11	13	-
12	13	-

Here,

Given Total Task = 44; Effort Estimated = 407 Person Day

BAC = 407

SPI = BCWP/BCWS = 133/159 = 0.8365

SV = BCWP-BCWS = 133-159 = -26 person-day

Now,

CPI = BCWP/ACWP = 133/130 = 1.02307

CV = BCWP-ACWP = 133-130 = 3 person-day

So, %Schedule for completion = BCWS/BAC

= (159/407) * 100

= 39.07%

[% of work schedule to be done at this time]

Again,

Complete = BCWP/BAC

= (133/407) * 100

= 32.68%

[% of work completed at this time]

11. Risk Management

Risk	Category	Probability	Impact
Size estimate may be significantly low	PS	30%	2
Larger number of users than planned	PS	80%	3
Less reuse than planned	PS	50%	3
End-user resist system	BU	20%	3
Delivery deadline will be tightened	BU	50%	3
Funding will be lost	CU	40%	1
Customer will change requirements	PS	70%	2
Technology will not meet expectations	TE	60%	1
Lack of training on tools	DE	30%	3
Staff inexperienced	ST	20%	2
Staff turnover will be high	ST	50%	2
Wrong estimation of available seat	CU	60%	2
Software Updating functionality	TE	35%	2
Data secure and software maintenance	TE	20%	2

Rubric for Project Assessment (CO1)

Marking Criteria	Marks Distribution (Maximum 3X5=15)				Acquired Marks
	Inadequate (1-2)	Satisfactory (3)	Good (4)	Excellent (5)	
Background Analysis	No background information regarding the project is given; project goals and benefits are missing.	Insufficient background information is given; project goals and benefits are poorly stated	Sufficient background information is given; the purpose and goals of the project are explained.	Thorough and relevant background information is given; project goals are clear and easy to identify.	
Analysis the impact of societal, health, safety, legal and cultural issues	Student vaguely discuss the impact of societal, health, safety, legal and cultural issues in their project	Student provided with partial relevance to the impact of societal, health, safety, legal and cultural issues in their project	Student fairly provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	Student comprehensively provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	
Existing Studies and Relevant Example	Ambiguous representative example.	Partially identify / indicate towards real-life example.	Real-life example is fairly connected towards the definition.	Comprehensively defend with real life example.	
				Acquired Marks:	
				CO Pass / Fail:	

Rubric for Project Assessment (CO2)

Criteria	Marks distribution (Max 3X5= 15)				Acquired Marks
	Inadequate (1-2)	**Satisfactory (3)**	**Good (4)**	**Excellent (5)**	
Argumentation of Model selection with Evidence of Argumentation	Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model	Articulates a position or argument for choosing models that are unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice	Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model	Clearly articulates a position or argument for the choosing software engineering models. Presents enough evidence to support argument for the model selection	
Role identification and Responsibility Allocation	The project has poor project management plans for identifying roles and assigning the responsibilities	Identify few roles in the project management where some of the roles are left alone with any project responsibilities	Identify most of the roles in the project management and assign their responsibilities	Well planned project with proper role identification and responsibility allocation in the project management activities	
Submission, Completeness, Spelling, grammar and Organization of the Project report	Project report is not complete and Several errors in spelling and grammar. Present a Confusing organization of concepts, supporting arguments, and real-life example. Sentences ramble, and details are repeated.	Some errors in spelling and grammar. Some problems of organizing the answer in a logical order of defining, elaborating, and providing real-life examples.	Few errors in spelling and grammar. Presents most of the details in a logical flow of organization in definition, details, and example.	Project report is complete and No errors in spelling and grammar. Consistently presents a logical and effective organization of definition, details, and real-life example of the topic.	
				Acquired marks:	
				CO Pass / Fail:	