Project Phase 1

Co-Working Space Management System

The Final Group

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Business needs

1. The system must be a membership system. 2. The system must be provided on a web browser.

Function requirement

Customer Part	
FR01	Customers need to have an account first, before applying for a membership.
FR02	Membership systems offer different membership tiers with varying periods and pricing: Daily / Monthly / Annual.
FR03	Customers must create an account with fill information into the system including first name, last name, address, and phone number.
FR04	Customers must deposit money or pay upfront.
FR05	Users can choose specific time slots when booking workspaces or meeting rooms for a particular day.
FR06	Users are required to select a specific date, time, and desired capacity (number of desks and chairs) for their booking.
FR07	Once the booking details are confirmed, users must proceed with payment before finalizing the reservation.
FR08	The system supports three payment options: credit card, bank transfer, and TRUE wallet.
FR09	The system must integrate with external banking APIs for processing bank transfer payments.
FR10	The booking is confirmed only after successful payment is made.

FR11	Customer selects a booking slot and doesn't complete payment within 30 minutes, the slot becomes available for other users.
FR12	To be eligible for a refund, cancellations must be requested at least 24 hours before the reserved time or before the user starts working in the co-working space, whichever comes first.
FR13	Refunds will be issued to the original payment method used during the booking process.
FR14	Users can edit, update, and suspend profiles.
FR15	Customers should be able to view detailed information about each co-working space, such as photos, descriptions, amenities, and reviews from other customers.
FR16	Customers should be able to contact the co-working space directly through the system with questions or concerns.
Employee Part	
FR17	Employee officers can access the system to view customer reservations, allowing them to manage equipment and resources accordingly.
FR18	The system shows the reserved co-working spaces to the employee system, reserved dates, and the number of reserved chairs.
FR19	Employee's system can check the availability of stock for supporting items (e.g., power extension cords, snacks, and computer peripherals) for customers' needs.
FR20	The employee's system side can access the CCTV system in the co-working space to monitor security on-site.
FR21	The employee can generate an income report for a specified date range based on the payments made by customers for seat bookings.

Manager Employee Part	
FR22	Managers have the privilege to add, delete, or manage employee information within the system.
FR23	Manager's system can log in into the system and they can see the total revenue that they get on each particular day and for each particular month, so they can do the income report to the owner of the co-working space.
FR24	Managers should be able to customize income reports and analytics.
Quality and System Requirements	
FR25	The system must be able to store the amount of member data maximum to one million.
FR26	The system must be able to support 1000 concurrent users at one particular time.
FR27	The system must have a design in the tone of blue and white as a color theme.
FR28	The system must encrypt customer data, including names, addresses, phone numbers, and transaction details, stored in the database

Non-Functional Requirements

Usability	
NR01	The booking process must be able to be completed within 5 minutes
NR02	Instructions during booking and payment should be presented in a step-by-step format, with no more than 3 steps for users to follow, and each step should be completed in under 80 seconds.
NR03	The booking process should be simple and intuitive, consisting of three steps or less, and allowing customers to complete reservations effortlessly.
NR04	Customers should easily view booking history, membership details, and payment records within two clicks from the homepage.
NR05	Modifying reservations, changing time slots, and making edits should be straightforward, consisting of three steps or less to complete each task.
NR06	Navigation should be intuitive, allowing users to access features and pages within one additional click from the homepage.
NR07	The Co-working Space Management System must be accessible through web browsers.
Security	
NR08	User data, including personal and payment information, should be encrypted and safeguarded.
NR09	Payment security should cover credit card, bank transfer, and true wallet transactions.
NR10	Sensitive user data should be encrypted for protection.
NR11	Data access should be restricted based on roles.
NR12	The encryption algorithm must be strong enough to protect user data from unauthorized access, even if an attacker has access to the ciphertext.
NR13	The encryption algorithm should be the AES algorithm.
NR14	The AES algorithm is resistant to a variety of known attacks, including brute-force attacks, differential analysis, and linear cryptanalysis.
NR15	The AES algorithm is also relatively fast and efficient, making it suitable for a variety of applications.

Performance	
NR16	The system should handle 1000 concurrent users smoothly across all roles.
NR17	Managerial interface should load quickly and provide easy access to revenue reports, occupancy analytics, and employee management.
Scalability	
NR18	The database should scale to accommodate up to one million user accounts and their data.
Maintainability	
NR19	Reports should be exportable in formats like PDF and Excel.
Portability	
NR20	The design should be cohesive across both Windows and macOS.
NR21	The interface should adapt to different screen sizes and resolutions.

Identifying Actors [System: Website]

External Parties:

1. **Customer:**
   - **Role:** Member of the coworking space seeking workspace for work purposes.
   - **Responsibilities:**
     - Create an account on the coworking space system to register as a member.
     - Apply for membership by providing necessary details and selecting membership plans.
     - Access the system to view availability of workspaces, including date, time, desks, and chairs.
     - Book a timeslot for desired work sessions, specifying the number of chairs and desks required.
     - Make secure online payments for membership fees and workspace bookings.
     - Cancel a booking if needed, with the option to receive refunds as per the cancellation policy.
2. **Employee at Coworking Space:**
   - **Role:** Staff responsible for coworking space operations and customer service.
   - **Responsibilities:**
     - Check and manage reservations to ensure proper workspace allocation.
     - Handle equipment rentals such as power plugs, cables, mouse, and keyboards.
     - Monitor CCTV system for security and safety within the coworking space.
     - Manage stock of snacks and amenities available to customers.
     - Maintain accurate records of reservations and customer interactions in the system.
3. **Manager:**
   - **Role:** Oversees the overall coworking space operations and administration.
   - **Responsibilities:**
     - Monitor and analyze the coworking space's reservation number of people, revenue, and expenses.

- Login with privileges to do income reports and manage employee accounts.
- Manage employee information, including adding and editing staff details.
- Access CCTV system for security and safety within the coworking space.

4. Co-Working owner:

- **Role:** The Co-Working Owner is responsible for overseeing the co-working space's operations and financial performance.
- **Responsibilities:**
  - Access the CCTV system in the co-working space to monitor security and ensure the safety of occupants and assets.
  - View and analyze the total revenue generated by the co-working space, including income from memberships, reservations, and additional services.
  - Use revenue data for financial planning, budgeting, and decision-making to optimize the co-working space's profitability and growth.

External Systems:

1. **Email Authentication:**
   - **Role:** Ensuring the security and identity verification of users during registration and login processes on our website.
   - **Key Functions:**
     - User Verification: Sends verification emails to users who have registered on our website. These emails contain a verification link or code.
     - Account Activation: Email Authentication verifies that users' email addresses are valid and associated with their accounts.
2. **Bank System:**
   - **Role:** Making payment transactions for our website's users integrated through an API.

- **Key Functionality:**
    - API Integration: Provides an API (Application Programming Interface) that allows our website's payment system to connect and interact with the Bank System for payment processing.
    - Payment Processing: Accepts payment requests and instructions sent via the API, including credit card transactions, bank transfers, and payments via digital wallets like True Wallet.

3. **Credit card payment system:**
    - **Role:** Serving as an external payment gateway for processing credit card transactions on customer payment systems.
    - **Key Functionality:**
        - Receives credit card payment requests from the customer's internal system.
        - Encrypts and tokenizes sensitive credit card information to ensure data security.
        - Provides confirmation of successful or failed credit card transactions to the internal system.

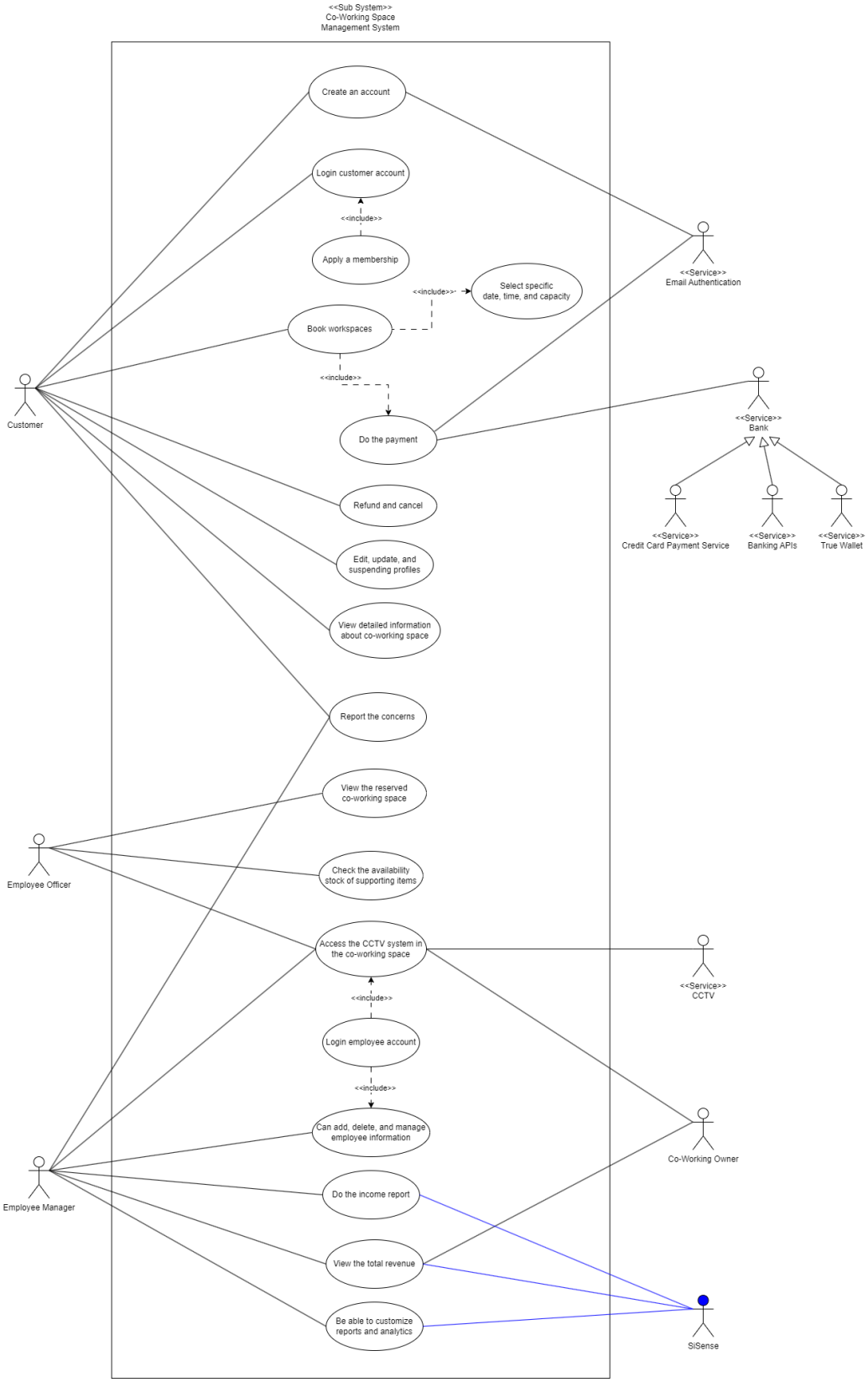
4. **Banking Transfer APIs:**
    - **Role:** Facilitating the secure and efficient electronic transfer of funds and financial transactions between different accounts or banks, it enables electronic money transfers and payments.
    - **Key Functionality:**
        - Provides secure access to banking services and accounts through APIs for customer internal systems.
        - Verifies user credentials and authorizes payment requests.
        - Provides confirmation of successful or failed banking transactions to your internal system.

5. **True Wallet:**
    - **Role:** Serving as a digital wallet provider that the customer's internal payment system can integrate with, allowing users to make payments using their True Wallet accounts.
    - **Key Functionality:**
        - Allows users to link their True Wallet accounts to your internal system for quick and easy payments.
        - Integrates with the customer's internal payment system via APIs to receive and authorize payment requests.
        - Provides confirmation of successful or failed credit card transactions to your internal system.

6. **CCTV System:**
    - **Role:** Providing security and monitoring through the system.
    - **Key Functionality:**
        - Real-time Monitoring: Provides live video feeds.
        - Recording: Captures and stores video footage
        - Access Control Integration: Links with access control systems to track entry and exit.
        - Staff Identification: Integrates with the registering system to identify staff members.

7. **SiSense:**
    - **Role:** Its primary role is to gather, analyze, and visualize data to support informed decision-making and enhance the overall management of co-working spaces.
    - **Key Functionality:**
        - Customize Reports and Analytics: SiSense allows customization of reports and analytics to meet specific co-working space requirements.
        - View Total Revenue: SiSense provides insights into total revenue, aiding financial analysis.
        - Generate Income Reports: SiSense can generate income reports, offering financial insights.

Use Case Diagram



Use case

List actors and roles:

Actor	Role
Customer	Co-working space members seeking workspace for work purposes, responsible for creating accounts, booking workspaces, and making payments.
Employee	Employees at the co-working space are on the front lines of operations. They handle operations, reservations, equipment rentals, CCTV monitoring, inventory, and ensuring a smooth customer experience.
Manager Employee	Manager has privilege oversight for monitoring CCTV, the coworking space's reservation number of people, revenue, and expenses. He configures system settings, manages access privileges, addresses customer issues, and generates income reports for the owner. He can manage employee information as well.
Co-Working Space Owner	Responsible for owning and overseeing the co-working space's operations. He monitors security through CCTV, analyzes revenue, and views financial decisions based on income reports.
<<service>> Email Authentication	Ensures user security and identity verification during registration and does the payment on the Coworking space's website.
<<service>> Banking System	It functions as a processor responsible for handling payment transactions on behalf of our website's users by integrating with an API.
<<service>> Credit payment service	Serving as an external payment gateway for processing credit card transactions. It facilitates secure credit card payments for customers, ensuring that financial transactions are processed smoothly and securely.
<<service>> Banking API	Facilitates secure payment transactions through API integration with banking institutions, including fund transfers and authorizations.
<<service>> True wallet	Enables users to make secure payments for co-working space services through account integration. Enabling them to link their accounts and make secure payments for co-working space services.

<<service>> CCTV	Provides real-time security and monitoring, enhancing safety through surveillance, access control, and incident prevention.
<<service>> SiSense	SiSense provides data analysis, reporting, and financial insights to optimize co-working space operations, improve employee experiences, and support data-driven decision-making.

List use cases and descriptions:

Use case name	Descriptions
Create an account	Customers have to create an account in the coworking space management. The system will record the customer's information, including name, email address, and phone number, by encrypting the data with the AES algorithm.
Login customer account	Customers can use their login credentials to access their account and view their bookings, payments, and other information.
Apply a membership	Customers must always have their own account before applying for membership through the system.
Booking workspaces	Customers can book workspaces through the system. The system will display a list of available workspaces and allow the customer to select the date, time, and capacity they need.
Select specific date, time, and capacity	Customers can select the specific date, time, and capacity they need when booking a workspace. The system will check available and display a price estimate.
Do the payment	Through the system, customers can pay for their booking. The system accepts a number of payment methods, including bank transfers, credit cards, and True Wallet. Furthermore, information for confirmation will be transmitted via email authentication.
Refund and cancel	Customers can request refunds or cancellations for their bookings through the system. The system will review the request and notify the customer of the outcome.
Edit, update, and suspending profiles	Customers can edit, update, and suspend their profiles through the system. This includes changing their personal

	information, contact information, and membership status.
View detailed information about co-working space	Customers can view detailed information about the coworking space, such as the location, amenities, and pricing plans, through the system.
Report the concerns	Customers can report any concerns they have about the co-working space to the manager through the system.
View the reserved co-working space	Employees can view the coworking space they have reserved through the system. This includes the date, time, capacity, and location of the workspace.
Check the availability stock of supporting items	Employees can check the availability stock of supporting items, such as meeting rooms, services, and snacks, through the system.
Access the CCTV system in the co-working space	Systems on the employee site will connect to the CCTV system in the coworking space through the system to check on their belongings or monitor the area around their workspace.
Do the income report	Employees can generate an income report for a specified date range based on the payments made by customers for seat bookings through the system.
Login employee account	Managers can use their login credentials to access their employee account through the system to add, delete, or edit the information.
Can add, delete, and manage employee information	Managers with the appropriate permissions can add, delete, and manage employee information in the system. This includes adding new employees, deleting inactive employees, and updating employee information.
View the total revenue	Managers and Co-Working space owners with the appropriate permissions can view the total revenue of the coworking space for a specified date range. This information can be used to track the performance of the business and make informed decisions about future growth.
Be able to customize reports and analytics	Managers with the appropriate permissions can customize reports and analytics in the system to meet their specific needs. This can be helpful for tracking key metrics, such as occupancy rates, customer satisfaction, and revenue trends.

Use case narrative

Use Case 1:	**Create Account**
Iteration:	3, last modification: September 22 by Pimmada
Primary Actor:	Customer
Secondary Actor:	None
Goal in Context:	The primary goal is to allow customers to create an account to access the co-working space services.
Precondition:	The customer still needs to be registered in the system.
Trigger:	The customer chooses to create a new account.
Scenario:	1. Customer selects the "Create Account" option on the system's homepage. 2. The system prompts the customer to provide their first name, last name, address, and phone number. 3. Customer fills in the required information. 4. The system validates the information. 5. If valid, the system generates a unique account ID and password for the customer. 6. The system notifies the customer that the account has been created successfully.
Exception	1. If the information provided by the customer is not valid (e.g., incorrect format for the phone number, missing fields), the system displays an error message indicating the specific issues with the provided information. 2. The customer is prompted to correct the errors and resubmit the information.
Priority:	High
When available:	When a new customer wants to use a co-working space.
Frequency of use:	Occasional

Channel to actor:	Co-Working Space Website
Secondary actors:	None
Channel to secondary actors:	None
Open issues:	1. **Password Policy:** Define the password policy, including complexity requirements (e.g., minimum length, special characters, etc.), and communicate this to the customer during the account creation process.
Postcondition:	The customer has an account and can access it.

Use Case 2:	Book Workspace/Meeting Room
Iteration:	2, last modification: September 22 by Pimmada
Primary Actor:	Customer
Secondary Actor:	None
Goal in Context:	The primary goal is to allow customers to book workspaces for a specific date and time.
Precondition:	The customer is logged into their account and has sufficient funds or credit for booking.
Trigger:	The customer selects a date, time, and desired capacity for booking.
Scenario:	1. Customer selects the type of space 2. The customer chooses a date and time slot. 3. Customer specifies the desired capacity (number of desks and chairs). 4. The system checks availability for the selected options. 5. If available, the system prompts the customer to proceed with payment. 6. Customer selects a payment method (credit card, bank transfer, or TRUE wallet). 7. The system processes the payment. 8. The system confirms the booking and notifies the customer.
Exception	1. **Space Unavailability:** If the system determines that the selected space, date, and time slot are unavailable, it should provide an error message to the customer and allow them to choose an alternative time or space.
Priority:	High
When available:	When a customer wants to reserve a workspace
Frequency of use:	Regular

Channel to actor:	Website
Secondary actors:	None
Channel to secondary actors:	None
Open issues:	1. **Overbooking Prevention:** Consider mechanisms or policies to prevent overbooking, especially during high-demand periods.
Postcondition:	The customer has a confirmed booking for the selected date and time.

Use Case 3:	Employee Accesses CCTV System
Iteration:	4, last modification: September 23 by Ponnapassorn
Primary Actor:	Employee
Goal in context:	To view the output of the camera placed throughout the Co-Working Space from any remote location via the Internet/Web browser.
Precondition:	The employee must have a valid account which is an ID and password with the coworking space management system.
Trigger:	The employee wants to view the live feed from a CCTV camera in the co-working space.
Scenario:	1. The employee logs onto the co-working space management system website. 2. The system displays all major function buttons. 3. The employee selects the 'surveillance' from the major function buttons. 4. The system displays the floor plan of the co-working space. 5. The employee selects a camera icon from the floor plan. 6. The employee selects the ‘view’ button. 7. The system displays a viewing window that is identified by the camera ID. 8. The system displays video output within the viewing window at one frame per second.
Exceptions:	1. If the employee does not have a **valid account** with the co-working space management system, they will not be able to login and view the CCTV feed.

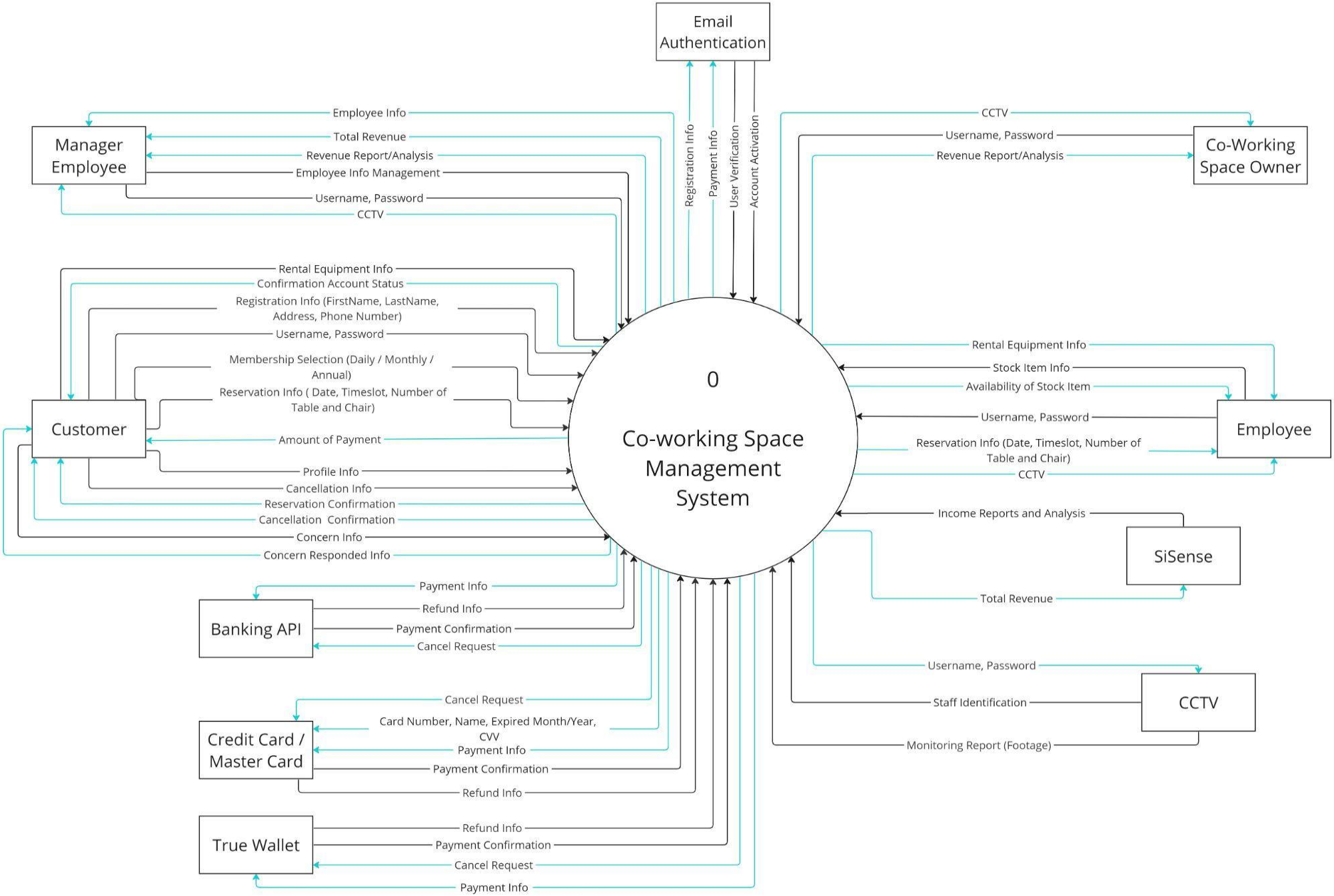
	2. If the employee is not **connected to the Internet**, they will not be able to view the CCTV feed. 3. If the CCTV camera is not working properly, the employee will not be able to view the live feed.
Priority:	Moderate priority
When available:	The CCTV system should be available to employees 24/7.
Frequency of use:	Moderate frequency: Employees may use the CCTV system to check and monitor the security of the co-working space, or simply to see what's going on.
Channel to actor:	Via PC-based browser and Internet connection.
Secondary actors:	CCTV
Channel to secondary actors:	CCTV System
Open issues:	1. How will the co-working space manager ensure that employees are using the CCTV system responsibly? 2. Is using CCTV cameras safe enough? If a hack occurs, how will the system be handled? 3. How will the co-working space manager protect the privacy and safety of customers?
Post condition:	Employees will be able to view the output of the camera placed throughout the Co-Working Space via the PC-based system.

Use Case 4:	Do the payment
Iteration:	4, last modification: September 23 by Ponnapassorn
Primary Actor:	Customer
Goal in context:	To pay for a co-working space membership or booking.
Precondition:	The customer must have a valid account with the co-working space management system.
Trigger:	The customer clicks on the "Make Payment" button on the system's website.
Scenario:	1. The customer fills in the information required on a payment page. 2. The system displays a list of the date and time that the customer has booked. 3. The customer selects their preferred payment method: credit card, bank transfer, or TRUE wallet. 4. The system displays the amount to be paid for the booked seat. 5. The customer reviews and confirms the payment amount. 6. The customer clicks on the "Pay" button. 7. The employee views a record. 8. The employee verified a payment record. 9. The system records verified payment records. 10. The system processes the payment and displays a confirmation receipt to the customer.
Exceptions:	1. If the customer's payment method is declined, the system will display an error message and prompt the customer to try again with a different payment method.

	2. If the system is unable to process the payment, the customer will be notified and instructed to contact the coworking space management team for assistance.
Priority:	High
When available:	The system is always available to customers 24/7.
Frequency of use:	Moderate frequency
Channel to actor:	Co-working space management system website
Secondary actors:	Banking System
Channel to secondary actors:	Credit card payment system, Banking API, True Wallet
Open issues:	1. Difficulty tracking customer bookings payment: Bank staff may have difficulty tracking which customers have booked seats and which customers have not.
Post condition:	The customer has confirmed payment for the booked date and time.

Use Case 5:	Do the income report
Iteration:	4, last modification: September 23 by Ponnapassorn
Primary Actor:	Employee
Goal in context:	To do the total revenue generated by the coworking space on a particular day or month.
Precondition:	1. The employee must have a valid account with the co-working space management system. 2. The employee has access to the system that stores the customer payment data.
Trigger:	The employee logs into the system and clicks on the "Revenue/Income Report" button.
Scenario:	1. Employees must retrieve customer payment information for a specified date range from the coworking space and may use data extraction tools. 2. Employees will calculate total income during the specified date and may use tools to help with the calculation. 3. When employees have finished extracting data and calculating, reports and information will be sent to the manager.
Exceptions:	1. If the employee does not have access to the system that stores the customer payment data, the system will display an error message. 2. If the employee does not select a start and end date for the income report, the system will display an error message. 3. If there is no customer payment data for the specified date range, the system will generate a blank income report.

Priority:	High
When available:	Always
Frequency of use:	Regular
Channel to actor:	Co-working space management system website
Secondary actors:	None
Channel to secondary actors:	None
Open issues:	None
Post condition:	1. The employee has an income report for the specified date range. 2. The employee has exported the report for further analysis or reporting to the manager.


Email Authentication
Registration Info
Payment Info
User Verification
Account Activation
Manager Employee
Employee Info
Total Revenue
Revenue Report/Analysis
Employee Info Management
Username, Password
CCTV
Co-Working Space Owner
CCTV
Username, Password
Revenue Report/Analysis
Customer
Rental Equipment Info
Confirmation Account Status
Registration Info (FirstName, LastName, Address, Phone Number)
Username, Password
Membership Selection (Daily / Monthly / Annual)
Reservation Info (Date, Timeslot, Number of Table and Chair)
Amount of Payment
Profile Info
Cancellation Info
Reservation Confirmation
Cancellation Confirmation
Concern Info
Concern Responded Info
0
Co-working Space Management System
Employee
Rental Equipment Info
Stock Item Info
Availability of Stock Item
Username, Password
Reservation Info (Date, Timeslot, Number of Table and Chair)
CCTV
SiSense
Income Reports and Analysis
Total Revenue
Banking API
Payment Info
Refund Info
Payment Confirmation
Cancel Request
CCTV
Username, Password
Staff Identification
Monitoring Report (Footage)
Credit Card / Master Card
Cancel Request
Card Number, Name, Expired Month/Year, CVV
Payment Info
Payment Confirmation
Refund Info
True Wallet
Refund Info
Payment Confirmation
Cancel Request
Payment Info

Bonus: additional requirement statements that involve the integration or utilization of cutting-edge technologies for a Co-Working Space Management System:

Technologies in Co-Working Space system (Implemented in system):

1. **Smart Access Control and Biometrics:**

   To ensure smooth and safe entry into co-working spaces, an access control system that makes use of palm print or facial scanning should be included. It is a technology that allows people to access the area according to the day and time they reserved a seat using facial recognition or a palm print even if they do not have a mobile phone with them. For a frictionless experience and to ensure that all users are comfortable using our system, we operate in the system by accessing a QR code or NFC technology if you do not consent to the collection of your biometric data.

2. **IoT-Enabled Workspace Customization:**

   IoT-Enabled Workspace Customization for co-working space is a concept or project that combines the Internet of Things (IoT) with customized co-working spaces to increase convenience and adjust to meet the needs of the user. The features or customizations that should be brought into this system are: Light and air are controlled via IoT within the workspace according to the climate and user comfort. Design customization: Users can use an app or interface to customize the layout of the space. Tasks such as adjusting lighting colors or arranging tables and chairs according to individual needs, and communication between users, that is, IoT systems can help in communicating between users through systems, applications, or other devices to exchange information.

   In terms of deploying this system to employees, there are two ways: first, bring the IOT system into use with the security system, namely the IoT can use sensors and CCTV cameras to customize the security system in the co-working space area. and use it to detect user entry and exit. Second, resource management. An IoT system is a system that can monitor the usage of resources such as electricity consumption or equipment in the work area. It helps to manage

resources as efficiently as possible. If users or customers have needs or are missing something, employees will be able to check immediately.

3. **Virtual Reality Meeting Rooms and collaborative AR/VR Experiences:**

Virtual reality (VR) technology has been applied to the co-working space management system to create a virtual conference room from a simulated physical meeting space. Collaborative augmented reality (AR) and virtual reality (VR) experiences are also being developed, allowing colleagues to interact and brainstorm within a shared virtual space, which this system enhances remote collaboration.

4. **Blockchain-Based:**

Blockchain technology is used in payments to ensure transparency and security for users in their payments. It offers advantages that enhance the entire payment process in our company. In customer care, the transparency of blockchain ensures that issues can be addressed swiftly and fairly, bolstering trust between businesses and consumers.

Technologies in Co-Working Space room (Function/Features):

5. **Voice Assistants:**

Voice assistants powered by natural language processing (NLP) may be introduced to assist users in various tasks. Users can use voice commands to reserve meeting rooms, order equipment, adjust environment settings, and receive information.

6. **Wireless Charging Infrastructure:**

Install wireless charging stations throughout our co-working space with the latest in fast-changing technology. This allows users to conveniently charge their devices while they work without worrying about tangled cables.

External Technologies

7. SiSense

SiSense is a robust business intelligence and data analytics platform that plays a main role in optimizing the operations and decision-making processes of a Co-Working Space Management System. SiSense stands out in data analysis and visualization, with the capability to manage substantial datasets, processing millions of rows in seconds, unlocking valuable business insights. It's designed to make the most of data, giving co-working spaces the tools they need to manage resources effectively, improve member experiences, and grow their business.

Functional Requirement:

- The system shall provide a user-friendly interface of SiSense for co-working space administrators to customize reports and analytics.
- The system shall display total revenue figures in real-time for financial analysis in SiSense.
- The system shall generate income reports based on predefined parameters using SiSense.

By integrating these cutting-edge technologies, the Co-Working Space Management System can offer a unique and advanced user experience while optimizing space utilization, convenience, and sustainability.

Reference:

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