Software Requirements Specification

Term Project

COMP 225 - SEC.11

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Deliverable #1

1.1 Introduction

CareSync will be a centralized pharmacy system that increases accessibility with patients in the community who cannot physically leave their houses. This will be the first version of this system, as currently there is not a centralized system in Canada that ties all provinces and territories to exchange information between all providers and patients.

1.2 Documentation Conventions

The standards for documentation will include:

- **Century Gothic** font for better output from modern digital systems, useful for headlines and display work, in any language this font can be translated in languages without changing the context dramatically.
- **The size of the font** will be 14 - 16 for most headings, and 12 point font for readability. For those documenting in logs, they will have the option to change the output from a patient point of view to adjust font size and type to their liking and understanding. Serif types will be used as the options for patients creating their logs. This is easier for providers to read.
- **PowerBI** will be used to turn unrelated sources of data into coherent, visually appealing and interactive insights in to the program
- **Bold** will indicate command or keyword for things such as dates to be remembered, important indications for clinical interventions such as order directives, contraindications with other medications or foods.
- **SQL or Oracle** will be used for storing data recorded by healthcare providers and patients themselves. SQL is a widely used database system in healthcare organizations to store and manage patient information, clinical data and financial records

1.3 Intended Audience and Reading Suggestions

The expected audience for CareSync will be allied health professions including:

End Users:

- Pharmacy and other pharmaceutical staff working with the patient
- Medical practitioners, nurses, therapy staff, personal care givers will have a specific interface with encryption protected services to maintain information safety according to PHIPA(Personal Health Information Protection Act)
- Next of Kin/Power of Attorney will have a limited database for information to have access to legal documents for signatures, and approval/consent on behalf of the patient in need of advocacy
    - Next of kin means persons whom you consider to be part of your immediate family/most close to the patient (Canada.gc.ca)
    - Power of Attorney - Patient"representative". Legally Appointed (Canada.gc.ca)
- Patients who will have an alternative interface for their specific documentations within a patient portal

Back end development

- **Applications Software Developer of this application** will analyze the end users as outlined in the first 4 bullet points in order to design and develop the software to meet the needs for a centralized health record system. They will test and design the CareSync software needed to achieve the specifications
- **Programmers** will be involved in this process and will assist the software developers in structuring the CareSync software with SQL as the backbone of the software
- **Project Managers** will be responsible for the planning, execution and completion of the project, there will be the expectation that the PM is able to guide and improve how medical facilities will run with this software implementation

1.4 Project Scope

The aim of CareSync is to increase communication with primary care providers while also lessening the load of providers through an efficient cloud based software system.

Patients will be able to book appointments online with their e-mails automatically synced with their calendar, able to upload legal documentation such as insurance information that can be shared with pharmacies, as well as book with health care providers that specialize in treating certain diseases with multilingual options for better patient outcomes.

There will be plans to implement map services based on the OS of the user where it's a computer or mobile device. CareSync will be available through internet servers.

Patients and providers will be able to review their information with a licensed health provider at the time of their scheduled 1 hour appointments. Patients prior to their appointments will be asked to log into the secure cloud system to meet with a clerk to ensure all their information is correct and up to date, as well as ensure their connection is working. The clerk will then give the go ahead for the MD to continue the meeting with the patient and provide a follow up indication when needed at the end of their appointment if the MD believes there is a need.

The need for faxing over prescriptions will be eliminated by having the prescription entered into the "Orders" tab where the information will be accessed and dispensed by the pharmaceutical team prior to pick up. Patients will be able to see changes to their profile within 48 hours of the change and be able to start a new log when they begin to take the medication.

This product will address the problem of disabled individuals for to achieve the following goals:

- Multilingual provider services
- Decreased wait times in primary care provider offices
- Increased accessibility for those with physical or mental limitations
- Allowing people living with mental challenges (dementia, aspergers etc) by introducing a POA(power of attorney/next of kin) system so there is patient advocacy during virtual health meetings
- Implementing encrypted technology with cryptographic engineering
- Private chat box systems to communicate with healthcare professionals within the circle of care, and counsellors

- Symptom management logs for new medication changes (antidepressants,daily glucose logs, cardiac, respiratory and other physiological systems).

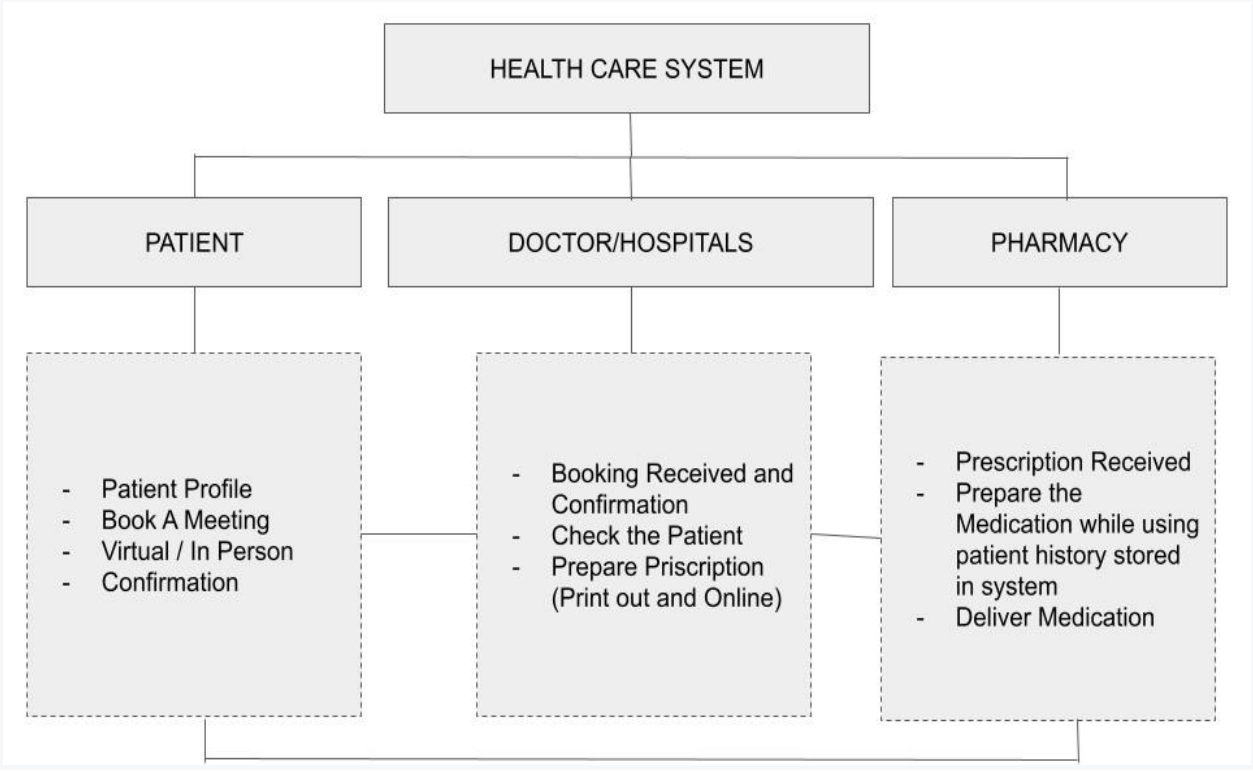
Section 2:

***2.1 Product Perspective*:** CareSync in this Software Requirements Specification (SRS) is a new, self-contained product known as the Centralized Pharmacy System. It is not a follow-on member of a product family or a replacement for existing systems, but rather a standalone solution designed to streamline and optimize pharmacy operations in a centralized manner.

The Centralized Pharmacy System is developed to address the needs of large-scale pharmacies, hospitals, or healthcare organizations with multiple locations. It serves as a comprehensive software solution that centralizes and manages various pharmacy-related tasks, including inventory management, prescription processing, patient information, billing, and reporting.

In the context of a larger system, the Centralized Pharmacy System can be considered a component within a broader healthcare management system. This larger system might encompass other modules or components such as electronic medical records (EMR), patient management, billing, and other administrative functions. The functionality of the Centralized Pharmacy System is tightly integrated with these other components to ensure seamless data exchange and workflow coordination.

2.2 Product Features:



2.3 Stakeholder Register - Deliverable #2 - See Appendix C

User Classes and Characteristics

Patients:

- **Patients of all ages: CareSync** caters to patients of all ages, ranging from infants to the elderly. The system should be user-friendly and adaptable to accommodate patients with varying levels of technological literacy.
- **Patients with diverse medical conditions: CareSync** serves patients with a wide range of medical conditions, including acute illnesses, chronic diseases, and preventive care. It should be able to handle different types of medications, prescriptions, and treatment plans.
- **Technologically proficient users:** Patients who are comfortable using **CareSync**, such as smartphones or computers, can interact with the system through digital interfaces like web portals or mobile applications. They can access their medical information, view prescriptions, request refills, and communicate with healthcare providers electronically.
- **Non-technologically proficient users:** Some patients may have limited or no access to technology or face challenges in using digital interfaces. They may prefer traditional communication channels, such as phone calls or in-person interactions. The system should provide alternative means for these users to access their medical information, request prescriptions, and interact with healthcare providers effectively.
- **Patients with language or accessibility needs:** The system should support language translation to cater to patients with diverse linguistic backgrounds. Additionally, it should consider accessibility standards to accommodate individuals with disabilities, ensuring that the system's interfaces are accessible to visually impaired or hearing-impaired patients.
- **Privacy-conscious users:** Patients are concerned about the privacy and security of their medical information. The system should implement robust security measures and comply with relevant data protection regulations to instill confidence in patients regarding the confidentiality of their health records. Measures could include biometrics, and encrypted networks/servers. Verification of providers will be considered as priority in privacy concerns.
- **Patients seeking convenience and efficiency:** Patients expect the centralized healthcare system to provide convenient services, such as online appointment scheduling, medication delivery options, and electronic prescriptions. They value efficiency in accessing healthcare services, minimizing waiting times, and streamlining administrative processes.

Doctors/Hospitals:

- **Doctors with varying specialties:** CareSync should cater to doctors from different medical specialties, including general practitioners, specialists, surgeons, and other healthcare professionals. Each specialty may have specific requirements for accessing patient information, prescribing medications, and managing treatment plans.
- **Hospital administrators and staff:** Apart from doctors, hospital administrators and staff members are also users of the centralized healthcare system. They may require access to the system for managing patient records, scheduling appointments, coordinating care, and handling administrative tasks related to billing, insurance claims, and resource management.

- **Multiple device usage:** Doctors and hospital staff may access the centralized healthcare system from various devices, including desktop computers, laptops, tablets, or smartphones. The system should be designed to provide a seamless user experience across these different platforms.
- **Need for real-time information:** Doctors require up-to-date and accurate patient information to make informed decisions about diagnosis, treatment plans, and medication prescriptions. The centralized healthcare system should ensure timely synchronization of data to provide real-time information to doctors and hospital staff.
- **Privacy and security concerns:** Doctors and hospitals handle sensitive patient information, and they need assurance that the centralized healthcare system maintains strict privacy and security measures. The system should comply with data protection regulations, employ encryption methods, and implement user authentication mechanisms to safeguard patient data.
- **Collaboration and communication needs:** Doctors often collaborate with other healthcare professionals, such as nurses, pharmacists, and laboratory technicians. The system should facilitate communication and collaboration features, such as secure messaging, sharing of test results, or treatment plan coordination, to enhance teamwork and patient care.

Pharmacists:

Pharmacists are the primary users of CareSync. They are responsible for dispensing medications, managing inventory, processing prescriptions, and providing medication-related counseling to patients. Pharmacists require access to the system's features and functional centralized healthcare system, the Centralized Pharmacy System needs to integrate with other hospital management systems, such as electronic medical records (EMR), laboratory systems, and billing systems. Doctors and hospitals expect seamless interoperability between these systems to ensure smooth data flow and streamline healthcare operations.

Pharmacy: Abilities to efficiently carry out their responsibilities.

- **Pharmacy Technicians:** Pharmacy technicians work closely with pharmacists to assist in various pharmacy operations. They may perform tasks such as medication dispensing, inventory management, data entry, and customer service. CareSync should support the roles and workflows of pharmacy technicians, providing them with appropriate access and functionalities.
- **Technologically proficient users:** Pharmacists and pharmacy technicians who are comfortable with technology can utilize the digital interfaces of the Centralized Pharmacy System. They should be able to navigate the system, retrieve patient information, process prescriptions, manage inventory, generate reports, and communicate with healthcare providers or patients electronically.
- **Efficient workflow management:** Pharmacies operate in a fast-paced environment with a high volume of prescriptions and patient interactions. The Centralized Pharmacy System should streamline workflow management, allowing pharmacists and pharmacy technicians to efficiently process prescriptions, track inventory, manage refill requests, and coordinate with healthcare providers or other pharmacies.
- **Integration with other systems:** The Centralized Pharmacy System needs to integrate with other components of the centralized healthcare system, such as electronic medical records (EMR), patient management systems, or billing systems. This integration ensures smooth data exchange, synchronization of patient records, and coordination of pharmacy operations with other healthcare functions.

- **Patient counseling and education:** Pharmacists play a crucial role in patient counseling, providing information about medication usage, potential side effects, drug interactions, and compliance. The Centralized Pharmacy System should support documentation and communication features that enable pharmacists to provide comprehensive counseling and education to patients.
- **Accessibility and usability:** The Centralized Pharmacy System should consider the accessibility needs of pharmacy users. The interface should be user-friendly, easy to navigate, and designed to accommodate users with visual impairments or other disabilities. Clear and intuitive interfaces facilitate efficient usage and reduce the risk of errors.

2.4 Operating Environment

- **Hardware Platform**: The app is compatible with a variety of hardware platforms, including desktop PCs, tablets, and smartphones. It is compatible with the equipment that patients, physicians, nurses, chemists, and other healthcare professionals frequently use.
- **Operating system**: The app works with a variety of operating systems, including iOS for Apple devices (such as iPhones and iPads) and Android for devices with an Android operating system (such as smartphones and tablets). Operating system versions that are supported are listed.
- **Network Connectivity**: In order to access servers or other systems and exchange data with them, the app has to be connected to the internet. It is made to function in a variety of network settings, including Wi-Fi and mobile data connections.
- **Software Components**: The app requires specific libraries or software components. For instance, it is dependent on a particular version of a programming language (such as C#, Java), a database system (such as MongoDB), or a framework (such as React Native, Flutter) for development.

2.7 Assumptions and Dependencies

- **Third-Party Integrations**: The app connects to external programmes or services such insurance networks, pharmacy databases, and electronic health record (EHR) systems. It also implies compatibility with a range of health gadgets, including glucose metres, blood pressure monitors, and wearable fitness trackers. Data collection and patient health tracking may be reliant on the accessibility and compatibility of various devices.
- **Data security and privacy**: The app manages private patient data such as medical records and personal information. It can be assumed that the proper security precautions will be taken to safeguard the confidentiality and integrity of the data, such as user authentication and data encryption.
- **Regulatory Compliance**: The app would have to go by particular rules and specifications governing the privacy and security of personal health information. The Personal Information Protection and Electronic Documents Act (PIPEDA) is the main piece of legislation that deals with this. PIPEDA establishes guidelines for the gathering, use, and disclosure of personal data by businesses, including healthcare providers and service providers.
- **User authentication and authorization**: It is possible to assume that the app will employ safe user authentication processes like username/password login or two-factor authentication. In order to provide proper access control for various healthcare workers, assumptions might also be made on user roles and permissions.
- **Device Compatibility**: It is assumed that the app will function with a variety of gadgets and screen

sizes to support a variety of users, such as patients, physicians, nurses, chemists, and other healthcare professionals.

- **API accessibility**: The application relies on APIs (Application Programming Interfaces) offered by healthcare systems, laboratories, or pharmacies. For the sake of data sharing and interoperability, assumptions are made about the availability and stability of these APIs.
- **Internet Accessibility**: It is assumed that the app will need a steady internet connection in order to conduct real-time communication, sync data, and access online resources. Offline functionality is also regarded as a dependency.
- **Multi-language Support**: The software is developed with consideration for the necessity for multi-language support because it is designed for a varied user base. For translations and to adjust to different language preferences, the programme relies on localization tools.
- **Scalability and Performance**: Taking into account the anticipated rise in users, data volume, and system load over time, assumptions are made about the app's scalability and performance. To accommodate rising demand, it depends on the underlying technology and infrastructure.
- **User Support and Training**: It is assumed that the app will offer user support channels, documentation, and user training materials for users, such as patients, physicians, nurses, chemists, and other healthcare professionals.
- **Medical Standards Compliance**: The application must adhere to particular medical standards, such as HL7 (Health Level Seven) for healthcare data exchange or DICOM (Digital Imaging and Communications in Medicine) for medical imaging. There are presumptions regarding conformity to these requirements.
- **Collaboration with Healthcare Providers**: It is assumed that the app will work with medical facilities such as hospitals, clinics, or pharmacies to exchange and access patient data such as prescription information or appointment schedules.

Section 3:

Deliverable 1: Part B

Use Cases			
Use Case Name	**Listed of related requirements ID**	**Actor(s)**	**Brief Description**
Use Case #1 Prescribe Medications	FR01(Prescribe IT -prescription)	**Medical Professionals** **Patients**	Medical Professionals: ● Click on user profile, select medication list ● Review medications, select medication to be refilled ● CareSync will provide Actor with forms/options to refill x-days of medication ● CareSync will accept or deny completion of form

			• Actor will submit request through CareSync to correspond with pharmacy selected by Patient • CareSync will generate a request to pharmacy with pick up details/payment details and send confirmation to patient email with confirmation # to the medical professional for record keeping through CareSync Patients: • Click on user profile,select medication from medication list that needs to be refiled • Patient will send request to pharmacy through CareSync • Pharmacy will review refill status and either refill prescription or send verification to primary doctor for authorization • Once medication refill has been authorized, confirmation sent to patient phone number/email • Patient is notified of pick up time • Once patient has picked up the prescription, CareSync can clear alert
Use Case #2 Manage Appointments	FR02(Appointments and Scheduling)	**Medical Professionals** **Patients**	Medical Professionals: • Go to user profile, select calendar icon • Once calendar icon is selected, medical professional can access, update and cancel appointments • Calendar icon will allow medical professionals to indicate time, date, reason and what to bring to appointment • Once the form has been filled out, CareSync will automatically send patient the appointment details • When patient receives appointment details, they will confirm/deny or reschedule the appointment that synchronizes with their current OS calendar • Once the calendar has been update for

			the medical professional, they will be able to revisit the calendar invite for updated information Patients: ● Go to user profile and select calendar icon ● Once calendar icon has been selected, patient can request an appointment through their device based on availability of provider ● Once patient has selected their preferred appointment time, confirmation email/notification is sent to patient ● Reminder notifications can be enabled as per patient preferences for updates leading up to appointment ● patients will have up to 24 hours to cancel their appointments. ● Patients will be made aware of what to bring to their appointments through CareSync
Use Case #3 User Authentication and Authorization	FR04(Security and Access Control) NFR04 (Data Integrity)	**Systems Administrator** **Database Manager**	Systems Administrator: ● Will have access to CareSync to create, modify and delete user accounts within system ● Will be able to register new medical professionals with roles and access levels to ensure proper authorization and authentication for each user ● Will have access to “security and privacy” settings through CareSync, to define user groups, permissions and managing user roles to ensure patient data is only accessible to authorized individuals Database Manager: ● Will be able to review patient logins and provide support during change of password or log in credentials ● Administrator can report log in attempts, and audit logs in identifying potential security breaches or

			unauthorized attempts at accessing CareSync ● Logs and Audits will be reviewed with CareSync team and institutions to ensure that all information is up to date and ready for quality review ● DBM will be able to create reports and determine trends with CareSync through patient demographics to ensure quality improvement can be followed upon.

3.1 User Interfaces

The user interface of CareSync will depend on the platform it is being accessed from. There will be both a web interface and a mobile interface to cater to different user preferences and accessibility.

Web Interface:

CareSync's interface will be accessible through standard web browsers such as Chrome, Firefox, and Safari. It will be developed using HTML, CSS, and JavaScript technologies. The interface will have a responsive design to ensure usability on different screen sizes and resolutions. It will provide a user-friendly and intuitive interface for users to interact with the system. Key features of the web interface may include:

- Login/Register: Users will be able to create an account or log in using their credentials.
- Dashboard: A personalized dashboard will display relevant information and provide quick access to different functionalities.
- Navigation: A navigation menu or toolbar will allow users to navigate through different sections of the system.
- Forms and Input: Users will be able to input and update data through forms and input fields.
- Data Visualization: The system may include graphical representations of data using charts, graphs, or tables for easy understanding and analysis.
- Notifications: Users may receive notifications or alerts about important updates, tasks, or events , for instance, a notification alert to remind the user to take the medicine, or remind the user for their appointment.
- Search Functionality: A search bar or advanced search options may be available to help users find specific information within the system.
- Reports and Export: Users may have the ability to generate reports and export data in various formats (e.g., PDF, Excel) for further analysis or sharing.

Mobile Interface:

The mobile interface will be designed for smartphones and tablets running on iOS and Android platforms. It will be developed using native app development technologies such as Swift for iOS and Java or Kotlin for Android. The interface will provide a seamless and optimized user experience for mobile users. Key

features of the mobile interface may include:

- Login/Register: Users will be able to create an account or log in using their credentials, and biometrics for additional security and easy access.
- Home Screen: The app's home screen will provide an overview of important information and quick access to key features.
- Navigation: Users will be able to navigate through different sections of the app using intuitive gestures or navigation menus.
- Forms and Input: Users will be able to input and update data through forms and input fields optimized for mobile screens.
- Push Notifications: Users may receive push notifications on their mobile devices for important updates, reminders, or alerts.
- Barcode/QR Code Scanning: The app may support barcode or QR code scanning functionality for quick data input or retrieval.
- Offline Access: The app may provide limited offline access to certain features or data, allowing users to work without an internet connection.
- Integration with Device Features: The app may utilize device features such as camera, GPS, or contacts for enhanced functionality.
- Syncing with Web Interface: The mobile app may sync data with the web interface, ensuring seamless data transfer and continuity across platforms.

The user interfaces will be designed to provide a user-friendly and intuitive experience, keeping in mind the specific needs and preferences of the end users. Usability testing and user feedback will be taken into consideration during the design and development process to ensure an optimal user experience.

3.2 Hardware Interfaces

1. Prescription Barcode Scanner: To facilitate the prescription management process, a barcode scanner will be integrated into the system. This would allow pharmacists to scan barcodes on prescription labels for accurate and efficient data entry. The scanner would need to be compatible with the system and capable of reading prescription barcodes.

2.Medication Dispensing Machine: In order to automate the medication dispensing process, a hardware interface with a medication dispensing machine will be implemented. The system could send instructions to the machine to dispense the prescribed medication accurately. The hardware interface would involve communication protocols and compatibility with the specific dispensing machine used.

3.Electronic Signature Pad: To ensure the security and legality of electronic prescriptions and documentation, an electronic signature pad will be utilized. This would enable patients and healthcare providers to sign digital documents securely, such as consent forms or digital prescriptions. The hardware interface would involve integrating the electronic signature pad into the system and implementing the necessary software to capture and store the signatures.

3.3 Software Interfaces:

Google Calendar API (version 3): Integrating a calendar functionality into the system will help manage

appointments, reminders, and scheduling for patients and healthcare providers. The Google Calendar API can be utilized to interact with the Google Calendar service and incorporate its features within the centralized pharmacy system. You can find more information about the Google Calendar API and its documentation here.

PayPal Payment Gateway: To facilitate online payments for medications or services, integrating a payment gateway is essential. PayPal is a popular payment gateway that allows secure online transactions. The PayPal API can be used to interact with the PayPal platform, enabling users to make payments directly within the centralized pharmacy system. You can refer to the PayPal developer documentation here for more details.

TWAIN API (version 2.4): TWAIN is a widely used standard for interfacing image acquisition devices, such as scanners, with software applications. By implementing the TWAIN API, the centralized pharmacy system can communicate with TWAIN-compatible scanners to scan and capture documents or prescriptions

Section 4

Deliverable #2 Part B: Use Case template for CareSync - Divya

Use Case ID: FR02

Use Case Name: Appointments and Scheduling

Use Case Description:

To be used by medical professionals and patients to manage appointments within the CareSync system. It will involve the medical professional team and patients interacting with the system to schedule, update and cancel appointments. Patients will be able to schedule their appointments from home, use secure chat and logs to assist with their upcoming plan of care.

Primary Actors:

- Medical Professionals/team
- Patients

Goal in Context:

The goal of "Managing Appointments" use case is to provide professionals and patients with an accessible, convenient and efficient way to schedule, update, and cancel their appointments within the CareSyn system. The use case will assist with visualizing the streamline of appointment management process, clearer communication between the medical professionals and patients, and maintaining an accurate and synchronized calendar for both patients and professionals. The absolute goal is to enhance the scheduling experience, improve coordination and facilitate more effective healthcare delivery.

- Appointments are scheduled, updated or cancelled successfully
- Appointment details are communicated to the relevant parties
- The user's calendar is synchronized with appointment updates

Preconditions:

- The user is logged into the CareSync system
- The user has appropriate access rights as a professional or patient

Trigger: System will be triggered through the user navigating profiles, selecting calendar icons and using google maps for the closest provider. This action will indicate the user's intention to manage their appointments, whether it is a professional or patient.

Scenario:

1. Patient or professional is on their profile with the GUI within CareSync System
2. User selects calendar icon to manage appointments
3. CareSync will display the calendar interface, allowing the user to choose if they would like to access, update or cancel their appointments.

Professional User:

a. The professional will indicate the desired time, date, reason and specific requirements for the appointment
b. Professional submits appointment form
c. CareSync automatically sends appointment details to patient
d. Patient receives appointment details and has the option to confirm, deny or request to reschedule through their OS calendar
e. If patient makes any changes, CareSync will update the professional's calendar invite accordingly
f. The professional can revisit the calendar invite to view any updates made by the patient.

Patient User:

a. Patient requests an appointment based on medical professional's availability
b. Patient will select their preferred appointment time
c. CareSync will send a confirmation e-mail or notification to the patient, acknowledging the appointment request
d. CareSync will allow the patient to enable reminder notifications leading up to the appointment, according to their OS preferences
e. Patient will have up to 24 hours to cancel their appointment if needed
f. System will inform the patient about specific items they must bring to the appointment.

Exceptions:

1. Invalid input, if there is incomplete information on te form, the system will handle this exception by displaying the appropriate error message and prompting the user to correct the input
2. Scheduling conflicts: If a user attempts to schedule an appointment at a time that conflicts with existing appointments or availability, the system should detect the conflict and notify the user, the user can then choose an alternative time or consult with the relevant parties to resolve the conflict
3. Cancellation within time limits: If a patient cancels an appointment within a specific time frame before the scheduled appointment, CareSync will enforce cancellation fees or penalties based on agency policies of the healthcare provider. CareSync should handle the exception by notifying the

patient about applicable fees or penalties, and obtaining confirmation BEFORE proceeding with cancellation

4. System Errors: If the system encounters unexpected errors or technical issues during the appointment management process, such as server downtime or network failures, it should handle the exceptions. The system should display an ERROR message informing the user of the issue and provide troubleshooting instructions in or to proceed or to contact support for assistance.
5. Invalid Calendar Sync: In case of any issues with calendar synchronization between CareSync system and user's calendar, the system should handle this exception by providing troubleshooting steps or alternative methods for updating the calendar.
6. Missing Appointment Notifications: If the system fails to send appointment confirmation or reminder notifications to the patient, it should handle this exception by investigating the issue and re attempting to send the notifications. CareSync should also provide an option for the patient to manually confirm or reschedule the appointment if necessary.

When available:

Third increment: The development and implementation of this feature will take place during the third phase or iteration of the CareSync development process. This implies the feature will be worked on and completed after the completion of the previous increments or phases, it will align with the product roadmap/release plan of CareSync.

Frequency of use: Frequent

Secondary actors:

- CareSync system: CareSync itself will facilitate the appointment management process, handling data storage, processing and communication between the primary actors (medical professionals and patients)
- OS Calendar: Within a user's device, the OS calendar (e.g Google, iOS, Microsoft outlook calendar) is involved in synchronizing the appointment details between CareSync system and the user's personal calendar, ensuring that both parties have up-to-date information regarding the scheduled appointments.

Channels to secondary actors:

CareSync System:

1. Application systems will utilize web-based interfaces. Interactions with CareSync will begin with logging in, navigating to their user profile and selecting the calendar icon to manage appointments.
2. API Integration: Application Programming Interface will be used to allow other systems or applications to interact with features through object-oriented programming. This can enable integration with the external systems, such as electronic health record (EHR) systems or third-party calendar applications

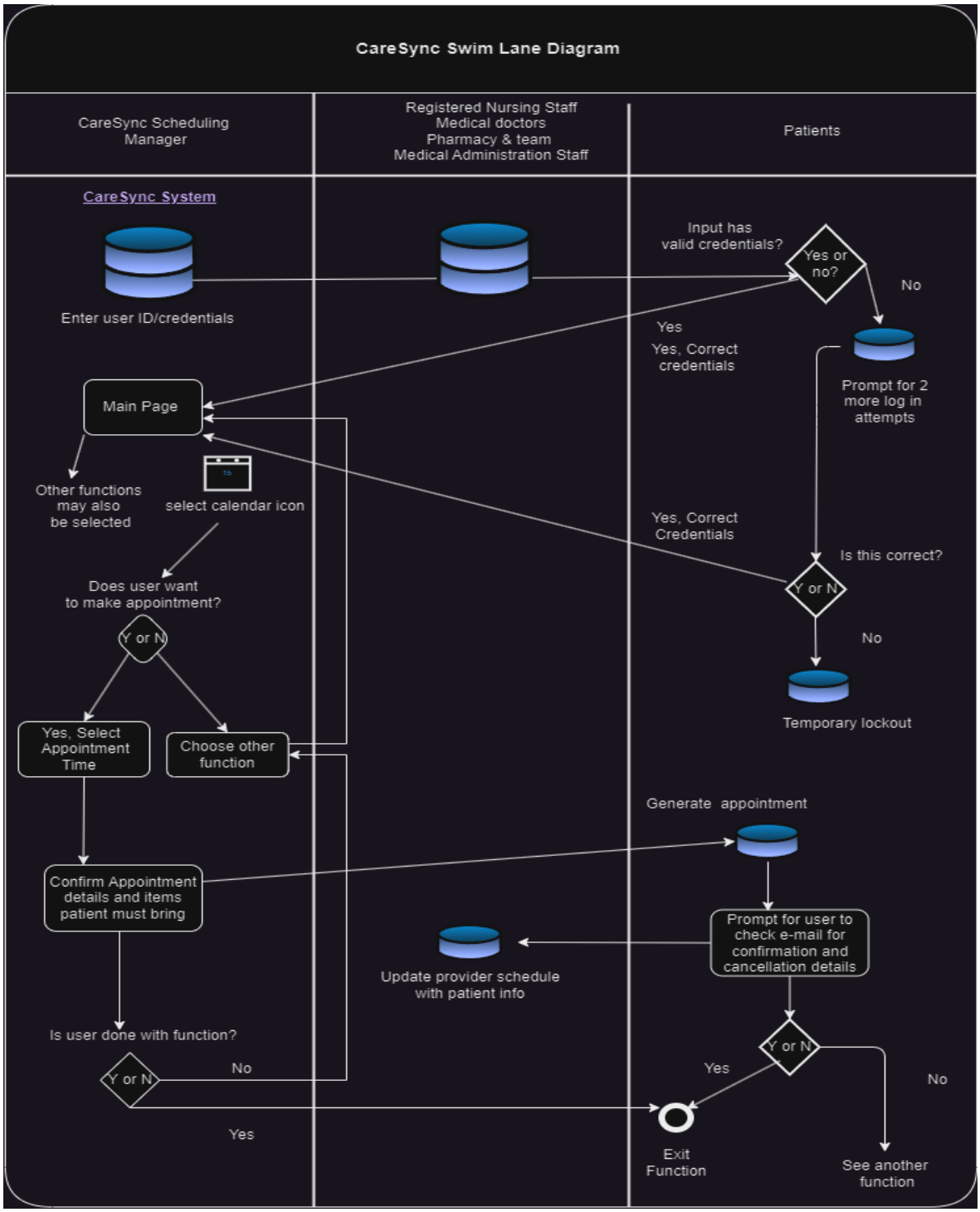
OS Calendar:

1. Synchronization Protocol: CareSync will communicate with the user's OS calendar using synchronization protocols or API's provided by the respective calendar service providers (e.g

Google Calendar API, Apple Calendar API, Microsoft Calendar API). This will enable the exchange of appointment details and updates between the CareSync system and the user's personal calendar.

Open issues:

1. Error Handling and Exception Scenarios: Open issues may exist in handling exceptional situations such as handling system errors, managing conflicts in scheduling, or enforcing cancellation policies. These issues require careful consideration to ensure appropriate error handling, effective communication with users and graceful recovery from exceptional scenarios.
2. Integration Challenges: If CareSync systems need to integrate with various external systems, such as EHR systems or calendar applications, there could be issues related to overcoming integration challenges. These issues may involve compatibility issues, data mapping, security considerations, or resolving conflicts in data synchronization.
3. Security and Privacy Concerns: The management of sensitive patient data within the CareSync system will raise open issues related to security and privacy. These issues might involve ensuring compliance with relevant data protection regulations, implementing robust authentication and access control mechanisms, and safeguarding patient information against unauthorized access or data breaches


CareSync Swim Lane Diagram
CareSync Scheduling Manager
Registered Nursing Staff
Medical doctors
Pharmacy & team
Medical Administration Staff
Patients
CareSync System
Enter user ID/credentials
Input has valid credentials?
Yes or no?
No
Yes
Yes, Correct credentials
Prompt for 2 more log in attempts
Main Page
Other functions may also be selected
select calendar icon
Yes, Correct Credentials
Is this correct?
Y or N
No
Temporary lockout
Does user want to make appointment?
Y or N
Yes, Select Appointment Time
Choose other function
Generate appointment
Confirm Appointment details and items patient must bring
Prompt for user to check e-mail for confirmation and cancellation details
Update provider schedule with patient info
Is user done with function?
Y or N
No
Yes
Y or N
Yes
No
Exit Function
See another function

Appendices for SRS:

Appendix C for Deliverable 2:

Stakeholder Name	Stakeholder Position	External/ Internal	Stakeholder Contact details	Operational/ Executive	Level of Interest
Hospital/Clinical Staff/Hospital and Clinic Administrators **@ "GreenWood Hospital"**	Nurses Doctors Personal Care Staff Mental Health Counselors Physical Therapy staff Hospital/Clinical Administrators Department Leaders Hospital Executives	**External**	All healthcare providers have specific email and contact information that is specific to their agency MD@GreenWoodHealthSciences.ca	**Operational**	**High**
Pharmacy Staff @ "GreenWood Pharmacy"	Pharmacists Pharmacy Assistants	**External**	Pharmacy@GreenWoodPharm.ca	**Operational**	**High**
Donald B	Investor	**External**	DonaldB@Investors.ca	**Executive**	**High**
End Users/Patients **John Smith**	All patients registered with system	**External**	PatientName@PersonalEmail.ca JohnSmith@gmail.com	**Operational**	**High**
Patient Caregiver	Alternate caregiver for patients who	**External**	MaryDoe@gmail.com	**Operational**	**High**

Mary Doe	lack capacity for decision making		AlternateCareGiver@Yahoo.ca		
Marketing and Quality Improvement	Marketing and Social Media Team Quality Improvement/Assurance Officer	**Internal**	Marketing@CareSyn.ca QI@CareSync.ca	**Operational**	**High**
Accountant	Accounts and Billing	**Internal**	Account@CareSync.ca	**Operational**	**High**
Sam Musa	Ontario Health	**External**	Smusa@Ont.ehealth.gov.ca	**Executive**	**High**
GreenWood Insurance Providers	Claims adjusters	**External**	MedicationCoverage@GreenWoodInsurance.ca	**Operational**	**Medium**
Systems Administrators and Database Managers	IT Administrator IT security Officer Database Manager	**Internal**	IT@CareSync.ca SecureIT@CareSync.ca	**Operational**	**Medium**
Joe Bob II	Programmer	**Internal**	Program@CareSync.ca	**Executive**	**Medium**

Appendix D for Deliverable 3

Round 1 - Systems Administrators/ Database Management

Question	Stakeholder Position	Answer
1. What type of database is used in your company?	Database Manager	SQL or Oracle
2. How is data going to be	Systems Administrator	PowerBi Analytics will create algorithms for each patient/user based on their care needs and

recorded and analyzed for patients?		documentations within the system
3. How will data be secured within the software system?	Privacy Officer	The system will be operated with encrypted servers. Licensed providers will have biometrics with finger scans in order to access the system. Patients will also have lock down through Ontario health portal where browsers are locked during appointments to ensure privacy is protected
4. How does the software handle data synchronization and data consistency across different systems?	IT officer	CareSync will use Ontario health in order to link information entered across different electronic health record systems and databases
5. What are the privacy controls in place to ensure security of health data?	Privacy Officer	Biometric data from licensed healthcare providers will be required upon logging into the system prior to appointments with their patients

Round 2 - Healthcare Directed

Question	Stakeholder Position	Answer
1. Do you want to launch this all over Canada or just for Ontario?	Health Canada Executive	For trial, let's launch in Ontario, and if it is successful, we will launch it throughout Canada.
2. Do you have staff to manage the traffic this app will generate?	Hospital Executives and Doctors	Yes, I believe so. And if this works well, I can hire more people. Some of these professionals will include EHR system administrator, Network Administrator, Security officers, and the individual healthcare facility or organization
3. Who will be the primary users of this app? Can you describe their roles and responsibilities?	Hospital Executives and Doctors	The primary users will be healthcare providers, such as doctors and nurses, who need to communicate with the patients and their caregivers securely.
4. Are there any budget or time constraints that need to be considered during the development of this app?	Hospital/Clinical Staff/Hospital and Clinic Administrators	We have a budget allocated for this project, and we expect the development to be completed within six months to meet our organizational goals.
5. Are there any existing systems or technologies that this app needs to integrate with?	Hospital/Clinical Staff/Hospital and Clinic Administrators	We use an electronic medical records system, and it would be helpful if the app can integrate with it to access patient data seamlessly.

Round 3 - User Directed

Question	Stakeholder Position	Answer
1. Who has access to the patient's health information?	User/Patient	● Only licensed providers and those who fall under the umbrella of Health will have access to your health information as well as yourself. If you are incapable of making health decisions, your advocate will also have access based on legal conditions ● Licensed providers will include Doctors, Nurses, Pharmacy staff ● Ontario Health portal will link any visits to healthcare providers within the province to maintain interoperability of information and systems
2. Does CareSync comply with relevant healthcare regulations or privacy acts?	Privacy Officer	● All health information is governed by PHIPA (Personal Health Information Protection Act)
3. How frequently is CareSync updated with bugs and fixes with system features?	Programmer	● Bugs fixes and patches will be repaired on an “As needed basis” once the software has been released
4. Will there be training resources or tutorials available to assist with using the software effectively?	Quality Assurance Officer	● Training will be provided to the superusers (administrators) will have privileges and permissions, they will be granted special permissions to assist in training the rest of the staff roster ● All licensed professionals, and patients will be required to complete training within 3 weeks of using the system, as well as obtaining and maintaining their log in credentials
5. How will Quality be assessed after the software	Quality Improvement Officer	● Software will be reviewed every 4 months to ensure key features are maintainable and error free. This will be a part of the Quality

release?		Assurance reviews

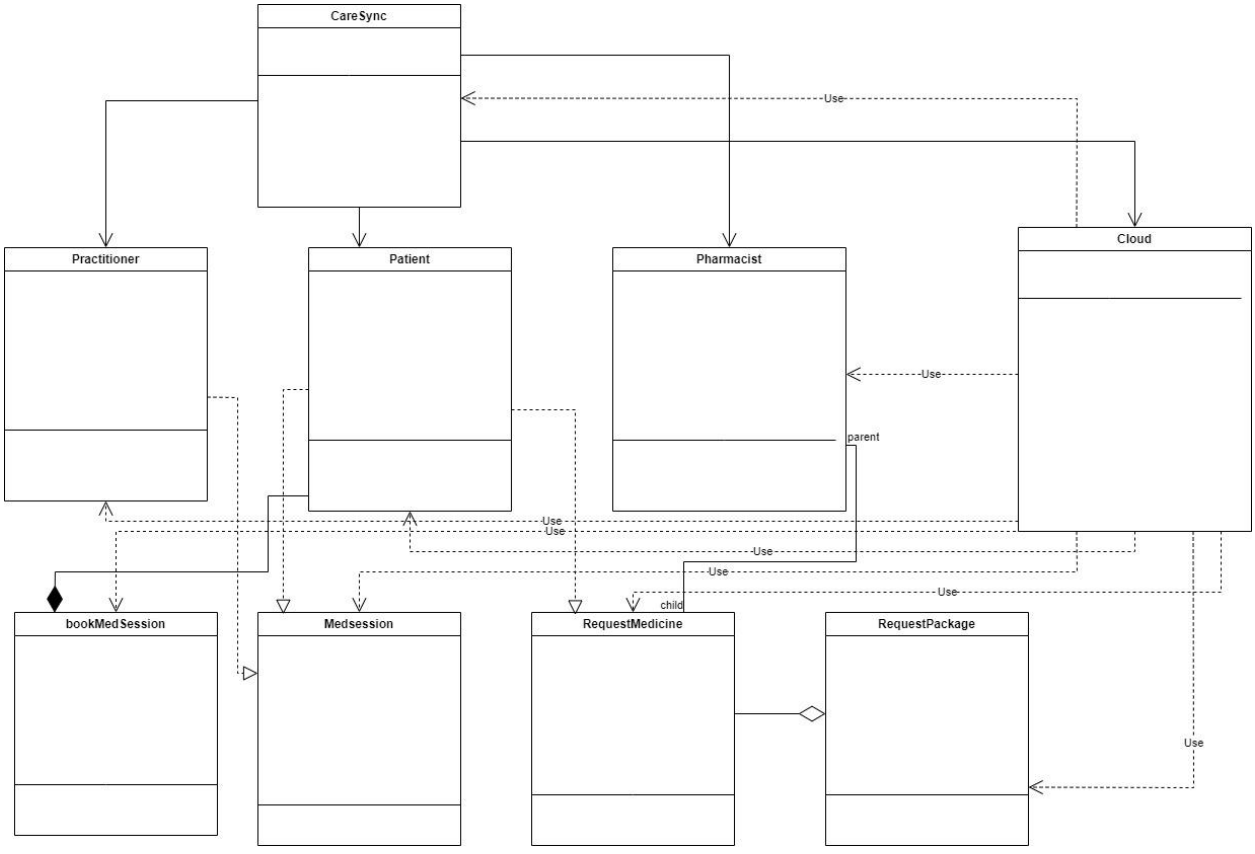
Round 4- Pharmacy Directed

Question	Stakeholder Position	Answer
1. What are the primary challenges or pain points you currently face in pharmacy operations that this app could help address?	Pharmacist	We struggle with inventory management, medication dispensing accuracy, and timely communication with patients and healthcare providers. An app that tackles these issues would be valuable.
2. Are there any specific regulations or standards unique to the Canadian healthcare and pharmacy environment that need to be considered for this app?	Pharmacist	Yes, we need to ensure compliance with regulations such as the Food and Drug Regulations, Controlled Drugs and Substances Act, and the Personal Information Protection and Electronic Documents Act (PIPEDA).
3. How does the prescription and medication dispensing process work in Canada, and how can this app support or improve those processes?	Pharmacy Staff	In Canada, prescriptions are typically issued electronically or in writing. The app can assist with features like secure electronic prescription processing, drug information lookup, and inventory management.
4. What are the primary roles and responsibilities of pharmacists and pharmacy staff in the Canadian	Pharmacy Staff	Pharmacists in Canada play a crucial role in medication dispensing, providing patient consultations, and ensuring the safe and effective use of medications. Pharmacy staff are involved in tasks such as inventory management and prescription processing.

healthcare system?		
5. Are there any regional or provincial differences in pharmacy regulations or workflows that need to be considered in the app's design and functionality?	Pharmacy Staff	Yes, pharmacy regulations and workflows can vary across different provinces in Canada. The app should be flexible enough to accommodate these regional differences.

Appendix E : Class Diagrams

Deliverable #4



First cut domain class diagram

Deliverable #5

CRC Card 1:

Medical Professional	
Responsibility	Collaborator
Control user profile data	
Access the appointment schedule and make changes	Collaborates with the CareSync system to manage appointments, medication lists, and user profile information
Analyze and control medication list	
Converse with patients and other health care providers	Collaborates with the Patient class to communicate and schedule appointments

CRC Card 2:

Patient	
Responsibility	Collaborator
Manage user profile information	
Create, modify, and cancel appointment requests	Collaborates with the CareSync system to manage appointments, access and update user profile information, and seek prescription refills.
Request prescription refills	
Obtain communication from medical professionals and reply to it	Collaborates with the Medical Professional class to coordinate appointments.
Maintain personal medication list	

CRC Card 3:

CareSync System	
Responsibility	Collaborator
Control user logins and authentication	
Keep and retrieve user profile data	
Handle appointment scheduling and updates	
Manage requests for pharmaceutical refills and communication	
Synchronize appointments with OS calendars	Collaborates with the OS Calendar class for synchronization of appointments
Facilitate communication between medical professionals and patients	Collaboration for user personal information, appointment scheduling, and communication with the Medical Professional and Patient classes

CRC Card 4:

BookMedSession	
Responsibility	Collaborator
Synchronise scheduled events with the user's private calendar	Collaborates with the CareSync System to synchronize and receive appointment updates.
Users are updated and sent reminders or modifications to their appointments	

Checks and displays availability of the practitioner.	

CRC Card 5:

Cloud	
Responsibility	Collaborator
Manage database operations	Collaborates with the CareSync System to manage databases, authenticate users, and produce reports.
Support user login and password changes	
Monitor system logs and audits	
Create reports and examine patient data patterns	

CRC Card 6:

Practitioner	
Responsibility	Collaborator
Manage practitioner profile information	
Handle practitioner authentication and authorization	
Upload availability schedule	

Prescribe medication to patients	Collaborates with the patient class for user personal information, appointment scheduling, and for medication prescribing.
Schedule appointments for patients	

CRC Card 7:

Pharmacist	
Responsibility	Collaborator
Manage pharmacist profile information	
Handle pharmacist authentication and authorization	
Review medication retrieval requests	Collaborates with the Patient class for medication retrieval requests.
Dispense medication to patients	Collaborates with the Medication class for accessing medication information.

CRC Card 8:

Manage Session	
Responsibility	Collaborator
Manage session type (book online/in-person)	
Manage session ID	
Manage session date	

Manage session time	
Manage session duration	
Manage prescription ID	
Manage patient ID	
Start session	

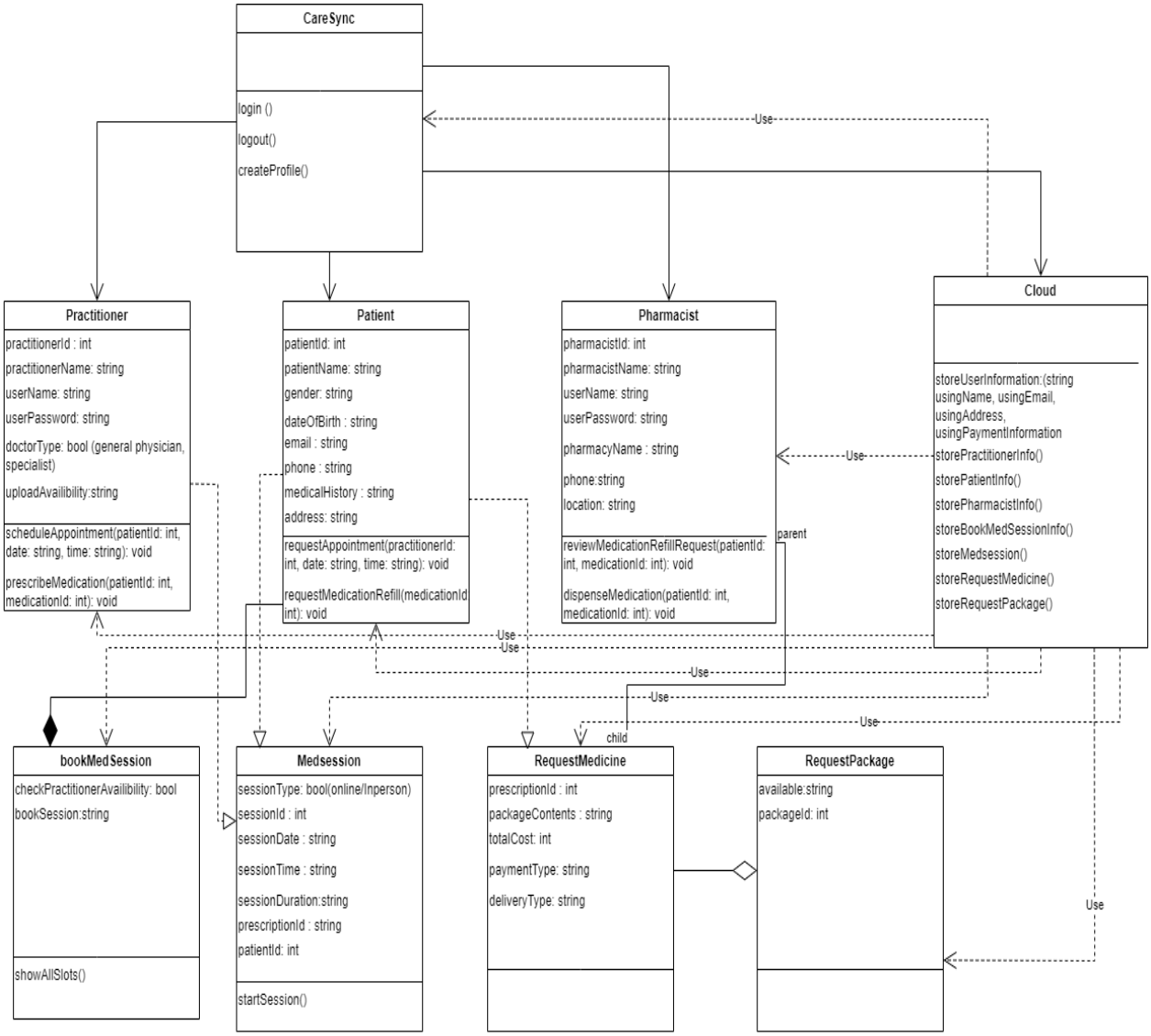
CRC Card 9 :

RequestMedicine	
Responsibility	Collaborator
Manage prescription ID	
Manage package contents	
Manage total cost	
Manage payment type	
Manage payment type	

CRC Card 10:

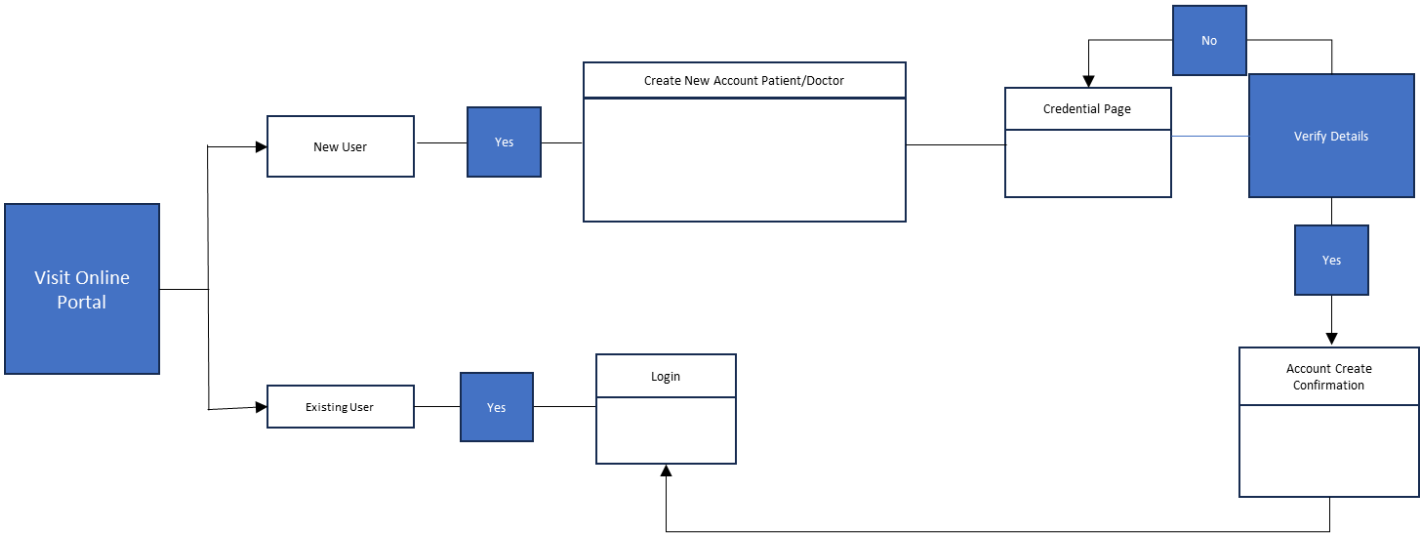
RequestPackage	
Responsibility	Collaborator
Manage availability status	
Manage package ID	

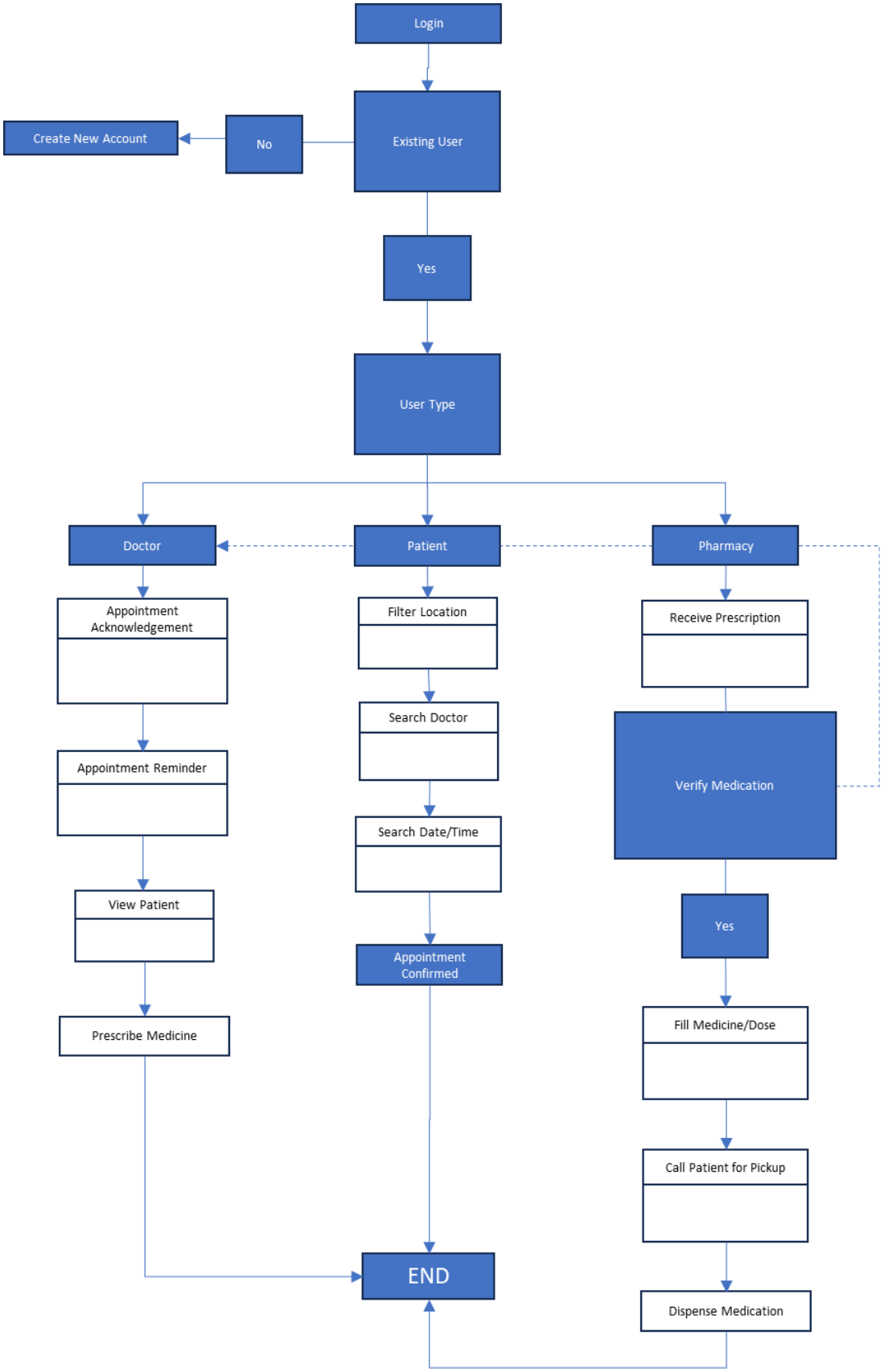
Deliverable #6



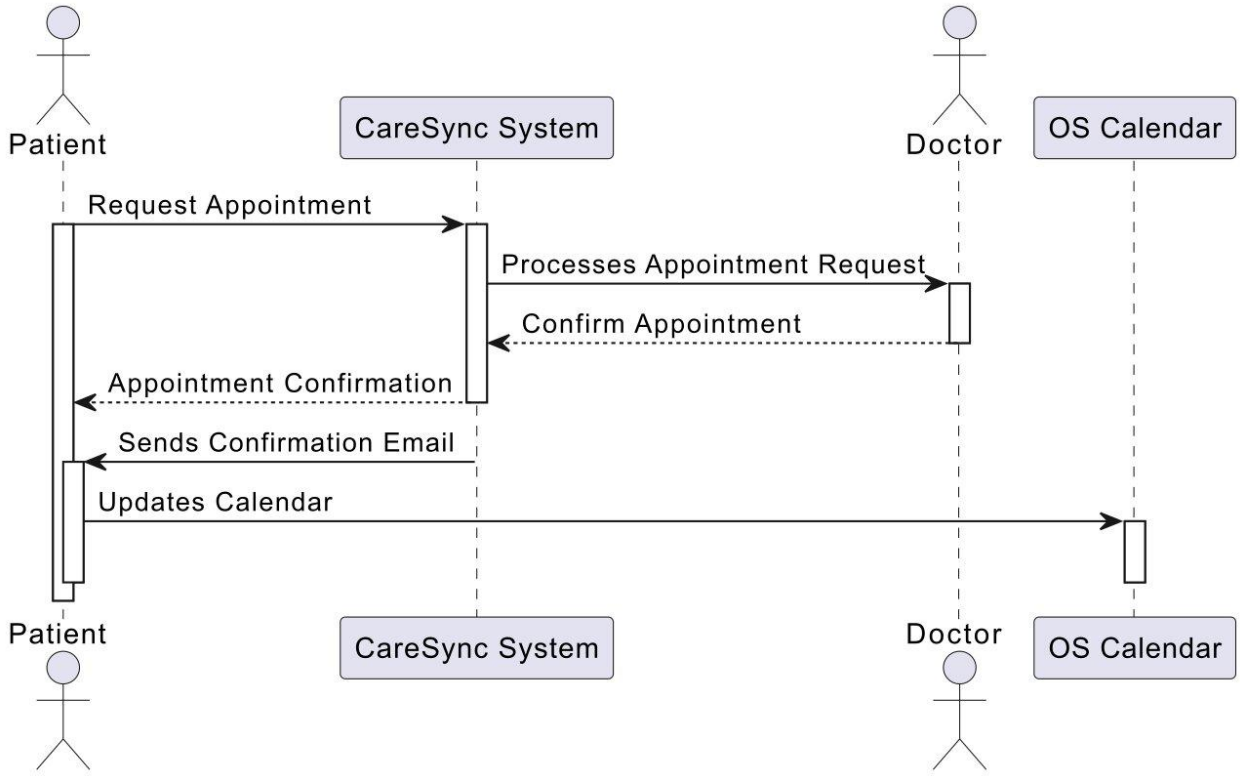
Part C:

Deliverable # 1:




Login
Existing User
No
Create New Account
Yes
User Type
Doctor
Patient
Pharmacy
Appointment Acknowledgement
Appointment Reminder
View Patient
Prescribe Medicine
Filter Location
Search Doctor
Search Date/Time
Appointment Confirmed
Receive Prescription
Verify Medication
Yes
Fill Medicine/Dose
Call Patient for Pickup
Dispense Medication
END

Deliverable # 2:



Sequence diagram

Deliverable # 4:

Martin Fowler developed the Party Analysis pattern, which is a practical method for describing generic parties and the connections among them in a domain. However, it is discovered that the Party Analysis pattern may not be appropriate for a number of reasons when analyzing the specific requirements and domain of the CareSync healthcare software.

First off, the Party Analysis pattern is made to represent parties in a general and abstract way, concentrating on traits that many actors have in common. The CareSync app, in contrast, is focused on specialized entities like "Practitioner," "Patient," and "Pharmacist," each of which has unique characteristics and functions within the healthcare setting. These organizations have unique roles and capabilities that go beyond the traditional notion of a party.

Secondly, the Party Analysis pattern removes specific details to produce a more adaptable model with the goals of reuse and generality. However, the CareSync app needs accurate representation of medical actions that are unique to the healthcare industry, such as "Prescribe Medication," "Schedule Appointment," and "Request Medication." The fundamental functions of the app depend on these interactions between various components.

Additionally, the interactions in the CareSync app, such as a "Practitioner" booking an appointment with a "Patient" or a "Pharmacist" giving medication to a "Patient," are more context-specific and domain-specific. For the healthcare process to effectively depict the interactions between many participants, these linkages are essential.
Overall, because of its specialized domain and requirement for accurate representation of medical actions and interactions, the CareSync app may not directly apply the Party Analysis pattern. Instead, the current class diagram offers a specialized depiction of doctors, patients, and chemists, capturing the particular needs of the healthcare sector and fulfilling the project's specific goals.

— added notes —
Notes from Analysis Patterns from Martin Fowler:

- “Party” refers to the supertype of person and organization, the organization structure problem is then used to show the development of the accountability model
- Combination of party and organization structure patterns produces accountability – accountabilities will handle multiple relationships between parties such as: organization structures, patient consent, contracts for services, employment and registration with professional bodies
- Party type allows parties to be classified and subtype with party type generalizations without chasing the model.
- References the address book: addresses, numbers, e-mails all linked to : one person or multiple people or a company (Taxi Company)
- Party is the supertype of a person or organization that allows the address book to hold numbers, addresses, names and emails of departments within companies, or informal teams
- “Party” should be used in many situations where person or organization is used
    - Example: John Smith works for CareSync, this can be modeled by an accountability type of “employment”
    - Gina Fang gives Dr. Robson the consent to follow up with a gastroenterologist, this will be modeled under a professional registration where Dr. Robson is responsible to the College of Physicians
- Modeling principle: Whenever defining features for a type that has a supertype, consider whether placing the features on the super type will make sense
- Knowledge level splits the model into two sectional: The operational and knowledge levels
- Operational level consists of accountability, party and its interrelationships
- Knowledge level consists of accountability type, party type, and it’ interrelationships

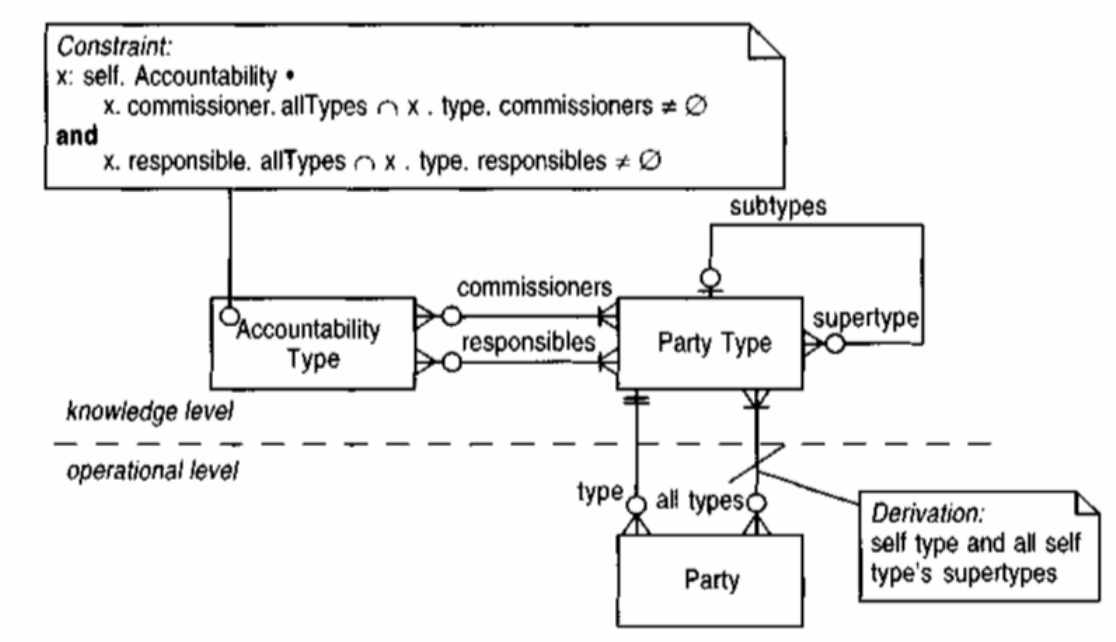


Figure 2.10 Allowing party types to have sub- and supertypes.

Adding generalization to party types makes it easier to define the knowledge level.

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Guidelines and resources for designing and developing Android apps:

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Guidelines and resources for designing and developing iOS apps:

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HIPAA Security Rule Guidance:

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