

Montreal Central Station Development (MCSD)

Requirement Specification Document By
somename systems inc.

ECSE 326 Software Requirements

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Group 10

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1. Introduction

The following document contains the system requirements specification for SomeName Systems' proposed mobile phone application for the Montreal Central Station Development Company. We will be following the IEEE System Requirements Specification (SyRS) standard for the formatting format and content of this document. Our team has also previously created an Business Proposal document following an interview with CEO Gunter Mussbacher, as well as an Elicitation Document. Both will be used as references to inform the specifications for our product.

1.1 System Purpose

Our Company was approached by the Montreal Central Station Development Company (MCSD) in order to improve both the experience of the passengers who pass through the station and the businesses who operate within the station. The application will improve the experience of a standard passenger by serving as a hub of information assisting the user in an number of ways, including providing direction throughout the concourse, alerting when train delays and updates occur, and tailoring sale notifications to the user's tastes. In terms of businesses, consumers who frequent through the station now have a new way to have advertisements targeted to them in the palm of their hand. The application will improve the profits of businesses by notifying consumers of sales, offer special customer loyalty services to improve recurring business, and assisting consumers to find their way to a business through the crowd. As the MCSD is primarily funded by a portion of the profits generated by the businesses that reside within the station, a boost in sales for the housed businesses will improve MCSD's inflow of money to use in future projects to further improve the station for the Montrealers who pass through.

1.2 System Scope

The Montreal Central Application (MCA) will provide several functions to the user. A User can open a web portal to add money to their OPUS cards. Monetary interactions with OPUS cards will not be directly provided by the application. A user can purchase VIA Rail tickets through a web portal to VIA Rail's website, through which a User will complete their form. Train tickets will not be directly purchased on our application. After the completion of the form, the portal will send a confirmation message and ticket information to the application, which will then be stored and displayed in the user's itinerary. After selecting the ticket, a scannable barcode can be displayed to be used at the rail before boarding. The station's timetable for both VIA Rail and EXO lines will be displayed by the application. Push notifications will be sent to the user to notify them of train delays or updates.

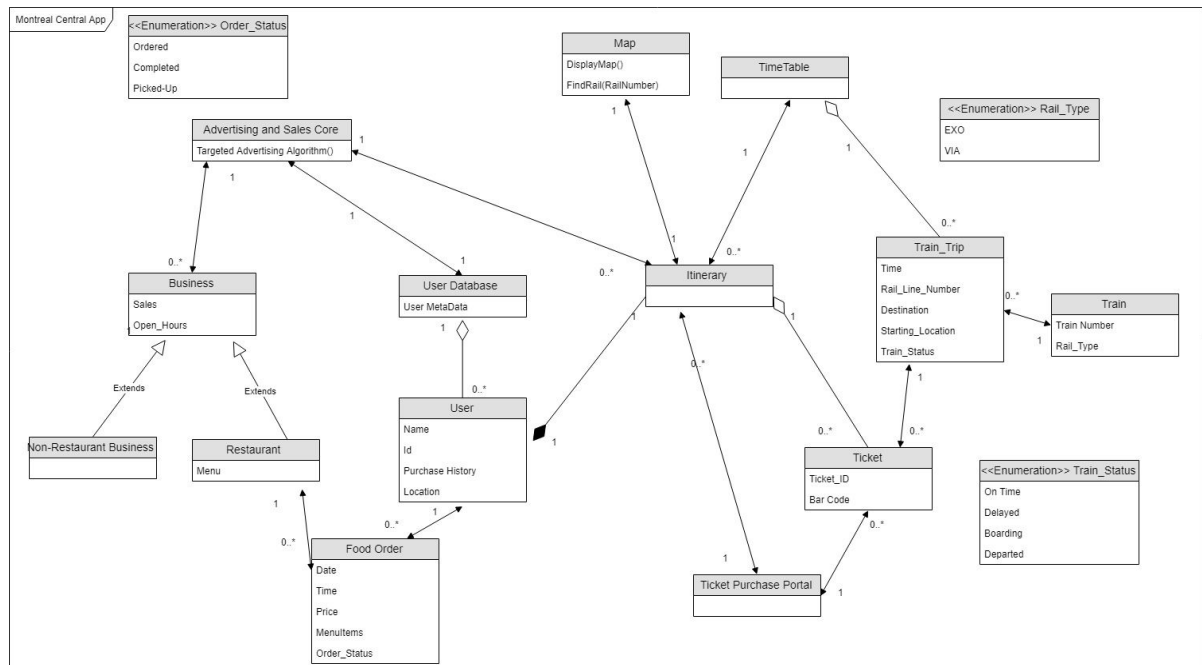
Our application will also support an interactive map of the station, which will assist in guiding the passengers to their rail line, and assist other station-goers find the business of their choice. A user's own location is displayed on the map, and a waypoint can be placed on the map to help find a desired destination.

The MCA will also have a portion dedicated to notifying the user of sales opportunities within the station. A business's sales and advertisements will be broadcast out to the user to help entice new business. User's can also preorder food items from restaurants in order to save time in the station. Consumer's purchase history will be recorded within a User Database, which will be

used in an algorithm designed to tailor future sales notifications and advertisements to the user's tastes.

1.3 System Context

The system will be broken up into several parts, as displayed in the domain model below. A User's name, id, password and other key information is stored. Every user has an itinerary. The Itinerary acts as a crossroad between several domains, including a user's tickets, the station map, and train timetable. The Itinerary interacts with the map by sending the rail line to display for the user to go to for boarding, displays all upcoming tickets previously purchased, and processes User interactions with the Train companies VIA rail and EXO. User information is stored within a database, which can be used by a Targeted Advertising Algorithm to better tailor advertisements and sales to an archetype individual. All businesses have their sales data and open hours stored, which is filtered into the Targeted Advertising Algorithm to find matches with User's with a high likelihood of enjoying their product. Users can also pre order food at a restaurant by creating a food order, which can save a busy commuter time in the station, or purchase something they may not have had time to without pre-ordering. All restaurants and businesses can update their business fields and sales through an online website. Train trip data is fed to the system from the MCSD.



2. References

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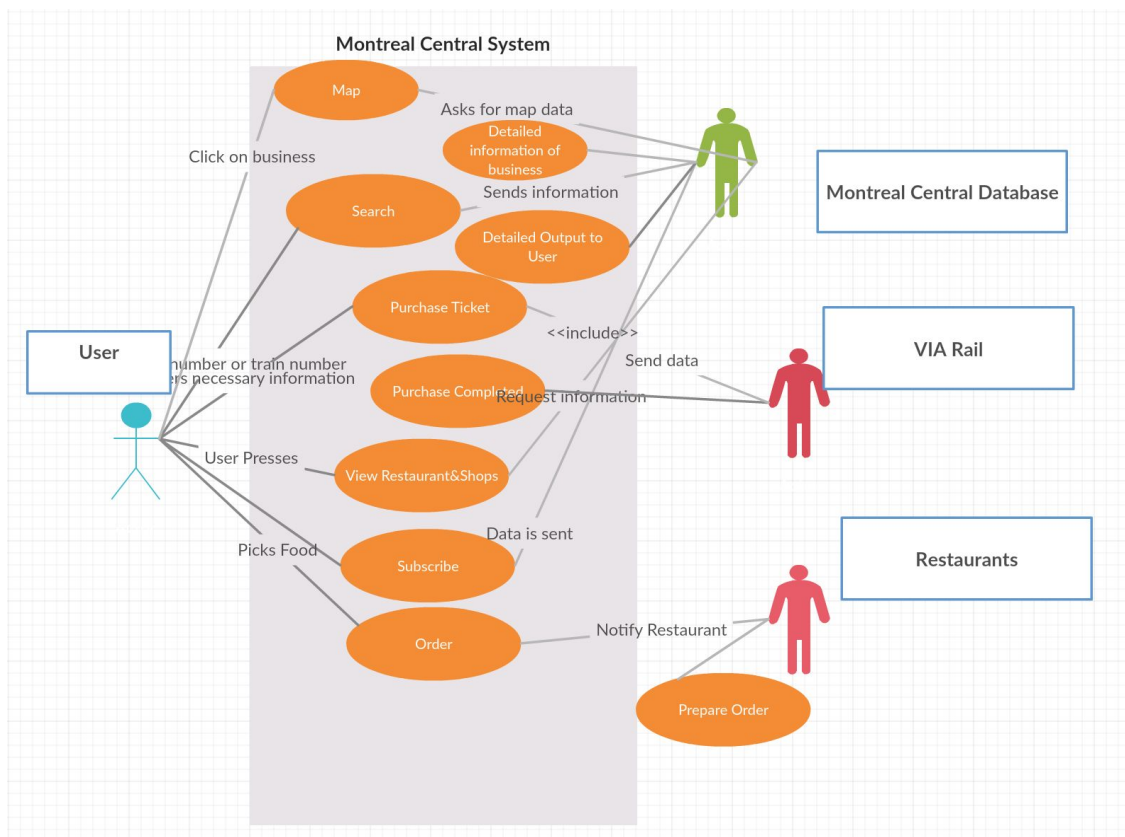
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3. System Requirements

3.1 Functional Requirements

The following are several use case and requirements we have created to describe our system.



3.1.1 Use Case: Purchase VIA Rail Ticket

Use Case 1	Author: Aleksas Murauskas 260718389
User Story	As a User, I would like to purchase a one way VIA Rail ticket to Toronto through the app so that I can visit family for the holiday season.
Use case name	Purchase VIA Rail Ticket
Brief Description	The intention of the Use is to book a one-way ticket.
Precondition	The User must have logged in, The User must have an internet Connection, User has selected English as their primary language.
Primary Actor	User
Secondary Actors	Viarail.ca
Dependency	VIA Rail Website's Ticket Purchasing System, INCLUDE USE CASE: Display
Generalization	none
Acceptance Criteria	A confirmation message is sent to the System after the User completes the ticket booking form. Ticket information appears within Itinerary. Valid Ticket Information Is received from viarail.com.

Basic Flow: BF1	Steps
Bf	1. User opens the Montreal Central app
	2. User selects "My Itinerary" window
	3. User selects the Purchase VIA Rail Ticket option
	4. System opens portal to https://reservia.viarail.ca/search.aspx?l=en
	5. User completes the viarail.ca ticket form
	6. Viarail.ca VALIDATES THAT User has completed the Ticket booking form.

	7. Viarail.ca sends ticket confirmation message, ticket information
	8. System VALIDATES THAT ticket confirmation message is received from viarail.ca
	9. System VALIDATES THAT ticket information is received from viarail.ca
	10. System VALIDATES THAT ticket has been added to User's itinerary
	11. INCLUDE USE CASE: Display Ticket Information
	12. System VALIDATES THAT ticket is displayed in the "My Itinerary" window
Postcondition	A valid booking has been made on viarail.com. A matching ticket is displayed in the User's

Specific Flow:	Alternate	RFS bf 8
AF1		1. System informs User that the viarail.com has not confirmed the ticket purchase
		2. ABORT
Postcondition		System does not record a ticket booking for the user

Specific Flow:	Alternate	RFS bf 9
AF2		1. System informs User that the System has not received ticket information from viarail.com
		2. ABORT
Postcondition		System does not display the ticket that's purchase was confirmed by viarail.com.

Specific Alternate Flow:	RFS bf 12
AF3	1. System informs User that the System has failed to display the Ticket in their Itinerary
	2. ABORT
Postcondition	System does not display the ticket that's purchase was confirmed by viarail.com.

Bounded Alternate Flow:	RFS bf 1-12
AF4	1. System VALIDATES THAT Timeout Timer passed Time limit
	2. System informs User that their connection has timed out
	3. ABORT
Postcondition	The System has not recorded a ticket booking

Related Requirements for Use Case 1

REQ1: The Montreal Central App System shall open a web portal to <https://reservia.viarail.ca/search.aspx?l=en> upon User request to purchase a VIA Rail Ticket.

REQ2: The Montreal Central App System shall display Ticket Information within the User's Itinerary

REQ3: The Montreal Central App System shall only allow Users who have logged into their account to access the web portal to viarail.com

REQ4: The Montreal Central App System shall receive a confirmation message from viarail.com to confirm the User has purchased a Ticket.

REQ5: The Montreal Central App System shall receive ticket information from viarail.com.

REQ6: The Montreal Central APP System shall open a portal that matches the User's preferred language.

3.1.2 Use Case: Display list of businesses inside the station

Use Case 2	Author: Edgar Chang 260729484
User Story	As a User, I would like to view the list of available shops and restaurants in the station on the app so I can know what to look for in the station.
Brief Description	The intention of the Use is to view available businesses in the station.
Precondition	The User must have logged in, The User must have an internet Connection, User has selected English as their primary language.
Primary Actor	User
Secondary Actors	
Dependency	none
Generalization	none
Acceptance Criteria	Verify that the page listing the businesses inside the station can be accessed from the homepage of the app. Verify that the list of available business is up to date. Verify that the list of available business provides correct information.

Basic Flow: BF1	Steps
bf	1. User opens the Montreal Central app.
	2. User selects “View Stores and Restaurants” button.
	3. The app displays a list of all businesses inside the station and several filters (business type, open hours, food type, price range, ratings) for the user to choose from.
Postcondition	A list of available businesses in the station is displayed on the app.

Specific Alternate Flow:	RFS bf 3
AF1	1. User enters one or more filter criteria.
	2. System validates that the chosen filter criteria are valid.
	3. Resume step bf 3.
Postcondition	The app shows an updated list of businesses according to the chosen filters.

Specific Alternate Flow:	RFS bf 3
AF2	1. User selected an interested business from the list.
	2. System displays relevant information such as opening hours, telephone number and promotions regarding the chosen business.
	3. Resume bf 3.
Postcondition	System has displayed the relevant details of the User's chosen business.

Bounded Alternate Flow:	RFS bf 1-3
AF4	1. System VALIDATES THAT Timeout Timer passed Time limit
	2. System informs User that their connection has timed out
	3. ABORT
Postcondition	The System has not displayed a list of businesses inside the station.

Bounded Alternate Flow:	RFS bf 1-3
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AF5	1. The User decides to not continue and exits the system.
	2. ABORT
Postcondition	The System has not displayed a list of businesses inside the station.

Related Requirements for Use Case 2

REQ1: The Montreal Central App System shall be able to access a list of businesses inside the station.

REQ2: The Montreal Central App System shall be able to update the list of businesses inside the station.

REQ3: The Montreal Central App System shall allow the user to apply filter on the list of businesses inside the station.

REQ4: The Montreal Central App System shall be able to display details of a business that the user selected from the list.

3.1.3 Use Case: RTM Train Push Notifications

Use Case 3	Author: Jules Boulay 260710129
User Story	As a User, I would like to receive push notifications from the App about RTM train delays so that I avoid losing time at the station.
Use case name	RTM Train Push Notifications
Brief Description	The intention of the Use is to inform the User about train delays.
Precondition	The User must have logged in, The User must have an internet Connection, User has subscribed to RTM Push Notifications.
Primary Actor	User
Secondary Actors	System, RTM
Dependency	none
Generalization	none

Acceptance Criteria	The System updates the train schedule. The User is informed about the train delay.
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Basic Flow: BF1	Steps
Bf	1. RTM detects RTM train departing from Montreal Central Station will be delayed
	2. RTM informs System about delay
	3. System updates schedule
	4. System searches for all Users that are subscribed to specific train push notifications
	5. System finds all subscribed Users
	6. System pushes notification to all subscribed Users
	7. User receives System notification
	8. System confirms User received notification
	9. User is informed about train delay
Postcondition	A subscribed User has been informed about a train delay.

Specific Alternate Flow:	RFS bf 5
AF1	1. System finds no subscribed Users
	2. ABORT
Postcondition	System does not notify any users about delay.

Specific Alternate Flow:	RFS bf 7
AF2	1. User does not receive notification
	2. System reports failed notification

	2. ABORT
Postcondition	System must notify User upon User request.

Related Requirements for Use Case 3

REQ1: The Montreal Central App System shall be able to receive train delay information from RTM.

REQ2: The Montreal Central App System shall be able to update train schedule information.

REQ3: The Montreal Central App System shall allow logged in Users to subscribe to schedule train departure push notifications.

REQ4: The Montreal Central App System shall be able to notify selected Users about train delays.

3.1.4 Use Case: Order Food

Use Case 4	Author: Fouad El-Bitar 260719196
User Story	As a User, I would like the UI to be structured with food categories to simplify ordering. As a User I would like my account to be connected to my billing information to speed up payment.
Use case name	Order Food
Brief Description	The intention of the user is to order food or drink so that upon arrival to the restaurant the order is already prepared or being prepared
Precondition	User must be connected to the internet, logged in, and has gone to the main ordering page.
Primary Actor	User
Secondary Actors	Montreal Central System, Restaurants Ordering Management Systems
Dependency	The restaurant's order management system is online INCLUDE USE CASE: Order Canceled
Generalization	none

Acceptance Criteria	An order confirmation number is sent to the System once order is placed, the number appears within <i>current orders</i> tab. The order number is valid and the restaurant receives the order and it is the correct order.
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Basic Flow: BF1	Steps
Bf	1. System displays the available restaurants
	2. User selects desired restaurant
	3. User requests the System to add order items to the cart, requests System to check out and enters payment information
	4. System validates payment information, connects to corresponding restaurant management system
	5. System requests order be placed, System validates the order confirmation is retrieved and informs User order is successful
	6. System validates ticket is added to User's current orders
Postcondition	A valid order has been made, order confirmation sent to System, restaurant begins preparing order.

Specific Flow:	Alternate	RFS bf 1
AF1		1. System informs user that no restaurants are available as they are closed, use case ends.
		2. ABORT
Postcondition		System does not make food order

Specific Flow:	Alternate	RFS bf 2
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AF2	1. User cannot find desirable restaurant, customizes search using specific food category filter
	2. System displays new results, continues at Step 3
Postcondition	A valid order has been made, order confirmation sent to System, restaurant begins preparing order.

Specific Flow:	Alternate Flow:	RFS bf 4
AF3		1. System rejects request and informs User the specific restaurant's order system is offline
		2. User gives up, use case ends with User unsatisfied.
Postcondition		System does not make food order

Specific Flow:	Alternate Flow:	RFS bf 4
AF4		1. System rejects request and informs User the restaurant has ran out of specific order, use case continues at step 3.
Postcondition		A valid order has been made, order confirmation sent to System, restaurant begins preparing order.

Related Requirements for Use Case 4:

REQ1: The Montreal Central Application System shall have a portal to the restaurant's Order Management Systems.

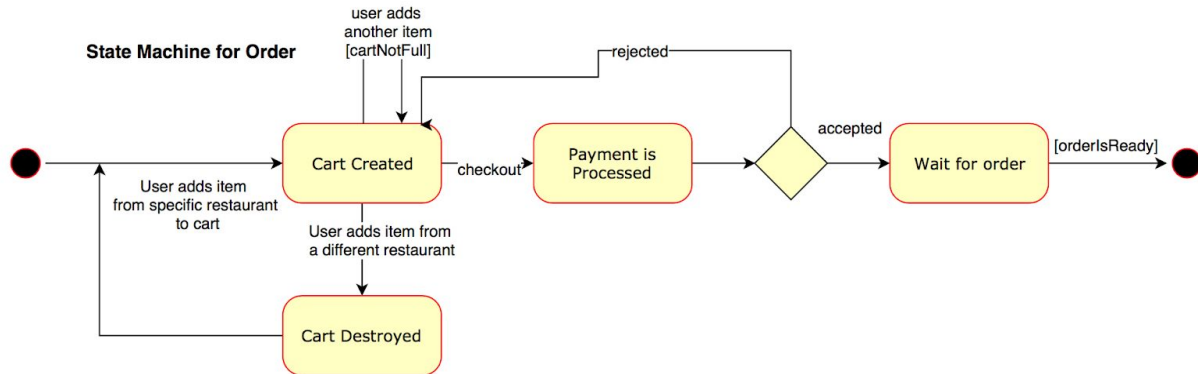
REQ2: The restaurant's Order Management System shall send the order number to the Montreal Central System.

REQ3: The System must store the order items and corresponding prices for every restaurant.

REQ4: The System must allow the restaurants to update the order items available and their prices.

REQ5: The System must update the status of the order number.

Example Proposed State Machine:



3.1.5 Use Case Use Map, Author: Jacob McConnell, 260706620

User story:

As a traveler in the Montréal central station, I want to be able to see a map of the train station with all of the amenities in it and see my location relative to them, so that I can find my way even if I do not know the station well.

Acceptance Criteria:

AC1. Verify that the user can reach the map from the homepage of the app.

AC2. Verify that the users location is displayed on the map.

AC3. Verify that if the user has a train departure on his itinerary that his departure platform will be indicated on the map.

AC4. Verify that if the user searches for a business a business that is in the train station the map indicates its location to the user.

AC5. Verify that if the user selects a business its business page, providing information, deals, and an easy way to initiate pre-ordering when applicable, is opened.

3.1.5 Use Case: Use Map

Use Case 5	Author: Jacob McConnell 260706620
Use case name	Use Map
Brief Description	The intent of the user is to look at a map of the train station to orient themselves and find where they need to go.
Precondition	The user has already downloaded the app on their phone. The user has signed into the app. The user has wifi or internet access on their phone. The user is at the homepage of the app.
Primary Actor	User
Secondary Actors	

Dependency	INCLUDE USE CASE Montreal central app:: Display Specific Business Page
Generalization	none

Basic Flow:	Steps
“bf”	1. User selects the map widget from the homepage of the app.
	2. The system presents the user with a map of the train station.
	3. The system obtains the users location from the mobile device and displays it to the user on the map.
	4. The system gets the users exit platform from their itinerary and indicates the users exit platform to them.
	5. The user searches for a business or restaurant.
	6. The system indicates where on the map the business.
	7. The user selects a business.
	8. INCLUDE USE CASE Montreal central app::Display specific business page
	9. The user indicates to the system to return to the map.
	10. The system closes the business page.
	11. The system displays the map.
	12. The user closes the map page.
Postcondition	The system displays the homepage.

Specific Alternate Flow:	RFS bf 5
“user_does_notSearch”	1. RESUME STEP bf 7
Postcondition	

Specific Alternate Flow:	RFS bf 7
“user_does_notSelectBuisness”	1.RESUME STEP bf 11
Postcondition	

Bounded Alternative Flow:	RFS bf 1-12
“user_closeMap”	1. ABORT
Postcondition	System returns user to home page.

Specific Alternate Flow:	RFS bf 4
“user_does_notHaveDeparture”	1. System VALIDATES THAT user does not have a departing train in the next 4 hours.
	2. RESUME STEP bf 5
Postcondition	System does not indicate any departure platform.

Related Requirements for Use Case 5:

REQ1. The Montreal Central app shall allow a user to view a map of the central station by selecting a widget from the homepage.

REQ2. The Montreal Central app shall display the location of the user within the station on the train station map in the app.

REQ3. The Montreal Central app shall check if the user has a departing train in their itinerary and if they do should indicate the departure terminal on the map.

REQ4. The Montreal Central app shall allow a user to select a business on the map and open that business' business page.

3.1.6 Use Case: View Train Timetable, Author: Ege Odaci, 260722818

Title: Train Times

Actors: User, Montreal Central App

Intention: The intention of the user is to see his or her train with a departure time and gate number. User does not check the train times manually but learn his/her train's time.

Precondition: Valid internet connection, Montreal Central App is up and running, working device to run the app.

Main Scenario:

1. User requests application to show all the departing trains.
2. Application gets the updated information about today's trains from database and shows it to the user.
3. User requests a search by providing a ticket number or train number.
4. Application validates the provided number and finds the train in the database.
5. Application shows user a detailed information of the selected train.
6. User learns the time and gate number and can get notifications before time.

Alternatives/Exceptions:

3a: Application can't verify the ticket or train number.

3a.1: User is informed. User checks the entered number and use case continues at step 2.

6a: User doesn't let application for push notifications

6a.1: User can't get notification but can still see the time within application

Postcondition: Detailed information is displayed on the app for a specific train and user can receive push notifications about it.

Use Case

As a user I want to be able to learn the detailed information of my train and get notifications by just providing a train number.

<<epic>>

- i) Today's all available trains are shown with time and gate information.
- ii) User can search for specific train.
- iii) When train is picked, user is informed with departure time, gate location etc.
- iv) User is further notified for any change in selected train.

Acceptance Criteria:

AC1: Verify that Montreal Central App can connect to the servers.

AC2: The Montreal Central App shall display all the departing trains today to the user.

AC3: The Montreal Central App shall make to search a train by train or ticket number.

AC4: The Montreal Central App shall show user the details of the train then send push notifications.

3.1.7 Use Case: Login

3.1.8 Use Case: Sign Up

3.1.9 Use Case: Display Specific Business Page

3.3 Performance Requirements

REQ1. The Montreal central app system shall be able to handle over 11 million users a year because the montreal central station is used by 11 million rail passengers a year[5] .

REQ2. The Montreal central app system shall be able to handle 5000 users using the system simultaneously to account for the variation in the number of users depending on date and time.

REQ3. The back end of the system shall respond to users' phone apps within 2 seconds 95% of the time. This is because anything longer than 4 seconds is unacceptably slow from the user experience perspective and it will take additional time for the results to be rendered on the users end that our outside our control (such as the user's phone's processor, and her data plan).

REQ4. The system shall be able to Store the user profiles and data of 11 million people because this would guarantee that the system would work for at least the first year even if every train station passenger signed up for the app. That would leave ample time to increase the capacity of the system for future years.

3.4 System Interface

Usability Requirements

REQ1. The System Interface should successfully satisfy 9 out of 10 User Map concerns.

REQ2. The System Interface should inform the user of most relevant train schedules.

REQ3. The System Interface should suggest the User products from business his profile would be most interested in according to the Systems algorithm.

REQ4. The System Interface should display available restaurants and their respective menu for pre-ordering products.

REQ5. The System Interface should provide the User means of adding restaurant menu items to a cart and consequently ordering them.

REQ6. The System Interface should provide the User means of logging in.

REQ7. The System Interface should provide the User means of signing up.

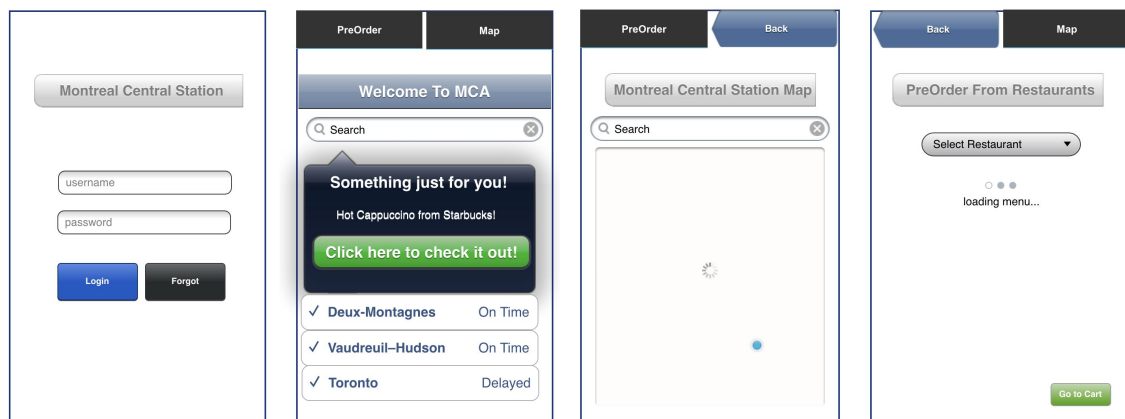
REQ8. The System Interface should provide the User means of subscribing to train schedules to receive push notifications.

REQ9. The system Interface should be available to users in French and English because Canada is a bilingual country.

System Interface

REQ1. The System Interface should be available in at least 80% of mobile devices used in greater area Montreal.

REQ2. The System Interface should be available in the latest versions of Android and IOs within 3 months of the Operating Systems' updates.



3.5 System Operations

Maintainability Requirements -

REQ1: The Ordering program module must be assessed for flexibility in order to accommodate for at least 70% of the restaurant order management systems.

REQ2: Adding new restaurants shall not affect the interaction with the current restaurants that are part of the system.

REQ3: The system shall allow restaurants the ability to change menu items and prices within maximum 3 days upon request.

Reliability Requirements -

REQ1: The food ordering sub-system defect rate shall be less than 1 failure per 10,000 transactions.

REQ2: The time-table sub-system defect rate shall be less than 1 failure per 1000 hours of operating.

3.9 System Security

The server for the Montreal Central software system should only be able to access by software maintenance employee of the company using a set ID and password updated everyday. Moreover, IT security software should be installed on the server and database of Montreal Central system. The IT security software should address the following points:

- Antivirus: The software should have constantly updated antivirus technology to protect the system from emerging viruses.
- Spyware detection: The software should automatically detect and destroy any spyware found in the system.
- Password protection: The software should limit access to the system and internal communication between different parts of the system with robust password protection to protect the user data stored in the database.

5. Appendices

5.1 Abbreviations

SyRS: IEEE System Requirements Specification

MCSD: Montreal Central Station Development Company

MCA: Montreal Central Application

bf: basic flow

af: alternative flow

5.2 Traceability Matrix

Requirements from high-level requirements document(Business proposal[6]):

R1: The system shall provide the departure location and time of trips targeted to customers.

R2: The system shall show the user current deals set by the businesses that are most likely to interest the user.

R3: The system shall display delays or lane changes for departing trains.

R4: The system shall provide information about a business's sales and specials.

R5: The system shall build a profile for each user to improve his experience at the train station.

R6: The system shall provide a map of the station to the user.

Requirements from Requirements Specification document:

RA: Use Case 1: Purchase VIA Rail Ticket

REQ1: The Montreal Central App System shall open a web portal to <https://reservia.viarail.ca/search.aspx?l=en> upon User request to purchase a VIA Rail Ticket.

REQ2: The Montreal Central App System shall display Ticket Information within the User's Itinerary

REQ3: The Montreal Central App System shall only allow Users who have logged into their account to access the web portal to viarail.com

REQ4: The Montreal Central App System shall receive a confirmation message from viarail.com to confirm the User has purchased a Ticket.

REQ5: The Montreal Central App System shall receive ticket information from viarail.com.

REQ6: The Montreal Central APP System shall open a portal that matches the User's preferred language.

RB: Use Case 2: Display list of businesses inside the station

REQ1: The Montreal Central App System shall be able to access a list of businesses inside the station.

REQ2: The Montreal Central App System shall be able to update the list of businesses inside the station.

REQ3: The Montreal Central App System shall allow the user to apply filter on the list of businesses inside the station.

REQ4: The Montreal Central App System shall be able to display details of a business that the user selected from the list.

RC: Use Case 3: RTM Train Push Notifications

REQ1: The Montreal Central App System shall be able to receive train delay information from RTM.

REQ2: The Montreal Central App System shall be able to update train schedule information.

REQ3: The Montreal Central App System shall allow logged in Users to subscribe to schedule train departure push notifications.

REQ4: The Montreal Central App System shall be able to notify selected Users about train delays.

RD: Use Case 4: Order Food

REQ1: The Montreal Central Application System shall have a portal to the restaurant's Order Management Systems.

REQ2: The restaurant's Order Management System shall send the order number to the Montreal Central System.

REQ3: The System must store the order items and corresponding prices for every restaurant.

REQ4: The System must allow the restaurants to update the order items available and their prices.

REQ5: The System must update the status of the order number.

RE: Use Case 5: Use Map

REQ1. The Montreal Central app shall allow a user to view a map of the central station by selecting a widget from the homepage.

REQ2. The Montreal Central app shall display the location of the user within the station on the train station map in the app.

REQ3. The Montreal Central app shall check if the user has a departing train in their itinerary and if they do should indicate the departure terminal on the map.

REQ4. The Montreal Central app shall allow a user to select a business on the map and open that business' business page.

RF: Use Case 6: View Train Timetable

Traceability Matrix:

Requirements	Is implemented by
R1	RF, RE{REQ3}
R2	RB, RD
R3	RC
R4	RB, RD, RE{REQ4}
R5	RA, RC
R6	RE{REQ1-3}