Software Requirements Specification
for
MBTA Trip Planner
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Revision History

Name	Date	Reason For Changes	Version
The Boys	10/20/12	Document compilation	1.0
The Boys	12/3/12	Final Revision	2.0

1. **Introduction**

1.1 Purpose

This document provides requirements for the MBTA Trip Planner system. Sections 1 and 2 are primarily intended for the client of the system. Section 3 is primarily intended for the software engineers who will be designing, implementing, and testing the system.

1.2 Product Scope

This document provides use cases to express high-level requirements (Section 2). The detailed/ specific requirements (Section 3) are structured based on the main functions of the system based generally on the use cases from Section 2.2.

2. **Overall Description**

2.1 Product Perspective

The MBTA Trip Planner system will allow users to see where they can go using the T including the current location of all trains. Users will be able to plan, search for, and sort routes.

2.2 Product Functions

This subsection provides the overall functionalities of the system based on the use cases. Specific/detailed requirements for these functionalities will be given in Section 3.

2.2.1 T Routes Use Case

Actor: User who wants to know where he/she can go using the T
Priority: Essential

1. System displays map of MBTA stops on main screen

or

1. User clicks “View Stops” button
2. System displays a table of all possible stops on the MBTA

2.2.2 Train Location Use Case

Actor: User who wants to know the current location of all trains
Priority: Essential

1. System overlays train icons on map approximating general location

or

1. User clicks “List Trains” button

2. System displays a table of all trains and their positions including the time away from the next stop

2.2.3 Next Train Use Case

Actor: User who wants to know when the next trains will gets to stop A
Priority: Essential

1. User hovers cursor over a stop on the map
2. System displays popup box with the information on when the next several trains will arrive

2.2.4 A To B Use Case

Actor: User who wants to know the options for getting from stop A to stop B
Priority: Essential

1. User selects stop A from drop down menu and clicks “Add Stop” button
2. System adds stop A to table and gives access to “Remove Stop” button
3. User selects stop B from drop down menu and clicks “Add Stop” button
4. System adds stop B to table
5. User clicks “Calculate Route”
6. System displays route from stop A to stop B. (There is only one route between any two stops)

2.2.5 Ordered List Use Case

Actor: User who wants to get an ordered list of stops
Priority: Desirable

1. User adds stops to table (see Use Case 2.2.4)
2. User checks “Ordered List” checkbox
3. System calculates and displays ordered route

2.2.6 Unordered List Use Case

Actor: User who wants to get to an unordered list of stops
Priority: Optional

1. User adds stops to table (see Use Case 2.2.4)

2. User unchecks “Ordered” checkbox
3. System calculates and displays unordered route

2.2.7 Specified Start and/or End Use Case

Actor: User who wants to get to an unordered list of stops with specified starting and/or ending points
Priority: Optional

1. User presses “Plan Route”
2. System displays two drop down menus, two search boxes, an advanced search button and a submit button
3. User selects stops
4. System populates table with stops including checkboxes to select start and end stops
5. User checks which stop is the start and/or end stop and clicks submit button
6. System displays list of possible routes from start to stop, if start stop isn’t supplied then the appropriate route to the end stop is displayed and vice versa

2.2.8 Time Use Case

Actor: User who wants to specify departure and/or arrival times
Priority: Desirable

1. User selects stops (see Use Case 2.2.4)
2. User enters departure time in “Departure Time” box if desired
3. User enters arrival time in “Arrival Time” box if desired
4. User pushes “Calculate Route” button
5. System displays the route between the stops, with train departure times starting at the specified time and arriving before the specified time.
6. If there are no trains departing after the departure time or arriving before the arrival time, the system will still calculate the route, but say that train time information is unavailable.

2.2.9 Sorting Use Case

Actor: User who wants to sort trains by the earliest departure, earliest arrival and fewest transfers
Priority: Desirable

1. User presses “Plan Route”
2. System displays a drop down menu, an add button, an advanced search button and a submit button
3. User types in or selects stops and clicks “Advanced Search”

4. System displays advanced search options including check boxes for earliest departure, earliest arrival and fewest transfers
6. User selects which of those check boxes he/she wants active
7. System displays list of possible routes from the start stop to the end stop and sorts the results based on selected check boxes

2.2.10 Test Use Case

Actor: User who wants to test the system with old data
Priority: Essential

1. User presses “Use Test Data”
2. System loads test data and displays the home screen, but all options now reference the test data instead of using the online data

2.3 User Classes and Characteristics

The system should be accessible to all types of users with varying skill levels. Both computer novices and experts should be able to use the system.

2.4 Design and Implementation Constraints

1. The system should be based on live data from the MBTA
2. The only information the system should access online is MBTA data
3. The system should be written in Java and run on CCIS Linux machines with only their standard software and JSON library in the course directory
4. The system should accept test data from file input

2.5 Apportioning of Requirements

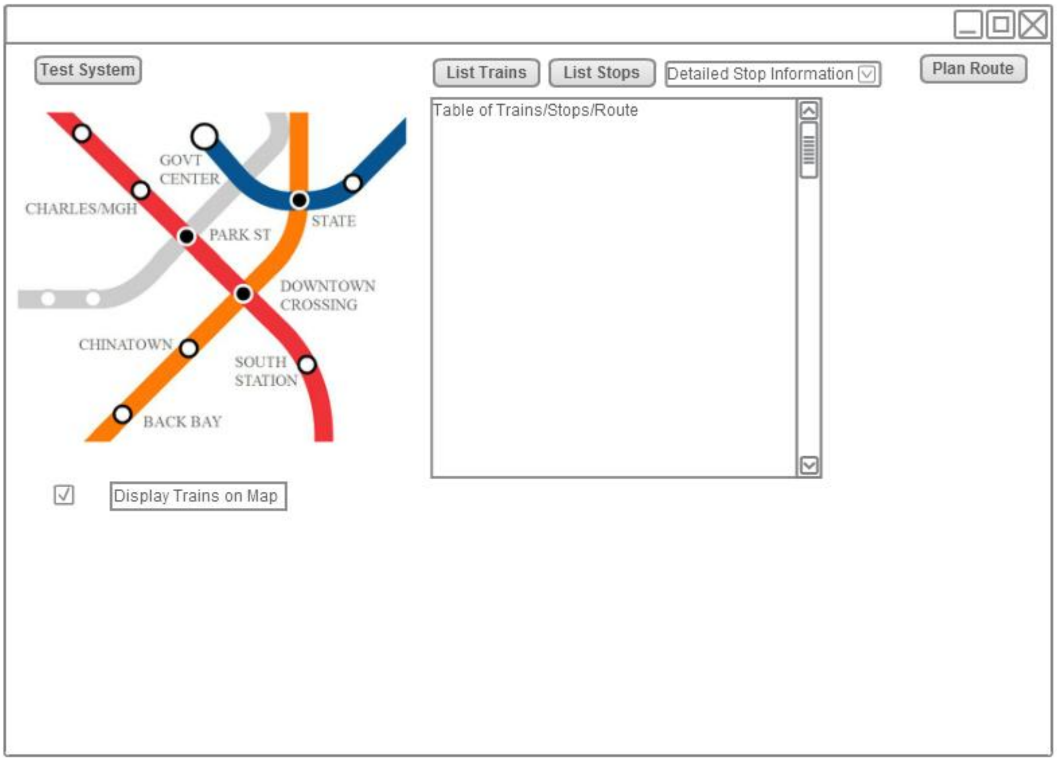
Sections 1 and 2 outline the “high-level requirements.” Section 3 discusses specific, detailed requirements. These requirements will be used to design and implement the system. Each requirement is designated as essential, desirable or optional. These priorities will be used to determine the order of implementation.

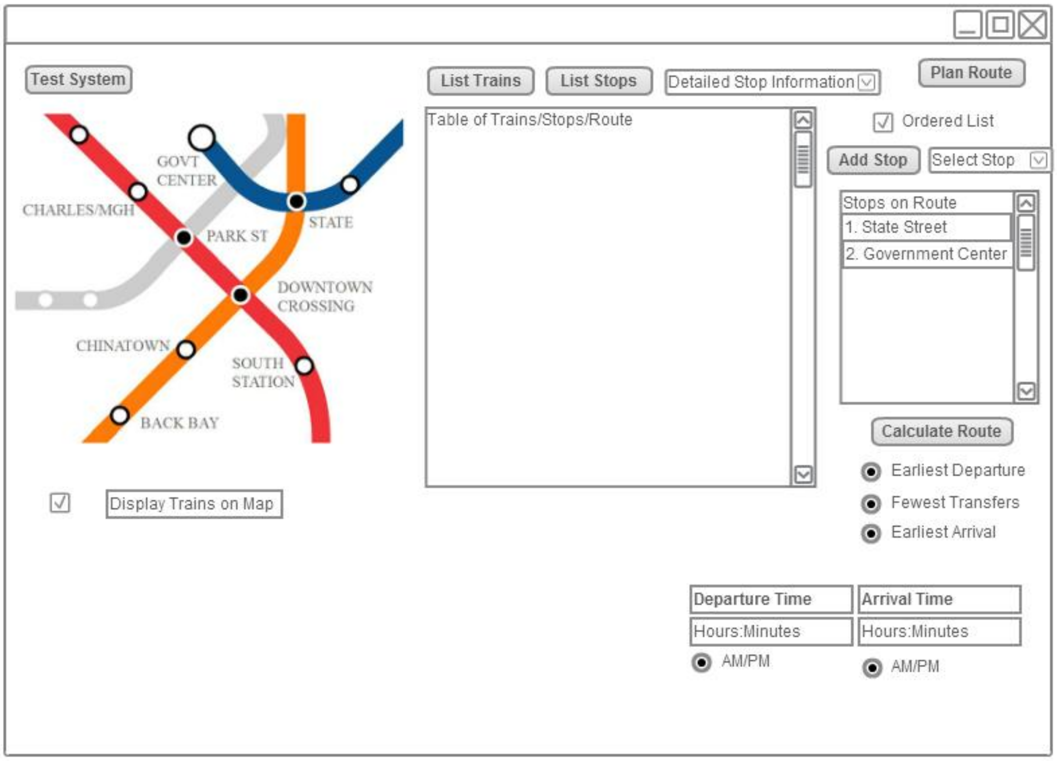
3. **Specific/Detailed Requirements**

3.1 User Interface

The MBTA Trip Planner will have a user interfaces based on the main functions of the system.

The user interface will be one screen from which the user can select the action he/she wishes to take. This user interface two columns. One column contains the map, another column contains options pertaining to how the user is currently using the software and the table in which information is displayed based on the user's selections. See Figure 1 below for prototype. The top image shows the interface when the application is first launched and the bottom image shows the interface in Plan Route mode. See Figure 2 for current GUI design.

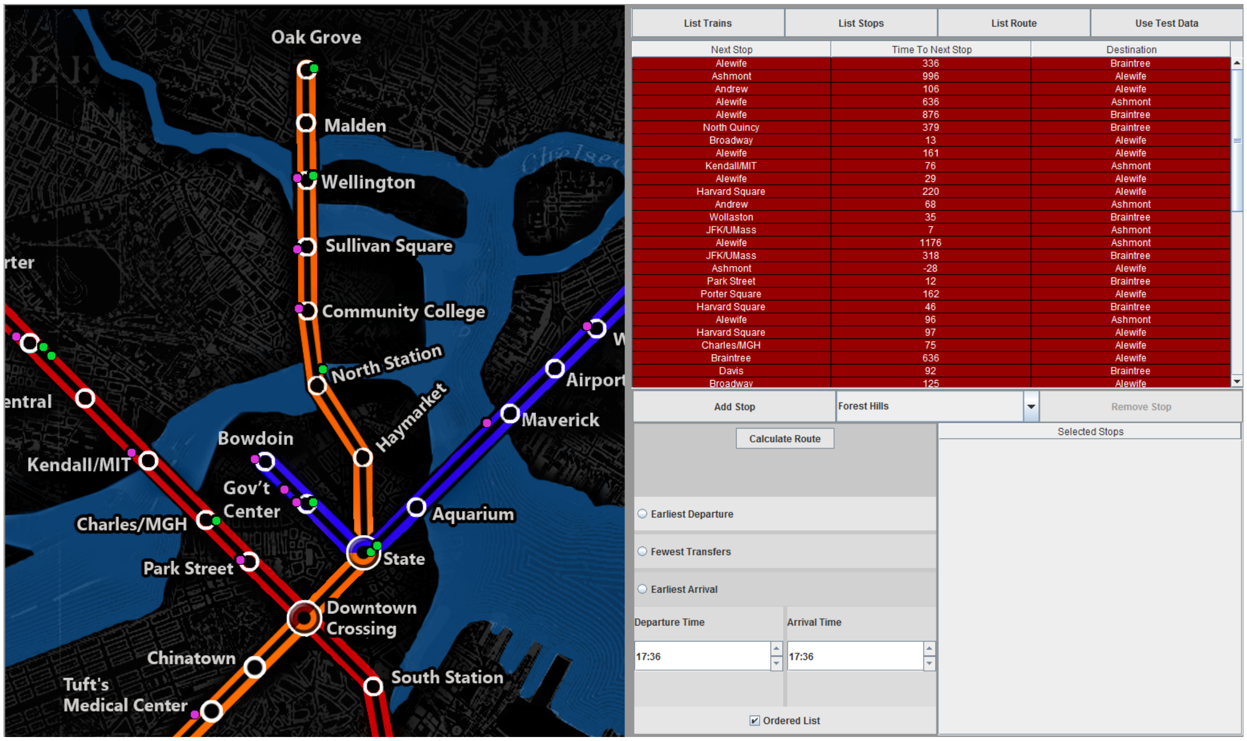




Stops on Route

1. State Street
2. Government Center

Figure 1



Next Stop	Time To Next Stop	Destination
Alewife	336	Braintree
Ashmont	996	Alewife
Andrew	106	Alewife
Alewife	636	Ashmont
Alewife	876	Braintree
North Quincy	379	Braintree
Broadway	13	Alewife
Alewife	161	Alewife
Kendall/MIT	76	Ashmont
Alewife	29	Alewife
Harvard Square	220	Alewife
Andrew	68	Ashmont
Wollaston	35	Braintree
JFK/UMass	7	Ashmont
Alewife	1176	Ashmont
JFK/UMass	318	Braintree
Ashmont	-28	Alewife
Park Street	12	Braintree
Porter Square	162	Alewife
Harvard Square	46	Braintree
Alewife	96	Ashmont
Harvard Square	97	Alewife
Charles/MGH	75	Alewife
Braintree	636	Alewife
Davis	92	Braintree
Broadway	125	Alewife

Forest Hills

○ Earliest Departure

○ Fewest Transfers

○ Earliest Arrival

Departure Time: 17:36

Arrival Time: 17:36

☑ Ordered List

Figure 2

3.2 System Features

This section offers specific detailed requirements organized by the main features of the system and the screen on which those features appear.

3.2.1 Main Screen

1. System displays map of MBTA stops, “Plan Route” button, “Use Test Data” button, “List Trains” button, drop down box for stop selection, a table, and all options from 3.2.2 Route Planning Functionality.

DR 1.1.1: The Main screen shall have a map with visual representations of each stop.
DR 1.1.2: The Main screen shall have a table for displaying data
DR 1.1.3: The Main screen shall have a “List Trains” button to switch the table to display train information
DR 1.1.4: The Main screen shall have a “List Stops” button to switch the table to display stop information

DR 1.1.5: The Main screen shall have a “List Route” button to switch the table to display route information

2. User hovers cursor over a stop or train on the map
DR 1.2.1: The system will display popup box with stop information including stop name and a list of all approaching trains when the mouse hovers over the stop.
DR 1.2.2: The system will highlight a circle around the next train to arrive at the stop going both directions.
DR 1.2.3: The system will display a highlighted route for a train when a train is hovered over. It will also display a popup box with arrival times for upcoming stops.

3. User clicks “List Trains” button.
DR 1.3.1: When the user clicks the “List Trains” button, the system will populate the table with the list of train information including destination, next stop, and estimated time until next stop.

4. User clicks “Use Test Data” button.
DR 1.4.1: When the user clicks the “Use Test Data” button, the system will repopulate its information with a test data file included in the project file. It will replace the “Use Test Data” button with a “Use Live Data” button.
DR 1.4.2: When the user clicks the “Use Live Data” button the system will repopulate its information with live data from the MBTA website. It will replace the “Use Live Data” button with a “Use Test Data” button.

3.2.2 Plan Route Functionality

1. Plan Route options include adding and removing stops from the route, choosing whether or not to order the list, choosing to sort by earliest departure, fewest transfers or earliest arrival, a “Add Stop” button, a “Remove Stop” button, a “Calculate Route” button, and a dropdown menu.
DR 2.1.1: The Main screen shall have a table to which stops can be added and removed
DR 2.1.2: The Main screen shall have a checkbox to toggle between an ordered and unordered list.
DR 2.1.3: The Main screen shall have three radio buttons to choose whether the route with the earliest departure, fewest transfers, or earliest arrival should be chosen.
DR 2.1.4: The Main screen shall have a “Calculate Route” button that will trigger the calculation of the route based from the selected stops.
DR 2.1.5: The Main screen shall have a “Add Stop” button to add the current stop in the drop box to the route

DR 2.1.6: The Main screen shall have a “Remove Stop” button to remove the selected stop from the route
DR 2.1.7: The Main screen shall have a “Plan Route” button to calculate the route between the stops added to the route
DR 2.1.8: The Main screen shall have a drop down box that contains a list of all stops the user can visit

2. User selects a stop and presses “Add Stop”.
DR 2.2.1: When the user clicks “Add Stop” the system shall add the current stop in the drop down menu to the table of stops.
DR 2.2.2: The system shall make the “Remove Stop” button available.

3. User selects “Remove Stop” button.
DR 2.3.1: When the user clicks “Remove Stop”, if a stop in the table was selected, it will be removed from the list.

4. System displays a drop down menu
DR 2.4.1: The Main screen shall have a drop down menu, which contains a list of accessible stops.

5. System displays list of possible routes from stop A to stop B, if stop A isn’t supplied then all possible routes to stop B are displayed and vice versa.
DR 2.5.1: The system will display the possible routes from A to B.
DR 2.5.2: The system will display routes from A if B is not specified.
DR 2.5.3: The system will display routes to B if A is not specified.
DR 2.5.4: The system will sort the listed routes by earliest departure time.

6. System displays list of possible routes from stop A to stop B
DR 2.6.1: The system will sort the routes from A to B displaying trains leaving from stop A after the given departure time and trains arriving at stop B before the given arrival time.
DR 2.6.2: The system will generate the route based on the selected advanced search options.
DR 2.6.4: The system will display routes as a list of the start stop, transfer stops, and the end stop, with predicted times of arrival and departure.

3.3 Nonfunctional Requirements

1. Each view change should be displayed 10 seconds.

2. The data structure will be updated from the MBTA website every 10 seconds.
3. All fonts will be 12 point unless otherwise stated.
4. The application will be implemented in Java using only the Jackson parser to interpret JSON data.