MyJETA

Software Requirements Specification

Document

Version: 2 **Date: 25/06/2018**

1. Introduction

1.1 Purpose

This document specifies the software requirements specification (SRS) for a web based application that will estimate the duration of a Dublin Bus journey at a given time and date. It is written for the benefit of external stakeholders, along with developers who will consequently design the application.

The functional and non-functional requirements of the application are outlined in this document. In addition, system relationships which must be established are also documented.

1.2 Scope

MyJETA is a web application that will operate on desktop and mobile browsers. The application will allow users to enter their start and destination bus stops, along with their desired departure/arrival time. When the user begins typing, suggested matching bus stops (or bus stops near a typed landmark name) will be offered.

The application will then run the inputs through a predictive model that takes into account various factors (from historical journey times to weather data) and present the user with an estimated journey duration. The application will also tell the user what time they should expect to arrive and whether this estimated time is longer or shorter than published timetables.

The application will also display the real time journey information for when their next bus will arrive and the cost of the journey.

The application will also highlight the route that their bus will take on a route map. All the Dublin Bus routes will be depicted on this map, but only the relevant one to the user will be highlighted with stop points on the way marked out.

The purpose of the application is to help users to plan a better journey via Dublin Bus, so that they can plan their day more accurately to ensure they arrive at appointments in good time.

It is important to note that this application is a journey planner, not a route planner or tracker. The application and the map will not assist the user in navigating to a bus stop or a final destination.

The assumption is that the user has a vague idea of where their desired bus stops are and their names. The application shall assist the user in planning their total journey time by estimating the duration of the most unpredictable part of their journey, the bus.

1.3 Overview

Section 2 provides an overview of what the application will do and how it will operate and is of most relevance to stakeholders.

Section 3 provides a more in-depth description of how the application will accomplish each task described in Section 2. It is of most relevance to developers designing the application and those testing the application in later development stages.

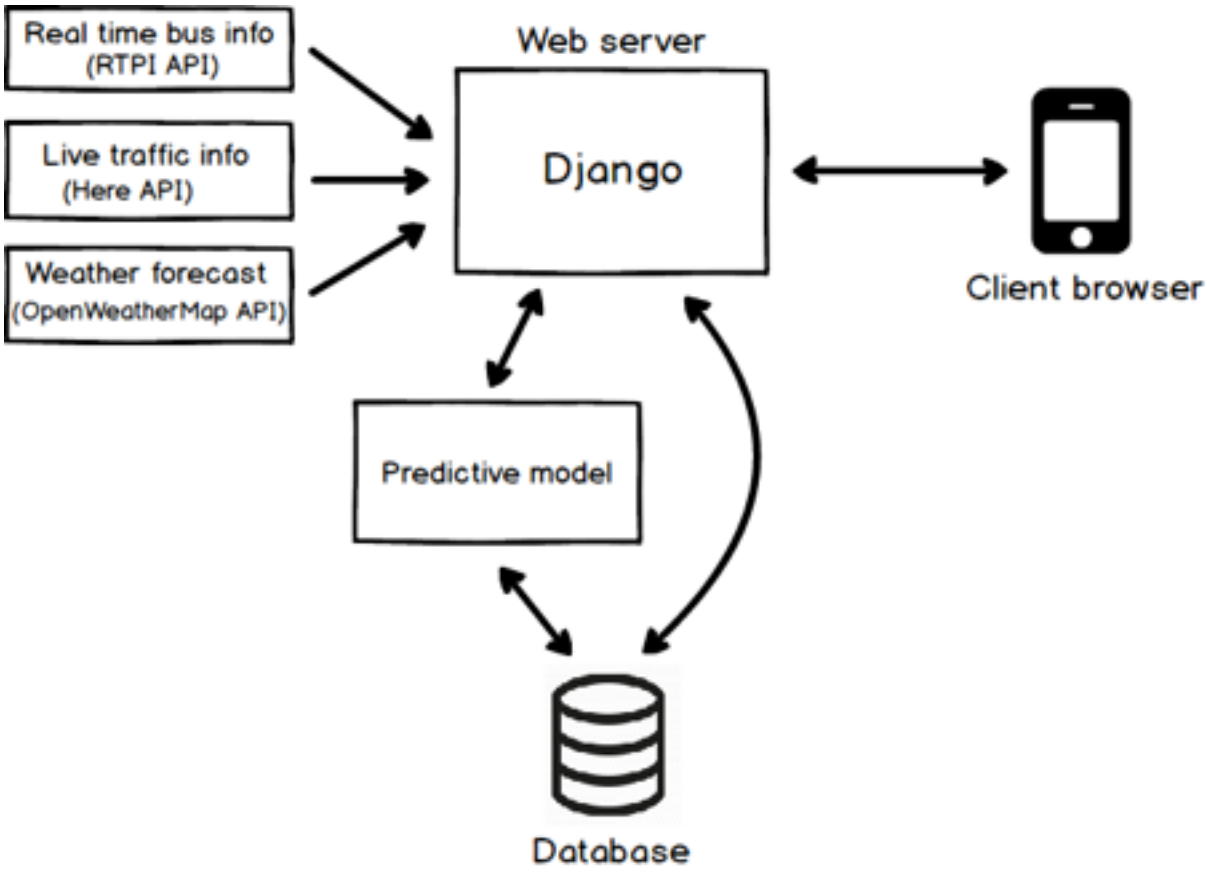
2. The overall description

This section outlines the broad purpose and functionality of the application. It is intended to give stakeholders a general understanding of what the proposed application will and will not do upon development.

2.1 Product Perspective

MyJETA is a standalone web application. The basic architecture of the application will involve three main parts, a database of historical data and bus stop/route information, a predictive model and a web server that will coordinate the communication between all parts.

Real time bus information and traffic JSON data feeds shall also communicate with the web server to assist in accurate journey duration calculations. The web server shall then display the information for the user in their browser.



Similar applications currently exist on the market such as:

- Dublin Bus route planner
- Hit the Road
- Google Maps

With the exception of the Dublin Bus route planner (which simply tells a user which bus to take and the stops until the destination), these applications all plan routes for the user.

MyJETA is different because it is not a route planner. A route planner will navigate a user from point A to B by the most efficient modes of transport available. MyJETA assumes that the user has already decided to take a bus and has a rough idea of where their start and finish bus stops are located. The MyJETA users main concerns in order are:

1. How long will my journey take?
2. When is the next bus at this stop (for my journey) going to arrive?
3. How much will the trip cost me?

2.1.1 Interfaces

The application shall be accessed primarily though the following internet browsers:

- Chrome
- Firefox
- Safari
- Edge
- Internet Explorer

Mobile:

- MobileSafari
- Google Chrome

The application shall be compatible across browsers listed.

The application GUI design should also consider users who are partially sighted. This would mean any text or functional fields or buttons may be magnified by the user in order for them to be able to successfully use the application. The application should continue to operate under these circumstances and be tested in accordance to WCAG 2.0 (Web Content Accessibility Guidelines).

2.2 Product Functions

This section sets out the various functions that MyJETA will perform. The functions are broadly separated into four parts.

2.2.1 Display estimated journey duration

The user will input the following information:

- Start bus stop
- Destination bus stop
- Option to specify departure or arrival time
- Date and time (through entering digits or calendar selection)

When the user begins typing bus stop names in the text fields, the application shall suggest match the bus stops names in the database and provide autocomplete suggestions on a drop down menu. Once one bus stop has been selected (either start or destination), only bus stops linked by a bus route will be suggested in the other text field.

Alternatively, the user can pan around the map and hover over all bus stops (whereby the bus stop name will display on hover). The user can click on a bus stop and this stop shall be entered into the start field. At this point, only bus stops connected to the start on a route will display on hover. The user can then click on any of these options and that stop shall be entered into the destination field.

When the user submits, the application shall run the inputs through the predictive model and display the estimated journey duration and whether this time is longer or shorter than the published timetable duration.

2.2.2 Display real time bus arrival information

When a journey duration and the bus route has been successfully found, the application shall display the next expected arrival time for that bus at the start bus stop (if departure is immediate).

If two or more bus routes service the start and destination bus stops, the route presented to the user will be the the one expected to arrive first.

2.2.3 Display route cost

The application shall use the start and destination bus stops in order to calculate the cost of this journey for the user.

2.2.3 Display journey route on bus route map

The application shall have a route map that displays all the bus routes offered by Dublin Bus. Initially these shall be underemphasized on the map. When a successful result is displayed to the user, the chosen route shall be highlighted on the route map. The start and destination bus stop names will display as text next to circles to identify them. The intermediate bus stops will be highlighted as circles, the text to identify these can be displayed by the user while hovering over these points.

The user shall be able to pan and zoom over the route map. Initially the route map shall be focussed on the main Dublin metropolitan area. However, if a route is chosen that extends beyond this area (for example, a start or destination in Wicklow), the route map will automatically zoom out.

2.3 User characteristics

Users of the application could be from any demographic in society, mirroring the demographics on Dublin Bus users. As such, the application should be very easy to use with only minimal and inputs and screens before the relevant information is displayed to the user.

Frequent users of the application are also expected to be mobile users who are standing at or en-route to bus stops. Therefore, excellent functionality on a mobile browser is paramount.

2.6 Apportioning of requirements

The following functions of the application could be delayed until a later version of the application:

- The ability for the text field bus stop suggestions to deal with landmark names being typed in.
- The ability for the route map to automatically zoom in or out when routes are selected.
- The ability for the application to display a cost for the chosen route.
- The functionality ensuring usability by partially sighted individuals.

3. Specific requirements

This section outlines the functionality of the application required in more detail. It is intended to give developers an in depth understanding of what the design of the application will entail. It will also act as a guide for testing the application to ensure it meets the requirements in this document.

This section details what needs to be included in the external interfaces displayed to users of the application.

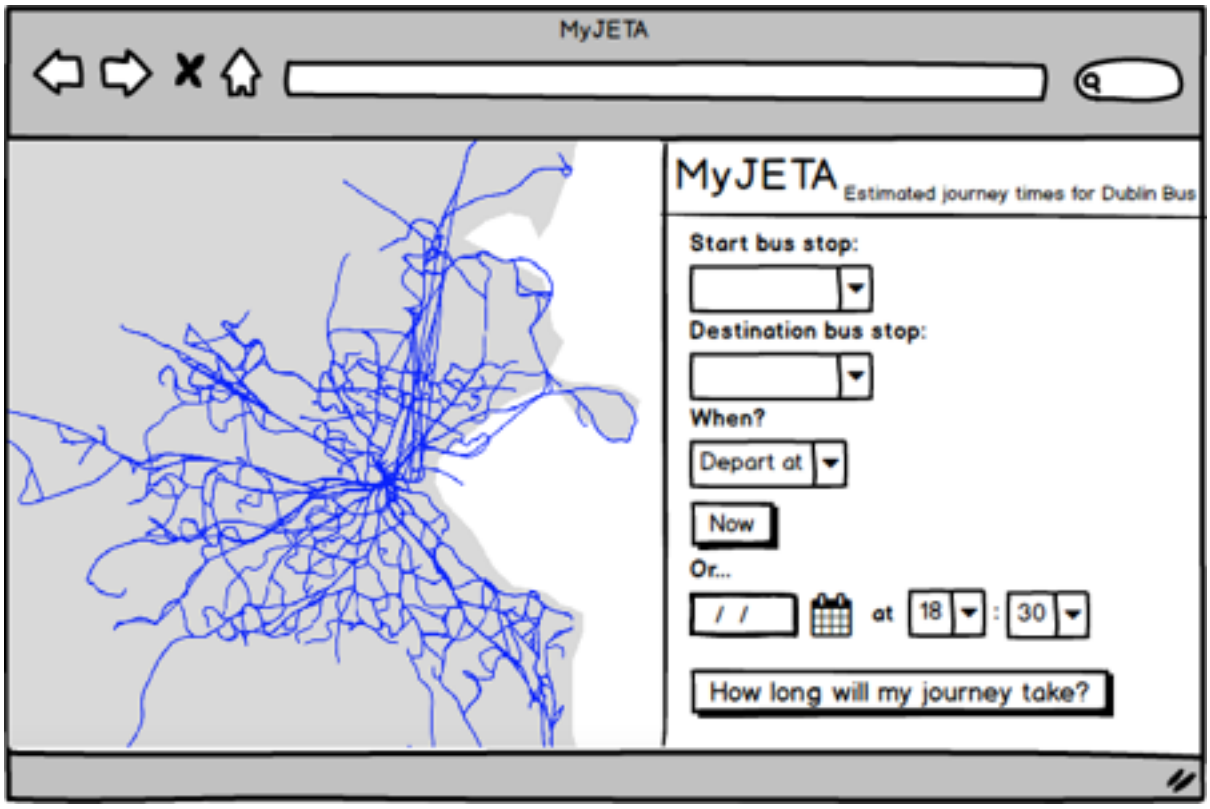
3.1 External Interfaces

3.1.1 Field input

When the user navigates to the MyJETA url, they will be presented with two main sections:

- The field inputs / information display
- The route map

Desktop version



Mobile version

Start bus stop / Destination fields

Text field selection

When the user clicks on these text boxes and begins to type, after three characters the application should produce a drop down of suggested bus stops that match the typed characters. When more characters are typed, these results should narrow down as a result.

The user should then be able to select from a list of suggested results. Alternatively, if the user types in a full bus stop number, the matching bus stop should also be suggested.

Once the start field is set, the destination field suggestions shall only display bus stops linked to the start by a single route.

If the user selects a bus stop that shares a name with others, the destination field suggestions shall display bus stops connected by all routes connected to the commonly named bus stops.

If the user selects a destination stop that is not directly linked by the initially chosen start bus stop, the application shall automatically change the start bus stop to the one that is directly linked to the chosen destination. The start bus stop name will therefore be the same, but the bus stop id will be different.

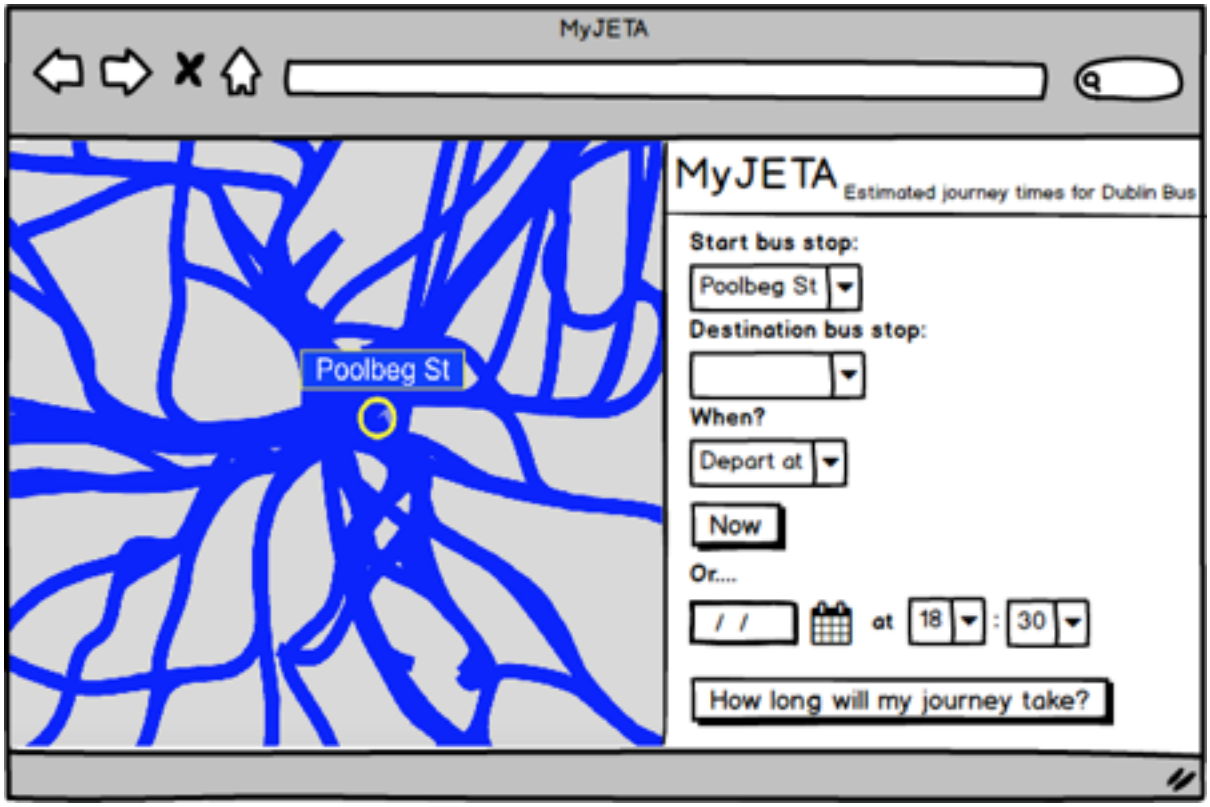
Map selection

The shall also be able to select their start and destination bus stops using the route map. As the user moves their cursor over the map, bus stops will appear (with a circle and their name as text) as the user hovers over each of them. If the user clicks on a bus stop they hover over, this gets entered into the start field.

At this point, only bus stops connected to the start bus stop by common single routes (as above) will display on hover. Again, the user can click on one of these options to enter the bus stop into the destination field.

In the mockup below, the user has hovered over the “Poolbeg St” bus stop and clicked. These actions have displayed the bus stop name on the map and entered it into the start field respectively.

Desktop version



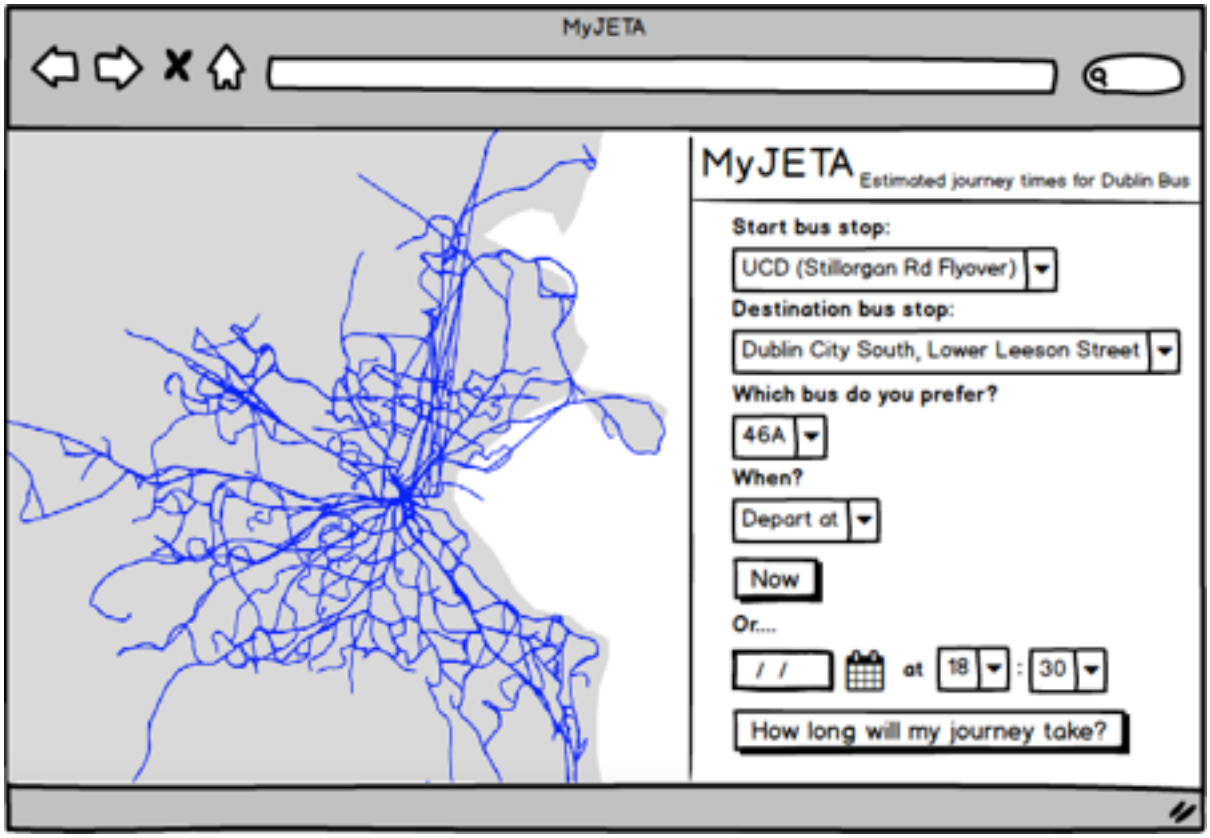
Mobile version

One mobile, map selection works differently. The mobile view offers a button to select bus stops on the map. This button toggles to a map view where a user can pan and zoom around. If they tap the map, a bus stop name will appear, if they tap the same bus stop again they will select it (as below). If they repeat this process, the destination will be selected. The user can return to the original screen by tapping the return button at the bottom.

Multiple bus route options

When the start and destination fields have been successfully entered, there may be occasions when these bus stops are connected by more than one bus route.

In this scenario, a new dropdown menu shall appear. It will list all the possible bus routes, the default will be set to whatever is the next bus according to the real time bus information at the start bus stop.



When? fields

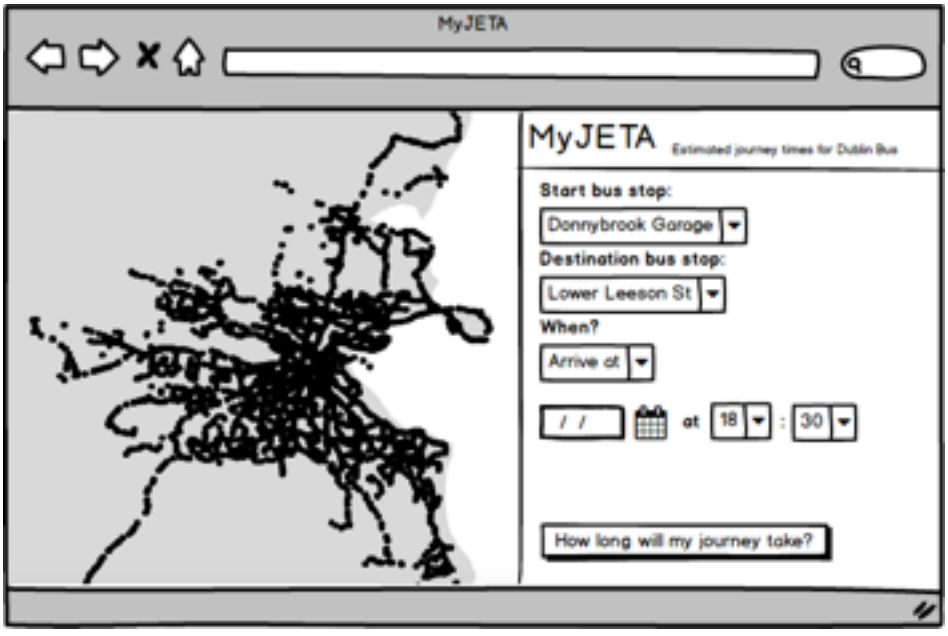
When the user clicks on this drop down, they should be offered two options:

- Depart at
- Arrive at

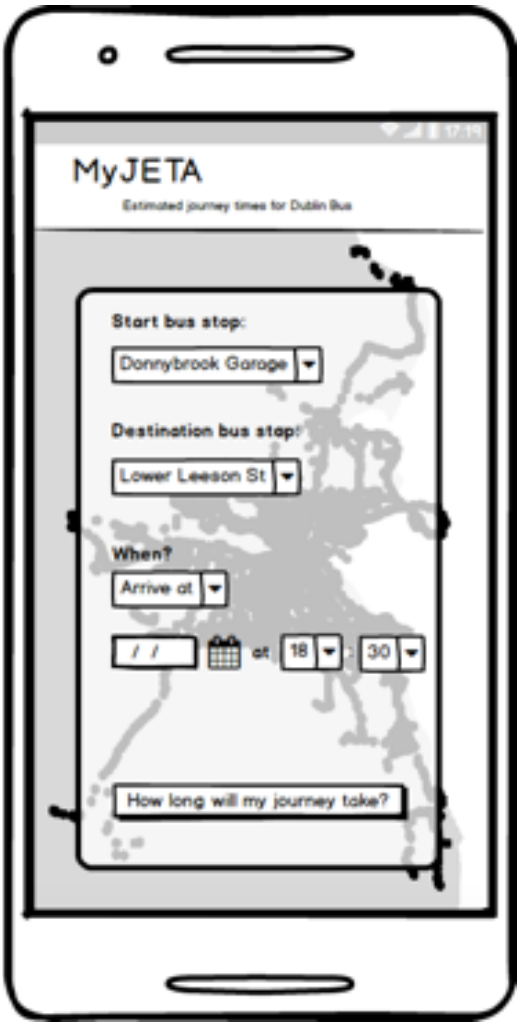
If “Depart at” is selected (the default) then a button for “Now” shall display directly below. If the user clicks this button, the application should forward the user directly to the results screen using the current date and time as inputs.

If “Arrive at” is selected, then the “Now” button (and “or...” text) should disappear, as below:

Desktop version



Mobile version



If “Now” has not been clicked or “Arrive at” is selected, the user can then choose a date and time in the future. The date field should automatically have today's date. However, if the user clicks the calendar icon, a calendar will appear giving the user the option to select a future date.

The time drop down fields should be automatically filled to:

- The current hour (24 hour)
- The next 15 minute interval in the future (to the current time)

If the user clicks these dropdown menus, they can select an hour and 15 its consecutive minute interval (the options being: 00, 15, 30, 45) respectively.

3.1.2 Display results

When the user has submitted their details, the next screen shall display seven fields. These results depend on whether the user selected to depart now, depart in the future or arrive at a time in the future. There will also be a “Search again” button that will return the user to the initial screen again.

If the user selected depart now, the results are:

- Start bus stop (from user input)
- Destination bus stop (from user input)
- You can take bus numbers (list based on buses servicing that route)
- Estimated journey time, time + or – from expected (from predictive model)
- Estimated arrival time (from real time arrival time + estimated journey time)
- Next arrival time for suitable bus route at your bus stop (from real time arrival times)
- Journey cost (from cost calculation based on Dublin Bus stages)

Desktop version

Mobile version

If the user selected depart/arrive at a future date/time, the results are:

- Start bus stop (from user input)
- Destination bus stop (from user input)
- You should take bus numbers (list based on buses servicing that route)
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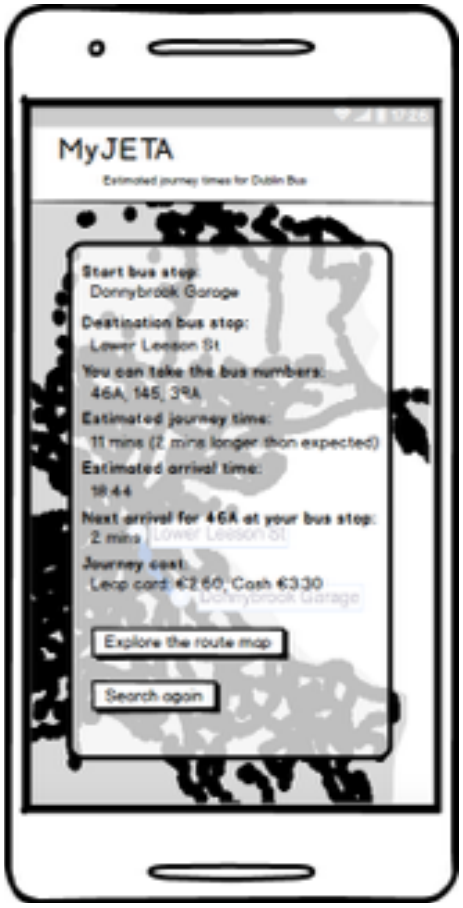
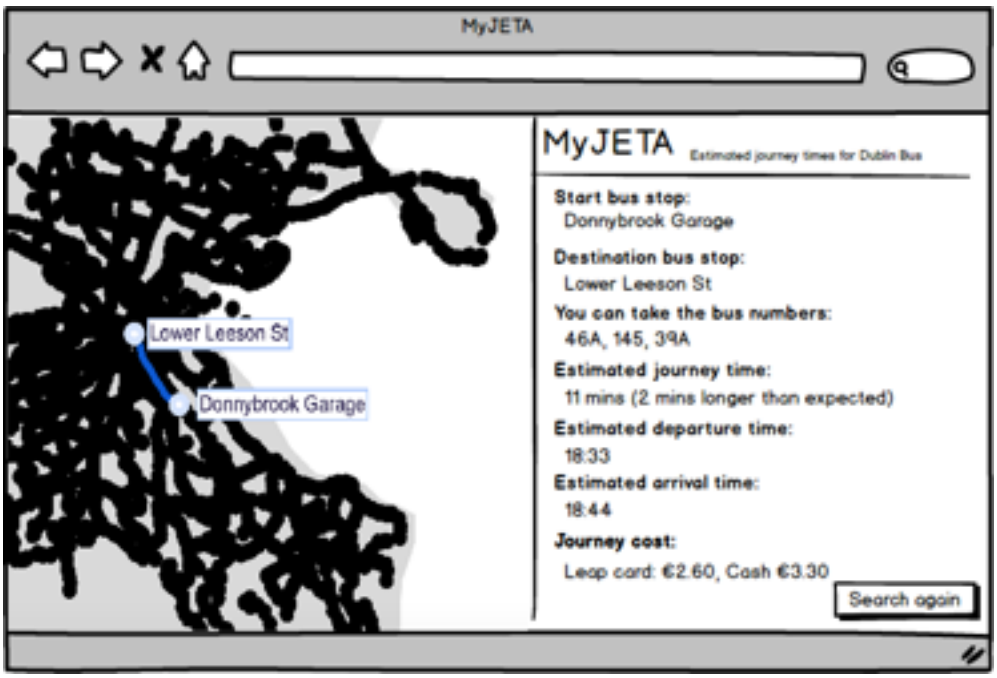


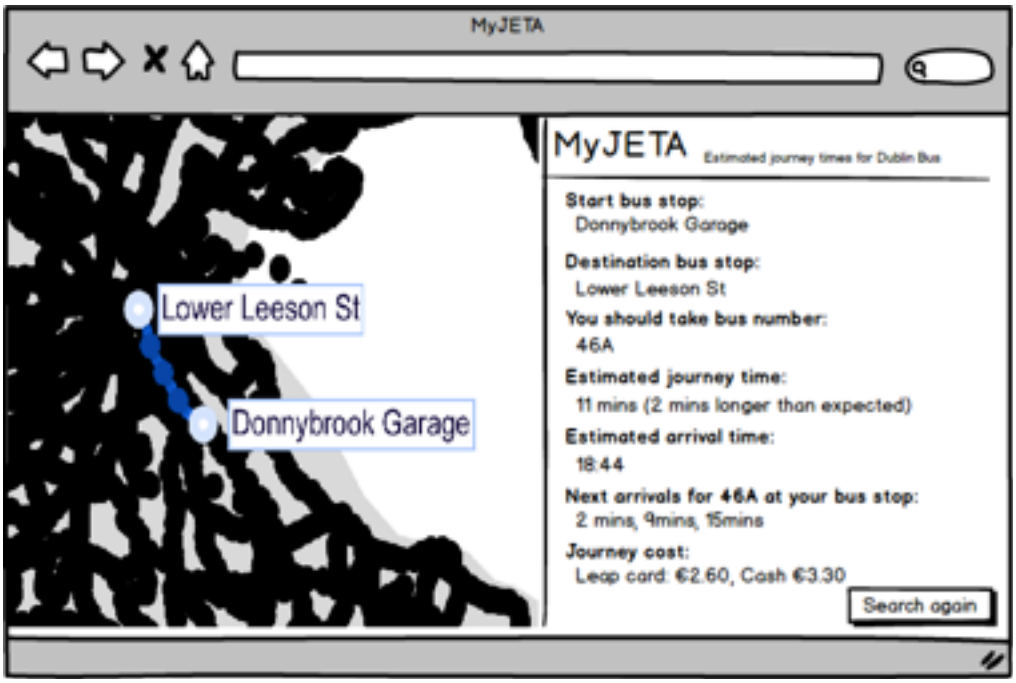
- Estimated journey time, time + or – from expected (from predictive model)
- Depart at (from user input, or calculation if user input arrival time)
- Estimated arrival time (from calculation using estimated journey time)
- Journey cost (from cost calculation based on Dublin Bus stages)

Desktop version



Mobile version

The user shall be able to zoom in and pan around the route map to explore. The intermediate stops on their route will be marked, to see the name of these stops, the user can hover over these marks.



Mobile version

On the mobile version, the user will need to tap the “Explore route map” button to see and use the map. They can tap the “Return to results” button to go back to the previous screen.

3.2 Functions

Function A will outline how MyJETA shall suggest bus stops to the user (when start and destination are empty):

Description	The application suggests bus stops matching characters typed by user
Input	• At least three characters or a full bus stop number • Bus stop names held in database
Operations	• Function shall display a drop down list of bus stops matching the characters typed • Function shall narrow down this list as more characters are typed • Function shall match a bus stop number to name if all digits typed and suggest • Function shall select suggested bus stop clicked by user • Function shall match nearby bus stops if landmark typed (optional)
Output	Correctly selected bus stop for input to next step and predictive model

Function B will outline how MyJETA shall suggest bus stops to the user (when either start or destination have been selected):

Description	The application suggests bus stops matching characters typed by user
Input	• At least three characters or a full bus stop number • Bus stop names held in database • Start or destination bus stop

Operations	• Function shall display a drop down list of bus stops matching the characters typed • Function shall narrow down this list as more characters are typed • Function shall match a bus stop number to name if all digits typed • Function shall only display bus stops that are linked on a route to the start or destination bus stop • If selected start or destination bus stop shares a common name with other bus stops, all common bus stops linked by routes shall be available to display to user • Function shall select suggested bus stop clicked by user • Function will automatically change start/ destination bus stop if second field chosen needs to depart/arrive at another bus stop with a common name • Function shall match nearby bus stops if landmark typed (optional)
Output	Correctly selected bus stop for input to next step and predictive model

Function C will outline how MyJETA shall select a current date/time:

Description	The application selects current date/time with “Now” button
Input	• Current date/time
Operations	• Function shall automatically submit the current date and time into next step predictive model and show results
Output	Correctly selected date for input to next step and predictive model

Function D will outline how MyJETA shall select dates:

Description	The application selects date input in the future
Input	• Auto date selection • Or user date selection
Operations	• Function shall automatically set the date field to the current date • If user clicks calendar icon, function shall display only date options today or in future

Output	Correctly selected date for input to next step and predictive model

Function E will outline how MyJETA shall select times:

Description	The application selects time inputs
Input	• User time selection
Operations	• Function shall automatically set the hour field to the current hour (if time is 45 or more minutes past the hour, function sets to next hour) • Function shall allow a user to select one of 24 hours from menu • Function shall automatically set the minute field to the nearest future 15 minute interval • Function shall allow a user to select one of four 15 minute intervals (00, 15, 30, 45)
Output	Correctly selected time for input to next step and predictive model

Function F will outline how MyJETA shall calculate its journey duration time:

Description	The application uses a predictive model to estimate the journey duration based on multiple inputs and factors
Input	• Start bus stop • Destination bus stop • Date of travel • Time of travel • Historic bus data • Weather data • Other data sources
Operations	• Application shall run all inputs through the model to derive a predicted travel duration time in minutes • Application shall compare the predicted duration to timetable stated duration
Output	• Estimated journey duration for display on results screen and other calculations • Any discrepancy between timetable stated duration shall also be displayed on results screen

Function G will outline how MyJETA shall decide on bus route(s) to display:

Description	The application displays bus route(s) that serve selected bus stops
Input	• Start bus stop • Destination bus stop
Operations	• Function matches all bus routes that connect selected start and destination bus stops
Output	All bus route numbers connecting the start and destination bus stops are displayed on the results screen

Function H will outline how MyJETA shall calculate departure and arrival times:

Description	The application calculates departure and arrival times for bus journey
Input	• Estimated journey duration from predictive model • User input of departure or arrival time • Real time next selected bus calculation from Function I
Operations	<u>If user selects a departure time:</u> • Function calculates time of arrival as selected departure time + estimated journey duration (from Function F) <u>If user selects an arrival time:</u> • Function calculates time of departure as selected arrival time - estimated journey duration (from Function F) <u>If user selects to depart now:</u> • Function calculates time of arrival as current time + time to next bus (from Function I) + estimated journey duration (from Function F)
Output	<u>If user selected future departure/arrival times:</u> • User selected departure or arrival time is displayed on results screen • Estimated departure or arrival time is displayed on results screen <u>If user selected to depart now:</u> • Estimated arrival time is displayed on results screen

Function I will outline how MyJETA shall calculate which real time next bus information to display:

Description	The application displays the next suitable bus that will arrive at the start bus stop
Input	• Start bus stop • Selected route numbers from Function G • Real time Dublin Bus JSON feed
Operations	• Function compares next arrival times at bus stop to suitable bus routes for selected journey • Function returns bus route and time to arrival for nearest available match to current time • If JSON feed returns no results, function should return “No buses departing soon.” error.
Output	Bus route number and time to arrival are displayed on results screen

Function J will outline how MyJETA shall calculate a journey cost:

Description	The application displays the cost of the selected journey
Input	• Start bus stop • Destination bus stop • Dublin Bus fare data
Operations	• Function find cost for Leap card and cash on selected route
Output	Application displays Leap card and cash fares on results screen

Function K will outline how MyJETA shall display the route map:

Description	The application displays all Dublin Bus routes on its route map
Input	• All bus stops on each bus route (longitude and latitude)
Operations	• Function draws individual path from each bus stop to the next, for every bus route • Function allows user to zoom and pan around map • Function displays bus stop name and circle for any bus stop hovered over by user
Output	Application displays all bus routes on its route map

Function L will outline how MyJETA shall display a selected route on a map:

Description	The application displays the selected user route on its route map
Input	• Start bus stop (longitude and latitude) • Destination bus stop (longitude and latitude) • Start bus stop name • Destination bus stop name • Intermediate bus stops (longitude and latitude) • Intermediate bus stops names
Operations	• Function draws highlighted path from start bus stop to destination bus stop on route map • Function applies text labels to start bus stop and destination bus stop to display names • Function displays intermediate bus stops on route as circles • On hover of intermediate bus stops, text labels of names appears
Output	Application displays path and bus stop names on map

Function M will outline how MyJETA shall select start/destination through the route map:

Description	The application inputs clicked bus stops on the map into the start/destination fields
Input	• Route map from Function K • Empty start field • Empty destination field
Operations	• Function enters bus stop information into start field on first user click (on bus stop now displaying name due to hover in Function K) • Function then only displays bus stop names on hover of bus stops linked by a route from start • Function enters bus stop information into destination field on second user click.
Output	Application enters start/destination bus stops into relevant fields ready for user to submit.

3.3 Logical database requirements

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