Module Interface Specification for Greenway

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2 Symbols, Abbreviations and Acronyms

See SRS Documentation on project repo.

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3 Introduction

The following document details the Module Interface Specifications for Greenway.

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at https://github.com/mehtaj8/Greenway.

4 Notation

The structure of the MIS for modules comes from HoffmanAndStrooper1995, with the addition that template modules have been adapted from GhezziEtAl2003. The mathematical notation comes from Chapter 3 of HoffmanAndStrooper1995. For instance, the symbol := is used for a multiple assignment statement and conditional rules follow the form $(c_1 \Rightarrow r_1 | c_2 \Rightarrow r_2 | ... | c_n \Rightarrow r_n)$.

The following table summarizes the primitive data types used by Greenway.

Data Type	Notation	Description
character	char	a single symbol or digit
integer	$\mathbb{Z}$	a number without a fractional component in (-∞, ∞)
natural number	$\mathbb{N}$	a number without a fractional component in [1, ∞)
real	$\mathbb{R}$	any number in (-∞, ∞)

The specification of Greenway uses some derived data types: sequences, strings, and tuples. Sequences are lists filled with elements of the same data type. Strings are sequences of characters. Tuples contain a list of values, potentially of different types. In addition, Greenway uses functions, which are defined by the data types of their inputs and outputs. Local functions are described by giving their type signature followed by their specification.

5 Module Decomposition

The following table is taken directly from the Module Guide document for this project.

Level 1	**Level 2**
Hardware-Hiding Module	
Behaviour-Hiding Module	Location Input Module Car Input Module Map Display Module Fuel Information Module Elevation Module
Software Decision Module	Map Data Module Car Data Module Fuel Data Module

Table 1: Module Hierarchy

6 MIS of Location Input Module (M2)

6.1 Module extends React.Component

Location_Input_Module

6.2 Uses

Map_Data_Module

6.3 Syntax

6.3.1 Exported Constants

None

6.3.2 Exported Access Programs

Name	In	Out	Exceptions
constructor	HTML attribute		
setCurrentLocation	String		Location not found.
setDestinationLocation	String		Location not found.
render		ReactDOM	

6.4 Semantics

6.4.1 State Variables

props : HTML attribute

6.4.2 Environment Variables

None

6.4.3 Assumptions

None

6.4.4 Access Routine Semantics

constructor(*props*):

- transition: $state = initialBlock$
- output: *out* := self

- exception: none

setCurrentLocation(*String*):

- transition: This function sets the current location from the user.
- exception: Location not found.

setDestinationLocation(*String*):

- transition: This function sets the destination location from the user.
- exception: Location not found.

render():

- output: This function renders the output of the Input Location Module.
- exception: none

6.4.5 Local Functions

None

7 MIS of Car Input Module (M3)

7.1 Module extends React.Component

Car_Input_Module

7.2 Uses

Car_Data_Module

7.3 Syntax

7.3.1 Exported Constants

None

7.3.2 Exported Access Programs

Name	In	Out	Exceptions
constructor	HTML attribute		
setCarMake	String		Make not found.
setCarModel	String		Model not found.
setCarYear	Number		Car not found.
render		ReactDOM	

7.4 Semantics

7.4.1 State Variables

props : HTML attribute

7.4.2 Environment Variables

None

7.4.3 Assumptions

None

7.4.4 Access Routine Semantics

constructor(*props*):

- transition: $state = initialBlock$

- output: *out* := self
- exception: none

setCarMake(*String*):

- transition: This function sets the make of the car from the user.
- exception: Location not found.

setCarModel(*String*):

- transition: This function sets the model of the car from the user.
- exception: Location not found.

setCarYear(*String*):

- transition: This function sets the manufacturing year of the car from the user.
- exception: Location not found.

render():

- output: This function renders the output of the Input Car Module.
- exception: none

7.4.5 Local Functions

None

8 MIS of Map Display Module (M4)

8.1 Module

Map_Display_Module, Location_Input_Module

8.2 Uses

Map_Data_Module

8.3 Syntax

8.3.1 Exported Constants

8.3.2 Exported Access Programs

Name	In	Out	Exceptions
getRoute	List<String, String>	List< $\mathbb{R}, \mathbb{R}$ >	Location not found.
calRoute	$\mathbb{R}$		Make not found.
pathOverview render	List< $\mathbb{R}, \mathbb{R}$ >	ReactDOM ReactDOM	Location not found.

8.4 Semantics

8.4.1 State Variables

Map_state: *String*

8.4.2 Environment Variables

None

8.4.3 Assumptions

None

8.4.4 Access Routine Semantics

getRoute(List<String, String>):

- output: List< $\mathbb{R}, \mathbb{R}$ > : Coordinates of the start and destination locations.
- exception: Location not found.

calRoute(*String*):

- transition: This function sets the model of the car from the user.

- exception: Location not found.

pathOverview(List$< \mathbb{R}, \mathbb{R} >$):

- Output: The route from start to end destination.
- exception: Map component not loaded.

render():

- output: This function renders the output of the MAP component.
- exception: none

8.4.5 Local Functions

None

9 MIS of Fuel Information Module (M5)

9.1 Module extends React.Component

Fuel_Information_Module

9.2 Uses

Fuel_Data_Module, Car_Data_Module, Car_Input_Module

9.3 Syntax

9.3.1 Exported Constants

9.3.2 Exported Access Programs

Name	In	Out	Exceptions
getMileage	List<String, String, $\mathbb{R}$ >	$\mathbb{R}$	
getFuelPrice	List< $\mathbb{R}, \mathbb{R}$ >	$\mathbb{R}$	
getElevation	List< $\mathbb{R}, \mathbb{R}$ >	Array< $\mathbb{R}$ >	
calFuelUsage	List< $\mathbb{R}, \mathbb{R}, \mathbb{R}$ >	$\mathbb{R}$	
render		ReactDOM	

9.4 Semantics

9.4.1 State Variables

None

9.4.2 Environment Variables

None

9.4.3 Assumptions

None

9.4.4 Access Routine Semantics

getMilage (List<String, String, $\mathbb{R}$ >) :

- output: $\mathbb{R}$: The mileage of the car model.
- exception: Location not found.

getFuelPrice(List< $\mathbb{R}, \mathbb{R}$ >) :

- output: $\mathbb{R}$: The average fuel price on the route to destination.
- exception: Location not found.

getElevation(List$< \mathbb{R}, \mathbb{R} >$) :

- output: Array$< \mathbb{R} >$: All the elevation point from the current location to destination location.
- exception: Map component not loaded.

calFuelUsage(List$< \mathbb{R}, \mathbb{R}, \mathbb{R} >$):

- output: $\mathbb{R}$: The total fuel usage for the trip.
- exception: Map component not loaded.

render():

- output: This function renders the outputs the milage, the distance travelled and the total cost.
- exception: none

9.4.5 Local Functions

None

10 MIS of Elevation Module (M6)

10.1 Module extends React.Component

Elevation_Information_Module

10.2 Uses

Map_Data_Module

10.3 Syntax

10.3.1 Exported Constants

10.3.2 Exported Access Programs

Name	In	Out	Exceptions
getElevation	List$< \mathbb{R}, \mathbb{R} >$	Array$< \mathbb{R} >$	

10.4 Semantics

10.4.1 State Variables

None

10.4.2 Environment Variables

None

10.4.3 Assumptions

None

10.4.4 Access Routine Semantics

getElevation(List$< \mathbb{R}, \mathbb{R} >$) :

- output: Array$< \mathbb{R} >$: All the elevation point from the current location to destination location.
- exception: Map component not loaded.

10.4.5 Local Functions

None

11 MIS of Map Data Module (M7)

11.1 Module extends React.Component

Map_Data_Module

11.2 Uses

None

11.3 Syntax

11.3.1 Exported Constants

11.3.2 Exported Access Programs

Name	In	Out	Exceptions
getMapData	List$< \mathbb{R}, \mathbb{R} >$	Array$< \mathbb{R} >$	

11.4 Semantics

11.4.1 State Variables

None

11.4.2 Environment Variables

None

11.4.3 Assumptions

None

11.4.4 Access Routine Semantics

getMapData(List$< \mathbb{R}, \mathbb{R} >$) :

- output: Array$< \mathbb{R} >$: Retrieves all the map components used for determining the current and the destination locations.
- exception: Map component not loaded.

11.4.5 Local Functions

None

12 MIS of Car Data Module (M8)

12.1 Module extends React.Component

Car_Data_Module

12.2 Uses

None

12.3 Syntax

12.3.1 Exported Constants

12.3.2 Exported Access Programs

Name	In	Out	Exceptions
getCarData	List<string, string, $\mathbb{R}$ >	Array< $\mathbb{R}$ >	

12.4 Semantics

12.4.1 State Variables

None

12.4.2 Environment Variables

None

12.4.3 Assumptions

None

12.4.4 Access Routine Semantics

getCarData(List<string, string, $\mathbb{R}$ >) :

- output: Array< $\mathbb{R}$ > : Retrieves all the data related to the car chosen by the user from the database, which includes the make and the model of the car, the year it was manufactured, and it's fuel mileage.
- exception: Car component not loaded.

12.4.5 Local Functions

None

13 MIS of Fuel Data Module (M9)

13.1 Module extends React.Component

Fuel_Data_Module

13.2 Uses

None

13.3 Syntax

13.3.1 Exported Constants

13.3.2 Exported Access Programs

Name	In	Out	Exceptions
getFuelData	List$< \mathbb{R}, \mathbb{R} >$	Array$< \mathbb{R} >$	

13.4 Semantics

13.4.1 State Variables

None

13.4.2 Environment Variables

None

13.4.3 Assumptions

None

13.4.4 Access Routine Semantics

getFuelData(List$< \mathbb{R}, \mathbb{R} >$) :

- output: Array$< \mathbb{R} >$: Retrieves all fuel prices near current location.
- exception: Fuel component not loaded.

13.4.5 Local Functions

None