Module Interface Specification for Greenway

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1 Revision History

Date	Version	Notes
Jan 18, 2023	1.0	Revision 0
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2 Symbols, Abbreviations and Acronyms

See SRS Documentation on project repo.

Contents

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 Trip Details Module Navigation Module SideBar 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 Inputs

Input Name	Type	Description
Start	String	Address of the start location
Start	String	Address of the end location

6.3.3 Exported Access Programs

Name	In	Out	Exceptions
constructor	HTML attribute		
setStartLocation	String Start		Location not found.
setEndLocation	String End		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

setStartLocation(*String* Start):

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

setDestinationLocation(*String* End):

- 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 Inputs

Input Name	Type	Description
Make	String	Make of the Car
Model	String	Model of the Car
Year	Number	Year of the Car
Mileage	String	Mileage of the Car

7.3.3 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.
setCarMileage	Number		Invalid mileage.
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* Make):

- transition: This function sets the make of the car from the user by making a call to the database to find all available makes.
- exception: Make not found.

setCarModel(*String* Model):

- transition: This function sets the model of the car from the user by making a call to the database to find all available Models.
- exception: Model not found.

setCarYear(*Number* Year):

- transition: This function sets the manufacturing year of the car from the user by making a call to the database to find all available Years.
- exception: Year not found.

setCarMileage(*Number* Mileage):

- transition: This function sets the mileage of the car from the user as an alternative the other car details.
- exception: Year 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 Inputs

Input Name	Type	Description
startEndLoc	List<String, String>	Array of the start and end location as addresses that the user en
mileageLocal	$\mathbb{R}$	Price of gas locally
points	List$< \mathbb{R}, \mathbb{R} >$	Coordinates for points along the route
mileage	$\mathbb{R}$	Mileage of the Car

8.3.3 Exported Access Programs

Name	In	Out	Exceptions
getRoute	List<String, String> startEndLoc	List$< \mathbb{R}, \mathbb{R} >$ startEndLocCoords	Location not fo
calRoute	$\mathbb{R}$ mileageLocal		Make not found
pathOverview	List$< \mathbb{R}, \mathbb{R} >$ points, $\mathbb{R}$ mileage	ReactDOM	Location not fo
getRoadGrade	List$< \mathbb{R}, \mathbb{R} >$ Points	List$< \mathbb{R} >$ roadGrades	Make not found
render		ReactDOM	

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> startEndLoc):

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

calRoute(*String* mileageLocal):

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

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

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

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

- Output: The road grade for each pair of coordiantes in points.
- 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 Trip Detail Module (M5)

9.1 Module extends React.Component

TripDetails_Module

9.2 Uses

9.3 Syntax

9.3.1 Exported Constants

9.3.2 Inputs

Input Name	Type	Description
GasPrice	$\mathbb{R}$	Price of gas in the start location
mileage	$\mathbb{R}$	Mileage of car
Distance	$\mathbb{R}$	Total distance to travel along the route in km
Total Price	$\mathbb{R}$	Total Price of the trip

9.3.3 Exported Access Programs

Name	In	Out	Exceptions
render	$\mathbb{R}$ GasPrice, $\mathbb{R}$ mileage, $\mathbb{R}$ Distance, $\mathbb{R}$ TotalPrice	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

render($\mathbb{R}$ GasPrice, $\mathbb{R}$ mileage, $\mathbb{R}$ Distance, $\mathbb{R}$ TotalPrice):

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

9.4.5 Local Functions

None

10 MIS of Navigation Module (M6)

10.1 Module extends React.Component

Navigation_Module

10.2 Uses

Sidebar_Module

10.3 Syntax

10.3.1 Exported Constants

10.3.2 Inputs

Input Name	Type	Description
evalFunc	Function	Function to evaluate the end result of the app or trip details
GasPrice	$\mathbb{R}$	Price of gas in the start location
mileage	$\mathbb{R}$	Mileage of car
Distance	$\mathbb{R}$	Total distance to travel along the route in km
Total Price	$\mathbb{R}$	Total Price of the trip

10.3.3 Exported Access Programs

Name	In	Out	Exceptio
render	$\mathbb{R}$ GasPrice, $\mathbb{R}$ mileage, $\mathbb{R}$ Distance, $\mathbb{R}$ TotalPrice, Function evalFunc	ReactDOM	

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

render(ℝ GasPrice, ℝ mileage, ℝ Distance, ℝ TotalPrice, Function evalFunc) :

- output: Renders Sidebar along with a button to minimize it.
- exception: None

10.4.5 Local Functions

None

11 MIS of SideBar Module (M7)

11.1 Module extends React.Component

SideBar_Module

11.2 Uses

Location_Input_Module, Car_Input_Module, Trip_Details_Module

11.3 Syntax

11.3.1 Exported Constants

11.3.2 Inputs

Input Name	Type	Description
evalFunc	Function	Function to evaluate the end result of the app or trip details
GasPrice	$\mathbb{R}$	Price of gas in the start location
updateStart	Function	Update start location
updateEnd	Function	Update end location
mileage	$\mathbb{R}$	Mileage of car
Distance	$\mathbb{R}$	Total distance to travel along the route in km
TotalPrice	$\mathbb{R}$	Total Price of the trip

11.3.3 Exported Access Programs

Name	In
render	$\mathbb{R}$ GasPrice, $\mathbb{R}$ mileage, $\mathbb{R}$ Distance, $\mathbb{R}$ TotalPrice, Function evalFunc, Function updateStart, Fu

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

render(ℝ GasPrice, ℝ mileage, ℝ Distance, ℝ TotalPrice, Function evalFunc, Function updateStart, Function updateEnd) :

- output: Renders the content of Sidebar along with any other components that it uses like Trip Details Module.
- exception: None

11.4.5 Local Functions

None

12 MIS of Map Data Module (M7)

12.1 Module extends React.Component

Map_Data_Module

12.2 Uses

None

12.3 Syntax

12.3.1 Exported Constants

12.3.2 Inputs

Input Name	Type	Description
points	List$< \mathbb{R}, \mathbb{R} >$	coords of different points along a route

12.3.3 Exported Access Programs

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

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.

12.4.5 Local Functions

None

13 MIS of Car Data Module (M8)

13.1 Module extends React.Component

Car_Data_Module

13.2 Uses

None

13.3 Syntax

13.3.1 Exported Constants

13.3.2 Inputs

Input Name	Type	Description
carDetails	List<string, string, $\mathbb{R}$ >	A car's make, model and year.

13.3.3 Exported Access Programs

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

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

- 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.

13.4.5 Local Functions

None

14 MIS of Fuel Data Module (M9)

14.1 Module extends React.Component

Fuel_Data_Module

14.2 Uses

None

14.3 Syntax

14.3.1 Exported Constants

14.3.2 Inputs

Input Name	Type	Description
coords	List$< \mathbb{R}, \mathbb{R} >$	Coordinates to find a fuel price at.

14.3.3 Exported Access Programs

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

14.4 Semantics

14.4.1 State Variables

None

14.4.2 Environment Variables

None

14.4.3 Assumptions

None

14.4.4 Access Routine Semantics

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

- output: $< \mathbb{R} >$: Retrieves fuel price for a desired location.
- exception: Fuel component not loaded.

14.4.5 Local Functions

None