



# **MMRP User Manual**

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# **1. Installing MMRP**

## **1.1 Installing Java**

Please refer to [https://www.java.com/en/download/help/windows\\_manual\\_download.xml](https://www.java.com/en/download/help/windows_manual_download.xml) for information on how to install Java on your system.

## **1.2 Installing MySQL**

Please refer to <http://ushastry.blogspot.com/2009/06/installing-mysql-on-windows.html> for information on how to install MySQL on your system.

## **1.3 Installing MMRP**

Install MMRP by downloading, or otherwise obtaining a copy of the program from Dr. Sam Thangiah. Once on the hard-drive the program icon can be double clicked to run the application.

## **1.4 Building The Database**

This step can be skipped if you have access to the Excalibur Server at Slippery Rock University. The MMRP application will automatically attempt to use the Excalibur Server if no other database set is performed.

The building a new database option is currently not supported in this version of MMRP.

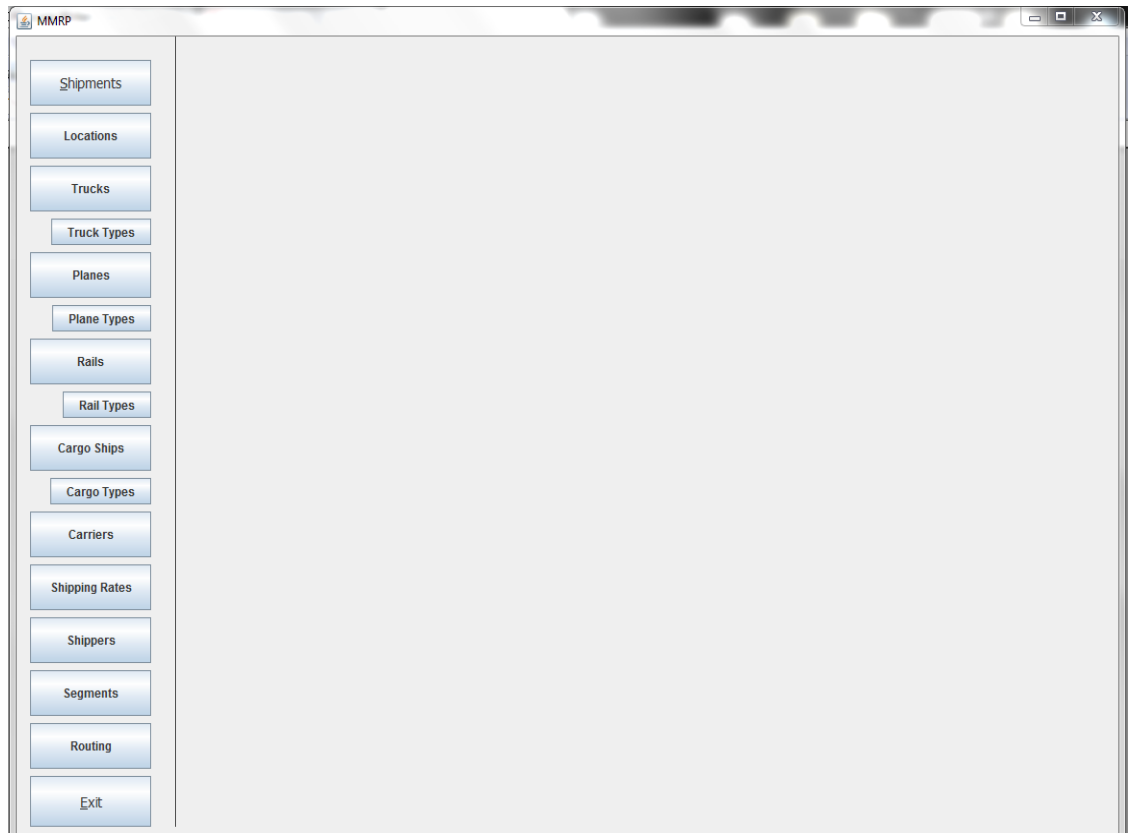
## **2. About MMRP**

### **2.1 Starting Up MMRP**

- 1) Begin the MMRP by double clicking the the MMRP icon in the directory you installed the program in.



- 2) The program will start up and connect to the MySQL database you created in the Building the Database Section 1.4
- 3) You will be presented with the following screen.



- 4) This is the main menu screen, from here you can explore the MMRP database, add and remove objects from the database and route shipments.

## **2.1 MMRP Objects**

### **2.2.1 Vehicles**

A Vehicle is a means to transport a Shipment from one Location to another. There are currently only four modes of transportation supported by the MMRP program. The supported modes are Truck, Cargo, Plane and Rail. Each Vehicle will have a Carrier. This Carrier owns the Vehicle and supplies it to the routing problem. Every Vehicle will also have a current Status. This Status will give a quick idea of how readily available a Vehicle is for use. The following sections will explain in greater detail the different modes of transportation available in the MMRP Program.

#### **2.2.1.1 Trucks**

A Truck is one of the four modes of transportation available in the MMRP program that can be used to transport a Shipment from one location to another. A Truck is a generalization of all the vehicles that use highways, roads and streets to get from one Location to another. A Truck will generally travel between Depots, but will also make the connecting stops at Ports, Stations, and Airports to link the travel modes together.

#### **2.2.2.2 Cargo Ships**

A Cargo Ship is one of the four modes of transportation available in the MMRP program that can be used to transport a Shipment from one location to another. A Cargo Ship is a generalization of all the vehicles that use ocean trade lanes and waterways to get from one Location to another. A Cargo Ship will generally travel between Ports.

#### **2.2.2.3 Planes**

A Plane is one of the four modes of transportation available in the MMRP program that can be used to transport a Shipment from one location to another. A Plane is a generalization of all the vehicles that travel through the air to get from one location to another. A Plane will generally travel between Airports.

#### **2.2.2.4 Rails**

A Rail is one of the four modes of transportation available in the MMRP program that can be used to transport a Shipment from one location to another. A Rail is a generalization of all the vehicles that travel by fixed tracks from one Location to another. A Rail will generally travel between Stations.

### **2.2.2 Locations**

A Location is a place that the Shipment may stop at, either to switch Vehicles or because it is its point of origin or its destination. If a Location is reachable by Truck it is considered a Depot. If a Location is reachable by Cargo Ship it is considered a Port. If a Location is reachable by Plane it is considered an Airport. If a Location is reachable by Rail it is considered a Station. These designations are not exclusive. A Location can be both a Depot and a Port for example. Every Location will have the information fields of its Country, State, City, Latitude and Longitude, along with which modes of transportation can reach this Location.

### **2.2.3 Segments**

A Segment is a path between two Locations that the Shipment can travel along. The Segments are traversed by a particular Vehicle. Many Segments can exist between the same two Locations but they will be considered different because they have a different Vehicle that travels this path. The different Vehicles will mean these two Segments will have different times, costs and distances that the Shipment to consider for the routing. A path of Segments traversed in order from the Shipment's Start Location to its End Location is a routing solution. Every Segment has a Start and End Location, a Vehicle that travels this gap, estimated arrival and departure times, earliest arrival and departure times and latest arrival and departure times.

### **2.2.4 Shipping Rates**

A Shipping Rate is a cost modifier that is supplied by a Carrier for a Segment. Each Carrier will have a host of Shipping Rates that it will supply along with its fleet of Vehicles. Different Shipping Rates will be applied over different Segments and will greatly affect the overall fiscal cost of using certain Segments and in turn will affect the routing possibilities. Each Shipping Rate will offer its own Flat Rate, Mile Rate, and three classes of Weight categories each with its own monetary Rate it the Shipment weighs over the given Weight.

### **2.2.5 Carriers**

A Carrier is the company that owns the Vehicles that are supplied for the Segments. A Carrier also owns the Shipping Rates which determine how costly it is to use their Vehicles. Each Carrier will have its own Name, Carrier Code, Safety Rating, the date it was last rated, an Authorize value, a Contract Date, an Ins End Date, and optionally a Fax Number and Email Address.

### **2.2.6 Shipments**

A Shipment is the package that needs to get from one Location to another via Routing. The Shipments sent by Shippers and are transported by a variety of Vehicles supplied from Carriers along potentially many Segments to reach their destination. Every Shipment will have a Start and End Location, a Priority, a Size, a Weight, an Earliest and Latest Arrival Time, an Earliest and Latest Departure Time, potentially a Shipment History, a Time To Load and Unload, a Shipper, a maximum number of stops, a Loading Rate, a Trailer Type, an Unloading and Loading Type, a list of Preferred Carriers, Hazardous Material Constraints, and options for taking Toll Roads and performing Congestion Bypass.

### **2.2.7 Shippers**

A Shipper is the company that is sending a Shipment from one Location to another. Each Shipper has a Location or origin, a Company Name, a Contact Name, a Phone Number, an Email Address and a list of Preferred Carriers.

### **2.2.8 Travel Types**

A Travel Type is a particular type of a Vehicle mode. For example a Log Carrier and a pick up Truck are both trucks but have very different properties. Each Travel Type has a Minimum Capacity, a Maximum Capacity, a Maximum Weight, a Service Type, and has options for 0-2 Trailers, Radiation transport, Refrigeration transport, Hazardous Material transport, Explosive transport, and Tracking information.

#### **2.2.8.1 Truck Types**

A Truck Type is the specific category of the Truck travel mode that a particular Vehicle is. This means that while two Vehicles might both be Trucks, one might be a pick-up Truck and the other may be a Log Carrier. This difference will give the two Trucks very different properties. These properties are captured in the Truck Type.

#### **2.2.8.2 Cargo Types**

A Cargo Type is the specific category of the Cargo travel mode that a particular Vehicle is. This means that while two Vehicles might both be Cargo Ships, one might be a small ferry Cargo Ship and the other may be an oil tanker. This difference will give the two Cargo Ships very different properties. These properties are captured in the Cargo Type.

### **2.2.8.3 Plane Types**

A Plane Type is the specific category of the Plane travel mode that a particular Vehicle is. This means that while two Vehicles might both be Planes, one might be a small Cessna Plane and the other may be a Jumbo Jet. This difference will give the two Planes very different properties. These properties are captured in the Plane Type.

### **2.2.8.4 Rail Types**

A Rail Type is the specific category of the Rail travel mode that a particular Vehicle is. This means that while two Vehicles might both be Rails, one might be a small 1 car locomotive and the other may be a high-speed bullet train. This difference will give the two Rails very different properties. These properties are captured in the Rail Type.

### 3. Exploring The Database

The MMRP Database is full of objects used in a routing problem. The Graphical User Interface (GUI) supplies a means to add, remove and explore the objects that have been saved to the database (DB). To view objects in the DB the MMRP program must first be running.

### 3.1 Exploring Vehicles

### 3.1.1 Exploring Trucks

To view a Truck that exists in the database follow these steps

- 1) Click on the Trucks button on the left menu bar.



- 2) The Trucks menu will be presented in the main viewing area.

## Trucks

ID	Carrier	Status	Name
1	DHL	RUNNING	Truck1
2	FEDEX	DELAYED	h
3	FEDEX	RUNNING	Truck3
4	FEDEX	RUNNING	Truck4
5	DHL	RUNNING	NewName

View

New

Delete

- 3) From the Truck menu you can select any of the Trucks in the database from the Truck table. Scroll until you find the Truck you want.
- 4) Select the desired Truck.
- 5) Click the View button





- 6) The Truck Editor Tabbed Panel will appear displaying all the Truck's information.
- 7) The Basic Tab will let you explore cursory information about the truck

The screenshot shows the 'Basic' tab of the Truck Editor. It contains three input fields: 'Name' with the value 'Truck4', 'Status' with the value 'RUNNING', and 'Carrier' with the value 'FEDEX'. Below these fields are two buttons: 'Edit' and 'Cancel'.

- 8) Clicking on the Segments Panel will display all the Segments that this vehicle operates over.

The screenshot shows the 'Segments' tab of the Truck Editor. It displays a table with the following headers: 'ID', 'Start', 'End', and 'Type'. The table is currently empty.

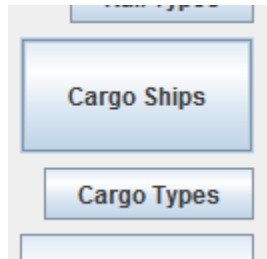
- 9) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

The screenshot shows the 'Types' tab of the Truck Editor. It features two lists: 'Used' and 'Available'. The 'Used' list contains 'TruckType1' and 'TestTruckTy'. The 'Available' list contains 'TruckType2' and 'defaultVehicleTy'. Between the lists are two buttons: a right-pointing arrow and a left-pointing arrow. Below each list are navigation controls (back, forward, and search icons).

### 3.1.2 Exploring Cargo Ships

To view a Cargo Ship that exists in the database follow these steps

- 1) Click on the Cargo Ships button on the left menu bar.



- 2) The Cargo Ships menu will be presented in the main viewing area.

**Cargo**

ID	Carrier	Status	Name
1	UPS	RUNNING	Ship1
2	FEDEX	RUNNING	Ship2
3	DHL	RUNNING	Ship3
4	USPS	RUNNING	Ship4
5	UPS	RUNNING	Ship5
6	FEDEX	RUNNING	Ship6
306	DHL	DISABLED	defaultCargoName

View New Delete

- 3) From the Cargo Ships menu you can select any of the Cargo Ships in the database from the Cargo Ships table. Scroll until you find the Cargo Ship you want.
- 4) Select the desired Cargo Ship.
- 5) Click the View button.



- 6) The Cargo Editor Tabbed Panel will appear displaying all the Cargo Ship's information.

Basic Segments Types

Name: Ship5

Status: RUNNING

Carrier: UPS

Edit Cancel

- 7) The Basic Tab will let you explore cursory information about the cargo.
- 8) Clicking on the Segments Panel will display all the Segments that this vehicle operates over.

Basic	Segments	Types	
ID	Start	End	Type

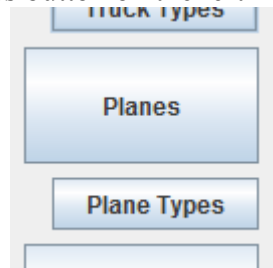
- 9) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

Basic	Segments	Types
<div><div>Used</div><div>CargoType3</div><div>Available</div><div>CargoType1 CargoType2</div></div>		

### 3.1.3 Exploring Planes

To view a Plane that exists in the database follow these steps

- 1) Click on the Planes button on the left menu bar.



- 2) The Planes menu will be presented in the main viewing area.

**Planes**

ID	Carrier	Status	Name
1	DHL	RUNNING	Plane1
2	USPS	RUNNING	Plane2
3	UPS	RUNNING	Plane3
4	FEDEX	RUNNING	Plane4
5	DHL	RUNNING	Plane5
6	USPS	RUNNING	Plane6
56	DHL	RUNNING	NewSuperTest

View New Delete

- 3) From the Plane menu you can select any of the Planes in the database from the Plane table. Scroll until you find the Plane you want.
- 4) Select the desired Plane.
- 5) Click the View button.



- 6) The Plane Editor Tabbed Panel will appear displaying all the Plane's information.

Basic Segments Types

Name: Plane5

Status: RUNNING

Carrier: DHL

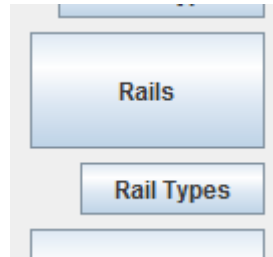
Edit Cancel



### 3.1.4 Exploring Rails

To view a Rail that exists in the database follow these steps

- 1) Click on the Rails button on the left menu bar.



- 2) The Rails menu will be presented in the main viewing area.

#### **Rails**

ID	Carrier	Status	Name	
1	UPS	RUNNING	Rail1	▲
2	USPS	RUNNING	Rail2	
3	FEDEX	RUNNING	Rail3	
4	DHL	RUNNING	Rail4	≡
5	USPS	RUNNING	Rail5	
6	UPS	RUNNING	Rail6	
51	DHL	RUNNING	defaultRailName	▼

ViewNewDelete

- 3) From the Rail menu you can select any of the Rails in the database from the Rail table. Scroll until you find the Rail you want.
- 4) Select the desired Rail.
- 5) Click the View button.



- 6) The Rail Editor Tabbed Panel will appear displaying all the Rail's information.

BasicSegmentsTypes

Name: Rail6

Status: RUNNING ▼

Carrier: UPS ▼

EditCancel

- 7) The Basic Tab will let you explore cursory information about the rail.
- 8) Clicking on the Segments Panel will display all the Segments that this vehicle operates over.

Operator's View

Basic	Segments	Types	
ID	Start	End	Type

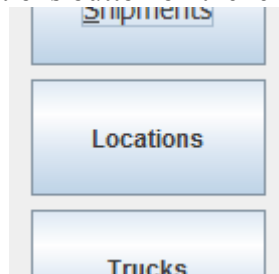
- 9) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

Basic	Segments	Types
<div><div>Used</div><div>RailType1</div><div>Available</div><div>RailType2 RailType3</div></div>		

## 3.2 Exploring Locations

To view a Location that exists in the database follow these steps

- 1) Click on the Locations button on the left menu bar.



- 2) The Locations menu will be presented in the main viewing area.

Locations				
ID	City	State	Country	
1	Harrisburg	PA	USA	▲
2	Antwerp	AN	Belgium	☰
3	New York City	NY	USA	
4	Miami	FI	USA	
5	Mobile	AI	USA	
6	Mempis	TN	USA	
7	Paris	IF	France	▼
			View	New
			Delete	

- 3) In the Location menu you can select any of the Locations in the database from the Location table. Scroll until you find the Location you want.
- 4) Select the desired Location.
- 5) Click the View button.



- 6) The Location Editor will appear displaying all the selected Location information.

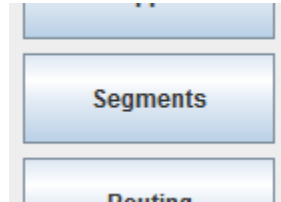
Location	
City: Antwerp	Truck: <input checked="" type="checkbox"/>
State: AN	Rail: <input checked="" type="checkbox"/>
Country: Belgium	Train: <input checked="" type="checkbox"/>
Latitude: 51.2167	Cargo: <input checked="" type="checkbox"/>
Longitude: 4.4	
Edit Cancel	



### 3.3 Exploring Segments

To view a Segment that exists in the database follow these steps

- 1) Click on the Segments button on the left menu bar.



- 2) The Segments menu will be presented in the main viewing area.

**Segments**

ID	Start	End	Type
8001	TestNode2	TestNode3	EMPTY
8002	TestNode3	TestNode4	EMPTY
8003	TestNode1	TestNode6	EMPTY
8004	TestNode6	TestNode5	EMPTY
8005	TestNode5	TestNode4	EMPTY
8006	TestNode1	TestNode3	EMPTY
8007	TestNode1	TestNode4	EMPTY

View New Delete

- 3) In the Segment menu you can select any of the Segments in the database from the Segment table. Scroll until you find the Location you want.
- 4) Select the desired Segment.
- 5) Click the View button.



- 6) The Segment Editor will appear displaying all the selected Segment's information.

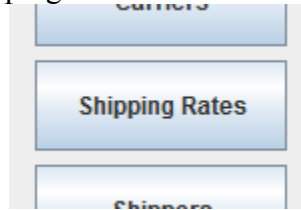
**Segments**

SegmentID	8000	Est. Departure	0
Mode	TRUCK	Earliest Departure	0
Vehicle	8000	Latest Departure	100
Travel Type	1	Est. Arrival	50
Distance	30.0	Earliest Arrival	0
Lane	Any	Latest Arrival	100
Shipping Rate	0 - Flat Rate : 1.0		
Actual Capacity	0.0		
<b>Start Location</b>		<b>End Location</b>	
Country:	DANATION	Country:	CHRISVILLE
State:	NA	State:	NA
City:	TestNode1	City:	TestNode2
Edit		Cancel	

### 3.4 Exploring Shipping Rates

To view a Shipping Rate that exists in the database follow these steps

- 1) Click on the Shipping Rates button on the left menu bar.



- 2) The Shipping Rate Form will then appear

#### **Shipping Rates**

ID	Carrier	Type	Mile Rate	Flat Rate	
1	DHL	TruckType1	10.0	5.0	▲
2	DHL	PlaneType1	10.0	1.0	
3	DHL	CargoType1	10.0	99.0	
4	DHL	RailType1	10.0	1.0	≡
5	DHL	TruckType1	10.0	1.0	
7	DHL	CargoType1	10.0	1.0	
8	DHL	RailType1	10.0	1.0	▼

View

New

Delete

- 3) From the Shipping Rate Form you can select any of the Shipping Rates in the database from the Shipping Rate table. Scroll until you find the Shipping Rate you want.
- 4) Select the desired Shipping Rate.
- 5) Click the View button.



- 6) The Shipping Rate Editor will appear displaying all the selected Shipping Rate's information.

**Shipping Rate**

Shipping Rate ID

Carrier

Travel Type

Flat Rate

Mile Rate

Weight 1

Weight 2

Weight 3

Rank

Rate 1

Rate 2

Rate 3

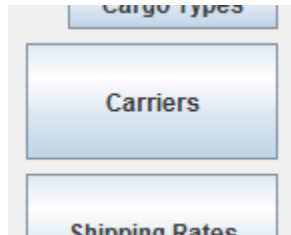
Edit

Cancel

### 3.5 Exploring Carriers

To view a Carrier that exists in the database follow these steps

- 1) Click on the Carriers button on the left menu bar.



- 2) The Carrier Form will then appear.

#### **Carriers**

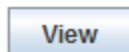
ID	Name	Code	Safety Rating
1	DHL	1	1
2	USPS	1	1
3	UPS	1	1
4	FEDEX	1	1

View

New

Delete

- 3) From the Carrier Form you can select any of the Carriers in the database from the Carrier table. Scroll until you find the Carrier you want.
- 4) Select the desired Carrier.
- 5) Click the View button.



- 6) The Carrier Editor will appear displaying all the selected Carrier's information.

Carrier

CarrierID 2

☒ Fax Number

Carrier Name USPS

☐ Email

Carrier Code 1

Fax Number 123-456-7890

Area Code 123

Email noOne@nowhere.com

Contract Date January 1 1970

Cost Modifiers

Authorize 1

Truck 1

Safety Rating 1

Cargo 1

Rating Date January 1 1970

Plane 1

Ins End Date January 1 1970

Rail 1

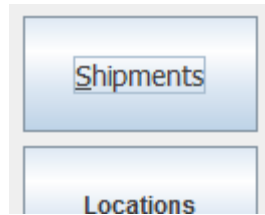
Edit

Cancel

### 3.6 Exploring Shipments

To view a Shipment that exists in the database follow these steps

- 1) Click on the Shipments button on the left menu bar.



- 2) The Shipment Table will then appear.

#### **Shipments**

ID	From	To
1	Harrisburg	Frankfurt
2	Harrisburg	Antwerp
3	Frankfurt	Antwerp
4	New York City	Harrisburg
5	New York City	Frankfurt
6	Pittsburgh	Miami
7	Pittsburgh	Harrisburg

ViewNewDelete

- 3) The table will be populated with all the Shipments on the database. Scroll on the table until you find the shipment you want.
- 4) Select the shipment from the table you wish to know more about
- 5) Click the view button.



- 6) The selected Shipment's information will populate the fields of the Shipment Tabbed panel.

InfoHistory

Location: USA PA Harrisburg Shipper ID

Company: Encore Steel

Contact: defaultContactName

Phone: 123-456-7890

Email: defaultEmailAddress@IwannaMakeYouMine.com

Preferred Carriers: ANY

To: Belgium AN Antwerp

Size: 3.0 Toll Roads: ☐

Weight: 1.0 Congestion By-Pass: ☐

Priority: 1

Earliest Departure: Latest Departure:

Earliest Arrival: Latest Arrival:

Time to Load: 0

Time to UnLoad: 0

Hazmat: NONE

Loading Type: NONE

Unloading Type: NONE

Trailer Type Required: NONE

EditCancel

- 7) The Shipment's main information is displayed on the “Info” tab.
- 8) Click on the “History” tab.
- 9) If the selected Shipment has any previous Shipping History it will be displayed here.

Info		History	
ID	Name	Code	Safety Rating
4332	0	Harrisburg	Antwerp

### 3.7 Exploring Shippers

To view a Shipper that exists in the database follow these steps

- 1) Click on the Shippers button on the left menu bar.



- 2) The Shipper Form will then appear.

**Shippers**

ID	Company Name	Contact Name	Phone Number
1	NewSuperTest	defaultContactName	123-456-7890
2	NewSuperTest2	defaultContactName	123-456-7890
3	defaultCompanyName	defaultContactName	123-456-7890
5	DeletedCompany	defaultContactName	123-456-7890
6	DeletedCompany	defaultContactName	123-456-7890
7	DeletedCompany	defaultContactName	123-456-7890
8	DeletedCompany	defaultContactName	123-456-7890

- 3) From the Shipper Form you can select any of the Shippers in the database from the Shipper table. Scroll until you find the Shipper you want.
- 4) Select the desired Shipper.
- 5) Click the View button.



- 6) The Shipper Editor will appear displaying all the selected Shipper's information.

**Shipper**

Shipper ID

Company Name  Preferred Carriers

Contact Name

Phone Number

Email

**Location**

Country

State

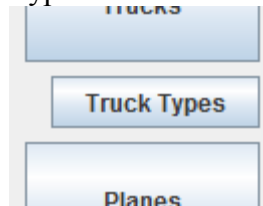
City

## 3.8 Exploring Travel Types

### 3.8.1 Exploring Truck Types

To view a Truck Type that exists in the database follow these steps

- 1) Click on the Truck Types button on the left menu bar.



- 2) The Truck Type Table will then appear.

#### **Truck Types**

ID	Name	Max Capacity	Max Weight	
1	TruckType1	100.0	500.0	▲
5	TruckType2	100.0	500.0	☰
8000	TestTruckType	100.0	500.0	
8025	defaultVehicleTypeN...	1000000.0	1000000.0	▼

ViewNewDelete

- 3) The table will be populated with all the Truck Types on the database. Scroll on the table until you find the Truck Type you want.
- 4) Select the Truck Type from the table you wish to know more about
- 5) Click the view button



- 6) The Truck Type Information panel will appear.

**Truck Type**

TypeID 5

Type Name TruckType2

Trailer 1 defaultTrailer1

Trailer 2 defaultTrailer2

Service Type defaultServiceType

Min. Capacity 0.0

Max. Capacity 100.0

Max Weight 500.0

☐ Radiation

☐ Refrigeration

☐ Hazardous Material

☐ Explosive Material

☐ Tracking Available

Edit

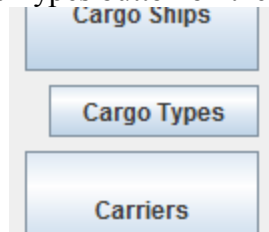
Cancel

- 7) The selected Truck Type's information will populate the fields of the information panel.

### 3.8.2 Exploring Cargo Types

To view a Cargo Type that exists in the database follow these steps

- 1) Click on the Cargo Types button on the left menu bar.



- 2) The Cargo Type Table will then appear.

**Cargo Types**

ID	Name	Max Capacity	Max Weight
3	CargoType1	100.0	500.0
9	CargoType2	100.0	500.0
10	CargoType3	100.0	500.0

[View](#) [New](#) [Delete](#)

- 3) The table will be populated with all the Cargo Types on the database. Scroll on the table until you find the Cargo Type you want.
- 4) Select the Cargo Type from the table you wish to know more about
- 5) Click the View button.



- 6) The Cargo Type Information panel will appear.

**Cargo Type**

TypeID	9	<input type="checkbox"/> Radiation
Type Name	CargoType2	<input type="checkbox"/> Refrigeration
Service Type	defaultServiceType	<input type="checkbox"/> Hazardous Material
Max Weight	500.0	<input type="checkbox"/> Explosive Material
Min. Capacity	0.0	<input type="checkbox"/> Tracking Available
Max. Capacity	100.0	

[Edit](#) [Cancel](#)

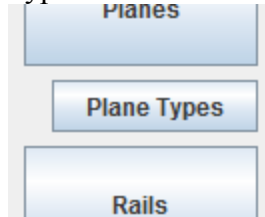
- 7) The selected Cargo Type's information will populate the fields of the information panel.



### 3.8.3 Exploring Plane Types

To view a Plane Type that exists in the database follow these steps

- 1) Click on the Plane Types button on the left menu bar.



- 2) The Plane Type Table will then appear.

## Plane Types

ID	Name	Max Capacity	Max Weight
2	PlaneType1	100.0	500.0
7	PlaneType2	100.0	500.0
8	PlaneType3	100.0	500.0

View

New

Delete

- 3) The table will be populated with all the Plane Types on the database. Scroll on the table until you find the Plane Type you want.
- 4) Select the Plane Type from the table you wish to know more about.
- 5) Click the View button.



- 6) The Plane Type Information panel will appear.

**Plane Type**

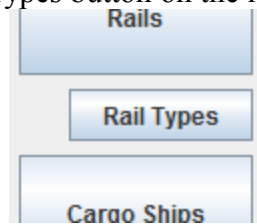
TypeID	<input type="text" value="7"/>	<input type="checkbox"/> Radiation
Type Name	<input type="text" value="PlaneType2"/>	<input type="checkbox"/> Refrigeration
Service Type	<input type="text" value="defaultServiceType"/>	<input type="checkbox"/> Hazardous Material
Max Weight	<input type="text" value="500.0"/>	<input type="checkbox"/> Explosive Material
Min. Capacity	<input type="text" value="0.0"/>	<input type="checkbox"/> Tracking Available
Max. Capacity	<input type="text" value="100.0"/>	

- 7) The selected Plane Type's information will populate the fields of the information panel.

### 3.8.4 Exploring Rail Types

To view a Rail Type that exists in the database follow these steps

- 1) Click on the Rail Types button on the left menu bar.



- 2) The Rail Type Table will then appear.

**Rail Types**

ID	Name	Max Capacity	Max Weight
4	RailType1	100.0	500.0
11	RailType2	100.0	500.0
12	RailType3	100.0	500.0

[View](#) [New](#) [Delete](#)

- 3) The table will be populated with all the Rail Types on the database. Scroll on the table until you find the Rail Type you want.
- 4) Select the Rail Type from the table you wish to know more about
- 5) Click the View button.



- 6) The Rail Type Information panel will appear.

**Rail Type**

TypeID	4	<input type="checkbox"/> Radiation
Type Name	RailType1	<input type="checkbox"/> Refrigeration
Service Type	defaultServiceType	<input type="checkbox"/> Hazardous Material
Max Weight	500.0	<input type="checkbox"/> Explosive Material
Min. Capacity	0.0	<input type="checkbox"/> Tracking Available
Max. Capacity	100.0	

[Edit](#) [Cancel](#)

- 7) The selected Rail Type's information will populate the fields of the information panel.

## 4. Adding Objects To The Database

The MMRP Database is capable of using user-defined objects for use in its routing solutions. You can add the following objects to the database by following the steps listed below.

## 4.1 Adding Vehicles

### 4.1.1 Adding Trucks

To add a new Truck to the database follow these steps

- 1) Click on the Trucks button on the left menu bar.



- 2) The Trucks menu will be presented in the main viewing area.

## Trucks

ID	Carrier	Status	Name
1	DHL	RUNNING	Truck1
2	FEDEX	DELAYED	h
3	FEDEX	RUNNING	Truck3
4	FEDEX	RUNNING	Truck4
5	DHL	RUNNING	NewName

[View](#)
[New](#)
[Delete](#)

- 3) Click the New button.



- 4) The Truck Editor Tabbed Panel will appear displaying all the Truck's information that can be entered.

Basic	Segments	Types
Name: <input type="text"/>		
Status:	<input type="text" value="RUNNING"/>	▼
Carrier:	<input type="text" value="DHL"/>	▼
Save		Cancel

- 5) The Basic Tab will let you enter cursory information about the truck.
1. Name – Type in valid name for the vehicle, consisting of 1-45 alphanumeric characters.

Name:

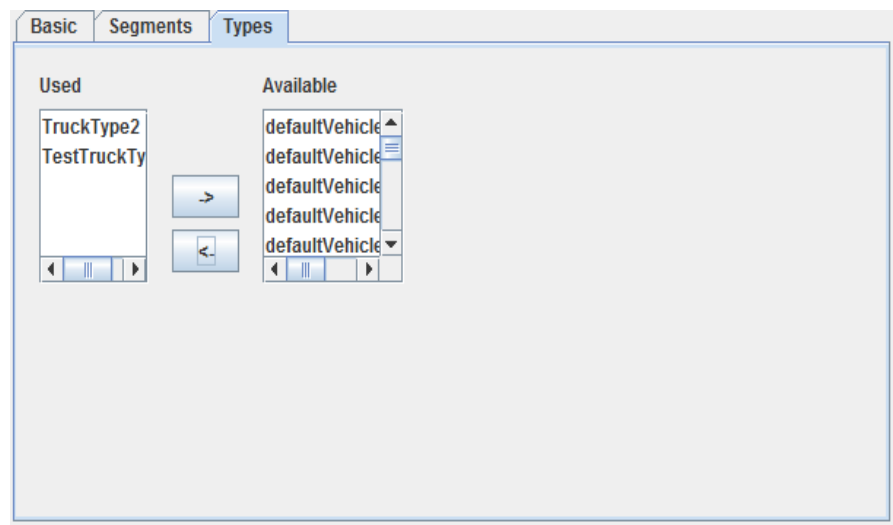
2. Status – The status can be set to any of the options in the dropbox.

Status:

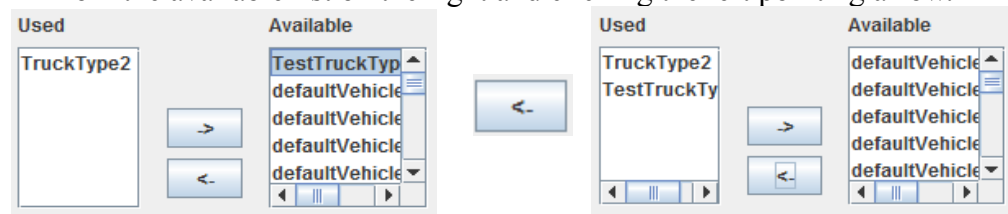
3. Carrier – The Carrier can be set via the dropbox to any of the Carriers in the database.

Carrier:

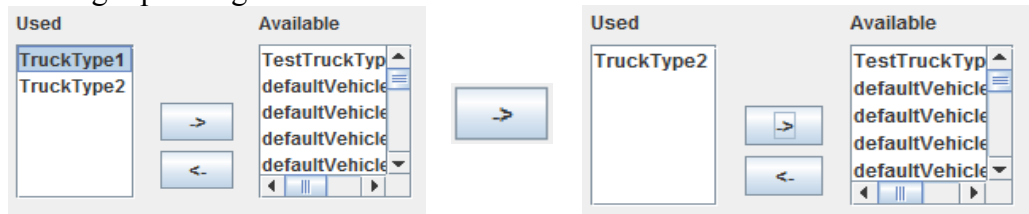
- 6) You can add segments to this vehicle afterwards by going to the Locations Menu. See Section 4.3 'Adding Segments'
- 7) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.



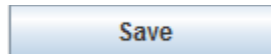
- 8) New types available for this vehicle can be added by selecting a desired type from the available list on the right and clicking the left pointing arrow.



- 9) Similarly to remove a type from the used list select a type from the left and click the right pointing arrow to move it to the Available list.



- 10) After all the fields are filled with valid values and all the desired types have been moved to the 'Used' list, click on the Basic Tab and hit the Save Button

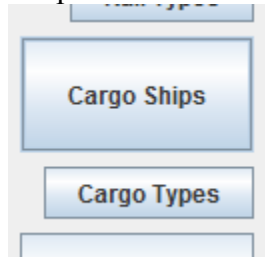


- 11) The new Truck object has now been added to the database and will be used in the Routing process.

### 4.1.2 Adding Cargo Ships

To add a new Cargo Ship to the database follow these steps

- 1) Click on the Cargo Ships button on the left menu bar.



- 2) The Cargo Ships menu will be presented in the main viewing area.

**Cargo**

ID	Carrier	Status	Name
1	UPS	RUNNING	Ship1
2	FEDEX	RUNNING	Ship2
3	DHL	RUNNING	Ship3
4	USPS	RUNNING	Ship4
5	UPS	RUNNING	Ship5
6	FEDEX	RUNNING	Ship6
306	DHL	DISABLED	defaultCargoName

View New Delete

- 3) Click the New button



- 4) The Cargo Ship Editor Tabbed Panel will appear displaying all the Truck's information that can be entered.

Basic Segments Types

Name:

Status: RUNNING ▼

Carrier: DHL ▼

Save Cancel

- 5) The Basic Tab will let you enter cursory information about the Cargo Ship
1. Name – Type in valid name for the vehicle, consisting of 1-45 alphanumeric characters.

Name:

2. Status – The status can be set to any of the options in the dropbox.

Status:

3. Carrier – The Carrier can be set via the dropbox to any of the Carriers in the database.

Carrier:

- 6) You can add segments to this vehicle afterwards by going to the Locations Menu. See Section 4.3 'Adding Segments'
- 7) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

The 'Types' tab interface shows two columns: 'Used' and 'Available'. The 'Used' column contains 'CargoType3'. The 'Available' column contains 'CargoType1' and 'CargoType2'. Between the columns are two buttons: a right-pointing arrow and a left-pointing arrow.

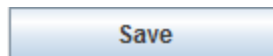
- 8) New types available for this vehicle can be added by selecting a desired type from the available list on the right and clicking the left pointing arrow.

The diagram illustrates the process of adding a new type to the 'Used' list. It shows two states of the 'Types' panel. In the first state, 'CargoType2' is selected in the 'Available' list. In the second state, 'CargoType2' has been moved to the 'Used' list, and 'CargoType1' remains in the 'Available' list. A left-pointing arrow button is shown between the two states.

- 9) Similarly to remove a type from the used list select a type from the left and click the right pointing arrow to move it to the Available list.



- 10) After all the fields are filled with valid values and all the desired types have been moved to the 'Used' list, click on the Basic Tab and hit the Save Button



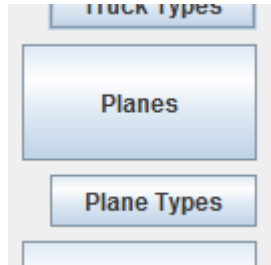
- 11) The new Cargo object has now been added to the database and will be used in the Routing process.



### 4.1.3 Adding Planes

To add a new Plane to the database follow these steps

- 1) Click on the Planes button on the left menu bar.



- 2) The Planes menu will be presented in the main viewing area.

**Planes**

ID	Carrier	Status	Name
1	DHL	RUNNING	Plane1
2	USPS	RUNNING	Plane2
3	UPS	RUNNING	Plane3
4	FEDEX	RUNNING	Plane4
5	DHL	RUNNING	Plane5
6	USPS	RUNNING	Plane6
56	DHL	RUNNING	NewSuperTest

View New Delete

- 3) Click the New button.



- 4) The Plane Editor Tabbed Panel will appear displaying all the Plane's information that can be entered.

Basic Segments Types

Name:

Status: RUNNING ▼

Carrier: DHL ▼

Save Cancel

- 5) The Basic Tab will let you enter cursory information about the Plane.
1. Name – Type in valid name for the vehicle, consisting of 1-45 alphanumeric characters.

Name:

2. Status – The status can be set to any of the options in the dropbox.

Status: RUNNING ▼

3. Carrier – The Carrier can be set via the dropbox to any of the Carriers in the database.

Carrier: DHL ▼

- 6) You can add segments to this vehicle afterwards by going to the Locations Menu. See Section 4.3 'Adding Segments'
- 7) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

The screenshot shows the 'Types' tab of a vehicle management interface. It features two columns: 'Used' and 'Available'. The 'Used' column contains 'PlaneType2' and 'PlaneType1'. The 'Available' column contains 'PlaneType3'. Between the columns are two buttons: a right-pointing arrow and a left-pointing arrow.

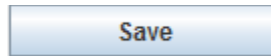
- 8) New types available for this vehicle can be added by selecting a desired type from the available list on the right and clicking the left pointing arrow.

The image shows two side-by-side screenshots of the 'Types' tab. The left screenshot shows 'PlaneType3' in the 'Used' column and 'PlaneType2' and 'PlaneType1' in the 'Available' column. The right screenshot shows 'PlaneType3' and 'PlaneType2' in the 'Used' column and 'PlaneType1' in the 'Available' column. A left-pointing arrow button is shown between the two screenshots, indicating the action of moving a type from available to used.

- 9) Similarly to remove a type from the used list select a type from the left and click the right pointing arrow to move it to the Available list.



- 10) After all the fields are filled with valid values and all the desired types have been moved to the 'Used' list, click on the Basic Tab and hit the Save Button

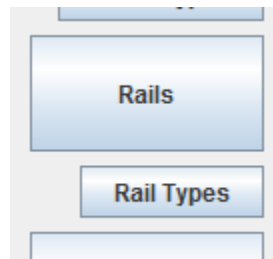


- 11) The new Plane object has now been added to the database and will be used in the Routing process.

#### 4.1.4 Adding Rails

To add a new Rail to the database follow these steps

- 1) Click on the Rails button on the left menu bar.



- 2) The Rails menu will be presented in the main viewing area.

**Rails**

ID	Carrier	Status	Name
1	UPS	RUNNING	Rail1
2	USPS	RUNNING	Rail2
3	FEDEX	RUNNING	Rail3
4	DHL	RUNNING	Rail4
5	USPS	RUNNING	Rail5
6	UPS	RUNNING	Rail6
51	DHL	RUNNING	defaultRailName

View New Delete

- 3) Click the New button.



- 4) The Rail Editor Tabbed Panel will appear displaying all the Rail's information that can be entered.

Basic Segments Types

Name:

Status: RUNNING ▼

Carrier: DHL ▼

Save Cancel

- 5) The Basic Tab will let you enter cursory information about the Rail.
1. Name – Type in valid name for the vehicle, consisting of 1-45 alphanumeric characters.

Name:

2. Status – The status can be set to any of the options in the dropdown.

Status: RUNNING ▼

3. Carrier – The Carrier can be set via the dropdown to any of the Carriers in the database.

Carrier: DHL ▼

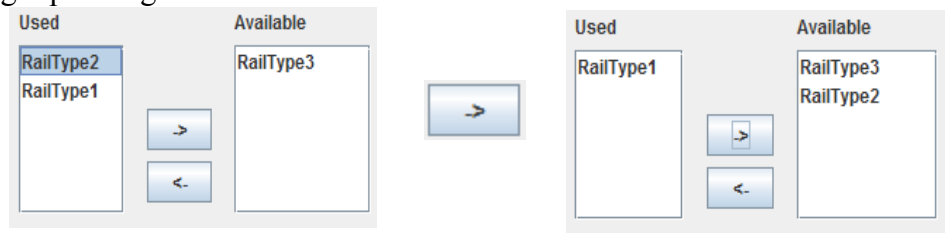
- 6) You can add segments to this vehicle afterwards by going to the Locations Menu. See Section 4.3 'Adding Segments'.
- 7) Finally, the Types panel will display the Travel Types this vehicle can use and all the types that are available.

The 'Types' tab is active, showing a panel with two columns: 'Used' and 'Available'. The 'Used' column is empty. The 'Available' column contains a list of travel types: RailType2, RailType3, and RailType1. Between the columns are two buttons: a right-pointing arrow and a left-pointing arrow.

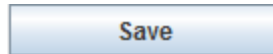
- 8) New types available for this vehicle can be added by selecting a desired type from the available list on the right and clicking the left pointing arrow.

The diagram illustrates the process of adding a new type to the 'Used' list. It shows two 'Types' panels. In the first panel, 'RailType2' is selected in the 'Available' list. A left-pointing arrow button is shown between the two panels. In the second panel, 'RailType2' has been moved to the 'Used' list.

- 9) Similarly to remove a type from the used list select a type from the left and click the right pointing arrow to move it to the Available list.



- 10) After all the fields are filled with valid values and all the desired types have been moved to the 'Used' list, click on the Basic Tab and hit the Save Button

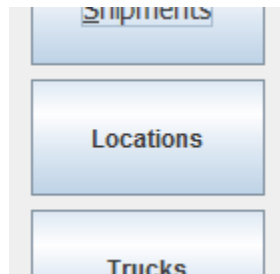


- 11) The new Rail object has now been added to the database and will be used in the Routing process.

## 4.2 Adding Locations

To add a new Location to the database follow these steps

- 1) Click on the Locations button on the left menu bar.



- 2) The Location menu will be presented in the main viewing area.

**Locations**

ID	City	State	Country
1	Harrisburg	PA	USA
2	Antwerp	AN	Belgium
3	New York City	NY	USA
4	Miami	FI	USA
5	Mobile	AI	USA
6	Mempis	TN	USA
7	Paris	IF	France

View New Delete

- 3) Click the New Button



- 4) The empty Location Editor will appear.

**Location**

City:

State:

Country:

Latitude:

Longitude:

Truck: ☐

Rail: ☐

Train: ☐

Cargo: ☐

Save Cancel

- 5) The fields can then be filled out as follows
  1. Country – Type in a valid country name containing between 1 and 45 alphabetical characters.

Country:

2. State – Type in a valid state name containing between 1 and 45 alphabetical characters.

State:

3. City – Type in a valid city name containing between 1 and 45 alphabetical characters.

City:

4. Latitude – Type in a latitude for the new location between the values of -90.0 degrees and 90.0 degrees.

Latitude:

5. Longitude – Type in a longitude for the new location between the values of -180.0 degrees and 180.0 degrees.

Longitude:

6. Travel Modes – If the location can be reached by the Mode of vehicle named, then check the box.

Truck:	<input type="checkbox"/>
Rail:	<input type="checkbox"/>
Train:	<input type="checkbox"/>
Cargo:	<input type="checkbox"/>

- 6) Once all the fields are set to a desired valid value click Save

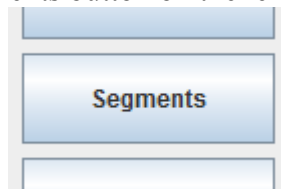
- 7) The new Location will be added to the database and can be found in the Location Explorer, see Section 3.2 'Exploring Locations'



## 4.3 Adding Segments

To add a new Segment to the database follow these steps

- 1) Click on the Segments button on the left menu bar.



- 2) Click on the New Button located on the right



- 3) The fields in the Segment Editor will appear beneath the Segment table.

A screenshot of the "Segments" form in a web application. The form is titled "Segments" and is divided into several sections. On the left, there are input fields for "SegmentID", "Mode" (a dropdown menu with "Select..." selected), "Vehicle" (a dropdown menu), "Travel Type" (a dropdown menu), "Distance", "Lane", "Shipping Rate", and "Actual Capacity". On the right, there are input fields for "Est. Departure", "Earliest Departure", "Latest Departure", "Est. Arrival", "Earliest Arrival", and "Latest Arrival". At the bottom, there are two sections for "Start Location" and "End Location", each containing "Country", "State", and "City" dropdown menus. At the bottom right, there are "Save" and "Cancel" buttons.

- 4) Enter valid inputs in the following fields
  1. Mode – Select a travel mode that will be used over this Segment.

A screenshot of the "Mode" dropdown menu. The word "Mode" is to the left of the dropdown. The dropdown is open, showing "TRUCK" as the selected option.

2. Vehicle ID – Select a Vehicle ID of the selected Mode to be used over this Segment.

A screenshot of the "Vehicle" dropdown menu. The word "Vehicle" is to the left of the dropdown. The dropdown is open, showing "4-FedexTruck4" as the selected option.

3. Travel Type ID – Select the Travel Type that this Vehicle will be using over this Segment.

A screenshot of the "Travel Type" dropdown menu. The words "Travel Type" are to the left of the dropdown. The dropdown is open, showing "TruckType2" as the selected option.

4. Lane – Input the lane restrictions you wish to place on this Vehicle – Currently this will accept any values but only place "ANY" in the database.

A screenshot of the "Lane" input field. The word "Lane" is to the left of the input field. The input field contains the text "ANY".

5. Rate ID – Input the ID of the Shipping Rate you wish to act over this Segment.

Shipping Rate

6. Est. Departure – Input a time and date, using a 24-hour clock to indicate the estimated time that the Vehicle will be leaving the Start Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Est. Departure 15:30 03/24/2014

7. Earliest Departure - Input a time and date, using a 24-hour clock to indicate the earliest time that the Vehicle will be allowed to leave the Start Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Earliest Departure 15:30 03/23/2014

8. Latest Departure - Input a time and date, using a 24-hour clock to indicate the latest time that the Vehicle will be allowed to leave the Start Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Latest Departure 15:30 03/25/2014

9. Est. Arrival - Input a time and date, using a 24-hour clock to indicate the estimated time that the Vehicle will arrive at the End Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Est. Arrival 5:30 04/24/2014

10. Earliest Arrival - Input a time and date, using a 24-hour clock to indicate the earliest time that the Vehicle will be allowed to reach the End Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Earliest Arrival 5:30 04/14/2014

11. Latest Arrival - Input a time and date, using a 24-hour clock to indicate the latest time that the Vehicle will be allowed to reach the End Location. Use the following format “HH:mm MM/dd/YYYY” ex 15:15 11/23/1980

Latest Arrival 5:30 05/12/2014

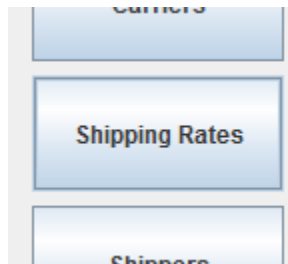
- 5) Select a Start Location using the available dropboxes for the Country, State, and City. More information is provided in Section 3.2 'Exploring Locations'
- 6) Similarly select an End Location for this Segment.
- 7) Click Save and the new Segment will be saved to the database and used in future routing.

Save

## 4.4 Adding Shipping Rates

To add a new Shipping Rate to the database follow these steps

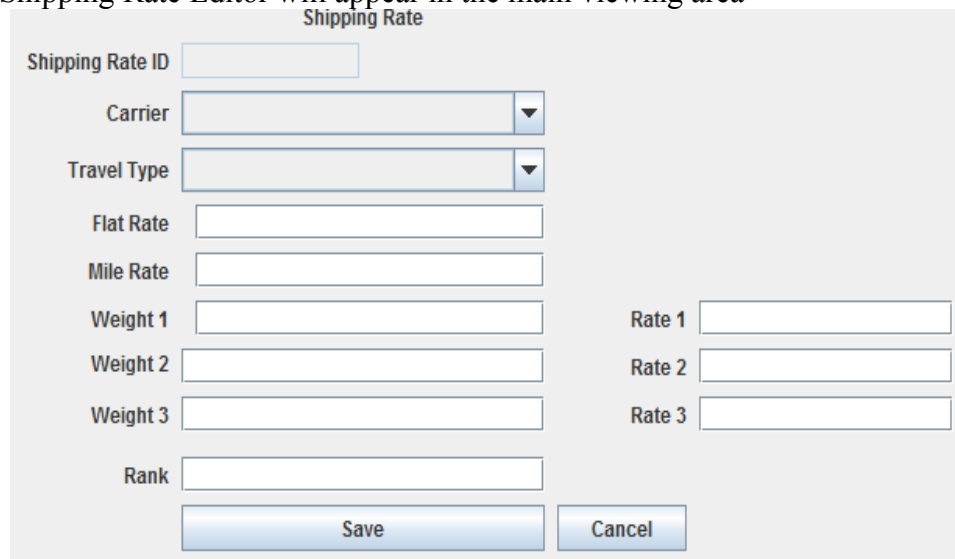
- 1) Click on the Shipping Rates button on the left menu bar.



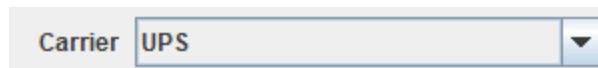
- 2) Beneath the Shipping Rates Table click on the New Button



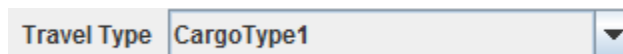
- 3) The Shipping Rate Editor will appear in the main viewing area

A form titled 'Shipping Rate' with the following fields: 'Shipping Rate ID' (text input), 'Carrier' (dropdown menu), 'Travel Type' (dropdown menu), 'Flat Rate' (text input), 'Mile Rate' (text input), 'Weight 1' (text input), 'Weight 2' (text input), 'Weight 3' (text input), 'Rank' (text input), 'Rate 1' (text input), 'Rate 2' (text input), 'Rate 3' (text input), and 'Save' and 'Cancel' buttons at the bottom.

- 4) Select a Carrier for the Shipping Rate from the Carrier dropdown.

A dropdown menu labeled 'Carrier' with 'UPS' selected and a downward arrow on the right.

- 5) Select a Travel Type for the Shipping Rate from the Travel Type dropdown

A dropdown menu labeled 'Travel Type' with 'CargoType1' selected and a downward arrow on the right.

- 6) Enter valid values into the following fields

1. Flat Rate – This is the base fee for transportation. This can be any value over 0

A text input field labeled 'Flat Rate' containing the number '10'.

2. Mile Rate – This is the amount that is charged per mile travelled. This rate can be anything over 0.

A text input field labeled 'Mile Rate' containing the number '5'.

3. Weight 1 – This is the weight for under which only the Flat Rate and Mile Rate will apply.

Weight 1

4. Weight 2 – This is the upper bound for which Rate 1 will apply

Weight 2

5. Weight 3 – This is the upper bound for which Rate 2 will apply

Weight 3

6. Rate 1 – This is the additional charge that will be applied for Shipments weighing between Weight 1 and Weight 2

Rate 1

7. Rate 2 – This is the additional charge that will be applied for Shipments weighing between Weight 2 and Weight 3

Rate 2

8. Rate 3 – This is the additional charge that will be applied for Shipments weighing over Weight 3.

Rate 3

9. Rank – This is a number between 0 and 10.

Rank

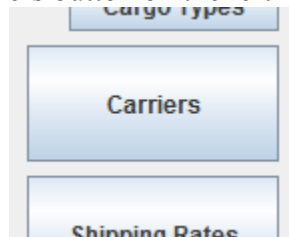
- 7) Click Save

- 8) The new Shipping Rate is now added to the database and can be used in future routing solutions.

## 4.5 Adding Carriers

To add a new Carrier to the database follow these steps

- 1) Click on the Carriers button on the left menu bar.



- 2) Beneath the Carriers Table click on the New Button



- 3) The Carrier Editor will appear in the main viewing area

A screenshot of the 'Carrier Editor' form. The title 'Carrier' is at the top center. The form contains several input fields: 'CarrierID', 'Carrier Name', 'Carrier Code', 'Fax Number', 'Email', 'Contract Date', 'Authorize', 'Safety Rating', 'Rating Date', 'Ins End Date', 'Area Code', and four 'Cost Modifiers' (Truck, Cargo, Plane, Rail). There are also checkboxes for 'Fax Number' and 'Email'. At the bottom, there are 'Save' and 'Cancel' buttons.

- 4) Enter valid values into the following fields
  1. Carrier Name – This is the name of the Carrier company. It can consist of 1-45 alphabetical characters.

A screenshot of the 'Carrier Name' input field. The label 'Carrier Name' is on the left, and the text 'Special Delivery Inc' is entered in the text box.

2. Carrier Code – This is the short hand code for the Carrier. It can consist of 1-4 alphanumeric characters.

A screenshot of the 'Carrier Code' input field. The label 'Carrier Code' is on the left, and the text 'SDEV' is entered in the text box.

3. Fax Number – This is the company fax number. It should be presented in the following ten digit format, “### - ### - #####”

A screenshot of the 'Fax Number' input field. The label 'Fax Number' is on the left, and the text '123-555-5435' is entered in the text box.

4. Email – This is the email address that the Carrier can be reached at. It should be entered in the following format, “(any alphanumeric characters)@(any alphanumeric character).(2-4 alphabetical characters)”

Email

5. Contract Date – This is the date the contract was validated. It should be entered in the following format, “MM/dd/YYYY”

Contract Date

6. Authorize – This is a value between 0 and 10

Authorize

7. Safety Rating – This is a value representing how safety they have performed their task of handling Shipments. This value should be between 0 and 100.

Safety Rating

8. Rating Date – This is the date that they received their last safety evaluation. It should be in the following format, “MM/dd/YYYY”

Rating Date

9. Ins End Date – This date should be in the following format, “MM/dd/YYYY”

Ins End Date

10. Fax Number Checkbox – check this box if this Carrier can be reached via a fax machine

☒ Fax Number

11. Email Checkbox – check this box if this Carrier can be reached via an email address.

☒ Email

12. Area Code – This is the area code for the phone number which the Carrier can be reached at. It should be three numbers long

Area Code

13. Cost Modifiers – These are available to change the standard costs associated with the types of Vehicles this Carrier supplies

1. Truck – This value will modify the costs of using this Carrier's Trucks. This should be a value between 0 and 100.

Truck

2. Cargo – This value will modify the costs of using this Carrier's Cargos. This should be a value between 0 and 100.

Cargo

3. Plane – This value will modify the costs of using this Carrier's Planes. This should be a value between 0 and 100.

Plane

4. Rail – This value will modify the costs of using this Carrier's Rails. This should be a value between 0 and 100.

Rail

- 5) Click Save

- 6) The new Carrier is now added to the database and can be used in future routing solutions.

## 4.6 Adding Shipments

To add a new Shipment to the database follow these steps

- 1) Click on the Shipments button on the left menu bar.



- 2) The Shipment Menu will appear

## Shipments

ID	From	To
8000	TestNode1	TestNode2

ViewNewDelete

- 3) Click on the New button on the right, under the Shipments Table



- 4) The blank Shipment Editor will appear in the main viewing area

Info	History
Company: <input type="text"/>	
Location: <input type="text"/>	
Contact: <input type="text"/>	
Phone: <input type="text"/>	
Email: <input type="text"/>	
Preferred Carriers: <input type="text"/>	
<hr/>	
To: <input type="text"/>	
Size: <input type="text"/>	Toll Roads: <input type="checkbox"/>
Weight: <input type="text"/>	Congestion By-Pass: <input type="checkbox"/>
Priority: <input type="text"/>	
Earliest Departure: <input type="text"/>	Latest Departure: <input type="text"/>
Earliest Arrival: <input type="text"/>	Latest Arrival: <input type="text"/>
Time to Load: <input type="text"/>	Max Stops: <input type="text"/>
Time to UnLoad: <input type="text"/>	
Hazmat: <input type="text"/>	
Loading Type: <input type="text"/>	
Unloading Type: <input type="text"/>	
Trailer Type Required: <input type="text"/>	
<div> <input type="button" value="Save"/> <input type="button" value="Cancel"/> </div>	



- 5) Select a Shipper from the Company dropbox

Company:  ▼

- 6) Once selected the Shipper's information will populate the Shipper information window

Company:  ▼

Location:

Contact:

Phone:

Email:

Preferred Carriers:

- 7) Select an End Location using the Country, State and City dropboxes. For more information on how to do this see Section 3.2 'Exploring Locations'

To:  ▼  ▼  ▼

- 8) Enter valid values in the following fields

1. Size – this is the volumetric size of the Shipment in meters cubed. This value should be greater than 0.

Size:

2. Weight – this is how much the Shipment weighs in kilograms. This value should be greater than 0.

Weight:

3. Priority – this is how important the Shipment is. The higher the Priority the more important the Shipment. The dropbox values range from 1 to 10.

Priority:  ▼

4. Earliest Departure Time – This is the earliest time that a Shipment can leave its Start Location. The format should be “HH:mm MM/dd/YYYY” usign a 24-hour clock.

Earliest Departure:

5. Latest Departure Time – This is the latest time that a Shipment can leave its Start Location. The format should be “HH:mm MM/dd/YYYY” usign a 24-hour clock. This is currently not supported.

Latest Departure:

6. Earliest Arrival Time – This is the earliest time that a Shipment can arrive at its End Location. The format should be “HH:mm MM/dd/YYYY” usign a 24-hour clock.

Earliest Arrival:

7. Latest Arrival Time – This is the latest time that a Shipment can arrive at its End Location. The format should be “HH:mm MM/dd/YYYY” using a 24-hour clock. This is currently not supported.

Latest Arrival:

8. Time To Load – This is the estimated time it will take to load the Shipment onto a Vehicle. This is currently unsupported and should be set to 0.

Time to Load:

9. Time To Unload – This is the estimated time it will take to unload the Shipment from a Vehicle. This is currently unsupported and should be set to 0.

Time to UnLoad:

10. Hazmat – This is a list of the hazardous material constraints that need to be considered when handling this Shipment. This is currently unsupported and should be set to “NONE”

Hazmat:

11. Loading Type – This is the type of loading that is required to get a Shipment onto a Vehicle. For example a crane may be needed. This is currently unsupported and should be set to “NONE”

Loading Type:

12. Unloading Type – This is the type of unloading that is required to remove a Shipment from a Vehicle. For example a crane may be needed. This is currently unsupported and should be set to “NONE”

Unloading Type:

13. Trailer Type Required - This is the type of trailer that will be needed to transport a Shipment. This is currently unsupported and should be set to “NONE”.

Trailer Type Required:

14. Toll Roads – Check this box if the Shipment is allowed to take toll roads. This is currently not supported.

Toll Roads: ☒

15. Congestion By-Pass – Check this box if the Shipment is allowed to attempt to by-pass congested routes. This is currently not supported.

Congestion By-Pass: ☐

- 9) Click Save

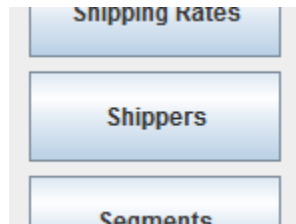
Save

- 10) The new Shipment will be added to the database and can be routed.

## 4.7 Adding Shippers

To add a new Shipper to the database follow these steps

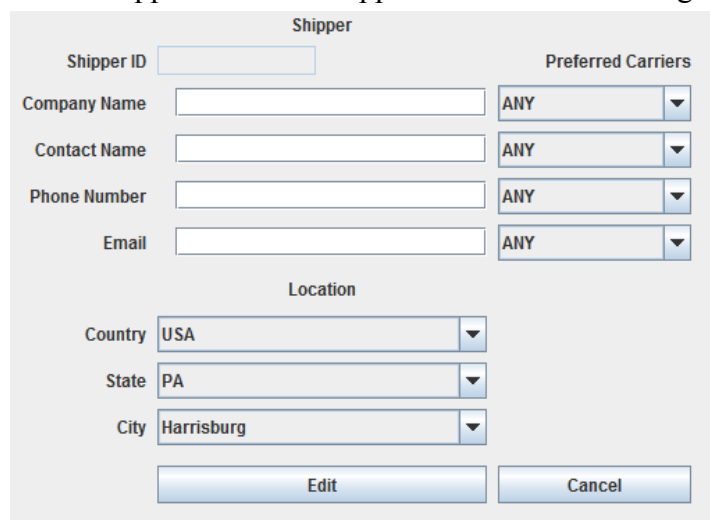
- 1) Click on the Shippers button on the left menu bar.



- 2) Click on the New button on the right, under the Shippers Table



- 3) The blank Shipper Editor will appear in the main viewing area



Shipper

Shipper ID

Company Name  Preferred Carriers

Contact Name

Phone Number

Email

Location

Country

State

City

- 4) Select a Location using the Country, State and City dropboxes. For more information on how to do this see Section 3.2 'Exploring Locations'
- 5) Enter valid values in the following fields
  1. Company Name – This is the company name of the Shipper. This field should have between 1 and 45 alphanumeric characters



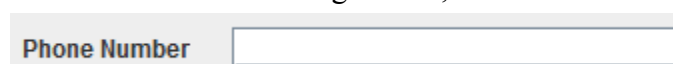
Company Name

2. Contact Name – This is the individual that can be reached using the contact information. This field should have between 1 and 45 alphabetical characters



Contact Name

3. Phone Number – This is the number that the Shipper can be reached at. This field should be in the following format, “###-###-####”.



Phone Number

4. Email – This is the email address that the Shipper can be reached at. This field should be in the following format, “(any alphanumeric characters)@(any alphanumeric characters).(2-4 alphabetic characters)”

Email

5. Preferred Carriers – Select up to 4 preferred carriers that the Shippers will use for sending Shipments. This is currently not supported and will be set to “ANY”

**Preferred Carriers**

ANY	▼
ANY	▼
ANY	▼
ANY	▼

- 6) Click Save

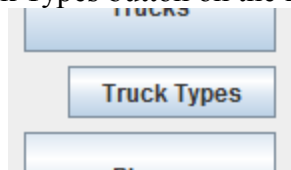
- 7) The new Shipper will be added to the database and can be used for future routing.

## 4.8 Adding Travel Types

### 4.8.1 Adding Truck Types

To add a new Truck Type to the database follow these steps

- 1) Click on the Truck Types button on the left menu bar.



- 2) The Truck Types menu will appear.

**Truck Types**

ID	Name	Max Capacity	Max Weight
1	TruckType1	100.0	500.0
5	TruckType2	100.0	500.0
8000	TestTruckType	100.0	500.0
8025	defaultVehicleTypeN...	1000000.0	1000000.0

View New Delete

- 3) Click on the New button on the right, under the Truck Types Table



- 4) The blank Truck Type Editor will appear in the main viewing area

**Truck Type**

TypeID

Type Name  ☐ Radiation

Trailer 1  ☐ Refrigeration

Trailer 2  ☐ Hazardous Material

Service Type  ☐ Explosive Material

Min. Capacity  ☐ Tracking Available

Max. Capacity

Max Weight

Save Cancel

5) Enter valid values in the following fields

1. Type Name – This is the new name of the travel type you are creating. It should consist of 1-45 alphanumeric characters.

Type Name

2. Trailer 1 – This is currently not supported.

Trailer 1

3. Trailer 2 – This is currently not supported.

Trailer 2

4. Service Type – This is currently not supported

Service Type

5. Min. Capacity – This is the minimum capacity that this travel type must be filled to leave its location. This value must be greater than or equal to zero.

Min. Capacity

6. Max. Capacity- This is the maximum capacity that this travel type can be filled to. This value must be greater than or equal to the Min. Capacity value.

Max. Capacity

7. Max. Weight – This is the maximum weight this travel type can transport. This value must be greater than or equal to zero.

Max Weight

8. Radiation – Check this box if this travel type can handle radioactive shipments.

☐ Radiation

9. Refrigeration – Check this box if this travel type can handle refrigerated shipments.

☐ Refrigeration

10. Hazardous Material – Check this box if this travel type can handle hazardous shipments.

☐ Hazardous Material

11. Explosive Material – Check this box if this travel type can handle explosive shipments.

☐ Explosive Material

12. Tracking Available – Check this box if this travel type has tracking available for it.

☐ Tracking Available

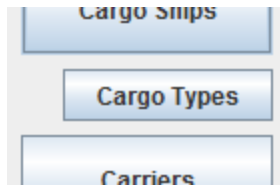
6) Click Save

- 7) The new Truck Type will be added to the database and can be used for future routing.

## 4.8.2 Adding Cargo Types

To add a new Cargo Type to the database follow these steps

- 1) Click on the Cargo Types button on the left menu bar.



- 2) The Cargo Types Menu will appear.

**Cargo Types**

ID	Name	Max Capacity	Max Weight
3	CargoType1	100.0	500.0
9	CargoType2	100.0	500.0
10	CargoType3	100.0	500.0

- 3) Click on the New button on the right, under the Cargo Types Table



- 4) The blank Cargo Type Editor will appear in the main viewing area

**Cargo Type**

TypeID

Type Name

Service Type

Max Weight

Min. Capacity

Max. Capacity

☐ Radiation

☐ Refrigeration

☐ Hazardous Material

☐ Explosive Material

☐ Tracking Available

- 5) Enter valid values in the following fields
  1. Type Name – This is the new name of the travel type you are creating. It should consist of 1-45 alphanumeric characters.

Type Name

2. Trailer 1 – This is currently not supported.

Trailer 1

3. Trailer 2 – This is currently not supported.

Trailer 2

4. Service Type – This is currently not supported

Service Type

5. Min. Capacity – This is the minimum capacity that this travel type must be filled to leave its location. This value must be greater than or equal to zero.

Min. Capacity

6. Max. Capacity- This is the maximum capacity that this travel type can be filled to. This value must be greater than or equal to the Min. Capacity value.

Max. Capacity

7. Max. Weight – This is the maximum weight this travel type can transport. This value must be greater than or equal to zero.

Max Weight

8. Radiation – Check this box if this travel type can handle radioactive shipments.

☐ Radiation

9. Refrigeration – Check this box if this travel type can handle refrigerated shipments.

☐ Refrigeration

10. Hazardous Material – Check this box if this travel type can handle hazardous shipments.

☐ Hazardous Material

11. Explosive Material – Check this box if this travel type can handle explosive shipments.

☐ Explosive Material

12. Tracking Available – Check this box if this travel type has tracking available for it.

☐ Tracking Available

- 6) Click Save

Save

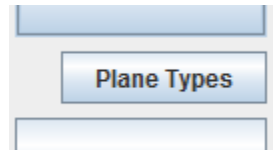
- 7) The new Cargo Type will be added to the database and can be used for future routing.



### 4.8.3 Adding Plane Types

To add a new Plane Type to the database follow these steps

- 1) Click on the Plane Types button on the left menu bar.



- 2) The Plane Types Menu will appear.

**Plane Types**

ID	Name	Max Capacity	Max Weight
2	PlaneType1	100.0	500.0
7	PlaneType2	100.0	500.0
8	PlaneType3	100.0	500.0

- 3) Click on the New button on the right, under the Plane Types Table



- 4) The blank Plane Type Editor will appear in the main viewing area

**Plane Type**

TypeID

Type Name

Service Type

Max Weight

Min. Capacity

Max. Capacity

☐ Radiation

☐ Refrigeration

☐ Hazardous Material

☐ Explosive Material

☐ Tracking Available

- 5) Enter valid values in the following fields
  1. Type Name – This is the new name of the travel type you are creating. It should consist of 1-45 alphanumeric characters.

Type Name

2. Trailer 1 – This is currently not supported.

Trailer 1

3. Trailer 2 – This is currently not supported.

Trailer 2

4. Service Type – This is currently not supported

Service Type

5. Min. Capacity – This is the minimum capacity that this travel type must be filled to leave its location. This value must be greater than or equal to zero.

Min. Capacity

6. Max. Capacity- This is the maximum capacity that this travel type can be filled to. This value must be greater than or equal to the Min. Capacity value.

Max. Capacity

7. Max. Weight – This is the maximum weight this travel type can transport. This value must be greater than or equal to zero.

Max Weight

8. Radiation – Check this box if this travel type can handle radioactive shipments.

☐ Radiation

9. Refrigeration – Check this box if this travel type can handle refrigerated shipments.

☐ Refrigeration

10. Hazardous Material – Check this box if this travel type can handle hazardous shipments.

☐ Hazardous Material

11. Explosive Material – Check this box if this travel type can handle explosive shipments.

☐ Explosive Material

12. Tracking Available – Check this box if this travel type has tracking available for it.

☐ Tracking Available

- 6) Click Save

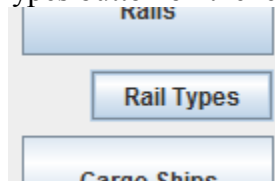
Save

- 7) The new Plane Type will be added to the database and can be used for future routing.

## 4.8.4 Adding Rail Types

To add a new Rail Type to the database follow these steps

- 1) Click on the Rail Types button on the left menu bar.



- 2) The Rail Types Menu will appear.

**Rail Types**

ID	Name	Max Capacity	Max Weight
4	RailType1	100.0	500.0
11	RailType2	100.0	500.0
12	RailType3	100.0	500.0

- 3) Click on the New button on the right, under the Rail Types Table



- 4) The blank Rail Type Editor will appear in the main viewing area

**Rail Type**

TypeID	<input type="text"/>	<input type="checkbox"/> Radiation
Type Name	<input type="text"/>	<input type="checkbox"/> Refrigeration
Service Type	<input type="text"/>	<input type="checkbox"/> Hazardous Material
Max Weight	<input type="text"/>	<input type="checkbox"/> Explosive Material
Min. Capacity	<input type="text"/>	<input type="checkbox"/> Tracking Available
Max. Capacity	<input type="text"/>	

- 5) Enter valid values in the following fields
  1. Type Name – This is the new name of the travel type you are creating. It should consist of 1-45 alphanumeric characters.

Type Name

2. Trailer 1 – This is currently not supported.

Trailer 1

3. Trailer 2 – This is currently not supported.

Trailer 2

4. Service Type – This is currently not supported

Service Type

5. Min. Capacity – This is the minimum capacity that this travel type must be filled to leave its location. This value must be greater than or equal to zero.

Min. Capacity

6. Max. Capacity- This is the maximum capacity that this travel type can be filled to. This value must be greater than or equal to the Min. Capacity value.

Max. Capacity

7. Max. Weight – This is the maximum weight this travel type can transport. This value must be greater than or equal to zero.

Max Weight

8. Radiation – Check this box if this travel type can handle radioactive shipments.

☐ Radiation

9. Refrigeration – Check this box if this travel type can handle refrigerated shipments.

☐ Refrigeration

10. Hazardous Material – Check this box if this travel type can handle hazardous shipments.

☐ Hazardous Material

11. Explosive Material – Check this box if this travel type can handle explosive shipments.

☐ Explosive Material

12. Tracking Available – Check this box if this travel type has tracking available for it.

☐ Tracking Available

- 6) Click Save

Save

- 7) The new Rail Type will be added to the database and can be used for future routing.

## 5. Editing Objects In The Database

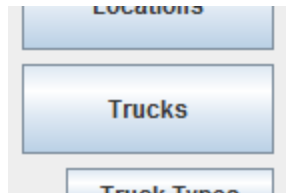
The MMRP Database objects can be modified in many ways to model changes in the real world, or to better suit the needs of the user. To modify existing database objects follow the steps below.

### 5.1 Editing Vehicles

#### 5.1.1 Editing Trucks

To edit an existing Truck in the database follow these steps

- 1) Click on the Trucks button on the left menu bar.



- 2) The Trucks table will then appear in the main area

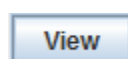
**Trucks**

ID	Carrier	Status	Name
1	DHL	RUNNING	Truck1
2	FEDEX	DELAYED	h
3	FEDEX	RUNNING	Truck3
4	FEDEX	RUNNING	FedexTruck4
5	DHL	RUNNING	NewItem

- 3) Find the Truck you wish to edit on the Truck table
- 4) Select the desired Truck from the list

4	FEDEX	RUNNING	FedexTruck4
---	-------	---------	-------------

- 5) Click on the View button



- 6) The Truck Tabbed Editor will appear below the Trucks Table

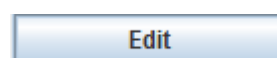
**Basic** Segments Types

Name: FedexTruck4

Status: RUNNING

Carrier: FEDEX

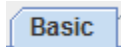
- 7) Click on the Edit Button in the Basic tab



- 8) The Truck's values can now be modified

#### **5.1.1.1 Changing A Truck's Name**

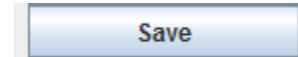
- 1) The Name field can be found in the Basic Tab of the Truck Tabbed Editor



- 2) Enter a new name for the Truck between 1 and 45 alphanumeric characters.

Name:

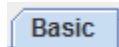
- 3) If you enter an invalid name an error message will appear.
- 4) Once you are satisfied with the new name click the Save button



- 5) The new name will be updated in the Trucks Table and in the database.

#### **5.1.1.2 Changing A Truck's Status**

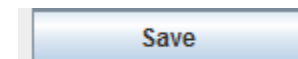
- 1) The Status dropbox can be found in the Basic Tab of the Truck Tabbed Editor



- 2) Click on the dropbox and select a new Status for the Truck.

Status:

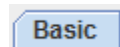
- 3) The currently supported Status states are:
  1. RUNNING – The vehicle is operating normally and is on time.
  2. DELAYED – The vehicle is operating normally but is running late.
  3. DISABLED – The vehicle is not operating.
- 4) Click Save



- 5) The new Status will be updated in the Trucks Table and in the database.

#### **5.1.1.3 Changing A Truck's Carrier**

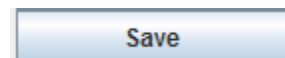
- 1) The Carrier dropbox can be found in the Basic Tab of the Truck Tabbed Editor



- 2) Click on the dropbox and select a new Carrier for the Truck.

Carrier:

- 3) The Carrier dropbox will be populated with all the Carriers in the database.
- 4) Click Save

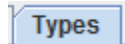


- 5) The new Carrier will be updated in the Trucks Table and in the database.

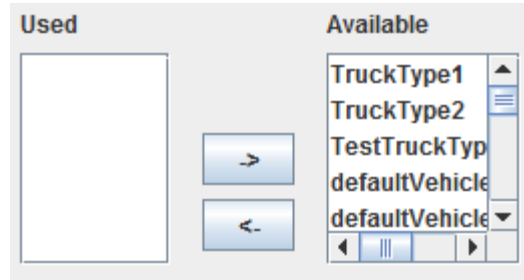
#### **5.1.1.4 Changing A Truck's Available Types**

##### **5.1.1.4.1 Adding Types**

- 1) Click on the Types tab of the Truck Tabbed Editor



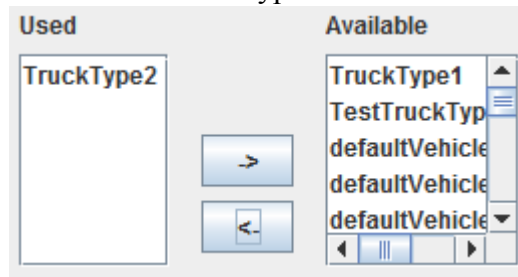
- 2) The Types menu will appear.



- 3) Click on the Truck type you wish to make available from the Available list.
- 4) Once selected click on the left pointing arrow



- 5) The selected Truck Type will move to the Used list and will be available

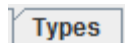


for use by this Truck

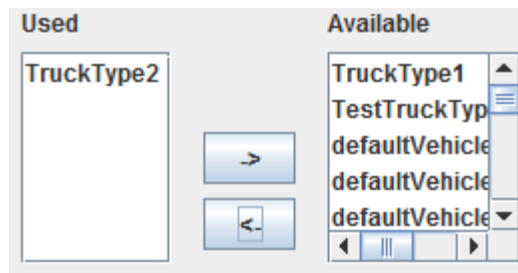
- 6) This change will be saved in the database

##### **5.1.1.4.2 Removing Types**

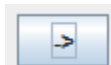
- 1) Click on the Types tab of the Truck Tabbed Editor



- 2) The Types menu will appear.



- 3) Click on the Truck type you wish to make unavailable from the Used list.
- 4) Once selected click on the right pointing arrow



- 5) The selected Truck Type will move to the Available list and will no longer be available for this Truck
- 6) This change will be saved in the database

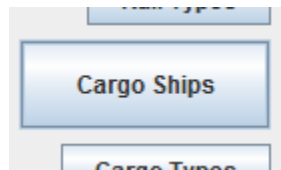
The screenshot shows a software interface with two main sections: 'Used' and 'Available'. The 'Used' section on the left contains an empty rectangular box. The 'Available' section on the right contains a list box with the following items: 'TruckType1', 'TestTruckType', 'defaultVehicle', 'defaultVehicle', and 'defaultVehicle'. Between these two sections are two buttons: the top button has a right-pointing arrow, and the bottom button has a left-pointing arrow. The interface is designed for moving items between the 'Used' and 'Available' states.



## 5.1.2 Editing Cargo Ships

To edit an existing Cargo Ship in the database follow these steps

- 1) Click on the Cargo Ship button on the left menu bar.



- 2) The Cargo Ships table will then appear in the main area

**Cargo**

ID	Carrier	Status	Name
1	UPS	RUNNING	Ship1
2	FEDEX	RUNNING	Ship2
3	DHL	RUNNING	Ship3
4	USPS	RUNNING	Ship4
5	UPS	RUNNING	Ship5
6	FEDEX	RUNNING	Ship6
306	DHL	DISABLED	defaultCargoName

View New Delete

- 3) Find the Cargo Ship you wish to edit on the Cargo Ship table
- 4) Select the desired Cargo Ship from the list

6	FEDEX	RUNNING	Ship6
---	-------	---------	-------

- 5) Click on the View button



- 6) The Cargo Ship Tabbed Editor will appear below the Cargo Ships Table

Basic Segments Types

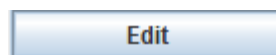
Name: Ship6

Status: RUNNING

Carrier: FEDEX

Edit Cancel

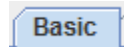
- 7) Click on the Edit Button in the Basic tab



- 8) The Cargo Ship's values can now be modified

### **5.1.2.1 Changing A Cargo Ships Name**

- 1) The Name field can be found in the Basic Tab of the Cargo Ship Tabbed Editor



- 2) Enter a new name for the Cargo Ship between 1 and 45 alphanumeric characters.



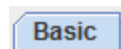
- 3) If you enter an invalid name an error message will appear.
- 4) Once you are satisfied with the new name click the Save button



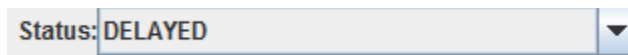
- 5) The new name will be updated in the Cargo Ships Table and in the database.

### **5.1.2.2 Changing A Cargo Ship's Status**

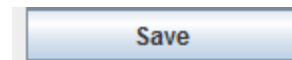
- 1) The Status dropbox can be found in the Basic Tab of the Cargo Ship Tabbed Editor



- 2) Click on the dropbox and select a new Status for the Cargo Ship.



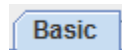
- 3) The currently supported Status states are:
  1. RUNNING – The vehicle is operating normally and is on time.
  2. DELAYED – The vehicle is operating normally but is running late.
  3. DISABLED – The vehicle is not operating.
- 4) Click Save



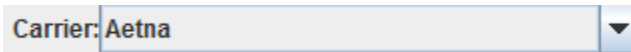
- 5) The new Status will be updated in the Cargo Ships Table and in the database.

### **5.1.2.3 Changing A Cargo Ship's Carrier**

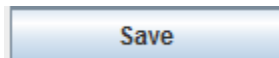
- 1) The Carrier dropbox can be found in the Basic Tab of the Cargo Ship Tabbed Editor



- 2) Click on the dropbox and select a new Carrier for the Cargo Ship.



- 3) The Carrier dropbox will be populated with all the Carriers in the database.
- 4) Click Save

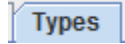


- 5) The new Carrier will be updated in the Cargo Ships Table and in the database.

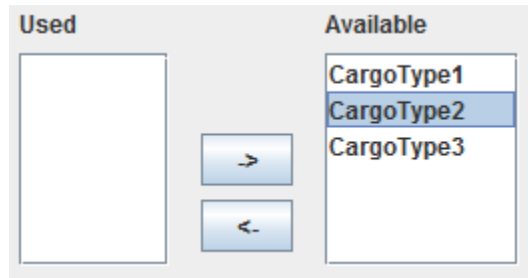
## **5.1.2.4 Changing A Cargo Ship's Available Types**

### **5.1.2.4.1 Adding Types**

- 1) Click on the Types tab of the Cargo Ship Tabbed Editor



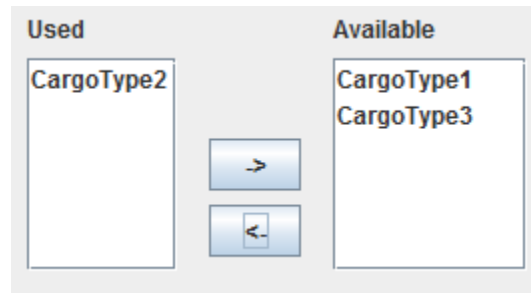
- 2) The Types menu will appear.



- 3) Click on the Cargo Ship type you wish to make available from the Available list.
- 4) Once selected click on the left pointing arrow



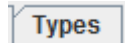
- 5) The selected Cargo Ship Type will move to the Used list and will be available for use by this Cargo Ship



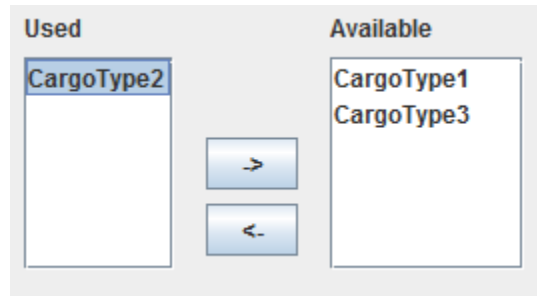
- 6) This change will be saved in the database

#### **5.1.2.4.2 Removing Types**

- 1) Click on the Types tab of the Cargo Ship Tabbed Editor



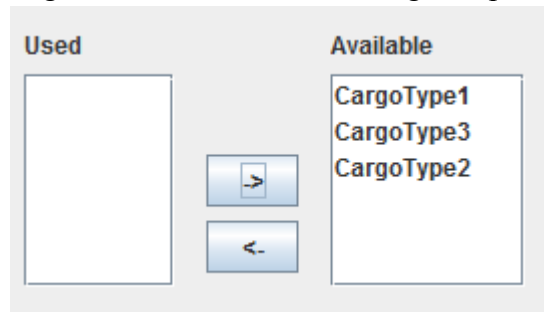
- 2) The Types menu will appear.



- 3) Click on the Cargo Ship type you wish to make unavailable from the Used list.
- 4) Once selected click on the right pointing arrow



- 5) The selected Cargo Ship Type will move to the Available list and will no longer be available for this Cargo Ship

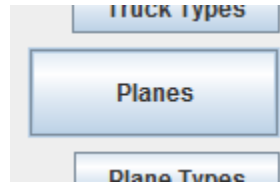


- 6) This change will be saved in the database

### 5.1.3 Editing Planes

To edit an existing Plane in the database follow these steps

- 1) Click on the Planes button on the left menu bar.



- 2) The Planes table will then appear in the main area

**Planes**

ID	Carrier	Status	Name
1	DHL	RUNNING	Plane1
2	USPS	RUNNING	Plane2
3	UPS	RUNNING	Plane3
4	FEDEX	RUNNING	Plane4
5	DHL	RUNNING	Plane5
6	USPS	RUNNING	Plane6
56	DHL	RUNNING	NewSuperTest

View New Delete

- 3) Find the Plane you wish to edit on the Plane table
- 4) Select the desired Plane from the list

3	UPS	RUNNING	Plane3
---	-----	---------	--------

- 5) Click on the View button



- 6) The Plane Tabbed Editor will appear below the Planes Table

**Basic Segments Types**

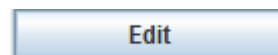
Name: Plane3

Status: RUNNING

Carrier: UPS

Edit Cancel

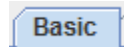
- 7) Click on the Edit Button in the Basic tab



- 8) The Plane's values can now be modified

### **5.1.3.1 Changing A Plane's Name**

- 1) The Name field can be found in the Basic Tab of the Plane Tabbed Editor



- 2) Enter a new name for the Plane between 1 and 45 alphanumeric characters.



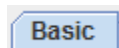
- 3) If you enter an invalid name an error message will appear.
- 4) Once you are satisfied with the new name click the Save button



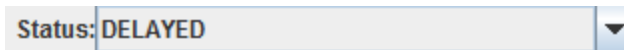
- 5) The new name will be updated in the Plane Table and in the database.

### **5.1.3.2 Changing A Plane's Status**

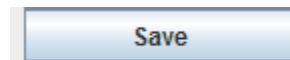
- 1) The Status dropbox can be found in the Basic Tab of the Plane Tabbed Editor



- 2) Click on the dropbox and select a new Status for the Plane.



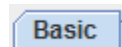
- 3) The currently supported Status states are:
  1. RUNNING – The vehicle is operating normally and is on time.
  2. DELAYED – The vehicle is operating normally but is running late.
  3. DISABLED – The vehicle is not operating.
- 4) Click Save



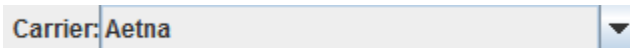
- 5) The new Status will be updated in the Plane s Table and in the database.

### **5.1.3.3 Changing A Plane's Carrier**

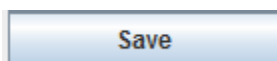
- 1) The Carrier dropbox can be found in the Basic Tab of the Plane Tabbed Editor



- 2) Click on the dropbox and select a new Carrier for the Plane.



- 3) The Carrier dropbox will be populated with all the Carriers in the database.
- 4) Click Save

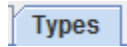


- 5) The new Carrier will be updated in the Planes Table and in the database.

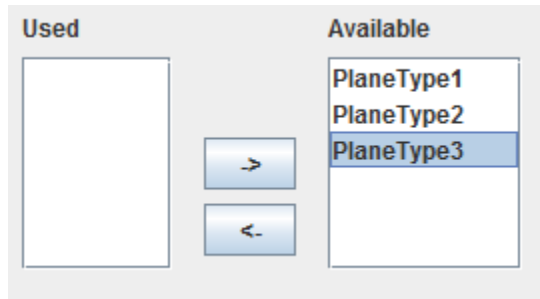
### **5.1.3.4 Changing A Plane's Available Types**

#### **5.1.3.4.1 Adding Types**

- 1) Click on the Types tab of the Plane Tabbed Editor



- 2) The Types menu will appear.



- 3) Click on the Plane type you wish to make available from the Available list.
- 4) Once selected click on the left pointing arrow



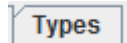
- 5) The selected Plane Type will move to the Used list and will be available for use by this Plane.



- 6) This change will be saved in the database

#### **5.1.3.4.2 Removing Types**

- 1) Click on the Types tab of the Plane Tabbed Editor



- 2) The Types menu will appear.



- 3) Click on the Plane type you wish to make unavailable from the Used list.
- 4) Once selected click on the right pointing arrow



- 5) The selected Plane Type will move to the Available list and will no longer be available for this Plane.



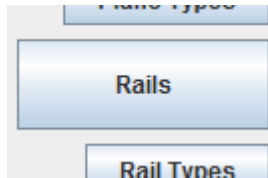
- 6) This change will be saved in the database



## 5.1.4 Editing Rails

To edit an existing Rail in the database follow these steps

- 1) Click on the Rails button on the left menu bar.



- 2) The Rails table will then appear in the main area

**Rails**

ID	Carrier	Status	Name
1	UPS	RUNNING	Rail1
2	USPS	RUNNING	Rail2
3	FEDEX	RUNNING	Rail3
4	DHL	RUNNING	Rail4
5	USPS	RUNNING	Rail5
6	UPS	RUNNING	Rail6
51	DHL	RUNNING	defaultRailName

View New Delete

- 3) Find the Rail you wish to edit on the Rail table
- 4) Select the desired Rail from the list

2	USPS	RUNNING	Rail2
---	------	---------	-------

- 5) Click on the View button



- 6) The Rail Tabbed Editor will appear below the Rails Table

Basic Segments Types

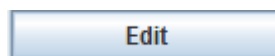
Name: Rail2

Status: RUNNING

Carrier: USPS

Edit Cancel

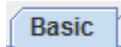
- 7) Click on the Edit Button in the Basic tab



- 8) The Rail's values can now be modified

#### **5.1.4.1 Changing A Rail's Name**

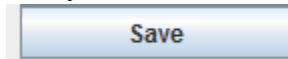
- 1) The Name field can be found in the Basic Tab of the Rail Tabbed Editor



- 2) Enter a new name for the Rail between 1 and 45 alphanumeric characters.



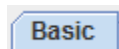
- 3) If you enter an invalid name an error message will appear.
- 4) Once you are satisfied with the new name click the Save button



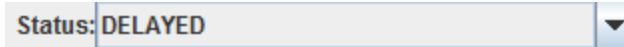
- 5) The new name will be updated in the Rail Table and in the database.

#### **5.1.4.2 Changing A Rail's Status**

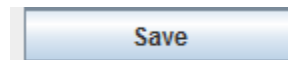
- 1) The Status dropbox can be found in the Basic Tab of the Rail Tabbed Editor



- 2) Click on the dropbox and select a new Status for the Rail.



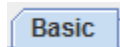
- 3) The currently supported Status states are:
  1. RUNNING – The vehicle is operating normally and is on time.
  2. DELAYED – The vehicle is operating normally but is running late.
  3. DISABLED – The vehicle is not operating.
- 4) Click Save



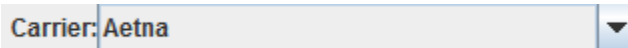
- 5) The new Status will be updated in the Rails Table and in the database.

#### **5.1.4.3 Changing A Rail's Carrier**

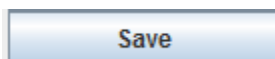
- 1) The Carrier dropbox can be found in the Basic Tab of the Rail Tabbed Editor



- 2) Click on the dropbox and select a new Carrier for the Rail.



- 3) The Carrier dropbox will be populated with all the Carriers in the database.
- 4) Click Save

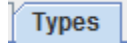


- 5) The new Carrier will be updated in the Rails Table and in the database.

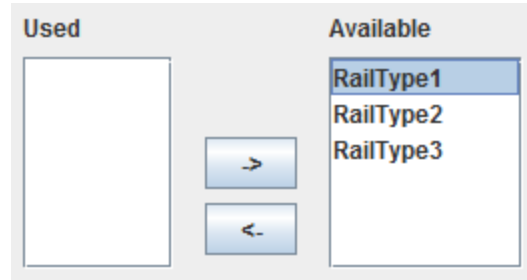
#### **5.1.4.4 Changing A Rail's Available Types**

##### **5.1.4.4.1 Adding Types**

- 1) Click on the Types tab of the Rail Tabbed Editor



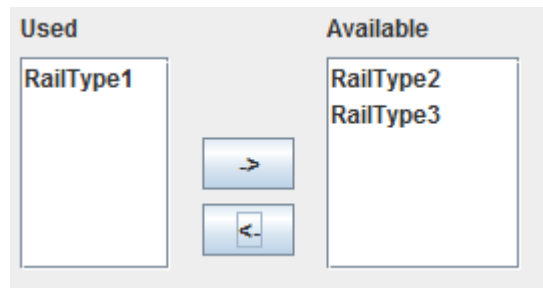
- 2) The Types menu will appear.



- 3) Click on the Rail type you wish to make available from the Available list.
- 4) Once selected click on the left pointing arrow



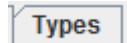
- 5) The selected Rail Type will move to the Used list and will be available for use by this Rail.



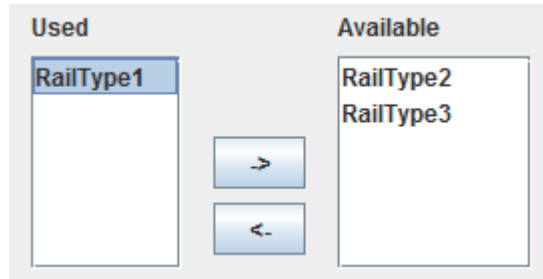
- 6) This change will be saved in the database

#### **5.1.4.4.2 Removing Types**

- 1) Click on the Types tab of the Rail Tabbed Editor



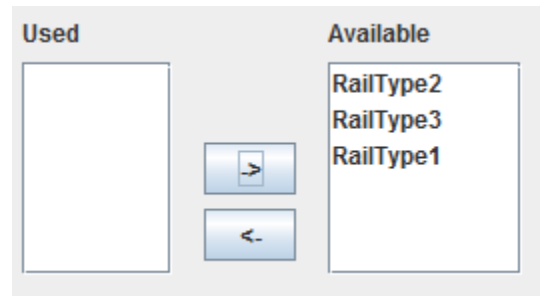
- 2) The Types menu will appear.



- 3) Click on the Rail type you wish to make unavailable from the Used list.
- 4) Once selected click on the right pointing arrow



- 5) The selected Rail Type will move to the Available list and will no longer be available for this Rail.

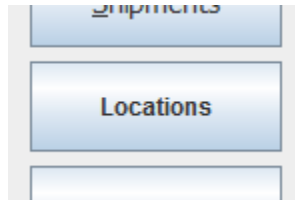


- 6) This change will be saved in the database

## 5.2 Editing Locations

To edit an existing Location in the database follow these steps

- 1) Click on the Locations button on the left menu bar.



- 2) The Location Menu will appear

**Locations**

ID	City	State	Country
1	Harrisburg	PA	USA
2	Antwerp	AN	Belgium
3	New York City	NY	USA
4	Miami	FI	USA
5	Mobile	AI	USA
6	Mempis	TN	USA
7	Paris	IF	France

View New Delete

- 3) Select a Location from the Locations Table.

3	New York City	NY	USA
---	---------------	----	-----

- 4) Click View



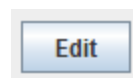
- 5) The Location Editor will appear below the Locations Table and be populated with the selected Location's information.

**Location**

City:	<input type="text" value="New York City"/>	Truck:	<input type="checkbox"/>
State:	<input type="text" value="NY"/>	Rail:	<input checked="" type="checkbox"/>
Country:	<input type="text" value="USA"/>	Train:	<input checked="" type="checkbox"/>
Latitude:	<input type="text" value="40.67"/>	Cargo:	<input checked="" type="checkbox"/>
Longitude:	<input type="text" value="-73.94"/>		

Edit Cancel

- 6) Click Edit



- 7) The Location's values are now modifiable.

### **5.2.1 Changing the Location's Country**

- 1) The Country field will accept any alphabetic string from 1-45 characters long

Country:

- 2) If an invalid entry is made an error message will appear
- 3) Click Save

Save

- 4) The new Country for this Location will be updated in the database.

### **5.2.2 Changing the Location's State**

- 1) The State field will accept any alphabetic string from 1-45 characters long

State:

- 2) If an invalid entry is made an error message will appear
- 3) Click Save

Save

- 4) The new State for this Location will be updated in the database.

### **5.2.3 Changing the Location's City**

- 1) The City field will accept any alphabetic string from 1-45 characters long

City:

- 2) If an invalid entry is made an error message will appear
- 3) Click Save

Save

- 1) The new City for this Location will be updated in the database.

### **5.2.4 Changing the Location's Latitude**

- 1) The Latitude field will accept any numeric value between -90.0 degrees and 90.0 degrees

Latitude:

- 2) If an invalid entry is made an error message will appear
- 3) Click Save

Save

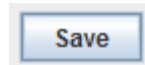
- 4) The new Latitude for this Location will be updated in the database.

### **5.2.5 Changing the Location's Longitude**

- 1) The Longitude field will accept any numeric value between -180.0 degrees and 180.0 degrees

Longitude:

- 2) If an invalid entry is made an error message will appear
- 3) Click Save



- 4) The new Longitude for this Location will be updated in the database.

### **5.2.6 Changing the Location's Travel Modes**

- 1) Check the checkboxes of the travel modes that can reach this Location
- 2) Uncheck the checkboxes of the travel modes that can not reach this Location.
- 3) Once the desired modes of travel have been checked, click Save.

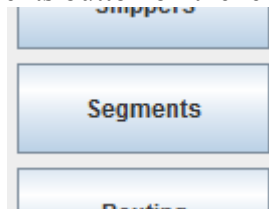


- 4) The new Travel Modes for this Location will be updated in the database.

## 5.3 Editing Segments

To edit an existing Segment in the database follow these steps

- 1) Click on the Segments button on the left menu bar.



- 2) The Segment Menu will appear

**Segments**

ID	Start	End	Type
8000	TestNode1	TestNode2	EMPTY

- 3) Select the Segment you wish to modify from the Segment Table

8000	TestNode1	TestNode2	EMPTY
------	-----------	-----------	-------

- 4) Click the View button

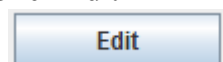


- 5) The Segment Editor will appear below the Segment Table

**Segments**

SegmentID	8000	Est. Departure	0
Mode	TRUCK	Earliest Departure	0
Vehicle	8000	Latest Departure	100
Travel Type	1	Est. Arrival	50
Distance	30.0	Earliest Arrival	0
Lane	Any	Latest Arrival	100
Shipping Rate	0 - Flat Rate : 1.0		
Actual Capacity	0.0		
<b>Start Location</b>		<b>End Location</b>	
Country:	DANATION	Country:	CHRISVILLE
State:	NA	State:	NA
City:	TestNode1	City:	TestNode2
<input type="button" value="Edit"/>		<input type="button" value="Cancel"/>	

- 6) Click Edit




- 7) The Segment's fields will now be modifiable.




### **5.3.1 Changing the Segment's Mode**

- 1) Select a new Travel Mode from the Travel Modes dropdown

A screenshot of a web form showing a dropdown menu labeled 'Mode'. The dropdown is open, and 'TRUCK' is selected. The dropdown arrow is pointing downwards.

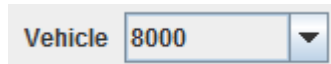
- 2) Click Save

A screenshot of a blue button with the text 'Save' in white.

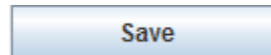
- 3) The new Travel Mode for this Segment will be updated in the database.

### **5.3.2 Changing the Segment's Vehicle**

- 1) Select a new Vehicle from the Vehicle dropdown

A screenshot of a web form showing a dropdown menu labeled 'Vehicle'. The dropdown is open, and '8000' is selected. The dropdown arrow is pointing downwards.

- 2) Click Save

A screenshot of a blue button with the text 'Save' in white.

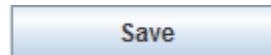
- 3) The new Vehicle for this Segment will be updated in the database.

### **5.3.3 Changing the Segment's Travel Type**

- 1) Select a new Travel Type from the Travel Type dropdown

A screenshot of a web form showing a dropdown menu labeled 'Travel Type'. The dropdown is open, and '1' is selected. The dropdown arrow is pointing downwards.

- 2) Click Save

A screenshot of a blue button with the text 'Save' in white.

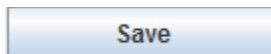
- 3) The new Travel Type for this Segment will be updated in the database.

### **5.3.4 Changing the Segment's Lane -CURRENTLY UNSUPPORTED**

- 1) The Lane field will accept any alphabetic string from 1-45 characters long

A screenshot of a web form showing a text input field labeled 'Lane'. The field contains the text 'Any'.

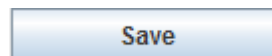
- 2) If an invalid entry is made an error message will appear
- 3) Click Save

A screenshot of a blue button with the text 'Save' in white.

- 4) The new Lane for this Segment will be updated in the database

### **5.3.5 Changing the Segment's Shipping Rate**

- 1) Select a new Shipping Rate from the Shipping Rate drop box
- 2) Click Save

A screenshot of a blue button with the text 'Save' in white.

- 3) The new Shipping Rate for this Segment will be updated in the database.

### **5.3.6 Changing the Segment's Departure Time**

#### **5.3.6.1 Changing the Segment's Estimated Departure Time**

- 1) Type in a new estimated time the the Vehicle for this Segment will leave its Start Location.

Est. Departure 15:30 03/14/2014

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Estimated Departure time for this Segment will be updated in the Database.

#### **5.3.6.2 Changing the Segment's Earliest Departure Time-Currently Not Supported**

- 1) Type in a new earliest time the the Vehicle for this Segment will leave its Start Location.

Earliest Departure 15:30 03/14/2014

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Earliest Departure time for this Segment will be updated in the Database.

#### **5.3.6.3 Changing the Segment's Latest Departure Time-Currently Not Supported**

- 1) Type in a new latest time the the Vehicle for this Segment will leave its Start Location.

Latest Departure 100

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Latest Departure time for this Segment will be updated in the Database.

### **5.3.7 Changing the Segment's Arrival Time**

#### **5.3.7.1 Changing the Segment's Estimated Arrival Time**

- 1) Type in a new estimated time the the Vehicle for this Segment will arrive at its End Location.

Est. Arrival 15:30 03/14/2014

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Estimated Arrival time for this Segment will be updated in the Database.

#### **5.3.7.2 Changing the Segment's Earliest Arrival Time-Currently Not Supported**

- 1) Type in a new earliest time the the Vehicle for this Segment will arrive at its End Location.

Earliest Arrival 15:30 03/14/2014

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Earliest Arrival time for this Segment will be updated in the Database.

#### **5.3.7.3 Changing the Segment's Latest Arrival Time-Currently Not Supported**

- 1) Type in a new latest time the the Vehicle for this Segment will arrive at its End Location.

Latest Arrival 15:30 03/14/2014

- 2) The format should be, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990
- 3) If an invalid time was entered an error message will appear
- 4) Click Save

Save

- 5) The new Latest Arrival time for this Segment will be updated in the Database.

### **5.3.8 Changing the Segment's Starting Location**

- 1) In the Start Location Area select a new Country for the Start Location

Country: DANATION ▼

- 2) The State dropbox will be updated to reflect the changes in the Country

State: NA ▼

- 3) Select a new State for the Start Location from the State dropbox
- 4) The City dropbox will be updated to reflect the changes in the State
- 5) Select a new City for the Start Location from the City dropbox.

City: TestNode1

- 6) Click Save

Save

- 7) The new Start Location for this Segment will be updated in the database.

### **5.3.9 Changing the Segment's Ending Location**

- 1) In the End Location Area select a new Country for the End Location

Country: CHRISVILLE ▼

- 2) The State dropbox will be updated to reflect the changes in the Country
- 3) Select a new State for the End Location from the State dropbox

State: NA ▼

- 4) The City dropbox will be updated to reflect the changes in the State
- 5) Select a new City for the End Location from the City dropbox.

City: TestNode2

- 6) Click Save

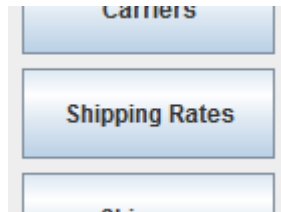
Save

- 7) The new End Location for this Segment will be updated in the database.

## 5.4 Editing Shipping Rates

To edit an existing Shipping Rate in the database follow these steps

- 1) Click on the Shipping Rates button on the left menu bar.



- 2) The Shipping Rates table will then appear in the main area

### Shipping Rates

ID	Carrier	Mile Rate	Flat Rate
1	DHL	10.0	5.0
2	DHL	10.0	1.0
3	DHL	10.0	99.0
4	DHL	10.0	1.0
5	DHL	10.0	1.0
7	DHL	10.0	1.0
8	DHL	10.0	1.0

ViewNewDelete

- 3) Find the Shipping Rate you wish to edit on the Shipping Rates table
- 4) Select the desired Shipping Rate from the list

4	DHL	10.0	1.0
---	-----	------	-----

- 5) Click on the View button



- 6) The Shipping Rate Editor will appear below the Shipping Rate Table

Shipping Rate

Shipping Rate ID: 4

Carrier: DHL

Flat Rate: 1.0

Mile Rate: 10.0

Weight 1: 10.0

Weight 2: 20.0

Weight 3: 30.0

Rank: 10

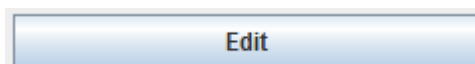
Rate 1: 10.0

Rate 2: 20.0

Rate 3: 30.0

EditCancel

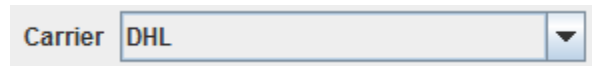
- 7) The selected Shipping Rate's information will populate the Shipping Rate Editor's fields.
- 8) Click on the Edit Button in the Shipping Rate Editor



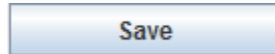
- 9) The Shipping Rate's values will now become modifiable

### **5.4.1 Changing the Shipping Rate's Carrier**

- 1) Select a new Carrier from the Carrier dropbox.

A screenshot of a web form showing a dropdown menu labeled 'Carrier' with 'DHL' selected. The dropdown arrow is visible on the right side of the box.

- 2) This dropbox will be populated with all the Carrier names in the database
- 3) Click Save

A blue rectangular button with the word 'Save' in black text.

- 4) The new Carrier for this Shipping Rate will be updated in the database.

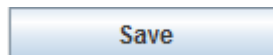
### **5.4.2 Changing the Shipping Rate's Rates Categories**

#### **5.4.2.1 Changing the Shipping Rate's Rate 1**

- 1) Enter a new value for the Shipping Rate's Rate 1

A screenshot of a web form showing an input field labeled 'Rate 1' with the value '10.0' entered.

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

A blue rectangular button with the word 'Save' in black text.

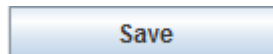
- 5) The new Rate 1 value will be updated in the database.

#### **5.4.2.2 Changing the Shipping Rate's Rate 2**

- 1) Enter a new value for the Shipping Rate's Rate 2

A screenshot of a web form showing an input field labeled 'Rate 2' with the value '20.0' entered.

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

A blue rectangular button with the word 'Save' in black text.

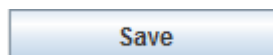
- 5) The new Rate 2 value will be updated in the database.

#### **5.4.2.3 Changing the Shipping Rate's Rate 3**

- 1) Enter a new value for the Shipping Rate's Rate 3

A screenshot of a web form showing an input field labeled 'Rate 3' with the value '30.0' entered.

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

A blue rectangular button with the word 'Save' in black text.

- 5) The new Rate 3 value will be updated in the database.

#### **5.4.2.4 Changing the Shipping Rate's Mile Rate**

- 1) Enter a new value for the Shipping Rate's Mile Rate

**Mile Rate**

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

**Save**

- 5) The new Mile Rate value will be updated in the database.

#### **5.4.2.5 Changing the Shipping Rate's Flat Rate**

- 1) Enter a new value for the Shipping Rate's Flat Rate

**Flat Rate**

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

**Save**

- 5) The new Flat Rate value will be updated in the database.

### **5.4.3 Changing the Shipping Rate's Weight Categories**

#### **5.4.3.1 Changing the Shipping Rate's Weight 1**

- 1) Enter a new value for the Shipping Rate's Weight 1

**Weight 1**

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

**Save**

- 5) The new Weight 1 value will be updated in the database.

#### **5.4.3.2 Changing the Shipping Rate's Weight 2**

- 1) Enter a new value for the Shipping Rate's Weight 2

**Weight 2**

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

**Save**

- 5) The new Weight 2 value will be updated in the database.

### **5.4.3.3 Changing the Shipping Rate's Weight 3**

- 1) Enter a new value for the Shipping Rate's Weight 3

Weight 3	<input type="text" value="30.0"/>
----------	-----------------------------------

- 2) Valid values must be greater than zero
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

Save
------

- 5) The new Weight 3 value will be updated in the database.

### **5.4.4 Changing the Shipping Rate's Rank**

- 1) Enter a new value for the Shipping Rate's Rank

Rank	<input type="text" value="10"/>
------	---------------------------------

- 2) Valid values must be an integer between 0 and 10
- 3) If an invalid entry is made an error message will appear
- 4) Click Save

Save
------

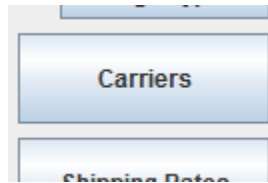
- 5) The new Rank value will be updated in the database.



## 5.5 Editing Carriers

To edit an existing Carrier in the database follow these steps

- 1) Click on the Carriers button on the left menu bar.



- 2) The Carriers Table will appear in the main area

**Carriers**

ID	Name	Code	Safety Rating
1	DHL	1	1
2	USPS	1	1
3	UPS	1	1
4	FEDEX	1	1

- 3) Select the Carrier you wish to edit from the Table

3	UPS	1	1
---	-----	---	---

- 4) Click on the View button

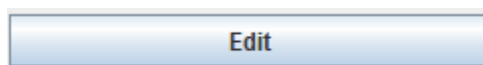


- 5) The Carrier Editor will appear below the Carrier Table

**Carrier**

CarrierID	3	<input checked="" type="checkbox"/> Fax Number	
Carrier Name	UPS	<input type="checkbox"/> Email	
Carrier Code	1		
Fax Number	123-456-7890	Area Code	123
Email	noOne@nowhere.com		
Contract Date	January 1 1970		
Authorize	1	Cost Modifiers	
Safety Rating	1	Truck	1
Rating Date	January 1 1970	Cargo	1
Ins End Date	January 1 1970	Plane	1
		Rail	1
<input type="button" value="Edit"/>		<input type="button" value="Cancel"/>	

- 6) The selected Carrier's information will populate the Carrier Editor's fields.
- 7) Click the Edit button on the Carrier Editor



- 8) This Carrier's values can now be modified.

### **5.5.1 Changing A Carrier's Name**

- 1) Enter a new name for the Carrier between 1 and 45 alphanumeric characters.

<b>Carrier Name</b>	<input type="text" value="UPS"/>
---------------------	----------------------------------

- 2) If you enter an invalid name an error message will appear.
- 3) Click Save

<b>Save</b>
-------------

- 4) The new name will be updated in the Carrier Table and in the database.

### **5.5.2 Changing A Carrier's Code**

- 1) Enter a new code for the Carrier between 1 and 4 alphanumeric characters.

<b>Carrier Code</b>	<input type="text" value="UPS1"/>
---------------------	-----------------------------------

- 2) If you enter an invalid code an error message will appear.
- 3) Click Save

<b>Save</b>
-------------

- 4) The new code will be updated in the Carrier Table and in the database.

### **5.5.3 Changing A Carrier's Fax Number**

- 1) Enter a new fax number for the Carrier using the following format, “###-###-####”

<b>Fax Number</b>	<input type="text" value="123-456-7890"/>
-------------------	-------------------------------------------

- 2) If you enter an invalid number an error message will appear.
- 3) Click Save

<b>Save</b>
-------------

- 4) The new number will be updated in the Carrier Table and in the database.

### **5.5.4 Changing A Carrier's Email Address**

- 1) Enter a new email address for the Carrier using the following format, “(any alphanumeric characters)@(any alphanumeric characters).(2-4 alphabetic characters)”

<b>Email</b>	<input type="text" value="noOne@nowhere.com"/>
--------------	------------------------------------------------

- 2) If you enter an invalid email address an error message will appear.
- 3) Click Save

<b>Save</b>
-------------

- 4) The new email address will be updated in the Carrier Table and in the database.

### **5.5.5 Changing A Carrier's Contract Date**

- 1) Enter a new Contract Date for the Carrier using the following format, "MM/dd/YYYY" ex 04/25/1990

Contract Date	01/01/1970
---------------	------------

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

Save
------

- 4) The new Contract Date will be updated in the Carrier Table and in the database.

### **5.5.6 Changing A Carrier's Authorize Value**

- 1) Enter a new Authorize value for the Carrier using an integer between 0 and 5.

Authorize	1
-----------	---

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

Save
------

- 4) The new Authorize will be updated in the Carrier Table and in the database.

### **5.5.7 Changing A Carrier's Safety Rating**

- 1) Enter a new Safety Rating value for the Carrier using an integer between 0 and 100.

Safety Rating	1
---------------	---

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

Save
------

- 4) The new Safety Rating will be updated in the Carrier Table and in the database.

### **5.5.8 Changing A Carrier's Safety Rating Date**

- 1) Enter a new Safety Rating Date for the Carrier using the following format, "MM/dd/YYYY" ex 04/25/1990

Rating Date	01/01/1970
-------------	------------

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

Save
------

- 4) The new Safety Rating Date will be updated in the Carrier Table and in the database.

### **5.5.9 Changing A Carrier's Ins End Date**

- 1) Enter a new Ins End Date for the Carrier using the following format, "MM/dd/YYYY" ex 04/25/1990

Ins End Date

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

Save

- 4) The new Ins End Date will be updated in the Carrier Table and in the database.

### **5.5.10 Changing A Carrier's Cost Modifiers**

#### **5.5.10.1 Changing A Carrier's Truck Cost Modifier**

- 1) Enter a new Truck Cost Modifier value for the Carrier using an integer between 0 and 100.

Truck

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

Save

- 4) The new Truck Cost Modifier will be updated in the Carrier Table and in the database.

#### **5.5.10.2 Changing A Carrier's Cargo Cost Modifier**

- 1) Enter a new Cargo Cost Modifier value for the Carrier using an integer between 0 and 100.

Cargo

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

Save

- 4) The new Cargo Cost Modifier will be updated in the Carrier Table and in the database.

### **5.5.10.3 Changing A Carrier's Plane Cost Modifier**

- 1) Enter a new Plane Cost Modifier value for the Carrier using an integer between 0 and 100.

Plane

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

Save

- 4) The new Plane Cost Modifier will be updated in the Carrier Table and in the database.

### **5.5.10.4 Changing A Carrier's Rail Cost Modifier**

- 1) Enter a new Rail Cost Modifier value for the Carrier using an integer between 0 and 100.

Rail

- 2) If you enter an invalid value an error message will appear.
- 3) Click Save

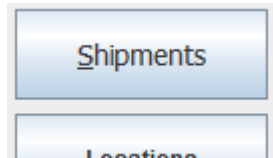
Save

- 4) The new Rail Cost Modifier will be updated in the Carrier Table and in the database.

## 5.6 Editing Shipments

To edit an existing Shipment in the database follow these steps

- 1) Click on the Shipments button on the left menu bar.



- 2) The Shipments Table will appear in the main area

## Shipments

ID	From	To
8000	TestNode1	TestNode2

[View](#)
[New](#)
[Delete](#)

- 3) Select the Shipment you wish to edit from the Table

8000	TestNode1	TestNode2
------	-----------	-----------

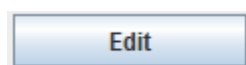
- 4) Click on the View button



- 5) The Shipment Editor will appear below the Shipment Table

Info	History
<b>Company:</b> <input type="text" value="DACS c/o Diamond Mfg."/>	
<b>Location:</b> <input type="text" value="DANATION"/> <input type="text" value="NA"/> <input type="text" value="TestNode1"/>	
<b>Contact:</b> <input type="text" value="defaultContactName"/>	
<b>Phone:</b> <input type="text" value="123-456-7890"/>	
<b>Email:</b> <input type="text" value="efaultEmailAddress@IwannaMakeYouMine.com"/>	
<b>Preferred Carriers:</b> <input type="text" value="ANY"/>	
<hr/>	
<b>To:</b> <input type="text" value="CHRISVILLE"/> <input type="text" value="NA"/> <input type="text" value="TestNode2"/>	
<b>Size:</b> <input type="text" value="1.0"/>	<b>Toll Roads:</b> <input type="checkbox"/>
<b>Weight:</b> <input type="text" value="10.0"/>	<b>Congestion By-Pass:</b> <input type="checkbox"/>
<b>Priority:</b> <input type="text" value="3"/>	
<b>Earliest Departure:</b> <input type="text"/>	<b>Latest Departure:</b> <input type="text"/>
<b>Earliest Arrival:</b> <input type="text"/>	<b>Latest Arrival:</b> <input type="text"/>
<b>Time to Load:</b> <input type="text" value="0"/>	<b>Max Stops:</b> <input type="text" value="50"/>
<b>Time to UnLoad:</b> <input type="text" value="0"/>	
<b>Hazmat:</b> <input type="text" value="NONE"/>	
<b>Loading Type:</b> <input type="text" value="NONE"/>	
<b>Unloading Type:</b> <input type="text" value="NONE"/>	
<b>Trailer Type Required:</b> <input type="text" value="NONE"/>	
<div> <input type="button" value="Edit"/> <input type="button" value="Cancel"/> </div>	

- 6) The selected Shipment's information will populate the Shipment Editor's fields.
- 7) Click the Edit button on the Shipment Editor



- 8) This Shipment's values can now be modified.

### **5.6.1 Changing a Shipment's Start Location**

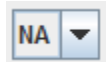
- 1) A Shipment's Start Location is dictated by its Shipper.
- 2) The change the Start Location please select a new Shipper
- 3) You can see how to set a Shipment's Shipper in Section 5.6.12

### **5.6.2 Changing a Shipment's End Location**

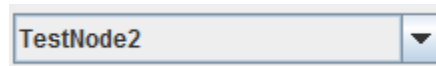
- 1) Change the Country dropdown next to the 'To:' label to the desired country

A screenshot of a web form showing a dropdown menu. The label 'To:' is followed by a box containing the text 'CHRISVILLE' and a small downward-pointing arrow on the right side.

- 2) This change will update the States and City dropdowns
- 3) Select the desired State for the new End Location from the State dropdown

A screenshot of a web form showing a dropdown menu. The box contains the text 'NA' and a small downward-pointing arrow on the right side.

- 4) This change will update the City dropdown
- 5) Finally select the desired City for the new End Location from the City dropdown.

A screenshot of a web form showing a dropdown menu. The box contains the text 'TestNode2' and a small downward-pointing arrow on the right side.

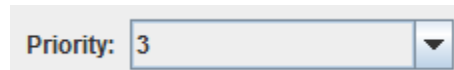
- 6) Click Save

A screenshot of a web form showing a button with the text 'Save' in the center.

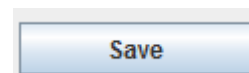
- 7) The new End Location for the Shipment will be save to the database.

### **5.6.3 Changing a Shipment's Priority**

- 1) Select a new Priority for the Shipment using the Priority drop box.

A screenshot of a web form showing a dropdown menu. The label 'Priority:' is followed by a box containing the text '3' and a small downward-pointing arrow on the right side.

- 2) The range of possible values are 1 -10 with 10 being the most important
- 3) Click Save

A screenshot of a web form showing a button with the text 'Save' in the center.

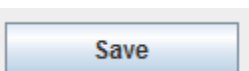
- 4) The new Priority for the Shipment will be saved to the database

### **5.6.4 Changing a Shipment's Weight**

- 1) Enter a new Weight for the Shipment in the Weight field.

A screenshot of a web form showing an input field. The label 'Weight:' is followed by a text box containing the text '10.0'.

- 2) The new weight must be greater than 0.
- 3) Click Save

A screenshot of a web form showing a button with the text 'Save' in the center.

- 4) The new Weight for the Shipment will be saved to the database

### **5.6.5 Changing a Shipment's Size**

- 1) Enter a new Size for the Shipment in the Size field.

Size:

- 2) The new Size must be greater than 0.
- 3) Click Save

- 4) The new Size for the Shipment will be saved to the database

### **5.6.6 Changing a Shipment's Earliest Arrival Time-Currently Not Supported**

- 1) Enter a new Earliest Arrival Time for the Shipment using the following format, "HH:mm MM/dd/YYYY" ex 15:30 04/25/1990

Earliest Arrival:

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

- 4) The new Earliest Arrival Time will be updated in the Shipment Table and in the database.

### **5.6.7 Changing a Shipment's Latest Arrival Time-Currently Not Supported**

- 1) Enter a new Latest Arrival Time for the Shipment using the following format, "HH:mm MM/dd/YYYY" ex 15:30 04/25/1990

Latest Arrival:

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

- 4) The new Latest Arrival Time will be updated in the Shipment Table and in the database.



#### **5.6.8 Changing a Shipment's Earliest Departure Time-Currently Not Supported**

- 1) Enter a new Earliest Departure Time for the Shipment using the following format, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990

Earliest Departure:

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

Save

- 4) The new Earliest Departure Time will be updated in the Shipment Table and in the database.

#### **5.6.9 Changing a Shipment's Latest Departure Time-Currently Not Supported**

- 1) Enter a new Latest Departure Time for the Shipment using the following format, “HH:mm MM/dd/YYYY” ex 15:30 04/25/1990

Latest Departure:

- 2) If you enter an invalid date an error message will appear.
- 3) Click Save

Save

- 4) The new Latest Departure Time will be updated in the Shipment Table and in the database.

#### **5.6.10 Changing a Shipment's Time To Load-Currently Not Supported**

- 1) Enter a new Time to Load for the Shipment in the Time to Load field.

Time to Load:

- 2) The new Time to Load must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Time to Load for the Shipment will be saved to the database

#### **5.6.11 Changing a Shipment's Time To Unload-Currently Not Supported**

- 1) Enter a new Time to Unload for the Shipment in the Time to Unload field.

Time to UnLoad:

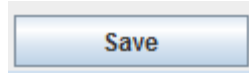
- 2) The new Time to Unload must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Time to Unload for the Shipment will be saved to the database

### **5.6.12 Changing a Shipment's Shipper**

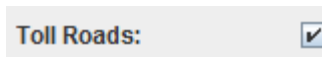
- 1) Use the Shipper dropdown to select a new Shipper
- 2) This change will update the Start Location of the Shipment to the Location of the Shipper as well.
- 3) Click Save



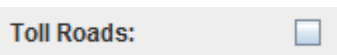
- 4)
- 5) The new Shipper for the Shipment will be saved to the database.

### **5.6.13 Changing a Shipment's Toll Road Option-Currently Not Supported**

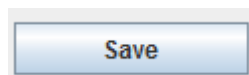
- 1) Check the Toll Road checkbox to allow the Shipment to take Toll Roads



- 2) Uncheck the Toll Road checkbox to not allow the Shipment to take Toll Roads



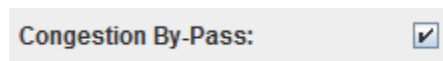
- 3) Click Save



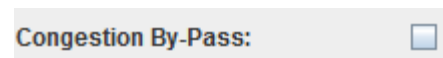
- 4) The new state of the checkbox will be save to the database.

### **5.6.14 Changing a Shipment's Congestion Bypass Option-Currently Not Supported**

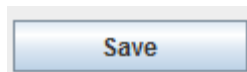
- 1) Check the Congestion Bypass checkbox to allow the Shipment to perform Congestion Bypasses.



- 2) Uncheck the Congestion Bypass checkbox to not allow the Shipment to perform Congestion Bypasses.



- 3) Click Save



- 4) The new state of the checkbox will be save to the database.

#### **5.6.15 Changing a Shipment's Maximum Stops**

- 1) Enter a new maximum number of stops for the Shipment in the maximum stops field.

Max Stops:

- 2) The new maximum number of stops must be greater than 0.
- 3) Click Save

Save

- 4) The new maximum number of stops for the Shipment will be saved to the database

#### **5.6.16 Changing a Shipment's Hazardous Material Constraints-Currently Not Supported**

- 1) Enter a new string between 1 and 45 alphabetical characters to specify the Hazardous Material constraints for this Shipment.

Hazmat:

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Hazardous Material Constraints will be saved to the database.

#### **5.6.17 Changing a Shipment's Loading Rate-Currently Not Supported**

- 1) Enter a new Loading Rate for the Shipment in the Loading Rate field.
- 2) The new Loading Rate must be greater than or equal to 0.
- 3) Click Save

Save

- 4)
- 5) The new Loading Rate for the Shipment will be saved to the database

#### **5.6.18 Changing a Shipment's Trailer Type-Currently Not Supported**

- 1) Enter a new string between 1 and 45 alphabetical characters to specify the Trailer Type for this Shipment.

Trailer Type Required:

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Trailer Type will be saved to the database.

### **5.6.19 Changing a Shipment's Loading Type-Currently Not Supported**

- 1) Enter a new string between 1 and 45 alphabetical characters to specify the Loading Type for this Shipment.

Loading Type:

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Loading Type will be saved to the database.

### **5.6.20 Changing a Shipment's Unloading Type-Currently Not Supported**

- 1) Enter a new string between 1 and 45 alphabetical characters to specify the Unloading Type for this Shipment.

Unloading Type:

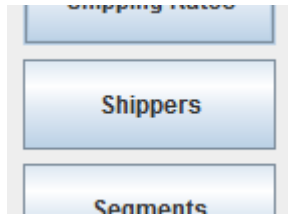
- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Unloading Type will be saved to the database.

## 5.7 Editing Shippers

To edit an existing Shipper in the database follow these steps

- 1) Click on the Shippers button on the left menu bar.



- 2) The Shippers Table will appear in the main area

### Shippers

ID	Company Name	Contact Name	Phone Number
1	NewSuperTest	defaultContactName	123-456-7890
2	NewSuperTest2	defaultContactName	123-456-7890
3	defaultCompanyName	defaultContactName	123-456-7890
5	DeletedCompany	defaultContactName	123-456-7890
6	DeletedCompany	defaultContactName	123-456-7890
7	DeletedCompany	defaultContactName	123-456-7890
8	DeletedCompany	defaultContactName	123-456-7890

- 3) Select the Shipper you wish to edit from the Table

3	defaultCompanyName	defaultContactName	123-456-7890
---	--------------------	--------------------	--------------

- 4) Click on the View button



- 5) The Shipper Editor will appear below the Shipper Table

Shipper

Shipper ID

Preferred Carriers

Company Name

ANY ▾

Contact Name

ANY ▾

Phone Number

ANY ▾

Email

ANY ▾

Location

Country

▾

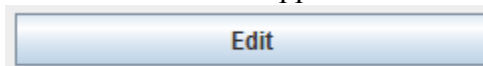
State

City

Edit

Cancel

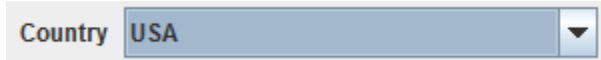
- 6) The selected Shipper's information will populate the Shipper Editor's fields.
- 7) Click the Edit button on the Shipper Editor



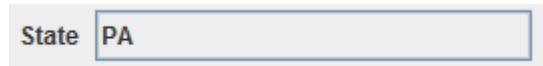
- 8) The Shippers values are now modifiable

### **5.7.1 Changing a Shipper's Location**

- 1) Select a new Country for the Shipper from the Country dropbox

A screenshot of a web form showing a dropdown menu for 'Country' with 'USA' selected. The dropdown arrow is visible on the right side of the box.

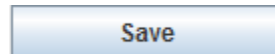
- 2) This selection will cause the State and City dropboxes to update
- 3) Select the new State for the Shipper from the State dropbox

A screenshot of a web form showing a dropdown menu for 'State' with 'PA' selected. The dropdown arrow is visible on the right side of the box.

- 4) This selection will cause the City dropbox to update
- 5) Select the new City for the Shipper

A screenshot of a web form showing a dropdown menu for 'City' with 'Harrisburg' selected. The dropdown arrow is visible on the right side of the box.

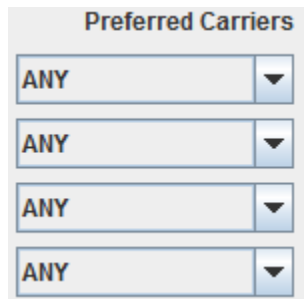
- 6) Click Save

A screenshot of a blue rectangular button with the text 'Save' in the center.

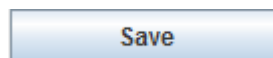
- 7) The new Location will be saved to the database.

### **5.7.2 Changing a Shipper's Preferred Carriers-Currently Not Supported**

- 1) Select a new Preferred Carrier from the dropboxes.

A screenshot of a web form section titled 'Preferred Carriers'. It contains four identical dropdown menus, each with 'ANY' selected. The dropdown arrows are visible on the right side of each box.

- 2) Note that duplicates will be ignored.
- 3) Click Save

A screenshot of a blue rectangular button with the text 'Save' in the center.

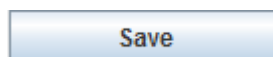
- 4) The new Preferred Carriers will be saved to the database.

### **5.7.3 Changing a Shipper's Company Name**

- 1) Enter a new Company Name between 1 and 45 alphabetical characters to specify the Company Name for this Shipper.

A screenshot of a web form showing a text input field for 'Company Name' with the text 'NewCompanyName' entered.

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

A screenshot of a blue rectangular button with the text 'Save' in the center.

- 4) The new Company Name will be saved to the database.

#### **5.7.4 Changing a Shipper's Contact Name**

- 1) Enter a new Contact Name between 1 and 45 alphabetical characters to specify the Contact Name for this Shipper.

Contact Name	<input type="text" value="NewContactName"/>
--------------	---------------------------------------------

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save
------

- 4) The new Contact Name will be saved to the database.

#### **5.7.5 Changing a Shipper's Phone Number**

- 1) Enter a new phone number for the Shipper using the following format, “###-###-####”

Phone Number	<input type="text" value="123-456-7890"/>
--------------	-------------------------------------------

- 2) If you enter an invalid number an error message will appear.
- 3) Click Save

Save
------

- 4) The new phone number will be updated in the Shipper Table and in the database.

#### **5.7.6 Changing a Shipper's Email Address**

- 1) Enter a new email address for the Shipper using the following format, “(any alphanumeric characters)@(any alphanumeric characters).(2-4 alphabetic characters)”

Email	<input type="text" value="new@emailaddress.com"/>
-------	---------------------------------------------------

- 2) If you enter an invalid email address an error message will appear.
- 3) Click Save

Save
------

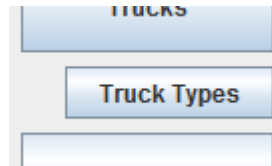
- 4) The new email address will be updated in the Shipper Table and in the database.

## 5.8 Editing Travel Types

### 5.8.1 Editing Truck Types

To edit an existing Truck Type in the database follow these steps

- 1) Click on the Truck Types button on the left menu bar.



- 2) The Truck Types Table will appear in the main area

**Truck Types**

ID	Name	Max Capacity	Max Weight
1	TruckType1	100.0	500.0
5	TruckType2	100.0	500.0
8000	TestTruckType	100.0	500.0
8025	defaultVehicleTypeN...	1000000.0	1000000.0

View New Delete

- 3) Select the Truck Type you wish to edit from the Table

5	TruckType2	100.0	500.0
---	------------	-------	-------

- 4) Click on the View button



- 5) The Truck Type Editor will appear below the Truck Type Table

**Truck Type**

TypeID: 5

Type Name: TruckType2 ☐ Radiation

Trailer 1: defaultTrailer1 ☐ Refrigeration

Trailer 2: defaultTrailer2 ☐ Hazardous Material

Service Type: defaultServiceType ☐ Explosive Material

Min. Capacity: 0.0 ☐ Tracking Available

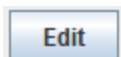
Max. Capacity: 100.0

Max Weight: 500.0

Edit Cancel

- 6) The selected Truck Type's information will populate the Truck Type Editor's fields.

- 7) Click the Edit button on the Truck Type Editor



- 8) This Truck Type's values can now be modified.



#### **5.8.1.1 Changing a Truck Type's Name**

- 1) Enter a new Name between 1 and 45 alphabetical characters to specify the Name for this Truck Type.

Type Name

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Name will be saved to the database.

#### **5.8.1.2 Changing a Truck Type's Trailer 1-Currently Not Supported**

- 1) Enter a new Trailer 1 between 1 and 45 alphabetical characters to specify the Trailer 1 for this Truck Type.

Trailer 1

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Trailer 1 will be saved to the database.

#### **5.8.1.3 Changing a Truck Type's Trailer 2-Currently Not Supported**

- 1) Enter a new Trailer 2 between 1 and 45 alphabetical characters to specify the Trailer 2 for this Truck Type.

Trailer 2

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Trailer 2 will be saved to the database.

#### **5.8.1.4 Changing a Truck Type's Service Type-Currently Not Supported**

- 1) Enter a new Service Type between 1 and 45 alphabetical characters to specify the Service Type for this Truck Type.

Service Type

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Service Type will be saved to the database.

#### **5.8.1.5 Changing a Truck Type's Minimum Capacity**

- 1) Enter a new Minimum Capacity for the Truck Type.

Min. Capacity

- 2) The new Minimum Capacity must be greater than or equal to 0.
- 3) Click Save

- 4) The new Minimum Capacity for the Shipment will be saved to the database

#### **5.8.1.6 Changing a Truck Type's Maximum Capacity**

- 1) Enter a new Maximum Capacity for the Truck Type.

Max. Capacity

- 2) The new Maximum Capacity must be greater than or equal to 0.
- 3) Click Save

- 4) The new Maximum Capacity for the Shipment will be saved to the database

#### **5.8.1.7 Changing a Truck Type's Maximum Weight**

- 1) Enter a new Maximum Weight for the Truck Type.

Max Weight

- 2) The new Maximum Weight must be greater than or equal to 0.
- 3) Click Save

- 4) The new Maximum Weight for the Shipment will be saved to the database

#### **5.8.1.8 Changing a Truck Type's Radiation Option-Currently Not Supported**

- 1) Check the Radiation checkbox if this Truck Type can handle radioactive Shipments.

☒ Radiation

- 2) Uncheck the Radiation checkbox if this Truck Type can not handle radioactive Shipments.

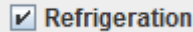
☐ Radiation

- 3) Click Save

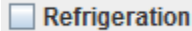
- 4) The new state of the Radiation checkbox will be saved to the database.

#### **5.8.1.9 Changing a Truck Type's Refrigeration Option-Currently Not Supported**

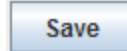
- 1) Check the Refrigeration checkbox if this Truck Type can handle refrigerated Shipments.



- 2) Uncheck the Refrigeration checkbox if this Truck Type can not handle refrigerated Shipments.



- 3) Click Save



- 4) The new state of the Refrigeration checkbox will be saved to the database.

#### **5.8.1.10 Changing a Truck Type's Hazardous Material Option-Currently Not Supported**

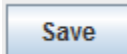
- 1) Check the Hazardous Material checkbox if this Truck Type can handle hazardous Shipments.



- 2) Uncheck the Hazardous Material checkbox if this Truck Type can not handle hazardous Shipments.



- 3) Click Save



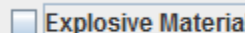
- 4) The new state of the Hazardous Material checkbox will be saved to the database.

#### **5.8.1.11 Changing a Truck Type's Explosive Material Option-Currently Not Supported**

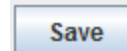
- 1) Check the Explosive Material checkbox if this Truck Type can handle explosive Shipments.



- 2) Uncheck the Explosive Material checkbox if this Truck Type can not handle explosive Shipments.



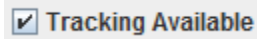
- 3) Click Save



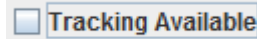
- 4) The new state of the Explosive Material checkbox will be saved to the database.

#### **5.8.1.12 Changing a Truck Type's Tracking Available Option-Currently Not Supported**

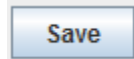
- 1) Check the Tracking Available checkbox if this Truck Type has tracking available.



- 2) Uncheck the Tracking Available checkbox if this Truck Type does not have tracking available.



- 3) Click Save

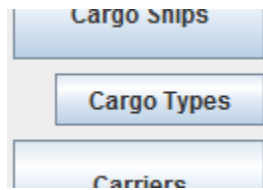


- 4) The new state of the Tracking Available checkbox will be saved to the database.

## 5.8.2 Editing Cargo Types

To edit an existing Cargo Type in the database follow these steps

- 1) Click on the Cargo Types button on the left menu bar.



- 2) The Cargo Types Table will appear in the main area

**Cargo Types**

ID	Name	Max Capacity	Max Weight
3	CargoType1	100.0	500.0
9	CargoType2	100.0	500.0
10	CargoType3	100.0	500.0

- 3) Select the Cargo Type you wish to edit from the Table

9	CargoType2	100.0	500.0
---	------------	-------	-------

- 4) Click on the View button



- 5) The Cargo Type Editor will appear below the Cargo Type Table

**Cargo Type**

TypeID  ☐ Radiation

Type Name  ☐ Refrigeration

Service Type  ☐ Hazardous Material

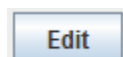
Max Weight  ☐ Explosive Material

Min. Capacity  ☐ Tracking Available

Max. Capacity

- 6) The selected Cargo Type's information will populate the Cargo Type Editor's fields.

- 7) Click the Edit button on the Cargo Type Editor



- 8) This Cargo Type's values can now be modified.

### **5.8.2.1 Changing a Cargo Type's Name**

- 1) Enter a new Name between 1 and 45 alphabetical characters to specify the Name for this Cargo Type.

Type Name

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Name will be saved to the database.

### **5.8.2.2 Changing a Cargo Type's Trailer 1-Currently Not Supported**

- 1) Enter a new Trailer 1 between 1 and 45 alphabetical characters to specify the Trailer 1 for this Cargo Type.

Trailer 1

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Trailer 1 will be saved to the database.

### **5.8.2.3 Changing a Cargo Type's Trailer 2-Currently Not Supported**

- 1) Enter a new Trailer 2 between 1 and 45 alphabetical characters to specify the Trailer 2 for this Cargo Type.

Trailer 2

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Trailer 2 will be saved to the database.

### **5.8.2.4 Changing a Cargo Type's Service Type-Currently Not Supported**

- 1) Enter a new Service Type between 1 and 45 alphabetical characters to specify the Service Type for this Cargo Type.

Service Type

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

- 4) The new Service Type will be saved to the database.

#### **5.8.2.5 Changing a Cargo Type's Minimum Capacity**

- 1) Enter a new Minimum Capacity for the Cargo Type.

Min. Capacity

- 2) The new Minimum Capacity must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Minimum Capacity for the Shipment will be saved to the database

#### **5.8.2.6 Changing a Cargo Type's Maximum Capacity**

- 1) Enter a new Maximum Capacity for the Cargo Type.

Max. Capacity

- 2) The new Maximum Capacity must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Maximum Capacity for the Shipment will be saved to the database

#### **5.8.2.7 Changing a Cargo Type's Maximum Weight**

- 1) Enter a new Maximum Weight for the Cargo Type.

Max Weight

- 2) The new Maximum Weight must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Maximum Weight for the Shipment will be saved to the database

#### **5.8.2.8 Changing a Cargo Type's Radiation Option-Currently Not Supported**

- 1) Check the Radiation checkbox if this Cargo Type can handle radioactive Shipments.

☒ Radiation

- 2) Uncheck the Radiation checkbox if this Cargo Type can not handle radioactive Shipments.

☐ Radiation

- 3) Click Save

Save

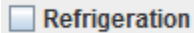
- 4) The new state of the Radiation checkbox will be saved to the database.

#### **5.8.2.9 Changing a Cargo Type's Refrigeration Option-Currently Not Supported**

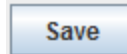
- 1) Check the Refrigeration checkbox if this Cargo Type can handle refrigerated Shipments.



- 2) Uncheck the Refrigeration checkbox if this Cargo Type can not handle refrigerated Shipments.



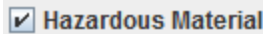
- 3) Click Save



- 4) The new state of the Refrigeration checkbox will be saved to the database.

#### **5.8.2.10 Changing a Cargo Type's Hazardous Material Option-Currently Not Supported**

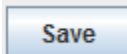
- 1) Check the Hazardous Material checkbox if this Cargo Type can handle hazardous Shipments.



- 2) Uncheck the Hazardous Material checkbox if this Cargo Type can not handle hazardous Shipments.



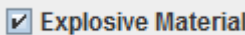
- 3) Click Save



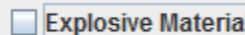
- 4) The new state of the Hazardous Material checkbox will be saved to the database.

#### **5.8.2.11 Changing a Cargo Type's Explosive Material Option-Currently Not Supported**

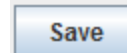
- 1) Check the Explosive Material checkbox if this Cargo Type can handle explosive Shipments.



- 2) Uncheck the Explosive Material checkbox if this Cargo Type can not handle explosive Shipments.



- 3) Click Save

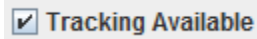


- 4) The new state of the Explosive Material checkbox will be saved to the database.



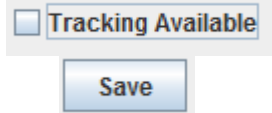
#### **5.8.2.12 Changing a Cargo Type's Tracking Available Option-Currently Not Supported**

- 1) Check the Tracking Available checkbox if this Cargo Type has tracking



available.

- 2) Uncheck the Tracking Available checkbox if this Cargo Type does not have tracking available.
- 3) Click Save

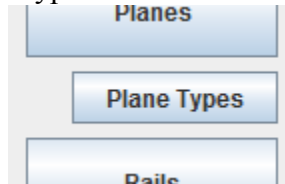


- 4) The new state of the Tracking Available checkbox will be saved to the database.

### 5.8.3 Editing Plane Types

To edit an existing Plane Type in the database follow these steps

- 1) Click on the Plane Types button on the left menu bar.



- 2) The Plane Types Table will appear in the main area

**Plane Types**

ID	Name	Max Capacity	Max Weight
2	PlaneType1	100.0	500.0
7	PlaneType2	100.0	500.0
8	PlaneType3	100.0	500.0

- 3) Select the Plane Type you wish to edit from the Table

8	PlaneType3	100.0	500.0
---	------------	-------	-------

- 4) Click on the View button



- 5) The Plane Type Editor will appear below the Plane Type Table

**Plane Type**

TypeID  ☐ Radiation

Type Name  ☐ Refrigeration

Service Type  ☐ Hazardous Material

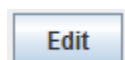
Max Weight  ☐ Explosive Material

Min. Capacity  ☐ Tracking Available

Max. Capacity

- 6) The selected Plane Type's information will populate the Plane Type Editor's fields.

- 7) Click the Edit button on the Plane Type Editor



- 8) This Plane Type's values can now be modified.

### **5.8.3.1 Changing a Plane Type's Name**

- 1) Enter a new Name between 1 and 45 alphabetical characters to specify the Name for this Plane Type.

Type Name

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Name will be saved to the database.

### **5.8.3.2 Changing a Plane Type's Trailer 1-Currently Not Supported**

- 1) Enter a new Trailer 1 between 1 and 45 alphabetical characters to specify the Trailer 1 for this Plane Type.

Trailer 1

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Trailer 1 will be saved to the database.

### **5.8.3.3 Changing a Plane Type's Trailer 2-Currently Not Supported**

- 1) Enter a new Trailer 2 between 1 and 45 alphabetical characters to specify the Trailer 2 for this Plane Type.

Trailer 2

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Trailer 2 will be saved to the database.

### **5.8.3.4 Changing a Plane Type's Service Type-Currently Not Supported**

- 1) Enter a new Service Type between 1 and 45 alphabetical characters to specify the Service Type for this Plane Type.

Service Type

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Service Type will be saved to the database.

#### **5.8.3.5 Changing a Plane Type's Minimum Capacity**

- 1) Enter a new Minimum Capacity for the Plane Type.

Min. Capacity

- 2) The new Minimum Capacity must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Minimum Capacity for the Shipment will be saved to the database

#### **5.8.3.6 Changing a Plane Type's Maximum Capacity**

- 1) Enter a new Maximum Capacity for the Plane Type.

Max. Capacity

- 2) The new Maximum Capacity must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Maximum Capacity for the Shipment will be saved to the database

#### **5.8.3.7 Changing a Plane Type's Maximum Weight**

- 1) Enter a new Maximum Weight for the Plane Type.

Max Weight

- 2) The new Maximum Weight must be greater than or equal to 0.
- 3) Click Save

Save

- 4) The new Maximum Weight for the Shipment will be saved to the database

#### **5.8.3.8 Changing a Plane Type's Radiation Option-Currently Not Supported**

- 1) Check the Radiation checkbox if this Plane Type can handle radioactive Shipments.

☒ Radiation

- 2) Uncheck the Radiation checkbox if this Plane Type can not handle radioactive Shipments.

☐ Radiation

- 3) Click Save

Save

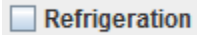
- 4) The new state of the Radiation checkbox will be saved to the database.

#### **5.8.3.9 Changing a Plane Type's Refrigeration Option-Currently Not Supported**

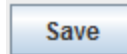
- 1) Check the Refrigeration checkbox if this Plane Type can handle refrigerated Shipments.



- 2) Uncheck the Refrigeration checkbox if this Plane Type can not handle refrigerated Shipments.



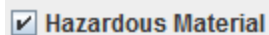
- 3) Click Save



- 4) The new state of the Refrigeration checkbox will be saved to the database.

#### **5.8.3.10 Changing a Plane Type's Hazardous Material Option-Currently Not Supported**

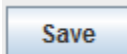
- 1) Check the Hazardous Material checkbox if this Plane Type can handle hazardous Shipments.



- 2) Uncheck the Hazardous Material checkbox if this Plane Type can not handle hazardous Shipments.



- 3) Click Save



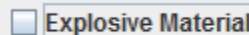
- 4) The new state of the Hazardous Material checkbox will be saved to the database.

#### **5.8.3.11 Changing a Plane Type's Explosive Material Option-Currently Not Supported**

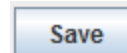
- 1) Check the Explosive Material checkbox if this Plane Type can handle explosive Shipments.



- 2) Uncheck the Explosive Material checkbox if this Plane Type can not handle explosive Shipments.



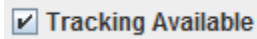
- 3) Click Save



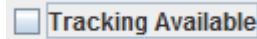
- 4) The new state of the Explosive Material checkbox will be saved to the database.

#### **5.8.3.12 Changing a Plane Type's Tracking Available Option-Currently Not Supported**

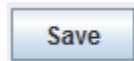
- 1) Check the Tracking Available checkbox if this Plane Type has tracking available.



- 2) Uncheck the Tracking Available checkbox if this Plane Type does not have tracking available.



- 3) Click Save

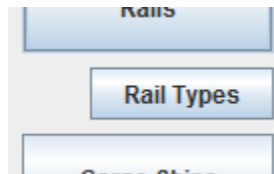


- 4) The new state of the Tracking Available checkbox will be saved to the database.

## 5.8.4 Editing Rail Types

To edit an existing Rail Type in the database follow these steps

- 1) Click on the Rail Types button on the left menu bar.



- 2) The Rail Types Table will appear in the main area

**Rail Types**

ID	Name	Max Capacity	Max Weight
4	RailType1	100.0	500.0
11	RailType2	100.0	500.0
12	RailType3	100.0	500.0

- 3) Select the Rail Type you wish to edit from the Table

12	RailType3	100.0	500.0
----	-----------	-------	-------

- 4) Click on the View button



- 5) The Rail Type Editor will appear below the Rail Type Table

**Rail Type**

TypeID  ☐ Radiation

Type Name  ☐ Refrigeration

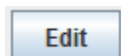
Service Type  ☐ Hazardous Material

Max Weight  ☐ Explosive Material

Min. Capacity  ☐ Tracking Available

Max. Capacity

- 6) The selected Rail Type's information will populate the Rail Type Editor's fields.
- 7) Click the Edit button on the Rail Type Editor



- 8) This Rail Type's values can now be modified.

#### **5.8.4.1 Changing a Rail Type's Name**

- 1) Enter a new Name between 1 and 45 alphabetical characters to specify the Name for this Rail Type.

Type Name

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Name will be saved to the database.

#### **5.8.4.2 Changing a Rail Type's Trailer 1-Currently Not Supported**

- 1) Enter a new Trailer 1 between 1 and 45 alphabetical characters to specify the Trailer 1 for this Rail Type.

Trailer 1

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Trailer 1 will be saved to the database.

#### **5.8.4.3 Changing a Rail Type's Trailer 2-Currently Not Supported**

- 1) Enter a new Trailer 2 between 1 and 45 alphabetical characters to specify the Trailer 2 for this Rail Type.

Trailer 2

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Trailer 2 will be saved to the database.

#### **5.8.4.4 Changing a Rail Type's Service Type-Currently Not Supported**

- 1) Enter a new Service Type between 1 and 45 alphabetical characters to specify the Service Type for this Rail Type.

Service Type

- 2) If an invalid entry is made an error message will appear.
- 3) Click Save

Save

- 4) The new Service Type will be saved to the database.



#### **5.8.4.5 Changing a Rail Type's Minimum Capacity**

- 1) Enter a new Minimum Capacity for the Rail Type.

Min. Capacity

- 2) The new Minimum Capacity must be greater than or equal to 0.
- 3) Click Save

- 4) The new Minimum Capacity for the Shipment will be saved to the database

#### **5.8.4.6 Changing a Rail Type's Maximum Capacity**

- 1) Enter a new Maximum Capacity for the Rail Type.

Max. Capacity

- 2) The new Maximum Capacity must be greater than or equal to 0.
- 3) Click Save

- 4) The new Maximum Capacity for the Shipment will be saved to the database

#### **5.8.4.7 Changing a Rail Type's Maximum Weight**

- 1) Enter a new Maximum Weight for the Rail Type.

Max Weight

- 2) The new Maximum Weight must be greater than or equal to 0.
- 3) Click Save

- 4) The new Maximum Weight for the Shipment will be saved to the database

#### **5.8.4.8 Changing a Rail Type's Radiation Option-Currently Not Supported**

- 1) Check the Radiation checkbox if this Rail Type can handle radioactive Shipments.

☒ Radiation

- 2) Uncheck the Radiation checkbox if this Rail Type can not handle radioactive Shipments.

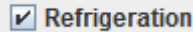
☐ Radiation

- 3) Click Save

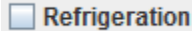
- 4) The new state of the Radiation checkbox will be saved to the database.

#### **5.8.4.9 Changing a Rail Type's Refrigeration Option-Currently Not Supported**

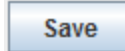
- 1) Check the Refrigeration checkbox if this Rail Type can handle refrigerated Shipments.



- 2) Uncheck the Refrigeration checkbox if this Rail Type can not handle refrigerated Shipments.



- 3) Click Save



- 4) The new state of the Refrigeration checkbox will be saved to the database.

#### **5.8.4.10 Changing a Rail Type's Hazardous Material Option-Currently Not Supported**

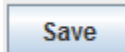
- 1) Check the Hazardous Material checkbox if this Rail Type can handle hazardous Shipments.



- 2) Uncheck the Hazardous Material checkbox if this Rail Type can not handle hazardous Shipments.



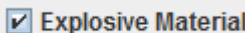
- 3) Click Save



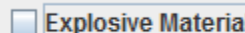
- 4) The new state of the Hazardous Material checkbox will be saved to the database.

#### **5.8.4.11 Changing a Rail Type's Explosive Material Option-Currently Not Supported**

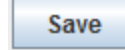
- 1) Check the Explosive Material checkbox if this Rail Type can handle explosive Shipments.



- 2) Uncheck the Explosive Material checkbox if this Rail Type can not handle explosive Shipments.



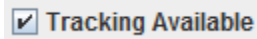
- 3) Click Save



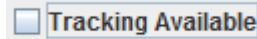
- 4) The new state of the Explosive Material checkbox will be saved to the database.

#### **5.8.4.12 Changing a Rail Type's Tracking Available Option-Currently Not Supported**

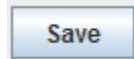
- 1) Check the Tracking Available checkbox if this Rail Type has tracking available.



- 2) Uncheck the Tracking Available checkbox if this Rail Type does not have tracking available.



- 3) Click Save



- 4) The new state of the Tracking Available checkbox will be saved to the database.

## 6. Removing Objects From The Database

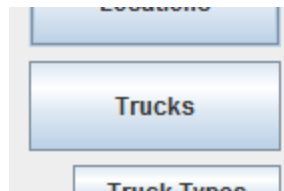
The MMRP Database can have objects removed from the database. This will stop outdated and unneeded objects from altering the routing procedures. To remove an item from the database follow the steps listed below.

## 6.1 Removing Vehicles

### 6.1.1 Removing Trucks

To remove a Truck from the database follow these steps

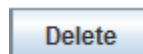
- 1) Click on the Trucks button the menu bar on the left



- 2) The Trucks table will appear in the main area

Trucks			
ID	Carrier	Status	Name
1	DHL	RUNNING	Truck1
2	FEDEX	DELAYED	h
3	FEDEX	RUNNING	Truck3
4	Aetna	DELAYED	NewTruckName
5	DHL	RUNNING	NewName

- 3) Select the Truck you wish to remove from the database
- 4) Click Delete

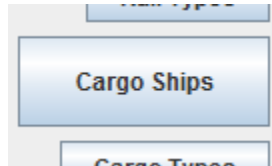


- 5) You will be prompted with a message box with the following warning, "Recovery of this object may not be possible after deletion, are you sure you wish to delete this Truck?"
- 6) Click Ok
- 7) The selected Truck will be marked as deleted in the database and will not be used in future routing.

## **6.1.2 Removing Cargo Ships**

To remove a Cargo Ship from the database follow these steps

- 1) Click on the Cargo Ships button the menu bar on the left



- 2) The Cargo Ships table will appear in the main area

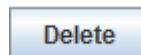
**Cargo**

ID	Carrier	Status	Name	
1	UPS	RUNNING	Ship1	▲
2	FEDEX	RUNNING	Ship2	☰
3	DHL	RUNNING	Ship3	
4	USPS	RUNNING	Ship4	
5	UPS	RUNNING	Ship5	
6	FEDEX	RUNNING	Ship6	
306	DHL	DISABLED	defaultCargoName	▼

- 3) Select the Cargo Ship you wish to remove from the database

6	FEDEX	RUNNING	Ship6
---	-------	---------	-------

- 4) Click Delete

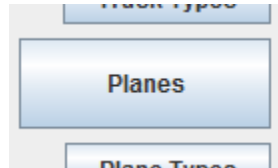


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Cargo Ship?”
- 6) Click Ok
- 7) The selected Cargo Ship will be marked as deleted in the database and will not be used in future routing.

### 6.1.3 Removing Planes

To remove a Plane from the database follow these steps

- 1) Click on the Planes button the menu bar on the left



- 2) The Planes table will appear in the main area

**Planes**

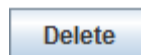
ID	Carrier	Status	Name
1	DHL	RUNNING	Plane1
2	USPS	RUNNING	Plane2
3	UPS	RUNNING	Plane3
4	FEDEX	RUNNING	Plane4
5	DHL	RUNNING	Plane5
6	USPS	RUNNING	Plane6
56	DHL	RUNNING	NewSuperTest

View New Delete

- 3) Select the Plane you wish to remove from the database

3	UPS	RUNNING	Plane3
---	-----	---------	--------

- 4) Click Delete

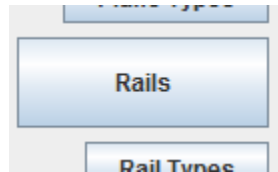


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Plane?”
- 6) Click Ok
- 7) The selected Plane will be marked as deleted in the database and will not be used in future routing.

## 6.1.4 Removing Rails

To remove a Rail from the database follow these steps

- 1) Click on the Rails button the menu bar on the left



- 2) The Rails table will appear in the main area

Rails				
ID	Carrier	Status	Name	
1	UPS	RUNNING	Rail1	▲
2	USPS	RUNNING	Rail2	
3	FEDEX	RUNNING	Rail3	
4	DHL	RUNNING	Rail4	
5	USPS	RUNNING	Rail5	
6	UPS	RUNNING	Rail6	
51	DHL	RUNNING	defaultRailName	▼
			<a href="#">View</a>	<a href="#">New</a>
			<a href="#">Delete</a>	

- 3) Select the Rail you wish to remove from the database

4	DHL	RUNNING	Rail4	:
---	-----	---------	-------	---

- 4) Click Delete

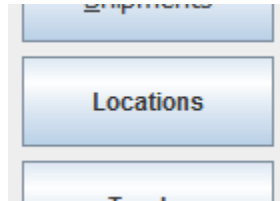


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Rail?”
- 6) Click Ok
- 7) The selected Rail will be marked as deleted in the database and will not be used in future routing.

## **6.2 Removing Locations**

To remove a Location from the database follow these steps

- 1) Click on the Locations button the menu bar on the left



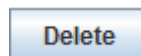
- 2) The Locations table will appear in the main area

Locations			
ID	City	State	Country
1	Harrisburg	PA	USA
2	Antwerp	AN	Belgium
3	New York City	NY	USA
4	Miami	FI	USA
5	Mobile	AI	USA
6	Mempis	TN	USA
7	Paris	IF	France
		View	New Delete

- 3) Select the Location you wish to remove from the database

6	Mempis	TN	USA
---	--------	----	-----

- 4) Click Delete



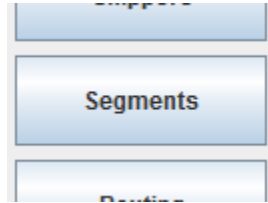
- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Location?”
- 6) Click Ok
- 7) The selected Location will be marked as deleted in the database and will not be used in future routing.



### 6.3 Removing Segments

To remove a Segment from the database follow these steps

- 1) Click on the Segments button the menu bar on the left



- 2) The Segments table will appear in the main area

## Segments

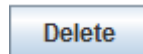
ID	Start	End	Type
8000	TestNode1	TestNode2	EMPTY

[View](#) [New](#) [Delete](#)

- 3) Select the Segment you wish to remove from the database

8000	TestNode1	TestNode2	EMPTY
------	-----------	-----------	-------

- 4) Click Delete

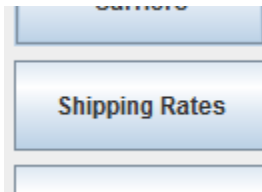


- 5) You will be prompted with a message box with the following warning, "Recovery of this object may not be possible after deletion, are you sure you wish to delete this Segment?"
- 6) Click Ok
- 7) The selected Segment will be marked as deleted in the database and will not be used in future routing.

## 6.4 Removing Shipping Rates

To remove a Shipping Rate from the database follow these steps

- 1) Click on the Shipping Rate button the menu bar on the left



- 2) The Shipping Rates table will appear in the main area

**Shipping Rates**

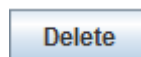
ID	Carrier	Mile Rate	Flat Rate
1	DHL	10.0	5.0
2	DHL	10.0	1.0
3	DHL	10.0	99.0
4	DHL	10.0	1.0
5	DHL	10.0	1.0
7	DHL	10.0	1.0
8	DHL	10.0	1.0

View New Delete

- 3) Select the Shipping Rate you wish to remove from the database

7	DHL	10.0	1.0
---	-----	------	-----

- 4) Click Delete

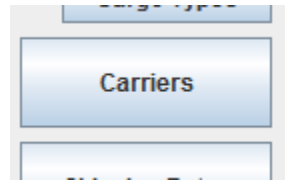


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Shipping Rate?”
- 6) Click Ok
- 7) The selected Shipping Rate will be marked as deleted in the database and will not be used in future routing.

## 6.5 Removing Carriers

To remove a Carrier from the database follow these steps

- 1) Click on the Carrier button the menu bar on the left



- 2) The Carriers table will appear in the main area

### **Carriers**

ID	Name	Code	Safety Rating
1	DHL	1	1
2	USPS	1	1
3	UPS	1	1
4	FEDEX	1	1

View

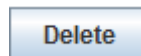
New

Delete

- 3) Select the Carrier you wish to remove from the database

3	UPS	1	1
---	-----	---	---

- 4) Click Delete

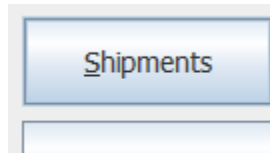


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Carrier?”
- 6) Click Ok
- 7) The selected Carrier will be marked as deleted in the database and will not be used in future routing.

## 6.6 Removing Shipments

To remove a Shipment from the database follow these steps

- 1) Click on the **Shipment** button the menu bar on the left



- 2) The Shipments table will appear in the main area

## Shipments

ID	From	To
8000	TestNode1	TestNode2

View

New

Delete

- 3) Select the Shipment you wish to remove from the database

8000	TestNode1	TestNode2
------	-----------	-----------

- 4) Click Delete

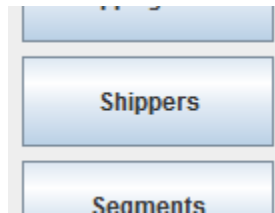


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Shipment?”
- 6) Click Ok
- 7) The selected Shipment will be marked as deleted in the database and will not be used in future routing.

## **6.7 Removing Shippers**

To remove a Shipper from the database follow these steps

- 1) Click on the Shippers button the menu bar on the left



- 2) The Shippers table will appear in the main area

Shippers			
ID	Company Name	Contact Name	Phone Number
1	NewSuperTest	defaultContactName	123-456-7890
2	NewSuperTest2	defaultContactName	123-456-7890
3	defaultCompanyName	defaultContactName	123-456-7890
5	DeletedCompany	defaultContactName	123-456-7890
6	DeletedCompany	defaultContactName	123-456-7890
7	DeletedCompany	defaultContactName	123-456-7890
8	DeletedCompany	defaultContactName	123-456-7890
			<div>ViewNewDelete</div>

- 3) Select the Shipper you wish to remove from the database

5	DeletedCompany	defaultContactName	123-456-7890
---	----------------	--------------------	--------------

- 4) Click Delete



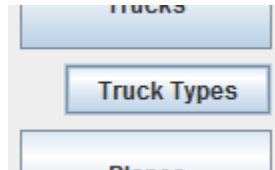
- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Shipper?”
- 6) Click Ok
- 7) The selected Shipper will be marked as deleted in the database and will not be used in future routing.

## **6.8 Removing Travel Types**

### **6.8.1 Removing Truck Types**

To remove a Truck Type from the database follow these steps

- 1) Click on the Truck Types button the menu bar on the left



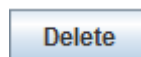
- 2) The Truck Types table will appear in the main area

Truck Types				
ID	Name	Max Capacity	Max Weight	
1	TruckType1	100.0	500.0	▲
5	TruckType2	100.0	500.0	☰
8000	TestTruckType	100.0	500.0	▼
8025	defaultVehicleTypeN...	1000000.0	1000000.0	▼
		<input type="button" value="View"/>	<input type="button" value="New"/>	<input type="button" value="Delete"/>

- 3) Select the Truck Type you wish to remove from the database

5	TruckType2	100.0	500.0	...
---	------------	-------	-------	-----

- 4) Click Delete

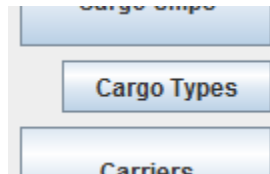


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Truck Type?”
- 6) Click Ok
- 7) The selected Truck Type will be marked as deleted in the database and will not be used in future routing.

## **6.8.2 Removing Cargo Types**

To remove a Cargo Type from the database follow these steps

- 1) Click on the Cargo Types button the menu bar on the left



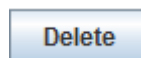
- 2) The Cargo Types table will appear in the main area

Cargo Types			
ID	Name	Max Capacity	Max Weight
3	CargoType1	100.0	500.0
9	CargoType2	100.0	500.0
10	CargoType3	100.0	500.0
		View	New Delete

- 3) Select the Cargo Type you wish to remove from the database

10	CargoType3	100.0	500.0
----	------------	-------	-------

- 4) Click Delete

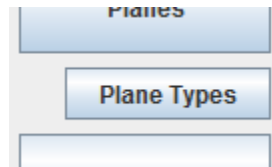


- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Cargo Type?”
- 6) Click Ok
- 7) The selected Cargo Type will be marked as deleted in the database and will not be used in future routing.

### **6.8.3 Removing Plane Types**

To remove a Plane Type from the database follow these steps

- 1) Click on the Plane Types button the menu bar on the left



- 2) The Plane Types table will appear in the main area

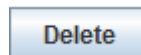
#### **Plane Types**

ID	Name	Max Capacity	Max Weight
2	PlaneType1	100.0	500.0
7	PlaneType2	100.0	500.0
8	PlaneType3	100.0	500.0
		<b>View</b>	<b>New</b>
		<b>Delete</b>	

- 3) Select the Plane Type you wish to remove from the database

2	PlaneType1	100.0	500.0
---	------------	-------	-------

- 4) Click Delete



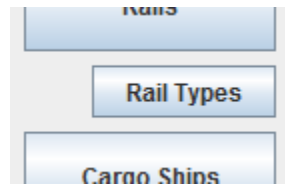
- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Plane Type?”
- 6) Click Ok
- 7) The selected Plane Type will be marked as deleted in the database and will not be used in future routing.



## 6.8.4 Removing Rail Types

To remove a Rail Type from the database follow these steps

- 1) Click on the Rail Types button the menu bar on the left



- 2) The Rail Types table will appear in the main area

**Rail Types**

ID	Name	Max Capacity	Max Weight
4	RailType1	100.0	500.0
11	RailType2	100.0	500.0
12	RailType3	100.0	500.0

View

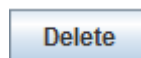
New

Delete

- 3) Select the Rail Type you wish to remove from the database

12	RailType3	100.0	500.0
----	-----------	-------	-------

- 4) Click Delete



- 5) You will be prompted with a message box with the following warning,  
“Recovery of this object may not be possible after deletion, are you sure you wish to delete this Rail Type?”
- 6) Click Ok
- 7) The selected Rail Type will be marked as deleted in the database and will not be used in future routing.

## **7. Routing A Shipment**

### **7.1 Routing Algorithms**

The MMRP supplies various algorithms for solving the routing problem. Each algorithm is capable of finding solutions to the routing problem in their own way. Each algorithm will explore different possibilities to get a shipment from the starting location to the end location. The way in which the different algorithms arrive at their different solutions will result in some good solutions and some bad solutions depending on the various components that the shipment being routed may have. That being said a variety of solutions used at the same time can generally find better solutions than any being used by itself.

#### **7.1.1 Node Crawler**

The Node Crawler algorithm is a random path choosing algorithm. This algorithm will, based on the variables passed into it, randomly attempt to get a direct path from the start to the end. If there are multiple direct paths to take, it will randomly choose one and return the route. If the algorithm chooses not to attempt a direct path it will grab all the paths that start at the shipments current location and randomly choose one to add to the total route. It will then check to see if it has randomly chosen a path that is connected to the end. If it has reached the destination the total route will return. If the end has not been reached the process will then repeat and it will choose if a direct path should be attempted.

#### **7.1.2 Best First Find**

The Best First Find algorithm is a deterministic algorithm, meaning given the same input it will give the same output every time. The Best First Find will attempt to find a direct path between the current location of the shipment and the destination. If it finds paths that allow direct travel it will choose the lowest cost path based on the given WeightedMetric. If no direct path is found, the algorithm will grab all the paths that start at the current location and choose the lowest cost path to traverse. Once at the new location it will attempt a direct path again. This process will repeat until it has found a direct path and reaches the destination. The total route will then be returned.

#### **7.1.3 Travel By Type**

The Travel By Type algorithm will route a shipment using only the vehicle mode chosen. This algorithm will randomly attempt a direct path using the given mode of travel. If a direct path is found it will choose the lowest cost path, based on the algorithm's WeightedMetric. If the direct path is not attempted, the algorithm will grab all the paths starting at the current location and then will either randomly choose the lowest cost path, or will choose a random path to add to the route. The algorithm will then check to see if it has reached the end. If the end has been reached the route will return. If the end has not been reached the process will repeat until the end is found.

#### **7.1.4 Next Available Vehicle**

The next available vehicle algorithm is an algorithm that attempts to reach its destination using the next vehicle that is ready to leave the current location. This algorithm will first attempt a direct path. If one is available it will choose the path with the next available vehicle for travelling and return the route. If a direct path is not available the algorithm will grab all the paths that start at the current location then choose the next available vehicle from all of them to traverse a path. It will then be checked to see if the end has been reached. If not the process will repeat and until the destination is reached.

#### **7.1.5 A Star**

Information to be added.

### **7.2 Choosing An Algorithm**

Each algorithm offers a different search space that can be explored to reach the shipment's destination. Which algorithm to choose will depend on what the priorities of the shipment are. If fast results are needed Best First Find may be your best choice. If generally good results are required A star may be the best choice. If you want to explore the most possibilities then Node Crawler could be the best algorithm to select. Each choice can further be altered by selecting the metric priorities for the algorithm. These priorities will be used to determine the cost of using a given path.

#### **7.2.1 Selecting Weights**

There are currently 3 different metrics supported by the MMRP program. These metrics are Time, Distance, and Cost (financial). The Time metric for a Segment is how long it takes for the Vehicle travelling along the Segment to get from the starting Location of the Segment to the ending Location. The Distance metric is a measure of the distance a Vehicle has to travel to get from the starting Location to the ending Location of a Segment. The Cost is a measure of the financial cost it will take to have the Vehicle transport the given Shipment along a Segment, based on that Segment's Shipping Rate. The weights for each of these metrics can be chosen on the Routing Menu using the spin fields next to the algorithms. Each spin bar is limited for a value between 0 and 100. The higher the number the more important that particular feature is to you. For example, if you were to set the Time spin bar to 100 and the Cost and Distance bars to 0 then only the time taken to traverse a Segment will be used to measure the best route. This may result in paths that take very little time, but have a high fiscal cost and distance values. It should be noted that the spin bar values act as a ratio. This fact means that setting each of the fields to the same value will result in each of the metrics an equal weight when the total cost is calculated.

### **7.3 Route**

The route that is returned from the Route button will be the best path found from the selected algorithms with the user-defined values. The route itself will be an ordered list of Segments that the Shipment used to get from its current location to the end location. This list of Segments will be displayed in the table below the Route button in the order that they were traversed.

## **8. Exploring Results**

### **8.1 Interpreting Results**

The Segments that the Shipment took to get from its origin to its destination will be displayed in the Segment table below the Route button. The time, distance and cost of each of the Segments that had to be used will also be displayed.

### **8.2 Saving Data**

Currently the MMRP program does not support saving the information out to any outside files. The Shipment's Shipping History however will be updated in the database once the Shipment has been routed.

## **9. Uninstalling MMRP**

Delete the MMRP application from the hard-drive. If you installed the database on your system it too will have to be deleted.