Train Ticket System

Submitted by: Alan Philpott

T00182898

Software Development - Stage 2

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# Introduction/overview

This document will outline the functional components and requirements for a Train Ticket System. The main system user will be the staff member’s at a train station. The functional activities which the staff will have control of are outlined in the Hierarchy chart. An example of one functional component is being able to add a new route to the sytem. The functional requirements are specified as both user requirements and system requirements using UML use case modelling.

The system model shows the system requirements as a collection of interacting functions and the external intities (e.g. The Customer) with which they interact. DFD’s have been used to produce the system model. The system’s data model is represented using Class Diagram’s. The class diagram is then transformed into a relational schema and then a database schema.

The primary actor for the system is the train stations staff member’s.

The system will provide station management. The primary actor can add a new station, close a station and list all stations. The system will provide route management being able to add a route, terminate a route and list a routes. A train schedule for a route can be created along with being able to view a train timetable of all scheduled trains. The system provides a function in relation to tickets. The system will firstly allow you to create/set ticket types e.g. Adult Single. If any new types should need to be added a function called Update Ticket Type will allow such updating. A ticket can then be sold in relation to the customer’s requests. The system will finally provide a function to view revenue analysis and ticket sales analysis, meaning you can view the gross amount of money being made and the what is the most frequent selling ticket type.

# Functional Components

A ***hierarchy chart*** representing the functional components of TTSSys.

# User Requirements

## TTSys will perform station administration.

### 3.1.1 TTSys will add stations.

### TTSys will close stations.

### TTSys will list stations.

## TTSys will perform route administration.

### TTSys will add routes.

### TTSys will terminate routes.

### TTSys will list all routes.

## TTSys will provide scheduling options.

### TTSys will schedule train times.

### TTSys will display a timetable.

## TTSys will deal directly with tickets.

### TTSys will set ticket types.

### TTSys will perform ticket type updates.

### TTSys will perform ticket sales.

## TTSys will provide financial options.

### TTSys will provide a revenue analysis report.

### TTSys will provide a ticket sales analysis report.

# System Requirements

Below is a diagram which shows who interacts with what part of the system. The use-case outline what happens in each process’ function.

## System Level Use Case Diagram

Use case diagram showing what each user will interact with in the system.

Manage Stations

Receptionist

Manage Routes

Customer

Process Schedules

Process Tickets

Manager

Generate Finance Reports

## Manage Stations

This module provides functions to add a station, remove a station and list stations.

### Add Station

Will provide a function to add a station.

Receptionist

Add Station

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Add Station** | |
| **Use Case Id** | 3.1.1 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Receptionist | |
| **Other Participating Actors** | None | |
| **Description** | This case will add a new station. | |
| **Preconditions** | A **Stations File** must exist for a station to be added. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The Staff Member starts the Add Station function.  **Step 3:** The staff member enters the required data:   * Station Name * Street * Town * County * Contact Number | **Step 2:** The system displays the UI.  **Step 4:** The system validates the data entered:   * All required fields must be entered. * Text only fields must not contain numeric entries.   **Step 5:** The system assigns a station ID.  **Step 6:** The system saves the station details in the **Stations File.**  **Step 7:** Display confirmation message.  **Step 8:** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A new station is added. | |
| **Post conditions** | This station may now be included on a route. | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Close Station

Will provide a function to close stations.

Receptionist

Close Station

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Close Station** | |
| **Use Case Id** | 3.1.2 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will close a station. | |
| **Preconditions** | Stations must exist in the **Stations File** to be deleted. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The Staff Member starts the close station function.  **Step 4:** The staff member chooses the station to close.  **Step 7:** The staff member confirms that the station is to be closed. | **Step 2:**  The system retrieves summary details of stations from Stations file in alphabetical order of name and loads on UI.  **Step 3:** The system displays the UI.  **Step 5:** The system validates that a station is selected.  **Step 6:** The System retrieves full details of the chosen station from the Stations File and displays on UI for viewing only.  **Step 8:** The system sets the station status to closed in the **Stations File.**  **Step 9:** The system sets the Route status for all routes to/from the chosen station to “Terminated”.  **Step 10:** The system sets the status for all scheduled trains on the effected routes to “Terminated”.  **Step 11:** Display confirmation message.  **Step 12** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A station is deleted. | |
| **Post conditions** | The station is no longer available for including on routes. | |
| **Business Rules** | The station cannot be closed if included on an existing route. | |
| **Implementation Constraints** |  | |

### List Stations

Will provide a function to list all stations.

Receptionist

List Stations

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **List Stations** | |
| **Use Case Id** | 3.1.3 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will list all stations. | |
| **Preconditions** | Stations must exist in the **Stations File**. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts the list station function.  **Step 4:** Staff member clicks finish. | **Step 2:** System retrieves details of all stations from the **Stations File** in order of station name.  **Step 3:** The system displays the UI.  **Step 5:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Staff Member Filters Data**  **Print Copy Requested** | **Step 4:** The Staff Member enters a filter keyword.  **Step 4:** The staff member requests a print copy. | **Step 5:** The system filters by keyword entered and displays matching station information.  **Step 5:** The system prints the list. |
| **Conclusions** | A list of all stations is displayed. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

## Manage Routes

This module provides functions to add a route, terminate a route and list routes.

### Add Route

Will provide a function to add a route.

Receptionist

Add Route

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Add Route** | |
| **Use Case Id** | 3.2.1 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will add a new route. | |
| **Preconditions** | A **Routes File** and a **Stations File** must exist for a route to be added. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts the add route function.  **Step 3:** The staff member enters the required data:   * Departure Station * Arrival Station * Total Route Distance | **Step 2:** The system retrieves all stations and displays the UI.  **Step 4:** The system validates the data entered:   * All required fields must be entered. * Departure and Arrival station are different. * Numeric only fields must not contain text entries.   **Step 5:** The system saves the route details in the **Routes File.**  **Step 6:** Display confirmation message.  **Step 7:** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A new route is added. | |
| **Post conditions** | This route can now be used to schedule a train. | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Terminate Route

Will provide a function to terminate routes.

Receptionist

Terminate Route

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Terminate Route** | |
| **Use Case Id** | 3.2.2 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will terminate a route. | |
| **Preconditions** | A **Routes File** must exist for an inoperative route to be terminated. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The Staff Member starts the terminate route function.  **Step 4:** The staff member chooses the route to terminate.  **Step 7:** The staff member confirms that the route is to be terminated. | **Step 2:**  The system retrieves summary details of routes from Routes file in alphabetical order of name and loads on UI.  **Step 3:** The system displays the UI.  **Step 5:** The system validates that a route is selected.  **Step 6:** The System retrieves full details of the chosen route from the Routes File and displays on UI for viewing only.  **Step 8:** The system sets the route status to terminate in the **Routes File.**  **Step 10:** The system sets the status for all scheduled trains on the effected routes to “Terminated”.  **Step 11:** Display confirmation message.  **Step 12** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A route is terminated. | |
| **Post conditions** | The terminated route is not available. | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### List Routes

Will provide a function to list all routes.

Receptionist

List Routes

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **List Routes** | |
| **Use Case Id** | 3.2.3 | |
| **Priority** | Low | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will list all routes. | |
| **Preconditions** | Routes must exist within the **Routes File**. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts the list route function.  **Step 4:** The staff member clicks finish. | **Step 2:** The system retrieves the details of all routes from the **Routes File** in order of Route ID.  **Step 3:** The system displays the UI.  **Step 5:** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Staff Member Filters Data**  **Print Copy Requested** | **Step 4:** The Staff Member enters a filter keyword.  **Step 4:** The staff member requests a print copy. | **Step 5:** The system filters by keyword entered and displays matching route information.  **Step 5:** The system prints the list. |
| **Conclusions** | A list of routes is displayed. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

## Train Scheduling

This module provides functions to schedule a train and view a train timetable.

### Schedule Train

Will provide a function to schedule a train on a route.

Receptionist

Schedule Train

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Schedule Train** | |
| **Use Case Id** | 3.3.1 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will schedule a train on a route. | |
| **Preconditions** | A **Schedules File** must exist and a **Routes File** must exist. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts the schedule train function.  **Step 3:** The staff member enters the required data:   * Route * Day of Week * Departure Time * Arrival Time | **Step 2:** The system displays the UI.  **Step 4:** The system validates the data entered:   * Departure and arrival time are different.   **Step 5:** The system adds Train Schedule to the **Schedules File**.  **Step 6:** Display confirmation message.  **Step 7:** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A train is scheduled on a route. | |
| **Post conditions** | Tickets can be bought for a train. | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Train Timetable

Will provide a function to view a train timetable.

Receptionist

Train Timetable

Customer

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Train Timetable** | |
| **Use Case Id** | 3.3.2 | |
| **Priority** | Low | |
| **Source** | Customer | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None. | |
| **Description** | This case will show a train timetable. | |
| **Preconditions** | The train must exist in the **Schedules File**. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts train timetable function.  **Step 3:** The staff member chooses the requested route.  **Step 5:** The staff member clicks finish. | **Step 2:** The system displays the UI.  **Step 4:** The system retrieves details of all train schedules with the relevant route from the **Schedules File** in order of Schedule ID.  **Step 6:** The system resets the UI**.** |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Print Copy Requested** | **Step 4:** The customer requests a print copy. | **Step 5:** The systems prints the timetable information requested. |
| **Conclusions** | A train timetable is displayed. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

## Sales Processing

This module will provide functions to set ticket type, update ticket type and sell tickets.

### Set Ticket Type

Will provide a function to set ticket type.

Receptionist

Set Ticket Type

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Set Ticket Type** | |
| **Use Case Id** | 3.4.1 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will set a ticket type for sale purposes. | |
| **Preconditions** | A **Rates File** must exist for ticket types to be set. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The manager starts the set ticket type function.  **Step 3:** The staff member enters the required data:   * Ticket Type Code * Ticket Type Description * Ticket Type Rate Per KM | **Step 2:** The system displays the UI.  **Step 4:** The system validates the data entered:   * All required fields must be entered. * Numeric only fields must not contain text entries. * Rate not equal to 0. * Type Code does not already exist.   **Step 5:** The ticket type data is added to the **Rates File**.  **Step 6:** Display confirmation message.  **Step 7:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A ticket type is created. | |
| **Post conditions** | A ticket can be sold in relation to a certain ticket type. | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Update Ticket Type

Will provide a function to update ticket type.

Receptionist

Update Ticket Type

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Update Ticket Type** | |
| **Use Case Id** | 3.4.2 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | None | |
| **Description** | This case will update data for a ticket type. | |
| **Preconditions** | The **Rates File** must contain entries for data to be updated. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The manager starts the update ticket type function.  **Step 3:** The staff member chooses the required data:   * Ticket Type Code   **Step 5:** The staff member enters the new required data:   * Ticket Type Description * Ticket Type Rate Per KM | **Step 2:** The system displays the UI.  **Step 4:** The System retrieves full details of the chosen Type Code from the Rates File and displays on UI.  **Step 6:** The system validates the data entered:   * All required fields must be entered. * Rate not equal to 0.   **Step 7:** The ticket type is updated.  **Step 8:** Display confirmation message.  **Step 9:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 6:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 6. |
| **Conclusions** | A ticket type is updated. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Sell Ticket

Will provide a function to sell tickets.

Receptionist

Sell Ticket

Customer

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\Activity Diagram - Sell Ticket.png

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Sell Ticket** | |
| **Use Case Id** | 3.4.3 | |
| **Priority** | High | |
| **Source** | Customer | |
| **Primary Business Actor** | Staff Member | |
| **Other Participating Actors** | Customer | |
| **Description** | This case will sell and print a ticket and record the sale in a **Sales File**. | |
| **Preconditions** | A **Schedules File**, **Rates File** and **Sales File** must exist for tickets to be sold. Valid student card identification must be presented. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The staff member starts the sell ticket function.  **Step 4:** The staff member selects the relevant customer data:   * Route   **Step 6:** The staff member selects the relevant customer data:   * Day of Travel   **Step 8:** The staff member selects the departure time relevant to the customer.  **Step 10:** The staff member selects the appropriate ticket type relevant to the customer.  **Step 12:** The staff member confirms purchase. | **Step 2:** The system retrieves all routes in order of departure station.  **Step 3:** The system displays the UI.  **Step 5:** The system updates the UI.  **Step 7:** The system retreieves all Schedules from the Schedules File for the route and chosen day of the week and displays schedules times on UI.  **Step 9:** The system updates the UI.  **Step 11:** The system calculates the cost of the ticket.  **Step 13:** The sale is recorded in the **Sales File.**  **Step 14:** The system prints the ticket**.**  **Step 15:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Customer Declines Ticket** | **Step 13:** The customer declines the ticket.  **Step 15:** The receptionist confirms cancellation. | **Step 14:** The system displays a warning message.  **Step 16:** Display an appropriate confirmation message and return to step 4. |
| **Conclusions** | A ticket is sold. | |
| **Post conditions** | This ticket can now be used on a train. | |
| **Business Rules** | ID verification must be shown on request to certain ticket types. | |

## Generate Finance Reports

This module provides functions to view revenue analysis and ticket sales analysis.

### Revenue Analysis

Will provide a function to view revenue analysis.

Manager

Revenue Analysis

Validation

<< Includes >>

Display Error Message

<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Revenue Analysis** | |
| **Use Case Id** | 3.5.1 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Manager | |
| **Other Participating Actors** | None | |
| **Description** | This case will provide a revenue analysis report. | |
| **Preconditions** | A **Sales File** must exist. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The manager starts the revenue analysis function.  **Step 3:** The manger selects the required option:   * Specific Date * Time Period | **Step 2:** The system displays the UI.  **Step 4:** The system validates the data entered:   * All required fields must be selected/entered. * Date cannot be in the future.   **Step 5:** The system displays the chosen UI.  **Step 5:** The system displays data for the requested information**.**   * Gross Amount   **Step 6:** Display confirmation message.  **Step 7:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A revenue analysis report is generated. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

### Ticket Sales Analysis

Will provide a function to view ticket sales analysis.

Manager

Ticket Sales Analysis

Validation

<< Includes >>

Display Error Message

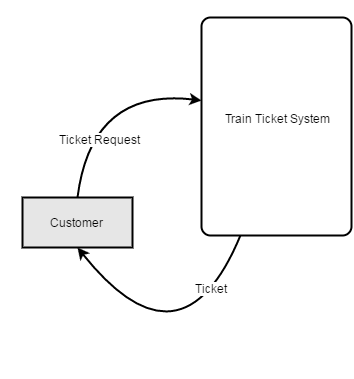
<< Extends >>

|  |  |  |
| --- | --- | --- |
| **Use Case Name** | **Ticket Sales Analysis** | |
| **Use Case Id** | 3.5.2 | |
| **Priority** | High | |
| **Source** | Manager | |
| **Primary Business Actor** | Manager | |
| **Other Participating Actors** | None | |
| **Description** | This case will provide a ticket sales analysis report. | |
| **Preconditions** | A **Sales File** must exist. | |
| **Trigger** | No. | |
| **Expected Scenario** | **Staff Member** | **System Response** |
|  | **Step 1:** The manager starts the ticket sales analysis function.  **Step 3:** The manager selects the required information:   * Specific Date * Time Period | **Step 2:** The system displays the UI.  **Step 4:** The system validates the data entered:   * All required fields must be selected/entered. * Date cannot be in the future.   **Step 5:** The system displays data for the requested information**.**   * Number of Adult Tickets sold. * Number of Student Tickets sold. * Number of Child Tickets sold.   **Step 6:** Display confirmation message.  **Step 7:** The system resets the UI. |
| **Alternate Scenarios** | **Actor Action** | **System Response** |
| **Invalid Data Detected** |  | **Step 4:** Invalid data detected.  **Step 5:** Display an appropriate error message and return to step 3. |
| **Conclusions** | A ticket sales analysis report is generated. | |
| **Post conditions** |  | |
| **Business Rules** |  | |
| **Implementation Constraints** |  | |

# System Model

*The following dataflow diagrams have been produced for the system*:

## Level-0 DFD



## Level-1 DFD

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 1.png

## Level-2 DFD (Process P1: Manage Stations)

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 2 - Process 1.png

## Level-2 DFD (Process P2: Manage Routes)

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 2 - Process 2.png

## Level-2 DFD (Process P3: Train Scheduling)

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 2 - Process 3.png

## Level-2 DFD (Process P4: Sales Processing)

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 2 - Process 4.png

## Level-2 DFD (Process P5: Generate Finance Reports)

C:\Users\Alan\AppData\Local\Microsoft\Windows\INetCacheContent.Word\DFD Level 2 - Process 5.png

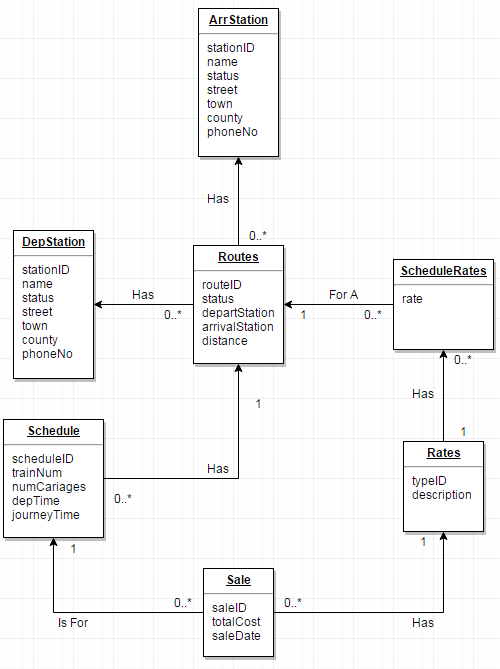
# Data Model (Class Diagram)

The following data model has bee produced for the system. Below is also the relational schema and database schema for the system.

## Class Diagram

Object Model – UML Class Diagram

Class diagram shows objects & attributes



## Relational Schema

Relational schema for the data requirements - Using ***bracket notation***

Station (stationID, name, street, town, county, phoneNo, status)

Route (routeID, depStation, arrStation, distance, status)

Schedule (scheduleID, *routeID*, numCarriages, depTime, arrTime)

ScheduleRates (routeID, *typeID*, rate)

Rates (typeID, description)

Sale (saleID, *routeID*, *typeID*, totalCost, saleDate)

## Database Schema

A definition of the database to be implemented.

This includes primary key, foreign key and other constraints to be implemented.

**Schema Name:** TrainTicketSystem

**Relation:** Stations

Attributes:

stationID number(3)

name varchar(20) NOT NULL

street varchar(20) NOT NULL

town varchar(20) NOT NULL

county varchar(20) NOT NULL

phoneNo varchar(16) NOT NULL

status varchar(1) DEFAULT ‘A’ NOT NULL

**Primary Key:** stationID

**Relation:** Routes

Attributes:

routeID number(3)

departStation varchar(20) NOT NULL

arrivalStation varchar(20) NOT NULL

distance decimal(8,2) NOT NULL

status varchar(1) DEFAULT ‘A’ NOT NULL

**Primary Key:** routeID

**Relation:** Schedules

Attributes:

scheduleID number(3)

routeID number(3)

numCarriages number(1) NOT NULL

depTime varchar(9) NOT NULL

arrTime varchar(9) NOT NULL

**Primary Key:** scheduleID, routeID

**Foreign Key:** routeID REFERENCES Routes

**Relation:** Rates

Attributes:

typeID number(2)

description varchar(25) NOT NULL

**Primary Key:** typeID

**Relation:** ScheduleRates

Attributes:

routeID number(3)

typeID number(2)

rate decimal(3,2) NOT NULL

**Primary Key:** routeID, typeID

**Foreign Key:** routeID REFERENCES Routes

**Foreign Key:** typeID REFERENCES Rates

**Relation:** Sale

saleID number(10),

routeID number(3),

typeID number(2),

totalCost decimal(5,2) NOT NULL

saleDate varchar(10) NOT NULL

**Primary Key:** saleID, routeID, typeID

**Foreign Key:** routeID REFERENCES Routes

**Foreign Key:** typeID REFERENCES Rates

# Conclusion

The Train Ticket system is a wide spread system to be used at every train station to manage Stations, Routes, Schedules and Tickets.

A shortcoming of the system would be the fact that a route can only be created between 2 stations. Future development might allow for intermediate stations on routes to be added. Another shortcoming would be that only one type of ticket can be sold at once. Future development might allow for multiple types of tickets to be sold at once.

# Appendices

## Appendix A – Title

## Appendix B – Title

Might include:

* **Lookup / Reference tables**
* **Sample reports / Listings**