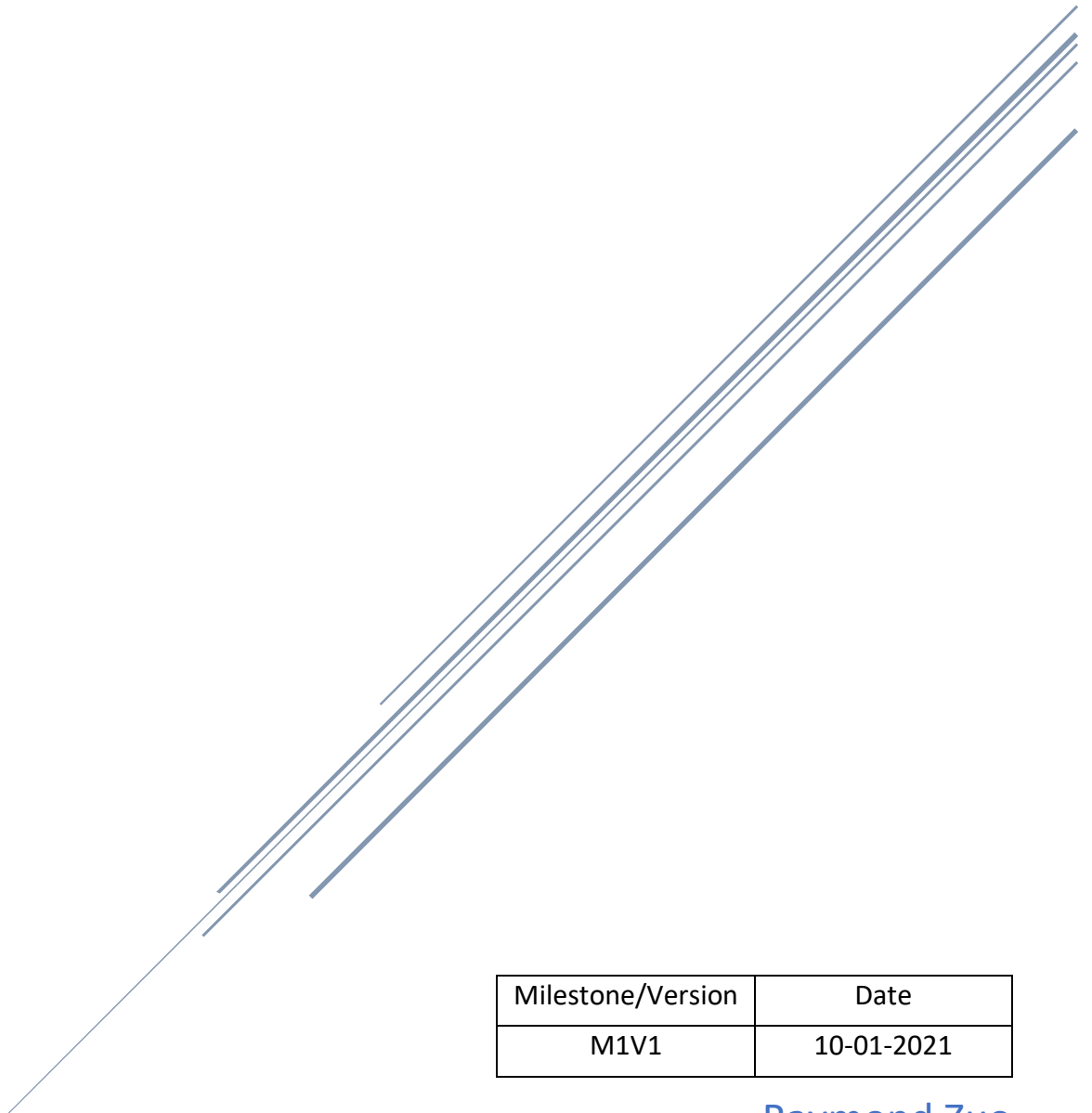


# RAILWAY SYSTEM DATABASE

Github: [Zellineous](#)



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## Project Description

The database that is being created in this project is a Railway System Database. The name of the app is RailX

This railway system will be an app that allows the passengers to look up train availability, the destination of the train, booking and cancelling of tickets, etc. This system will also allow the passengers to look at the records of the train which includes the name, number, seat availability, and whether the seats are already booked. It will also show what days the train will be available for booking. A Passenger will also be able to look at their own ticket and see what they booked. This system will also be good for the admins of the app. They can use the app to maintain the trains and resolve any issues people may have when booking their trips.

## Use Cases

Case 1: Dave is a passenger who wants to get a ticket from RailX. He is always late to work because he buys the ticket from the station right before the trains depart. He decides to use the railway app to book tickets ahead of time. He first registers with the into the system. He then logs in to his account. He then looks at all the train times and books his ticket. While booking ahead of time he realized that he is only able to book one ticket at a time. The system does not handle multiple tickets at a time.

Case 2: Tom is a person who never rode in the railway system before. He decides that he needs to use the railway to get to work. Since Tom is a very organized person, he wants to know everything ahead of time. He uses the Rail app to plan his trips. He finds the train number and the destination of the trains. Since he is not buying tickets from the app and is going to buy the tickets from the station clerk, he does not want to register. This is a problem because the system only allows registered users to view the times of the train.

Case 3: The manager of a station Bob wants to create a way for people in the station to see all the times of when the trains arrive. First, he registers with the app. Then he will display the times on the monitor. He sees that he is only able to display the time and the destination of one train at a time. The app does not have a section that shows all trains and times all at once currently.

Case 4: Rick is a police officer who must investigate in an area near the railway. He wants to investigate a case with the information of specific trains. To view this information, he must register with the app. This information is only presented for registered users. The information he was able to get is the trains number, schedule, how many passengers went in and out of the train on specific dates, and which passenger was in the train.

Case 5: Sam is a firefighter who is responding to a call about a situation in the train station. The fire station has access to admin permission of the database. While on the way to the situation the firefighters will be able to access all the information about the person who needs help. When the call is put in and a description of the person who is in need is given, the firefighters can get all the information they need before they even arrive on the scene.

# Database Requirements

## 1) Station

- a) A station shall have zero or more passengers.
- b) A station shall have zero or more employees.
- c) A station shall be at only one region.
- d) A station shall report to zero or more police department
- e) A station shall report to zero or more fire department
- f) A station shall have zero or more train yards
- g) A station shall have zero or more repair yards
- h) A station shall have one manager which is also an employee

## 2) Manager

- a) A manager is an employee.

## 3) Passengers

- a) A passenger shall have one and only one account.
- b) A passenger shall be at one or more stations.
- c) A passenger shall buy one or many tickets

## 4) User

- a) Many users shall have one account.

## 5) Account

- a) An account shall have one or more user
- b) An account shall have one unique account id
- c) An account shall have one user encrypted password
- d) An account shall have one unique user email
- e) An account shall have only one passenger
- f) An account shall be accessed by a device

## 6) Basic Account

- a) A basic account shall have one unique account id

## 7) Subscription Account

- a) A premium account shall have one unique account id
- b) A premium account shall have one expiration date

## 8) Employee

- a) An employee shall consist of one or more booking clerks
- b) An employee shall consist of zero or more guides
- c) An employee shall have a manager

- d) An employee shall work at least at one station
- e) An employee shall consist of zero or more drivers

**9) Booking clerk**

- a) A booking clerk is an employee
- b) A booking clerk shall sell many tickets

**10) Train**

- a) A train shall run zero or more trips.
- b) A train shall board many tickets holders

**11) Ticket**

- a) A ticket shall be owned by one and only one passenger
- b) A ticket shall allow the boarding of one train
- c) A ticket shall be sold by the booking clerk
- d) A ticket shall have an expiration date

**12) Trip**

- a) A trip shall be taken by zero or more trains
- b) A trip shall have one or more routes

**13) Train yard**

- a) A train yard shall reside in zero or more stations

**14) Guide**

- a) A guide is an employee.

**15) Police department**

- a) Many police departments shall respond to many stations

**16) Fire department**

- a) Many fire departments shall respond to many stations

**17) Routes**

- a) A route shall be in one or more trips

**18) Repair Yard**

- a) A repair yard shall reside in zero or more stations

**19) Expiration date**

- a) An expiration date shall handle tickets
- b) An expiration date shall handle premium accounts

**20) Region**

- a) A region will have only one station

**21) Driver**

- a) A Driver is an employee

## **22) Device**

- a) A device shall access an account

## Main Entities, Attributes and Keys

### 1) User: Strong

- a) user\_id: key, numeric
- b) name: multi-value, alphanumeric
- c) last\_name: multi-value, alphanumeric
- d) email: key, alphanumeric

### 2) Account: Weak

- a) account\_id: key, numeric
- b) email: key, alphanumeric
- c) password: alphanumeric

### 3) Train: Strong

- a) train\_id: key, numeric
- b) model: key, alphanumeric

### 4) Employee: Weak

- a) employee\_id: key, numeric
- b) station\_id: numeric

### 5) Police department: Strong

- a) police\_id: key, numeric
- b) p\_station\_id: key, alphanumeric

### 6) Fire department: Strong

- a) police\_id: key, numeric
- c) f\_station\_id: key, alphanumeric

### 7) Station: Strong

- a) station\_id: key, numeric
- b) name: alphanumeric

### 8) Train yard: Strong

- a) t\_yard\_id: key, numeric
- b) station\_id: numeric

### 9) Repair yard: Strong

- a) r\_yard\_id: key, numeric
- b) station\_id: numeric

### 10) Trip: Strong

- a) trip\_id: key, numeric
- b) name: alphanumeric



**11) Routes: Strong**

- a) route\_id: key, numeric
- b) name: alphanumeric

**12) Ticket: Strong**

- a) ticket\_id: key, numeric
- b) expiration\_id: numeric

**13) Passenger: Strong**

- a) passenger\_id: key, numeric
- b) name: alphanumeric

**14) Driver: Weak**

- a) driver\_id: key, numeric
- b) name: alphanumeric

**15) Manager: Weak**

- a) manager\_id: key, numeric
- b) name: alphanumeric

**16) Payment Type: Strong**

- a) type\_id: key, numeric
- b) billing\_address: alphanumeric

**17) Account Type: Strong**

- a) account\_typeid: key, numeric
- b) description: alphanumeric

**18) Region: Strong**

- a) region\_id: key, numeric
- b) description: alphanumeric

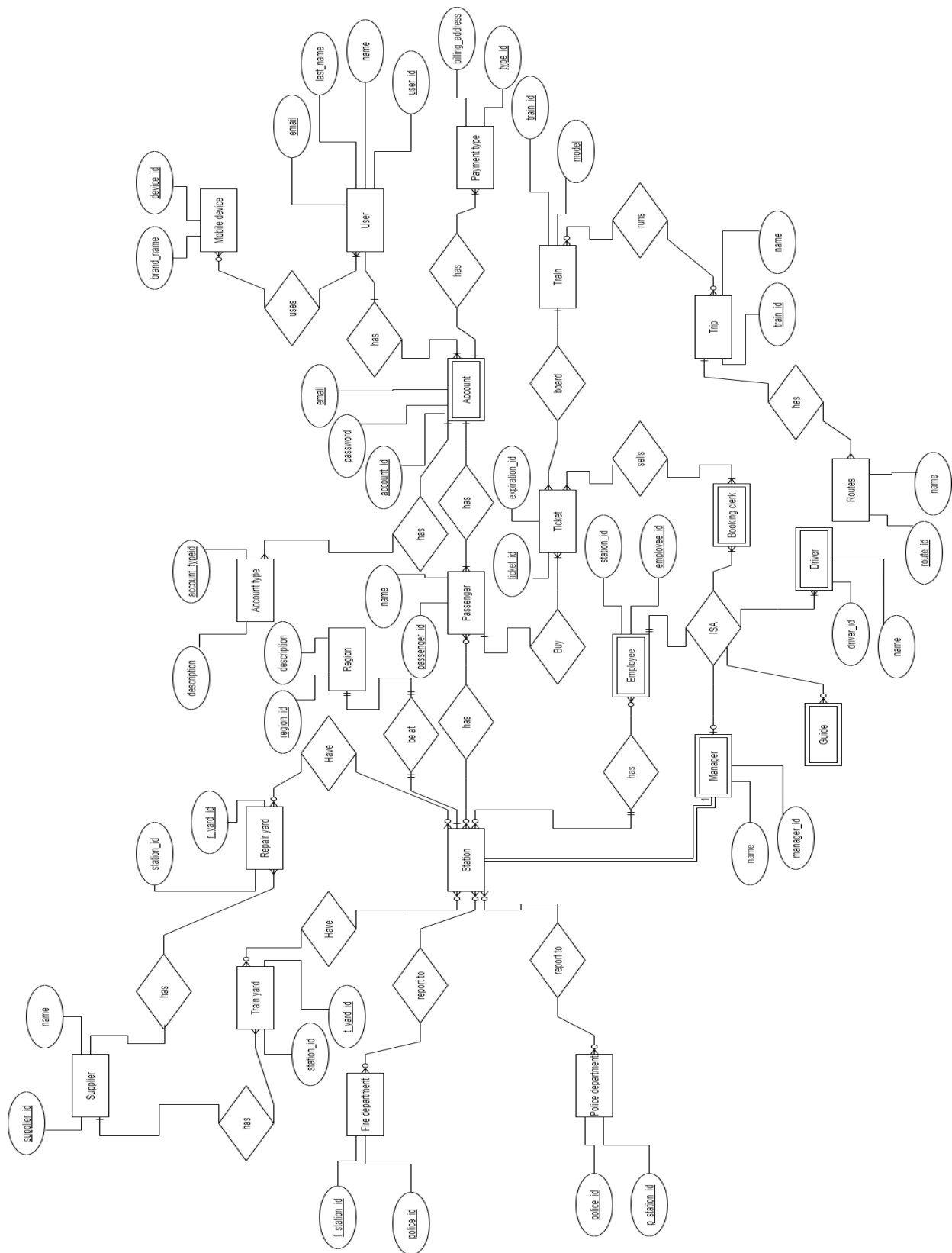
**19) Supplier: Strong**

- a) supplier\_id: key, numeric
- b) name: alphanumeric

**20) Mobile device: Strong**

- a) device\_id: key, numeric
- b) brand\_name: alphanumeric

# ERD



## Testing Table

Rule	Entity A	Relation	Entity B	Cardinality	P/F	Description
1	Station	has	Passenger	1-to-M	Fail	Can have zero passengers
2	Passenger	be at	Station	0-to-M	Pass	None
3	Station	has	Employee	1-to-M	Pass	None
4	Employee	works	Station	1-to-1	Fail	Employee can work at another station
5	Station	be at	Region	1-to-M	Fail	Station can only be in one region
6	Region	Has	Station	1-to1	Pass	None
7	Station	report to	Police department	1-to-M	Pass	None
8	Station	report to	Fire department	1-to-M	Pass	None
9	Police department	respond to	Station	M-to-M	Pass	None
10	Fire department	respond to	Station	M-to-M	Pass	None
11	Station	have	Train yard	1-to-M	Pass	None
12	Station	have	Repair yard	1-to-M	Pass	None
13	Repair yard	in	Station	1-to-M	Pass	None
14	Train yard	in	Station	1-to-M	Pass	None
15	Booking clerk	is a	Employee	ISA	Pass	None
16	Driver	is a	Employee	ISA	Pass	None
17	Guide	is a	Employee	ISA	Pass	None
18	Manager	is a	Employee	ISA (should be Recursive)	Fail	This is a Recursive relationship one manager will manage one station
19	Passenger	has	Account	1-to-M	Fail	A passenger should only have one account

<b>20</b>	Account	represent	Passenger	1-to-1	Fail	A passenger could make more than one account
<b>21</b>	User	has	Account	1-to-M	Pass	None
<b>22</b>	Account	represent	User	M-to-1	Pass	None
<b>23</b>	Passenger	buys	Ticket	1-to-M	Pass	None
<b>24</b>	Ticket	owned by	Passenger	1-to-1	Pass	None
<b>25</b>	Ticket	sold by	Booking clerk	1-to-M	Fail	Many tickets can be sold
<b>26</b>	Booking clerk	sells	Ticket	1-to-M	Pass	None
<b>27</b>	Train	has	Ticket	1-to-M	Pass	None
<b>28</b>	Ticket	board	Train	M-to-1	Pass	None
<b>29</b>	Train	runs	Trip	M-to-M	Pass	None
<b>30</b>	Trip	has	Train	1-to-M	Pass	None
<b>31</b>	Trip	has	Routes	1-to-M	Pass	None
<b>32</b>	Routes	is	Trip	1-to-M	Fail	There are many routes to one trip
<b>33</b>	Train yard	has	Supplier	1-to-1	Pass	None
<b>34</b>	Supplier	supplies	Train yard	1-to-M	Pass	None
<b>35</b>	Repair yard	has	Supplier	1-to-1	Pass	None
<b>36</b>	Supplier	supplies	Repair yard	1-to-M	Pass	None
<b>37</b>	Account	has	Account type	1-to-M	Pass	None
<b>38</b>	Account type	consist of	Account	M-to-1	Pass	None
<b>39</b>	Account	has	Payment Type	1-to-M	Pass	None
<b>41</b>	Payment Type	of	Account	M-to-1	Pass	None
<b>42</b>	User	has	Mobile device	1-to-M	Pass	None
<b>43</b>	Mobile device	used by	User	M-to-1	Pass	None