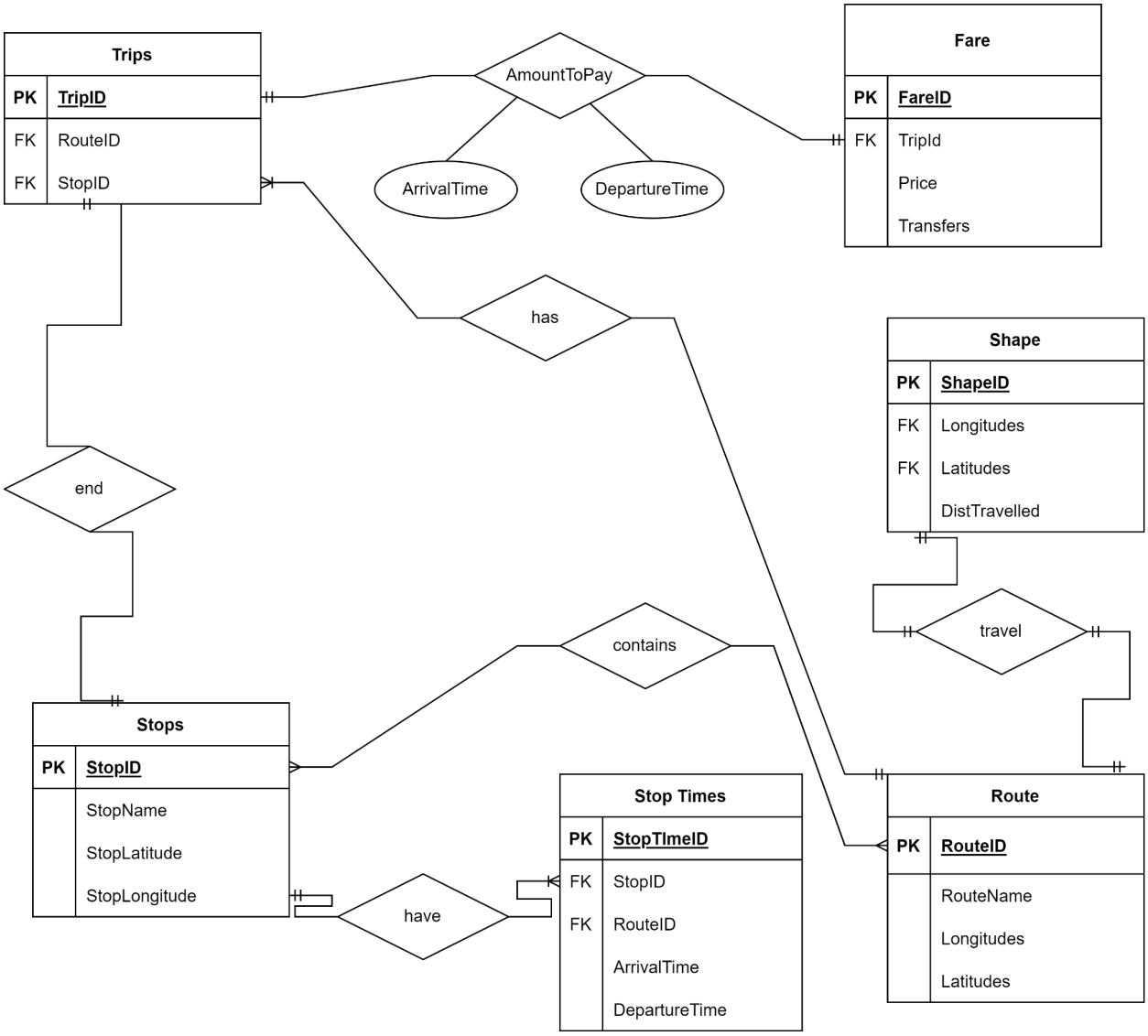
ER Diagram:



Descriptions/Cardinality and Assumptions:

1. Fare: The price of the trip traveled based on the trip taken.
2. Route: Includes the name and the descriptions of each route, as well as the location based on longitude and latitude. One assumption we have made is that each route can have multiple different shapes which is why we have the one to many relation travel. Routes can also be part of different trips, which makes it a one to many relationship that we called has. We are also operating under the assumption that Route will also have a many to many relation with stops called contains since multiple routes can have multiple stops.

3. Shape: Describes a trip path via a series of points through latitude and longitude, as well as the distance traveled during a trip. The relationship between shape and route is one to one.
4. StopTime: The arrival and departure times for every trip and also lists different stops.
5. Stop: Provides information of the name of the stops and where it is located (through latitude and longitude). An assumption we have made for stop is that each stop will have many different stop times which is a one to many relation.
6. Trip: Provides information about different trips for each route, as well as what the trip shape may be. One assumption that we are making is that each trip will have one fare which is a one to one relation that we called AmountToPay. Another assumption is that each trip will have one stop which is represented by a one to one relation with stops called end. Another assumption we made is that there can be multiple trips that have the same route which is why we have the one to many relation has.
7. AmountToPay: Provides information about how much one would pay depending on the specific trips based on arrival and departure times and is a one to one relationship.
8. has: A relation which describes the one to many relationship between routes and trips.
9. have: Describes the one to many relationship between stop and stop times.
10. travel: Describes the one to one relationship between routes and shapes.
11. end: Describes the one to one relationship between trips and stops.
12. contains: Describes the many to many relationship between stops and routes.

<u>Relational Schema:</u>

Fare (FareID: INT [PK], TripID INT [FK], Price REAL, Transfers VARCHAR(255))

Route (RouteID INT [PK], RouteName VARCHAR(255), Longitudes REAL, Latitudes REAL)

Shape (ShapeID INT [PK], Longitudes [FK] REAL, Latitudes [FK] REAL, DistTravelled REAL)

StopTime (StopTimeID INT [PK], StopID INT [FK], ArrivalTime hh:mm:ss, DepartureTime hh:mm:ss, RouteID INT [FK])

Stop (StopID INT [PK], StopName VARCHAR(255), StopLatitude REAL, StopLongitude REAL)

Trip (TripID INT [PK], RouteID INT [FK], StopID INT [FK])

AmountToPay (FareID, TripID, ArrivalTime hh:mm:ss [FK], DepartureTime hh:mm:ss [FK])

contains (StopID, RouteID)