1. **Description**
   1. In this diagram there are no weak entities.
   2. The entities are Bus, Town, Route, Stage, Garage, Driver, Type.
   3. There are many type of Busses. So, “Busses” and “Type” are connected through a relationship.
   4. Busses are passed through a particular route. And Busses are kept in a particular

Garage. So, “Busses” are also connected through relationship with “Route” and “Garage”.

* 1. Some of the Towns have Garages. so, “Town” and “Garage” are connected through a relationship.
  2. A town has many Number of route, and also a route covers one or more town. So,

“Town” and “Route” are connected through a many to many relationships.

* 1. Now, routes also have one or more stage. So, “Route” and “Stage” are connected through a relationship.
  2. A driver drives the bus through many number of stage, and also in a particular stage many drivers drives their busses. So, “Driver” and “Stage” are connected through a many to many relationships.

1. **Attribute**

TOWNS: { Town\_name , State, Area }

BUSSES: { Reg\_no }

TYPE: { Type\_id , Size , Deck , Passenger\_no }

ROUTES: { Route\_no , Avg\_passenger }

DRIVERS: { E\_id , E\_name , Address , Tel\_no }

GARAGE: { G\_id , Capacity}

STAGES: { S\_id }

1. **Relationships**
   1. A bus is allocated to a route and a route may have several busses.
   2. Bus-route (N:1) is serviced by
   3. A route comprises of one or more stages.
   4. Route-stage (1:N) comprises
   5. One or more drivers are allocated to each stage and one driver may drive one or more stages.
   6. Driver-stage (N:M) is allocated
   7. A route passes through some or all of the towns.
   8. Route-town (M:N) passes-through
   9. Some of the towns have a garage.
   10. Garage-town (1:1) is situated
   11. A garage keeps buses and each bus has one `home' garage.
   12. Garage-bus (1:N) is garaged
   13. Each bus has a specific type.
   14. Bus-type(N:1) specified



1. **Normalization of Relational Schema**
   1. **TOWNS table has {Town\_name ,State , Area } attributes.** Town\_name is primary key .

Town\_name -> {State, Area} So , table TOWNS is in 3NF .

* 1. **BUSSES table has { Reg\_no , G-id ,Type\_id, Route\_no} attributes.** Reg\_no is the primary key.

G\_id ,Type\_id, Route\_no are the forgien key related to the GARAGE,TYPE and ROUTE table

Reg\_no ->{ G-id ,Type\_id, Route\_no}

There are no other functional dependency so BUSSES table in 3NF.

* 1. **TYPE table has {Type\_id, Size, Deck, Passenger\_no}** Type\_id ->{ Size, Deck, Passenger\_no}

Type\_id is primary key. So the table is in 3NF.

* 1. **ROUTES table has {Route\_no, Avg\_passenger} attributes.** Route\_no is primary key .

Route\_no -> {Avg\_passenger} So , table TOWNS is in 3NF .

* 1. **DRIVERS table has {E\_id, E\_name, Address, Tel\_no}** E\_id-> {E\_name, Address, Tel\_no}

E\_id is primary key. So the table is in 3NF.

* 1. **GARAGE table has {G\_id, Town\_name, Capacity}**

Town\_name is the forgien key related to the table TOWNS. G\_id -> { Town\_name, Capacity}

G\_id is the only primary key. So the table is in 3NF.

* 1. **STAGES table has {S\_id, Route\_no}**

Route\_no is the forgien key related to the table ROUTES. S\_id -> { Route\_no}

So the table is in 3NF.

* 1. **DRIVE table has {E\_id, S\_id}**

DRIVE table is created to relate DRIVERS and STAGES table. So the table is in 3NF.

1. **PASS table has {Town\_name,Route\_no}**

PASS table is created to relate TOWNS and ROUTES table. So the table is in 3NF.