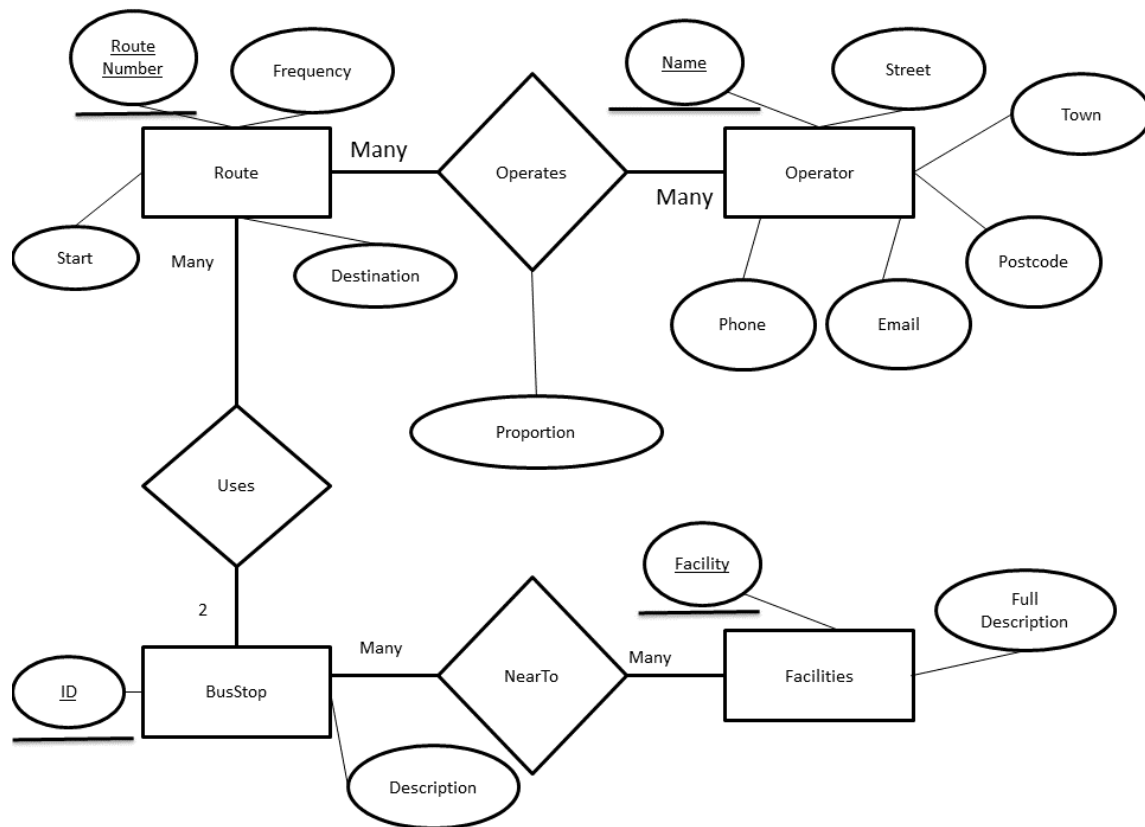
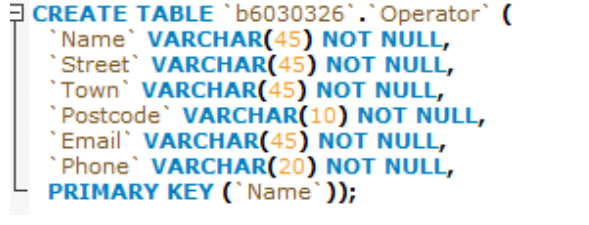
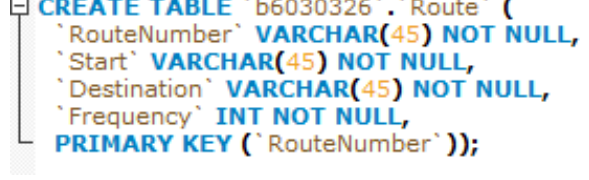


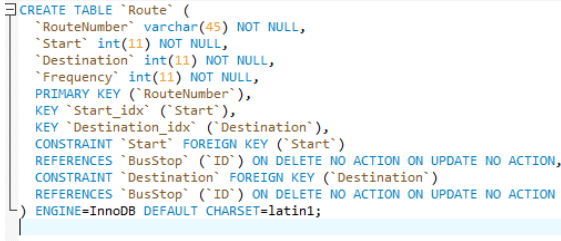
Task 1) Completed E-R Diagram





Task 2) Creating the tables on MySQL

Operator	
Screenshot	Code
	CREATE TABLE `b6030326`.`Operator` (`Name` VARCHAR(45) NOT NULL, `Street` VARCHAR(45) NOT NULL, `Town` VARCHAR(45) NOT NULL, `Postcode` VARCHAR(10) NOT NULL, `Email` VARCHAR(45) NOT NULL, `Phone` VARCHAR(20) NOT NULL, PRIMARY KEY (`Name`));

Route	
Screenshot	Code
	CREATE TABLE `b6030326`.`Route` (`RouteNumber` VARCHAR(45) NOT NULL, `Start` VARCHAR(45) NOT NULL, `Destination` VARCHAR(45) NOT NULL, `Frequency` INT NOT NULL, PRIMARY KEY (`RouteNumber`));

Append one – Changed Start and Destination to INTS –From VarChar	
<pre>ALTER TABLE `b6030326`.`Route` CHANGE COLUMN `Start` `Start` INT(11) NOT NULL, CHANGE COLUMN `Destination` `Destination` INT(11) NOT NULL;</pre>	
<p>Screenshot</p>  <pre>CREATE TABLE `Route` (`RouteNumber` varchar(45) NOT NULL, `Start` int(11) NOT NULL, `Destination` int(11) NOT NULL, `Frequency` int(11) NOT NULL, PRIMARY KEY (`RouteNumber`)) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>	<p>Code</p> <pre>CREATE TABLE `Route` (`RouteNumber` varchar(45) NOT NULL, `Start` int(11) NOT NULL, `Destination` int(11) NOT NULL, `Frequency` int(11) NOT NULL, PRIMARY KEY (`RouteNumber`)) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>
Append 2 – Changed Start and Destination to foreign keys	
<pre>ALTER TABLE `b6030326`.`Route` ADD INDEX `Start_idx` (`Start` ASC), ADD INDEX `Destination_idx` (`Destination` ASC); ALTER TABLE `b6030326`.`Route` ADD CONSTRAINT `Start` FOREIGN KEY (`Start`) REFERENCES `b6030326`.`BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION, ADD CONSTRAINT `Destination` FOREIGN KEY (`Destination`) REFERENCES `b6030326`.`BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION;</pre>	
<p>ScreenShot</p>  <pre>CREATE TABLE `Route` (`RouteNumber` varchar(45) NOT NULL, `Start` int(11) NOT NULL, `Destination` int(11) NOT NULL, `Frequency` int(11) NOT NULL, PRIMARY KEY (`RouteNumber`), KEY `Start_idx` (`Start`), KEY `Destination_idx` (`Destination`), CONSTRAINT `Start` FOREIGN KEY (`Start`) REFERENCES `BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Destination` FOREIGN KEY (`Destination`) REFERENCES `BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>	<p>Code</p> <pre>CREATE TABLE `Route` (`RouteNumber` varchar(45) NOT NULL, `Start` int(11) NOT NULL, `Destination` int(11) NOT NULL, `Frequency` int(11) NOT NULL, PRIMARY KEY (`RouteNumber`), KEY `Start_idx` (`Start`), KEY `Destination_idx` (`Destination`), CONSTRAINT `Start` FOREIGN KEY (`Start`) REFERENCES `BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Destination` FOREIGN KEY (`Destination`) REFERENCES `BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>

BusStop	
Screenshot	Code
 <pre>CREATE TABLE `b6030326`.`BusStop` (`ID` INT NOT NULL, `Description` VARCHAR(45) NOT NULL, PRIMARY KEY (`ID`));</pre>	<pre>CREATE TABLE `b6030326`.`BusStop` (`ID` INT NOT NULL, `Description` VARCHAR(45) NOT NULL, PRIMARY KEY (`ID`));</pre>

Facilities	
Screenshot	Code
<pre>CREATE TABLE `b6030326`.`Facilities` (`Facility` VARCHAR(45) NOT NULL, `FullDescription` VARCHAR(255) NOT NULL, PRIMARY KEY (`Facility`));</pre>	<pre>CREATE TABLE `b6030326`.`Facilities` (`Facility` VARCHAR(45) NOT NULL, `FullDescription` VARCHAR(255) NOT NULL, PRIMARY KEY (`Facility`));</pre>
Append one – spelled Facility correctly	
<pre>ALTER TABLE `b6030326`.`Facilities` CHANGE COLUMN `Facility` `Facility` VARCHAR(45) NOT NULL ;</pre>	<pre>ALTER TABLE `b6030326`.`Facilities` CHANGE COLUMN `Facility` `Facility` VARCHAR(45) NOT NULL ;</pre>
Screenshot	Code
 <pre>CREATE TABLE `Facilities` (`Facility` varchar(45) NOT NULL, `FullDescription` varchar(255) NOT NULL, PRIMARY KEY (`Facility`)) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>	<pre>CREATE TABLE `Facilities` (`Facility` varchar(45) NOT NULL, `FullDescription` varchar(255) NOT NULL, PRIMARY KEY (`Facility`)) ENGINE=InnoDB DEFAULT CHARSET=latin1;</pre>

NearTo	
Screenshot	Code
<pre>CREATE TABLE `b6030326`.`NearTo` (`ID` INT NOT NULL, `Facility` VARCHAR(45) NULL, INDEX `ID_idx` (`ID` ASC), INDEX `Facility_idx` (`Facility` ASC), CONSTRAINT `ID` FOREIGN KEY (`ID`) REFERENCES `b6030326`.`BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Facility` FOREIGN KEY (`Facility`) REFERENCES `b6030326`.`Facilities` (`Facility`) ON DELETE NO ACTION ON UPDATE NO ACTION);</pre>	<pre>CREATE TABLE `b6030326`.`NearTo` (`ID` INT NOT NULL, `Facility` VARCHAR(45) NULL, INDEX `ID_idx` (`ID` ASC), INDEX `Facility_idx` (`Facility` ASC), CONSTRAINT `ID` FOREIGN KEY (`ID`) REFERENCES `b6030326`.`BusStop` (`ID`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Facility` FOREIGN KEY (`Facility`) REFERENCES `b6030326`.`Facilities` (`Facility`) ON DELETE NO ACTION ON UPDATE NO ACTION);</pre>

Operates	
Screenshot	Code
<pre>CREATE TABLE `b6030326`.`Operates` (`RouteNumber` VARCHAR(45) NOT NULL, `Name` VARCHAR(45) NOT NULL, `Proportion` FLOAT(5,1) NOT NULL, PRIMARY KEY (`RouteNumber`, `Name`), INDEX `Name_idx` (`Name` ASC), CONSTRAINT `RouteNumber` FOREIGN KEY (`RouteNumber`) REFERENCES `b6030326`.`Route` (`RouteNumber`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Name` FOREIGN KEY (`Name`) REFERENCES `b6030326`.`Operator` (`Name`) ON DELETE NO ACTION ON UPDATE NO ACTION);</pre>	<pre>CREATE TABLE `b6030326`.`Operates` (`RouteNumber` VARCHAR(45) NOT NULL, `Name` VARCHAR(45) NOT NULL, `Proportion` FLOAT(5,1) NOT NULL, PRIMARY KEY (`RouteNumber`, `Name`), INDEX `Name_idx` (`Name` ASC), CONSTRAINT `RouteNumber` FOREIGN KEY (`RouteNumber`) REFERENCES `b6030326`.`Route` (`RouteNumber`) ON DELETE NO ACTION ON UPDATE NO ACTION, CONSTRAINT `Name` FOREIGN KEY (`Name`) REFERENCES `b6030326`.`Operator` (`Name`) ON DELETE NO ACTION ON UPDATE NO ACTION);</pre>

Task 2 ii) – Adding in the data to the tables

1) Inserting the facilities

```
INSERT INTO `b6030326`.`Facilities` (`Facility`, `FullDescription`) VALUES ('Bike rack', 'Bicycle rack within 200m of the bus stop');
INSERT INTO `b6030326`.`Facilities` (`Facility`, `FullDescription`) VALUES ('Cashpoint', 'Cashpoint within 200m of the bus stop');
INSERT INTO `b6030326`.`Facilities` (`Facility`, `FullDescription`) VALUES ('Toilet', 'Public toilet within 400m of the bus stop');
```

2) Inserting operators

```
INSERT INTO `b6030326`.`Operator` (`Name`, `Street`, `Town`, `Postcode`, `Email`, `Phone`) VALUES ('Venture Travel', 'Venture House', 'Consett', 'DH8 8SV', 'info@venturetravel.co.uk', '01207 222 145');
INSERT INTO `b6030326`.`Operator` (`Name`, `Street`, `Town`, `Postcode`, `Email`, `Phone`) VALUES ('OK Travel', 'Bondgate', 'Durham', 'DH2 2BC', 'passengerservices@ok.com', '0191 301 3012');
INSERT INTO `b6030326`.`Operator` (`Name`, `Street`, `Town`, `Postcode`, `Email`, `Phone`) VALUES ('Lockey's', 'The Garage', 'Durham', 'DH1 1AB', 'contact@lockeysbuses.co.uk', '0191 340 1934');
INSERT INTO `b6030326`.`Operator` (`Name`, `Street`, `Town`, `Postcode`, `Email`, `Phone`) VALUES ('Bond Brothers', 'Coronation Terrace', 'Durham', 'DH2 3AG', 'jeff.bond@bondbuses.com', '0191 333 1234');
INSERT INTO `b6030326`.`Operator` (`Name`, `Street`, `Town`, `Postcode`, `Email`, `Phone`) VALUES ('Diamond Buses', 'Diamond Buildings', 'Newcastle', 'NE2 5JH', 'info@diamondbuses.co.uk', '0191 267 8937');
```

3) Inserting BusStop

```
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('1015', 'Quayside');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('1023', 'Ferry terminal');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('1500', 'City Centre');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('6700', 'Airport');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('7628', 'Shopping Centre');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('9015', 'Railway Station');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('9016', 'Railway Station');
INSERT INTO `b6030326`.`BusStop` (`ID`, `Description`) VALUES ('9022', 'Park Gates');
```

4) Insert Route

```
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 1', 'Railway Station (Stop 9015)', 'Park Gates', '2');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 16', 'Shopping Centre', 'City Centre', '6');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 16a', 'Shopping Centre', 'Park Gates', '2');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 21', 'Ferry Terminal', 'Quayside', '4');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 22', 'Ferry Terminal', 'City Centre', '1');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 30', 'Quayside', 'City Centre', '4');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 64', 'Railway station (Stop 9015)', 'Shopping Centre', '6');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 88', 'Railway Station (Stop 9016)', 'Quayside', '2');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 100', 'Airport', 'City Centre', '4');
INSERT INTO `b6030326`.`Route` (`RouteNumber`, `Start`, `Destination`, `Frequency`) VALUES ('Route 111', 'Airport', 'Railway Station (Stop 9016)', '4');
```

I realised I had made a mistake and updated start and destination to contain the Bus stops ID.

```
UPDATE `b6030326`.`Route` SET `Start`='9015', `Destination`='9022' WHERE `RouteNumber`='Route 1';
UPDATE `b6030326`.`Route` SET `Start`='6700', `Destination`='1500' WHERE `RouteNumber`='Route 100';
UPDATE `b6030326`.`Route` SET `Start`='6700', `Destination`='9016' WHERE `RouteNumber`='Route 111';
UPDATE `b6030326`.`Route` SET `Start`='7628', `Destination`='1500' WHERE `RouteNumber`='Route 16';
UPDATE `b6030326`.`Route` SET `Start`='7628', `Destination`='9022' WHERE `RouteNumber`='Route 16a';
UPDATE `b6030326`.`Route` SET `Start`='1023', `Destination`='1015' WHERE `RouteNumber`='Route 21';
UPDATE `b6030326`.`Route` SET `Start`='1023', `Destination`='1500' WHERE `RouteNumber`='Route 22';
UPDATE `b6030326`.`Route` SET `Start`='1015', `Destination`='1500' WHERE `RouteNumber`='Route 30';
UPDATE `b6030326`.`Route` SET `Start`='9015', `Destination`='7628' WHERE `RouteNumber`='Route 64';
UPDATE `b6030326`.`Route` SET `Start`='9016', `Destination`='1015' WHERE `RouteNumber`='Route 88';
```

5) Insert NearTo

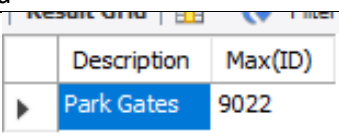
```
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1015', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1015', 'Bike rack');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1023', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1023', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1500', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1500', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('1500', 'Bike rack');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('6700', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('6700', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('6700', 'Bike rack');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('7628', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('7628', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('7628', 'Bike rack');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9015', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9015', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9015', 'Bike rack');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9016', 'Toilet');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9016', 'Cashpoint');
INSERT INTO `b6030326`.`NearTo` (`ID`, `Facility`) VALUES ('9016', 'Bike rack');
```

6) Insert operates


```
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 1', 'Venture Travel', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 16', 'Diamond Buses', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 16a', 'Diamond Buses', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 21', 'Bond Brothers', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 22', 'Bond Brothers', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 30', 'Bond Brothers', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 64', 'Lockey's', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 88', 'Venture Travel', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 100', 'OK Travel', '100');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 111', 'Venture Travel', '50');
INSERT INTO `b6030326`.`Operates` (`RouteNumber`, `Name`, `Proportion`) VALUES ('Route 111', 'OK Travel', '50');
```


Task 3

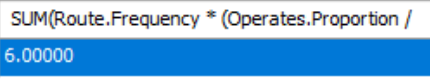
Question 1) What is the location of the bus stop with the highest stop ID?

Code	Produced
<pre>SELECT Description ,Max(ID) FROM BusStop WHERE ID = (SELECT Max(ID) FROM BusStop);</pre>	
<pre>SELECT Description ,Max(ID) FROM BusStop WHERE ID = (SELECT Max(ID) FROM BusStop);</pre>	

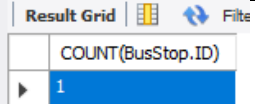
Question 2) List the name and phone number of the bus operators serving the Park Gates.

Code	Produced
<pre>SELECT Operator.Name, Operator.Phone FROM Operator, Operates, BusStop, Route WHERE Operator.Name = Operates.Name AND Operates.RouteNumber = Route.RouteNumber AND (Route.Start = BusStop.ID Or Route.Destination = BusStop.ID) AND BusStop.Description = 'Park Gates'</pre>	
<pre>SELECT Operator.Name, Operator.Phone FROM Operator, Operates, BusStop, Route WHERE Operator.Name = Operates.Name AND Operates.RouteNumber = Route.RouteNumber AND (Route.Start = BusStop.ID Or Route.Destination = BusStop.ID) AND BusStop.Description = 'Park Gates'</pre>	

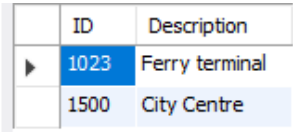
Question 3) How many bus journeys per hour are operated by OK Travel

Code	Produced
<pre>SELECT SUM(Route.Frequency * (Operates.Proportion / 100)) FROM Operates ,Route WHERE Operates.Name = 'OK Travel' AND Operates.RouteNumber = Route. RouteNumber ;</pre>	
<pre>SELECT SUM(Route.Frequency * (Operates.Proportion / 100)) FROM Operates ,Route WHERE Operates.Name = 'OK Travel' AND Operates.RouteNumber = Route. RouteNumber ;</pre>	

Question 4) How many bus stops have no facilities

Code	Produced
<pre>SELECT COUNT(BusStop.ID) FROM BusStop WHERE NOT BusStop.ID IN (SELECT NearTo.ID FROM NearTo);</pre>	
<pre>SELECT COUNT(BusStop.ID) FROM BusStop WHERE NOT BusStop.ID IN (SELECT NearTo.ID FROM NearTo);</pre>	

Question 5) A bus driver working for Bond Brothers needs to withdraw some cash during their break. At which bus stops served by Bond Brothers could they do this easily? You should give the answer as briefly as possible but ensure that your answer includes both the ID and description of the relevant bus stops.

Code	Produced						
<pre>SELECT DISTINCT BusStop.ID, BusStop.Description From BusStop , NearTo, Operates, Route Where BusStop.ID = NearTo.ID AND NearTo.Facility='Cashpoint' AND Operates.Name = 'Bond Brothers' AND Operates.RouteNumber = Route.RouteNumber AND (Route.Start = BusStop.ID OR Route.Destination = BusStop.ID);</pre>	 <table border="1"> <thead> <tr> <th>ID</th><th>Description</th></tr> </thead> <tbody> <tr> <td>1023</td><td>Ferry terminal</td></tr> <tr> <td>1500</td><td>City Centre</td></tr> </tbody> </table>	ID	Description	1023	Ferry terminal	1500	City Centre
ID	Description						
1023	Ferry terminal						
1500	City Centre						
<pre>SELECT DISTINCT BusStop.ID, BusStop.Description From BusStop , NearTo, Operates, Route Where BusStop.ID = NearTo.ID AND NearTo.Facility='Cashpoint' AND Operates.Name = 'Bond Brothers' AND Operates.RouteNumber = Route.RouteNumber AND (Route.Start = BusStop.ID OR Route.Destination = BusStop.ID);</pre>							

Task 4)

Question 1) Keep all the existing entities but add registration number, year of manufacture, seating capacity and brief description to the Operator entity.

This is not valid as it would mean a operator could only have one bus which isn't what we want as it's suggested that some operators have/use more than one bus. It also means that every time we want to edit a bus we would have to edit the operator which may cause issues.

Question 2) Add a new Bus entity containing the attributes of a bus. Join it to the Operator entity with a Many-Many relationship.

This would be invalid. A many – many relationship would suggest that a bus could be shared between multiple different operators which isn't/shouldn't be possible. It would also make contacting the operator difficult as the bus would possibly have multiple different operators.

Question 3) Add a new Bus entity containing the attributes of a bus plus an appropriate attribute for the owning operator. Join it to the Operator entity with a 1-Many relationship.

This would be valid. This means that a bus can only have one operator but an operator could have multiple different buses which is what we expected.

Question 4) Add a new Bus entity containing the attributes of a bus. Join it to the Route entity with a Many-Many relationship.

This is invalid as route to operator is a many to many relationship. This has the same issue as question 2. A many – many relationship would suggest that a bus could be shared between multiple different operators which isn't/shouldn't be possible

Task 5)

The scenario in this assignment said that the council only wanted to store the start and destination of each bus route. However, they are now considering a more detailed approach which would store every single bus stop served by each route. You may assume there is no limit on the number of stops that can be served by a route and that the council do not want to distinguish which of these stops is the start and which is the destination.

The council is aware that the “Uses” relationship now needs to become Many-to-Many (instead of 2-Many). List the other changes you would need to make to the E-R diagram and the database if this approach was to be used.

- ❖ First we need to change the two at ‘BusStops’ to a many
- ❖ On route we probably want to remove the start / destination attributes as that is something that the council no longer wants or requires.

We can do that by

```
ALTER TABLE BusStops  
DROP COLUMN start, destination;
```

- ❖ In the database we need add in a new table called uses which has two primary keys which are also foreign keys. One Key will connect to a bus stop ID another will connect to the Route Number. This means that you can multiple routes connected to multiple Bustops, not just a start and end destination .