Applied Databases
Topic 5 Exercise Sheet

1. Get bus.sql from Moodle and import it into MySQL.

2. How are the tables in the database related?
   The *busReg* column in *driver* is a Foreign Key referencing the *reg* column in *bus*.

3. Add the following drivers:
   "Mary"
   "Bob" – licence number "RN2423"
   "Sean" – licence number "FF88345" who drives bus "191-G-123"
   What happens and why?

   Can't insert "Mary" as she doesn't have a licence.
   INSERT INTO driver (licenceNo, name) values ("RN2423", "Bob");
   INSERT INTO driver values ("FF88345", "Sean", "191-G-123");

4. Add the following buses:
   "12-G-1323" that can hold up to 34 passengers and runs on "Diesel"
   "171-G-885" that can hold up to 84 passengers and runs on "Petrol"
   "191-D-45890" that can hold up to 120 passengers and runs on "Ethanol"
   What happens and why?

   Can't insert "12-G-1323" as reg is primary key and bus of that reg already exists.

   INSERT INTO bus values ("171-G-885", 84, "Petrol");

   Can't insert "191-D-45890" as fuel is an enum, and "Ethanol" is not one of the allowed values.

5. Update driver's licences that contain the letters "F" or "R" to have the letters "T-" before their current licence number.
   update driver
   set licenceNo = CONCAT("T-",licenceNo)
   where licenceNo like "%F%"
   or licenceNo like "%R%";

6. Delete driver "Alan". What happens and why?
   delete from driver
   where name = "Alan";
   The driver is deleted because even though he is referencing foreign key, no other column from any other table is referencing anything in his row.

7. Delete bus "161-d-1323". What happens and why?
   delete from bus where reg = "161-d-1323";

   Bus reg "161-D-1323" is deleted from the bus table.
   Driver "Tom" whose busReg attribute referenced bus "161-D-1323" is also deleted, this is because when defining the Foreign Key on the busReg attribute, it was defined as ON DELETE CASCADE, so anything in this table referencing an the value of an attribute to be deleted in the bus table would also be deleted.

8. Get bus2.sql from Moodle and import it into MySQL. To use this database type `use bus2;`

9. Delete bus "161-d-1323". What happens and why?
   delete from bus where reg = "161-d-1323";

   Bus reg "161-D-1323" is deleted from the bus table.
   Driver "Tom" whose *busReg* attribute referenced bus "161-D-1323" is NOT deleted, but his *busReg* attribute which was referencing bus "161-D-1323" now says NULL instead.

   This is because the Foreign Key on this table is set to ON DELETE CASCADE, meaning any attempt to delete a referenced foreign key will set the value to NULL in this table.

10. Get employees2.sql from Moodle and import it into MySQL. To use this database type `use employees2;`

11. Show the *emp_no*, *first_name* and *last_name* of employees born in the *average* year.
    The average year should be rounded down to the nearest whole number. For example,
    - 1949.1 becomes 1949.
    - 1949.9 becomes 1949.
    - 1949.0 becomes 1949.

    ```
    select emp_no, first_name, last_name from employees
    where year(birth_date) = (
     select floor(avg(year(birth_date))) from employees
    );
    ```

12. Show the *emp_no*, *first_name*, *last_name* and name of the department each employee is in.

    ```
    select distinct e.emp_no, e.first_name, e.last_name, d.name
    from employees e
    inner join salaries s
      on e.emp_no = s.emp_no
    inner join dept d
      on s.dept_no = d.dept_no
    where e.gender = "M"
    and month(birth_date) = 9;
    ```