1. Module number	*INF08104*
2. Module title	*Database Technology*
3. Module leader	*Andrew Cumming*
4. Tutor with responsibility for this Assessment Student's first point of contact	*Brian Davison* *Taoxin Peng*
5. Assessment	*SQL – Helpdesk*
6. Weighting	*50%*
7. Size and/or time limits for assessment	*Section 1 Five (of 15) problems to be attempted.* *1-5 attract a maximum of 5 points each* *6-10 attract a maximum of 8 points each* *11-15 attract a maximum of 12 points each* *Section 2 – up to 20 points*
8. Deadline of submission	*Hand in via Moodle by Nov 12th 23:55*
9. Arrangements for submission	*Answers to all sections in a single document.* *The section one answers should include SQL queries **and** the output generated. Please use appropriately formatted text and not screenshots.*
10. Assessment Regulations All assessments are subject to the University Regulations**.**	
11. The requirements for the assessment	*As described*
12. Special instructions	
13. Return of work	*You will receive feedback via Moodle.*
14. Assessment criteria	*You will be assessed on the accuracy and the quality of your code.*

Coursework Specification

Scenario

A software company has been successful in selling its products to a number of customer organisations, and there is now a high demand for technical support. There is already a system in place for logging support calls taken over the telephone and assigning them to engineers, but it is based on a series of spreadsheets. With the growing volume of data, using the spreadsheet system is becoming slow, and there is a significant risk that errors will be made.

You have been asked to join the design team working on a database to replace the current system. The company has supplied some information about the way the technical support service is currently organised:

- Operating hours are 0800 – 2000
- Each day is split into two six-hour shifts
- Each shift has one telephone operator who logs incoming calls and assigns them to an engineer for attention
- Each shift usually has two engineers, but may have only one at quiet times
- When a call is resolved, the engineer marks it as closed
- A manager is responsible for assigning operators and engineers to shifts
- Each employee of the company is assigned an access level to indicate which of the three roles (operator, engineer and manager) they can play.
- Several people from each customer organisation may call the helpdesk.
- Each customer organisation designates one person as their main company contact

Section One - SELECT Statements (60 points)

The helpdesk database is available in MySQL format from http://sqlzoo.net/helpdesk.sql The ER diagram for the tables is included.

SQL Questions – Choose any 5 questions to answer

1 There are three issues that include the words "index" and "Oracle". Find the call date for each of them

2 Samantha Hall made three calls on 2017-08-14. Show the date and time for each

3 There are 500 calls in the system. Write a query that shows the number that have each status.

4 Calls are not normally assigned to a manager but it does happen. How many calls have been assigned to staff who are at Manager Level?

5 Show the manager for each shift. Your output should include the shift date and type, and also the first and last name of the manager

6 List the Company name and the number of calls for those companies with more than 18 calls.

7 Find the callers who have never made a call. Show first name and last name

8 For each customer show: Company name, contact name, number of calls where the number of calls is fewer than 5

9 For each shift show the number of staff assigned.
Beware that some roles may be NULL and that the same person might have been assigned to multiple roles (The roles are 'Manager', 'Operator', 'Engineer1', 'Engineer2').

10 Caller 'Harry' claims that the operator who took his most recent call was abusive and insulting. Find out who took the call (full name) and when.

11 Show the manager and number of calls received for each hour of the day on 2017-08-12

12 80/20 rule. It is said that 80% of the calls are generated by 20% of the callers. Is this true? What percentage of calls are generated by the most active 20% of callers.

13 Annoying customers. Customers who call in the last five minutes of a shift are annoying. Find the most active customer who has never been annoying.

14 Maximal usage. If every caller registered with a customer makes a call in one day then that customer has "maximal usage" of the service.
List the maximal customers for 2017-08-13.

15 Consecutive calls occur when an operator deals with two callers within 10 minutes. Find the longest sequence of consecutive calls – give the name of the operator and the first and last call date in the sequence.

Section Two – Database Design (20 points)

You are required to extend the helpdesk system to cope with call transfers.

The following facilities are required:

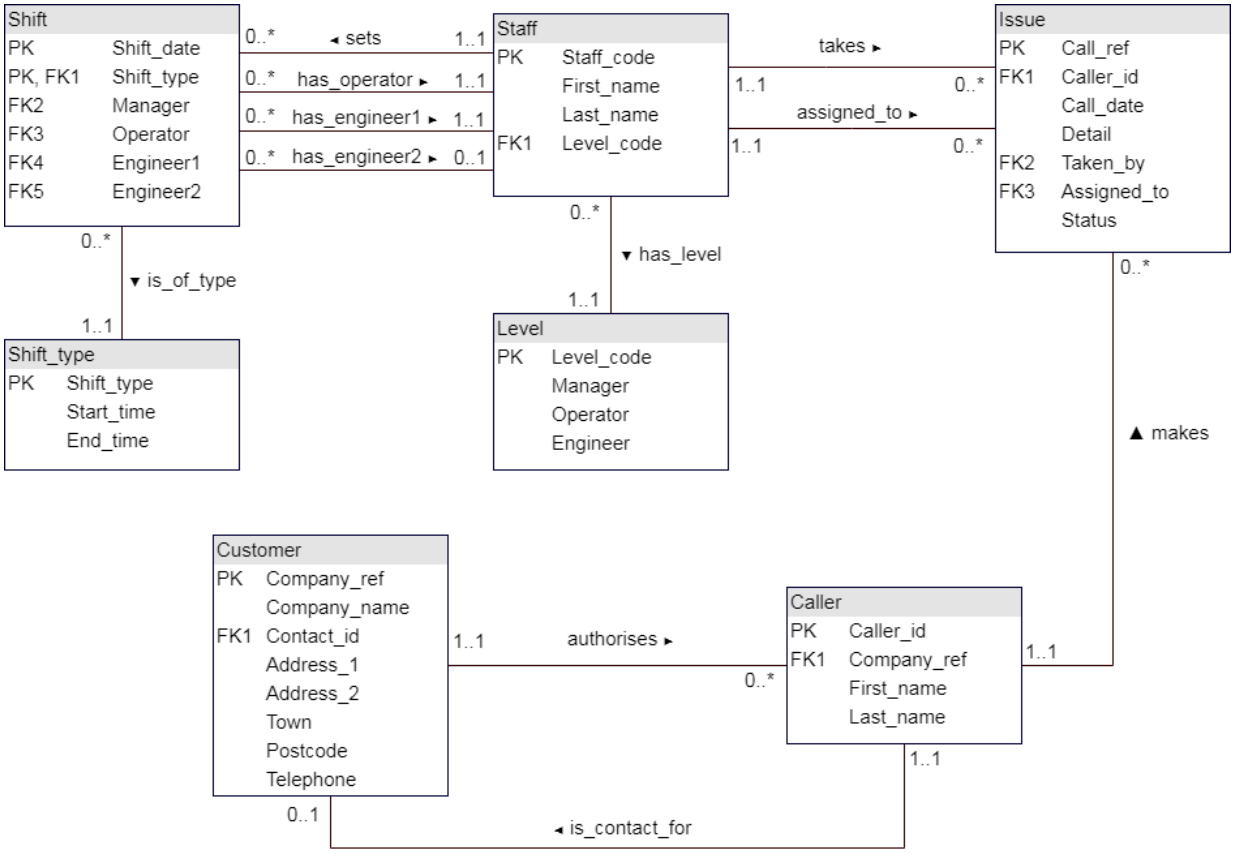
- Calls can be rated by callers. Customers can rate the response received on a 5-point scale.
- A call may be updated without being closed. The following updates are possible:
    - Reassignment - the call should be assigned to another member of staff (we must keep a record of the original assignment)
    - Multiple reassignments of a single call are possible.

The following information is to be recorded:

- Issue 1530 was rated 5 by the caller
- Issue 1531 was rated 1 by the caller
- Call ref 1707 was reassigned to AL1 on 2017-08-16 15:50:00 by DJ1
- The next day, at 08:00, AL1 reassigned the same Issue back to DJ1.

You are required to submit:

1. An update of the ER diagram to include tables/attributes to support these additional features
2. SQL statements to:
    a. alter the database to include any additional tables and attributes required
    b. insert data to reflect the four items above (two ratings and two call reassignments)


Shift
PK Shift_date
PK, FK1 Shift_type
FK2 Manager
FK3 Operator
FK4 Engineer1
FK5 Engineer2
0..* sets 1..1
0..* has_operator ▸ 1..1
0..* has_engineer1 ▸ 1..1
0..* has_engineer2 ▸ 0..1
Staff
PK Staff_code
First_name
Last_name
FK1 Level_code
takes ▸
1..1 0..*
assigned_to ▸
1..1 0..*
Issue
PK Call_ref
FK1 Caller_id
Call_date
Detail
FK2 Taken_by
FK3 Assigned_to
Status
0..* ▾ is_of_type 1..1
Shift_type
PK Shift_type
Start_time
End_time
0..* ▾ has_level 1..1
Level
PK Level_code
Manager
Operator
Engineer
0..* ▲ makes
Customer
PK Company_ref
Company_name
FK1 Contact_id
Address_1
Address_2
Town
Postcode
Telephone
1..1 authorises ▸ 0..*
Caller
PK Caller_id
FK1 Company_ref
First_name
Last_name
1..1
1..1
0..1 ◂ is_contact_for