

5CI022

Coursework

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CC LTD. CORPORATE CONTRACTORS

A specialist recruitment agency finding staff for many different organisations

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Peer Review

I can confirm that Andrei has made contributions equal to my own during this assignment. Throughout he has, communicated regularly and brought good ideas to the table. I would happily work with Andrei again.

David Pearson 1725412

Signed _____

Date _____

I can confirm that Dave has had a key role in this project. His deep insight and database know-how made this project seem easy. I would gladly be part of this team again.

Andrei Zachiteanu 1719810

Signed _____

Date _____

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Part A: Analysis

CC Ltd is a recruitment agency. The agency has several clients that it serves. Temporary workers will register with the agency, looking for work. When a client has a requirement for workers a job is created, and the agency will place temporary workers on the job to meet the client's requirements. After the job has been completed the agency will raise an invoice and send this to client for payment.

Looking at these interactions we have identified the following entities and associated attributes;

| Entity | Description | Attributes |
|----------|--|---|
| Staff | This will hold information on the agency employees/staff. | Staff_ID, Name, DOB, Job Title, Salary |
| Client | This will hold information on the clients that the agency serve, including which agency staff is responsible for them. | Client_ID, Client Name, Address, Contact Name, Contact Email, Contact Number, Staff Contact |
| Temp | This will hold information on the people who are temporary workers. | Temp_ID, Name, DOB, Address, NI Number, Registration Date, Staff Handler, Shifts Worked |
| Job | This will hold the information specific to the job. | Job_ID, Client, Start Date, end Date, Number of Temps, Day rate. |
| Invoice | This will hold all invoices raised by the agency. | Invoice_No, Invoice Date, Total, Temp_Detail, Job_ID, Paid, Due Date, |
| Supplied | This is a link entity between the Temp entity and Job Entity. | Job_ID, Temp_ID |

When looking at the typical business activities it is possible to draw up rules and apply them as relationships to the entities.

| Entities | | Type | Description & Business Rules |
|----------|----------|------|--|
| STAFF | TEMP | 1:M | One member of staff can be responsible for a number of temps, but a temp can only have one staff handler. |
| STAFF | CLIENT | 1:1 | One member of staff will have responsibility for one client, a client will have one key agency staff contact for all dealings. |
| CLIENT | INVOICE | 1:M | A client may have many invoices, but each individual invoice can only belong to one client |
| INVOICE | JOB | 1:M | An invoice can contain many jobs, but a job can only belong to one invoice. |
| TEMP | SUPPLIED | 1:M | A temp can be supplied many times but each time to a different job |
| JOB | SUPPLIED | 1:M | A job can have many temps supplied to it. |

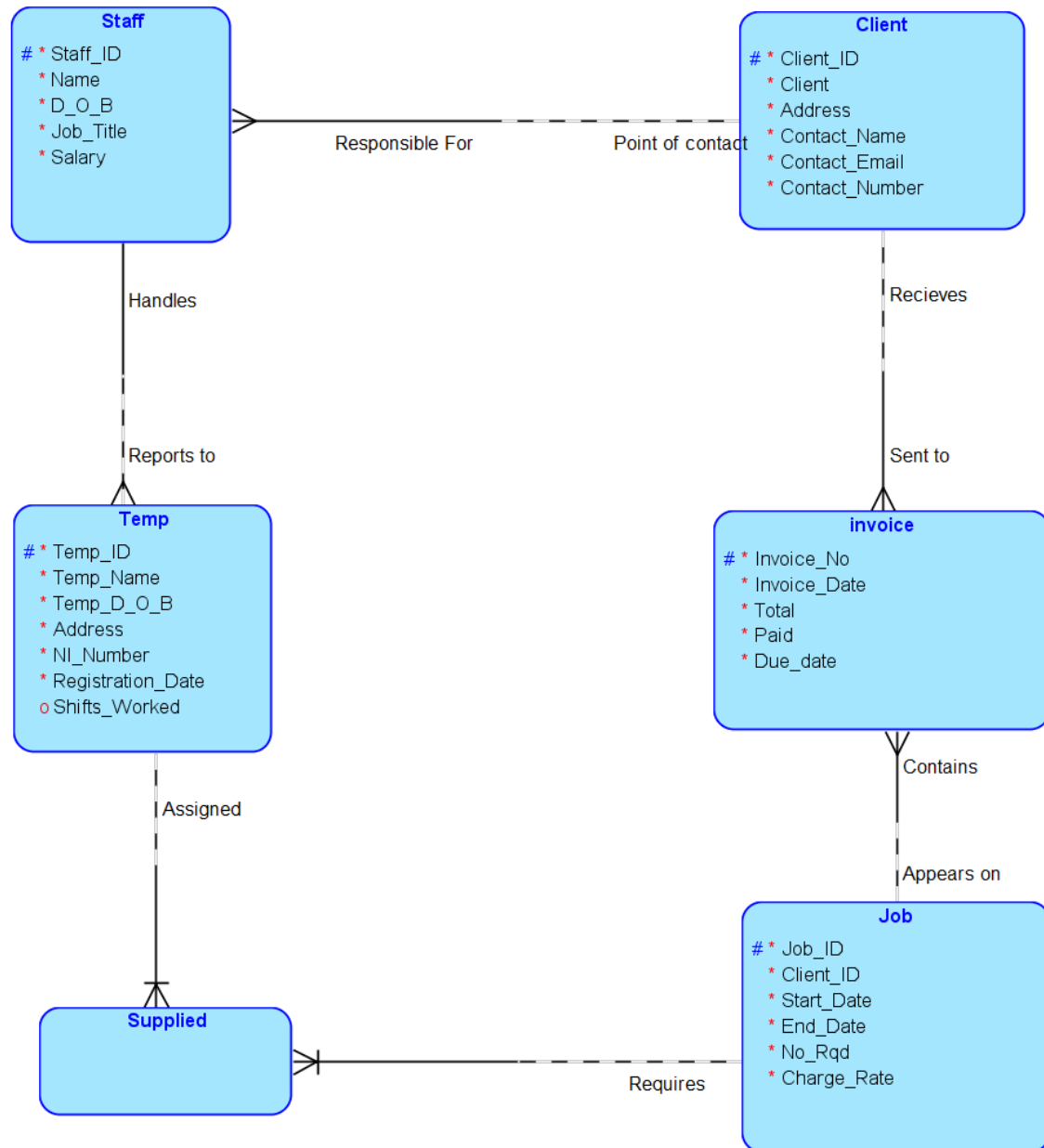
Analysis has shown that the data held within each entity holds importance to business. For example, a client may wish to query an invoice, the only piece of data they have is an invoice number. From this unique key the invoice can be located, the staff are able to see the job details via the Job ID shown on the invoice, similarly the temp details of the workers supplied. With the single piece of data, the business can query the data easily to obtain information required and allow decisions to be made.

On May 25th 2018 GDPR came into force, at its core it could be viewed as set of rules that governs how companies gather, process and record personal data. With specific regard to the database system we are designing consideration must be given to the term "personal data" this is anything that can be used to identify an individual, for example a name, employee number or National Insurance Number of a temporary worker. Looking at how the data will be managed from an ethical standpoint we have considered points such as informed consent of those registering their details with the business. Another argument being confidentiality, this has also been reviewed with consideration given to the security systems and access levels of users to the database. A final point of consideration is how long that data must be held for, a de-registration algorithm process could activate after a temp has not worked for a specified period of time, meeting the requirements of the GDPR.

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Part B: ER Diagram



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Part C: Relational Table Headings

Staff

(Staff_ID, Name, D_O_B, Job_Title, Salary, **Client_ID*)

Client

(Client_ID, Client, Address, Contact_Name, Contact_Email, Contact_Number)

Job

(Job_ID, **Client_ID*, Start_Date, End_Date, No_Rqd, Charge_Rate)

Temp

(Temp_ID, Temp_Name, Temp_D_O_B, Address, NI_Number, Registration_Date, **Staff_ID*, Shifts_Worked)

Invoice

(Invoice_No, Invoice_Date, Total, **Job_ID*, Paid, Due_Date)

Supplied

(*Job_ID, Temp_ID*,)

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Part D: SQL Script to create tables

```
1  drop table Supplied;
2  drop table invoice;
3  drop table temp;
4  drop table job;
5  drop table staff;
6  drop table client;
7
8
9  CREATE TABLE Client
10 (
11     Client_ID          CHAR(6)          CONSTRAINT PK_CLIENT_ID PRIMARY KEY,
12     Client              VARCHAR2(20)     NOT NULL,
13     Address             VARCHAR2(50)     NOT NULL,
14     Contact_Name        VARCHAR2(20)     NOT NULL,
15     Contact_Email       VARCHAR2(40)     NOT NULL,
16     Contact_Number      VARCHAR2(14)     NOT NULL,
17     CONSTRAINT UC_Client UNIQUE (Contact_Email)
18 );
19
20 CREATE TABLE Staff
21 (
22     Staff_ID           CHAR(6)          CONSTRAINT PK_STAFF_ID PRIMARY KEY,
23     Name               VARCHAR2(20)     NOT NULL,
24     D_O_B              DATE             NOT NULL,
25     Job_Title          VARCHAR2(20)     NOT NULL,
26     Salary             NUMERIC(8,2)     NOT NULL,
27     Client_ID          CHAR (6)         CONSTRAINT FK_CLIENTID_INSTAFF
28                                     REFERENCES CLIENT(Client_ID)
29 );
30
31 CREATE TABLE Temp
32 (
33     Temp_ID            CHAR(6)          CONSTRAINT PK_TEMP PRIMARY KEY NOT NULL,
34     Temp_D_O_B         DATE             NOT NULL,
35     Address             VARCHAR(50)     NOT NULL,
36     Temp_Name          VARCHAR(20)     NOT NULL,
37     NI_Number          CHAR(13)         NOT NULL,
38     Registered_Date    DATE             NOT NULL,
39     Shifts_Worked      NUMERIC(4)       NOT NULL,
40     Reports_To         CHAR(6)          CONSTRAINT FK_STAFFID_INTEMP
41                                     REFERENCES Staff(Staff_ID),
42     CONSTRAINT UC_Temp UNIQUE (NI_NUMBER)
43 );
44
45 CREATE TABLE Job
46 (
47     Job_ID             CHAR(6)          CONSTRAINT PK_JOB PRIMARY KEY NOT NULL,
48     Client_ID          CHAR(6)          CONSTRAINT FK_CLIENTID_INJOB REFERENCES CLIENT(Client_ID),
49     Start_Date         DATE             NOT NULL,
50     End_Date           DATE             NOT NULL,
51     No_Rqd             NUMERIC(2)       NOT NULL,
52     Charge_Rate        NUMERIC(5,2)     NOT NULL,
53     CONSTRAINT CHK_Job CHECK (Charge_Rate > 0)
54 );
55
56 CREATE TABLE Invoice
57 (
58     Invoice_NO          CHAR(6)          CONSTRAINT PK_INVOICE PRIMARY KEY NOT NULL,
59     Job_ID              CHAR(6)          CONSTRAINT FK_JOBID_ININVOICE REFERENCES JOB(Job_ID),
60     Invoice_Date        DATE             NOT NULL,
61     Total              NUMERIC(6,2)     NOT NULL,
62     Paid               CHAR(1)          DEFAULT 'N' NOT NULL,
63     Due_Date           DATE,
64     CONSTRAINT CHK_Invoice CHECK (Total > 0)
65 );
66
67 CREATE TABLE Supplied
68 (
69     Job_ID             CHAR(6)          CONSTRAINT FK_JOBID_INSUPPLIED REFERENCES JOB(Job_ID),
70     Temp_ID            CHAR(6)          CONSTRAINT FK_TEMPID_INSUPPLIED REFERENCES TEMP(Temp_ID),
71     PRIMARY KEY (JOB_ID,TEMP_ID)
72 );
```

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Part E: Database Population

SELECT * FROM STAFF

| STAFF_ID | NAME | D_O_B | JOB_TITLE | SALARY | CLIENT_ID |
|----------|------------------|-------------|-------------------|--------|-----------|
| 001SMI | John Smith | 10-JAN-1981 | Managing Director | 95000 | |
| 002ALB | Jazmyn Albert | 11-JUN-1987 | Line Manager | 75000 | |
| 003WIL | Kamal Wilder | 23-MAY-1988 | Line Manager | 75000 | |
| 004SHE | Aiden Shelton | 14-SEP-1972 | Client Manager | 35000 | 99005 |
| 005DEN | Gianluca Denton | 01-MAY-1990 | Client Manager | 35000 | 99001 |
| 006BYR | Alexandre Byrne | 11-DEC-1989 | Client Manager | 35000 | 99002 |
| 007BRA | Zaynah Branch | 10-NOV-1986 | Client Manager | 35000 | 99003 |
| 008CRO | Andy Croft | 09-OCT-1981 | Client Manager | 35000 | 99004 |
| 009BRI | Ruth Britton | 16-AUG-1984 | Client Manager | 35000 | 99006 |
| 010LAM | Darnell Lamb | 11-JAN-1962 | Client Manager | 35000 | 99007 |
| 011MIT | Peter Mitchell | 17-JUL-1962 | Client Manager | 35000 | 99008 |
| 012ROB | Domingo Robinson | 05-AUG-1967 | Client Manager | 35000 | 99009 |
| 013WIL | Lillian Willis | 08-SEP-1972 | Client Manager | 35000 | 99010 |
| 014POT | Kristine Potter | 03-OCT-1972 | Client Manager | 35000 | |
| 015BUL | Mina Bull | 08-AUG-1988 | Temp Handler | 28000 | |
| 016RIT | Rohaam Ritter | 27-JUN-1986 | Temp Handler | 28000 | |

16 rows selected.

SELECT * FROM CLIENT

| CLIENT_ID | CLIENT | ADDRESS | CONTACT_NAME | CONTACT_EMAIL | CONTACT_NUMBER |
|-----------|-----------|--|---------------|---------------------------|----------------|
| 99001 | DHL | 12 Challenger Drive, Walsall, WS12 4EF | Eloise Deacon | Eloise.Deacon@DHL.com | 0121 345 8978 |
| 99002 | Wincanton | 42 Prospect Avenue, Willenhall, WV6 7RT | Axl Decker | Axl.Decker@Wincanton.com | 019202 445566 |
| 99003 | Tesco | 118 Value Street, Minworth, B46 9UY | Everly Swan | Everly.Swan@Tesco.com | 01675 888999 |
| 99004 | Asda | Wallmart House, Tipton, DY4 2GH | Milton Robson | Milton.Robson@Asda.com | 01348 223478 |
| 99005 | Sainsbury | 89 St George Road, Tamworth, B78 7KL | Benas Head | Benas.Head@Sainsbury.com | 01827 123456 |
| 99006 | Amazon | Prime House, Rugley, WS15 8MN | Saul Bullock | Saul.Bullock@Amazon.com | 01889 369852 |
| 99007 | Waitrose | 32 Primrose Business Park, Dordon, B78 5RT | Jed Caldwell | Jed.Caldwell@Waitrose.com | 08445 668978 |
| 99008 | Ebay | 1 Enterprise Road, Wolverhampton, WV1 1AA | Kacie England | Kacie.England@Ebay.com | 01902 752185 |
| 99009 | DPD | 3 Voyager Park, Dudley, DY1 9LK | Dale Pruitt | Dale.Pruitt@DPD.com | 01384 777777 |
| 99010 | Brakes | 77 Orbital Way, Fazeley, B75 0HH | Alesha Walker | Alesha.Walker@Brakes.com | 01827 116548 |

10 rows selected.

SELECT * FROM TEMP

| TEMP_ID | TEMP_D_O_B | ADDRESS | TEMP_NAME | NI_NUMBER | REGISTERED | SHIFTS_WORKED | REPORT |
|---------|-------------|--|-------------------|---------------|-------------|---------------|--------|
| TEM001 | 07-JUN-1972 | 146 MillRoad,TUNBRIDGEWELLS,TN86 8VH | Clinton Anderson | CA 07 06 72 C | 18-SEP-2015 | 22 | 015BUL |
| TEM002 | 16-MAY-1973 | 29 TheAvenue,COVENTRY, CV8 9IZ | Shah Zavala | SZ 16 05 73 B | 20-OCT-2015 | 45 | 016RIT |
| TEM003 | 24-JAN-1978 | 82 Kingsway,CAMBRIDGE,CB23 2NC | Leonidas Truong | LT 24 01 78 A | 29-APR-2016 | 89 | 016RIT |
| TEM004 | 17-JUL-1978 | 471 SpringfieldRoad,GLOUCESTER,GL8 9GN | Aniqa Santiago | AS 17 07 78 D | 18-MAY-2017 | 35 | 015BUL |
| TEM005 | 11-SEP-1979 | 9474 TheGreen,ROCHESTER,ME16 0OM | Aydin Phan | AP 11 09 79 D | 29-AUG-2017 | 2 | 016RIT |
| TEM006 | 04-AUG-1980 | 28 SouthStreet,BOLTON,BL78 8EV | Haris Irvine | HI 04 08 80 B | 04-SEP-2017 | 4 | 016RIT |
| TEM007 | 07-JUN-1985 | 130 QueensRoad,GUILDFORD,GU98 8UJ | Shyla Kirkpatrick | SK 07 06 85 A | 29-SEP-2017 | 7 | 015BUL |
| TEM008 | 19-JUN-1986 | 625 GeorgeStreet,TORQUAY,TQ25 1DE | Fabian Abbott | FA 19 06 86 C | 19-OCT-2017 | 8 | 016RIT |
| TEM009 | 23-NOV-1989 | 211 St.Johns Road,SOUTHALL,UB93 8TL | Francis Huber | FH 23 11 89 B | 25-MAY-2018 | 22 | 015BUL |
| TEM010 | 21-MAY-1990 | 21 RichmondRoad,ILFORD,IG61 3AO | Chiara Michael | CM 21 05 90 A | 10-SEP-2018 | 15 | 015BUL |

10 rows selected.

SELECT * FROM JOB

| JOB_ID | CLIENT_ID | START_DATE | END_DATE | NO_RQD | CHARGE_RATE |
|--------|-----------|-------------|-------------|--------|-------------|
| JOB001 | 99001 | 14-OCT-2018 | 26-NOV-2018 | 3 | 7.9 |
| JOB002 | 99002 | 22-OCT-2018 | 11-NOV-2018 | 4 | 8.3 |
| JOB003 | 99003 | 28-OCT-2018 | 12-NOV-2018 | 2 | 9.45 |
| JOB004 | 99004 | 04-NOV-2018 | 20-JAN-2019 | 8 | 8.59 |
| JOB005 | 99005 | 05-NOV-2018 | 10-FEB-2019 | 9 | 10.2 |
| JOB006 | 99006 | 11-NOV-2018 | 23-DEC-2018 | 2 | 11.4 |
| JOB007 | 99007 | 11-NOV-2018 | 25-FEB-2019 | 4 | 9.15 |
| JOB008 | 99008 | 19-NOV-2018 | 14-JAN-2019 | 3 | 14 |
| JOB009 | 99009 | 19-NOV-2018 | 17-FEB-2019 | 9 | 8.3 |
| JOB010 | 99010 | 26-NOV-2018 | 20-JAN-2019 | 1 | 9.3 |

10 rows selected.

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SELECT * FROM INVOICE

| INVOIC | JOB ID | INVOICE DAT | TOTAL | P | DUE DATE |
|--------|--------|-------------|--------|---|-------------|
| INV001 | JOB001 | 28-JAN-2019 | 274.76 | Y | |
| INV002 | JOB002 | 07-JAN-2019 | 212.75 | N | 07-FEB-2019 |
| INV003 | JOB003 | 06-JAN-2019 | 142.99 | Y | |
| INV004 | JOB004 | 18-FEB-2019 | 267.95 | Y | |
| INV005 | JOB005 | 04-FEB-2019 | 116.73 | Y | |
| INV006 | JOB006 | 27-JAN-2019 | 257.75 | N | 27-FEB-2019 |
| INV007 | JOB007 | 18-FEB-2019 | 196.06 | N | 18-FEB-2019 |
| INV008 | JOB008 | 27-JAN-2019 | 272.07 | N | 27-FEB-2019 |
| INV009 | JOB009 | 07-JAN-2019 | 338.99 | Y | |
| INV010 | JOB010 | 10-FEB-2019 | 288.03 | Y | |

10 rows selected.

SELECT * FROM SUPPLIED

| JOB ID | TEMP ID |
|--------|---------|
| JOB001 | TEM001 |
| JOB001 | TEM002 |
| JOB001 | TEM003 |
| JOB002 | TEM004 |
| JOB002 | TEM005 |
| JOB002 | TEM006 |
| JOB002 | TEM007 |
| JOB003 | TEM008 |
| JOB003 | TEM009 |
| JOB010 | TEM010 |

10 rows selected.

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SQL & Queries

Part F: Use of BETWEEN logical operator

List the complete temp details for temps that have worked between 1 and 5 shifts.

```
SELECT *
FROM Temp
WHERE Shifts Worked BETWEEN 1 AND 5;
```

Results:

| TEMP_I | TEMP_D_O | ADDRESS | TEMP_NAME | NI_NUMBER | REGISTERE | SHIFTS_WORKED | REPORT |
|--------|-----------|----------------------------------|--------------|---------------|-----------|---------------|--------|
| TEM005 | 11-SEP-79 | 9474 TheGreen,ROCHESTER,ME16 0OM | Aydin Phan | AP 11 09 79 D | 29-AUG-17 | 2 | 016RIT |
| TEM006 | 04-AUG-80 | 28 SouthStreet,BOLTON,BL78 8EV | Haris Irvine | HI 04 08 80 B | 04-SEP-17 | 4 | 016RIT |

Part G: DISTINCY Query

List the distinct clients supplied with temps during October

```
SELECT DISTINCT CLIENT
FROM CLIENT,JOB
WHERE CLIENT.CLIENT_ID = JOB.CLIENT_ID
AND JOB.Start_Date BETWEEN TO_DATE ('01-OCT-2018', 'DD-MON-YYYY')
AND TO_DATE ('31-OCT-2018', 'DD-MON-YYYY');
```

Results:

```
CLIENT
-----
Wincanton
DHL
Tesco
```

Part H: TO_CHAR function

List all temps date of birth using full month names not short ones.

```
SELECT TO_CHAR(TEMP_D_O_B,'DDTH MONTH YYYY')
FROM TEMP;
```

Results:

```
TO_CHAR(TEMP_D_O_B,
-----
07TH JUNE          1972
16TH MAY           1973
24TH JANUARY       1978
17TH JULY          1978
11TH SEPTEMBER     1979
04TH AUGUST        1980
07TH JUNE          1985
19TH JUNE          1986
23RD NOVEMBER      1989
21ST MAY           1990
```

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Part I: Aggregate Query

List the average total of unpaid invoices

```
COLUMN Average_outstanding_invoice FORMAT 99,999.00
SELECT AVG (Total) AS Average_outstanding_invoice
FROM INVOICE
WHERE Paid = 'N';
```

Results:

```
AVERAGE_OUTSTANDING_INVOICE
-----
                        234.66
```

Part J: Group By Query

Count all staff grouped by job title

```
SELECT COUNT (STAFF_ID) AS Staff_Count, JOB_TITLE
FROM STAFF
GROUP BY Job_Title;
```

Results:

```
COUNT (STAFF_ID)  JOB_TITLE
-----
                1 Managing Director
                2 Line Manager
               11 Client Manager
                2 Temp Handler
```

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Part K: a SUBQUERY

List who is responsible for the temps supplied to DHL during October

```
SELECT DISTINCT STAFF.NAME AS STAFF_NAME,
  (SELECT CLIENT.CLIENT
    FROM JOB, CLIENT
   WHERE JOB.CLIENT_ID = '99001'
   AND CLIENT.CLIENT_ID = JOB.CLIENT_ID
  ) CLIENT
FROM JOB, TEMP, SUPPLIED, STAFF, CLIENT
WHERE JOB.JOB_ID = SUPPLIED.JOB_ID
AND TEMP.TEMP_ID = SUPPLIED.TEMP_ID
AND TEMP.REPORTS_TO = STAFF.STAFF_ID
AND JOB.Start_Date BETWEEN TO_DATE ('01-OCT-2018', 'DD-MON-YYYY')
AND TO_DATE ('31-OCT-2018', 'DD-MON-YYYY');
```

Results:

| STAFF_NAME | CLIENT |
|---------------|--------|
| ----- | ----- |
| Rohaam Ritter | DHL |
| Mina Bull | DHL |

Outer Join Query

List all employees and if they are responsible for any clients

```
SELECT STAFF.NAME, CLIENT.CLIENT
FROM STAFF
LEFT OUTER JOIN CLIENT
ON STAFF.CLIENT_ID = CLIENT.CLIENT_ID;
```

Results:

| NAME | CLIENT |
|------------------|-----------|
| ----- | ----- |
| Gianluca Denton | DHL |
| Alexandre Byrne | Wincanton |
| Zaynah Branch | Tesco |
| Andy Croft | Asda |
| Aiden Shelton | Sainsbury |
| Ruth Britton | Amazon |
| Darnell Lamb | Waitrose |
| Peter Mitchell | Ebay |
| Domingo Robinson | DPD |
| Lillian Willis | Brakes |
| Rohaam Ritter | |
| Mina Bull | |
| Kristine Potter | |
| Kamal Wilder | |
| Jazmyn Albert | |
| John Smith | |

16 rows selected.

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Part L: a DELETE command

Attempting to delete the temp with an ID that is equal to 'TEM001', we expect this to fail.

```
DELETE
FROM TEMP
WHERE TEMP_ID = 'TEM001';
```

Result:

```
ORA-02292: integrity constraint (OPS$1725412.FK_TEMPID_INSUPPLIED) violated - child record found
```

The DELETE command failed because the temp has a child record associated by the attribute TEMP_ID within the supplied table and is linked by the foreign key named FK_TEMPID_INSUPPLIED.

Attempting to delete invoice number INV010 as it has been raised in error, we expect this to succeed.

```
DELETE
FROM INVOICE
WHERE INVOICE_NO = 'INV010';
```

Result:

```
1 row deleted.
```

The DELETE command was a success and will remain permanent, if and when it is committed to the system, by a method such as typing COMMIT;

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Part M: an UPDATE command

Attempting to UPDATE the staff_id from '012ROB' to '013ROB', based on the FK Client_ID = 99009

```
UPDATE STAFF
SET STAFF_ID = '013ROB'
WHERE CLIENT_ID = '99009';
```

Result:

```
1 row updated.
```

The UPDATE command was successful

Attempting to change the foreign key for Staff_ID '013ROB' to '99999'

```
UPDATE STAFF
SET CLIENT_ID = '99999'
WHERE STAFF_ID = '013ROB';
```

Result:

```
ORA-02291: integrity constraint (OPSS$1719810.FK_CLIENTID_INSTAFF) violated - parent key not found
```

The UPDATE failed as the parent key does not exist.

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Part N: an INSERT command

Attempting to add a new client to the client table.

```
INSERT INTO CLIENT  
VALUES ('99991', 'ERR', 'BLA BLA', 'BLABLa@.com', 'asda', '2323');
```

Result:

```
1 row created.
```

The INSERT command was successful.

Attempting to add a client to the client table.

```
INSERT INTO CLIENT  
VALUES ('99001', 'ERR', 'bla bla', 'bla bla@.com', 'asda', '2323');
```

Result:

```
ORA-00001: unique constraint (OPS$1719810.PK_CLIENT_ID) violated
```

This INSERT command failed as the record already existed and as indicated in the error, this violates the constraint on the primary key.