DATABASE MANAGEMENT (95-703)

DB IMPLEMENTATION PROJECT

Fall 2021

Under guidance of:

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GROUP:

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PART II

B.

Question 1

```
SQL> SET LINESIZE 170
SQL> SET PAGESIZE 70
SQL> COLUMN Employee FORMAT A30
SQL> COLUMN Training FORMAT A30
SQL> SELECT
  2         e.emp_num || ':' || INITCAP(e.fname) || ' ' || INITCAP(e.lname) AS "Employee",
  3         s.code || ':' || INITCAP(s.name) AS "Training",
  4         COUNT(t.train_num) AS "#_of_skills",
  5         MIN(t.date_acquired) AS "Date_Acquired",
  6         TRUNC(MONTHS_BETWEEN(SYSDATE,MAX(t.date_acquired))) AS "Months_since_training"
  7  FROM
  8  training t
  9  JOIN employee e
 10  ON t.emp_num = e.emp_num
 11  JOIN skill s
 12  ON t.code = s.code
 13  GROUP BY
 14  (e.emp_num,e.fname,e.lname,s.code,s.name);
```

Employee	Training	#_of_skills	Date_Acquired	Months_since_training
141:Kamora Shaffer	1009:Cash Flows	1	22-MAR-19	32
117:Veronica Travis	1015:Sql	1	16-MAY-19	30
136:Julien Sullivan	1003:Communication	1	25-MAR-19	32
137:Summer Harding	1016:R Tools	1	26-JUL-19	28
116:Sanai Weaver	1014:Java	1	31-MAY-19	30
105:Steven Buchanan	1013:Html	1	16-MAY-19	30
148:Barbara Graham	1019:Contract Details	1	08-APR-19	31
113:Elaine Harper	1006:Customer Service	1	29-APR-19	31
128:Elliot Silva	1008:Sales Tricks	1	10-APR-19	31
140:Chasity Harris	1009:Cash Flows	1	15-MAR-19	32
140:Chasity Harris	1014:Java	1	08-JUL-21	4

106:Michael Suyama	1014:Java	1	03-NOV-20	12
115:Hermione Arnold	1004:Admin Report	2	21-JAN-19	14
116:Sanai Weaver	1011:Application Development	1	04-MAR-19	32
105:Steven Buchanan	1016:R Tools	1	30-OCT-19	25
105:Steven Buchanan	1014:Java	1	30-MAY-19	30
129:Casey Nolan	1007:Tableau	1	22-MAY-19	30
152:Sarah Clay	1004:Admin Report	1	24-AUG-21	3
102:Nancy Davolio	1001:Financial Management	1	08-MAR-21	8
106:Michael Suyama	1004:Admin Report	1	11-JAN-19	34
133:Khloe Costa	1007:Tableau	1	16-FEB-21	9
125:Marcelo Melton	1023:Analytical Thinking	1	19-FEB-19	33
124:Jared Rivera	1020:Creative Thinking	1	10-APR-19	31
124:Jared Rivera	1022:Advanced Consulting	1	15-FEB-19	33
117:Veronica Travis	1012:Artificial Intelligence	1	24-JUN-21	5
117:Veronica Travis	1016:R Tools	1	04-APR-19	31
148:Barbara Graham	1012:Artificial Intelligence	1	09-DEC-20	11
114:Kellan Bartlett	1011:Application Development	1	06-APR-20	19
153:Jack Smith	1004:Admin Report	1	16-JUL-21	4
102:Nancy Davolio	1012:Artificial Intelligence	1	14-MAR-19	32
133:Khloe Costa	1017:Master Advertising	1	25-JUN-19	29
132:Davis Valdez	1017:Master Advertising	1	04-FEB-19	33
125:Marcelo Melton	1002:Marketing	1	02-JAN-20	23
125:Marcelo Melton	1021:Problem-Solving	1	06-MAR-19	32
137:Summer Harding	1003:Communication	1	04-APR-19	31
116:Sanai Weaver	1013:Html	1	27-MAY-19	30
105:Steven Buchanan	1012:Artificial Intelligence	1	08-MAR-19	32
105:Steven Buchanan	1011:Application Development	1	21-FEB-19	33
113:Elaine Harper	1009:Cash Flows	1	22-APR-20	19
144:Nathalie Buchanan	1017:Master Advertising	1	23-APR-21	7
124:Jared Rivera	1021:Problem-Solving	1	22-MAR-19	32
117:Veronica Travis	1004:Admin Report	1	09-APR-20	19
120:Micaela Woodard	1001:Financial Management	1	01-MAY-19	31
114:Kellan Bartlett	1006:Customer Service	1	16-APR-19	31
113:Elaine Harper	1005:Networking	1	22-FEB-19	33
129:Casey Nolan	1008:Sales Tricks	1	15-APR-19	31
151:Amy Johnson	1004:Admin Report	1	04-AUG-21	3
154:Jamie Johanson	1020:Creative Thinking	1	20-MAY-21	6
125:Marcelo Melton	1018:Pr Communication	1	23-NOV-20	12
125:Marcelo Melton	1013:Html	1	25-JUN-20	17

```
125:Marcelo Melton          1022:Advanced Consulting          1 18-FEB-19                    33
110:Mikayla Schofield       1016:R Tools                      1 03-APR-19                    31
117:Veronica Travis         1009:Cash Flows                   1 20-SEP-19                    26
120:Micaela Woodard         1006:Customer Service             1 09-JUL-20                    16
136:Julien Sullivan         1010:Sas                          1 14-SEP-21                     2
137:Summer Harding          1002:Marketing                    1 04-JUN-19                    29
116:Sanai Weaver            1021:Problem-Solving              1 14-DEC-20                    11
144:Nathalie Buchanan       1018:Pr Communication             1 25-FEB-19                    33
145:Jaslene Gates           1018:Pr Communication             1 05-MAR-19                    32
150:Coby Park               1004:Admin Report                 1 01-JUL-21                     5
124:Jared Rivera            1010:Sas                          1 25-JAN-21                    10
110:Mikayla Schofield       1010:Sas                          1 26-APR-19                    31
117:Veronica Travis         1010:Sas                          1 15-MAY-19                    30
116:Sanai Weaver            1003:Communication                1 13-AUG-21                     3

64 rows selected.
```

Question 2

```
SQL> COLUMN Employee FORMAT A30
SQL> COLUMN Department FORMAT A30
SQL> SELECT LEVEL, LPAD(' ', 3*(LEVEL-1)) || e.emp_num || ':' || INITCAP(e.fname) || ' ' || INITCAP(e.lname) AS "Employee",
  2    d.dept_code || ':' || d.name AS "Department"
  3  FROM employee e, department d
  4  WHERE e.dept_code = d.dept_code
  5  START WITH e.emp_num = (
  6                  SELECT emp_num FROM employee WHERE super_id is null)
  7  CONNECT BY PRIOR e.emp_num = e.super_id;

     LEVEL Employee                       Department
---------- ------------------------------ ------------------------------
         1 107:Ben Wise                   512:Administrative
         2    101:Andrew Fuller           507:IT
         3       102:Nancy Davolio        507:IT
         4          105:Steven Buchanan   507:IT
         4          116:Sanai Weaver      507:IT
         2    103:Janet Leverling         512:Administrative
```

```
3       104:Margaret Peacock     512:Administrative
4          106:Michael Suyama    512:Administrative
4          115:Hermione Arnold   512:Administrative
4          150:Coby Park         512:Administrative
4          151:Amy Johnson       512:Administrative
4          152:Sarah Clay        512:Administrative
4          153:Jack Smith        512:Administrative
2    108:Jeremiah West           506:Data Analysis
3       109:Anika Iles           506:Data Analysis
4          110:Mikayla Schofield 506:Data Analysis
4          117:Veronica Travis   506:Data Analysis
2    111:Gruffydd Pitts          504:Marketing
3       112:Clyde Rayner         504:Marketing
4          113:Elaine Harper     504:Marketing
4          114:Kellan Bartlett   504:Marketing
2    118:Jan Ali                 503:Finance
3       119:Keon Ford            503:Finance
4          120:Micaela Woodard   503:Finance
4          121:Saige Fry         503:Finance
2    122:Rubi Blanchard          505:Consulting
3       123:Sanai Cordova        505:Consulting
4          124:Jared Rivera      505:Consulting
4          125:Marcelo Melton    505:Consulting
4          154:Jamie Johanson    505:Consulting
2    126:Jameson Rivers          508:Sales
3       127:Landon Coleman       508:Sales
4          128:Elliot Silva      508:Sales
4          129:Casey Nolan       508:Sales
2    130:Valery Huynh            509:Advertising
3       131:Alexus Whitaker      509:Advertising
4          132:Davis Valdez      509:Advertising
4          133:Khloe Costa       509:Advertising
2    134:Pierre Cooke            510:Human Resource
3       135:Landin Curry         510:Human Resource
4          136:Julien Sullivan   510:Human Resource
4          137:Summer Harding    510:Human Resource
```

```
         2    138:Kaylyn Macias           511:Accounting
         3       139:Ethan Vazquez        511:Accounting
         4          140:Chasity Harris    511:Accounting
         4          141:Kamora Shaffer    511:Accounting
         2    142:Nathalia Jarvis         513:Public Relations
         3       143:Parker Rojas         513:Public Relations
         4          144:Nathalie Buchanan 513:Public Relations
         4          145:Jaslene Gates     513:Public Relations
         2    146:Nash Hudson             514:Legal
         3       147:Regina Becker        514:Legal
         4          148:Barbara Graham    514:Legal
         4          149:Lizeth Yoder      514:Legal

54 rows selected.
```

Question 3

```
SQL> COLUMN Project_Name FORMAT A30
SQL> SELECT p.proj_number || ':' || p.name AS Project_Name, TO_CHAR(date_assigned, 'MM-YYYY') as month_year,
  2   NVL(COUNT(a.assign_num),0) AS "#_employees",
  3   NVL(SUM(hours_used),0) AS hours_used
  4  FROM assignment a
  5  INNER JOIN
  6   (SELECT * FROM project WHERE total_cost IS NULL)p
  7  ON a.proj_number = p.proj_number
  8  GROUP BY GROUPING SETS((p.proj_number || ':' || p.name,TO_CHAR(date_assigned, 'MM-YYYY')),
  9  p.proj_number || ':' || p.name);

PROJECT_NAME                   MONTH_YEAR     #_employees HOURS_USED
------------------------------ -------------- ----------- ----------
8816:PPSales Campaign          12-2021                  1          0
8816:PPSales Campaign                                   1          0
8815:HBM Annual Report         12-2021                  1          0
8815:HBM Annual Report                                  1          0
8814:EL Contract Review        08-2021                  1        160
```

```
8814:EL Contract Review        09-2021                 1        120
8814:EL Contract Review        11-2021                 1        150
8814:EL Contract Review        12-2021                 1          0
8814:EL Contract Review                                4        430
8817:AA Financial Analysis     12-2021                 1          0
8817:AA Financial Analysis                             1          0

11 rows selected.
```

Question 4

```
SQL> ALTER TABLE Employee
  2  ADD bonus_amt NUMBER(5);

Table altered.

SQL> UPDATE employee e1
  2  SET bonus_amt = (SELECT NVL(bonus,0) FROM
  3  (
  4          SELECT * FROM employee
  5          LEFT OUTER JOIN(
  6                      SELECT emp_num, SUM(bonus_per_project ) bonus
  7  FROM
  8  (
  9          SELECT emp_num, proj_number,SUM(hours_used)"Total Time", 200 bonus_per_project
 10          FROM project JOIN assignment USING (proj_number)
 11          WHERE start_date >= '01-JAN-'|| EXTRACT(YEAR FROM SYSDATE)
 12          AND start_date <='31-MAR-'|| EXTRACT(YEAR FROM SYSDATE)
 13          GROUP BY emp_num, proj_number
 14          HAVING SUM(hours_used)>=150
 15  )
 16      GROUP BY emp_num
 17  )USING(emp_num)
 18  )e2
 19  WHERE e1.emp_num = e2.emp_num
 20  );
```

```
54 rows updated.

SQL> COLUMN Name FORMAT A25
SQL> COLUMN Super_id FORMAT A12
SQL> SELECT emp_num || ':' || INITCAP(fname) || ' ' || INITCAP(lname) AS Name,
  2   DOB,
  3   hire_date,
  4   NVL(TO_CHAR(super_id),'---') AS Super_id,
  5   dept_code, TO_CHAR(bonus_amt, '$9999') AS bonus_amt
  6  FROM employee;

NAME                      DOB         HIRE_DATE   SUPER_ID      DEPT_CODE BONUS_AMT
------------------------- ----------- ----------- ------------ ---------- ------------
107:Ben Wise              31-MAY-64   04-SEP-00   ---                 512     $0
138:Kaylyn Macias         19-JUL-71   23-OCT-05   107                 511     $0
103:Janet Leverling       10-JAN-72   05-APR-05   107                 512     $0
130:Valery Huynh          09-JAN-79   03-MAY-06   107                 509     $0
122:Rubi Blanchard        01-SEP-79   28-MAY-06   107                 505     $0
108:Jeremiah West         10-NOV-71   04-FEB-05   107                 506     $0
118:Jan Ali               08-SEP-72   10-SEP-05   107                 503     $0
134:Pierre Cooke          09-JAN-73   09-OCT-05   107                 510     $0
101:Andrew Fuller         31-JAN-74   28-NOV-05   107                 507     $0
146:Nash Hudson           23-JUL-74   10-JAN-06   107                 514     $0
111:Gruffydd Pitts        07-AUG-76   15-MAR-06   107                 504     $0
142:Nathalia Jarvis       02-MAY-77   24-MAR-06   107                 513     $0
126:Jameson Rivers        26-FEB-81   10-JAN-06   107                 508     $0
139:Ethan Vazquez         26-FEB-81   14-OCT-05   138                 511     $0
104:Margaret Peacock      23-APR-84   22-MAR-06   103                 512     $0
131:Alexus Whitaker       28-MAY-84   06-APR-06   130                 509     $0
123:Sanai Cordova         15-JAN-85   07-JUN-06   122                 505     $0
109:Anika Iles            06-SEP-80   27-NOV-05   108                 506     $0
119:Keon Ford             15-JUN-80   06-JUN-06   118                 503     $0
135:Landin Curry          28-FEB-86   09-AUG-06   134                 510     $0
102:Nancy Davolio         22-DEC-85   23-JUN-06   101                 507   $400
147:Regina Becker         02-OCT-83   18-MAR-06   146                 514     $0
112:Clyde Rayner          08-JAN-81   31-DEC-05   111                 504     $0
143:Parker Rojas          26-JAN-83   05-FEB-06   142                 513     $0
```

127:Landon Coleman	24-DEC-84	28-MAY-06	126	508	$0
140:Chasity Harris	10-APR-93	05-AUG-17	139	511	$0
141:Kamora Shaffer	28-OCT-93	01-DEC-18	139	511	$0
106:Michael Suyama	31-AUG-86	20-AUG-06	104	512	$0
115:Hermione Arnold	16-NOV-93	04-JAN-18	104	512	$0
133:Khloe Costa	18-APR-88	17-APR-09	131	509	$0
132:Davis Valdez	03-MAY-88	18-MAY-11	131	509	$0
125:Marcelo Melton	09-JUN-86	18-AUG-06	123	505	$0
124:Jared Rivera	23-MAY-89	07-JUN-13	123	505	$0
110:Mikayla Schofield	02-MAY-88	28-MAR-10	109	506	$0
117:Veronica Travis	20-JAN-93	25-DEC-17	109	506	$200
120:Micaela Woodard	06-JAN-88	27-MAR-09	119	503	$0
121:Saige Fry	16-NOV-89	10-JUN-14	119	503	$0
136:Julien Sullivan	05-AUG-87	08-OCT-08	135	510	$0
137:Summer Harding	13-FEB-93	27-JUN-17	135	510	$0
116:Sanai Weaver	08-MAY-87	25-MAY-08	102	507	$0
105:Steven Buchanan	12-FEB-93	30-MAR-17	102	507	$200
148:Barbara Graham	10-FEB-90	13-AUG-14	147	514	$0
149:Lizeth Yoder	29-NOV-93	29-AUG-18	147	514	$0
114:Kellan Bartlett	01-DEC-86	10-APR-06	112	504	$0
113:Elaine Harper	27-SEP-91	25-OCT-15	112	504	$0
144:Nathalie Buchanan	29-MAY-88	28-JUL-11	143	513	$0
145:Jaslene Gates	08-AUG-90	17-OCT-15	143	513	$0
128:Elliot Silva	31-AUG-89	28-JAN-14	127	508	$0
129:Casey Nolan	03-OCT-93	16-JAN-18	127	508	$0
150:Coby Park	25-APR-93	01-APR-21	104	512	$0
151:Amy Johnson	31-AUG-89	02-APR-21	104	512	$0
152:Sarah Clay	20-NOV-92	03-APR-21	104	512	$0
153:Jack Smith	11-OCT-90	04-MAR-21	104	512	$0
154:Jamie Johanson	05-AUG-89	20-APR-21	123	505	$0

54 rows selected.

Question 5

The employees in the Administrative department do not run any projects as stated in PART I.

```
SQL> COLUMN Employee FORMAT A20
SQL> COLUMN Hire_date FORMAT A20
SQL> COLUMN Training_received FORMAT A30
SQL> COLUMN date_acquired FORMAT A20
SQL> SELECT
  2  e.emp_num || ':' || INITCAP(e.fname) || ' ' || INITCAP(e.lname) AS "Employee", e.hire_date AS "Hire_date",
  3  NVL(TO_CHAR(t.train_num || ':' || t.name),'---') AS "Training_received", t.date_acquired AS "Date_acquired",
  4  t.date_acquired - e.hire_date AS "Days", NVL("Project_count",0) AS "Project_#"
  5  FROM
  6    (
  7      SELECT *
  8      FROM employee
  9      WHERE hire_date BETWEEN '01-APR-' || EXTRACT(YEAR FROM SYSDATE) and '30-JUN-' || EXTRACT(YEAR FROM SYSDATE)
 10     )e
 11  LEFT JOIN
 12  training t
 13  ON e.emp_num = t.emp_num
 14  LEFT JOIN
 15  (
 16      SELECT emp_num,
 17      COUNT(DISTINCT(proj_number)) AS "Project_count"
 18      FROM assignment
 19      GROUP BY emp_num
 20  )a
 21  ON e.emp_num = a.emp_num;

Employee             Hire_date            Training_received              Date_acquired              Days  Project_#
-------------------- -------------------- ------------------------------ -------------------- ---------- ----------
150:Coby Park        01-APR-21            7428:Coursework                01-JUL-21                  91          0
151:Amy Johnson      02-APR-21            7444:Coursework                04-AUG-21                 124          0
152:Sarah Clay       03-APR-21            7453:Coursework                24-AUG-21                 143          0
154:Jamie Johanson   20-APR-21            7454:Workshop                  20-MAY-21                  30          1
```

Question 6

Assuming that when the time gap between the two assignments for a project is greater than 30 days, then the project is considered to be discontinued.

```
SQL> COLUMN Status FORMAT A12
SQL> SELECT p.proj_number, p.start_date,
  2  CASE
  3  WHEN p.total_cost IS NULL THEN 'Ongoing'
  4  ELSE 'Completed'
  5  END AS Status
  6  FROM
  7      (SELECT A.proj_number, B.date_assigned - A.date_ended AS date_diff
  8  FROM
  9  (
 10         (SELECT proj_number, date_assigned, date_ended,
 11          DENSE_RANK() OVER(PARTITION BY proj_number ORDER BY date_assigned) AS rank1
 12          FROM
 13          assignment
 14          GROUP BY proj_number, date_assigned, date_ended)A
 15     INNER JOIN
 16         (SELECT proj_number, date_assigned,date_ended,
 17          DENSE_RANK() OVER(PARTITION BY proj_number ORDER BY date_assigned) AS rank2
 18          FROM
 19          assignment
 20          GROUP BY proj_number, date_assigned, date_ended)B
 21         ON rank1 = rank2-1 AND A.proj_number = B.proj_number
 22         )
 23  )C
 24  INNER JOIN project p
 25  ON C.proj_number = p.proj_number
 26  WHERE C.date_diff >30;

PROJ_NUMBER START_DATE   STATUS
----------- ------------ ------------
       8813 01-JUL-21    Completed
       8814 02-AUG-21    Ongoing
```

Question 7

```
SQL> COLUMN Quarter FORMAT A20
SQL> SELECT C.Quarter AS "Quarter",
  2    NVL(COUNT(DISTINCT B.proj_number),0) AS "#_Project",
  3    NVL(COUNT(DISTINCT B.emp_num),0) AS "#_Employees",
  4    NVL(ROUND(AVG(B.hours_used)),0) AS "Avg_hours"
  5  FROM(
  6    (
  7          SELECT p.proj_number,
  8          CASE
  9          WHEN p.start_date BETWEEN '01-JAN-21' AND '31-MAR-21' THEN 'Quarter1'
 10          WHEN p.start_date BETWEEN '01-APR-21' AND '30-JUN-21' THEN 'Quarter2'
 11          WHEN p.start_date BETWEEN '01-JUL-21' AND '30-SEP-21' THEN 'Quarter3'
 12          WHEN p.start_date BETWEEN '01-OCT-21' AND '31-DEC-21' THEN 'Quarter4'
 13          END AS Quarter
 14          FROM project p
 15          WHERE p.start_date > '31-DEC-20')C
 16     JOIN
 17  (
 18          SELECT a.proj_number, a.emp_num, a.hours_used,
 19          CASE
 20          WHEN a.date_assigned BETWEEN '01-JAN-21' AND '31-MAR-21' THEN 'Quarter1'
 21          WHEN a.date_assigned BETWEEN '01-APR-21' AND '30-JUN-21' THEN 'Quarter2'
 22          WHEN a.date_assigned BETWEEN '01-JUL-21' AND '30-SEP-21' THEN 'Quarter3'
 23          WHEN a.date_assigned BETWEEN '01-OCT-21' AND '31-DEC-21' THEN 'Quarter4'
 24          END AS Quarter
 25          FROM assignment a)B
 26  ON C.Quarter = B.Quarter AND C.proj_number = B.proj_number
 27  )
 28  GROUP BY C.Quarter;

Quarter               #_Project #_Employees  Avg_hours
-------------------- ---------- ----------- ----------
Quarter1                      3           3        164
Quarter2                      1           2        145
Quarter3                      3           3        153
Quarter4                      3           3          0
```

Question 8

Since there are 12 skills in our Skill table, the output will be very long, we are just printing 5 skills according to the given output in the question.

```
SQL> COLUMN "Employee Name" FORMAT A20
SQL> COLUMN "ID" FORMAT A10
SQL> COLUMN "Number of skills:" FORMAT A20
SQL> COLUMN "Latest Date Acquired" FORMAT A12
SQL> COLUMN "Latest Date Acquired" heading 'Latest|Date|Acquired' justify center
SQL> COLUMN "Number of Skills:" heading 'Number|of|Skills:' justify center
SQL> SELECT TO_CHAR(e.emp_num) AS "ID" ,INITCAP(e.fname) ||' '|| INITCAP(e.lname) AS "Employee Name",
  2          SUM(DECODE(s.code,1004,1,0)) "Admin Report",
  3          NVL(TO_CHAR(MAX(DECODE(s.code,1004,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
  4          SUM(DECODE(s.code,1010,1,0)) "SAS",
  5          NVL(TO_CHAR(MAX(DECODE(s.code,1010,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
  6          SUM(DECODE(s.code,1016,1,0)) "R Tools",
  7          NVL(TO_CHAR(MAX(DECODE(s.code,1016,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
  8   SUM(DECODE(s.code,1009,1,0)) "Cash Flows",
  9          NVL(TO_CHAR(MAX(DECODE(s.code,1009,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 10   SUM(DECODE(s.code,1014,1,0)) "Java",
 11          NVL(TO_CHAR(MAX(DECODE(s.code,1014,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 12          NVL(TO_CHAR(COUNT(t.code)),0) "Number of Skills:"
 13  FROM employee e
 14  LEFT JOIN training t
 15  ON e.emp_num = t.emp_num
 16      LEFT JOIN skill s
 17  ON t.code = s.code
 18  GROUP BY e.emp_num, e.fname,e.lname
 19  UNION ALL
 20  SELECT '---', 'Number of Trainings:' , SUM(F.A),'------', SUM(F.B), '------',SUM(F.C),'------',SUM(F.D),
 21  '------',SUM(F.E),'------','------'
 22  FROM(
 23  SELECT TO_CHAR(e.emp_num) AS "ID",
 24         e.fname ||' '|| e.lname AS "Employee name",
 25          SUM(DECODE(s.code,1004,1,0)) A,
 26          NVL(TO_CHAR(MAX(DECODE(s.code,1004,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 27          SUM(DECODE(s.code,1010,1,0)) B,
```

```
 28           NVL(TO_CHAR(MAX(DECODE(s.code,1010,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 29           SUM(DECODE(S.CODE,1016,1,0)) C,
 30           NVL(TO_CHAR(MAX(DECODE(s.code,1016,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 31   SUM(DECODE(s.code,1009,1,0)) D,
 32           NVL(TO_CHAR(MAX(DECODE(s.code,1009,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 33   SUM(DECODE(s.code,1014,1,0)) E,
 34           NVL(TO_CHAR(MAX(DECODE(s.code,1014,t.date_acquired)),'MM/DD/YY'),'------') "Latest Date Acquired",
 35           NVL(COUNT(t.code),0) "Number of skills:"
 36  FROM employee e
 37  LEFT JOIN training t
 38  ON e.emp_num = t.emp_num
 39      LEFT JOIN skill s
 40  ON t.code = s.code
 41    GROUP BY e.emp_num, e.fname,e.lname
 42    ORDER BY e.emp_num)F;
```

ID	Employee Name	Admin Report	Latest Date Acquired	SAS	Latest Date Acquired	R Tools	Latest Date Acquired	Cash Flows	Latest Date Acquired	Java	Latest Date Acquired	Number of Skills:
124	Jared Rivera	0	------	1	01/25/21	0	------	0	------	0	------	4
154	Jamie Johanson	0	------	0	------	0	------	0	------	0	------	1
104	Margaret Peacock	0	------	0	------	0	------	0	------	0	------	0
142	Nathalia Jarvis	0	------	0	------	0	------	0	------	0	------	0
103	Janet Leverling	0	------	0	------	0	------	0	------	0	------	0
149	Lizeth Yoder	0	------	0	------	0	------	0	------	0	------	0
118	Jan Ali	0	------	0	------	0	------	0	------	0	------	0
147	Regina Becker	0	------	0	------	0	------	0	------	0	------	0
135	Landin Curry	0	------	0	------	0	------	0	------	0	------	0
105	Steven Buchanan	0	------	0	------	1	10/30/19	0	------	1	05/30/19	5
151	Amy Johnson	1	08/04/21	0	------	0	------	0	------	0	------	1
138	Kaylyn Macias	0	------	0	------	0	------	0	------	0	------	0
115	Hermione Arnold	2	09/14/20	0	------	0	------	0	------	0	------	2
145	Jaslene Gates	0	------	0	------	0	------	0	------	0	------	1
114	Kellan Bartlett	0	------	0	------	0	------	0	------	0	------	2
153	Jack Smith	1	07/16/21	0	------	0	------	0	------	0	------	1
123	Sanai Cordova	0	------	0	------	0	------	0	------	0	------	0
131	Alexus Whitaker	0	------	0	------	0	------	0	------	0	------	0
106	Michael Suyama	1	01/11/19	0	------	0	------	0	------	1	11/03/20	2
102	Nancy Davolio	0	------	0	------	0	------	0	------	0	------	2
148	Barbara Graham	0	------	0	------	0	------	0	------	0	------	2
139	Ethan Vazquez	0	------	0	------	0	------	0	------	0	------	0
112	Clyde Rayner	0	------	0	------	0	------	0	------	0	------	0
122	Rubi Blanchard	0	------	0	------	0	------	0	------	0	------	0
110	Mikayla Schofield	0	------	1	04/26/19	1	04/03/19	0	------	0	------	2
137	Summer Harding	0	------	0	------	1	07/26/19	0	------	0	------	3
129	Casey Nolan	0	------	0	------	0	------	0	------	0	------	2
133	Khloe Costa	0	------	0	------	0	------	0	------	0	------	2
150	Coby Park	1	07/01/21	0	------	0	------	0	------	0	------	1
152	Sarah Clay	1	08/24/21	0	------	0	------	0	------	0	------	1
146	Nash Hudson	0	------	0	------	0	------	0	------	0	------	0
126	Jameson Rivers	0	------	0	------	0	------	0	------	0	------	0
109	Anika Iles	0	------	0	------	0	------	0	------	0	------	0

```
130       Valery Huynh               0 ------            0 ------            0 ------            0 ------            0 ------       0
125       Marcelo Melton             0 ------            0 ------            0 ------            0 ------            0 ------       6
140       Chasity Harris             0 ------            0 ------            0 ------            1 03/15/19          1 07/08/21     2
121       Saige Fry                  0 ------            0 ------            0 ------            0 ------            0 ------       0
107       Ben Wise                   0 ------            0 ------            0 ------            0 ------            0 ------       0
134       Pierre Cooke               0 ------            0 ------            0 ------            0 ------            0 ------       0
119       Keon Ford                  0 ------            0 ------            0 ------            0 ------            0 ------       0
108       Jeremiah West              0 ------            0 ------            0 ------            0 ------            0 ------       0
113       Elaine Harper              0 ------            0 ------            0 ------            1 04/22/20          0 ------       3
144       Nathalie Buchanan          0 ------            0 ------            0 ------            0 ------            0 ------       2
141       Kamora Shaffer             0 ------            0 ------            0 ------            1 03/22/19          0 ------       1
136       Julien Sullivan            0 ------            1 09/14/21          0 ------            0 ------            0 ------       2
120       Micaela Woodard            0 ------            0 ------            0 ------            0 ------            0 ------       2
101       Andrew Fuller              0 ------            0 ------            0 ------            0 ------            0 ------       0
111       Gruffydd Pitts             0 ------            0 ------            0 ------            0 ------            0 ------       0
132       Davis Valdez               0 ------            0 ------            0 ------            0 ------            0 ------       1
116       Sanai Weaver               0 ------            0 ------            0 ------            0 ------            1 05/31/19     5
117       Veronica Travis            1 04/09/20          1 05/15/19          1 04/04/19          1 09/20/19          0 ------       6
128       Elliot Silva               0 ------            0 ------            0 ------            0 ------            0 ------       1
143       Parker Rojas               0 ------            0 ------            0 ------            0 ------            0 ------       0
127       Landon Coleman             0 ------            0 ------            0 ------            0 ------            0 ------       0
---       Number of Trainings:       8 ------            4 ------            4 ------            4 ------            4 ------       ------

55 rows selected.
```

Question 9

```
SQL> BREAK ON Name
SQL> COLUMN Name FORMAT A30
SQL> COLUMN Trained_skill FORMAT A40
SQL> SELECT dept_code || ':' || dept_name AS Name,
  2    skill_code || ':' || skill_name AS Trained_skill, skill_count,
  3    DENSE_RANK() OVER (partition by dept_code ORDER BY skill_count DESC) AS rankings
  4  FROM
  5  (
  6   SELECT A.dept_code, dept_name, skill_code, skill_name, COUNT(DISTINCT t.train_num) AS skill_count
  7   FROM
  8         (SELECT d.dept_code, d.name AS dept_name, s.code AS skill_code, s.name AS skill_name
  9          FROM department d
 10          CROSS JOIN skill s) A
 11  LEFT JOIN employee e
 12  ON A.dept_code = e.dept_code
 13  LEFT JOIN training t
 14  ON A.skill_code = t.code AND t.emp_num = e.emp_num
 15  GROUP BY A.dept_code, dept_name, skill_code, skill_name
 16  );
```

NAME	TRAINED_SKILL	SKILL_COUNT	RANKINGS
503:Finance	1006: Customer Service	1	1
	1001: Financial Management	1	1
	1019: Contract Details	0	2
	1018: PR Communication	0	2
	1005: Networking	0	2
	1009: Cash Flows	0	2
	1013: HTML	0	2
	1015: SQL	0	2
	1020: Creative Thinking	0	2
	1022: Advanced Consulting	0	2
	1010: SAS	0	2
	1016: R tools	0	2
	1017: Master Advertising	0	2
	1002: Marketing	0	2
	1003: Communication	0	2
	1004: Admin Report	0	2
	1021: Problem-solving	0	2
	1014: Java	0	2
	1023: Analytical Thinking	0	2
	1008: Sales Tricks	0	2
	1007: Tableau	0	2
	1012: Artificial Intelligence	0	2
	1011: Application Development	0	2
504:Marketing	1006: Customer Service	2	1
	1005: Networking	1	2
	1011: Application Development	1	2
	1009: Cash Flows	1	2
	1016: R tools	0	3
	1007: Tableau	0	3
	1008: Sales Tricks	0	3
	1019: Contract Details	0	3
	1002: Marketing	0	3
	1004: Admin Report	0	3
	1013: HTML	0	3

	1014: Java	0	3
	1022: Advanced Consulting	0	3
	1020: Creative Thinking	0	3
	1021: Problem-solving	0	3
	1015: SQL	0	3
	1010: SAS	0	3
	1012: Artificial Intelligence	0	3
	1003: Communication	0	3
	1023: Analytical Thinking	0	3
	1017: Master Advertising	0	3
	1001: Financial Management	0	3
	1018: PR Communication	0	3
505:Consulting	1021: Problem-solving	2	1
	1020: Creative Thinking	2	1
	1022: Advanced Consulting	2	1
	1023: Analytical Thinking	1	2
	1018: PR Communication	1	2
	1010: SAS	1	2
	1013: HTML	1	2
	1002: Marketing	1	2
	1012: Artificial Intelligence	0	3
	1009: Cash Flows	0	3
	1016: R tools	0	3
	1007: Tableau	0	3
	1006: Customer Service	0	3
	1008: Sales Tricks	0	3
	1014: Java	0	3
	1011: Application Development	0	3
	1015: SQL	0	3
	1001: Financial Management	0	3
	1003: Communication	0	3
	1019: Contract Details	0	3
	1017: Master Advertising	0	3
	1004: Admin Report	0	3
	1005: Networking	0	3
506:Data Analysis	1010: SAS	2	1

	1016: R tools	2	1
	1004: Admin Report	1	2
	1009: Cash Flows	1	2
	1015: SQL	1	2
	1012: Artificial Intelligence	1	2
	1008: Sales Tricks	0	3
	1007: Tableau	0	3
	1021: Problem-solving	0	3
	1013: HTML	0	3
	1018: PR Communication	0	3
	1005: Networking	0	3
	1006: Customer Service	0	3
	1003: Communication	0	3
	1014: Java	0	3
	1019: Contract Details	0	3
	1017: Master Advertising	0	3
	1011: Application Development	0	3
	1020: Creative Thinking	0	3
	1002: Marketing	0	3
	1001: Financial Management	0	3
	1023: Analytical Thinking	0	3
	1022: Advanced Consulting	0	3
507:IT	1014: Java	2	1
	1012: Artificial Intelligence	2	1
	1013: HTML	2	1
	1011: Application Development	2	1
	1003: Communication	1	2
	1021: Problem-solving	1	2
	1016: R tools	1	2
	1001: Financial Management	1	2
	1020: Creative Thinking	0	3
	1015: SQL	0	3
	1007: Tableau	0	3
	1005: Networking	0	3
	1004: Admin Report	0	3
	1017: Master Advertising	0	3

	1006: Customer Service	0	3
	1008: Sales Tricks	0	3
	1022: Advanced Consulting	0	3
	1023: Analytical Thinking	0	3
	1009: Cash Flows	0	3
	1019: Contract Details	0	3
	1002: Marketing	0	3
	1018: PR Communication	0	3
	1010: SAS	0	3
508:Sales	1008: Sales Tricks	2	1
	1007: Tableau	1	2
	1010: SAS	0	3
	1023: Analytical Thinking	0	3
	1005: Networking	0	3
	1004: Admin Report	0	3
	1015: SQL	0	3
	1011: Application Development	0	3
	1012: Artificial Intelligence	0	3
	1018: PR Communication	0	3
	1009: Cash Flows	0	3
	1017: Master Advertising	0	3
	1021: Problem-solving	0	3
	1002: Marketing	0	3
	1003: Communication	0	3
	1006: Customer Service	0	3
	1001: Financial Management	0	3
	1014: Java	0	3
	1013: HTML	0	3
	1020: Creative Thinking	0	3
	1022: Advanced Consulting	0	3
	1016: R tools	0	3
	1019: Contract Details	0	3
509:Advertising	1017: Master Advertising	2	1
	1007: Tableau	1	2
	1022: Advanced Consulting	0	3
	1012: Artificial Intelligence	0	3

	1002: Marketing	0	3
	1004: Admin Report	0	3
	1008: Sales Tricks	0	3
	1023: Analytical Thinking	0	3
	1001: Financial Management	0	3
	1006: Customer Service	0	3
	1021: Problem-solving	0	3
	1011: Application Development	0	3
	1013: HTML	0	3
	1015: SQL	0	3
	1009: Cash Flows	0	3
	1020: Creative Thinking	0	3
	1014: Java	0	3
	1005: Networking	0	3
	1019: Contract Details	0	3
	1018: PR Communication	0	3
	1010: SAS	0	3
	1016: R tools	0	3
	1003: Communication	0	3
510:Human Resource	1003: Communication	2	1
	1016: R tools	1	2
	1002: Marketing	1	2
	1010: SAS	1	2
	1019: Contract Details	0	3
	1009: Cash Flows	0	3
	1021: Problem-solving	0	3
	1018: PR Communication	0	3
	1014: Java	0	3
	1020: Creative Thinking	0	3
	1008: Sales Tricks	0	3
	1004: Admin Report	0	3
	1013: HTML	0	3
	1011: Application Development	0	3
	1005: Networking	0	3
	1022: Advanced Consulting	0	3
	1023: Analytical Thinking	0	3

	1001: Financial Management	0	3
	1015: SQL	0	3
	1007: Tableau	0	3
	1017: Master Advertising	0	3
	1006: Customer Service	0	3
	1012: Artificial Intelligence	0	3
511:Accounting	1009: Cash Flows	2	1
	1014: Java	1	2
	1018: PR Communication	0	3
	1011: Application Development	0	3
	1022: Advanced Consulting	0	3
	1003: Communication	0	3
	1007: Tableau	0	3
	1015: SQL	0	3
	1016: R tools	0	3
	1001: Financial Management	0	3
	1017: Master Advertising	0	3
	1008: Sales Tricks	0	3
	1021: Problem-solving	0	3
	1019: Contract Details	0	3
	1023: Analytical Thinking	0	3
	1006: Customer Service	0	3
	1002: Marketing	0	3
	1004: Admin Report	0	3
	1013: HTML	0	3
	1005: Networking	0	3
	1012: Artificial Intelligence	0	3
	1020: Creative Thinking	0	3
	1010: SAS	0	3
512:Administrative	1004: Admin Report	7	1
	1014: Java	1	2
	1017: Master Advertising	0	3
	1022: Advanced Consulting	0	3
	1010: SAS	0	3
	1012: Artificial Intelligence	0	3
	1002: Marketing	0	3

	1006: Customer Service	0	3
	1011: Application Development	0	3
	1023: Analytical Thinking	0	3
	1005: Networking	0	3
	1001: Financial Management	0	3
	1003: Communication	0	3
	1021: Problem-solving	0	3
	1016: R tools	0	3
	1019: Contract Details	0	3
	1008: Sales Tricks	0	3
	1013: HTML	0	3
	1007: Tableau	0	3
	1015: SQL	0	3
	1018: PR Communication	0	3
	1009: Cash Flows	0	3
	1020: Creative Thinking	0	3
513:Public Relations	1018: PR Communication	2	1
	1017: Master Advertising	1	2
	1016: R tools	0	3
	1004: Admin Report	0	3
	1015: SQL	0	3
	1014: Java	0	3
	1008: Sales Tricks	0	3
	1009: Cash Flows	0	3
	1012: Artificial Intelligence	0	3
	1006: Customer Service	0	3
	1001: Financial Management	0	3
	1020: Creative Thinking	0	3
	1023: Analytical Thinking	0	3
	1019: Contract Details	0	3
	1013: HTML	0	3
	1007: Tableau	0	3
	1021: Problem-solving	0	3
	1011: Application Development	0	3
	1003: Communication	0	3
	1022: Advanced Consulting	0	3

	1010: SAS	0	3
	1005: Networking	0	3
	1002: Marketing	0	3
514:Legal	1019: Contract Details	1	1
	1012: Artificial Intelligence	1	1
	1008: Sales Tricks	0	2
	1021: Problem-solving	0	2
	1015: SQL	0	2
	1017: Master Advertising	0	2
	1001: Financial Management	0	2
	1018: PR Communication	0	2
	1016: R tools	0	2
	1023: Analytical Thinking	0	2
	1020: Creative Thinking	0	2
	1004: Admin Report	0	2
	1005: Networking	0	2
	1011: Application Development	0	2
	1007: Tableau	0	2
	1006: Customer Service	0	2
	1009: Cash Flows	0	2
	1010: SAS	0	2
	1022: Advanced Consulting	0	2
	1003: Communication	0	2
	1014: Java	0	2
	1013: HTML	0	2
	1002: Marketing	0	2

276 rows selected.

Question 10

```
SQL> COLUMN Name FORMAT A30
SQL> SELECT p.proj_number || ':' || p.name AS Name, SUM(date_ended - date_assigned) AS Total_days
  2  FROM
  3          (SELECT proj_number,SUM(days)
  4           FROM
  5           (
  6                SELECT proj_number, days,
  7                DENSE_RANK() OVER(ORDER BY days DESC) AS day_rank
  8                FROM
  9                (
 10                      SELECT assign.proj_number, assign.date_assigned, assign.date_ended,
 11                      assign.date_ended - assign.date_assigned AS days
 12                      FROM assignment assign
 13                  JOIN
 14                  (
 15                      SELECT proj_number, emp_num
 16                      FROM assignment
 17                      GROUP BY proj_number, emp_num
 18                      HAVING COUNT(proj_number) >=5
 19                   )A
 20                ON assign.proj_number = A.proj_number
 21                )
 22           )
 23          WHERE day_rank<4
 24          GROUP BY proj_number
 25          HAVING SUM(days)>=60
 26          )B
 27  JOIN assignment a
 28  ON B.proj_number = a.proj_number
 29  JOIN project p
 30  ON p.proj_number = a.proj_number
 31  GROUP BY p.proj_number, p.name;
```

```
NAME                           TOTAL_DAYS
------------------------------ ----------
8809:RH Consulting Project            257
8812:RT PR Campaign                   218
```

Question 11

The seniority in this query is based on the hire date of the employees.

```
SQL> COLUMN Employee FORMAT A20
SQL> COLUMN hire_date FORMAT A20
SQL> COLUMN dept FORMAT A20
SQL> SELECT B.emp_num || ': ' || INITCAP(B.lname) AS Employee, B.hire_date,
  2   NVL(B.dept_name,'Administrative') AS dept,
  3   NVL(COUNT(DISTINCT emp.emp_num),0) AS "#_employee_supervises"
  4  FROM
  5     (SELECT emp_num, lname, hire_date, d.name AS dept_name
  6      FROM
  7          (SELECT emp_num, lname, hire_date,
  8           RANK() OVER (ORDER BY hire_date ASC) as senior_ranks
  9           FROM
 10           employee e
 11           ) A
 12      LEFT JOIN department d
 13      ON A.emp_num = d.manager_id
 14      WHERE senior_ranks <5) B
 15  LEFT JOIN employee emp
 16  ON B.emp_num = emp.super_id
 17  GROUP BY B.emp_num, B.lname, B.hire_date, B.dept_name;

EMPLOYEE             HIRE_DATE            DEPT                 #_EMPLOYEES_SUPERVISES
-------------------- -------------------- -------------------- ----------------------
107: Wise            04-SEP-00            Administrative                         12
103: Leverling       05-APR-05            Administrative                          1
108: West            04-FEB-05            Data Analysis                           1
118: Ali             10-SEP-05            Finance                                 1
```

Question 12

```
SQL> COLUMN client_type FORMAT A30
SQL> SELECT
  2         CASE
  3         WHEN web_address LIKE '%.edu' THEN 'Educational Institute'
  4         WHEN web_address LIKE '%.gov' THEN 'Government Agency'
  5         WHEN web_address LIKE '%.org' THEN 'Non-For-Profit Organisation'
  6         WHEN web_address LIKE '%.com' THEN 'For-Profit Organisation'
  7         WHEN web_address IS NULL THEN 'Not Available'
  8         ELSE 'Others'
  9         END AS client_type,
 10   NVL(COUNT(c.client_id),0) AS "#_of_clients",
 11   NVL(COUNT(p.proj_number),0) AS "#_of_projects"
 12  FROM
 13  client c
 14  LEFT JOIN project p
 15  ON c.client_id = p.client_id
 16  GROUP BY
 17    CASE
 18    WHEN web_address LIKE '%.edu' THEN 'Educational Institute'
 19    WHEN web_address LIKE '%.gov' THEN 'Government Agency'
 20    WHEN web_address LIKE '%.org' THEN 'Non-For-Profit Organisation'
 21    WHEN web_address LIKE '%.com' THEN 'For-Profit Organisation'
 22    WHEN web_address IS NULL THEN 'Not Available'
 23    ELSE 'Others'
 24  END;

CLIENT_TYPE                   #_of_clients #_of_projects
----------------------------- ------------ -------------
Others                                   2             0
Not Available                            2             0
Non-For-Profit Organisation              1             1
For-Profit Organisation                 16            16
Government Agency                        2             2
Educational Institute                    2             2

6 rows selected.
```

Question 13

```
SQL> COLUMN name FORMAT A30
SQL> COLUMN dept_name FORMAT A30
SQL> COLUMN project_name FORMAT A30
SQL> SELECT e.emp_num || ': ' || INITCAP(e.fname) || ' ' || INITCAP(e.lname) AS Name,
  2         d.dept_code || ': ' || d.name AS dept_name,
  3         p.proj_number || ': ' || INITCAP(p.name) AS project_name
  4  FROM
  5    (
  6         SELECT emp_num, proj_number, date_assigned FROM
  7         (
  8               SELECT emp_num, proj_number, date_assigned,
  9               RANK() OVER(PARTITION BY emp_num ORDER BY date_assigned DESC) as date_rank
 10               FROM assignment
 11          )
 12     WHERE date_rank = 1 AND date_assigned <= '31-JUL-'|| EXTRACT(YEAR FROM SYSDATE)
 13     )A
 14  JOIN employee e
 15  ON A.emp_num = e.emp_num
 16  LEFT JOIN department d
 17  ON e.dept_code = d.dept_code
 18  JOIN project p
 19  ON A.proj_number = p.proj_number
 20  ORDER BY d.name,e.lname;

NAME                           DEPT_NAME                      PROJECT_NAME
------------------------------ ------------------------------ ------------------------------
133: Khloe Costa               509: Advertising               8803: Ffr Advertise
132: Davis Valdez              509: Advertising               8803: Ffr Advertise
125: Marcelo Melton            505: Consulting                8809: Rh Consulting Project
117: Veronica Travis           506: Data Analysis             8811: St Database Project
105: Steven Buchanan           507: IT                        8819: Bmg Ai Usage
102: Nancy Davolio             507: IT                        8819: Bmg Ai Usage
116: Sanai Weaver              507: IT                        8810: Aweb Web Development
144: Nathalie Buchanan         513: Public Relations          8812: Rt Pr Campaign
8 rows selected.
```

Question 14

```
SQL> COLUMN CATEGORY FORMAT A20
SQL> (
  2   SELECT s.category AS "CATEGORY",
  3         NVL(COUNT(DISTINCT p.proj_number),0) AS "#_OF_TRAININGS",
  4         NVL(COUNT(DISTINCT a.assign_num),0) AS "#_OF_PROJECTS"
  5   FROM
  6   skill s
  7   LEFT JOIN project p
  8   ON s.code = p.code
  9   LEFT JOIN assignment a
 10   ON p.proj_number = a.proj_number
 11   GROUP BY s.category
 12  )
 13  UNION ALL
 14  (
 15   SELECT '--------Grand Total:',
 16   COUNT(DISTINCT p.proj_number),
 17   COUNT(DISTINCT a.assign_num)
 18   FROM
 19   skill s
 20   LEFT JOIN project p
 21   ON s.code = p.code
 22   LEFT JOIN assignment a
 23   ON p.proj_number = a.proj_number
 24  );

CATEGORY             #_OF_TRAININGS #_OF_PROJECTS
-------------------- -------------- -------------
Accounting                        1             1
Administrative                    0             0
Advertising                       1             2
Consulting                        7            19
Data Analysis                     1             1
Finance                           2             2
```

```
Human Resource                    0             0
IT                                4             6
Legal                             1             4
Marketing                         0             0
Public Relations                  1             8
Sales                             3             2
--------Grand Total:            21            45

13 rows selected.
```

Question 15

```
SQL> COLUMN "Constraint Type" FORMAT A20
SQL> COLUMN "Search Condition" FORMAT A60
SQL> COLUMN "Table Name" FORMAT A12
SQL> COLUMN "Column Name" FORMAT A18
SQL> COLUMN "FK References" FORMAT A30
SQL> COLUMN "Constraint Type" FORMAT A20
SQL> BREAK ON "Table Name"
SQL> SELECT
  2         utc.Table_Name "Table Name",
  3         utc.Column_Name "Column Name",
  4         NVL(unc.Constraint_Name, '--') "Constraint Type",
  5         CASE
  6         WHEN u.Constraint_Type = 'P' THEN 'PK'
  7         WHEN u.Constraint_Type = 'R' THEN 'FK'
  8         WHEN u.Constraint_Type = 'C' AND LOWER(u.Constraint_Name) LIKE '%ck%' THEN 'CK'
  9         WHEN u.Constraint_Type = 'C' AND LOWER(u.Constraint_Name) LIKE '%nn%' THEN 'NN'
 10         ELSE '--'
 11         END "Constraint Type",
 12         NVL(SUBSTR(ac.R_Constraint_Name, 0, LENGTH(ac.R_Constraint_Name) - 3), '--') "FK References",
 13         u.Search_Condition "Search Condition"
 14  FROM user_tab_columns utc
 15  LEFT OUTER JOIN user_cons_columns unc on
 16  utc.Table_Name = unc.Table_Name
 17  AND utc.Column_Name = unc.Column_Name
```

```
 18  FULL OUTER JOIN user_constraints u on
 19  unc.Constraint_Name = u.Constraint_Name
 20  LEFT JOIN all_constraints ac on
 21  unc.Constraint_Name = ac.Constraint_Name
 22  ORDER BY
 23  utc.Table_Name ASC;
```

Table Name	Column Name	Constraint Type	Constraint Type	FK References	Search Condition
ASSIGNMENT	HOURS_USED	--	--	--	
	EMP_NUM	ASSIGNMENT_ASSIGN_EMP_NUM_FK	FK	EMPLOYEE_EMP_NUM	
	PROJ_NUMBER	ASSIGNMENT_PROJ_NUMBER_FK	FK	PROJECT_PROJ_NUMBER	
	PROJ_NUMBER	ASSIGNMENT_PROJ_NUMBER_FK	FK	PROJECT_NUMBER	
	DATE_ASSIGNED	ASSIGNMENT_DATE_ASSGINED_CK	CK	--	REGEXP_LIKE (Date_Assigned, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	ASSIGN_NUM	ASSIGNMENT_ASSIGN_NUM_PK	PK	--	
	DATE_ASSIGNED	ASSIGNMENT_CHECK_DATE	CK	--	Date_Ended > Date_Assigned
	DATE_ENDED	ASSIGNMENT_CHECK_DATE	CK	--	Date_Ended > Date_Assigned
	DATE_ENDED	ASSIGNMENT_DATE_ENDED_CK	CK	--	REGEXP_LIKE (Date_Ended, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	ASSIGN_NUM	ASSIGNMENT_ASSIGN_NUM_PK	PK	--	
CLIENT	INDUSTRY	CLIENT_INDUSTRY_NN	NN	--	"INDUSTRY" IS NOT NULL
	CLIENT_ID	CLIENT_CLIENT_ID_PK	PK	--	
	CLIENT_ID	CLIENT_CLIENT_ID_PK	PK	--	
	ZIP_CODE	CLIENT_ZIP_CODE_CK	CK	--	LENGTH(Zip_Code) = 5
	STATE	CLIENT_STATE_CK	CK	--	LENGTH(State) = 2
	PHONE	SYS_C008275	--	--	REGEXP_LIKE (Phone, '^([0-9]{3}[-][0-9]{3}[-][0-9]{4})$')
	WEB_ADDRESS	SYS_C008274	--	--	REGEXP_LIKE (Web_Address, '^[www]{3}.[a-zA-Z0-9]+.[a-z]{3}$')
	CONTACT_FNAME	CONTACT_FNAME_NN	NN	--	"CONTACT_FNAME" IS NOT NULL
	CONTACT_LNAME	CONTACT_LNAME_NN	NN	--	"CONTACT_LNAME" IS NOT NULL
	STATE	CLIENT_STATE_NN	NN	--	"STATE" IS NOT NULL
	CITY	CLIENT_CITY_NN	NN	--	"CITY" IS NOT NULL
	STREET	CLIENT_STREET_NN	NN	--	"STREET" IS NOT NULL
	NAME	CLIENT_NAME_NN	NN	--	"NAME" IS NOT NULL
DEPARTMENT	DEPT_CODE	DEPARTMENT_DEPT_CODE_PK	PK	--	
	DEPT_CODE	DEPARTMENT_DEPT_CODE_PK	PK	--	
	PHONE	DEPARTMENT_PHONE_CK	CK	--	REGEXP_LIKE (Phone, '^([0-9]{3}-[0-9]{3}-[0-9]{4})$')
	MANAGER_ID	DEPARTMENT_MANAGER_ID_FK	FK	EMPLOYEE_EMP_NUM	

	MANAGER_ID	DEPARTMENT_MANAGER_ID_FK	FK	EMPLOYEE_EMP_NUM	
	LOCATION	DEPARTMENT_LOCATION_NN	NN	--	"LOCATION" IS NOT NULL
	NAME	DEPARTMENT_NAME_NN	NN	--	"NAME" IS NOT NULL
EMPLOYEE	DEPT_CODE	EMPLOYEE_DEPT_CODE_FK	FK	DEPARTMENT_DEPT_CODE	
	DOB	EMPLOYEE_DOB_CK	CK	--	REGEXP_LIKE (DOB, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	DEPT_CODE	EMPLOYEE_DEPT_CODE_FK	FK	DEPARTMENT_DEPT_CODE	
	SUPER_ID	EMPLOYEE_SUPER_ID_FK	FK	EMPLOYEE_EMP_NUM	
	SUPER_ID	EMPLOYEE_SUPER_ID_FK	FK	EMPLOYEE_EMP_NUM	
	EMP_NUM	EMPLOYEE_EMP_NUM_PK	PK	--	
	EMP_NUM	EMPLOYEE_EMP_NUM_PK	PK	--	
	FNAME	EMPLOYEE_FNAME_NN	NN	--	"FNAME" IS NOT NULL
	HIRE_DATE	EMPLOYEE_HIRE_DATE_CK	CK	--	REGEXP_LIKE (Hire_Date, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	LNAME	EMPLOYEE_LNAME_NN	NN	--	"LNAME" IS NOT NULL
	BONUS_AMT	--	--	--	
PROJECT	CODE	PROJECT_CODE_FK	FK	SKILL_CODE	
	CODE	PROJECT_CODE_FK	FK	SKILL_CODE	
	CLIENT_ID	PROJECT_CLIENT_ID_FK	FK	CLIENT_CLIENT_ID	
	CLIENT_ID	PROJECT_CLIENT_ID_FK	FK	CLIENT_CLIENT_ID	
	DEPT_CODE	PROJECT_DEPT_CODE_FK	FK	DEPARTMENT_DEPT_CODE	
	PROJ_NUMBER	PROJECT_NUMBER_PK	PK	--	
	START_DATE	PROJECT_DATE_CK	CK	--	REGEXP_LIKE (Start_Date, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	NAME	PROJECT_NAME_NN	NN	--	"NAME" IS NOT NULL
	TOTAL_COST	--	--	--	
	DEPT_CODE	PROJECT_DEPT_CODE_FK	FK	DEPARTMENT_DEPT_CODE	
SKILL	CODE	SKILL_CODE_PK	PK	--	
	CODE	SKILL_CODE_PK	PK	--	
	NAME	SKILL_NAME_NN	NN	--	"NAME" IS NOT NULL
	CATEGORY	SKILL_CATEGORY_NN	NN	--	"CATEGORY" IS NOT NULL
TRAINING	COMMENTS	--	--	--	
	EMP_NUM	TRAINING_EMP_NUM_FK	FK	EMPLOYEE_EMP_NUM	
	CODE	TRAINING_CODE_FK	FK	SKILL_CODE	
	CODE	TRAINING_CODE_FK	FK	SKILL_CODE	
	TRAIN_NUM	TRAINING_TRAIN_NUM_PK	PK	--	
	NAME	TRAINING_NAME_NN	NN	--	"NAME" IS NOT NULL
	DATE_ACQUIRED	TRAINING_DATE_ACQUIRED_CK	CK	--	REGEXP_LIKE (Date_Acquired, '^([0-9]{2}[-][a-zA-Z]{3}[-][0-9]{2})$')
	TRAIN_NUM	TRAINING_TRAIN_NUM_PK	PK	--	
	EMP_NUM	TRAINING_EMP_NUM_FK	FK	EMPLOYEE_EMP_NUM	

64 rows selected.