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Further Examples 5: SQL

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The full *Further Examples 5* contents are:

The ‘Going Green’ Scenario

Example 1: Table Creation (including constraints)

Example 2: Table Alteration (additional constraints)

Example 3: View Creation (adding virtual tables)

Example 4: Table Population (adding content)

Example 5: Content Modification - Tables

Example 6: Content Modification - Views

Example 7: Displaying the Final Tables

Example 8: Queries – Using the WHERE clause

Example 9: Queries – Using logical operators

Example 10: Queries – Using the IN and BETWEEN operators

Example 11: Queries – Using the comparison operators

Example 12: Queries – Using the DISTINCT operator

Example 13: Queries – Handling NULL values

Example 14: Queries – Using row-by-row functions

Example 15: Queries – Using aggregate functions

Example 16: Queries – Ordering and Grouping

Example 17: Queries – Handling fuzzy or incomplete data

Example 18: Queries – Handling Joins

Example 19: Queries – Handling Set Operations

Example 20: Queries – Handling Sub-Queries

Example 21: Deleting the Tables

Problem-Solving

Solutions

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Below are some examples...

Example: View Creation

Once the 10 base tables and all their constraints are implemented, we can then define a set of views over them.

-- Extracts those companies who have spent at least £500 on a course

```
CREATE VIEW Priority_Clients AS
SELECT P.CompanyName, P.Telephone, P.Email, T.StartDate
FROM TakenBy T, Practitioner P, PD_Course C
WHERE T.PD_Code = C.PD_Code
AND T.CompanyName = P.CompanyName
AND C.Fee > 500;
```

-- Extracts those staff that do not teach modules or supervise projects

```
CREATE VIEW Research_Only_Staff AS
SELECT Staff_ID FROM TUTOR          -- List ALL staff
MINUS
(SELECT Tutor FROM Module          -- List TEACHING staff
UNION
SELECT Supervisor FROM Project)    -- List SUPERVISING staff
```

-- Extracts the details of staff who proposed unwanted projects

```
CREATE VIEW Writers_Of_Dull_Projects AS
SELECT T.Name, T.Extension, T.Email
FROM Tutor T, Project P
WHERE T.Staff_ID = P.ProposedBy
AND P.Student_ID IS NULL;
```

Example: Queries – Using the IN and BETWEEN operators

Use of IN and BETWEEN to perform range-based queries.

-- List the identifier and name for all staff working in Botany, Soil Science or Agriculture

```
SELECT Staff_ID, Name FROM Tutor
WHERE Department IN ('Botany', 'Soil Science', 'Agriculture');
```

-- List the identifier and name of any staff member with a telephone extension between 2200 and 2500

```
SELECT Staff_ID, Name FROM Tutor
WHERE Extension BETWEEN 2200 AND 2500;
```

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-- List the identifier and name for any member of staff working in Botany, Soil Science or Agriculture and
-- they have a telephone extension between 2200 and 2500

```
SELECT Staff_ID, Name FROM Tutor
WHERE Department IN ('Botany', 'Soil Science', 'Agriculture')
AND Extension BETWEEN 2200 AND 2500;
```

-- List the contact details of any employee working for Go2Grow, Green Fingers, Landscape Fantasies or
-- Heavenly Horizons

```
SELECT Email, Telephone FROM Practitioner
WHERE CompanyName IN ('Go2Grow', 'Green Fingers', 'Landscape Fantasies', 'Heavenly Horizons');
```

-- List the contact details of any employee working for Go2Grow, Green Fingers, Landscape Fantasies or
-- Heavenly Horizons or they are called G. Harper, P. Valentine, W. Arnold or L. Freeman

```
SELECT Email, Telephone FROM Practitioner
WHERE CompanyName IN ('Go2Grow', 'Green Fingers', 'Landscape Fantasies', 'Heavenly Horizons')
OR Name IN ('G. Harper', 'P. Valentine', 'W. Arnold', 'L. Freeman');
```

-- List the contact details of any employee working for Go2Grow, Green Fingers, Landscape Fantasies or
-- Heavenly Horizons or they are called G. Harper, P. Valentine, W. Arnold or L. Freeman and they have
-- any length of experience except 25 years

```
SELECT Email, Telephone FROM Practitioner
WHERE CompanyName IN ('Go2Grow', 'Green Fingers', 'Landscape Fantasies', 'Heavenly Horizons')
OR Name IN ('G. Harper', 'P. Valentine', 'W. Arnold', 'L. Freeman')
AND Experience NOT IN ('25 years');
```

Example: Queries – Handling Sub-Queries

This section covers sub-queries (nested queries).

Strictly speaking, the following two queries should not work because the returned values from the INNER query do not match the expected values in the OUTER query. However, when run you simply get back the message 'no rows selected'.

-- Staff identifiers do not match project codes!

```
SELECT Name
FROM Tutor
WHERE Staff_ID IN
(SELECT ProjectCode
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'));
```

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-- Staff identifiers do not match student identifiers!

```
SELECT Name
FROM Tutor
WHERE Staff_ID IN
(SELECT Student_ID
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'));
```

-- Here, the inner query returns TWO sets of values (staff identifiers and names) but the outer query
-- is only expecting one set of values (staff identifiers). Hence, you get an error message 'too many values'

```
SELECT Name
FROM Tutor
WHERE Staff_ID IN
(SELECT Staff_ID, Name
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'));
```

-- **The following queries WILL work...**

-- List those staff who work in a department where office numbers begin with a 'B'

```
SELECT Staff_ID, Name
FROM Tutor
WHERE Department IN
(SELECT Department
FROM Tutor
WHERE Office LIKE 'B%');
```

-- List the name and contact details of those staff who supervise a Pathology or Soil Science project

```
SELECT Name, Extension, Email
FROM Tutor
WHERE Staff_ID IN
(SELECT Supervisor
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'));
```

-- List the name and contact details of those staff who supervise or propose a Pathology or Soil Science
-- project

```
SELECT Name, Extension, Email
FROM Tutor
WHERE Staff_ID IN
(SELECT Supervisor
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'))
UNION
SELECT ProposedBy
FROM Project
WHERE Domain IN ('Pathology', 'Soil Science'));
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-- List the code and title of all projects where the domain belongs to a project supervised by a member of
-- staff from the Biology, Agriculture or Horticulture departments

```
SELECT ProjectCode, Title
FROM Project
WHERE Domain IN
(SELECT Domain
FROM Project
WHERE Supervisor IN
(SELECT Staff_ID
FROM Tutor
WHERE Department IN ('Botany', 'Agriculture', 'Horticulture')));
```

-- List all professional development courses that cost more than the average PD course fee

```
SELECT PD_Code, Title, Fee
FROM PD_Course
WHERE Fee > (SELECT AVG (Fee)
FROM PD_Course);
```

-- List all professional development courses that cost more than the average PD course fee
-- (but only for college-based courses)

```
SELECT PD_Code, Title, Fee
FROM PD_Course
WHERE Fee > (SELECT AVG (Fee)
FROM PD_Course
WHERE PD_Code IN
(SELECT PD_Code
FROM PD_Course
WHERE Location LIKE '%College%'));
```