COMP3311 Week 5

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Learning Objectives

01 → SQL Views

02 → PL/pgSQL Functions

03 → SQL Functions

04 → Combining SQL Statements w/ Functions

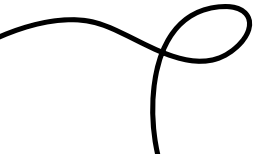
05 → Putting it all to practice...!

01

SQL Views

01 → SQL Views

- A “stored” query
- To make querying simpler (and more reusable)
- Return a **view of the database off some query**
    - This view can then be **used in other queries**



01 → SQL Views

- Order matters!!
  - i.e. You must declare the view before using it

```
create view
    CourseMarksAndAverages(course, term, student, mark, avg)
as
    select  s.code, termName(t.id), e.student, e.mark, avg(mark)
    from    CourseEnrolments e
    join    Courses c on c.id = e.course
    join    Subjects s on s.id = c.subject
    join    Terms t on t.id = c.term
;

select  course, term, student, mark
from    CourseMarksAndAverages
where   mark < avg;
```

01 → SQL Views

This is what the first few questions in the assignment template sql file is doing

```
-- Question 1 --

/**
    Write a SQL View, called Q1, that:
    Retrieves the 10 movies with the highest number of votes.
*/
CREATE OR REPLACE VIEW Q1(Title, Year, Votes) AS
    -- TODO: Write your SQL query here
;
```

In the 'Example Output' they get you to select the SQL view (Q1) and you should display the same output

Q1

Dump 1

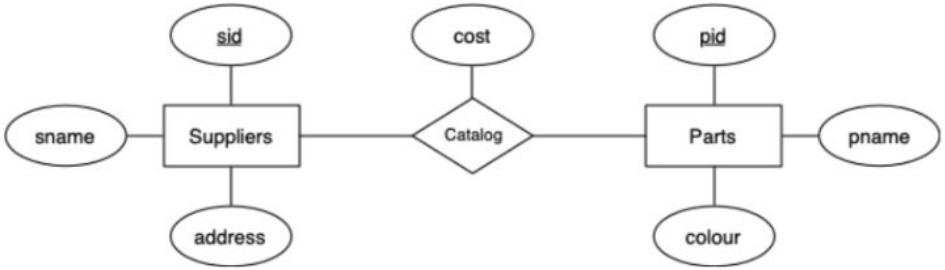
```
IMDB=# SELECT * FROM Q1;

       title       | year |  votes
-------------------+------+---------
 The Dark Knight   | 2008 | 2843738
 Good Will Hunting | 1997 | 1054895
 Watchmen          | 2009 |  578999
 Super 8           | 2011 |  366264
 Ghost Rider       | 2007 |  250940
 Luca              | 2021 |  190404
 The Drop          | 2014 |  161287
 Get Hard          | 2015 |  146177
 Licorice Pizza    | 2021 |  138879
 Wild Hogs         | 2007 |  122967
(10 rows)
```

01 → SQL Views Question

Q. Find the pids of the most expensive part(s) supplied by suppliers named "Yosemite Sham".

Consider the following data model for a a business that supplies various parts:



Based on the ER design and the above considerations, here is a relational schema to represent this scenario:

```
create table Suppliers (
      sid     integer primary key,
      sname   text,
      address text
);
create table Parts (
      pid     integer primary key,
      pname   text,
      colour  text
);
create table Catalog (
      sid     integer references Suppliers(sid),
      pid     integer references Parts(pid),
      cost    real,
      primary key (sid,pid)
);
```

02

PL/pgSQL Functions

02 → PL/pgSQL Functions

- Sometimes a view isn't enough, sometimes we want **more flexibility**
- We need a function
- PL/pgSQL is a PostgreSQL procedural programming language

```
create or replace
    funcName(param1 type, param2 type, ...) returns type
as
$$
declare
    variable1 type;
    variable2 type;
begin
    -- code for function
end;
$$ language plpgsql
;
```

02 → PL/pgSQL Functions Factorial Example

```
create or replace function
    factorial (n integer) returns integer
as $$
declare
    i integer;
    fac integer : = 1;
begin
    for i in 1..n loop
        fac := fac * i;
    end loop;
    return fac;
end;
$$ language plpgsql;
```

02

PL/pgSQL Functions Withdraw Example

SQL inside PL/pgSQL function →

```
create or replace function
    withdraw(acctNum text, amount integer) returns text
as $$
declare
    bal integer;
begin
    select  balance into bal
    from    Accounts
    where   acctNo = acctNum;

    if bal < amount then
        return 'Insufficient Funds';
    else
        update  Accounts
        set     balance = balance - amount
        where   acctNo = acctNum;

        select  balance into bal
        from    Accounts
        where   acctNo = acctNum;

        return 'New Balance: ' || bal;
    end if;
end;
$$ language plpgsql;
```

03

SQL Functions

03 → SQL Functions

- Differences between SQL functions and PL/pgSQL functions:
  - SQL function bodies are **a single SQL statement**
  - SQL functions **can use positional parameter notation**
    - e.g. $1, $2, $3...
  - SQL functions have **NO return**
    - Result is the result of the SQL statement
  - Return types can be atomic (booleans, integers, string, floats), tuple, or **setof** tuples

03 → SQL Functions vs PL/pgSQL Functions

```sql
create or replace function
    add(integer, integer) returns integer
as $$
    select $1 + $2;
$$ language sql;
```

```sql
create or replace function
    add(n1 integer, n2 integer) returns integer
as $$
begin
    return n1 + n2;
end;
$$ language plpgsql;
```

03 → SQL Functions vs PL/pgSQL Functions

```
create or replace function
    fac(int) returns int
as $$
    select case
               when $1 = 0 then 1
               else $1  * fac($1 - 1)
           end;
$$ language sql;
```

“case when” is like a switch statement for SQL statements

```
create or replace function
    fac(n int) returns int
as $$
begin
    if (n = 0) then
        return 1;
    else
        return n * fac(n-1);
    end if;
end;
$$ language plpgsql;
```

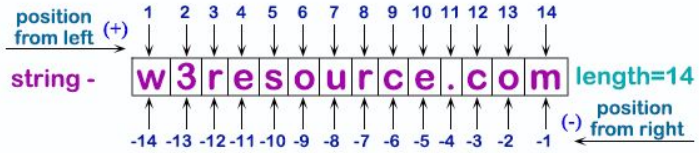
04

Putting it all to practice...!

PostgreSQL substring() function

Extracts specific number of characters from specific position

Syntax : **substring (string, str_pos, ext_char)**



Example :

Result : **source**

Example :

Result : **source.com**

Example :

Result : **w3resource.com**

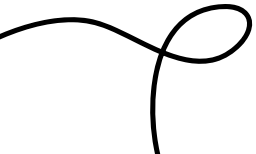
Example :

Result : **w3re**

Example :

Result : **source**

1. `~` : Case-sensitive, compares two statements, returns true if the first string is contained in the second
2. `~*` : Case-insensitive, compares two statements, returns true if the first string is contained in the second
3. `!~` : Case-sensitive, compares two statements, returns false if the first string is contained in the second
4. `!~*` : Case-insensitive, compares two statements, return false if the first string is contained in the second



Simple STRING_AGG Example

The following example will rollup all currency names and separate each using a forward slash.

```
SELECT STRING_AGG(name,'/') as output
FROM [Sales].[Currency]
```