Digging Deeper with PostgreSQL

Automating processes and partitioning data with inheritance

Case Study Overview

- Shopping experience
- Primary keys will always be ‘id’ column in tables
- All foreign keys will refer to: <table_name>_id

Case Study: Shopping site

Shopping Components

Products
Product Types
Users
Orders
Carts

Case Study: Shopping site

Shopping Components

Products

Product Types

Users

Orders

Carts

products

- id
- product_type_id
- price
- name
- grams
- address

Case Study: Shopping site

Shopping Components

Products

Product Types

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Carts

products

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product_types

id
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description

Case Study: Shopping site

Shopping Components

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Case Study: Shopping site

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description

users

id

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address

email

password

Case Study: Shopping site

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- name
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orders
- id
- user_id
- status
- shipping_total
- order_total

Case Study: Shopping site

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carts
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- last_updated

Case Study: Shopping site

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- order_total

order_products
- id
- product_id
- order_id

carts
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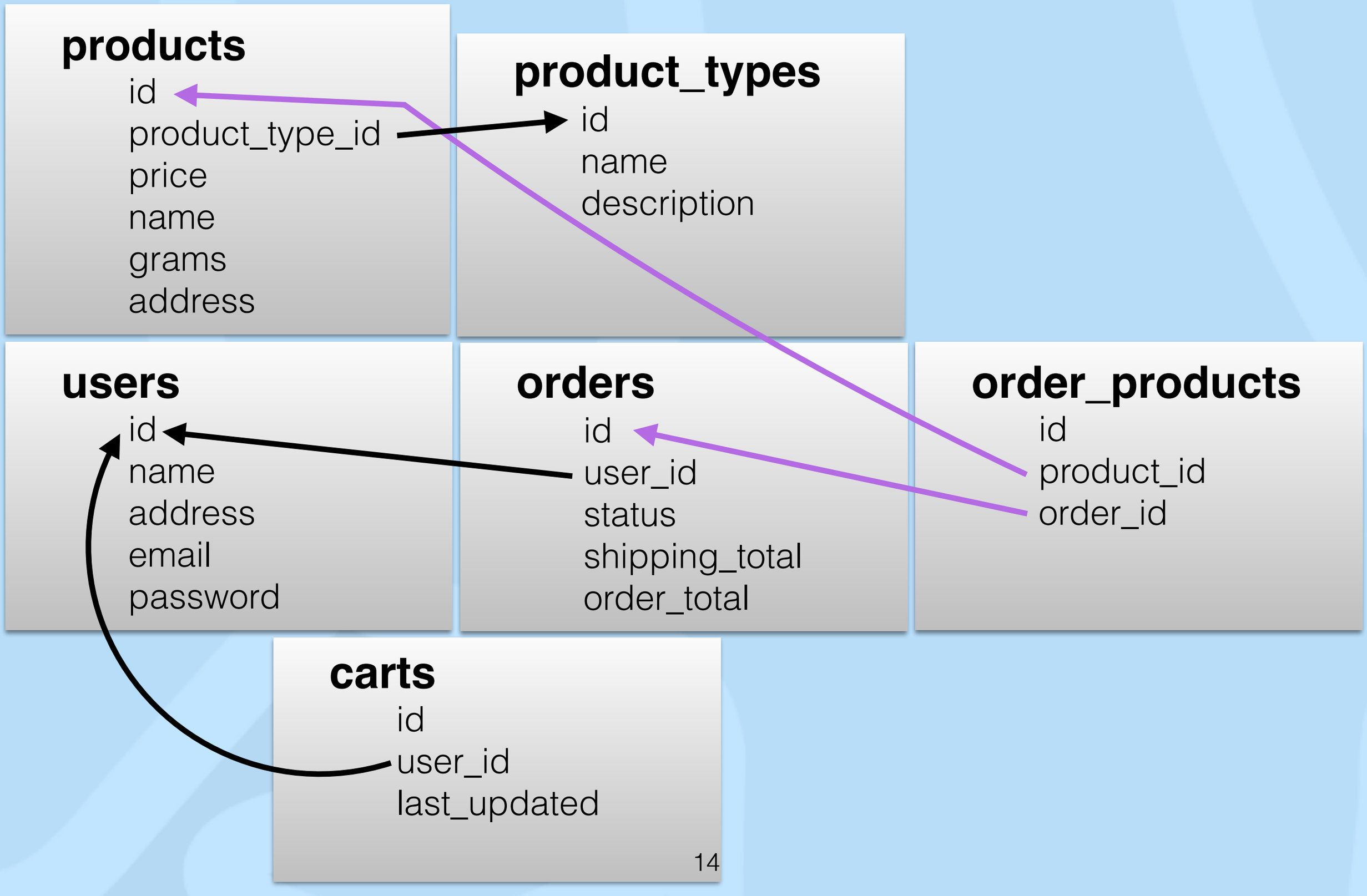
- user_id
- last_updated

Case Study: Shopping site



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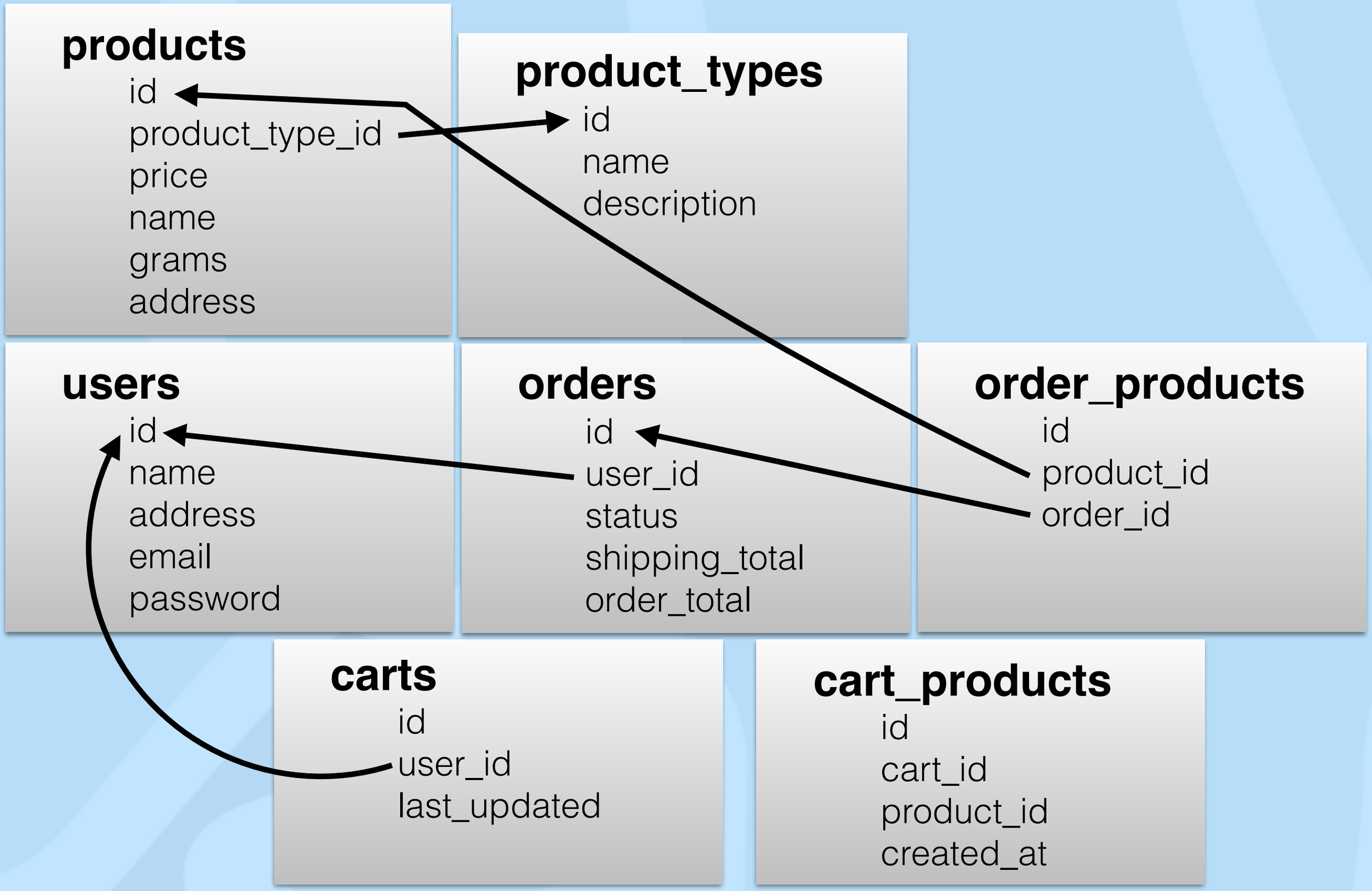

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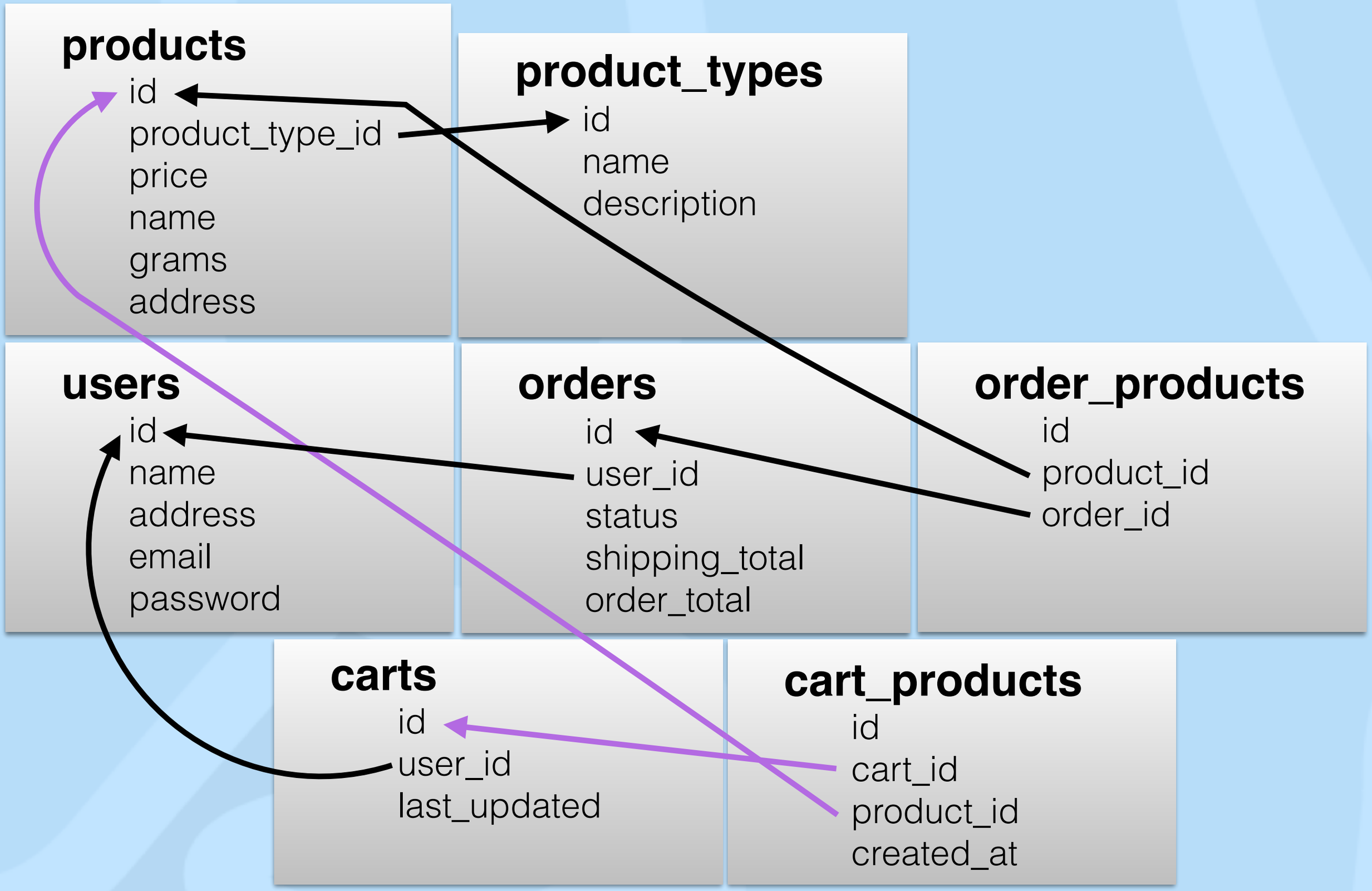

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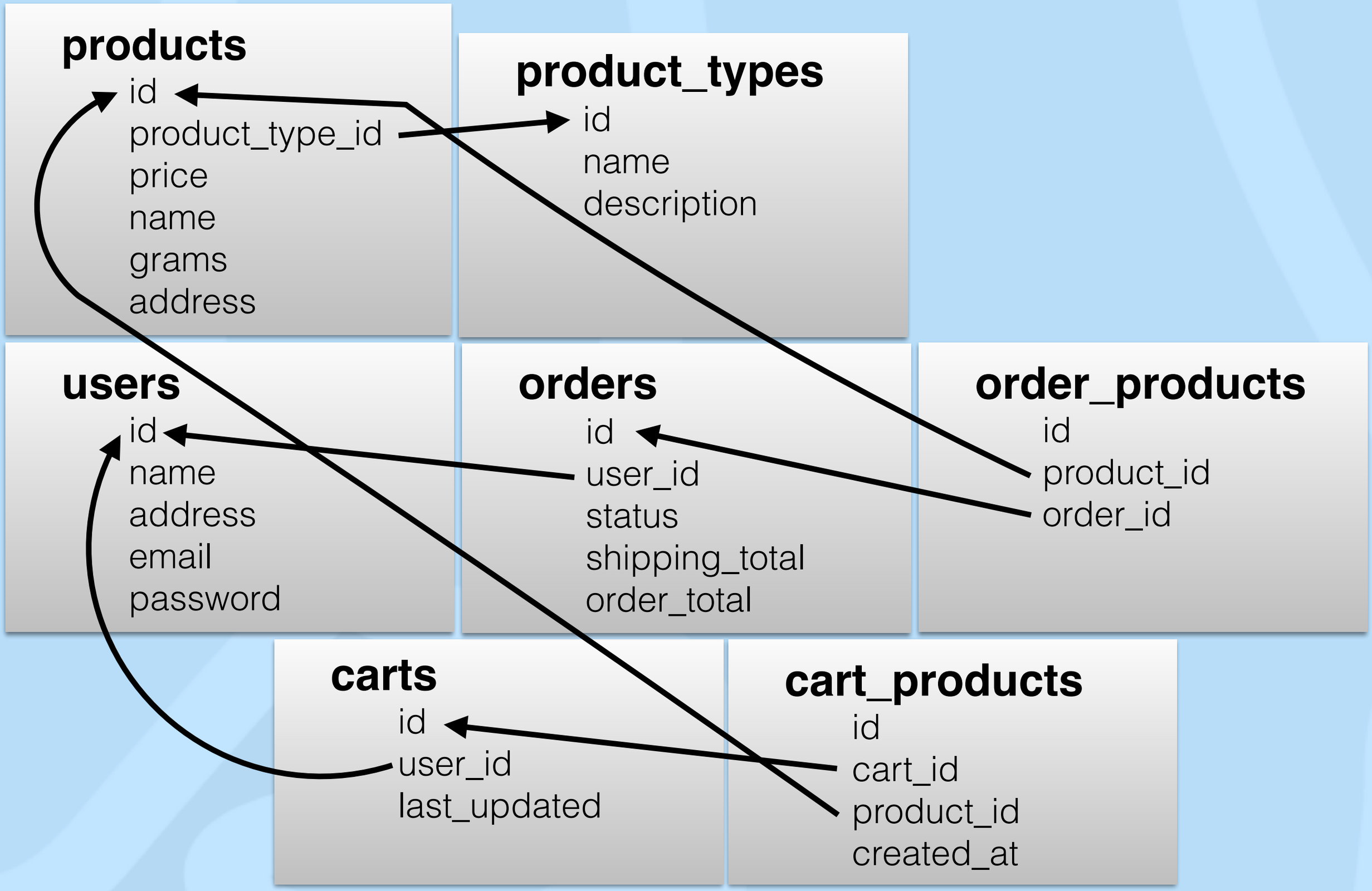

Case Study: Shopping site

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- name
- grams
- address

product_types
- id
- name
- description

users
- id
- name
- address
- email
- password

orders
- id
- user_id
- status
- shipping_total
- order_total

order_products
- id
- product_id
- order_id

carts
- id
- user_id
- last_updated

cart_products
- id
- cart_id
- product_id
- created_at

PgAdmin4 Overview

- PG Admin4 intro

Key Concept Review

- Select Functions
- Casting & data types
- Sets
- Creating tables

Key Concept Review

- select functions
  - distinct and group by
  - math and date functions
  - case statements
  - aliasing

Key Concept Review

- distinct and group by

SELECT **DISTINCT** product_type_id FROM products;

SELECT product_type_id FROM products
ORDER BY product_type_id
GROUP BY product_type_id;

Key Concept Review

- math functions: avg, count, sum; date functions
  - SELECT **SUM**(shipping_total) as shipping_total, **COUNT**(*) as total_orders, **AVG**(order_total) as avg_order,
    EXTRACT(MONTH FROM created_at) as month,
    EXTRACT(YEAR FROM created_at) as year
    FROM orders
    GROUP BY year, month
    ORDER BY year, month;

Key Concept Review

- select functions
- aliasing - setting name for columns, tables and values to be referred to more
    - ex: SELECT o.shipping_total AS total FROM orders o;

Key Concept Review

- select functions
    - aliasing - setting name for columns, tables and values to be referred to more
    - ex: SELECT o.shipping_total AS total FROM
      FROM orders o
      JOIN order_products op on op.order_id = o.id
      JOIN cart_products cp on cp.product_id = op.product_id

Casting: Data Types

- Casting values - common 'types'
  - Text - a 'string' of characters, words/characters (i.e. from a keyboard)
  - Integer - whole number
  - Decimal - Float (i.e. floating point)
  - Date - a calendar date
  - Timestamp - a date with specific time, can also have a specific timezone

Casting

- Casting values
  - 2 methods:
    - **CAST**(<column/result> **AS** <type>)
    - <column/result>**::<type>**

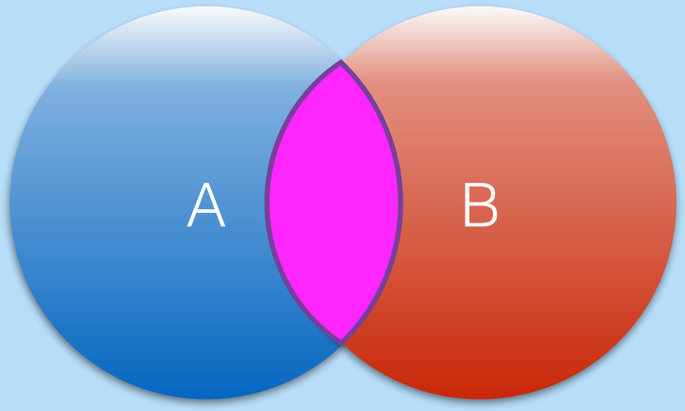
- SELECT
  CAST(o.shipping_total **AS** int) as int_total,
  o.shipping_total**::INTEGER** as int_total_v2
  FROM orders o;

Key Concept Review

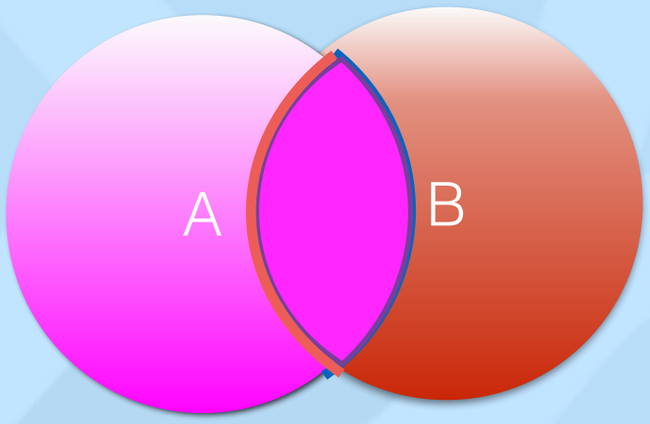
- Sets
- Outer vs Inner
- Left vs Right
- Union, Intersect Except

Key Concept Review

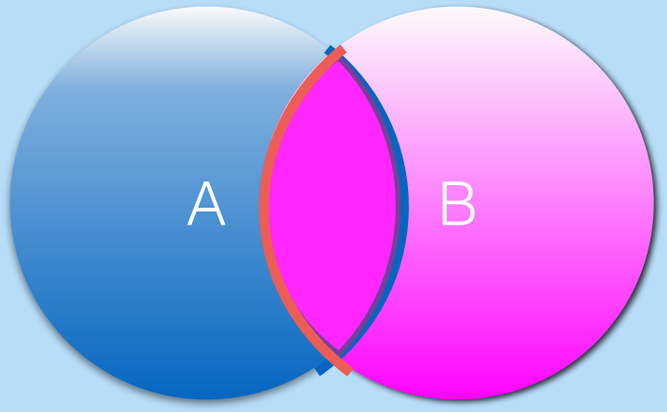
- Sets overview
  - Outer vs Inner
  - Left vs Right



A INNER JOIN B



A LEFT OUTER B

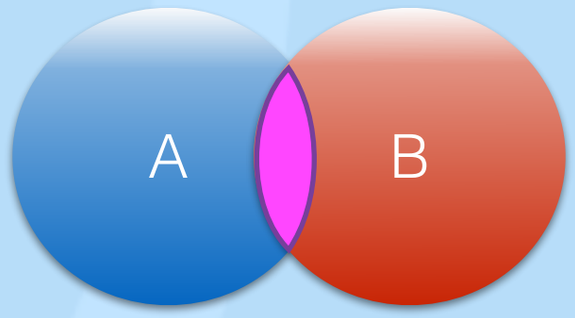


A RIGHT OUTER B

Inner Join

A = Users

id	integer
name	text
address	text
created_at	date



B = Orders

id	integer
user_id	integer
order_total	float
address	text

SELECT * FROM
users INNER JOIN orders ON users.id = orders.user_id

AA

id	name	address	created_at
1	John Nob…	123 nowhe…	2016-03-19
2	John Som…	234 a pla…	2016-05-23
3	John Doe	345 Doesv…	2016-05-22

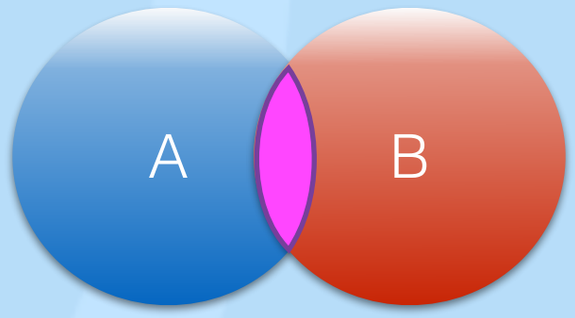
BB1

id	user_id	order_total	address
8	1	147.33	678 nowhe…
23	2	43.27	372 other…
52	3	57.9	345 Doesv…

Inner Join

A = Users

id	integer
name	text
address	text
created_at	date



B = Orders

id	integer
user_id	integer
order_total	float
address	text

SELECT * FROM
users, orders
WHERE users.id = orders.user_id

A

id	name	address	created_at
1	John Nob…	123 nowhe…	2016-03-19
2	John Som…	234 a pla…	2016-05-23
3	John Doe	345 Doesv…	2016-05-22

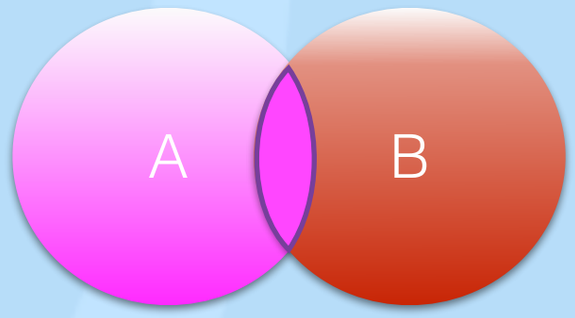
B-1

id	user_id	order_total	address
8	1	147.33	678 nowhe…
23	2	43.27	372 other…
52	3	57.9	345 Doesv…

Left Outer Join

A = Users

id	integer
name	text
address	text
created_at	date



B = Orders

id	integer
user_id	integer
order_total	float
address	text

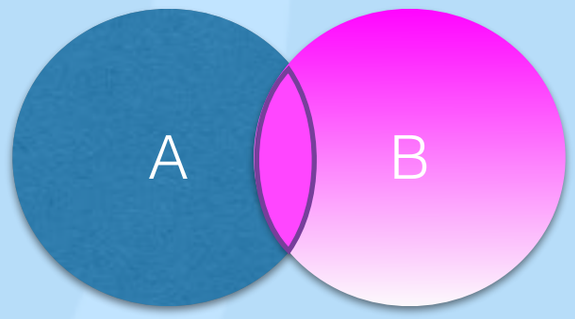
SELECT * FROM users
LEFT OUTER JOIN orders ON users.id = orders.user_id

A				B			
id	name	address	created_at	id	user_	order_total	address
1	John Nob…	123 nowhe…	2016-03-19	8	**1**	147.33	678 nowhe…
2	John Som…	234 a pla…	2016-05-23	23	**2**	43.27	372 other…
3	John Doe	345 Doesv…	2016-05-22	52	**3**	57.9	345 Doesv…
14	Jane Smith	502 downt…	2017-10-21	null	**null**	null	null
17	Janet Farm	402 lastt…	2018-01-24	null	**null**	null	null

Right Join

A = Users

id	integer
name	text
address	text
created_at	date



B = Orders

id	integer
user_id	integer
order_total	float
address	text

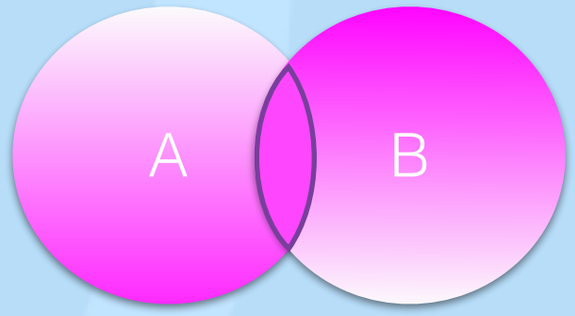
SELECT * FROM users
RIGHT OUTER JOIN orders ON users.id = orders.user_id

A				B			
id	name	address	created_at	id	user_id	order_total	address
1	John Nob…	123 nowhe…	2016-03-19	8	1	147.33	678 nowhe…
2	John Som…	234 a pla…	2016-05-23	23	2	43.27	372 other…
3	John Doe	345 Doesv…	2016-05-22	52	3	57.9	345 Doesv…

Full Join

A = Users

id	integer
name	text
address	text
created_at	date



B = Orders

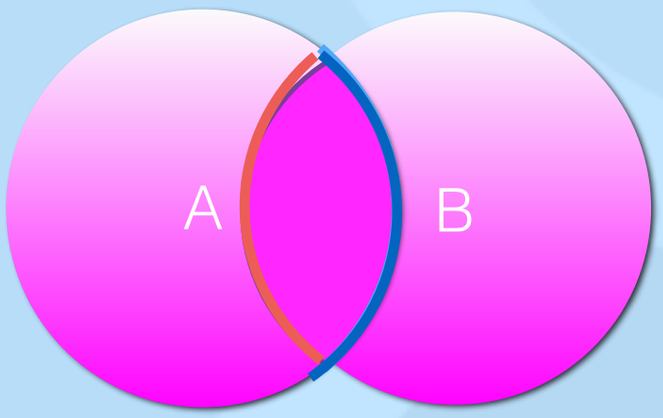
id	integer
user_id	integer
order_total	float
address	text

Users FULL OUTER JOIN orders ON users.address = orders.address

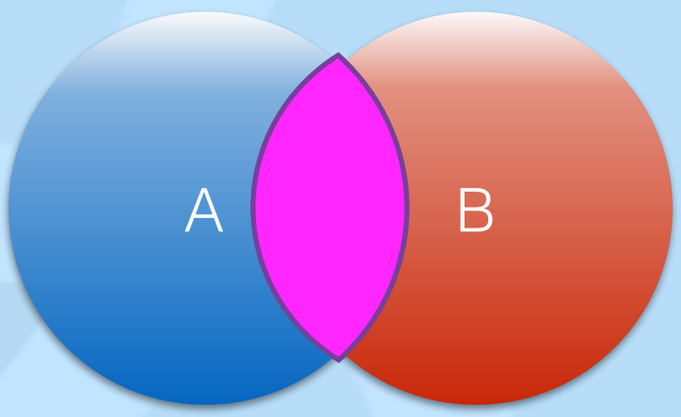
A				B			
id	name	address	created_at	id	user_	order_total	address
1	John Nob…	123	2016-03-19	null	null	null	null
14	Jane Smith	502	2017-10-21	null	null	null	null
2	John Som…	234 a	2016-05-23	35	2	113.99	234 a pla…
3	John Doe	345	2016-05-22	52	3	57.9	345 Doesv…
4	John Moe	456	2016-05-22	61	4	74.99	456 somew…
null	null	null	null	109	9	19.24	36127 av…
null	null	null	null	20	1	64.23	678 nowh…

Key Concept Review

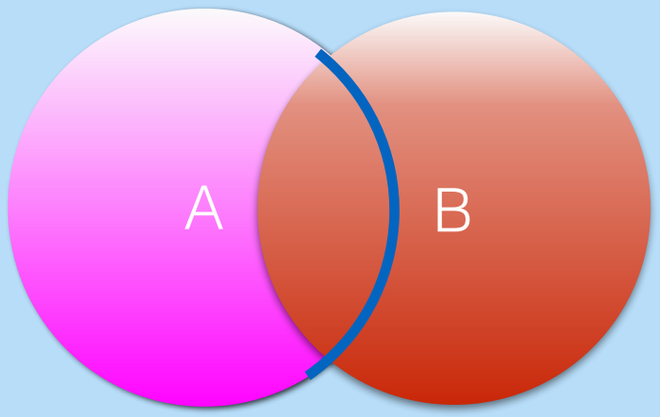
- Sets overview
  - Union, Intersect Except



A union B



A intersect B



A except B

Q & A

Advanced Functions

- Having
- String Functions
- Random

Having

- Having allows you to filter the results on the result of the rest of the query
- Useful for filtering results of aggregate and math results only
    - Won't work with case statement results for example

Having

- Having allows you to filter the results on the RESULT of the rest of the query

- WHERE
  Select product_id, count(*) from order_products
  WHERE count(*) > 2
  GROUP BY product_id
  ORDER BY count desc

- HAVING
  Select product_id, count(*) from order_products
  GROUP BY product_id
  HAVING count(*) > 2
  ORDER BY count(*) desc

Advanced functions con't.

- String Functions
  - ||, concatenate

Advanced functions con't.

- String Functions
  - ||, concatenate - push two text values together

Advanced functions con't.

- String Functions
- ||, concatenate - push two text values together

  Example: select 'add text' || name from products;

Concatenate: Quick Exercise

- String Functions
  - ||, concatenate - push two text values together

    Example: select 'add text' || name from products;

- EXERCISE: Return all users' full address with their name and address concatenated together.

Concatenate: Quick Exercise

- String Functions
  - ||, concatenate - push two text values together

    Example: select 'add text' || name from products;

- EXERCISE: Return all users' full address with their name and address concatenated together.

  SELECT name || ' ' || address from users;

Advanced functions con't.

- Random

Advanced functions con't.

- Random - returns a random value between 0 and 1
  EX: Select random()

Advanced functions con't.

- Random - returns a random value between 0 and 1
  EX: Select random() * 10

Advanced functions con't.

- Random - returns a random value between 0 and 1
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- Getting whole numbers
  - round - round to the nearest whole number
  - floor - round the down to the nearest whole number less than the value
  - ceiling - round up to the nearest whole number above the value

Advanced functions con't.

- Random - returns a random value between 0 and 1
  EX: Select random() * 10

- Getting whole numbers
  - round - round to the nearest whole number
  - floor - round the down to the nearest whole number less than the value
  - ceiling - round up to the nearest whole number above the value

- SELECT random_value,
  round(random_value),
  floor(random_value),
  ceiling(random_value)
  FROM (select random() * 10 AS random_value) random_query

Random: Quick Exercise

- Random - returns a random value between 0 and 1
  EX: Select random()

- Write a query to return a random whole number value between 5 and 10

Random: Quick Exercise

- Random - returns a random value between 0 and 1
  EX: Select random()

- Write a query to return a random whole number between 5 and 10
  (HINT: 5 + <random whole # from 0-5>)
  select random() * 10
  round: 0-10
  floor: 0-9
  ceiling: 1-10

PUT YOUR QUERY IN THE GROUP CHAT :)

Random: Quick Exercise

- Random - returns a random value between 0 and 1
  EX: Select random()

- Write a query to return a random value between 5 and 10

  SELECT 5 + round(random() * 5)
  SELECT floor(random() * 6) + 5

Q & A

Functions and Scripts

- Purpose/use cases
- Automation
- Share/Create re-usable common translations/ process

Functions

Functions

- CREATE FUNCTION <function_name>()
RETURNS <data type of result>
    AS '<query>'
    LANGUAGE SQL
    IMMUTABLE/STABLE/VOLATILE
;

Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS '<query>'
  -- will only use SQL or plpgsql functions
  LANGUAGE SQL
  <IMMUTABLE/STABLE/VOLATILE>
;

Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS $$ BEGIN
  (<plpgsql_statement>)
  END $$
  -- will only use SQL or plpgsql functions
  LANGUAGE plpgsql
  <IMMUTABLE/STABLE/VOLATILE>;

Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS <'query'/plpg statement>
  -- will only use SQL or plpgsql functions
  LANGUAGE SQL
  -- help optimize the function by defining
  -- if query will interact with tables/random
  <IMMUTABLE/STABLE/VOLATILE>
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  LANGUAGE SQL
  -- help optimize the function by defining
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  ;

- IMMUTABLE - function cannot alter or read from database
  STABLE - function may read from the database, but not alter it
  VOLATILE - function read from database may change within the function:
  Ex: Use of these w/in a query:
  random(), now(), timeofday()

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  Ex: Use of these w/in a query:
  random(), currval(), timeofday()

Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS <'query'/plpg statement>
  -- will only use SQL or plpgsql functions
  LANGUAGE SQL/<pgplsql>
  -- help optimize the function by defining
  -- if query will interact with tables/random
  <IMMUTABLE/STABLE/VOLATILE>
;

Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS <'query'/plpg statement>
  -- will only use SQL or plpgsql functions
  LANGUAGE SQL
  -- help optimize the function by defining
  -- if query will interact with tables/random
  <**IMMUTABLE**/STABLE/VOLATILE>
;

Immutable Functions

- CREATE FUNCTION **test()**
  RETURNS **TEXT**
  AS '**SELECT "some text" ;**'
  LANGUAGE SQL
  -- query won't alter or read from the database
  IMMUTABLE
;

Immutable Functions

- CREATE FUNCTION **hundred**()
  RETURNS **INTEGER**
  AS '**SELECT 100**;'
  LANGUAGE SQL
  -- query won't alter or read from the database
  IMMUTABLE
;

SQL Functions: Quick Exercise

- Write a function to return Christmas Day of 2018 as a date (HINT use Cast/::DATE)

```
CREATE FUNCTION christmas()
RETURNS DATE
    AS '<query>'
    LANGUAGE SQL
    -- query won't alter or read from the database
    IMMUTABLE;
```

SQL Functions: Quick Exercise

- Write a function to return Christmas Day of 2018 as a date (HINT use Cast/::DATE, don't forget to escape ')

```
CREATE FUNCTION christmas()
RETURNS DATE
    AS 'SELECT "2018-12-25"::DATE'
    LANGUAGE SQL
    -- query won't alter or read from the database
    IMMUTABLE;
```

- --FILL IN BELOW; PASTE ANSWER INTO THE GROUP CHAT :)
- CREATE OR REPLACE FUNCTION christmas() --2018-12-25
- RETURNS DATE
- AS $$ select '2018-12-25'::DATE $$
- LANGUAGE SQL
- -- query won't alter or read from the database
- IMMUTABLE;

Immutable pgplsql Functions

- use the postgreSQL functions and calculations without selecting from the database

- CREATE FUNCTION **hundred**()
  RETURNS **INTEGER**
  AS **'SELECT 100;'**
  LANGUAGE **SQL**
  -- query won't alter or read from the database
  IMMUTABLE;

Immutable pgplsql Functions

- Use the postgreSQL functions and calculations without selecting from the database

- CREATE FUNCTION hundred()
  RETURNS **INTEGER**
  AS **$$ BEGIN**
  RETURN (100);
  END $$
  LANGUAGE **'plpgsql'**
  IMMUTABLE; -- query won't alter or read from the db

pgplsql Functions: Quick Exercise

- Write a function to return Christmas Day of 2018 as a date (HINT use Cast/::DATE)

```
CREATE FUNCTION pg_christmas()
RETURNS DATE
    AS $$ BEGIN
      RETURN (<result>)
    END $$
    LANGUAGE 'plpgsql'
    IMMUTABLE; -- query won't alter or read from the db
```

pgplsql Functions: Quick Exercise

- Write a function to return Christmas Day of 2018 as a date (HINT use Cast/::DATE)

```
CREATE FUNCTION pg_christmas()
RETURNS DATE
    AS $$ BEGIN
      RETURN ('2018-12-25'::DATE);
    END $$
    LANGUAGE 'plpgsql'
    IMMUTABLE; -- query won't alter or read from the db
```

Q & A

10 Min Break

Stable Functions

Stable Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'plpgsql'>
    -- define if the query will interact with tables/random
    <IMMUTABLE/**STABLE**/VOLATILE>;

Stable Functions

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS <'query'/plpg statement>
  LANGUAGE <SQL/'plpgsql'>
  -- query will interact with the DB
  STABLE
;

Stable Functions

- Function to return the current time in your timezone

  CREATE FUNCTION **now_with_timezone**()
  RETURNS **timestamp**
  AS <'query'/plpg statement>
  LANGUAGE <SQL/'plpgsql'>
  -- query will interact with the DB
  STABLE
  ;

Stable Functions:

- Function to return the current time in your timezone

```
CREATE FUNCTION now_with_timezone()
RETURNS timestamp with time zone
    AS 'SELECT now()::timestamp with time zone'
    LANGUAGE SQL
    -- query will interact with the DB
    STABLE;
```

Stable Functions:

- Function to return the current time in your timezone

  CREATE FUNCTION now_with_timezone()
  RETURNS **timestamp**
  AS $$ BEGIN
  RETURN **<result>**
  END $$
  LANGUAGE '**plpgsql**'
  -- query will interact with the DB
  STABLE;

Stable Functions:

- Function to return the current time in your timezone

CREATE FUNCTION now_with_timezone()
RETURNS **timestamp**
AS $$ BEGIN
RETURN **now::timestamp with timezone**
END $$
LANGUAGE '**plpgsql**'
-- query will interact with the DB
STABLE;

Q & A

Volatile Functions

Volatile Functions

- VOLATILE - function read from database may change within the function:

  Ex: Use of these w/in a query:

  random(), currval(), timeofday()

- CREATE FUNCTION <function_name>()
  RETURNS <data type of result returned>
  AS <'query'/plpg statement>
  LANGUAGE <SQL/'pgplsql'>
  -- define if the query will interact with tables/random
  <IMMUTABLE/STABLE/**VOLATILE**>
  ;

Volatile Function

- use the postgreSQL functions and calculations without selecting from the database

- CREATE FUNCTION **random_to_5()**
  RETURNS **float**
  AS **'SELECT random() * 5'**
  LANGUAGE **SQL**
  VOLATILE; -- random could change w/in query

Volatile plpgsql Function

- use the postgreSQL functions and calculations without selecting from the database

- CREATE FUNCTION **random_to_5()**
  RETURNS **float**
  AS **$$ BEGIN**
  (random() * 5)
  END $$
  LANGUAGE **'pgplsql'**
  VOLATILE; -- random could change w/in query

Volatile Function - Advanced Example

- Function to pick a random date in the next 30 days.

```
CREATE FUNCTION random_date_next_month()
RETURNS date
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'plpgsql'>
    -- query value could change
    VOLATILE;
```

Volatile Function - Advanced Example

- Function to pick a random date in the next 30 days.

```
CREATE FUNCTION random_date_next_month()
RETURNS date
    AS '<query>;'
    LANGUAGE SQL
    VOLATILE;
```

Volatile Function - advanced Example

- Function to pick a random date in the next 30 days.

  CREATE FUNCTION random_date_next_month()
  RETURNS date
  AS **'SELECT CAST(now() + (round(random()*30) * interval "1 day") AS DATE);'**
  LANGUAGE SQL
  VOLATILE; -- random could change w/in query

Function - Advanced Example

- Function to pick a random date in the next 30 days.

```
CREATE FUNCTION random_date_next_month()
RETURNS date
    AS <plpg statement>
    LANGUAGE 'plpgsql';
```

Function - advanced Example

- Function to pick a random date in the next 30 days.

CREATE FUNCTION random_date_next_month()
RETURNS date
AS **$$ BEGIN**
RETURN (now() + (floor(random()*30) * interval '1 day')::DATE) **;**
END $$
LANGUAGE SQL;

Q & A

Functions - Variables

Functions - Variables

- CREATE FUNCTION **<function_name>(<data_type>, …)**
  RETURNS <data type of result>
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'pgplsql'>
    <IMMUTABLE/STABLE>;

Functions - Variables

- CREATE FUNCTION **<function_name>(<data_type>, …)**

```
RETURNS <data type of result>
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'pgplsql'>
;
```

Functions - Variables

- CREATE FUNCTION **sample(text, text, integer, integer)** RETURNS text
  AS 'SELECT **$1 II $2 II $3 II $4**;'
  LANGUAGE SQL
  IMMUTABLE; -- optimize the query for the DB

SELECT sample('first', 'second', 3, 4);

Functions - Variables

- CREATE FUNCTION **<function_name>(<data_type>, …)**

RETURNS <data type of result>
AS '<query>;'
LANGUAGE <SQL/'pgplsql'>
-- **optionally can deal with null values specifically**
RETURNS NULL ON NULL INPUT;

Functions - Variables

- Example: Create a function for addition:

```
CREATE FUNCTION addition(<data_type>, …)
RETURNS <data type of result>
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'pgplsql'>
  ;
```

Functions - Variables

- Example: Create a function for addition:

```
CREATE FUNCTION addition(integer, integer)
RETURNS <data type of result>
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'pgplsql'>
 ;
```

Functions - Variables

- Example: Create a function for addition:

```
CREATE FUNCTION addition(integer, integer)
RETURNS integer
    AS <'query'/plpg statement>
    LANGUAGE <SQL/'pgplsql'>
;
```

Functions - Variables

- Example: Create a function for addition:

```
CREATE FUNCTION addition(integer, integer)
RETURNS integer
    AS 'SELECT $1 + $2;'
    LANGUAGE SQL
;
```

Functions - Variables

- Example: Create a function to add two integers

```
CREATE FUNCTION addition(integer, integer)
RETURNS integer
    AS 'SELECT $1 + $2;'
    LANGUAGE SQL
    IMMUTABLE; -- function won't use DB
```

Functions - Variables

- Example: Create a function to add two integers

CREATE FUNCTION **addition(integer, integer)**
RETURNS **integer**
AS $$ BEGIN
RETURN **($1 + $2);**
END; $$
LANGUAGE **'plpgsql'**
IMMUTABLE; -- function won't use database

Functions: Quick Exercise

- Create a function that multiplies two integers using the SQL language

Functions: Quick Exercise

- Create a function that multiplies two integers using the SQL language
- *PUT YOUR ANSWER IN THE GROUP CHAT :)*

```
CREATE FUNCTION multiply(integer, integer)
RETURNS integer
    AS '<query>'
    LANGUAGE SQL
    IMMUTABLE;
```

Functions: Quick Exercise

- Create a function that multiplies two integers using the SQL language

```
CREATE FUNCTION multiply(integer, integer)
RETURNS integer
    AS 'select $1 * $2;'
    LANGUAGE SQL
    IMMUTABLE;
```

Functions: Quick Exercise

- Create a function that multiplies two integers using the plpgsql language

Functions: Quick Exercise

- Create a function that multiplies two integers using the plpgsql language

```
CREATE FUNCTION multiply2(integer, integer)
        RETURNS integer
        AS $$ BEGIN
            RETURN (<result>);
         END; $$
LANGUAGE 'plpgsql'
IMMUTABLE;
```

Functions: Quick Exercise

- Create a function that multiplies two integers using the plpgsql language

```
CREATE FUNCTION multiply2(integer, integer)
        RETURNS integer
        AS $$ BEGIN
            RETURN ($1 * $2);
         END; $$
LANGUAGE 'plpgsql'
IMMUTABLE;
```

Functions - Variables

- Example: Create a function to add two integers - store the value into a variable

```
CREATE FUNCTION addition_w_tot(integer, integer)
RETURNS integer
    AS $$
        DECLARE total integer;
    BEGIN
        SELECT ($1 + $2) INTO total;
        RETURN total;
    END; $$
    LANGUAGE 'pgplsql'
    IMMUTABLE; -- query won't use DB
```

Q & A

Functions Exercises

1.Create a function that returns the current week with year value as text: "year_week" using SQL HINT(Use EXTRACT and now())

2. … Also using pgplsql

Functions Exercises

1.Create a function that returns the current week with year value as text: "year_week"
HINT(Use EXTRACT and now())

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS '<...>'
        LANGUAGE SQL
  STABLE;
```

2. using plpgsql:

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS $$ BEGIN
          RETURN <...>;
        END $$
        LANGUAGE SQL
  STABLE;
```

Functions Exercises

1.Create a function that returns the current week with year value as text: "year_week"
HINT(Use EXTRACT and now()):

SELECT EXTRACT(YEAR FROM now()) II '_' II EXTRACT (WEEK from now())

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS '<...>'
        LANGUAGE SQL
  STABLE;
```

2. using plpgsql:

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS $$ BEGIN
          RETURN (<...>);
        END $$
        LANGUAGE SQL
  STABLE;
```

Functions Exercises

1. Create a function that returns the current week with year value as text: "year_week"
   HINT(Use EXTRACT and now())

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS 'SELECT EXTRACT(YEAR from now()) ||
                        "_" || EXTRACT(WEEK from
now());'
        LANGUAGE SQL
   STABLE;
```

Functions Exercises

2.Create a function that returns the current week with year value as text: "year_week"
HINT(Use EXTRACT and now())

```
CREATE OR REPLACE FUNCTION year_week_pl()
RETURNS text AS $$ BEGIN
RETURN EXTRACT(YEAR from now()) ll '_' ll
EXTRACT(WEEK from now());
END $$
LANGUAGE 'plpgsql'
STABLE;
```

Q & A

10 Min Break

Scripts

- Scripts are a series of commands stored in a file.

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- Useful with tools such as psql a command line version of pgAdmin (no graphical interface).

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- Separate each command with **;**

Scripts

- Scripts are a series of commands stored in a file.
- Useful with tools such as psql a command line version of pgAdmin (no graphical interface).
- Separate each command with **;**
- Each command will run fully before going to the next one

Scripts

- Scripts are a series of commands stored in a file.
- Useful with tools such as psql a command line tool (no graphical interface) or can be ran from the Query Tool version of pgAdmin.
- Separate each command with **;**
- Each command will run fully before going to the next one
- The script won't complete if any command has an error

Scripts

- Script commands can be 'wrapped' to execute a generated query:

- DO $$ BEGIN
  <execute/command>
  END $$

Scripts

- Script commands can be 'wrapped' to execute a command:

- DO $$ BEGIN
  <execute/command>
  END $$

Scripts

- Example

- Create a function, then run a command to utilize it

Scripts

- Example
- Create a function, then run a command to utilize it
- Using the multiply function from earlier:

```
CREATE FUNCTION multiply(integer, integer)
    RETURNS integer
    AS 'select $1 * $2;'
    LANGUAGE SQL
    IMMUTABLE;

SELECT multiply(4,3)
UNION
SELECT multiply(10,2);
```

Scripts

- Example
- Create a function, then run a command to utilize it
- Using the multiply function from earlier:

```
CREATE OR REPLACE FUNCTION multiply(integer, integer)
    RETURNS integer
    AS 'select $1 * $2;'
    LANGUAGE SQL
    IMMUTABLE;

SELECT multiply(4,3)
UNION
SELECT multiply(10,2);
```

Scripts

- Script can have any number of commands that will be ran.

Functions and Scripts

- Advanced Use case:
  Since carts can be updated at any time, want to keep history. Let's create a script that will create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 1: Query to get the current products in a cart.

```
SELECT products.id as product_id,
products.price,
products.grams,
products.name as product,
cart_products.cart_id,
cart_products.created_at as cart_added_at
FROM cart_products
JOIN products on products.id = cart_products.product_id
```

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 2: Include now() as the snapshot date

```
SELECT products.id as product_id,
products.price,
products.grams,
products.name as product,
cart_products.cart_id,
cart_products.created_at as cart_added_at,
now() as snapshot_date
FROM cart_products
JOIN products on products.id = cart_products.product_id
```

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 3: Create a table for with the results of the snapshot
CREATE TABLE product_details AS
SELECT products.id as product_id,
products.price,
products.grams,
products.name as product,
cart_products.cart_id,
cart_products.created_at as cart_added_at,
now() as snapshot_date
FROM cart_products
JOIN products on products.id = cart_products.product_id

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 4: Ensure the table names are unique
CREATE TABLE product_details_YEAR_WEEK AS
SELECT products.id as product_id,
products.price,
products.grams,
products.name as product,
cart_products.cart_id,
cart_products.created_at as cart_added_at,
now() as snapshot_date
FROM cart_products
JOIN products on products.id = cart_products.product_id

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 5: Utilize a function to create the name - Start with query from earlier!

```
CREATE OR REPLACE FUNCTION year_week()
        RETURNS text
        AS 'SELECT "EXTRACT(YEAR from now()) ||
                        ''_'' || EXTRACT(WEEK from now());'
        LANGUAGE SQL
   STABLE;

SELECT product_detail_table();
```

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 5: Utilize a function to create the name

```
CREATE OR REPLACE FUNCTION product_detail_tablename()
        RETURNS text
        AS 'SELECT "product_detail_" ||
                        EXTRACT(YEAR from now()) ||
                        ''_'' || EXTRACT(WEEK from now());'
        LANGUAGE SQL
    STABLE;

SELECT product_detail_tablename();
```

Functions and Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 5: Utilize a function to create the name
  CREATE OR REPLACE FUNCTION **product_detail_tablename**()
  RETURNS text
  AS 'SELECT **"product_detail_" ||**
  EXTRACT(YEAR from now()) ||
  "_" || EXTRACT(WEEK from now());'
  LANGUAGE SQL
  STABLE;

  SELECT product_detail_tablename();

- DO $$ BEGIN
  EXECUTE 'CREATE TABLE ' || product_detail_tablename() ||
  ' AS SELECT 100 as hundred;';
  END $$

Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 6: Bring it all together

```
CREATE OR REPLACE FUNCTION product_detail_tablename()
        RETURNS text
        AS 'SELECT ''product_detail_'' ||
                EXTRACT(YEAR from now()) ||
                ''_'' || EXTRACT(WEEK from now());'
    LANGUAGE SQL
  STABLE;
DO $$ BEGIN
EXECUTE 'CREATE TABLE ' || product_details_tablename() || ' AS
   SELECT products.id as product_id,
      products.price,
      products.grams,
      products.name as product,
      cart_products.cart_id,
      cart_products.created_at as cart_added_at,
      now() as snapshot_date
   FROM cart_products
   JOIN products on products.id = cart_products.product_id;';
END $$;
```

Scripts

- Create a snapshot of the products that are in a cart each week, and record the cart they are in with the date of the snapshot.

- Step 6: Bring it all together

```
CREATE OR REPLACE FUNCTION product_detail_tablename()
        RETURNS text
        AS 'SELECT ''product_detail_'' ||
            EXTRACT(YEAR from now()) ||  ''_'' || EXTRACT(WEEK from now());'
    LANGUAGE SQL
  STABLE;
DO $$ BEGIN
EXECUTE 'DROP TABLE IF EXISTS ' || product_detail_tablename() ||
   '; CREATE TABLE ' || product_details_tablename() || ' AS
   SELECT products.id as product_id,
      products.price,
      products.grams,
      products.name as product,
      cart_products.cart_id,
      cart_products.created_at as cart_added_at,
      now() as snapshot_date
   FROM cart_products
   JOIN products on products.id = cart_products.product_id;';
END $$;
```

Q & A

Schema

- Schemas are a named 'space' for data to be stored
- If a database is like a large excel spreadsheet
- Schema is like a single tab

Schemas

- Common use cases:
  - separation of 'type' of data (from different sources or by concept
  - need to 'segment'/separate data to improve performance
  - Simplify master queries, etc.

Schema

- CREATE SCHEMA historical_cart_details;

Schemas

- Referring to tables in the schema:
  - <schema>.<table>

Schema

- CREATE OR REPLACE FUNCTION product_detail_tablename()
  RETURNS text
  AS 'SELECT ''**historical_cart_details.**product_detail_'' ||
  EXTRACT(YEAR from now()) || ''_'' || EXTRACT(WEEK from now());'
  LANGUAGE SQL
  STABLE;

```
DO $$ BEGIN
EXECUTE EXECUTE 'DROP TABLE IF EXISTS ' || product_detail_tablename() ||
    '; CREATE TABLE ' || product_details_tablename() || ' AS
    SELECT products.id as product_id,
        products.price,
        products.grams,
        products.name as product,
        cart_products.cart_id,
        cart_products.created_at as cart_added_at,
        now() as snapshot_date
    FROM cart_products
    JOIN products on products.id = cart_products.product_id;';
END $$;
```

Inheritance

- Creating a table will 'inherit' the schema from the source table

Inheritance

- First let's create a master table
- CREATE TABLE cart_details

(product_id integer,
price double precision,
grams double precision,
product character varying(100),
cart_id integer,
cart_added_at timestamp without time zone,
snapshot_date timestamp with time zone)

Inheritance

- CREATE TABLE historical_cart_details.test_table() INHERITS(cart_details)

Inheritance

- CREATE TABLE historical_cart_details.test_table INHERITS(cart_details)

- SELECT * FROM historical_cart_details.test_table

Inheritance

- **INSERT INTO historical_cart_details.test_table**
  (SELECT 2000 as product_id,
  0.00 as price,
  0 as grams,
  'test' as product,
  2000 as cart_id,
  now() as cart_added_at,
  now()::DATE as snapshot_date
);

Inheritance

- SELECT * FROM historical_cart_details.test_table;

Inheritance

- SELECT * FROM historical_cart_details.test_table;

Inheritance

- DO $$ BEGIN
  EXECUTE 'DROP TABLE IF EXISTS ' || product_detail_tablename() ||
  '; **CREATE TABLE ' ll product_details_tablename() ll ' AS**
  SELECT products.id as product_id,
  products.price,
  products.grams,
  products.name as product,
  cart_products.cart_id,
  cart_products.created_at as cart_added_at,
  now() as snapshot_date
  FROM cart_products
  JOIN products on products.id = cart_products.product_id;**';**
  END $$;

Inheritance

- **INSERT INTO <table>**
  (SELECT products.id as product_id,
  products.price,
  products.grams,
  products.name as product,
  cart_products.cart_id,
  cart_products.created_at as cart_added_at,
  now()::DATE as snapshot_date
  FROM cart_products
  JOIN products on products.id =
cart_products.product_id**);**

Inheritance

- DO $$ BEGIN
  EXECUTE EXECUTE 'DROP TABLE IF EXISTS ' || product_detail_tablename() ||
  '; **CREATE TABLE ' ll product_details_tablename() ll ' INHERITS**
  cart_details;
  INSERT INTO cart_details
  (SELECT products.id as product_id,
  products.price,
  products.grams,
  products.name as product,
  cart_products.cart_id,
  cart_products.created_at as cart_added_at,
  now() as snapshot_date
  FROM cart_products
  JOIN products on products.id = cart_products.product_id**);' ;**
  END $$;

Inheritance

- Now I can select from the parent table and see rows from both child tables.

  SELECT * FROM cart_details;

Q & A

Day 2 Wrap-up