

What's in the database?

EXPLORATORY DATA ANALYSIS IN SQL



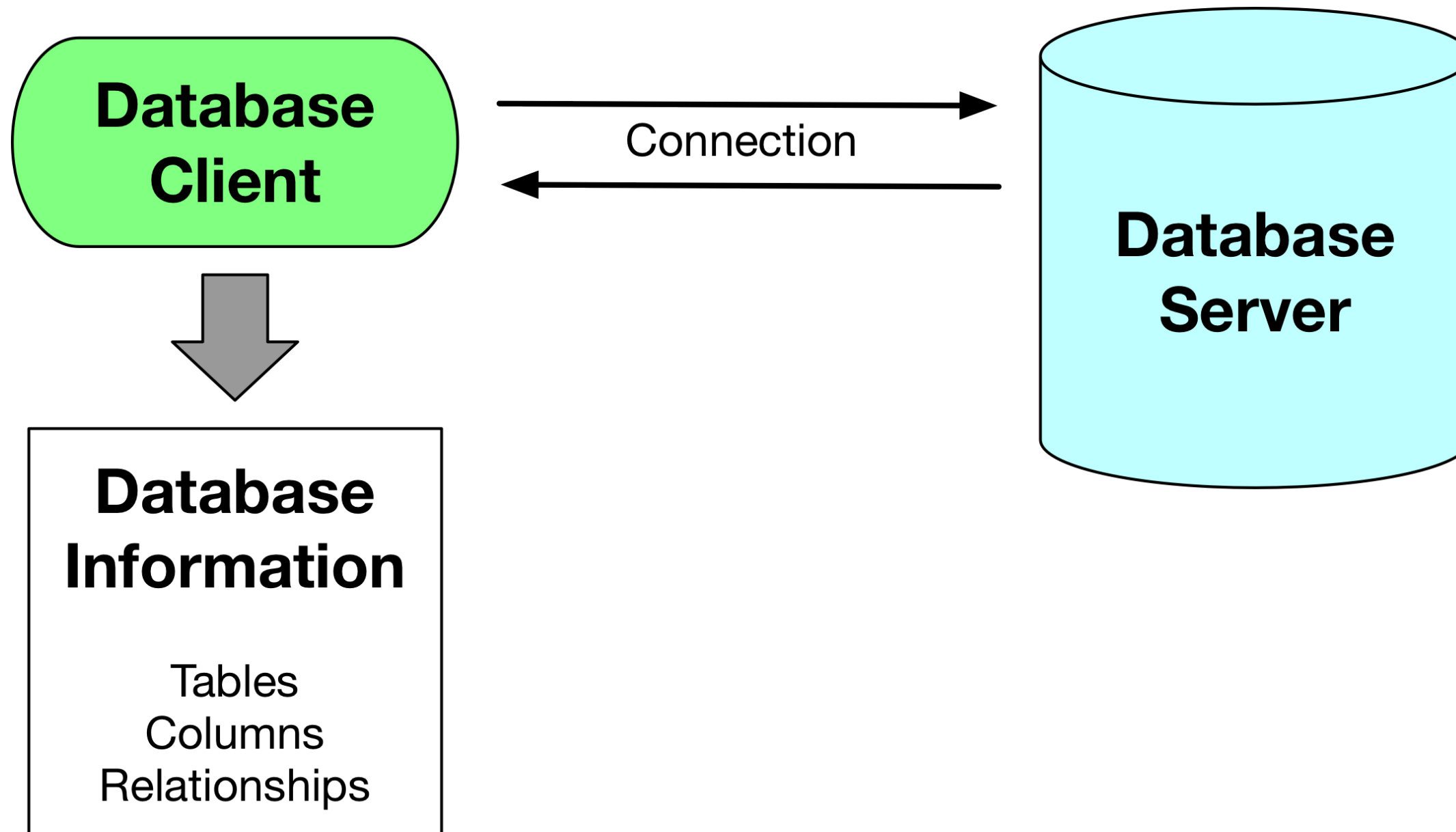
Christina Maimone
Data Scientist











PostgreSQL

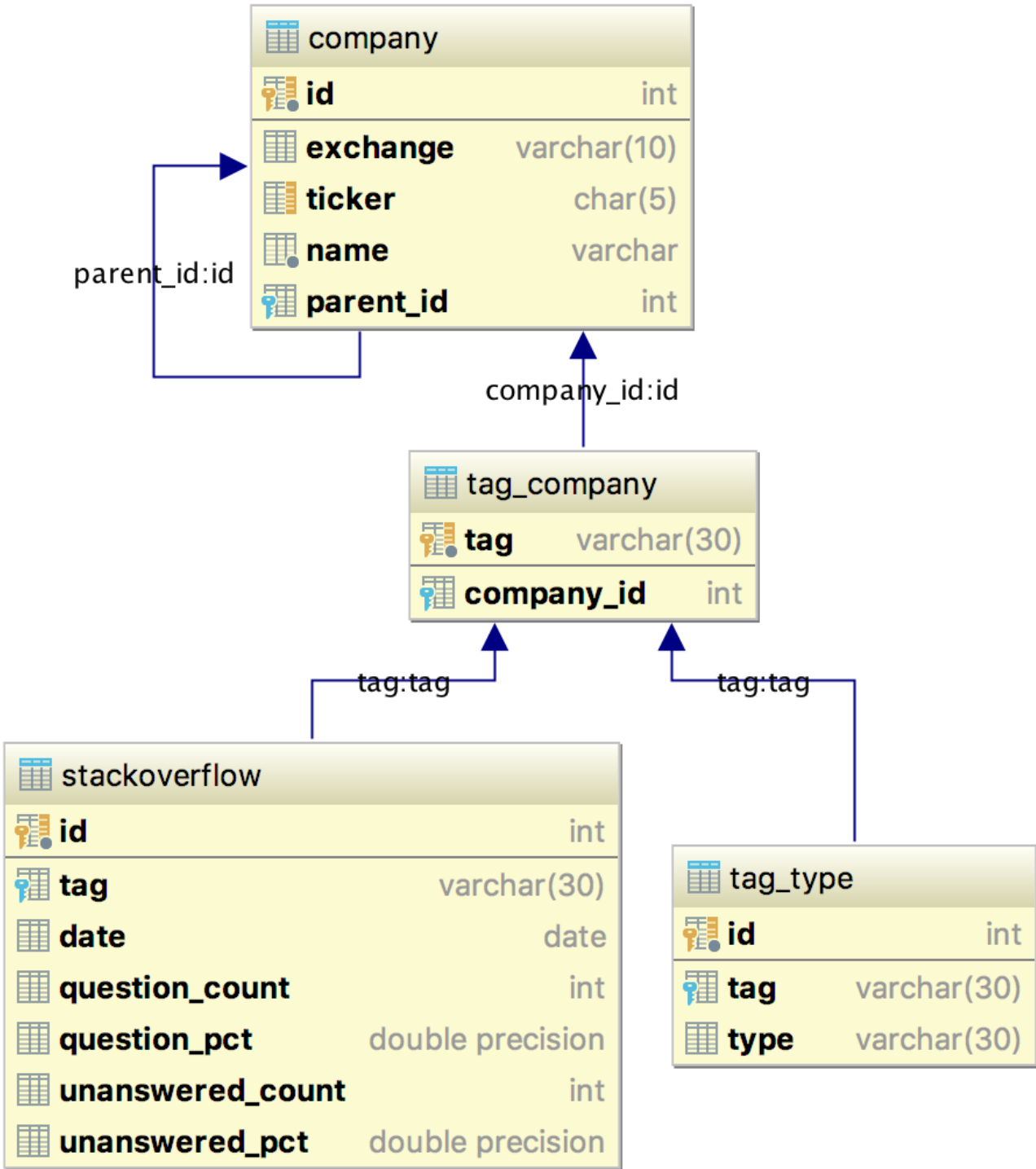

















PostgreSQL

Database client



















evanston311	
 id	int
 priority	varchar(6)
 source	varchar(20)
 category	varchar(64)
 date_created	timestamptz
 date_completed	timestamptz
 street	varchar(48)
 house_num	varchar(12)
 zip	char(5)
 description	varchar




fortune500	
 title	varchar
 rank	int
 name	varchar
 ticker	char(5)
 url	varchar
 hq	varchar
 sector	varchar
 industry	varchar
 employees	int
 revenues	int
 revenues_change	real
 profits	numeric
 profits_change	real
 assets	numeric
 equity	numeric




Stack Overflow data was provided by Thinknum <https://www.thinknum.com>









evanston311	
 id	int
 priority	varchar(6)
 source	varchar(20)
 category	varchar(64)
 date_created	timestampz
 date_completed	timestampz
 street	varchar(48)
 house_num	varchar(12)
 zip	char(5)
 description	varchar





	company	
	id	int
	exchange	varchar(10)
	ticker	char(5)
	name	varchar
	parent_id	int
















parent_id:id



	tag_company	
	tag	varchar(30)
	company_id	int

	stackoverflow	
	id	int
	tag	varchar(30)
	date	date
	question_count	int
	question_pct	double precision
	unanswered_count	int
	unanswered_pct	double precision

	tag_type	
	id	int
	tag	varchar(30)
	type	varchar(30)

fortune500	
 title	varchar
 rank	int
 name	varchar
 ticker	char(5)
 url	varchar
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 equity	numeric

parent_id:id

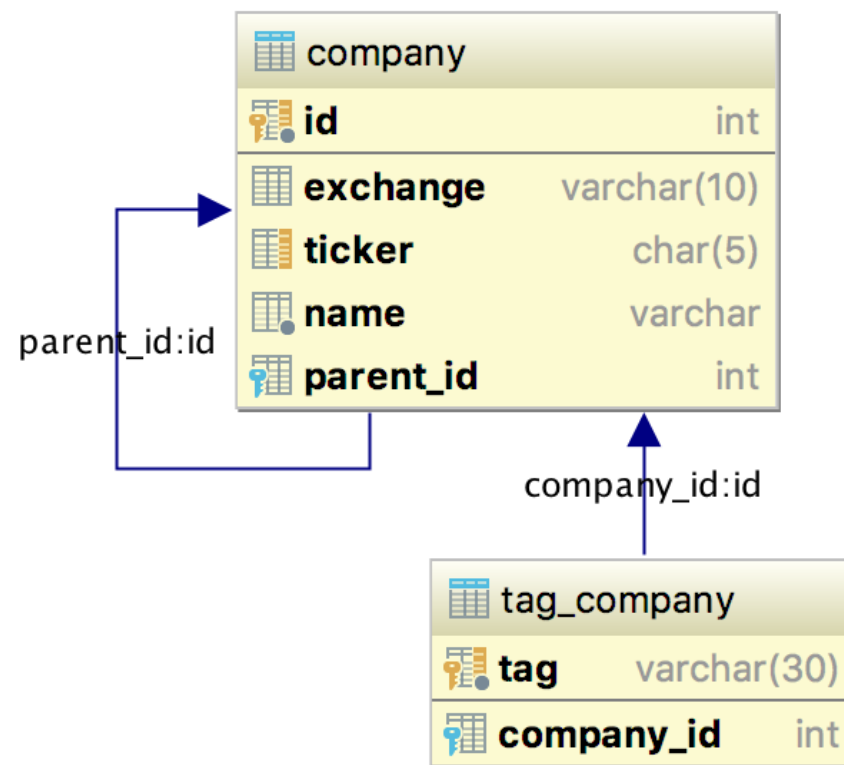
company_id:id

tag:tag

tag:tag

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evanston311	
id	int
priority	varchar(6)
source	varchar(20)
category	varchar(64)
date_created	timestampz
date_completed	timestampz
street	varchar(48)
house_num	varchar(12)
zip	char(5)
description	varchar













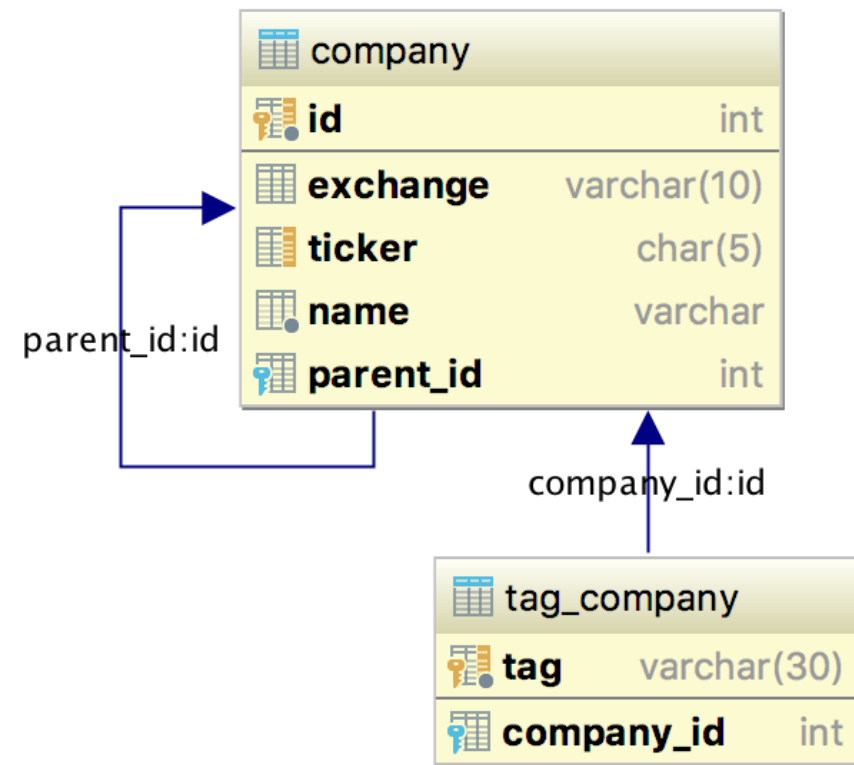
fortune500	
title	varchar
rank	int
name	varchar
ticker	char(5)
url	varchar
hq	varchar
sector	varchar
industry	varchar
employees	int
revenues	int
revenues_change	real
profits	numeric
profits_change	real
assets	numeric
equity	numeric
















stackoverflow	
id	int
tag	varchar(30)
date	date
question_count	int
question_pct	double precision
unanswered_count	int
unanswered_pct	double precision





tag_type	
id	int
tag	varchar(30)
type	varchar(30)

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evanston311	
 id	int
 priority	varchar(6)
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 date_created	timestamptz
 date_completed	timestamptz
 street	varchar(48)
 house_num	varchar(12)
 zip	char(5)
 description	varchar

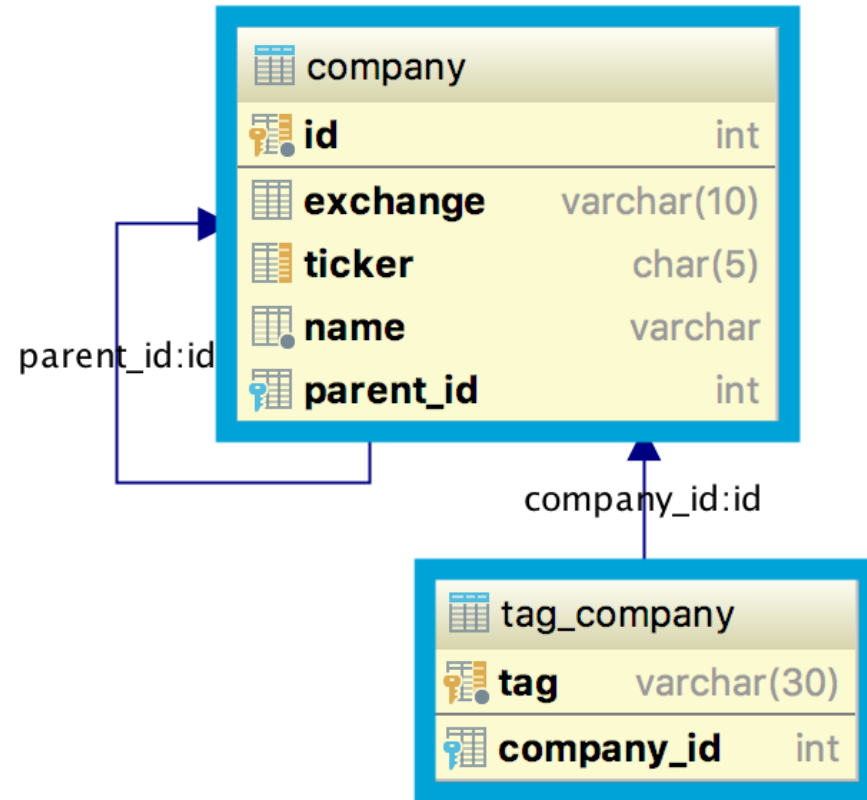


fortune500	
 title	varchar
 rank	int
 name	varchar
 ticker	char(5)
 url	varchar
 hq	varchar
 sector	varchar
 industry	varchar
 employees	int
 revenues	int
 revenues_change	real
 profits	numeric
 profits_change	real
 assets	numeric
 equity	numeric

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	id	int
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id	int
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unanswered_pct	double precision

tag_type	
id	int
tag	varchar(30)
type	varchar(30)

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Select a few rows

```
SELECT *  
  FROM company  
 LIMIT 5;
```

id	exchange	ticker	name	parent_id
1	nasdaq	PYPL	PayPal Holdings, Inc.	
2	nasdaq	AMZN	Amazon.com, Inc.	
3	nasdaq	MSFT	Microsoft Corporation	
4	nasdaq	MDB	MongoDB Inc.	
5	nasdaq	DBX	Dropbox, Inc.	

(5 rows)

A few reminders

Code	Note
NULL	missing

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<code>NULL</code>	missing
<code>IS NULL</code> , <code>IS NOT NULL</code>	don't use <code>= NULL</code>

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<code>count(*)</code>	number of rows

A few reminders

Code	Note
<code>NULL</code>	missing
<code>IS NULL</code> , <code>IS NOT NULL</code>	don't use <code>= NULL</code>
<code>count(*)</code>	number of rows
<code>count(column_name)</code>	number of non- <code>NULL</code> values

A few reminders

Code	Note
<code>NULL</code>	missing
<code>IS NULL</code> , <code>IS NOT NULL</code>	don't use <code>= NULL</code>
<code>count(*)</code>	number of rows
<code>count(column_name)</code>	number of non- <code>NULL</code> values
<code>count(DISTINCT column_name)</code>	number of different non- <code>NULL</code> values

A few reminders

Code	Note
<code>NULL</code>	missing
<code>IS NULL</code> , <code>IS NOT NULL</code>	don't use <code>= NULL</code>
<code>count(*)</code>	number of rows
<code>count(column_name)</code>	number of non- <code>NULL</code> values
<code>count(DISTINCT column_name)</code>	number of different non- <code>NULL</code> values
<code>SELECT DISTINCT column_name ...</code>	distinct values, including <code>NULL</code>

Let's start exploring

EXPLORATORY DATA ANALYSIS IN SQL

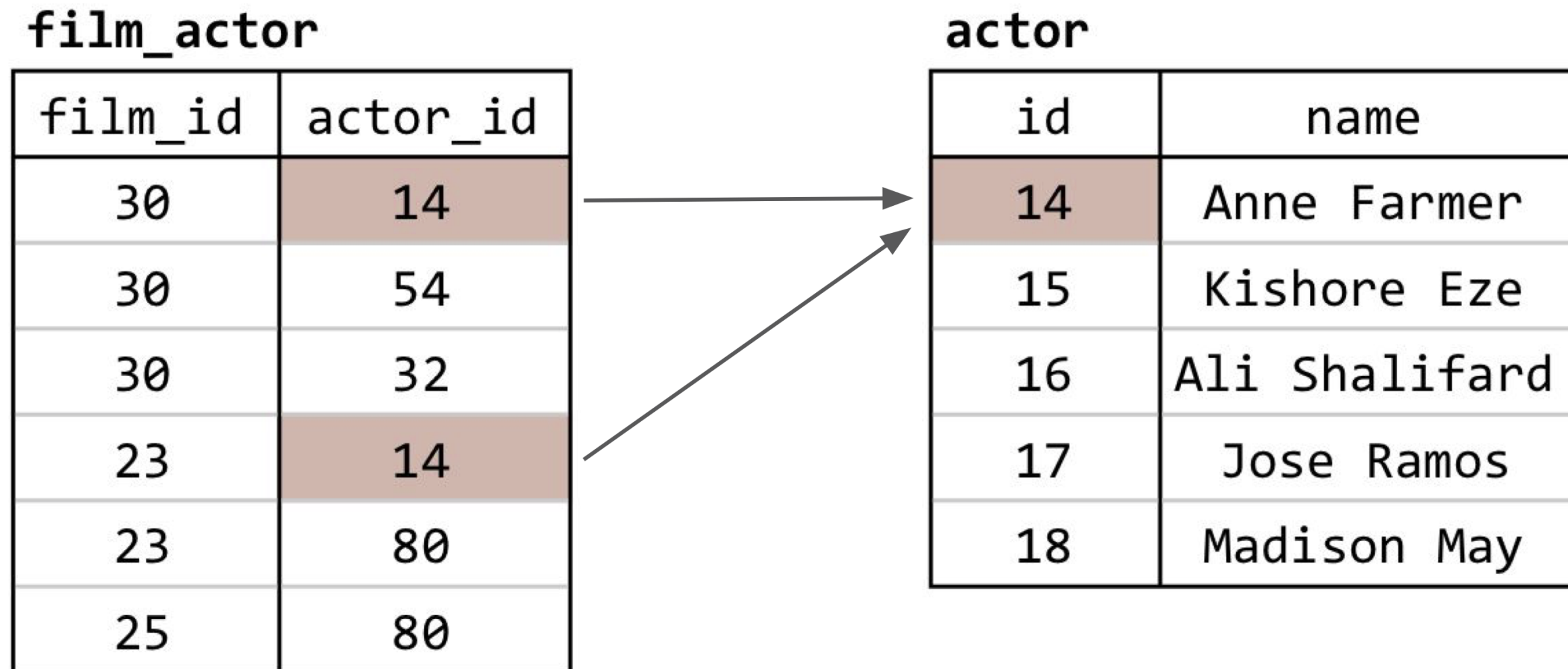
The keys to the database

EXPLORATORY DATA ANALYSIS IN SQL













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Data Scientist

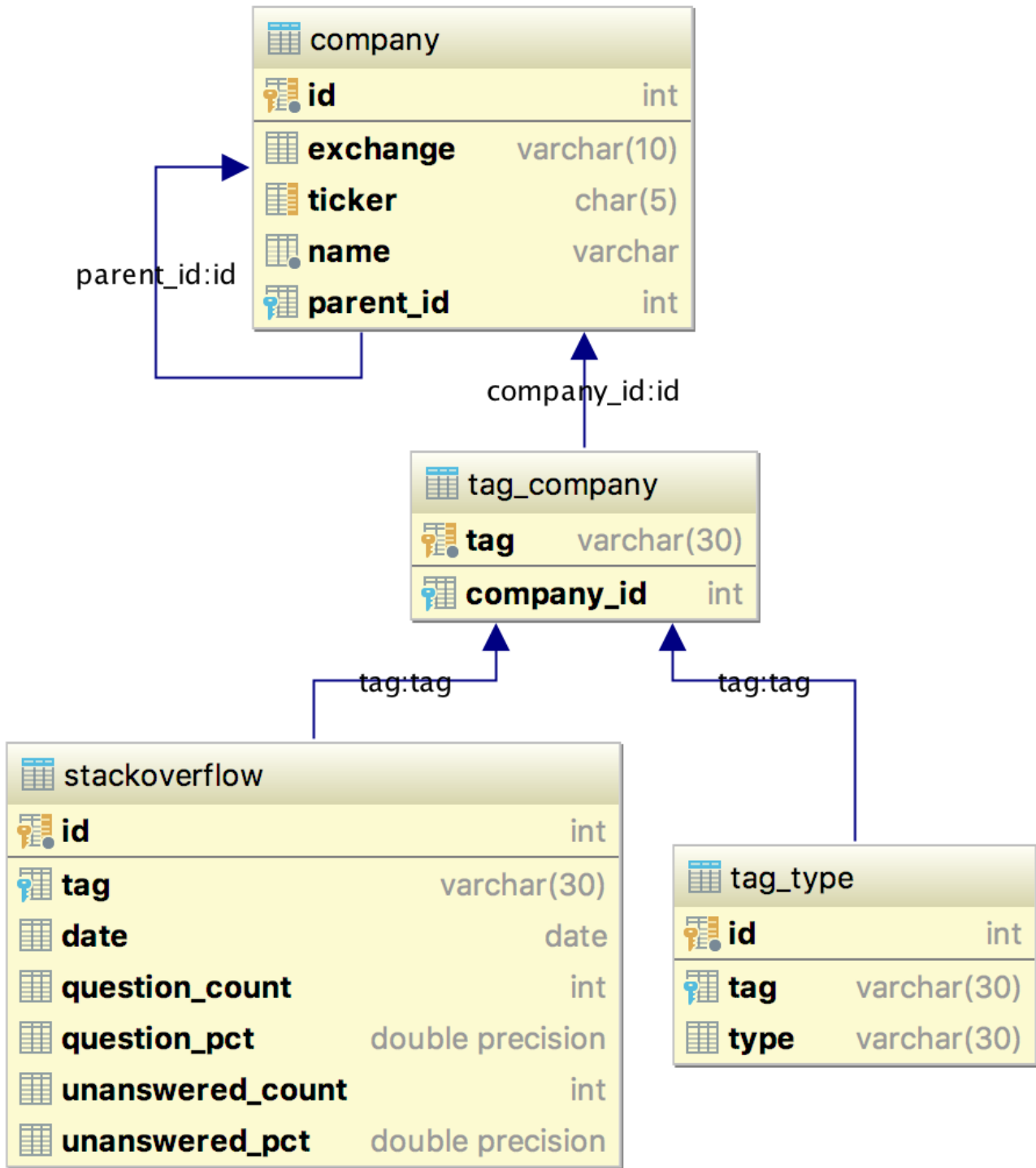
Foreign keys


















Foreign keys

- Reference another row
 - In a different table or the same table
 - Via a unique ID
 - >> Primary key column containing unique, non-NULL values
- Values restricted to values in referenced column OR NULL

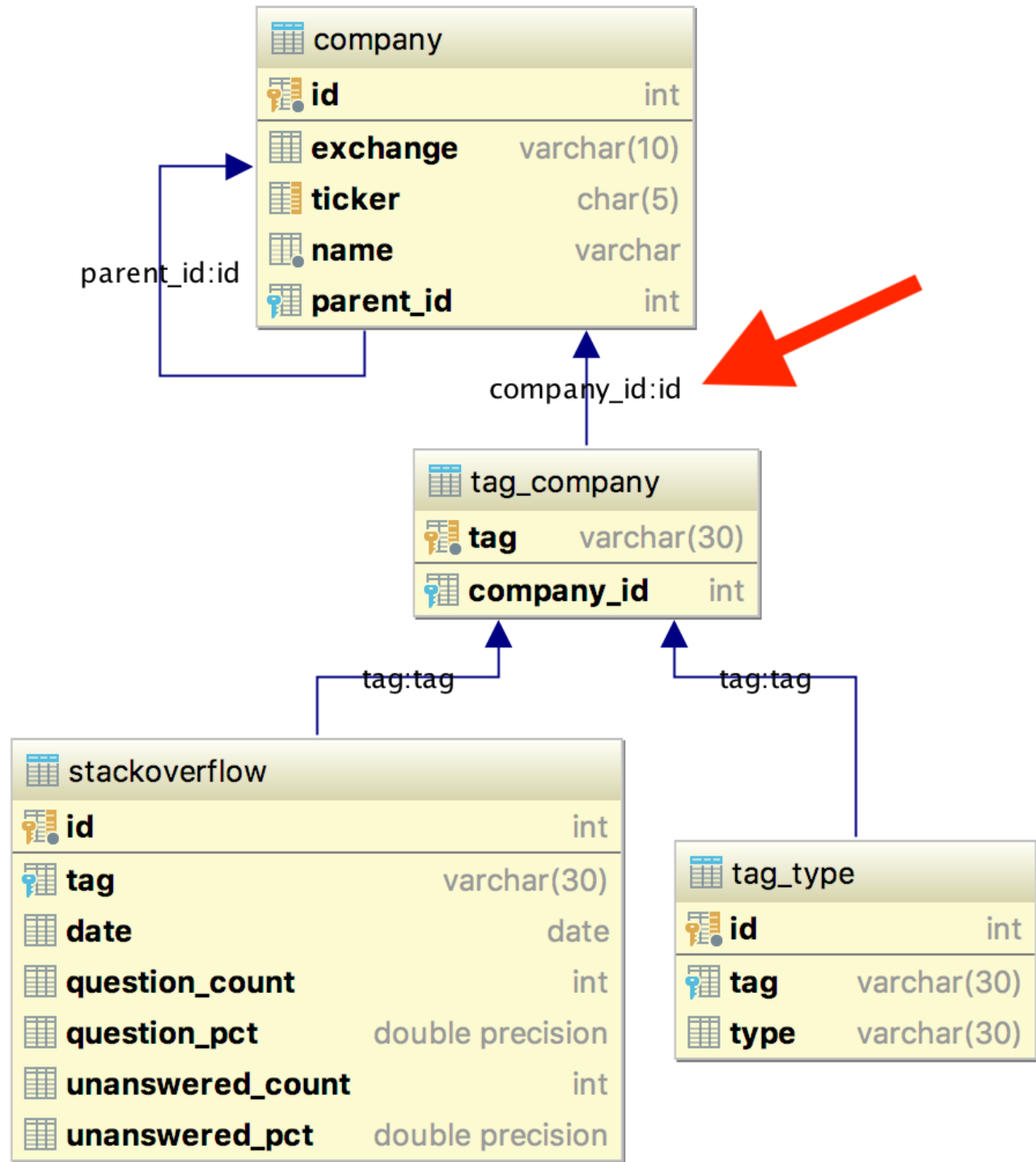
evanston311	
 id	int
 priority	varchar(6)
 source	varchar(20)
 category	varchar(64)
 date_created	timestamptz
 date_completed	timestamptz
 street	varchar(48)
 house_num	varchar(12)
 zip	char(5)
 description	varchar



fortune500	
 title	varchar
 rank	int
 name	varchar
 ticker	char(5)
 url	varchar
 hq	varchar
 sector	varchar
 industry	varchar
 employees	int
 revenues	int
 revenues_change	real
 profits	numeric
 profits_change	real
 assets	numeric
 equity	numeric

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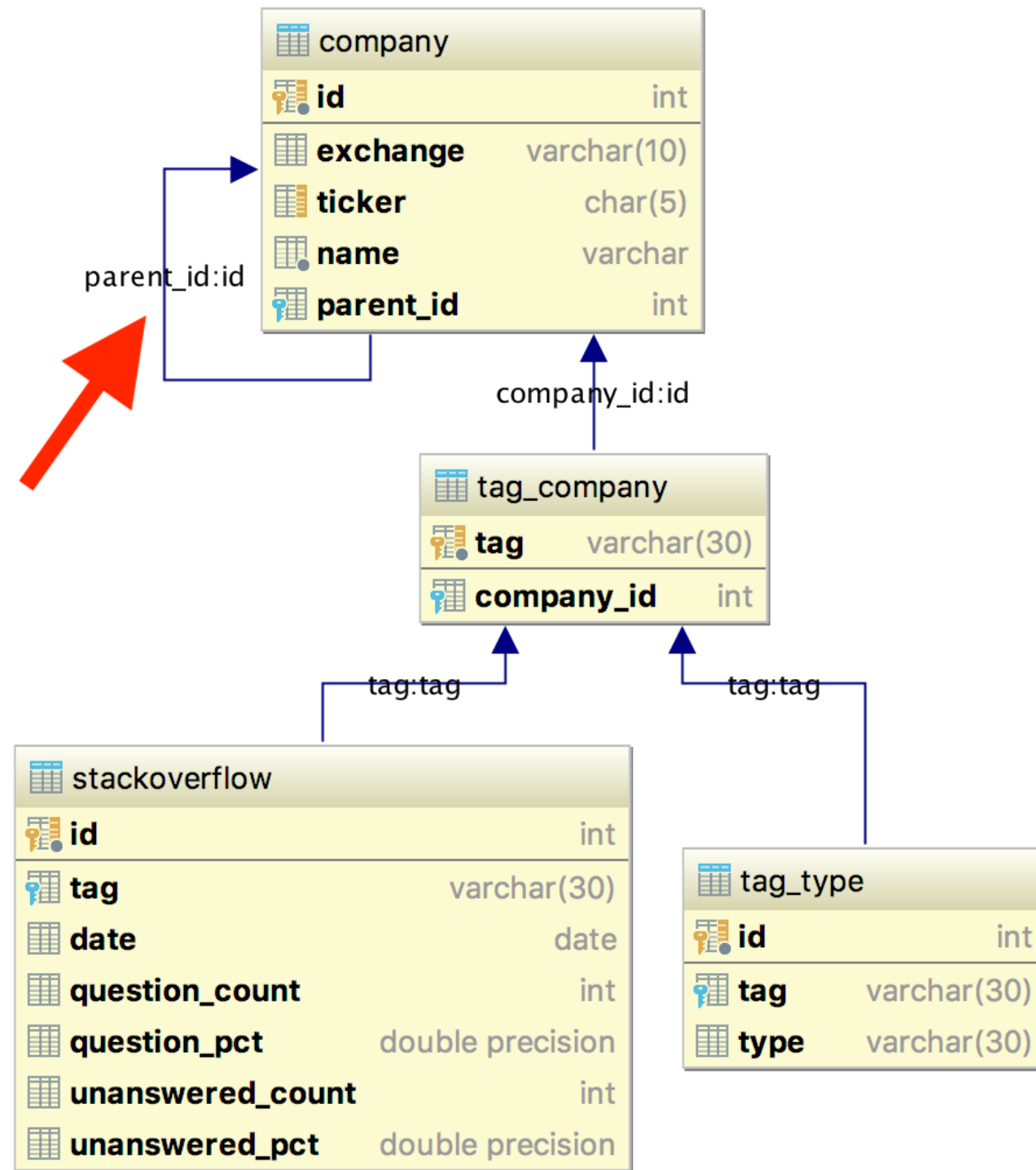
evanston311	
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source	varchar(20)
category	varchar(64)
date_created	timestampz
date_completed	timestampz
street	varchar(48)
house_num	varchar(12)
zip	char(5)
description	varchar



fortune500	
title	varchar
rank	int
name	varchar
ticker	char(5)
url	varchar
hq	varchar
sector	varchar
industry	varchar
employees	int
revenues	int
revenues_change	real
profits	numeric
profits_change	real
assets	numeric
equity	numeric











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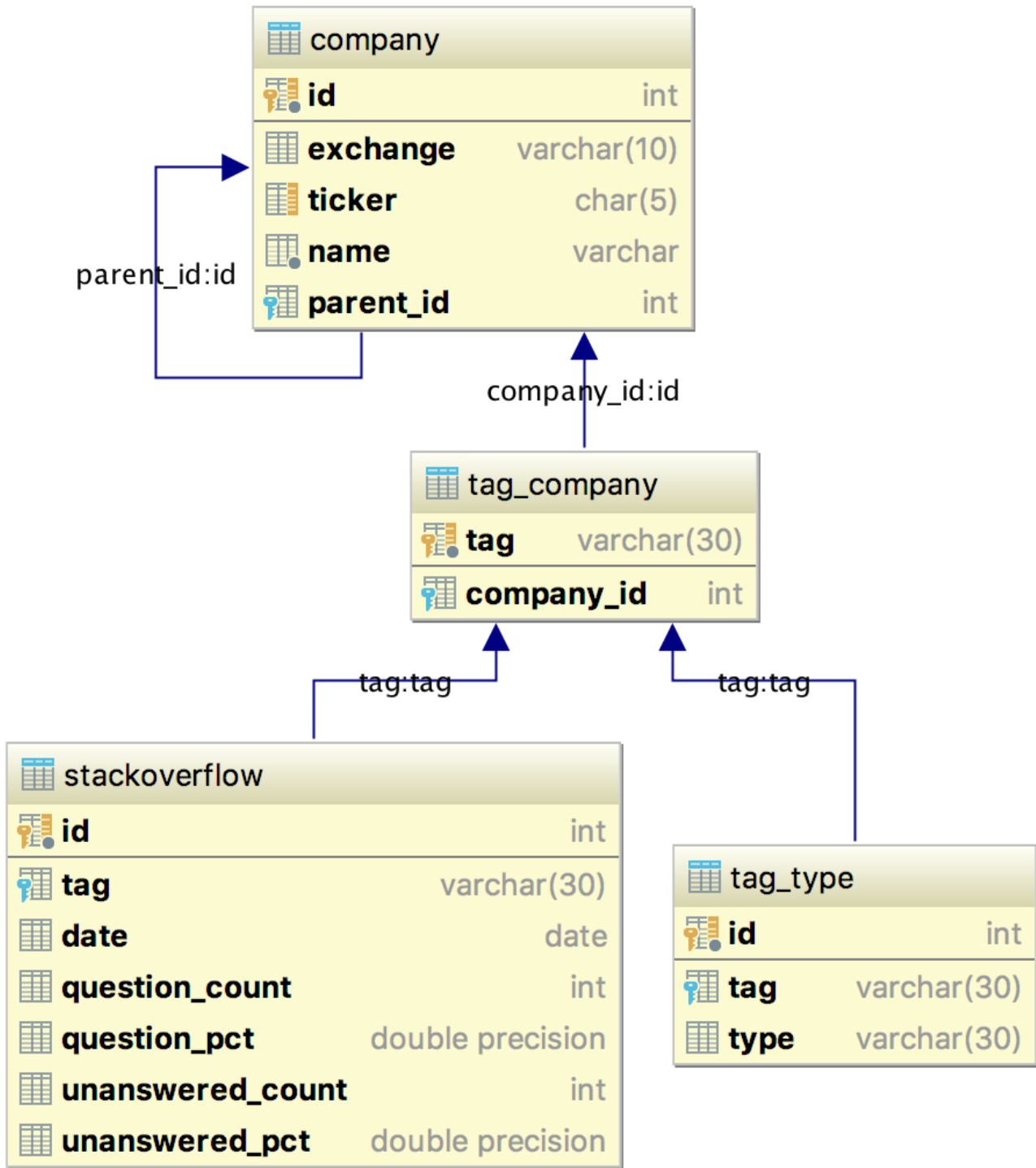
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id	int
priority	varchar(6)
source	varchar(20)
category	varchar(64)
date_created	timestampz
date_completed	timestampz
street	varchar(48)
house_num	varchar(12)
zip	char(5)
description	varchar


















fortune500	
title	varchar
rank	int
name	varchar
ticker	char(5)
url	varchar
hq	varchar
sector	varchar
industry	varchar
employees	int
revenues	int
revenues_change	real
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 profits	numeric
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 assets	numeric
 equity	numeric

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evanston311
id int
priority varchar(6)
source varchar(20)
category varchar(64)
date_created timestamptz
date_completed timestamptz
street varchar(48)
house_num varchar(12)
zip char(5)
description varchar

company
id int
exchange varchar(10)
ticker char(5)
name varchar
parent_id int

fortune500
title varchar
rank int
name varchar
ticker char(5)
url varchar
hq varchar
sector varchar
industry varchar
employees int
revenues int
revenues_change real
profits numeric
profits_change real
assets numeric
equity numeric

tag_company
tag varchar(30)
company_id int

stackoverflow
id int
tag varchar(30)
date date
question_count int
question_pct double precision
unanswered_count int
unanswered_pct double precision

tag_type
id int
tag varchar(30)
type varchar(30)

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Coalesce function

```
coalesce(value_1, value_2 [, ...])
```

- Operates row by row
- Returns first non-NULL value

Coalesce function

```
SELECT *  
FROM prices;
```

column_1	column_2
	10
22	
3	4

```
SELECT coalesce(column_1, column_2)  
FROM prices;
```

coalesce
10
22
3

Time to keep exploring!

EXPLORATORY DATA ANALYSIS IN SQL

Column Types and Constraints

EXPLORATORY DATA ANALYSIS IN SQL



Christina Maimone
Data Scientist

Column constraints

- **Foreign key:** value that exists in the referenced column, or NULL
- **Primary key:** unique, not NULL
- **Unique:** values must all be different except for NULL
- **Not null:** NULL not allowed: must have a value
- **Check constraints:** conditions on the values
 - `column1 > 0`
 - `columnA > columnB`

Data types

Common

- Numeric
- Character
- Date/Time
- Boolean

Special
















- Arrays
- Monetary
- Binary
- Geometric
- Network Address
- XML
- JSON
- and more!









Numeric types: PostgreSQL documentation

Table 8-2. Numeric Types

Name	Storage Size	Description	Range
<code>smallint</code>	2 bytes	small-range integer	-32768 to +32767
<code>integer</code>	4 bytes	typical choice for integer	-2147483648 to +2147483647
<code>bigint</code>	8 bytes	large-range integer	-9223372036854775808 to +9223372036854775807
<code>decimal</code>	variable	user-specified precision, exact	up to 131072 digits before the decimal point; up to 16383 digits after the decimal point
<code>numeric</code>	variable	user-specified precision, exact	up to 131072 digits before the decimal point; up to 16383 digits after the decimal point
<code>real</code>	4 bytes	variable-precision, inexact	6 decimal digits precision
<code>double precision</code>	8 bytes	variable-precision, inexact	15 decimal digits precision
<code>smallserial</code>	2 bytes	small autoincrementing integer	1 to 32767
<code>serial</code>	4 bytes	autoincrementing integer	1 to 2147483647
<code>bigserial</code>	8 bytes	large autoincrementing integer	1 to 9223372036854775807

Types in entity relationship diagrams

fortune500	
 title	varchar
 rank	int
 name	varchar
 ticker	char(5)
 url	varchar
 hq	varchar
 sector	varchar
 industry	varchar
 employees	int
 revenues	int
 revenues_change	real
 profits	numeric
 profits_change	real
 assets	numeric
 equity	numeric



Casting with CAST()

Format

```
-- With the CAST function  
SELECT CAST (value AS new_type);
```

Examples

```
-- Cast 3.7 as an integer  
SELECT CAST (3.7 AS integer);
```

```
4
```

```
-- Cast a column called total as an integer  
SELECT CAST (total AS integer)  
FROM prices;
```

Casting with ::

Format

```
-- With :: notation  
SELECT value::new_type;
```

Examples

```
-- Cast 3.7 as an integer  
SELECT 3.7::integer;
```

```
-- Cast a column called total as an integer  
SELECT total::integer  
FROM prices;
```

Time to practice!

EXPLORATORY DATA ANALYSIS IN SQL