table inheritance

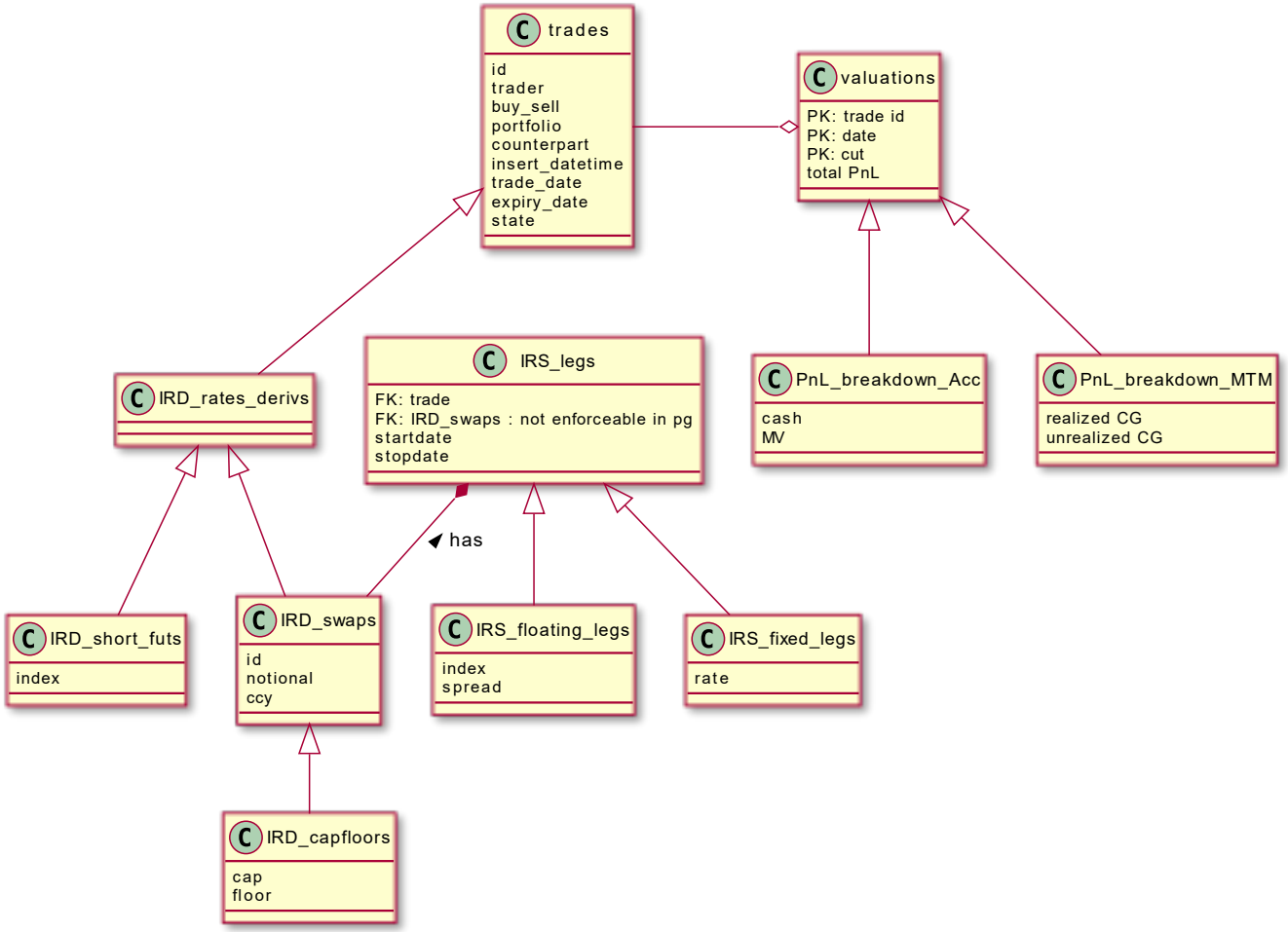
#ObjectRelationshipDataModeling #Postgres #SQL

financial products modeling on an object-relational database

- the financial products found in all the major cross-asset risk-management applications can be modeled with an inheritance pattern: basic products have evolved into more sophisticated, "exotic" products.
- an object-relational database like postgres can help with the definition of such products and a better support for consistency.
- for example: the dates attribute of the legs of a swap should all have the same value.
- in a traditional model, the swaps are in one table and their legs are in other tables; the consistency of the dates has to be guaranteed by the application.
- by adopting this model, the same is guaranteed by design.

example of class diagram

glossary:
IRD = interest-rate derivative
IRS = interest-rate swap, a type of IRD



database image

```
image: "postgres:9.6.20"
```

SQL script

```
drop table if exists IRS_fixed_legs;
drop table if exists IRS_floating_legs;
drop table if exists IRS_legs;
drop table if exists IRD_swaps;
drop table if exists IRD_rates_derivative_trades;
drop table if exists trades;

CREATE TYPE buysell_ AS ENUM ('B', 'S');
CREATE TYPE upfront_inarrears_ AS ENUM ('UF', 'AR');

CREATE TABLE trades (
   id SERIAL  PRIMARY KEY,  -- integer + AUTO_INCREMENT
   trader   text,
   buysell   buysell_,
   portfolio   text,
   counterpart   text,
```

```
    insert_datetime   timestamp ,
    trade_date   date,
    expiry_date   date,
    state   text
);

CREATE TABLE IRD_rates_derivative_trades (
  ccy char(3),
  notional   money -- two-digit precision
) INHERITS (trades);

CREATE TABLE IRD_swaps (
  id SERIAL  PRIMARY KEY
  -- this PK override will allow the the proper FK in table IRS_legs
) INHERITS (IRD_rates_derivative_trades);



CREATE TABLE IRS_legs (
  id SERIAL  PRIMARY KEY,
  trade   integer  REFERENCES IRD_swaps(id),
  startdate   date,
  enddate   date,
  upfront_inarrears   upfront_inarrears_
);

CREATE TABLE IRS_fixed_legs (
  fixed_rate   real   -- 6 decimal digits precision
) INHERITS (IRS_legs);

CREATE TABLE IRS_floating_legs (
  floating_index   text,
  floating_index_spread   real   -- 6 decimal digits precision
) INHERITS (IRS_legs);
```

selecting entries - example:

```
SELECT * FROM IRD_swaps;
SELECT * FROM ONLY trades; -- i.e. not IRD_swaps
```

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ref.
https://www.postgresql.org/docs/current/tutorial-inheritance.html

> The inheritance hierarchy is actually a directed acyclic graph

https://www.postgresql.org/docs/current/datatype.html

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