
JOOQ
Joy of SQL

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Google Developer Expert
on **Google Cloud** & **Kotlin**

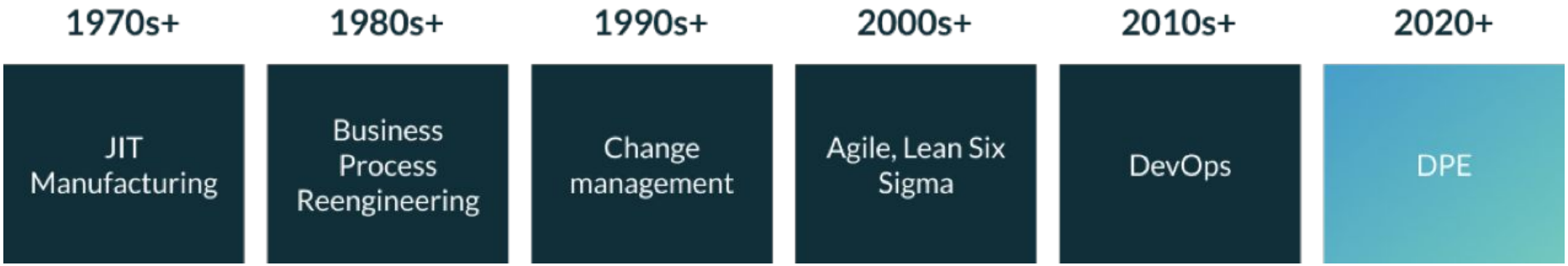
Gitlab Heroes

Open Source Contributor


Gradle

Our mission at **Gradle** is to **accelerate developer productivity** and **make developers happier**

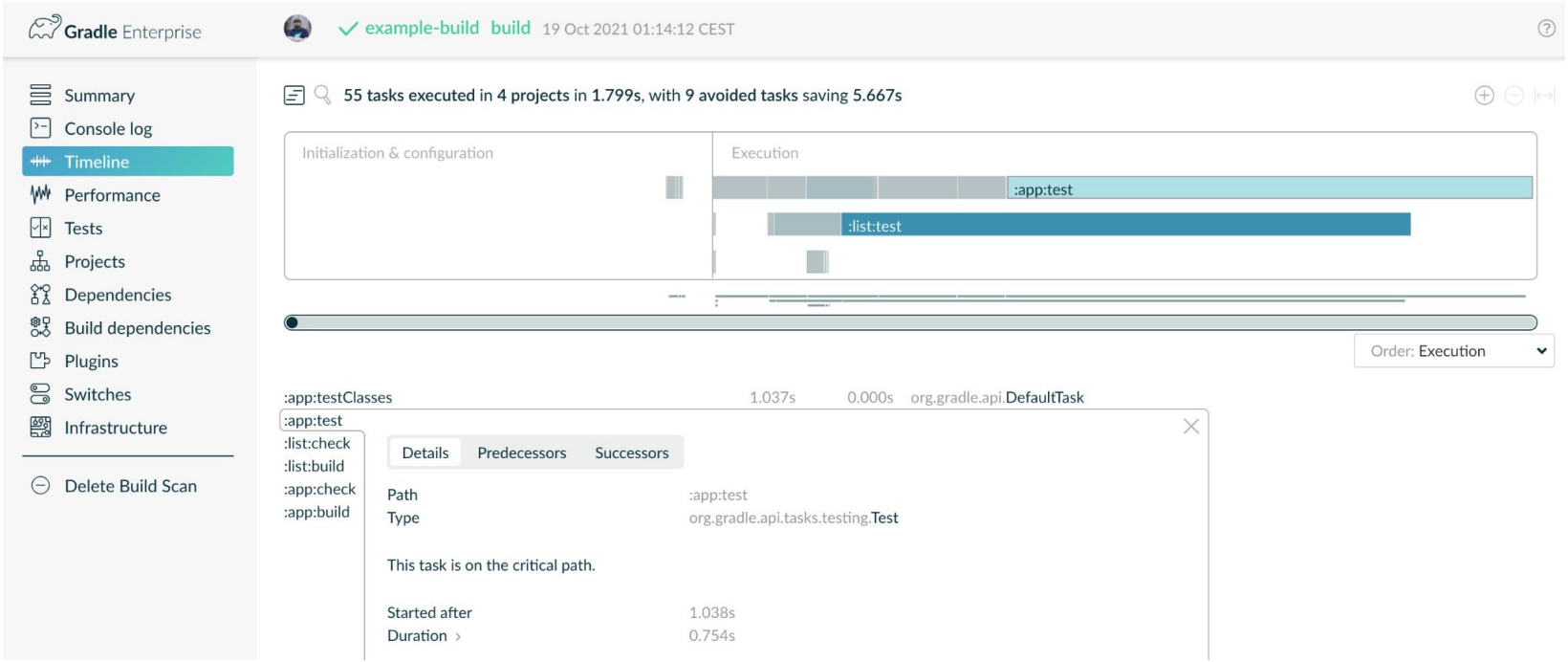
What comes after DevOps?

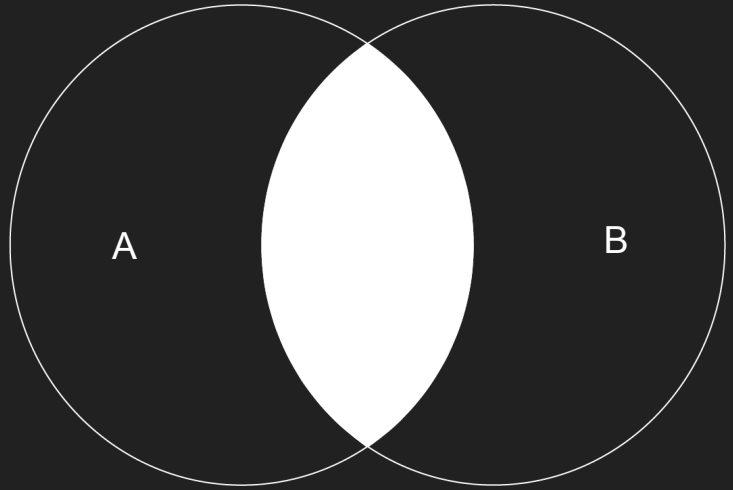


Developer **P**roductivity **E**ngineering

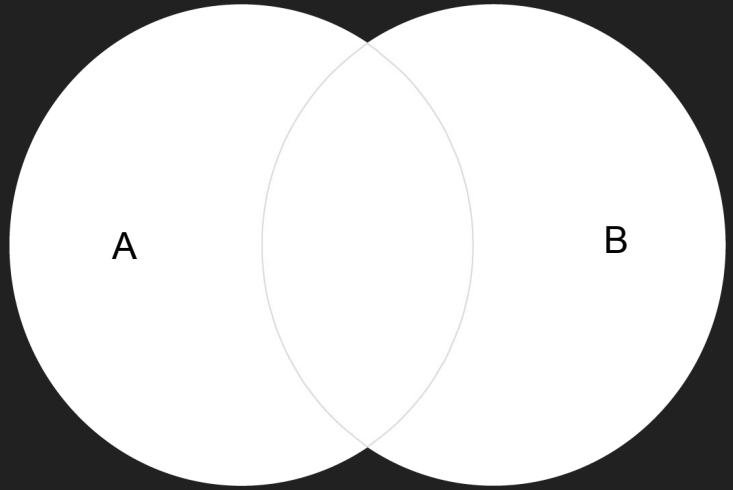
“If you can’t measure it, you can’t improve it!”

by Peter Drucker

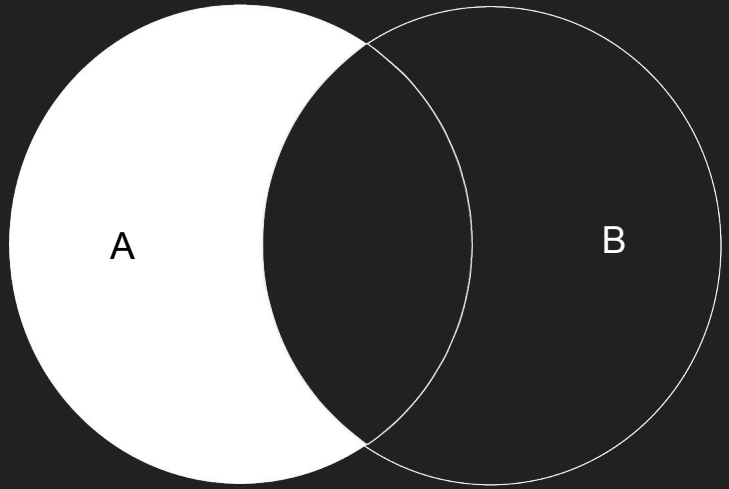




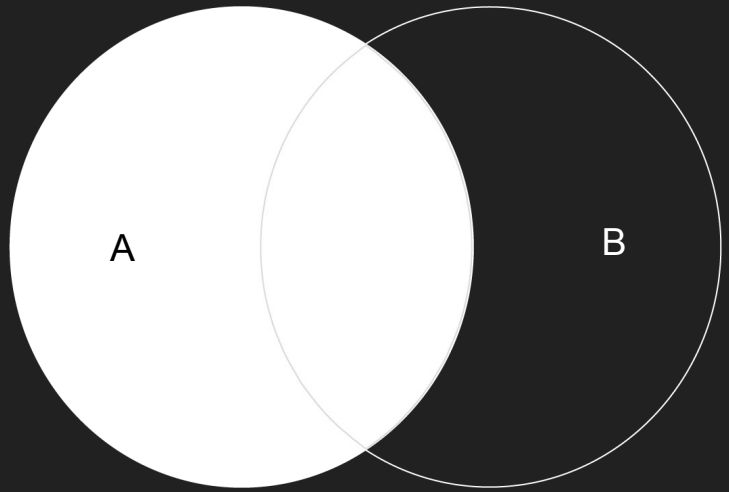

```
SELECT *
FROM A
     INNER JOIN B
        ON A.ID = B.ID
```



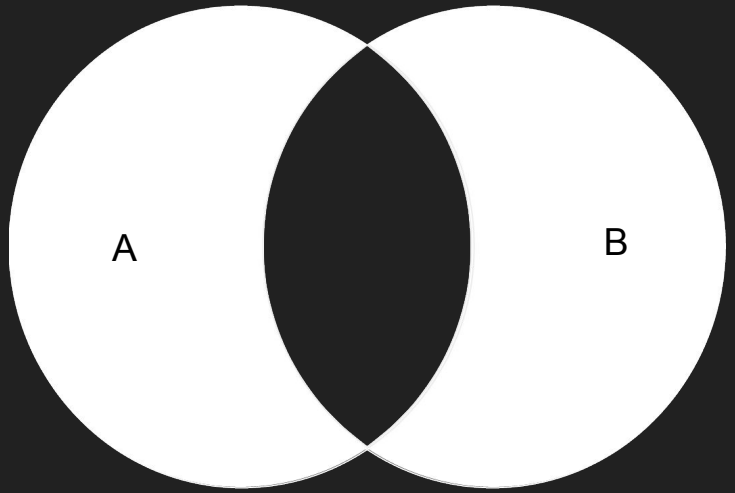

```
SELECT *
FROM A
     FULL OUTER JOIN B
        ON A.ID = B.ID
```




```sql
SELECT *
FROM A
     LEFT JOIN B
        ON A.ID = B.ID
```

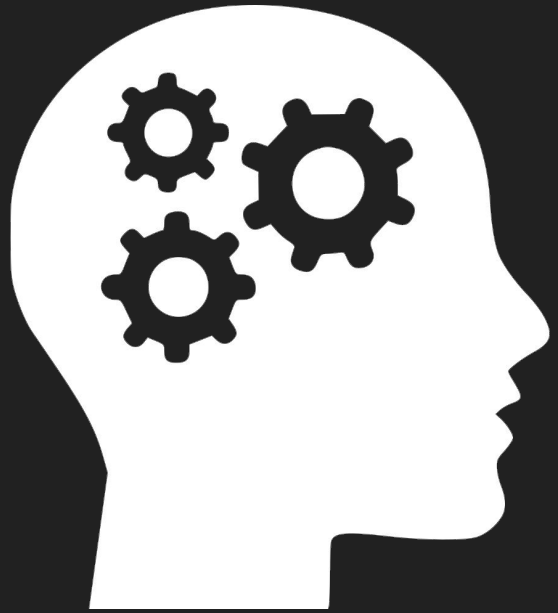


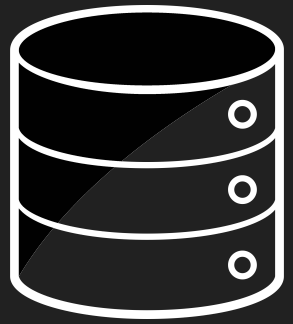

```
SELECT *
FROM A
     LEFT OUTER JOIN B
        ON A.ID = B.ID
```



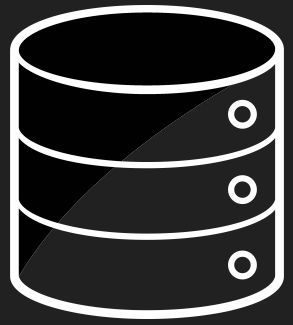

```sql
SELECT *
FROM A
     FULL OUTER JOIN B
        ON A.ID = B.ID
WHERE A.ID IS NULL
AND B.ID IS NULL
```

```
SELECT P.id_person,
       P.first_name,
       P.last_name,
       CONVERT(varchar(30), P.birth, 104),
       A.id_council,
       A.id_groupe,
       A.num_activities
  FROM person P JOIN (SELECT id_person,
                             MIN(id_council) id_council,
                             MIN(id_groupe) id_groupe,
                             COUNT(*) num_activities
                        FROM activity
                        GROUP BY id_person
       ) A ON (A.id_person = P.id_person)
 WHERE P.id_person NOT IN (SELECT id_person
                             FROM activity
                            WHERE id_council != 5)
```





Database



Data(store)

podcast

Java 6

Java 8

From **Imperative** to **Declarative**

```
List<String> errors = new ArrayList<>();
int errorCount = 0;
File file = new File(fileName);
String line = file.readLine();
while (errorCount < 40 && line != null) {
    if (line.startsWith(“ERROR”)) {
        errors.add(line);
        errorCount++;
    }
    line = file.readLine();
}
```

```
List<String> errors =
    Files.lines(Paths.get(fileName))
         .filter(l -> l.startsWith{“ERROR”)
         .limit(40)
         .collect(toList())
```

Doing some
Peach Iced Tea

Ingredients:

- 3.5L of water
- 4 Teabags
- 2 peaches (sliced)
- Honey

Instructions:

1. Add tea bags and peaches slices to a large JUG
2. Pour in 1.5l boiling water over and stir
3. Leave overnight in the fridge
4. Remove tea bags and peaches and top up with the rest of the water
5. Add some honey to taste…

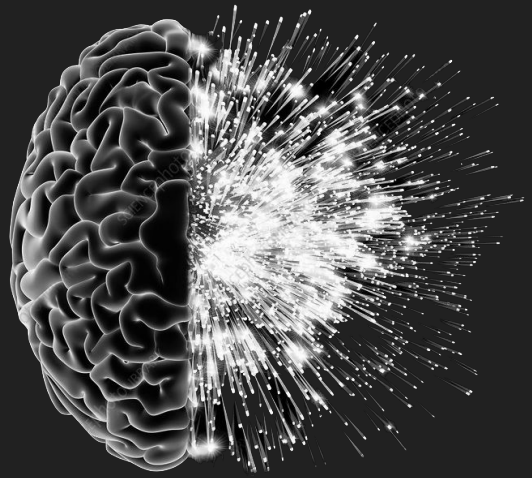
Asking for
Peach Iced Tea

“

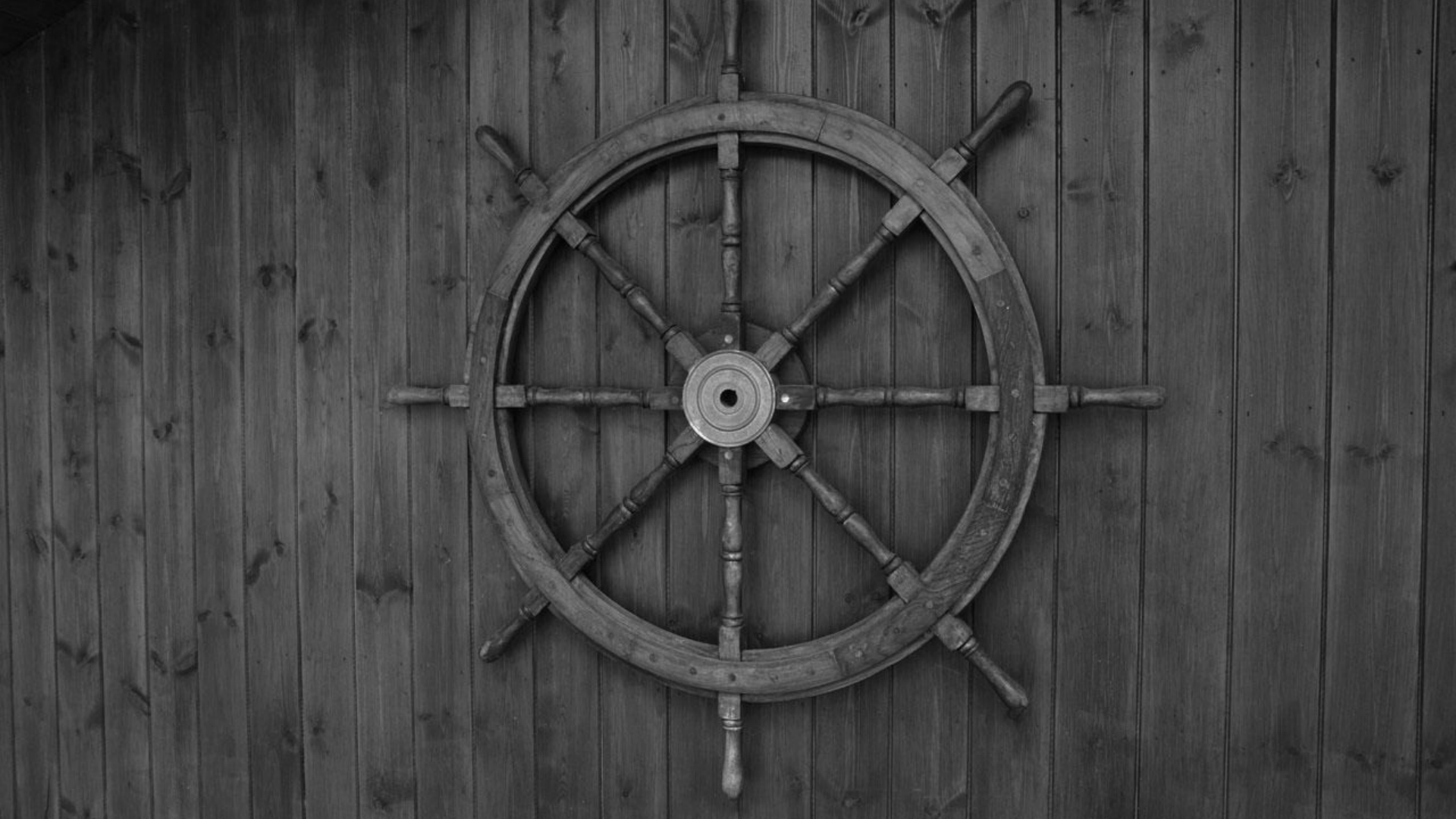
Can I have a
Peach iced tea

Please *?*

”




2174
2184
2194
2204
2173
2183
2193
2203



```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
      - name: nginx
        image: nginx:1.7.9
        ports:
        - containerPort: 80
```

10 YEARS LATER

is just

Declarative

```
TABLE                : Stream<Tuple<..>>
SELECT               : map()
DISTINCT             : distinct()
JOIN                 : flatMap()
WHERE / HAVING       : filter()
GROUP BY             : collect()
ORDER BY             : sorted()
UNION ALL            : concat()
...
```

https://blog.jooq.org/2015/08/13/common-sql-clauses-and-their-equivalents-in-java-8-streams/

KEEP
CALM
AND
USE
SQL

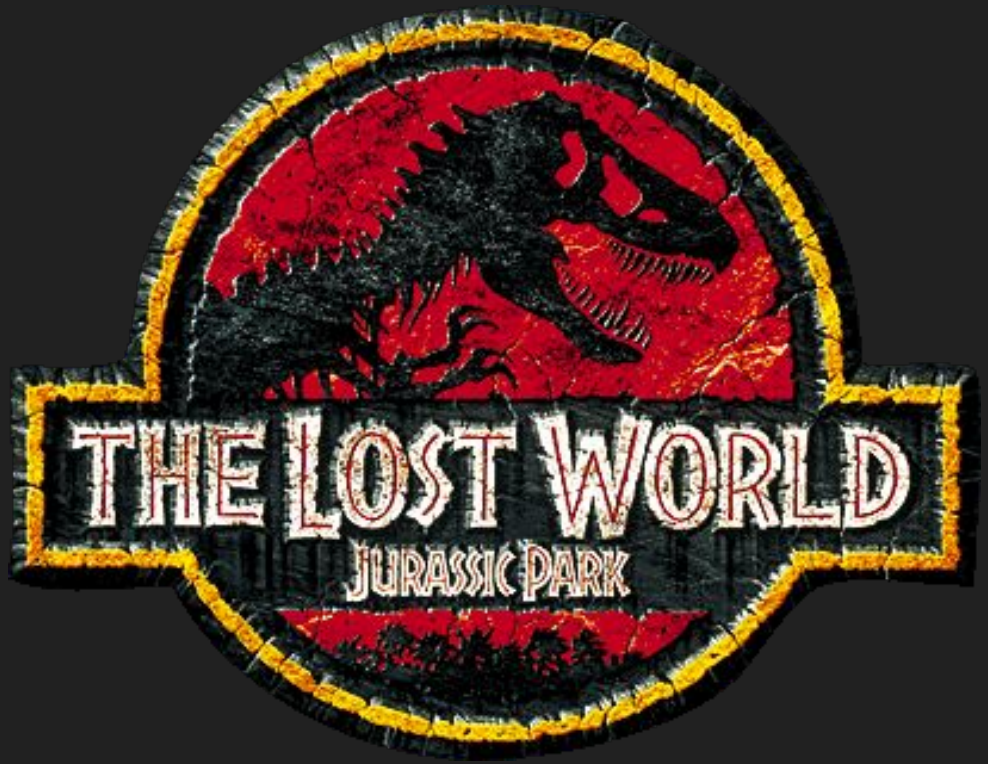
+ SQL

How ?

First, JDBC !

```java
var stmt = connection.prepareStatement("""
               SELECT TITLE, URL                  // Statement are String based and should
               FROM PODCAST                       // be constructed using only String
               WHERE ID = ?                       // methods (concat, join…)
""");

stmt.setObject(1, id);                            // Positional Parameters…

var rs = stmt.executeQuery();
rs.next();                                        // Managing spatial cursor position

if (rs.isAfterLast()) {
   return Optional.empty();
}

var title = rs.getString("TITLE");                // Field name duplication
var url = rs.getString("URL");                    // for every one

rs.close();                                       // Result should be closed…
stmt.close();                                     // And Statement too

return Optional.of(new Podcast(id, title, url));
```

JDBC is **OLD** !

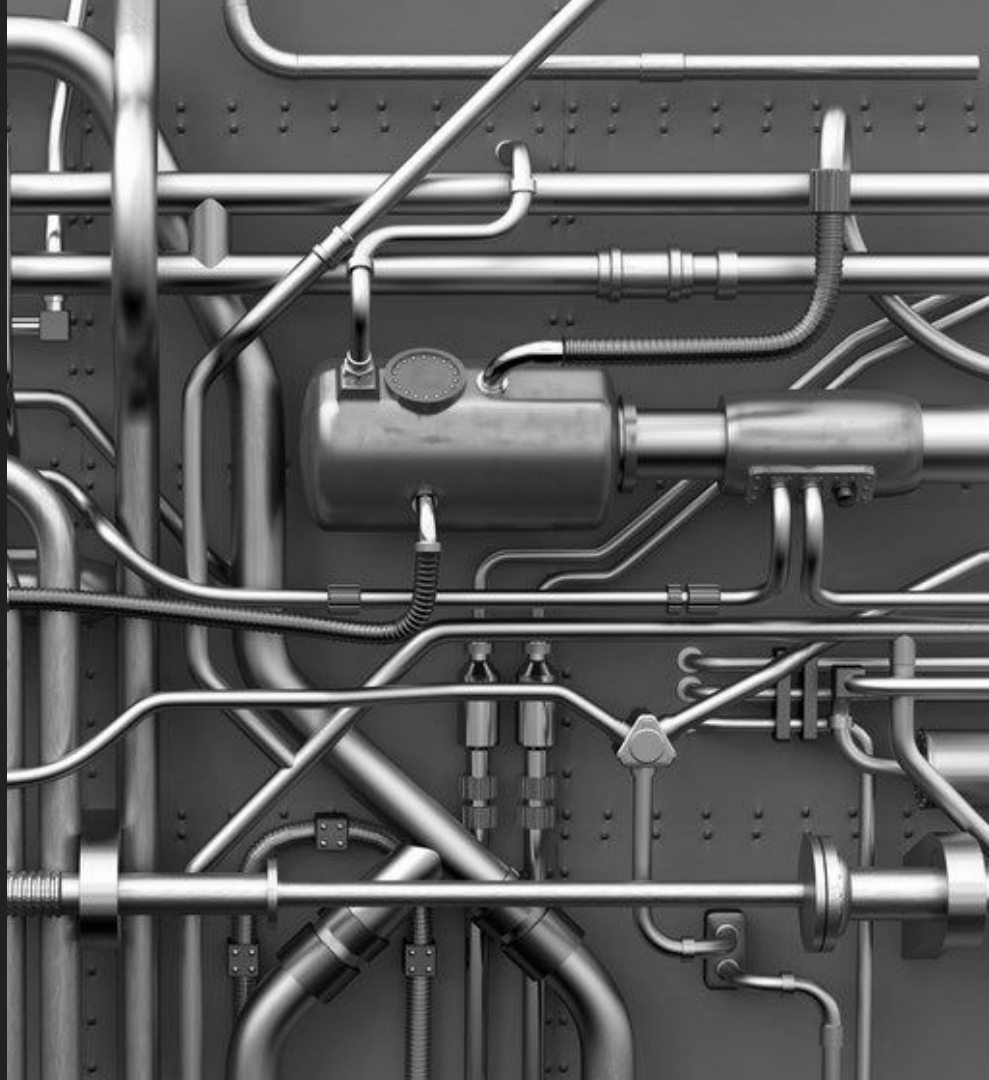


*Very old (**1997**) in **Java 1.1***

But one of the
most important
JAVA API

One of the
most supported
JAVA API

But very
low level
API



JDBC

Database

then, EJB 2.0 Entity Beans

Hopefully, I’ve never used them…

```
public interface Podcast extends EJBObject {
   UUID getId();
   String getTitle();
   String getUrl();

   @Override
   void remove();
}

public interface PodcastRepository extends EJBHome {
   Podcast create(UUID id);
   Podcast find(UUID id);
}
```

```
<enterprise-beans>
   <entity>
       <description>no description</description>
       <display-name>Podcast</display-name>
       <ejb-name>Podcast</ejb-name>
       <home>app.Podcast</home>
       <remote>app.Podcast</remote>
       <ejb-class>app.Podcast</ejb-class>
       <persistence-type>Container</persistence-type>
       <cmp-version>2.x</cmp-version>
       <abstract-schema-name>Podcast</abstract-schema-name>
       <reentrant>False</reentrant>
       <cmp-field><field-name>id</field-name></cmp-field>
       <cmp-field><field-name>title</field-name></cmp-field>
       <cmp-field><field-name>url</field-name></cmp-field>
       ...
   </entity>
</enterprise-beans>
```

```
<ejb-ql>
SELECT OBJECT(p)
 FROM PODCAST p
ORDER BY ID ASC
</ejb-ql>
```

not SQL

EJB Query Language

EJB

Application Server

JDBC

Database

Rise of the

Object **R**elational **M**apping

(aka **ORM**)

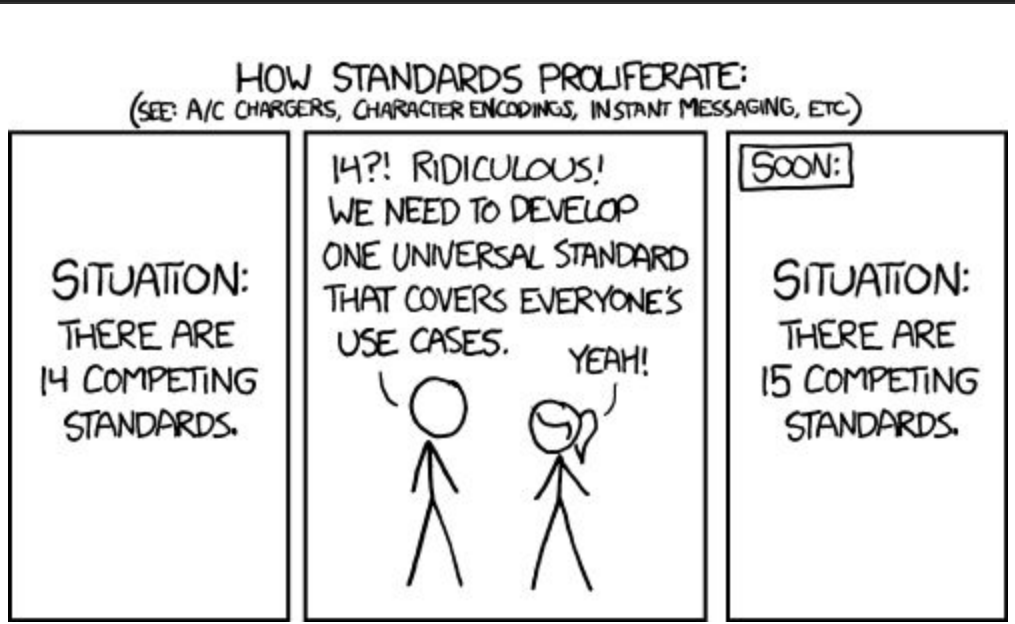

HIBERNATE
eclipselink
OpenJPA

ORM

JDBC

Database

In **Java** world,
we like to create
Standard


HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)
SITUATION: THERE ARE 14 COMPETING STANDARDS.
14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES.
YEAH!
SOON:
SITUATION: THERE ARE 15 COMPETING STANDARDS.

Java Persistence API

is born

JPA

ORM

JDBC

Database

```java
@Entity
@Table(
     name = "PODCAST",
     uniqueConstraints = @UniqueConstraint(columnNames={"id", "url"})
)
public class Podcast {

   @Id
   @GeneratedValue
   @Column(columnDefinition = "UUID")
   private UUID id;
   @Column(name = "TITLE")
   private String title;
   private String url;

   ...

}
```

```java
@Entity
@Table(
     name = "PODCAST",
     uniqueConstraints = @UniqueConstraint(columnNames={"id", "url"})
)
public class Podcast {

   ...

   public UUID getId() { return id; }
   public void setId(UUID id) { this.id = id; }

   public String getTitle() { return title; }
   public void setTitle(String title) { this.title = title; }

   public String getUrl() { return url; }
   public void setUrl(String url) { this.url = url; }

   ...

}
```

```java
@Entity
@Table(
     name = "PODCAST",
     uniqueConstraints = @UniqueConstraint(columnNames={"id", "url"})
)
public class Podcast {

   ...

   @Override
   public boolean equals(Object o) {
      if (this == o) return true;
      if (o == null || getClass() != o.getClass()) return false;
      Podcast podcast = (Podcast) o;
      return Objects.equals(id, podcast.id) &&
             Objects.equals(title, podcast.title) &&
             Objects.equals(url, podcast.url);
   }

   @Override
   public int hashCode() {
      return Objects.hash(id, title, url);
   }
}
```

Object to database

```java
public record PodcastRepository(EntityManager em) {

    public List<Podcast> findAll() {
        return em.createQuery("FROM Podcast", Podcast.class).getResultList();
    }

    public Optional<Podcast> findOneById(UUID id) {
        CriteriaBuilder cb = em.getCriteriaBuilder();

        CriteriaQuery<Podcast> cq = cb.createQuery(Podcast.class);
        Root<Podcast> root = cq.from(Podcast.class);
        cq.select(root);

        cq.where(cb.equal(root.get("id"), id));

        var podcast = em.createQuery(cq).getSingleResult();

        return Optional.ofNullable(podcast);
    }
}
```

JPQL, not **SQL**, again…

Not type safe…

```
public List<Podcast> findAll() {
    return em.createQuery("FROM Podcast", Podcast.class).getResultList();
}
```

Criteria Query, not **SQL** again…

Not type safe…

```
public Optional<Podcast> findOneById(UUID id) {
   CriteriaBuilder cb = em.getCriteriaBuilder();

   CriteriaQuery<Podcast> query = cb.createQuery(Podcast.class);
   Root<Podcast> p = query.from(Podcast.class);

   query
           .select(p)
           .where(
                   cb.equal(p.get("id"), id)
           );

   var podcast = em.createQuery(query).getSingleResult();

   return Optional.ofNullable(podcast);
}
```

SQL-ish API

Fails only at runtime

JPQL + Criteria Query

JPA

ORM

JDBC

Database

And with **2** entities ?

```java
@Entity
public class Podcast {

   @Id
   @GeneratedValue
   @Column(columnDefinition = "UUID")
   private UUID id;

   @OneToMany(mappedBy = "podcast")
   private List<Item> items = new ArrayList<>();

}
```

JOIN managed by annotations

```java
@Entity
public class Item {
   @Id
   @GeneratedValue
   @Column(columnDefinition = "UUID")
   private UUID id;

   @ManyToOne(fetch = FetchType.LAZY)
   private Podcast podcast;

}
```

Annotation Hell

begins 🔥

Hard (impossible?) to test

```
@Entity
public class Item {

    @ManyToOne(fetch = FetchType.LAZY)
    private Podcast podcast;

}
```

Only triggers **side effects**

Generated queries depend on object values

All of this to replace the **JOIN** keyword in SQL…

```
@NamedEntityGraph(
        name = "podcast-item-graph",
        attributeNodes = {
                @NamedAttributeNode("items")
        },
        subgraphs = {
                @NamedSubgraph(
                        name = "items-tags",
                         attributeNodes = {
                                @NamedAttributeNode("tags")
                        }
                )
        }
)
@Entity
@Table(name = "PODCAST")
public class Podcast {}
```


Just… why ?

ORM

Trying to solve problem

we should not have

if we **don’t use it** first...

Did you ever change
your **database** layer?

Did you ever change
your **database** ?

And we can **dig** deeper…

Spring Data JPA

Micronaut Data

Quarkus with Panache

```java
public interface PodcastRepository extends Repository<Podcast, UUID> {

   List<Podcast> findByTitleAndUrl(String title, String url);

}
```

Framework naming convention,
maybe checked at compile time…
or not.


public interface PodcastRepository extends Repository<Podcast, UUID> {
List<Podcast> findByTitleAndUrl(String title, String url);
}
SELECT *
FROM podcast
WHERE title = ?1
AND url = ?2;

Framework Abstraction Layer

JPQL + Criteria Query

JPA

ORM

JDBC

Database

What Java ORM do you prefer, and why?

Asked 11 years, 7 months ago Active 3 years, 9 months ago Viewed 211k times

263

It's a pretty open ended question. I'll be starting out a new project and am looking at different ORMs to integrate with database access.

Do you have any favorites? Are there any you would advise staying clear of?

105

java orm

https://stackoverflow.com/questions/452385/what-java-orm-do-you-prefer-and-why

239

I have stopped using ORMs.

The reason is not any great flaw in the concept. Hibernate works well. Instead, I have found that queries have low overhead and I can fit lots of complex logic into large SQL queries, and shift a lot of my processing into the database.

So consider just using the JDBC package.

share edit follow flag

answered Sep 27 '09 at 11:22

David Crawshaw

9,463 ● 6 ● 34 ● 39

https://stackoverflow.com/questions/452385/what-java-orm-do-you-prefer-and-why


ORM
ノ(゜□゜ノ)

SQL
┬──┬ノ(ಠ_ಠノ)

Framework Abstraction Layer

JPQL + Criteria Query

JPA

ORM

JDBC

Database

Writing SQL safely with jOOQ

JDBC

Database

Is here to **simplify** our work...

Is a **JAVA DSL** over **SQL**

```
SELECT              PODCAST.ID   ,
                    PODCAST.TITLE   ,
                    PODCAST.URL
FROM                PODCAST
ORDER BY            PODCAST.ID   ASC
```

```
query   .select  (   field("PODCAST.ID"),
                     field("PODCAST.TITLE"),
                     field("PODCAST.URL")       )
        .from    (   table("PODCAST")           )
        .orderBy(    field("PODCAST.ID").asc()  )
```

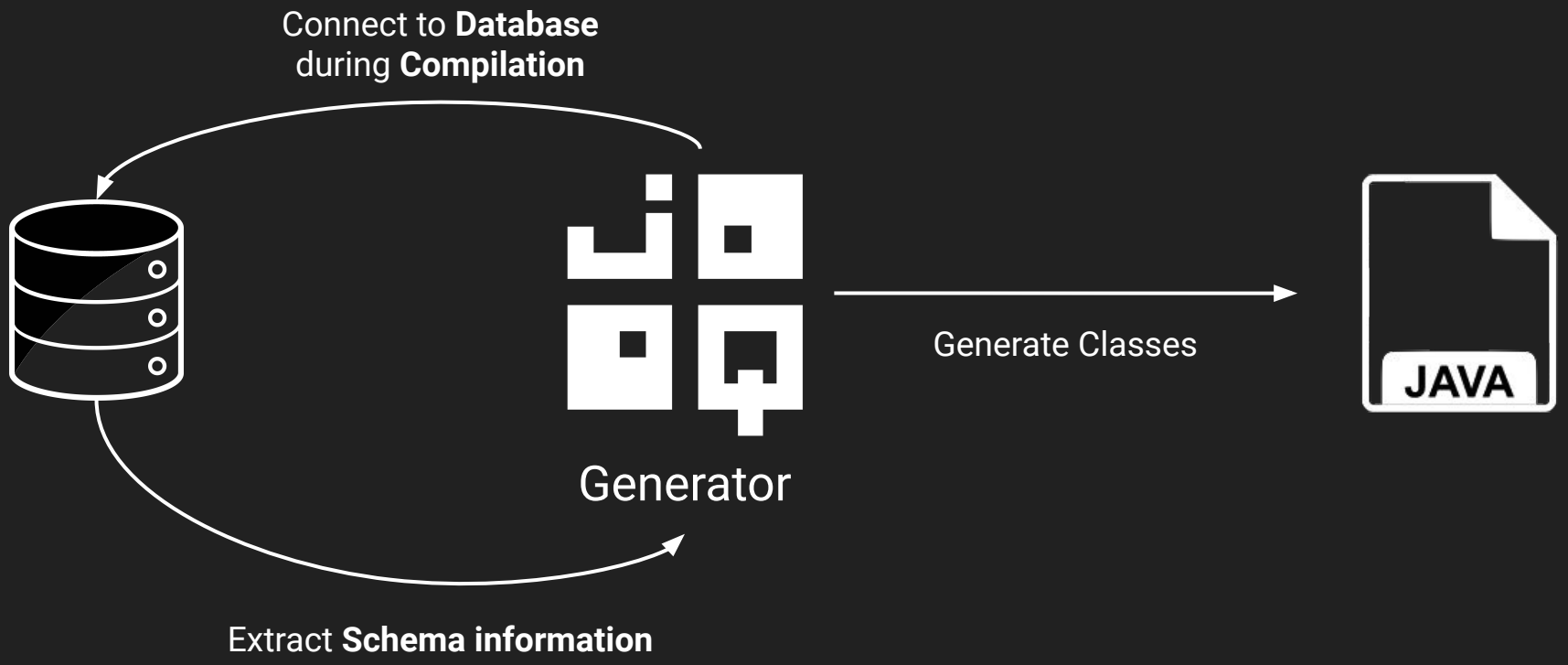
```
public List<Podcast> findAll() {

    var id = field("PODCAST.ID").cast(UUID.class);
    var title = field("PODCAST.TITLE").cast(String.class);
    var url = field("PODCAST.URL").cast(String.class);

    return query
            .select(id, title, url)
            .from(table("PODCAST"))
            .orderBy(id.asc())
            .fetch(it -> new Podcast(it.get(id), it.get(title), it.get(url)))
}
```

If you know **SQL**

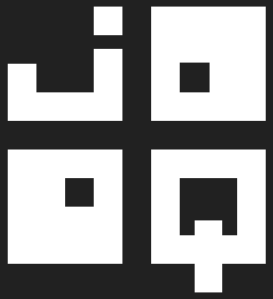
you know **JOOQ**

But, this is
not **type-safe** ?

Is **Database first !**


Connect to **Database** during **Compilation**
Generate Classes
JAVA
Generator
Extract **Schema information**

Tips
Use **Database versioning** Tool



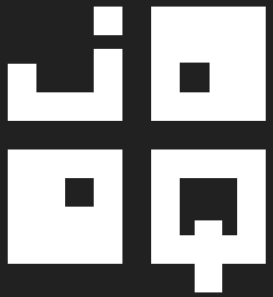
Java CLI

Ant

Apache Maven

Gradle

Java 7+



Generator

Kotlin

```
SELECT          PODCAST.ID ,
                PODCAST.TITLE ,
                PODCAST.URL
FROM            PODCAST
ORDER BY        PODCAST.ID   ASC
```

```
query   .select  (          PODCAST.ID),
                            PODCAST.TITLE),
                            PODCAST.URL))
        .from    (          PODCAST )
        .orderBy(           PODCAST.ID   .asc() )
```

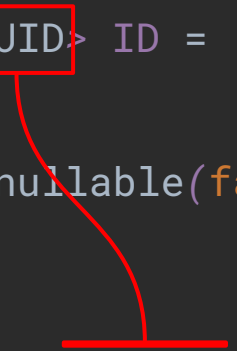
```
public List<Podcast> findAll() {
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .from(PODCAST)
            .orderBy(PODCAST.ID.asc())
            .fetch(it -> new Podcast(
                    it.get(PODCAST.ID),
                    it.get(PODCAST.TITLE),
                    it.get(PODCAST.URL))
             );
}
```

```
public Optional<Podcast> findOne(UUID id) {
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .from(PODCAST)
            .where(PODCAST.ID.eq(id))
            .fetchOptional(it -> new Podcast(
                    it.get(PODCAST.ID),
                    it.get(PODCAST.TITLE),
                    it.get(PODCAST.URL))
             );
}
```

This is

really **type-safe** ?

```java
/**
* This class is generated by jOOQ.
*/
public class Podcast extends TableImpl<PodcastRecord> {

    public static final Podcast PODCAST = new Podcast();

    public final TableField<PodcastRecord, UUID> ID =
        createField(
            DSL.name("id"),
            org.jooq.impl.SQLDataType.UUID.nullable(false),
            this,
            ""
        );
```



Type information

How much

type-safe

it is ?

```
public Optional<Podcast> findOne(UUID id) {
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .from(PODCAST)
            .where(PODCAST.ID.eq(id))
            .fetchOptional(it -> new Podcast(
                    it.get(PODCAST.ID),    // UUID
                    it.get(PODCAST.TITLE), // String
                    it.get(PODCAST.URL))   // URI
             );
}
```

```
public Optional<Podcast> findOne(UUID id) {
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .from(PODCAST)
            .where(PODCAST.ID.eq("05863ea0-1bd7-4d4a-9c72-283fdfe4a393"))
            .fetchOptional(it -> new Podcast(
                    it.get(PODCAST.ID),
                    it.get(PODCAST.TITLE),
                    it.get(PODCAST.URL))
             );
}
```

Errors will be detected **during compilation**

What is
the generated
SQL Query ?

```
public Optional<Podcast> findOne(UUID id) {
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .from(PODCAST)
            .where(PODCAST.ID.eq(id))
            .fetchOptional(it -> new Podcast(
                    it.get(PODCAST.ID),
                    it.get(PODCAST.TITLE),
                    it.get(PODCAST.URL))
             );
}
```

```
select
 "podcast"."id",
 "podcast"."title",
 "podcast"."url"
from "podcast"
where "podcast"."id" = cast(? as uuid);
```

What are
query parameters ?

```sql
select
 "podcast"."id",
 "podcast"."title",
 "podcast"."url"
from "podcast"
where "podcast"."id" = 'b08c7404-d9de-43d0-b1a3-25b8a26fa67d';
```

And you can **see result** too
directly from your **console logs** !

```
<dependency>
   <groupId>org.slf4j</groupId>
   <artifactId>slf4j-api</artifactId>
</dependency>

...

<dependency>
   <groupId>ch.qos.logback</groupId>
   <artifactId>logback-classic</artifactId>
</dependency>
```

```
14:50:30.878 [main] DEBUG org.jooq.tools.LoggerListener - Executing query          :
select
  "podcast"."id",
  "podcast"."title",
  "podcast"."url"
from "podcast"
where "podcast"."id" = cast(? as uuid)
14:50:30.879 [main] DEBUG org.jooq.tools.LoggerListener - -> with bind values      :
select
  "podcast"."id",
  "podcast"."title",
  "podcast"."url"
from "podcast"
where "podcast"."id" = 'b08c7404-d9de-43d0-b1a3-25b8a26fa67d'
14:50:30.945 [main] DEBUG org.jooq.tools.LoggerListener - Fetched result           : +------------------------------------+----------------+------------------------------------+
14:50:30.946 [main] DEBUG org.jooq.tools.LoggerListener -                          : |id                                  |title           |url                                 |
14:50:30.946 [main] DEBUG org.jooq.tools.LoggerListener -                          : +------------------------------------+----------------+------------------------------------+
14:50:30.946 [main] DEBUG org.jooq.tools.LoggerListener -                          : |b08c7404-d9de-43d0-b1a3-25b8a26fa67d|Les Cast Codeurs|http://lescastcodeurs.libsyn.com/rss|
14:50:30.946 [main] DEBUG org.jooq.tools.LoggerListener -                          : +------------------------------------+----------------+------------------------------------+
14:50:30.946 [main] DEBUG org.jooq.tools.LoggerListener - Fetched row(s)           : 1
```

And with **2** tables ?

```
public List<PodcastWithCover> findThreeWithCover() {
    return query
            .select(   PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
                       COVER.URL, COVER.HEIGHT, COVER.WIDTH)
            .from(PODCAST)
                  .innerJoin(COVER).on(PODCAST.COVER_ID.eq(COVER.ID))
            .orderBy(PODCAST.ID.asc())
            .limit(3)
            .fetch(it -> new PodcastWithCover(
                                it.get(PODCAST.ID),
                                it.get(PODCAST.TITLE),
                                it.get(PODCAST.URL),
                                new PodcastWithCover.Cover(
                                    it.get(COVER.URL),
                                    it.get(COVER.HEIGHT),
                                    it.get(COVER.WIDTH)
                                )
                           );
            );
}
```

```
// Fetch only required data
select(  PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
         COVER.URL, COVER.HEIGHT, COVER.WIDTH)

// Type Safe join operation between tables
.from(PODCAST)
    .innerJoin(COVER)
        .on(PODCAST.COVER_ID.eq(COVER.ID))

// Standard SQL operations, nothing fancy here…
.orderBy(PODCAST.ID.asc())
.limit(3)
```

```
public List<PodcastWithCover> findThreeWithCover() {
    return query
            .select(   PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
                       COVER.URL, COVER.HEIGHT, COVER.WIDTH)
            .from(PODCAST)
                  .innerJoin(COVER).on(PODCAST.COVER_ID.eq(COVER.ID))
            .orderBy(PODCAST.ID.asc())
            .limit(3)
            .fetch(it -> new PodcastWithCover(
                                it.get(PODCAST.ID),
                                it.get(PODCAST.TITLE),
                                it.get(PODCAST.URL),
                                new PodcastWithCover.Cover(
                                    it.get(COVER.URL),
                                    it.get(COVER.HEIGHT),
                                    it.get(COVER.WIDTH)
                                )
                           );
            );
}
```

This is **almost**
plain old
standard SQL


BORING

YES.

But, it can be **sexy** too!

```
// Fetch only required data
select(  PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
      PODCAST.cover().URL, PODCAST.cover().HEIGHT, PODCAST.cover().WIDTH)

// Join statement with COVER automatically done by JOOQ
.from(PODCAST)

// Standard SQL operations, nothing fancy here…
.orderBy(PODCAST.ID.asc())
.limit(3)
```

And with **m-n** relationship ?

```
public List<Podcast> findAllWithItems() {
    return query
            .select(
                    PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
                    multiset(
                            select(ITEM.ID, ITEM.TITLE, ITEM.URL)
                                    .from(ITEM)
                                    .where(ITEM.PODCAST_ID.eq(PODCAST.ID))
                    )
                            .as("items")
                            .convertFrom(it -> it.map(mapping(Podcast.Item::new)))
            )
            .from(PODCAST)
            .fetch(mapping(Podcast::new));
}
```

Type-safe mapping into a List<Item>

Mapping into Podcast

```
public record Podcast(UUID id, String title, String url, Collection<Item> items) {
    public record Item(UUID id, String title, String url) {}
}
```

```
select
 podcast.id,
 podcast.title,
 podcast.url,
 (
   select coalesce(
     jsonb_agg(jsonb_build_array("v0", "v1", "v2")),
     jsonb_build_array()
   )
   from (
     select id as "v0", title as "v1", url as "v2"
     from item
     where item.podcast_id = podcast.id
   ) as t
 ) as items
from podcast;
```

But, what if
my **database doesn't** support
XXX **SQL syntax** ?

```
public List<PodcastWithCover> findThreeWithCover() {
    return query
            .select(   PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
                       COVER.URL, COVER.HEIGHT, COVER.WIDTH)
            .from(PODCAST)
                  .innerJoin(COVER).on(PODCAST.COVER_ID.eq(COVER.ID))
            .orderBy(PODCAST.ID.asc())
            .limit(3) -- LIMIT syntax specific to some Engine…
            .fetch(it -> new PodcastWithCover(
                                 it.get(PODCAST.ID),
                                 it.get(PODCAST.TITLE),
                                 it.get(PODCAST.URL),
                                 new PodcastWithCover.Cover(
                                     it.get(COVER.URL),
                                     it.get(COVER.HEIGHT),
                                     it.get(COVER.WIDTH)
                                 )
                             );
            );
}
```

```
select
 "podcast"."id","podcast"."title","podcast"."url",
 "cover"."url","cover"."height","cover"."width"
from "podcast"
 join "cover"
   on "podcast"."cover_id" = "cover"."id"
order by "podcast"."id" asc
limit 3; -- LIMIT syntax for PostgreSQL, MySQL, MariaDB…
```

```
select top 3 -- TOP syntax for SQL Server
 "podcast"."id","podcast"."title","podcast"."url",
 "cover"."url","cover"."height","cover"."width"
from "podcast"
 join "cover"
   on "podcast"."cover_id" = "cover"."id"
order by "podcast"."id" asc;
```

```
select "v0" "id", "v1" "title", "v2" "url", "v3" "url", "v4" "height", "v5" "width"
from (
 select "x"."v0", "x"."v1", "x"."v2", "x"."v3", "x"."v4", "x"."v5", rownum "rn"
 from (
   select "podcast"."id" "v0","podcast"."title" "v1","podcast"."url" "v2","cover"."url"
"v3","cover"."height" "v4","cover"."width" "v5"
   from "podcast"
     join "cover"
       on "podcast"."cover_id" = "cover"."id"
   order by "v0" asc
 ) "x"
 where rownum <= 3 -- LIMIT emulated for Oracle runtime
)
where "rn" > 0 -- which is very complex to write as a developer 😅
order by "rn"
```

converts

standard SQL

to your RDBMS syntax

emulates

non-standard SQL

in your RDBMS syntax

```
public Podcast create(Podcast p) {
    var id = UUID.randomUUID();
    query
            .insertInto(PODCAST,
                    PODCAST.ID, PODCAST.TITLE, PODCAST.URL)
            .values(id, p.title(), p.url())
            .execute();

    return new Podcast(id, p.title(), p.url());
}
```

```
insert into "podcast" (
 "id",
 "title",
 "url"
)
values (
 '81fa5710-5364-4b63-bc0c-6288d7e16d55',
 'KubeCon and CloudNativeCon Europe 2020',
 'https://www.youtube.com/playlist?list=PLj6h78yzYM2O1wlsM-Ma-RYhfT5LKq0XC'
)
```

```java
public Podcast create(Podcast p) {
    var id = UUID.randomUUID();

    query
            .insertInto(PODCAST)
            .set(PODCAST.ID, id)                // SET syntax, UPDATE-like,
            .set(PODCAST.TITLE, p.title())      // simpler to read
            .set(PODCAST.URL, p.url())          // available only for some
            .execute();                         // RDBMS like MySQL

    return new Podcast(id, p.title(), p.url());
}
```

```
insert into "podcast" (
 "id",
 "title",
 "url"
)
values (
 '81fa5710-5364-4b63-bc0c-6288d7e16d55',
 'KubeCon and CloudNativeCon Europe 2020',
 'https://www.youtube.com/playlist?list=PLj6h78yzYM2O1wlsM-Ma-RYhfT5LKq0XC'
)
```

emulates

non-standard SQL

to simplify our life...

```java
public Podcast create(Podcast p) {
    var id = p.id() != null ? p.id() : UUID.randomUUID();

    query
     .insertInto(PODCAST)
     .set(PODCAST.ID, id)
     .set(PODCAST.TITLE, p.title())
     .set(PODCAST.URL, p.url())
     .onDuplicateKeyUpdate()                // if ID already exists,
     .set(PODCAST.LAST_UPDATE, now())       // update instead of insert
     .execute();                            // UPSERT style…

    return new Podcast(id, p.title(), p.url());
}
```

```java
public Podcast create(Podcast p) {
    var id = UUID.randomUUID();

    query
            .insertInto(PODCAST)
            .set(PODCAST.ID, id)
            .set(PODCAST.TITLE, p.title())
            .set(PODCAST.URL, p.url())
            .onConflict(PODCAST.URL).doUpdate() // Triggers update on
            .set(PODCAST.LAST_UPDATE, now())    // specific conflicts
            .execute();

    return new Podcast(id, p.title(), p.url());
}
```

```
insert into "podcast" (
 "id",
 "title",
 "url"
)
values (
 '9eff8121-94fe-47b0-b354-02f37f472b39',
 'KubeCon and CloudNativeCon Europe 2020',
 'https://www.youtube.com/playlist?list=PLj6h78yzYM2O1wlsM-Ma-RYhfT5LKq0XC'
)
on conflict ("url") do update
set "last_update" =
            timestamp with time zone '2020-09-09 15:08:12.328091+00:00';

-- Or emulates equivalent syntax if possible…
```

becomes our

SQL

Best Friend

But,

XYZ is **simpler**

for my

CRUD

Yes,

but it’s **not** really

safe

provides

alternatives

provides

Active **Records**

```java
@Test
public void should_fetch_one() {
    /* GIVEN */
    var id = UUID.fromString("b08c7404-d9de-43d0-b1a3-25b8a26fa67d");

    /* WHEN  */
    var podcast = query.newRecord(PODCAST);
    podcast.setId(id);
    podcast.refresh(); // Triggers a SELECT SQL request

    /* THEN  */
    assertThat(podcast.getTitle()).isEqualTo("Les Cast Codeurs");
    assertThat(podcast.getId()).isEqualTo(id);
    assertThat(podcast.getDescription()).isNull();
}
```

```java
@Test
public void should_update_too() {
    /* GIVEN */
    var id = UUID.fromString("b08c7404-d9de-43d0-b1a3-25b8a26fa67d");
    var podcast = query.newRecord(PODCAST);
    podcast.setId(id);
    podcast.refresh();

    /* WHEN  */
    podcast.setDescription("Le meilleur podcast sur la JVM 🇫🇷");
    podcast.update(); // Triggers an UPDATE SQL request

    /* THEN  */
    assertThat(podcast.getTitle()).isEqualTo("Les Cast Codeurs");
    assertThat(podcast.getDescription())
         .isEqualTo("Le meilleur podcast sur la JVM 🇫🇷");
}
```

```
PodcastRecord podcast = query.newRecord(PODCAST);

podcast.store();
podcast.changed();
podcast.copy();
podcast.insert();
podcast.update();
podcast.delete();
podcast.detach();
podcast.attach(configuration);
podcast.refresh();

// Bridge object between Database and your code, fully generated
```

provides

DAOs

```
<plugin>
   ...
   <configuration>
      ...
      <generator>
          <generate>
              <daos>true</daos> <!-- Activate DAOs in JOOQ Generator-->
          </generate>
       </generator>
      ...
   </configuration>
      ...
</plugin>
```

```java
package com.gitlab.davinkevin.podcastserver.database.tables.pojos;

/**
* This class is generated by jOOQ.
*/
@SuppressWarnings({ "all", "unchecked", "rawtypes" })
public class Podcast implements Serializable {

    private static final long serialVersionUID = 633654975;

    private UUID          id;
    private String        description;
    private String        title;

    public Podcast() {}

    public Podcast(Podcast value) {
        this.id = value.id;
        this.description = value.description;
        this.title = value.title;
    }
...
}
```

```java
package com.gitlab.davinkevin.podcastserver.database.tables.daos;

/**
* This class is generated by jOOQ.
*/
@SuppressWarnings({ "all", "unchecked", "rawtypes" })
public class PodcastDao extends DAOImpl<PodcastRecord, Podcast, UUID> {

   public List<Podcast> fetchById(UUID... values)
   public Podcast fetchOneById(UUID value)

   public List<Podcast> fetchByDescription(String... values)
   public List<Podcast> fetchByTitle(String... values)

   public List<Podcast> fetchByUrl(String... values)
   public Podcast fetchOneByUrl(String value)

}
```

```java
@Test
public void should_fetch_one() {
    /* GIVEN */
    var id = UUID.fromString("b08c7404-d9de-43d0-b1a3-25b8a26fa67d");

    /* WHEN  */
    var podcast = repository.findById(id);

    /* THEN  */
    assertThat(podcast.getTitle()).isEqualTo("Les Cast Codeurs");
    assertThat(podcast.getId()).isEqualTo(id);
    assertThat(podcast.getDescription()).isNull();
}
```

```
var repository = new PodcastDao(query.configuration());

repository.deleteById(id);
repository.delete(podcast);
repository.exists(podcast);
repository.existsById(id);
repository.count();
repository.findAll();
repository.findById();
repository.insert(podcast);
repository.update(podcast);

// And all methods available in ActiveRecords 🔥
```

But, I still prefer

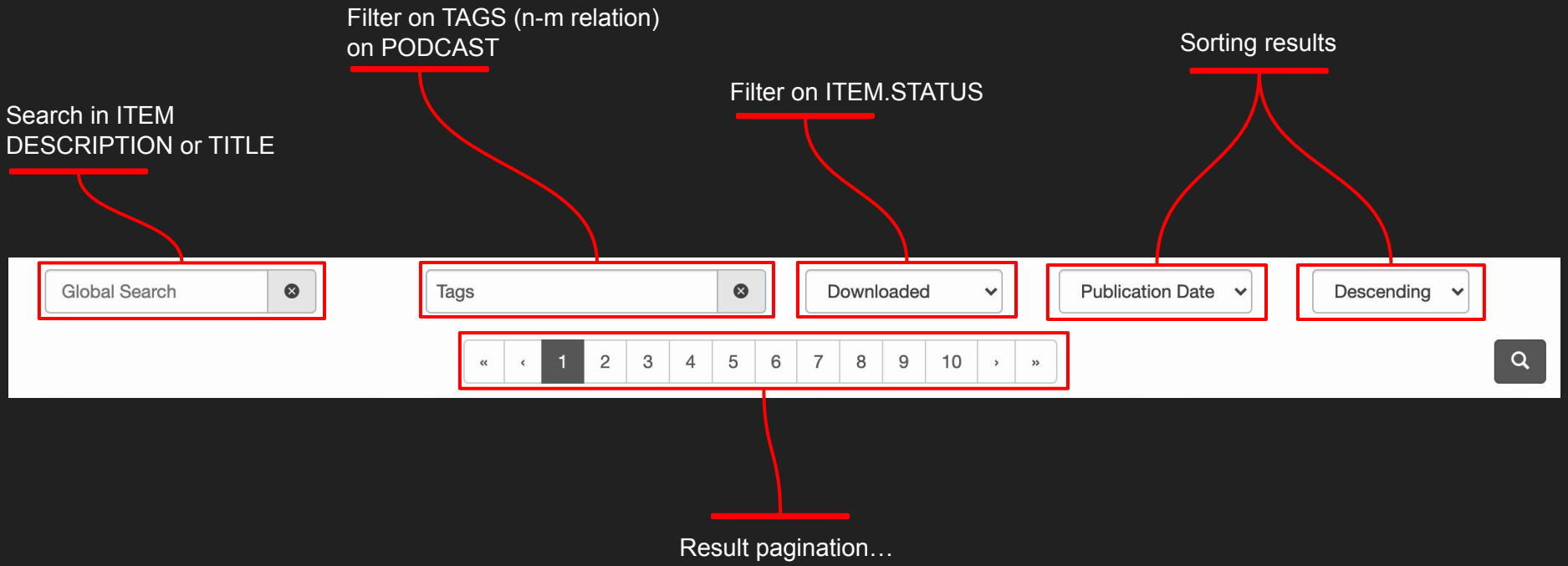
SQL DSL


WHY

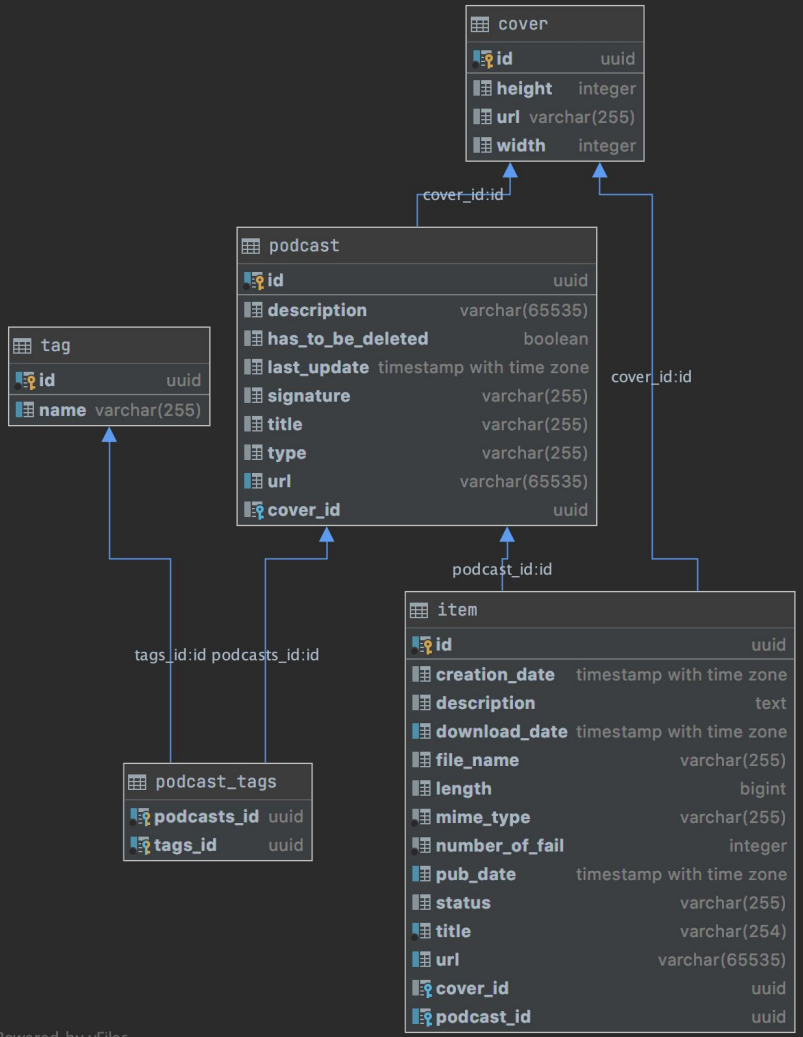
We can construct

anything

simply & safely



And the same request search can be scoped to a Podcast


cover
id uuid
height integer
url varchar(255)
width integer
cover_id:id
podcast
id uuid
description varchar(65535)
has_to_be_deleted boolean
last_update timestamp with time zone
signature varchar(255)
title varchar(255)
type varchar(255)
url varchar(65535)
cover_id uuid
cover_id:id
tag
id uuid
name varchar(255)
tags_id:id podcasts_id:id
podcast_id:id
item
id uuid
creation_date timestamp with time zone
description text
download_date timestamp with time zone
file_name varchar(255)
length bigint
mime_type varchar(255)
number_of_fail integer
pub_date timestamp with time zone
status varchar(255)
title varchar(254)
url varchar(65535)
cover_id uuid
podcast_id uuid
podcast_tags
podcasts_id uuid
tags_id uuid
Powered by yFiles

```
public class ItemRepository(DSLContext query) {

  public Page<Item> search(
     String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
  ) {
      ...
  }
}
```

```
public Page<Item> search(
   String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {

   // Create condition based on q parameters on ITEM.TITLE or ITEM.DESCRIPTION
   var queryCondition = q.isEmpty()
      ? noCondition()
      : ITEM.TITLE.containsIgnoreCase(q).or(ITEM.DESCRIPTION.containsIgnoreCase(q));

      ...


}
```

```java
public Page<Item> search(
   String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {
      ...

   // Fetch tags UUID associated to tag names provided
   var tagIds = query
           .select(TAG.ID)
           .from(TAG)
           .where(TAG.NAME.in(tagNames))
           .fetchSet(Record1::value1);

   // Then create a condition depending on the previous result
   var tagsCondition = tagIds
                   .stream()
                   .map(it -> value(it).in(query
                           .select(PODCAST_TAGS.TAGS_ID)
                           .from(PODCAST_TAGS)
                           .where(ITEM.PODCAST_ID.eq(PODCAST_TAGS.PODCASTS_ID)))
                   ) // Create a condition for each tag id fetched
                   .reduce(noCondition(), DSL::and); // Accumulate those conditions into one Condition
      ...


}
```

```java
public Page<Item> search(
   String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {

      ...

   // Create a condition on ITEM.STATUS
   var statusesCondition = statuses.isEmpty()
       ? noCondition()
       : ITEM.STATUS.in(statuses);

   // Create a condition on ITEM.PODCAST_ID
   var podcastCondition = podcastId == null
       ? noCondition()
       : ITEM.PODCAST_ID.eq(podcastId);

      ...


}
```

```
public Page<Item> search(
    String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {
    ...

    // Merge all those conditions with AND keyword…
    var conditions = and(queryCondition, tagsCondition, statusesCondition, podcastCondition);

    ...

}
```

```java
public Page<Item> search(
   String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {
   ...
   // Creation of a COMMON TABLE EXPRESSION (CTE) fetching only required ITEMS
   var fi = name("FILTERED_ITEMS").as(
       select(
              ITEM.ID, ITEM.TITLE, ITEM.URL,
              ITEM.PUB_DATE, ITEM.DOWNLOAD_DATE, ITEM.CREATION_DATE,
              ITEM.DESCRIPTION, ITEM.MIME_TYPE, ITEM.LENGTH, ITEM.FILE_NAME, ITEM.STATUS,

              ITEM.PODCAST_ID, ITEM.COVER_ID
       )
              .from(ITEM)
              .where(conditions) // Usage of our previously created conditions
              .orderBy(toOrderBy(page.sort()), ITEM.ID.asc())
              .limit(page.size() * page.page(), page.size().intValue())
   );

   ...

}
```

```
public Page<Item> search(
   String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {
   ...
   // Global query doing the global work, joining with COVER and PODCAST
   var content = query
       .with(fi) // Usage of our CTE created just before…
       .select(
              fi.field(ITEM.ID), fi.field(ITEM.TITLE), fi.field(ITEM.URL),
              fi.field(ITEM.PUB_DATE), fi.field(ITEM.DOWNLOAD_DATE), fi.field(ITEM.CREATION_DATE),
              fi.field(ITEM.DESCRIPTION), fi.field(ITEM.MIME_TYPE), fi.field(ITEM.LENGTH),
              fi.field(ITEM.FILE_NAME), fi.field(ITEM.STATUS),

              PODCAST.ID, PODCAST.TITLE, PODCAST.URL,
              COVER.ID, COVER.URL, COVER.WIDTH, COVER.HEIGHT
       )
       .from(
             fi
               .innerJoin(COVER).on(fi.field(ITEM.COVER_ID).eq(COVER.ID))
              .innerJoin(PODCAST).on(fi.field(ITEM.PODCAST_ID).eq(PODCAST.ID))
       )
       .orderBy(toOrderBy(page.sort(), fi), fi.field(ITEM.ID))
       .fetch( r -> createItem(r) );

   ...

}
```

```
public Page<Item> search(
    String q, List<String> tagNames, List<String> statuses, PageRequest page, UUID podcastId
) {
    ...

    // Fetching metadata for pagination to fulfill Page<T>
    var totalElements = query
        .select(countDistinct(ITEM.ID))
        .from(ITEM)
        .where(conditions) // Reuse of our previously created conditions
        .fetchOne(countDistinct(ITEM.ID));

    return Page.of(
        content,
        totalElements,
        page
    );
}
```

```sql
with FILTERED_ITEMS as (
 select
   item.id,item.title,item.url,
   item.pub_date,item.download_date,item.creation_date,
   item.description,item.mime_type,item.length,item.file_name,item.status,
   item.podcast_id,item.cover_id
 from item
 where (
   '21fada5d-73ae-419a-8750-0074769e26d9' in (
     select podcast_tags.tags_id from podcast_tags where item.podcast_id = podcast_tags.podcasts_id
   )
   and item.status in ('FINISH')
 )
 order by item.pub_date desc, item.id asc
 limit 5 offset 0
)
select
 FILTERED_ITEMS.id,FILTERED_ITEMS.title,FILTERED_ITEMS.url,
 FILTERED_ITEMS.pub_date,FILTERED_ITEMS.download_date,FILTERED_ITEMS.creation_date,
 FILTERED_ITEMS.description,FILTERED_ITEMS.mime_type,FILTERED_ITEMS.length,
 FILTERED_ITEMS.file_name,FILTERED_ITEMS.status,
 podcast.id,podcast.title,podcast.url,
 cover.id,cover.url,cover.width,cover.height
from FILTERED_ITEMS
 join cover
   on FILTERED_ITEMS.cover_id = cover.id
 join podcast
   on FILTERED_ITEMS.podcast_id = podcast.id
order by
 FILTERED_ITEMS.pub_date desc, FILTERED_ITEMS.id
```

Only **1 optimized request** to fetch our data

We are transforming

input → SQL

With all

SQL capabilities

Because mostly known

SQL features

are from SQL-92

Since 92, a lot of

evolutions

happen in **SQL world**

We are using

Common Table Expression

(specified in **SQL-99**)

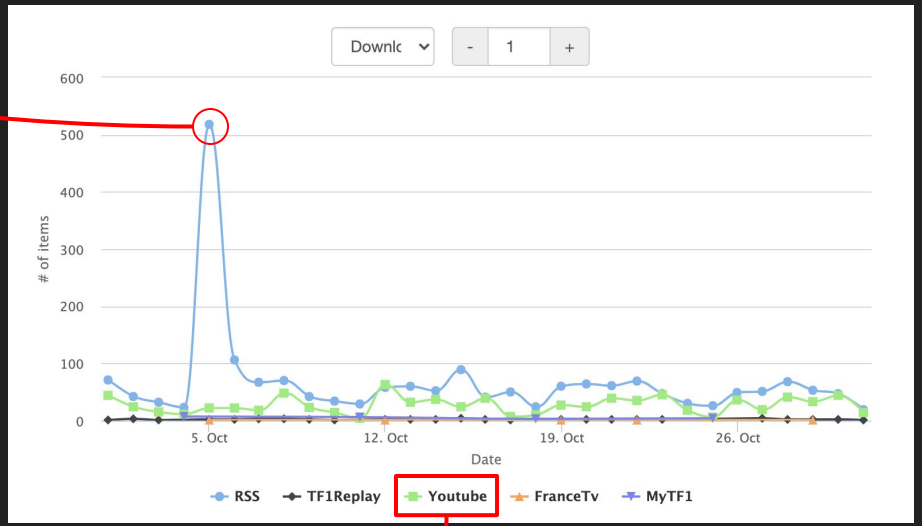
to simplify our query

```sql
with FILTERED_ITEMS as (
 select
   item.id,item.title,item.url,
   item.pub_date,item.download_date,item.creation_date,
   item.description,item.mime_type,item.length,item.file_name,item.status,
   item.podcast_id,item.cover_id
 from item
 where (
   '21fada5d-73ae-419a-8750-0074769e26d9' in (
     select podcast_tags.tags_id from podcast_tags where item.podcast_id = podcast_tags.podcasts_id
   )
   and item.status in ('FINISH')
 )
 order by item.pub_date desc, item.id asc
 limit 5 offset 0
)
select
 FILTERED_ITEMS.id,FILTERED_ITEMS.title,FILTERED_ITEMS.url,
 FILTERED_ITEMS.pub_date,FILTERED_ITEMS.download_date,FILTERED_ITEMS.creation_date,
 FILTERED_ITEMS.description,FILTERED_ITEMS.mime_type,FILTERED_ITEMS.length,
 FILTERED_ITEMS.file_name,FILTERED_ITEMS.status,
 podcast.id,podcast.title,podcast.url,
 cover.id,cover.url,cover.width,cover.height
from FILTERED_ITEMS
 join cover
   on FILTERED_ITEMS.cover_id = cover.id
 join podcast
   on FILTERED_ITEMS.podcast_id = podcast.id
order by
 FILTERED_ITEMS.pub_date desc, FILTERED_ITEMS.id
```

Using CTE instead of Nested Queries

Statistics on download

NumberOfItemByDate



StatsPodcastByType

```java
public List<StatsPodcastByType> findStatByTypeAndPubDate(OffsetDateTime startingFrom) {
   var date = trunc(ITEM.PUB_DATE);

   return query
       .select(
              PODCAST.TYPE,
              date,
              count()
       )
       .from(ITEM.innerJoin(PODCAST).on(ITEM.PODCAST_ID.eq(PODCAST.ID)))
       .where(ITEM.PUB_DATE.isNotNull())
       .and(
              date.gt(offsetDateTime(startingFrom).minus(10))
       )
       .groupBy(PODCAST.TYPE, date)
       .orderBy(PODCAST.TYPE, date)
       // Result<Record3<PODCAST.TYPE, OffsetDateTime, count()>>
       // [
       //        Tuple("Youtube", 2020-11-17, 10),
       //        Tuple("Youtube", 2020-11-16, 15),
       //        Tuple("RSS", 2020-11-17, 15),
       //        …
       // ]
       .fetch(it -> convertToStats(it));
}
```

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 count(*)
from item
 join podcast
   on item.podcast_id = podcast.id
where (
 item.pub_date is not null
 and date_trunc('day', item.pub_date) > (timestamp with time zone '2020-07-01
00:00:00+00:00' + -(10) * interval '1 day')
)
group by podcast.type, date_trunc('day', item.pub_date)
order by podcast.type, date_trunc('day', item.pub_date)
```

podcast.type	date_trunc('day', item.pub_date)	count(*)
'RSS'	'2020-06-22'	2
'RSS'	'2020-06-23'	3
'RSS'	'2020-06-24'	1
'Youtube'	'2020-06-22'	9
'Youtube'	'2020-06-23'	1
'Youtube'	'2020-06-24'	16

What if I want
aggregated / cumulated
values ?

Don’t do it
in
memory !

Use

OVER

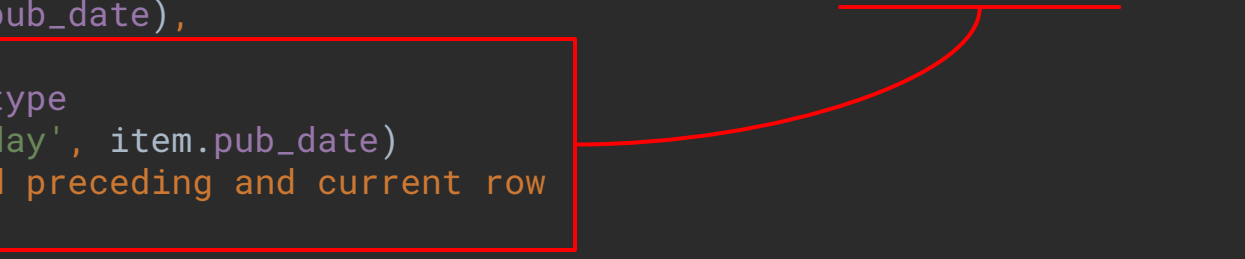
SQL feature

(specified in **SQL-2003**)

```java
public List<StatsPodcastByType> _findStatByTypeAndPubDateCumulated(OffsetDateTime startingFrom) {
    var date = trunc(ITEM.PUB_DATE);
    return query
            .select(
                    PODCAST.TYPE,
                    date,
                    sum(count()).over()
                            .partitionBy(PODCAST.TYPE)
                            .orderBy(date)
                            .rowsBetweenUnboundedPreceding()
                            .andCurrentRow()
            )
            .from(ITEM.innerJoin(PODCAST).on(ITEM.PODCAST_ID.eq(PODCAST.ID)))
            .where(ITEM.PUB_DATE.isNotNull())
            .and(
                    date.gt(offsetDateTime(startingFrom).minus(10))
            )
            .groupBy(PODCAST.TYPE, date)
            .orderBy(PODCAST.TYPE, date)
            // Record<PODCAST.TYPE, count(), OffsetDateTime>
            .fetch(it -> convertToStats(it));
}
```

Partition by *PODCAST.TYPE*

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from item
 join podcast
   on item.podcast_id = podcast.id
where (
 item.pub_date is not null
 and date_trunc('day', item.pub_date) > (timestamp with time zone '2020-07-01
00:00:00+00:00' + -(10) * interval '1 day')
)
group by podcast.type, date_trunc('day', item.pub_date)
order by podcast.type, date_trunc('day', item.pub_date)
```



```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	
'RSS'	'2020-06-23'	3	
'RSS'	'2020-06-24'	1	
'Youtube'	'2020-06-22'	9	
'Youtube'	'2020-06-23'	1	
'Youtube'	'2020-06-24'	16	

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	
'RSS'	'2020-06-23'	3	
'RSS'	'2020-06-24'	1	
'Youtube'	'2020-06-22'	9	
'Youtube'	'2020-06-23'	1	
'Youtube'	'2020-06-24'	16	

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	2
'RSS'	'2020-06-23'	3	
'RSS'	'2020-06-24'	1	
'Youtube'	'2020-06-22'	9	
'Youtube'	'2020-06-23'	1	
'Youtube'	'2020-06-24'	16	

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	2
'RSS'	'2020-06-23'	3	5
'RSS'	'2020-06-24'	1	
'Youtube'	'2020-06-22'	9	
'Youtube'	'2020-06-23'	1	
'Youtube'	'2020-06-24'	16	

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	2
'RSS'	'2020-06-23'	3	5
'RSS'	'2020-06-24'	1	6
'Youtube'	'2020-06-22'	9	
'Youtube'	'2020-06-23'	1	
'Youtube'	'2020-06-24'	16	

```
select
 podcast.type,
 date_trunc('day', item.pub_date),
 sum(count(*)) over (
   partition by podcast.type
   order by date_trunc('day', item.pub_date)
   rows between unbounded preceding and current row
 )
from …
```

podcast.type	date_trunc('day', item.pub_date)	count(*)	sum(count(*)) over
'RSS'	'2020-06-22'	2	2
'RSS'	'2020-06-23'	3	5
'RSS'	'2020-06-24'	1	6
'Youtube'	'2020-06-22'	9	9
'Youtube'	'2020-06-23'	1	10
'Youtube'	'2020-06-24'	16	26

And if I want to use

proprietary syntax

of my **favorite RDBMS** ?

PostgreSQL

manage JSON with ease

with **JSONB**

```
CREATE TABLE public.podcast (
    id uuid NOT NULL,
    description character varying(65535),
    has_to_be_deleted boolean,
    last_update timestamp with time zone,
    signature character varying(255),
    title character varying(255),
    type character varying(255),
    url character varying(65535),
    metadata jsonb DEFAULT '{}',
    cover_id uuid
);
```

Specific type of PostgreSQL

And a set of specifics operators: ->, ->>, #>, #>>, @>, <@, and many more

JSON stored as **B**inary data, indexable

96365a7c-8875-44f1-9f25-9b6fadbb4ec2	Goood Morning Web	{}
e4335987-9d2b-4e24-95fb-93164c9d3809	IFTTD - If This Then Dev	{}
cf615560-5f61-42f2-a931-0bf43c6823cd	JetBrainsTV	{"youtube": {"channelId": "UC_JOQIIOQJEFOQI"}}
44d82b60-41b0-4e21-a252-c680ef366768	Message à caractère informatique	{"youtube": {"channelId": "UC_OJQONOIHAAAIHIAJ"}}
2e8a6a65-d1ab-4128-b355-edd5e11bddee	JUG Leaders	{"youtube": {"channelId": "UC_QE5QFEQ6E45GH3AC5"}}

And

JOOQ

can use it !

```java
public Optional<YoutubePodcast> findOne(UUID id) {
    var youtubeField = jsonPath(PODCAST.METADATA, "youtube", "channelId");
    return query
            .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL, youtubeField)
            .from(PODCAST)
            .where(PODCAST.ID.eq(id))
            .and(hasKey(PODCAST.METADATA, "youtube"))
            .orderBy(PODCAST.ID.asc())
            .fetchOptional(it -> new YoutubePodcast(
                            it.get(PODCAST.ID), it.get(PODCAST.TITLE),
                             it.get(PODCAST.URL), it.get(youtubeField)
                    )
            );
}

private static Field<String> jsonPath(Field<JSONB> jsonField, String... path) {
    return DSL.field("{0} #>> {1}", String.class, jsonField, DSL.array(path));
}

public static Condition hasKey(Field<JSONB> f, String... keys) {
    return DSL.condition("{0} ??| {1}", f, DSL.array(keys));
}
```

Custom JSONB operator from java code

```kotlin
fun findOne(id: UUID): YoutubePodcast? {
        val youtubeField = PODCAST.METADATA.path("youtube", "channelId")
        return query
                .select(PODCAST.ID, PODCAST.TITLE, PODCAST.URL, youtubeField)
                .from(PODCAST)
                .where(PODCAST.ID.eq(id))
                .and(PODCAST.METADATA.hasKey("youtube"))
                .orderBy(PODCAST.ID.asc())
                .fetchOne { (id, title, url, channelId) ->
                    YoutubePodcast(id, title, url, channelId)
                }
    }

}

private fun Field<JSONB?>.path(vararg path: String): Field<String> {
    return DSL.field("{0} #>> {1}", String::class.java, this, DSL.array(*path))
}

private fun Field<JSONB?>.hasKey(vararg keys: String): Condition {
    return DSL.condition("{0} ??| {1}", this, DSL.array(*keys));
}
```

Custom JSONB extension function from **Kotlin** code

```
select
 podcast.id, podcast.title, podcast.url,
 podcast.metadata #>> array['youtube','channelId']
from podcast
where (
 podcast.id = '2e8a6a65-d1ab-4128-b355-edd5e11bddee'
 and (podcast.metadata ??| array['youtube'])
)
```

You can leverage

SQL and NoSQL

from

PostgreSQL

This **talk** is
about
JOOQ

But JOOQ is
about
SQL

JOOQ

is the best way to

learn SQL

But why

SQL is so

important ?

is just

Declarative

SQL is

everywhere !

BigQuery

Google Cloud Spanner

New PostgreSQL Interface makes Cloud Spanner's scalability and availability more open and accessible

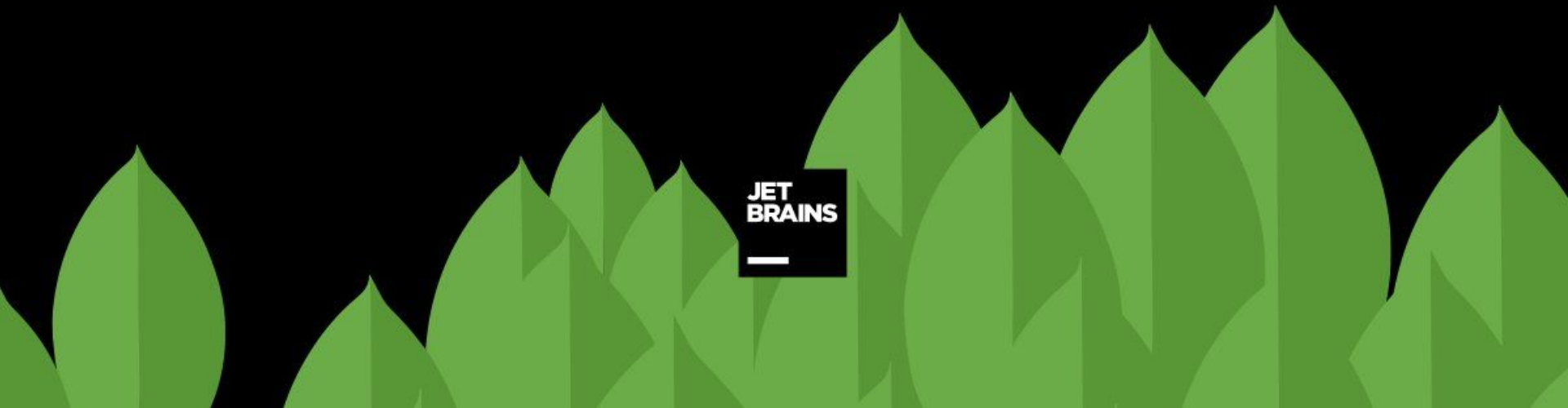
RediSQL

APACHE

DRILL

PrestoDB

SQL for MongoDB



SQL

is becoming

the data language

JOOQ

is **not** compatible

with all of these (**yet***)

But using **JOOQ**

will help you to

learn and **understand** SQL

This is why

I  JOOQ & SQL


Thank you


Questions ?

Stickers & Swag !