Intro to Ecto

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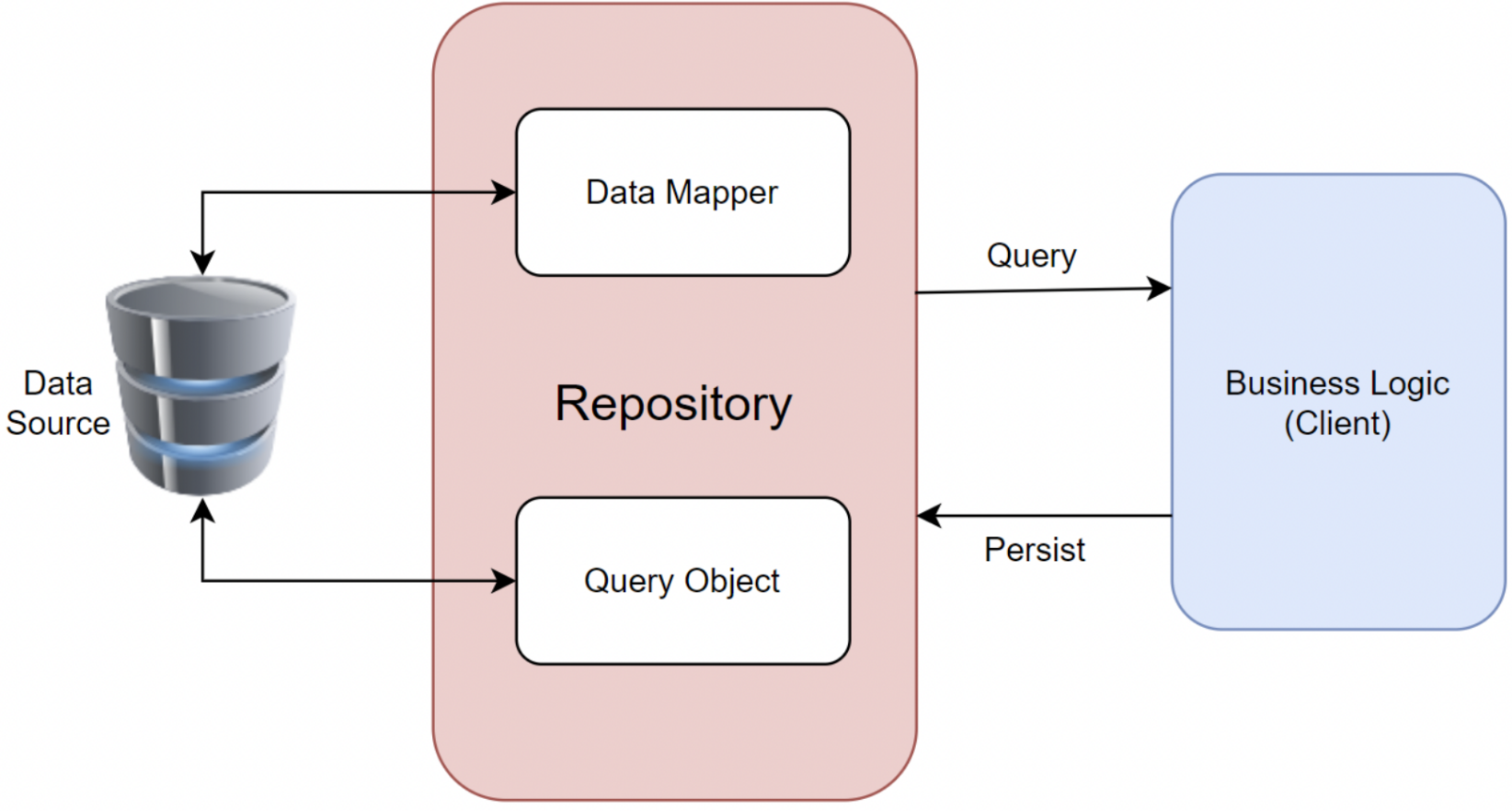
Overview

- Repository Pattern
- SQL Basics Review
- Ecto Basics

Repository Pattern



SQL Queries in PgAdmin Demo

- Basic CRUD operations in SQL

```sql
-- Create
insert into users(last_name, first_name, inserted_at,updated_at)
values('Brown', 'Bill','2022-01-01','2022-01-01')

-- Read
select * from users where last_name = 'Brown'

-- Update
update users set last_name='Blue' where id=1

-- Delete
delete from users where id = 1
```

Ecto CRUD Equivalents

- These Ecto functions generate the SQL appropriate for the configured database

```
Repo.insert %User{...} # create a new user

Repo.all(User) # select * from users;

Repo.get(User,1) # select * from users where id=1

Repo.update changeset # update users set...

Repo.delete u# delete from users where user_id = u
```

Inserting Records in Ecto

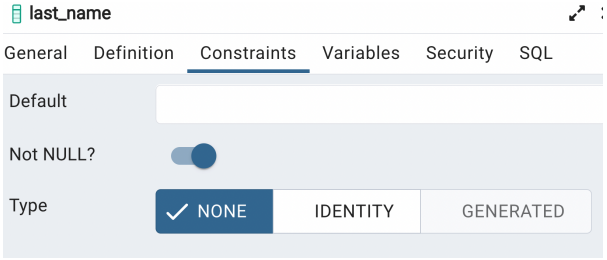
- Records can be inserted directly using Repo
- Constraints in the database are enforced, however, direct insertions are not validated against the application constraints

```
iex(32)> Repo.insert user
[debug] QUERY OK db=1.8ms queue=1.7ms idle=1661.7ms
INSERT INTO "users" ("inserted_at","updated_at") VALUES ($1,$2) RETURNING "id" [~N[2022-03-03 17:12:37], ~N[2022-03-03
17:12:37]]
{:ok,
 %AccountManager.Accounts.User{
   __meta__: #Ecto.Schema.Metadata<:loaded, "users">,
   first_name: nil,
   id: 11,
   inserted_at: ~N[2022-03-03 17:12:37],
   last_name: nil,
   updated_at: ~N[2022-03-03 17:12:37]
 }}
```

- Notice that the first_name and last_name are both missing, even though they are required by the Phoenix app

Database Constraints

- Adding a contraint directly using pgAdmin



- Error returned by Ecto when constraint is violated

```
iex(34)> Repo.insert user
** (Postgrex.Error) ERROR 23502 (not_null_violation) null value in column "last_name" of relation "users" violates n
ot-null constraint

    table: users
    column: last_name

Failing row contains (12, null, null, 2022-03-03 17:32:43, 2022-03-03 17:32:43).
    (ecto_sql 3.7.2) lib/ecto/adapters/sql.ex:760: Ecto.Adapters.SQL.raise_sql_call_error/1
    (ecto 3.7.1) lib/ecto/repo/schema.ex:744: Ecto.Repo.Schema.apply/4
    (ecto 3.7.1) lib/ecto/repo/schema.ex:367: anonymous fn/15 in Ecto.Repo.Schema.do_insert/4
[debug] QUERY ERROR db=17.3ms queue=1.4ms idle=1437.0ms
INSERT INTO "users" ("inserted_at","updated_at") VALUES ($1,$2) RETURNING "id" [~N[2022-03-03 17:32:43], ~N[2022-03-
03 17:32:43]]
```

Adding Column Constraints using Ecto

- Setting the not null constraint in the migration

```
add :first_name, :string, null: false
```

- Column contraints are added when the table is created, and can be modified later
- *Table* constraints can be added at any time. They can be complex and operate on multiple columns

```
  def change do
    create constraint(:users, :first_name_exists, check: ~s|(first_name is not
null)|)
  end
```

Validations and the Changeset

- Ecto changesets are used to prepare data prior to inserting or updating records on the client side

```
def changeset(user, attrs) do
  user
  |> cast(attrs, [:last_name, :first_name]) # returns a changeset
  |> validate_required([:last_name, :first_name]) #
end
```

- There are quite a number of validations available "out of the box". Documentation can be found at https://hexdocs.pm/ecto/3.7.0/Ecto.Changeset.html

Ecto.Changeset.cast

- `cast` returns an `Ecto.Changeset` includes a field `valid?`
  - A changeset is marked as invalid if the data types do not match (passing in a number when a string was required, etc.)

```
iex(16)> cs = cast(u,%{first_name: 123},[:first_name])
#Ecto.Changeset<
  action: nil,
  changes: %{},
  errors: [first_name: {"is invalid", [type: :string, validation: :cast]}],
  data: #AccountManager.Accounts.User<>,
  valid?: false
>
```

Getting Specific Results

- In SQL, we use the `where` clause to filter our results

```
select * from users where last_name = 'Lancaster'
```

- The equivalent query in Ecto

```
import Ecto.Query
query = from u in User, where: last_name == "Lancaster"
Repo.all(query)
```

Composable Queries

- In SQL, we can use `and` to filter to limit the results of the query

```
select * from users where last_name = 'Lancaster' and first_name = 'Joshua'
```

- Ecto queries are *composable*, so we can do this

```
query = from u in User, where: last_name == "Lancaster"
query2 = from q in query, where: q.first_name == "Joshua"
Repo.all(query2)
```