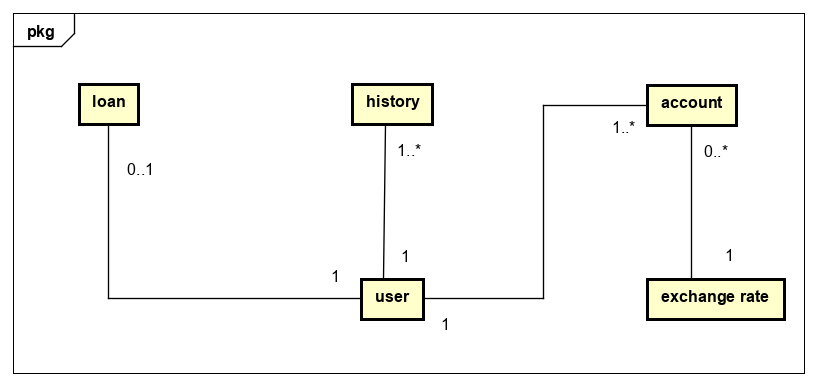
Appendix D

Database

-Manuel-

The following figures are the Conceptual model and the Entity/Relationship (E/R) model of the database that shows an overview of all the information (attributes) stored inside the five different entities: User, loan, account, history, exchange rate. The relationships between them are also represented in the figure, with all the cardinality, primary key and foreign key.

Relationship Model:

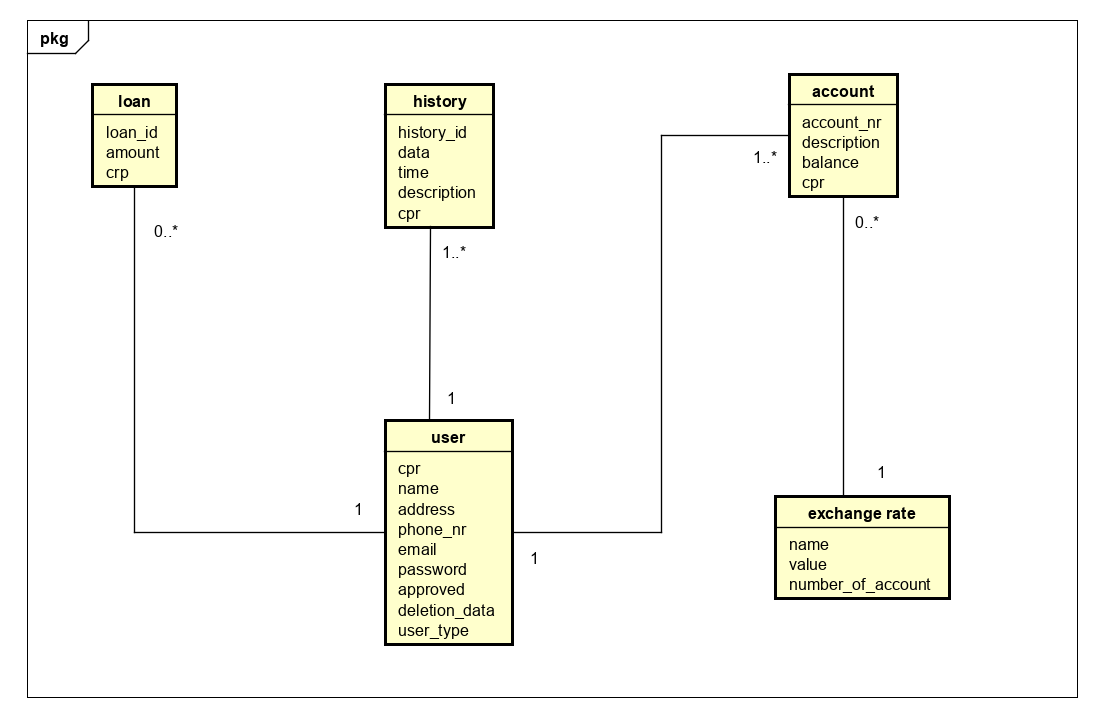


The entity User relates to all other tables by one to many. The database respect 1nf and 2nf.

The first normal form is been respected because each variable has a single value and the entity in a column are the same type and the rows are uniquely identified by a variable.

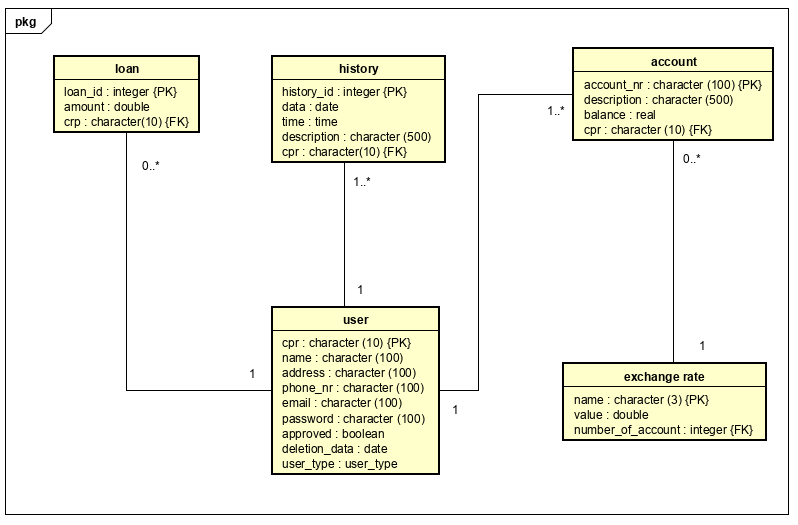
The second normal form is been respected because all the attributes (non-key columns) depend on the key.

The third normal form is the only one that is not respected because all fields can’t be determinate by the key in the table and no other column.

Conceptual Model:

The variable address is kept in user because we don’t use it in our system as a variable that helps the staff and manager with all the information about the customers.

Database Model:



The model was created in the PostgreSQL and implemented in our system.

**SQL code for database creation:**

CREATE DATABASE "BBB-DataBase";

CREATE SCHEMA bbb\_dbs;

CREATE TABLE bbb\_dbs.user (

    cpr character(10) NOT NULL PRIMARY KEY,

    name character varying(100) NOT NULL,

    address character varying(100) NOT NULL,

    phone\_nr character varying(100) NOT NULL,

    email character varying(100) NOT NULL,

    password character varying(100) NOT NULL,

    approve boolean NOT NULL,

    deletion\_date date,

    user\_type public.user\_type NOT NULL

);

CREATE DOMAIN bbb\_dbs.user\_type AS character varying

CONSTRAINT user\_type\_check CHECK (((VALUE)::text = ANY ((ARRAY['client'::character varying, 'staff'::character varying, 'manager'::character varying])::text[])));

CREATE TABLE bbb\_dbs.account (

    account\_nr character varying(100) NOT NULL PRIMARY KEY,

    description character varying(500),

    balance real,

    cpr character(10) NOT NULL,

FOREIGN KEY(cpr) REFERENCES bbb\_dbs.user(cpr)

);

CREATE TABLE bbb\_dbs.exchange\_rate (

    name character(3) NOT NULL PRIMARY KEY,

    value double precision,

    number\_of\_accounts integer

);

CREATE TABLE bbb\_dbs.history (

    history\_id integer NOT NULL PRIMARY KEY,

    date date NOT NULL,

    "time" time without time zone NOT NULL,

    description character varying(500) NOT NULL,

    cpr character(10) NOT NULL,

FOREIGN KEY(cpr) REFERENCES bbb\_dbs.user(cpr)

);

CREATE TABLE bbb\_dbs.loan (

    loan\_id integer NOT NULL PRIMARY KEY,

    amount double precision NOT NULL,

    cpr character(10) NOT NULL,

FOREIGN KEY(cpr) REFERENCES bbb\_dbs.user(cpr)

);

**DML**

DML code for DataBase interaction

* SELECT \* FROM bbb\_dbs.user WHERE approve ='false';
* SELECT \* FROM bbb\_dbs.user WHERE user\_type ='staff' OR user\_type ='manager';
* SELECT \* FROM bbb\_dbs.loan;
* UPDATE bbb\_dbs.exchange\_rate SET number\_of\_accounts = '12' WHERE name = 'DKK';
* SELECT \* FROM bbb\_dbs.user;
* INSERT INTO bbb\_dbs.exchange\_rate VALUES('RUB', '0.09', '0');