

Business logic “TO DO Task” system:

- The system has accounts of 3 levels:
 - user: access to their resources;
 - administrator: user rights extension - access to resources of other users and statistics;
 - privileged administrator: extension of administrator rights - access to the system of accounts, creation of ordinary and privileged administrators.
- Users have a unique name and email in the system with an encrypted password.
- When creating an account, it is marked as not completed confirmation and restricts login.
- When deleting an account, the date of deletion is saved, and after N months after deletion, all account data will be erased, during this time the account can be restored.
- Users store tasks in the system, each of which is associated with a user category, has a name, description, completion status and optionally: deadline and files attached to the task.
- Custom categories can contain several tasks, as well as have a display color.

I) INFOLOGIC MODEL

Entities:

- User
- Task
- Category
- File

M - mutable

I - immutable

“User” attributes:

- I - Name (string, <= 20 chars, UNIQUE)
- M - Email (string, <= 100 chars, UNIQUE)

- M - Password (hash-string, <= 256)
- I - CreateDate (date)
- I - Role (enum: user, admin, owner; default=user)
- M - Status (enum: confirmed, not_confirmed, deleted; default=not_confirmed)

“Task” attributes:

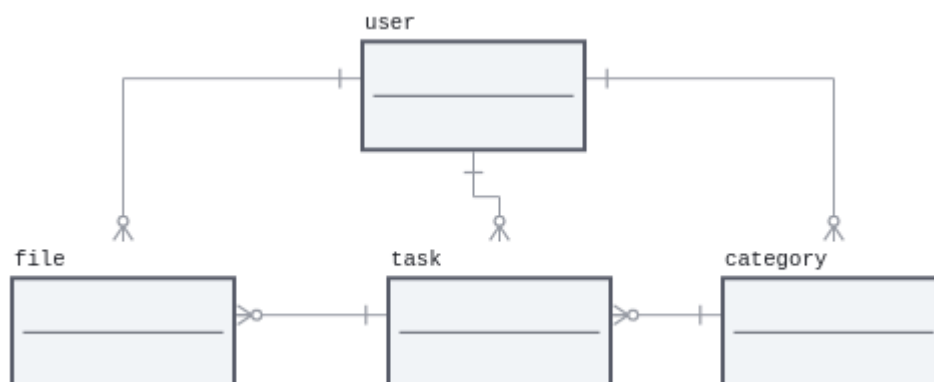
- M - Name (string, <= 16 chars)
- M - Description (text, <= 200 chars, null)
- M - Done Status (bool, default=false)
- M - Deadline (timestamp, null)
- M - Category
- I - User

“Category” attributes:

- M - Name (string, <=16)
- M - Color (string; format: “#hhhhhh”, h - hex digit; null)
- I - User

“File” attributes:

- I - Name (string, <=100)
- I - Path (string, <=500, UNIQUE)
- I - Task
- I - User



Img 1. Infologic connection of entities.

II) DATALOGIC MODEL.

Begin relations:

- R1 - User,
- R2 - Task
- R3 - Category
- R4 - File

Relation attributes R1:

A10 - ID (PK)

A11 - Name

A12 - Email

A13 - Password

A14 - Created Date

A15 - Role

A16 - Status

Relation attributes R2:

A20 - ID (PK)

A21 - Name

A22 - Description

A23 - Done Status

A24 - Deadline

A25 - Category

A26 - User

Relation attributes R3:

A30 - ID (PK)

A31 - Name

A32 - Color

A33 - User

Relation attributes R4:

A40 - ID (PK)

A41 - Name

A42 - Path

A43 - Task

A44 - User

Functional relations

INSIDE TABLES:

$F1: A10 \rightarrow A11, A12, A13, A14, A15, A16$

$F2: A20 \rightarrow A21, A22, A23, A24, A25, A26$

$F3: A20, A26 \rightarrow A25$

$F4: A30 \rightarrow A31, A32, A33, A34$

$F5: A40 \rightarrow A41, A42, A43, A44$

$F6: A40, A44 \rightarrow A43$

BETWEEN TABLES:

$F7: A10 \leftrightarrow A26$

$F8: A10 \leftrightarrow A44$

$F9: A10 \leftrightarrow A33$

$F10: A20 \leftrightarrow A43$

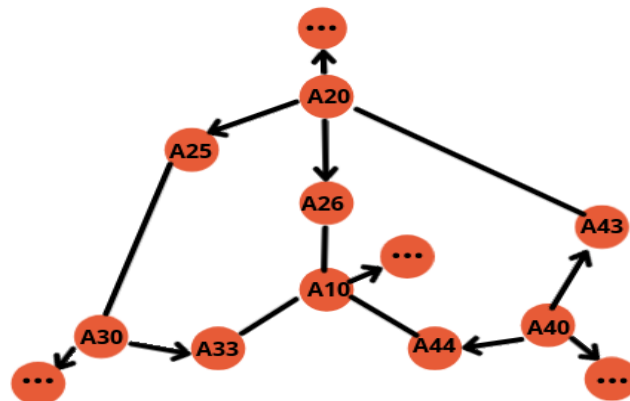
$F11: A30 \leftrightarrow A25$

$R1(\underline{A10}, A11, A12, A13, A14, A15, A16)$

$R2(\underline{A20}, A21, A22, A23, A24, A25, A26)$

$R3(\underline{A30}, A31, A32, A33)$

$R4(\underline{A40}, A41, A42, A43, A44)$



Img 2. Datalogic references.

$A40 \rightarrow A43 \rightarrow A20 \rightarrow A25 \rightarrow A30 \rightarrow A33 \rightarrow A10$

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↓

$A44 \rightarrow A10$

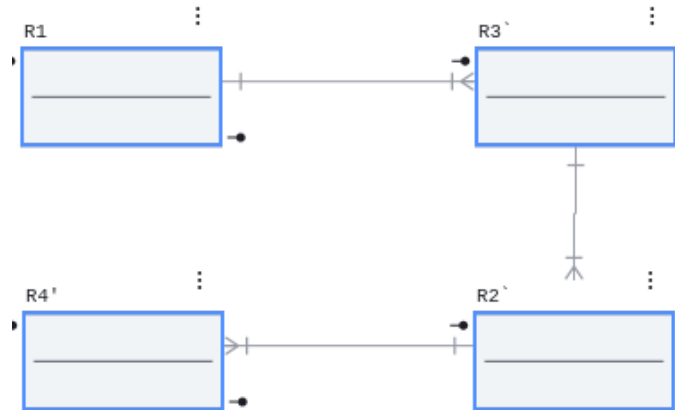
$A26 \rightarrow A10$

R1(A10, A11, A12, A13, A14, A15, A16)

R2`(A20, A21, A22, A23, A24, A25)

R3`(A30, A31, A32, A33)

R4`(A40, A41, A42, A43)



Img 3. Datalogic models.

III) Table structs on SQL (*PostgreSQL dialect*)

```
create TYPE account_role as ENUM (  
    'user',  
    'admin',  
    'owner'  
);  
  
create TYPE account_status as ENUM (  
    'not_confirmed',  
    'confirmed',  
    'deleted'  
);  
  
create TABLE _user(  
    user_id INT GENERATED ALWAYS AS IDENTITY,  
    name varchar(20) NOT NULL UNIQUE,  
    email varchar(100) NOT NULL UNIQUE,  
    password varchar(256) NOT NULL,  
    on_create date NOT NULL,  
    role account_role NOT NULL default 'user',  
    status account_status NOT NULL default 'not_confirmed',  
    PRIMARY KEY(user_id)  
);
```

```
create TABLE category(  
    category_id INT GENERATED ALWAYS AS IDENTITY,  
    name varchar(16) NOT NULL,  
    color varchar(7) NULL,  
    user_id int NOT NULL,  
    PRIMARY KEY(category_id),  
    CONSTRAINT fk_user  
        FOREIGN KEY(user_id)  
        REFERENCES _user  
        ON DELETE CASCADE  
);  
  
create TABLE task(  
    task_id INT GENERATED ALWAYS AS IDENTITY PRIMARY KEY,  
    name varchar(16) NOT NULL,  
    description varchar(200) NULL,  
    completed BOOLEAN NOT NULL default false,  
    category_id int,  
    CONSTRAINT fk_category  
        FOREIGN KEY(category_id)  
        REFERENCES category  
        ON DELETE CASCADE  
);  
  
create TABLE file(  
    file_id INT GENERATED ALWAYS AS IDENTITY PRIMARY KEY,  
    name varchar(100) NOT NULL,  
    path varchar(500) NOT NULL,  
    task_id int,  
    CONSTRAINT fk_task  
        FOREIGN KEY(task_id)  
        REFERENCES task  
        ON DELETE CASCADE  
);
```