Web Application for Toolsharing System

Design Documentation

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# Architecture design

The system is split into two applications - one on the frontend and one on the backend. The backend application is designed as a three-tier architecture, with separate data, business and presentation layers. The frontend is two-tier, with a REST controller and UI layer. The two applications communicate between the backend presentation layer and the frontend REST controller using a REST API.

**Used Technologies**

Backend framework:

* Java Spring
* Hibernate
* JUnit 5

Frontend:

* jQuery + HTML5
* Bootstrap UI



Obrázek 1 - Classes relations



Obrázek 2 - Design classes model

## bl

Business layer used to validate data from presentation layer and serve them to data layer. And ask data layer for any data that is requested by presentation layer.



Obrázek 3 - bl

### services

Services package contains all interfaces with their implementation used for validating data before sending them to data layer.



Obrázek 4 - services

## dl

Data layer includes data persistence mechanism and repositories used for accessing the stored data without exposing the data storage mechanism.



Obrázek 5 - dl

### entities

Package containing the data structure of each of the entities.



Obrázek 6 - entities

#### Class ToolEntity

One specific instance of tool.

| **Název atributu** | **Datový typ** | **Popis** |
| --- | --- | --- |
| name | String | Tool brand name |
| price | int |  |
| reservations | List<ReservationEntity> |  |
| series | int |  |
| state | ToolState |  |
| tool\_id | long | Tool identification number |

#### Class UserEntity

User which uses the system.

| **Název atributu** | **Datový typ** | **Popis** |
| --- | --- | --- |
| e-mail | String |  |
| firstname | String |  |
| karma | Integer | Karma is an attribute that increases or decreases based on the user's renting history. It increases for rents that proceed without problems, and decreases for late pickups or returns, or for damaging tools.  High karma can lead to discounts on subscriptions, while low karma can lead to fines or bans. |
| phonenumber | String |  |
| reservations | List<ReservationEntity> |  |
| secondname | String |  |

### repositories

Repositories package provides the methods for accessing the data from business layer.



Obrázek 7 - repositories

## frontend

Frontend uses two packages, one for communication with presentation layer and second one to display the data recieved.

### REST controller

This package is designed to communicate with the endpoints provided by the presentation layer.

### UI Layer

UI package is used for displaying the data retrieved by REST controller package.

## pl

Presentation layer is layer that provides the frontend component with rest API endpoints. Using these endpoints will be the only way how to get necessary data from the business layer. At the same time the endpoints will be used to receive data from frontend and transform them to be processed by the business layer.

There is only one part of the presentation layer, called controller. All classes from this package are designed to communicate information from business layer to API and in the opposite way.



Obrázek 8 - pl

### controller

This package is used for transformation of user data to data that could be processed by business layer using the methods provided by business layer.



Obrázek 9 - controller

### dto



Obrázek 10 - dto

# Relational data model

We chose to save the data in relational database described in this chapter. As data storage we will be using the MySQL database.



Obrázek 11 - Database Model

## Implemented Database



Obrázek 12 – Implemented Database

### box *«table»*

Location where the tool can be picked up.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| BOX\_ID | INTEGER | True |  |
| ADDRESS | VARCHAR(50) | True | Adress of code lock box |
| NUMBER | INTEGER | True | Box identification number - printed on front of box |

### tool *«table»*

One specific instance of tool.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| TOOL\_ID | INTEGER | True | Tool identification number. |
| NAME | VARCHAR(50) | True | Tool brand name |
| PRICE | INTEGER | True |  |
| STATE | VARCHAR(8) | True |  |

### user *«table»*

User which uses the system.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| USER\_ID | INTEGER | True |  |
| KARMA | INTEGER | True | Karma is an attribute that increases or decreases based on the user's renting history. It increases for rents that proceed without problems, and decreases for late pickups or returns, or for damaging tools.  High karma can lead to discounts on subscriptions, while low karma can lead to fines or bans. |
| FIRST\_NAME | VARCHAR(30) | True |  |
| SECOND\_NAME | VARCHAR(30) | True |  |
| EMAIL | VARCHAR(30) | True |  |
| PHONE | VARCHAR(15) | False |  |
| PASSWORD | VARCHAR(30) | True |  |

## Toolsharing

Chapter consist of all relational tables used in our design.



Obrázek 13 - Relational Database Model

### ADMIN *«table»*

Admin that moderates the system.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| PERSON\_ID | INTEGER | True |  |
| WORKSFROM | DATETIME | True | Date when he started work from. |

### BOX *«table»*

Location where the tool can be picked up.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| BOX\_ID | INTEGER | True |  |
| ADDRESS | CHAR(50) | True | Adress of code lock box |
| NUMBER | INTEGER | True | Box identification number - printed on front of box |

### PAYMENT *«table»*

Amount of money that some specific user should pay.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| PAYMENT\_ID | INTEGER | True |  |
| PERSON\_ID | INTEGER | True |  |
| AMOUNT | DOUBLE | True | Payment amount to be billed to the user |
| DATE | DATETIME | True | Date when the payment should be payed. |
| SUBSCRIPTION\_ID | INTEGER | False |  |
| FINE\_ID | INTEGER | False |  |

### PERSON *«table»*

Person that used the system.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| PERSON\_ID | INTEGER | True |  |
| EMAIL | VARCHAR(30) | True | Person's email, used for contacting in case of any changes. |
| FIRST\_NAME | VARCHAR(20) | True | Given name |
| SECOND\_NAME | VARCHAR(30) | True | Person's surname |
| PHONE | INTEGER | False | Person's phone number, used for contacting the person and stored for legal purposes. |

### ROLE *«table»*

DON'T REMEMBER

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| ROLE\_ID | DECIMAL | True |  |
| NAME | VARCHAR(50) | True |  |

### TOOL *«table»*

One specific instance of tool.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| TOOL\_ID | INTEGER | True | Tool identification number. |
| TOOL\_TYPE\_ID | INTEGER | True |  |
| NAME | VARCHAR(50) | True | Tool brand name |
| PRICE | INTEGER | False |  |
| STATE | VARCHAR(8) | True |  |

### TOOL\_TYPE *«table»*

Type of tool.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| TOOL\_TYPE\_ID | INTEGER | True |  |
| SUBSCRIPTION\_TYPE\_ID | INTEGER | True | Which subscription level the user needs to be subscribed to to have access to this tool type. Expensive/premium tools will only be accessible to users with more expensive subscriptions. |
| NAME | VARCHAR(30) | True | General description of tool - e.g. "Screwdriver", "Soldering iron", "Hand drill". Does not refer to a specific tool by brand name |

### USER *«table»*

User which uses the system.

| **Název atributu** | **Datový typ** | **Not null** | **Popis** |
| --- | --- | --- | --- |
| KARMA | INTEGER | True | Karma is an attribute that increases or decreases based on the user's renting history. It increases for rents that proceed without problems, and decreases for late pickups or returns, or for damaging tools.  High karma can lead to discounts on subscriptions, while low karma can lead to fines or bans. |
| PERSON\_ID | INTEGER | True |  |
| new | DOUBLE | False |  |