

# DREAMHOME

## **Informationssysteme Projekt**

im Studiengang  
Wirtschaftsinformatik  
vorgelegt von

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an der Hochschule Esslingen

Prüfer: Prof. Dr. Rer. Pol. Dirk Hesse

## Table of contents

<b>Table of contents .....</b>	<b>2</b>
<b>List of figures.....</b>	<b>4</b>
<b>List of tables .....</b>	<b>4</b>
<b>1      Group Structure .....</b>	<b>5</b>
<b>2      Mission.....</b>	<b>6</b>
2.1    Mission statement.....	6
2.2    Mission objectives .....	6
<b>3      Time schedule.....</b>	<b>7</b>
3.1    Milestone 1 .....	7
3.2    Milestone 2 .....	8
3.3    Milestone 3 .....	8
3.4    Milestone 4 .....	9
<b>4      User views (use case) .....</b>	<b>10</b>
4.1    Use Case 1: Csv file upload.....	10
4.1.1    ERM .....	11
4.1.2    Relevant entities and relationships .....	11
4.2    Use Case 2: Operating cost statement .....	11
4.2.1    ERM .....	12
4.2.2    Relevant entities and relationships .....	12
4.3    Use Case 3: Open positions .....	13
4.3.1    ERM .....	13
4.3.2    Relevant entities and relationships .....	13
<b>5      Requirements .....</b>	<b>14</b>
5.1    Functional requirements .....	14
5.2    Non-functional requirements.....	14
<b>6      Data Catalog.....</b>	<b>15</b>
<b>7      Conceptual Data Model .....</b>	<b>17</b>
<b>8      Relations in BCNF .....</b>	<b>18</b>
8.1    SS2101_AccountMovement.....	18
8.2    SS2101_Transaction.....	18

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8.3	SS2101_Renter .....	19
8.4	SS2101_LeaseContract.....	19
8.5	SS2101_Appartment.....	19
<b>9</b>	<b>Mockup vs. actual Implementation.....</b>	<b>20</b>
<b>10</b>	<b>Lessons Learned .....</b>	<b>27</b>
10.1	Ranna Alemi .....	27
10.2	Tim Brecht.....	27
10.3	Anna Dobler .....	27
10.4	Sven Schuler.....	28
10.5	Timo Schwind .....	28

## List of figures

Figure 1: group structure.....	5
Figure 2: gantt-chart milestone 1 .....	7
Figure 3: gantt-chart milestone 2 .....	8
Figure 4: gantt-chart milestone 3 .....	9
Figure 5: gantt-chart milestone 4 .....	9
Figure 6: ERM use case 1 .....	11
Figure 7: ERM use case 2 .....	12
Figure 8: data model .....	17
Figure 9: Renters Mockup .....	20
Figure 10: Renters Implantation .....	20
Figure 11: Renter Mockup .....	21
Figure 12: Renter Implementation .....	21
Figure 13: Apartments mockup .....	22
Figure 14: Apartments implementation .....	22
Figure 15: Apartment mockup .....	23
Figure 16: Apartment Implementation .....	23
Figure 17: Lease contract mockup.....	24
Figure 18: Lease contracts implementation .....	24
Figure 19: Operating cost statements mockup.....	25
Figure 20: Operating cost statements implementation .....	25
Figure 21: Open position mockup .....	26
Figure 22: Open positions implementation.....	26

## List of tables

Table 1: data catalog .....	15
Table 2: description of relationships.....	16

# 1 Group Structure

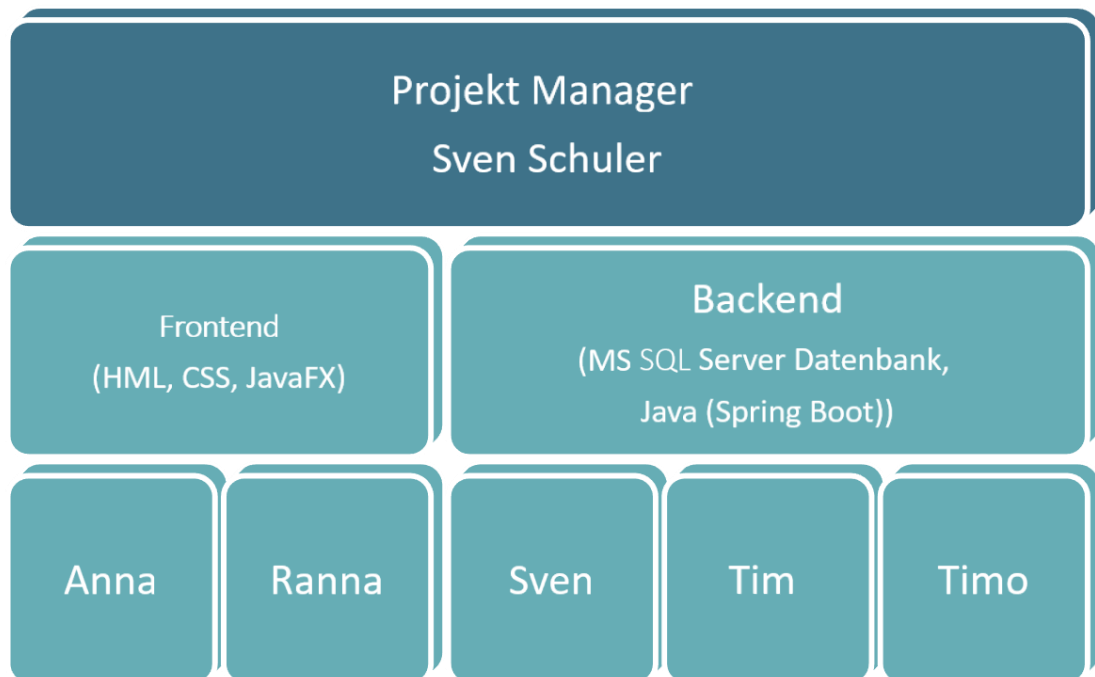


Figure 1: group structure

## **2 Mission**

### **2.1 Mission statement**

The property management/E-Ship Information System is used by employee of Dream House to manage the daily business regarding monitoring and handling incoming payment in relation to the managed properties.

The main focus will be on the automatic processing and validation of the data.

### **2.2 Mission objectives**

- Display paid rents and open positions.
- Upload, decomposition and transformation of account detail.
- Calculate operating costs for each client.
- Partitioning of the operating costs for the clients and display them via PDF or CSV.

### 3 Time schedule

To coordinate the tasks in the team, we use the online project management tool “agantty”. This is a free online tool to organize tasks in a gantt chart. For each task it is possible to enter the responsible persons, a deadline and you can declare tasks as done. So every team member knows, which task he or she still has to do and sees the work of the others.

#### 3.1 Milestone 1

Deadline: 05.05.2021

##### Goals

- documentation of group structure
- mission statement & mission objectives
- time schedule
- user views (use cases)
- list of requirements (structured, sorted, numbered)

##### Gantt-Chart

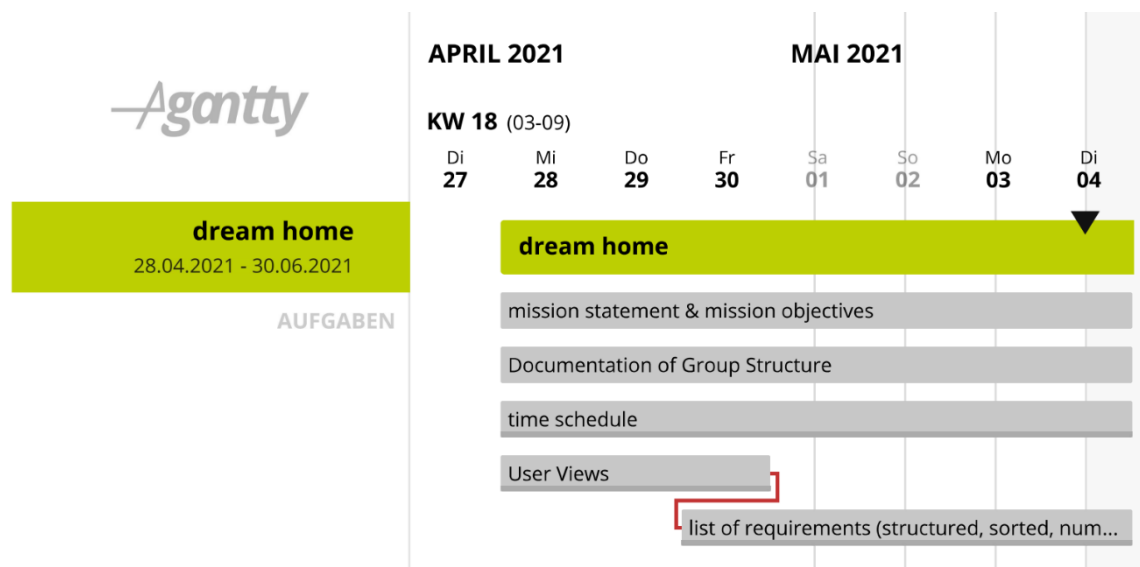


Figure 2: gantt-chart milestone 1

## 3.2 Milestone 2

Deadline: 19.05.2021

### Goals

- conceptual data model on paper (Chen notation)
- data catalogue
- list of all relevant entities and relationships for each user view

### Gantt-Chart

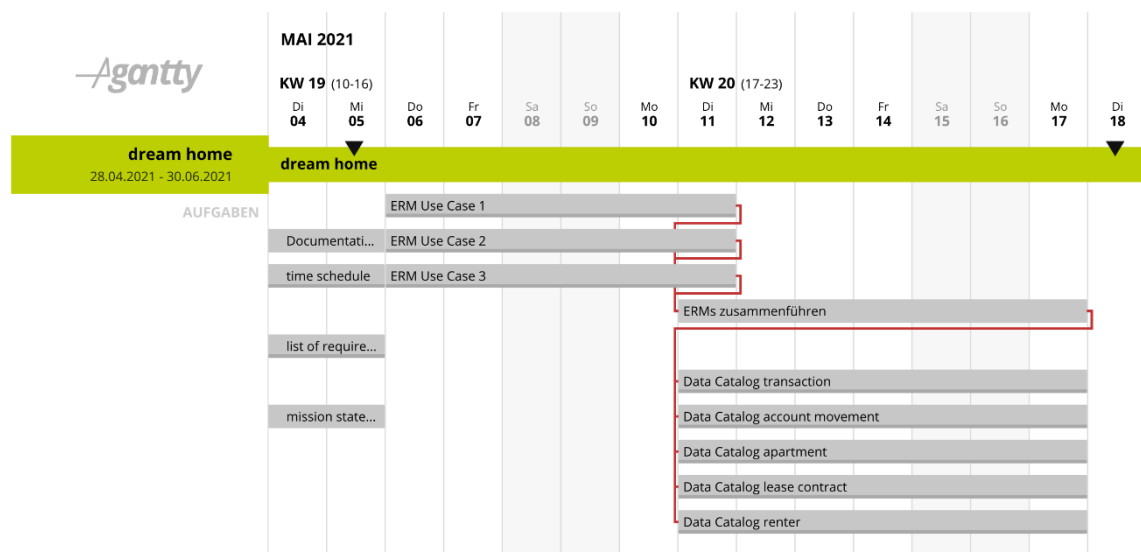


Figure 3: gantt-chart milestone 2

## 3.3 Milestone 3

Deadline: 02.06.2021

### Goals

- conceptual data model in CASE-tool
- logical data model
- proof that all relations are in BCNF or explanation why not



## Gantt-Chart

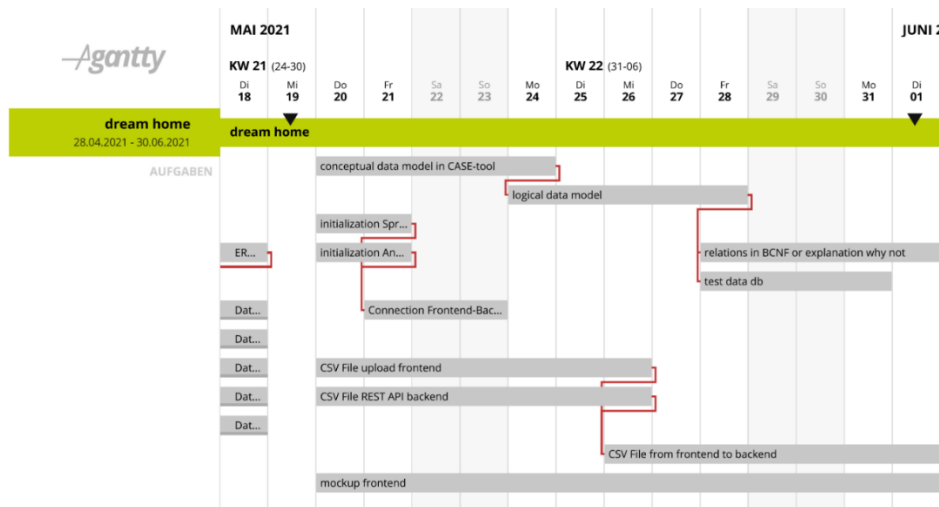


Figure 4: gantt-chart milestone 3

### 3.4 Milestone 4

Deadline: 15.06.2021

#### Goals

- All SQL code
- Java or source code of project
- Sql-code for data loading
- list of successful and failed test cases

## Gantt-Chart

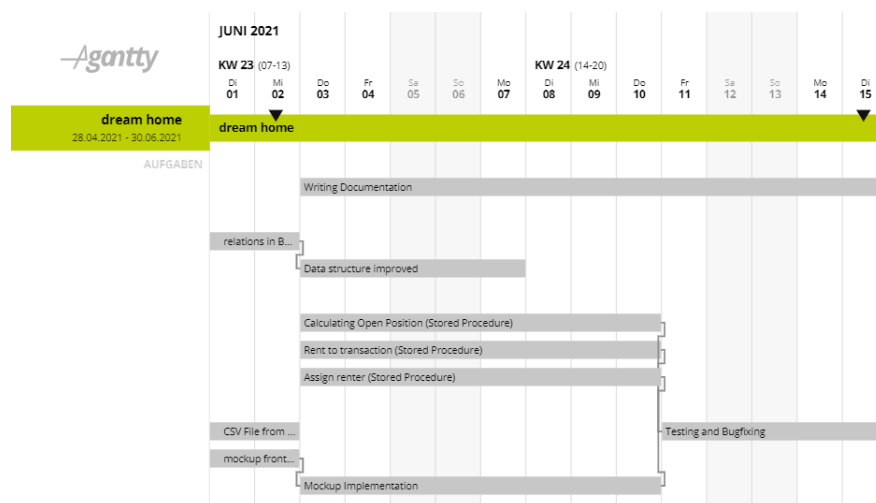


Figure 5: gantt-chart milestone 4

## 4 User views (use case)

### 4.1 Use Case 1: Csv file upload

Actor	employee of Dream House, responsible for Data Management
Preconditions	new monthly statement of bank account available
Trigger	Employee starts the upload manually
Basic Flow	<ol style="list-style-type: none"><li>1. Every month an employee of Dream House loads up the csv file to receive information about the bank account and it's transactions.</li><li>2. The system divides up the transactions to the renters and houses.</li><li>3. To divide up the operating costs the system uses several allocation keys (number of persons living in the flat – get from lease contract; Behälter – get from lease contract; Wohnfläche get from lease contract; Einzelabrechnung – get from number of flats)</li></ol>
Alternative Flow	<p>If wrong file with wrong information, print error message for user.</p> <p>If no new information is available, print error message for user.</p> <p>If allocation keys can't be found, print error message for user.</p>

### 4.1.1 ERM

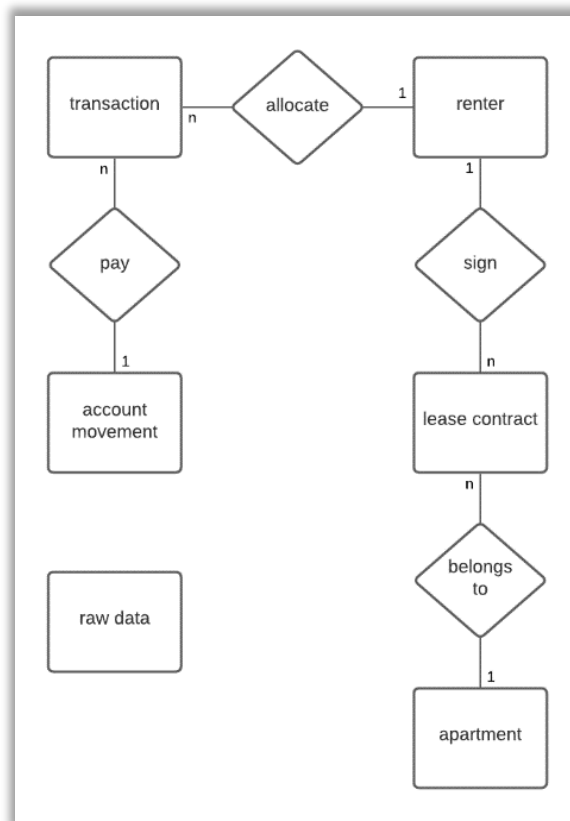


Figure 6: ERM use case 1

### 4.1.2 Relevant entities and relationships

- PostingDate
- PaymentReason
- AmmountOfPayment
- DebtorCreditor\_ID
- Renter\_ID
- NumberOfPersons
- Size
- Lease\_Amount
- AdditionalCost

## 4.2 Use Case 2: Operating cost statement

Actor	employee/ specialist of Dream House, responsible for
Preconditions	Csv file uploaded

Trigger	new year; request of customer
Basic Flow	<ol style="list-style-type: none"> <li>1. The system searches for specific customer figures (already allocated)</li> <li>2. The system checks whether there have been some positive or negative transfers pre-payments of the specific renter and add these to the operating cost statement.</li> <li>3. The system sums up the operating costs of specific renter and subtracts the sum of pre-payments of specific renter.</li> <li>4. After this all operating cost statement are going to be send to renters.</li> </ol>
Alternative Flow	If system can't information of customers, print error message for user.

#### 4.2.1 ERM

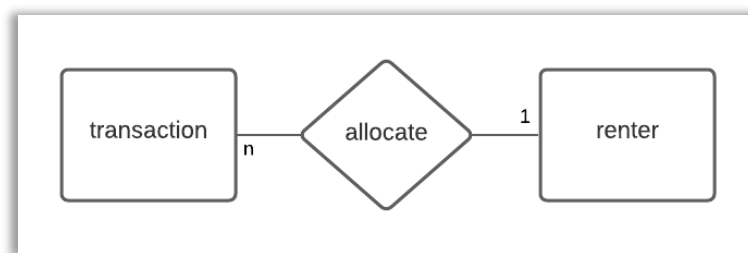


Figure 7: ERM use case 2

#### 4.2.2 Relevant entities and relationships

- Renter\_ID
- TransactionAmount

### 4.3 Use Case 3: Open positions

Actor	employee/ specialist of Dream House, responsible for
Preconditions	
Trigger	new month
Basic Flow	<ol style="list-style-type: none"><li>1. The system searches for specific customer figures</li><li>2. The system stores all done payments of specific customer and the figures of the payment he has to pay (triggered out of Stammdaten) in an accounting file.</li><li>3. Both figures are summed up separately.</li><li>4. The system shows the difference of the two sums.</li></ol>
Alternative Flow	If check (or calculation) of accounting file can't be done, print error message for user.

#### 4.3.1 ERM

#### 4.3.2 Relevant entities and relationships

- Renter\_ID
- TransactionAmount

## 5 Requirements

### 5.1 Functional requirements

- The information system must verify the statement of bank accounts.
- The information system must be able to receive statement of bank account csv files.
- The information system must be able to print tables and information (operating cost statement; missing payments) as a pdf.
- The information system must be able to show operating cost statements and missing payments.
- The information system must calculate the operating cost statement.
- The information system must relate the cost positions to a building and distribute the costs to the different renters by a certain key.
- The information system must give the user the possibility to create, update and delete renters.
- The information system must not send the operating cost statements per e-mail.

### 5.2 Non-functional requirements

- The information system must use a MS SQL Server.
- The logic should (if possible) run on the database server.
- The information system needs a graphical interface.

6 Data Catalog

Table 1: data catalog

Data Catalog - Dream Home					
Entity Name	Attributes	Description	Data Type & length	Constraints	
Transaction	AccountMovement_ID	FK from Table Account Movement	int	Foreign Key (composite key1)	
	Renter_ID	FK from Table Renter	int	Foreign Key (composite key2)	
	PostingDate	Date of the transaction	Date	Not Null	
	PaymentReason	Explanation of the transaction	varchar	Not Null	
	Amount	Amount of money	money	Not Null	
Renter	Renter_ID	Unique identification	int	Primary Key	
	rName	Last Name of the tenant	varchar	Not Null	
	rSurname	First Name of the tenant	varchar	Not Null	
	rPostcode		int	Not Null	
	rCity	Adress of the tenant	varchar	Not Null	
	rStreet		varchar	Not Null	
Account Movement	rGender	Gender of the tenant	char	Not Null	
	AccountMovement_ID	Unique identification	int	Primary Key	
	PostingDate	Date of the transaction	Date	Not Null	
	PaymentReason	Explanation of the transaction	varchar	Not Null	
	Amount	Amount of money	money	Not Null	
	DebtorCreditor_ID	Name of Payer	varchar	Not Null	
Lease Contract	RawData_ID	FK from Table raw data	int	Foreign Key	
	Contract_ID	Unique identification	int	Primary Key	
	Renter_ID	FK from Table Renter	int	Foreign Key	
	Appartment_ID	FK from Table Apartment	int	Foreign Key	
	Lease_amount	Monthly Lease	money	Not Null	
	DateOfSignature	Date the lease was signed	Date	Not Null	
Appartment	NumberOfPersons		int	Not Null	
	Additional costs	Information about add. costs	money	Not Null	
	Security_Deposit	Amount of money	money	Not Null	
	Appartment_ID	Unique identification	int	Primary Key	
	Max_Renter	Number of maximum renters in this appartment	int	Not Null	
	Size	Size of appartment in m²	float	Not Null	
	Appartment_number	number of appartments in house	int	Not Null	
	Number_rooms	Number of rooms in appartments	int	Not Null	
	House_Number	get number of appartments in house	int	Not Null	

Table 2: description of relationships

Description of relationships				
Entity Name	Multiplicity	Relationship	Multiplicity	Entity name
transaction	n	allocate	1	renter
	n	pay	1	account movement
renter	1	sign	n	lease contract
lease contract	n	belongs to	1	apartment



## 7 Conceptual Data Model

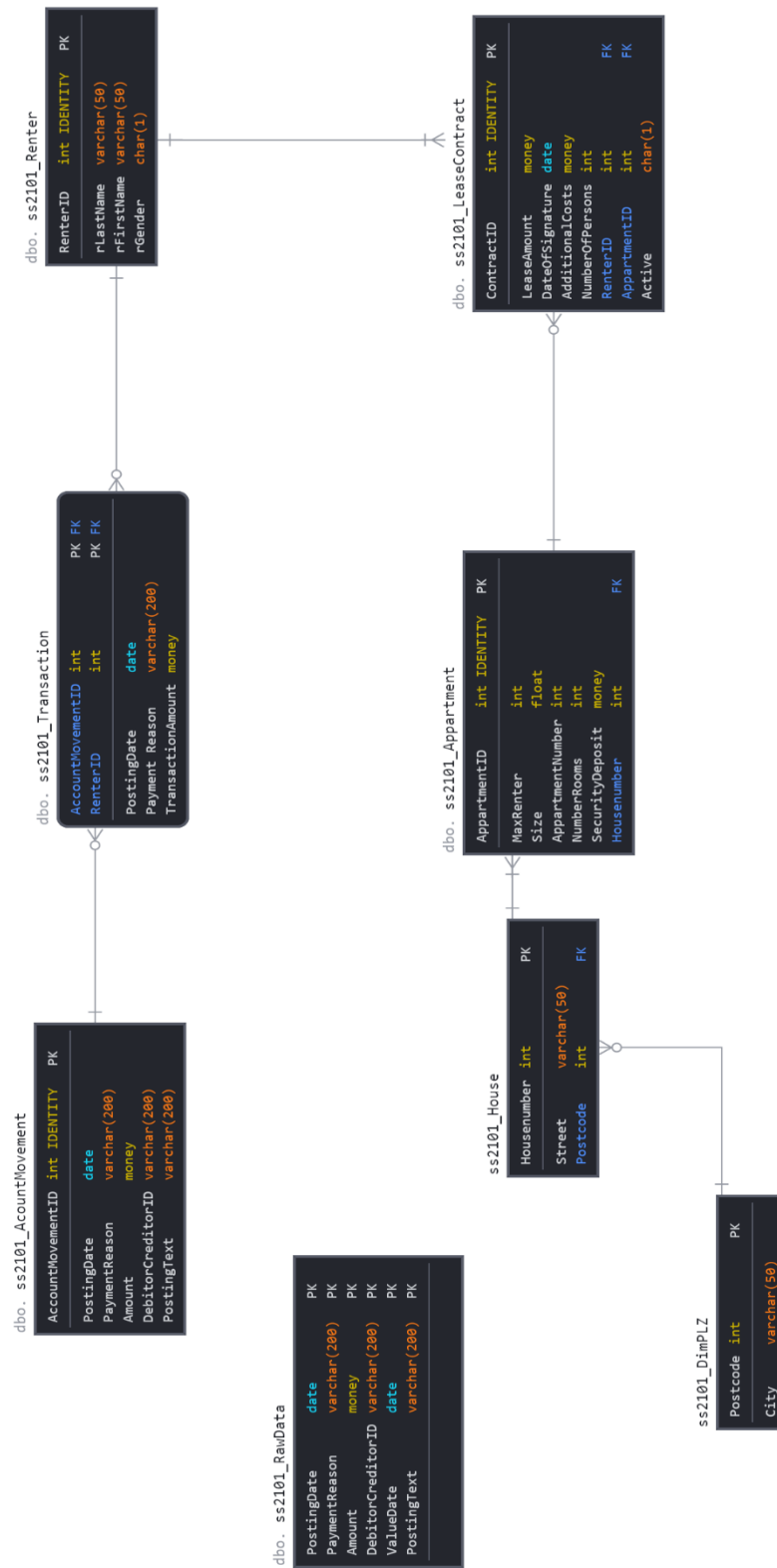


Figure 8: data model

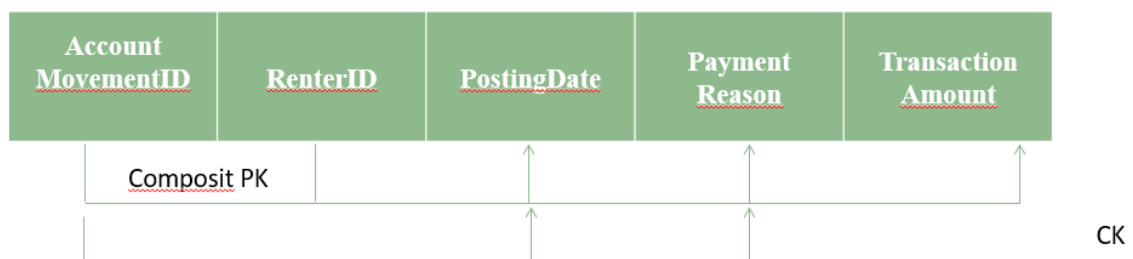
## 8 Relations in BCNF

### 8.1 SS2101\_AccountMovement



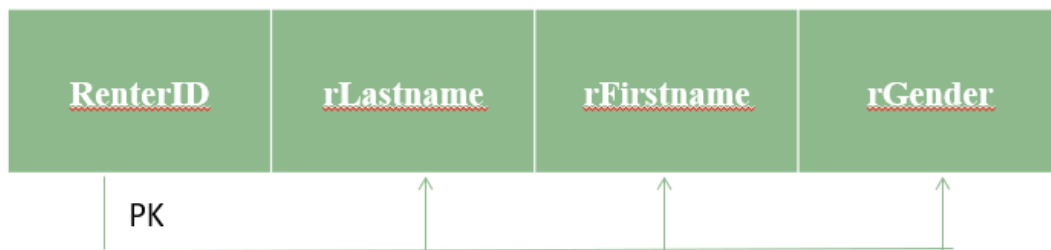
- No Transitive Dependencies (No additional Debitor-Creditor Info)
- No Partial Dependencies (Due to no composite PK)
- Every Determinant is a candidate key

### 8.2 SS2101\_Transaction



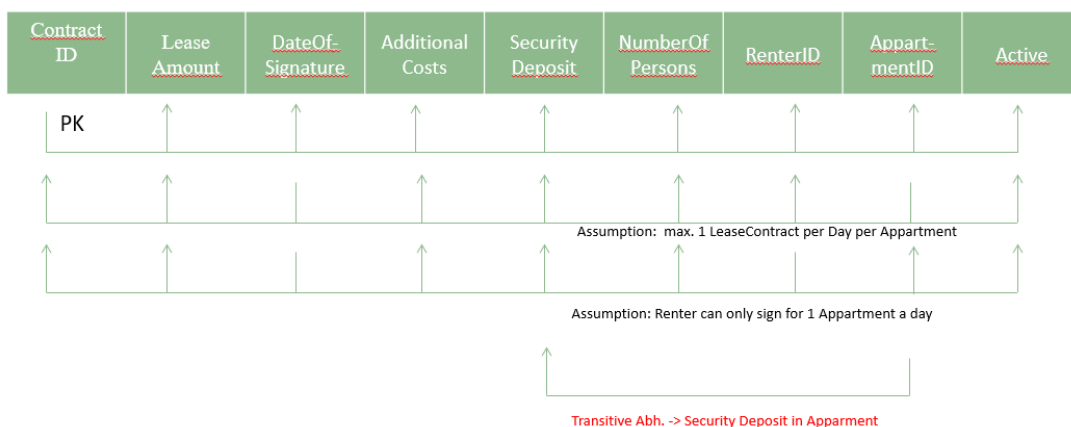
- No Transitive Dependencies
- 3 Partial Dependencies

### 8.3 SS2101\_Renter

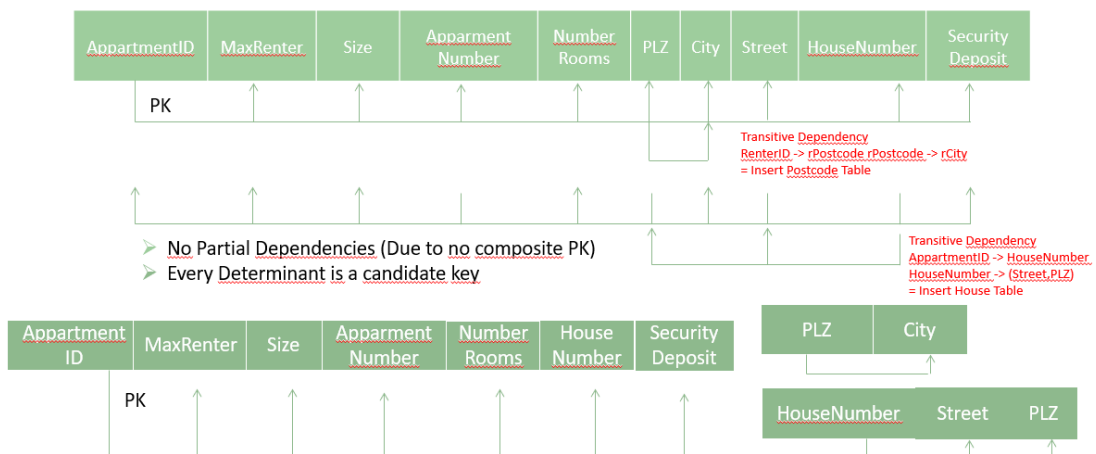


- No Transitive Dependencies (No additional Debitor-Creditor Info)
- No Partial Dependencies (Due to no composite PK)
- Every Determinant is a candidate key

### 8.4 SS2101\_LeaseContract



### 8.5 SS2101\_Apartment



## 9 Mockup vs. actual Implementation

Below is a comparison between the mock-up and the actual implementation.

# Dream Home

Home

Renters

Apartment

Lease Contract

operating cost statements

Open Position

Renters

search

Renter ID	Firstname	Lastname
10000	Ranna	Alemi
100005	Timo	Schwind
100010	Sven	Schuler
100015	Herbert	Müller
100020	Harald	Schmidt
100025	Julia	Schulze
100030	Sabrina	Scholz
100035	Tompson	Tom
100040	Max	Mustermann

Figure 9: Renters Mockup

DREAMHOME																																																																											
Home	Renters																																																																										
Renters	<input type="text" value="search"/> <input type="button" value="Q"/> <input type="button" value="new renter"/>																																																																										
Apartment	<table> <tr> <th>Renter ID</th><th>Firstname</th><th>Lastname</th><th>Gender</th></tr> <tr><td>10000</td><td>Timo</td><td>Schwind</td><td>M</td></tr> <tr><td>10010</td><td>Ranna</td><td>Alemi</td><td>W</td></tr> <tr><td>10020</td><td>Sven</td><td>Schuler</td><td>M</td></tr> <tr><td>10030</td><td>Anna</td><td>Dobler</td><td>W</td></tr> <tr><td>10040</td><td>Tim</td><td>Brecht</td><td>M</td></tr> <tr><td>10050</td><td>Nadine</td><td>Maria</td><td>W</td></tr> <tr><td>10060</td><td>Martin</td><td>Simon</td><td>M</td></tr> <tr><td>10070</td><td>Sara</td><td>Ahad</td><td>W</td></tr> <tr><td>10080</td><td>Elif</td><td>Koral</td><td>W</td></tr> <tr><td>10090</td><td>Sarwar</td><td>Belal</td><td>M</td></tr> <tr><td>10100</td><td>Anna</td><td>Obenland</td><td>W</td></tr> <tr><td>10110</td><td>Dogus</td><td>Arslan</td><td>M</td></tr> <tr><td>10120</td><td>Lorena</td><td>Brandt</td><td>W</td></tr> <tr><td>10130</td><td>Irem</td><td>Nur</td><td>W</td></tr> <tr><td>10140</td><td>Mergim</td><td>Rizaj</td><td>M</td></tr> <tr><td>10150</td><td>Lulze</td><td>Tafa</td><td>W</td></tr> <tr><td>10160</td><td>Ahmed</td><td>Abdol</td><td>M</td></tr> </table>			Renter ID	Firstname	Lastname	Gender	10000	Timo	Schwind	M	10010	Ranna	Alemi	W	10020	Sven	Schuler	M	10030	Anna	Dobler	W	10040	Tim	Brecht	M	10050	Nadine	Maria	W	10060	Martin	Simon	M	10070	Sara	Ahad	W	10080	Elif	Koral	W	10090	Sarwar	Belal	M	10100	Anna	Obenland	W	10110	Dogus	Arslan	M	10120	Lorena	Brandt	W	10130	Irem	Nur	W	10140	Mergim	Rizaj	M	10150	Lulze	Tafa	W	10160	Ahmed	Abdol	M
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Lease Contracts																																																																											
Open Positions																																																																											
Operating Cost Statements																																																																											
Statement of Bank Account																																																																											

Figure 10: Renters Implantation

Dream Home

Home	<b>Timo Schwind</b> <table> <tr><td>Renter-ID</td><td>1000</td></tr> <tr><td>Lastname</td><td>Schwind</td></tr> <tr><td>Firstname</td><td>Timo</td></tr> <tr><td>Postcode</td><td>73240</td></tr> <tr><td>City</td><td>Wendlingen</td></tr> <tr><td>Street</td><td>Aalstr. 18</td></tr> <tr><td>Gender</td><td>Male</td></tr> </table>	Renter-ID	1000	Lastname	Schwind	Firstname	Timo	Postcode	73240	City	Wendlingen	Street	Aalstr. 18	Gender	Male
Renter-ID		1000													
Lastname		Schwind													
Firstname		Timo													
Postcode		73240													
City		Wendlingen													
Street		Aalstr. 18													
Gender		Male													
Renters															
Appartment															
Lease Contract															
operating cost statements															
Open Position															

Figure 11: Renter Mockup

DREAMHOME

Home
Renters
Apartments
Houses
Lease Contracts
Open Positions
Operating Cost Statements
Statement of Bank Account

**Timo Schwind**  

RenterId	10000
Firstname	Timo
Lastname	Schwind
Gender	M

save

Figure 12: Renter Implementation

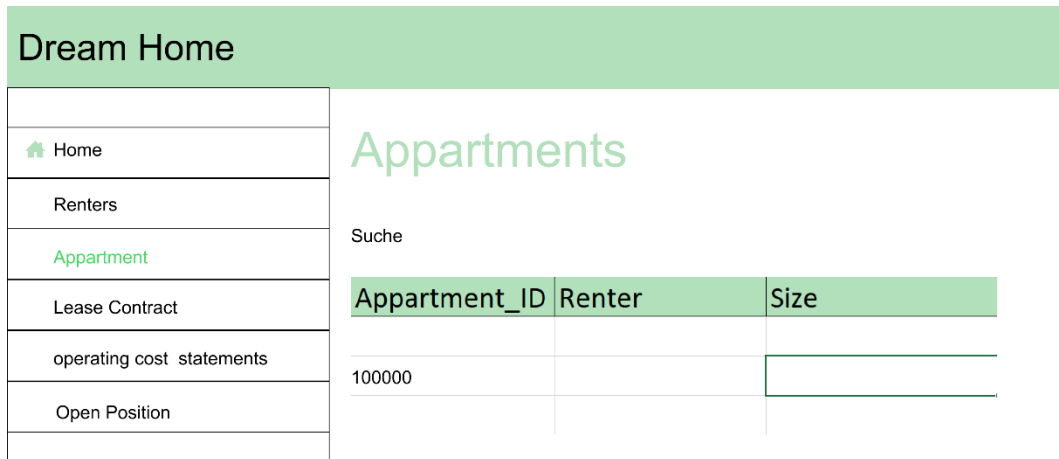


Figure 13: Apartments mockup

**DREAMHOME**

Home

Renters

**Appartments**

Houses

Lease Contracts

Open Positions

Operating Cost Statements

Statement of Bank Account

Suche

[new apartment](#)

Apartment ID	Maximum of Renters	Size	Apartment Number	Number of Rooms	Security Deposit	House ID	Street	Postcode	City
10011	4	89 m <sup>2</sup>	1	4	500 €	10214	Kirchstraße	70736	Fellbach
10021	2	50 m <sup>2</sup>	1	2	300 €	10204	Eichstraße	70734	Fellbach
10031	2	50 m <sup>2</sup>	2	2	300 €	10204	Eichstraße	70734	Fellbach
10041	2	50 m <sup>2</sup>	3	2	300 €	10204	Eichstraße	70734	Fellbach
10051	8	155 m <sup>2</sup>	1	6	1000 €	10194	Rotebühlstraße	70199	Stuttgart
10061	3	70 m <sup>2</sup>	1	3	600 €	10184	Karlstraße	70197	Stuttgart
10071	2	40 m <sup>2</sup>	1	1	300 €	10044	Flanderstraße	73728	Esslingen
10081	2	40 m <sup>2</sup>	2	1	300 €	10044	Flanderstraße	73728	Esslingen
10091	2	40 m <sup>2</sup>	3	1	300 €	10044	Flanderstraße	73728	Esslingen
10101	2	40 m <sup>2</sup>	5	1	300 €	10044	Flanderstraße	73728	Esslingen
10111	2	40 m <sup>2</sup>	4	1	300 €	10044	Flanderstraße	73728	Esslingen
10121	6	120 m <sup>2</sup>	1	5	1000 €	10054	Heinestraße	70173	Stuttgart
10131	6	120 m <sup>2</sup>	2	5	1000 €	10054	Heinestraße	70173	Stuttgart
10141	4	80 m <sup>2</sup>	1	4	600 €	10064	Löffelstraße	70174	Stuttgart
10151	1	20 m <sup>2</sup>	1	1	100 €	10074	Rubensstraße	70176	Stuttgart
10161	1	20 m <sup>2</sup>	2	1	100 €	10074	Rubensstraße	70176	Stuttgart
10171	2	50 m <sup>2</sup>	1	3	500 €	10084	Schrempfstraße	70178	Stuttgart

Figure 14: Apartments implementation

Dream Home

Home	Apartment 10000
Renters	
Apartment	
Lease Contract	
operating cost statements	
Open Position	

Appartment_ID	100000
Maximum of Renters	
Size	
Appartment Number	
Number of Rooms	
Total Appartment in House	
Renter	

Figure 15: Apartment mockup

DREAMHOME

Apartment Number: 1

Home	Apartment ID	10011
Renters	Maximum of Renters	4
Apartments	Size (in m²)	89
Houses	Apartment Number	1
Lease Contracts	Number of Rooms	4
Open Positions	Security Deposit (in €)	500
Operating Cost Statements	House Number	10214
Statement of Bank Account	Street	Kirchstraße
	Postcode	70736
	City	Fellbach

Figure 16: Apartment Implementation



Figure 17: Lease contract mockup

Contract ID	Lease Amount	Date of Signature	Additional Costs	Number of Persons	Renter ID	Apartment ID	Active
10042	1000 €	2021-01-02	200 €	4	10000	10011	J
10252	720 €	2019-01-13	130 €	2	10010	10021	J
10262	720 €	2019-01-13	130 €	2	10020	10031	J
10272	720 €	2019-01-13	130 €	2	10030	10041	J
10282	1700 €	2018-05-01	350 €	4	10040	10051	J
10292	900 €	2018-12-06	500 €	2	10050	10061	J
10302	500 €	2020-10-03	120 €	1	10060	10071	J
10312	500 €	2019-09-20	120 €	1	10070	10081	J
10322	500 €	2019-09-20	120 €	1	10080	10091	J
10332	700 €	2018-02-05	120 €	2	10220	10231	N
10342	700 €	2020-02-05	120 €	2	10210	10231	J
10352	700 €	2010-01-06	150 €	2	10200	10221	J
10362	700 €	2015-04-07	135 €	2	10190	10211	N
10372	700 €	2018-05-09	135 €	2	10180	10211	J
10382	2000 €	2021-01-01	400 €	6	10170	10201	J

Figure 18: Lease contracts implementation



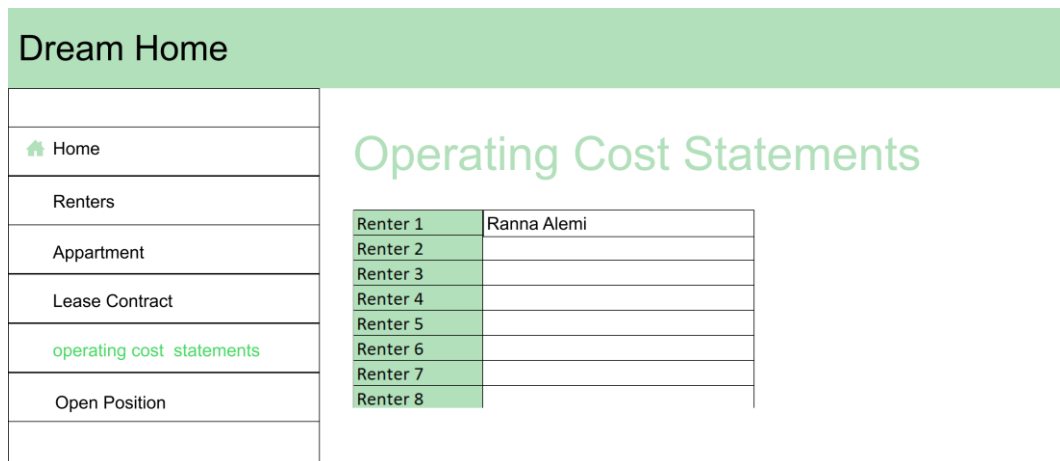


Figure 19: Operating cost statements mockup

Renter ID	Firstname	Lastname	Year	Active Renter	Get Statement
10000	Timo	Schwind	2019	J	<a href="#">get statement</a>
10000	Timo	Schwind	2021	J	<a href="#">get statement</a>
10010	Ranna	Alemi	2019	J	<a href="#">get statement</a>
10010	Ranna	Alemi	2020	J	<a href="#">get statement</a>
10010	Ranna	Alemi	2021	J	<a href="#">get statement</a>
10020	Sven	Schuler	2019	J	<a href="#">get statement</a>
10020	Sven	Schuler	2021	J	<a href="#">get statement</a>
10030	Anna	Dobler	2019	J	<a href="#">get statement</a>
10030	Anna	Dobler	2021	J	<a href="#">get statement</a>
10040	Tim	Brecht	2019	J	<a href="#">get statement</a>
10040	Tim	Brecht	2021	J	<a href="#">get statement</a>

Figure 20: Operating cost statements implementation

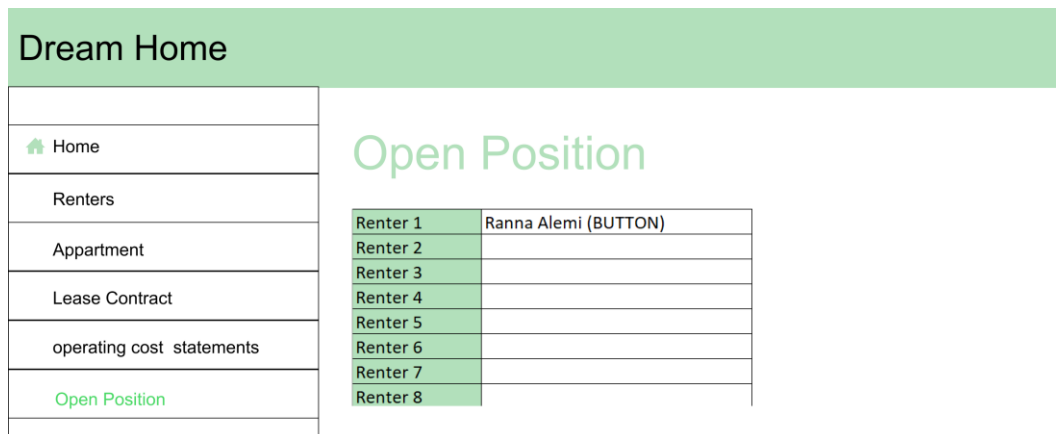


Figure 21: Open position mockup

Renter ID	Firstname	Lastname	Balance
10000	Timo	Schwind	-32380 €
10010	Ranna	Alemi	-26513.3334 €
10020	Sven	Schuler	-2383.3334 €
10030	Anna	Dobler	-16463.3334 €
10040	Tim	Brecht	-5150 €
10050	Nadine	Maria	-7700 €
10080	Elif	Koral	166.6666 €
10090	Sarwar	Belal	10000 €
10100	Anna	Obenland	8500 €
10110	Dogus	Arslan	9000 €
10120	Lorena	Brändle	-150 €
10130	Irem	Nur	-150 €
10140	Mergim	Rizaj	-400 €
10150	Luiza	Tafa	-900 €

Figure 22: Open positions implementation

## **10 Lessons Learned**

### **10.1 Ranna Alemi**

For me it was the first experience to be from the beginning till to the end of such a project. I have learnt a lot from my colleagues. It was great to design a mock up und to implemented even better than what we expected. Even if the implementation in the frontend was a challenge.

The biggest problem was the time management. We invested more time than 60 hours of work (per person), because of the number of tasks. That is why it made it even difficult to organize with all the other modules. Also, because we communicated only through Webex it made even harder. Because of that I learned how important it is to communicate very well in the team, so everyone can work in the short time, everyone has, effective and efficient.

### **10.2 Tim Brecht**

I like the idea of designing and creating an information system from scratch. However, I had problems with taking so much time in the last weeks of the semester for such a lab. I think it would be worth considering this project instead of a written exam for the module grade.

However, I learned a lot and was able to gain practical experience around database conception and database creation. Furthermore, project basics were deepened during the collaboration with the team.

### **10.3 Anna Dobler**

This project taught me even more how to work in teams. Most times there is not too much important stuff to do for each person in the beginning – it's more about discussions, in the end there is always a lot to do though. Therefore, it is very important that one starts immediately with planning and split work as soon as possible.

In our case we have had a lot of contact with each other even in the part where work was divided up. This was very good because we were able to talk to and help each other. This is what teamwork is about.

Furthermore, I was able to increase my knowledge in creating frontends with the help of angular. Discussions of the team also increased my knowledge and experience in database creation.

Additionally, I realized that writing protocols help to understand the project and the requirements even better. It allows you to think about it while writing the protocol.

This project also taught me how much work is behind all of the websites and databases we use in our daily lives. Although this was just a small project it took a while till it worked properly.

## **10.4 Sven Schuler**

Through the project I improved my programming skills in java and typescript. For the first time I had to program a REST API which returns an excel file. Because of that I had to try a lot of different approaches to solve the requirement. Also, the implementation in the frontend was new, which was a challenge too.

The biggest problem was the time management. All tasks were split in the team, so everyone could work on his tasks by himself. But at the end of the project there were so many tasks, which could not be done early and with all the other modules and their exams and the other projects it was very hard to organize myself. Because of that I learned how important it is to communicate very well in the team, so everyone can work in the short time, everyone has, effective and efficient.

## **10.5 Timo Schwind**

While working on the project I dramatically improved my T-SQL and SQL skills. I learned a lot about cursors and how to use them in the right way. I also worked a lot with the CASE-Tool SQLDBM which improved my understanding of data modelling and what is important to note during that process.

Timing the project wasn't always that easy because I also had a lot of other things to do which often ended in stress, but in the end, everything worked fine, and I managed to do everything in time. Communication in our team was mostly very clear and on point, everybody had a good idea about what their tasks were so that everybody knew what to do. The stored procedure to assign the renter from the payment reason was by far the most difficult task to complete. But after I managed that too, my understanding of transact SQL even got better.