

Group 0006/Budgeting Application

Group 0006/Budgeting Application Project plan and manual

Version 1.0

Team 6 - Budgeting Application

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1. Goals and terms

1.1. Introduction.

The assignment was given as a second semester project in the course IDATT1002 – Software Engineering at NTNU.

1.2. Problem description

The task was to create a tool for private individuals or small businesses to help get an overview of income and expenses, as well as aid in budgeting and accounting. The purpose of the tool was to help with the client's economy.

The project required the team to find stakeholders, such as a client and users to perform user tests.

1.3. Terms

Each team member was given 120 hours, $\pm 10\%$, at their disposal to work with the project. As well as an hourly salary of NOK 1599. This meant that hours had to be kept on timesheets to ensure the team did not go over budget.

Source code was written in the programming language Java. The graphical user interface was created using JavaFX. Wireframes used for prototyping were created using the software BalsamiQ. Software such as GitLab, Google Docs, and Notion were used to store source code and all parts of the documentation and reporting.

2. Organization

The project consisted of students, a teaching assistant, lecturers, a client, and testers. The team was made up of the students studying Software Engineering at NTNU, who worked to finish the project assignment. The teaching assistant helped guide the students in weekly meetings. The client worked with the students by giving requirements and feedback on the project. The testes were used to give feedback, as a way to improve the project. The lecturers helped guide the students as well as giving them feedback and evaluations.

3. Follow-up and quality assurance

3.1. Quality Assurance.

The team used different methods to ensure a high-quality product. One of the ways we ensured a high-quality product was by creating a detailed list of prioritized features, and keeping to this list during development. Another way was through regular meetings. This included meetings with the teaching assistant and the client. The meetings helped the development team focus on the high priority aspects of the project. Thorough testing, both within the team and using external testers, also made a big impact on the quality of the final product.

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3.2. Reporting.

To whom and how often (ie customer, lectures learning assistant, within the team, others)

Reporting was done to lecturers, a learning assistant, our client, as well as within the team.

The team had meetings with a designated learning assistant one per week where we reported our work and asked any questions we had regarding the project.

During the two meetings with our lecturer we reported on the vision document, wireframes, domain model and our minimal viable product.

After each important update was reported to the client.

Reporting within the team was done during our weekly meetings, as well as over online communication. During our meetings we discussed what we had done, what problems we faced, and what our plan was.

4. Attachments – Process documentation

These attachments' purpose is both to document the team process during the project and to help the team identify tasks and organize their work.

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4.1. Collaboration agreement

Collaboration agreement

Name	Number	E-mail
Magnus Gjerstad	48218789	magngje@stud.ntnu.no
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Melissa Visnjic	97898088	Melissv@stud.ntnu.no
Knut Skoe	91000347	knutskoe@stud.ntnu.no
Kristiane Skogvang Kolshus	91398117	krisskol@stud.ntnu.no

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This employment contract is based on a set of typical goals, task allocation, procedures, and guidelines for how the interaction between given students should occur.

Goals

Primary Outcome

Get to know each other, build trust and increase motivation

To get to know each other better and build trust among the individuals within the group, it has been established that members should meet outside of school at least once a month to engage in a social activity unrelated to work. Improving the cohesion in the group should hopefully lead to increased motivation for meetings, helping each other and successfully finishing the assignment.

Effective collaboration

To achieve effective collaboration, the group should adhere to some rules regarding how work sessions should be carried out. Meetings will be held at least once a week for continuity and following up. Once a meeting/work session has begun, there should be 45-50 minutes of continuous work, followed by a 10-15 minute break.

Developing flexibility and solution-oriented behaviour.

To develop flexibility and solution-oriented work, the group must be careful to:

- Actively listen, be open to and respect others' ideas.
- Set up digital as well as physical meetings in various settings - not static.
- Be flexible with deadlines that the group sets for itself, if the individual has a valid reason.
- Learn from each other and actively share personal resources.

Performance goals

Punctuality

To achieve punctuality, the group shall set clear deadlines in a shared calendar, as well as communicate time in physical meetings and on the Discord group-chat. These deadlines are initially available on Blackboard. Each group member is responsible for staying up to date, as well as notifying the group and adding it to the calendar. Separate deadlines will also be set outside the educational institution's deadlines, to ensure that there are no delays. Delays will result in strikes (ref. point Interaction)

Evaluation

To achieve the desired evaluation in the subject, the group shall ensure that continuous meetings are set up, with short- and long-term goals/requirements (ref. plan) for what will happen at these meetings and how it will be carried out. There should also be a quality assurance check of all assignments before submission. Everyone must make an effort which reflects the desired grade.

Complete the study

To ensure that everyone completes the study, everyone should help push and support each other. Social events will also be held to bring the group closer together, creating a better learning environment. There should not be put too much pressure on individuals.

Roles and task allocation

Magnus Gjerstad

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- Scrum Master
 - The Scrum Master sets up the plan for the group's sprints, the tasks to be performed during that period, and distributes responsibility for them.
- Client Contact
 - The Client Contact will be responsible for the communication with the customer for the project, including communication and scheduling meetings.

Kristiane Skogvang Kolshus

- Product Design
 - The Product Design supervisor includes overseeing the work on the product design, including interaction design, UI and visual profile.
- Quality Assurance
 - Quality Assurance supervisor ensures that the work carried out during the project is of sufficient quality, with regard to task requirements, design principles and code standards.

Henrik Teksle Sandok

- HR/ lecturer contact
 - HR is responsible for solving internal problems, or contacting the lecturer if this is not possible. If team members experience any problems they should be able to reach out to HR.
 - HR will also be responsible for contact with
- Chairman
 - The chairman has the responsibility to hold the weekly scrum meetings, and will therefore be the person with the responsibility to lead the meetings as well.

Knut Skoe

- Document responsible
 - The document responsible has the responsibility to keep track over all documents regarding the project, so they are easily available during the whole project.
- Delivery supervisor
 - The delivery supervisor has to hand inn all nessesary documents when the project is terminated. The supervisor also has the responsibility to keep track of the time so the documents are handed in at the right time.

Melissa Visnjic

- Tester
 - The tester has the responsibility to have an overview over all tests, topics regarding it and start or delegate if necessary, testing of the product. The tester works together with the qualityensurer to make sure that implementations to the product and the test, correlate.
- Referent + organizer

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- The referent writes reports after each meeting, and work together with the leader to plan meetings. The referent will help the leader organize what shall be done in meetings or work-sessions.

Work methodology- scrum

The group will work with an agile development method, called scrum.

Meetings

Sprint planning

- Sprints, two weeks
- The Scrum master will create a sprint backlog, a plan for the upcoming sprint. This will be the basis for the Scrum board, which the team will work from during the sprint.

Daily standup

- Will take place during the sprint, over the Discord group chat.

Sprint review

- Present the results of the sprint to the product owner/client.
- Feedback on the results.

Sprint retrospective

- Within the team.
- What worked and what did not, lessons for the next sprint.
- Improve/edit the product backlog
- Go through the tasks that were completed during the sprint.

Meeting framework

Weekly sprint meetings, 45 minutes for sprint retrospective, 1 hour and 15 minutes for sprint-planning.

Weekly meeting with student assistant.

Artifacts/Planning/Documentation

Product backlog

A complete list of the product's improvement points/outstanding tasks, sorted by priority. This is developed based on the product description and requirements. The list can be expanded as needed during the sprints and edited at the end of each sprint.

Product goal - the long-term goal for the product. The “finished” state. A new product goal can be formulated only after the previous one has been reached.

Scrum-board

- Overview of the tasks in the upcoming/ongoing sprint.

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- Columns that represent task status.
- Sprint backlog - a plan for an upcoming sprint.
 - Defines a sprint goal and pulls items from the product backlog. Backlog is the first column on the scrum board.
 - Sprint goal - defines an overarching objective for what the team wants to achieve during the sprint.

Increments/milestones

- A stretch goal, one of several that make up product goal

Procedure

Meeting

Academic quarter: as a general rule, the meeting start time is set to 15 minutes past the hour.

If you are running late or unable to attend, you must provide advance notice with a valid reason(e.g illness). Working out, “Don’t feel like it” or partying are not valid excuses. Notification should be made through the group channel on Discord, directly to the meeting leader, or through another group member who takes responsibility for informing the meeting leader as soon as possible

Meeting notice

- Work/School - Weekly - invitation through Outlook or Discord
- Social –Once a month– invitation through Outlook or Discord
- Emergency meetings – by appointment - Discord

Document management

Code will be stored and used on GitLab. Collaborative writing will happen on Google Docs and Notion. The remaining documents will be posted on Notion.

Decision making

Everyone in the group should have the opportunity to vote on significant decisions, which will take place during meetings. If a group member is not present, they should be given the opportunity to vote via Discord. Decisions that are not significant for the project do not require a vote. When possible, the vote should be conducted anonymously.

In the case of a tie:

- If there are more than two alternatives, the alternatives with the fewest votes are discarded
- If there are only two alternatives and no majority is reached:
 - The vote is repeated and all group members must vote again.
 - The decision is made by veto (see roles)

Interaction

Attendance and preparation

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All members should arrive on time, preferably early, maximum 10 minutes late. If you are going to be late or later than 10 minutes, you should notify the meeting leader with a valid reason. The group shall come prepared for meetings based on the requirements set in the last meeting, to streamline work and ensure that everyone is aware of what is being done.

Presence and engagement

Everyone should participate in the work. If someone has nothing to do, they should involve themselves by asking what needs to be done. All work done should be related to the task. Other activities will have designated break times and are therefore not allowed during meetings.

How to support one another

To create a workspace where people want to be, all group members should be open to each other's ideas and speak up if this is not followed. The work processes should be inclusive and everyone should be aware of what is being done(i.e the processes are explained to everyone in the group, no one should feel left out. There should be no interruptions during discussions. Everyone must wait for the meeting leader to give them the word if it does not happen naturally. The group should be reminded to be attentive to each other and if anyone does not seem to be enjoying themselves, they should be helped. Taking time to socialize and build a better sense of community can also contribute to a better workplace.

Disagreements and breaches of contract

Breach of contract will be recorded in a point system, where the number of points varies depending on severity, with 5 points as the upper limit.

Point with weight1:

- Failing to attend a meeting without notice and a valid reason. Arriving late (10 minutes) without a valid reason, or arriving late (10 minutes) with a valid reason but failing to notify.
- Failing to perform assigned tasks without a valid reason. Valid reasons include:
 - Unexpectedly long task duration.
 - Unforeseen tasks with a higher priority.
 - Lack of resources.
- Failure to follow procedures or assigned tasks
- Ignoring verbal instructions, repeatedly.

Point with weight 5:

- Sexual harassment and general unwanted behaviour.
- Tampering with other people's work.

If a person receives 5 points, they will be called to a joint meeting where it will be decided by a vote whether to expel said person or give them a final chance. If no agreement is reached, a lecturer or other impartial third party will be called in to help make the decision.

Signatures

Magnus Gjerstad:

Team 6 - Budgeting Application



Henrik Teksle Sandok:



Melissa Visnjic:



Knut Skoe:



Kristiane Skogvang Kolshus:

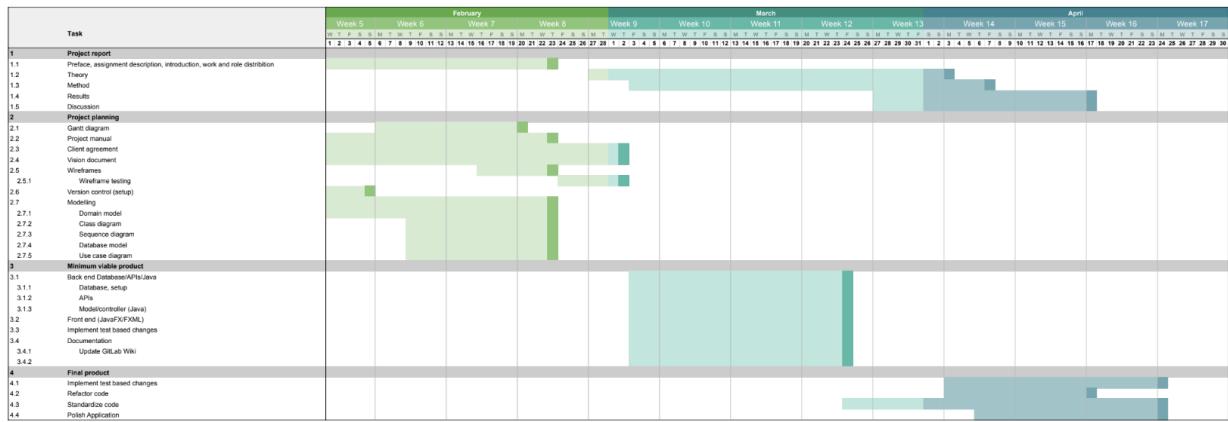


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4.2. Project plans

Project Schedule: Budgeting Application

Subject IDATT1002, NTNU



4.3. Meeting summon

4.4. Minutes

Meeting with student assistant 20. February

Agenda:

1. Review of collaboration agreement
2. Project plan

Notes:

1. Collaboration agreement is detailed and good.
2. Project plan looks good, but the team should be wary of assigning too much work.
3. Make sure not to go over the 15-minute time limit.

Next meeting with student assistant (27. February)

Time: 13:15-13:30

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Meeting with student assistant 27. February

Agenda:

1. Domain model
2. Vision document
3. Wireframe

Notes:

1. Domain model should not be too complicated, important to think of product owner and other stakeholders.
2. Vision document should follow the template, but if certain points are unnecessary they can be excluded.
3. Nothing lacks from the wireframe. Make sure to conduct usability tests.

Next meeting with student assistant (20. March)

Time: 13:15-13:30

Meeting with student assistant 20. March

Agenda:

1. User test procedure
2. MVP

Notes:

1. Good procedure for user tests.
2. The team had come far on the MVP and should remember to start writing in the report as soon as possible.

Next meeting with student assistant (27. March)

Time: 13:15-13:30

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Meeting with student assistant 17. April

Agenda:

1. Wiki
2. Report
3. Product

Notes:

1. The team should remember to go through the assignment description to ensure all documents are in place
2. Report w

Next meeting with student assistant ()

Time: 16:15-16:30

Meeting with student assistant 24. April

Agenda:

1. Report
2. Project Manual

Notes:

1. The team decided not to look at the report or project manual. Instead we got feedback on the project wiki

Next meeting with student assistant ()

Time: 16:15-16:30

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4.5. Time list w/status report

Hours by Week

Aa Week	Hours
2	5
3	16
4	33.61
5	12.33
6	5.91
7	16.07
8	24.25
9	20
10	16.7
11	18
12	37.5
13	4.24
14	12.5
15	21.57
16	86.66
17	122.65

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Hours by Category

Aa Category	Hours
Dokumentasjon/administrasjon	125.63
Programmering	195.97
Modellering	41.75
Testing	10
Formidling	1
Diverse	27.03
Devops	8
Research	45.36

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Melisa

Aa Aktivitet	Σ Uke	↗ Kategori	Σ Timer
Planlegging av prosjekt	2	📄 Dokumentasjon/administrasjon	2
Notion setup	3	📄 Dokumentasjon/administrasjon	2
Team meeting, planned low-fidelity Wireframe	3	📄 Diverse	2
Meeting with lecturer (Grethe)	3	📄 Dokumentasjon/administrasjon	0.5
Team meeting, features and modelling	3	📄 Modellering	1
Design app prototyper	4	📄 Modellering	2
Research JavaFX	4	📄 Research	3.5
Møte - modellering	4	📄 Modellering	4
Team meeting	4	📄 Diverse	3.75
Team meeting, planned roles, collaboration agreement, client	5	📄 Dokumentasjon/administrasjon	1
Research	5	📄 Research	7
Team meeting, work on wireframe	6	📄 Modellering	1.75
Møte	7	📄 Dokumentasjon/administrasjon	1
Team meeting, planned meetings and other organization	7	📄 Dokumentasjon/administrasjon	3.41
Meeting with client	7	📄 Dokumentasjon/administrasjon	1
Programmering frontend	8	📄 Programmering	3
Programmering frontend	8	📄 Programmering	3
Team meeting, work on vision document	8	📄 Diverse	3.75
Programmering backend	8	📄 Programmering	4
Fixing bugs	9	📄 Programmering	2
Team meeting, final touches on wireframe before meeting with client	9	📄 Modellering	1.75
Meeting with client	9	📄 Formidling	1
Research javaFX	10	📄 Research	3
Team meeting, made standard procedure for testing	10	📄 Diverse	2.7
Programmering i javaFX	10	📄 Programmering	5
Programmering frontend	11	📄 Programmering	4
Improvements frontend	12	📄 Modellering	2
Reasearch	14	📄 Research	3
Reasearch	14	📄 Research	2
Prog overview	15	📄 Programmering	7
Rydding og fiksing av feil	16	📄 Programmering	4
Testing	16	📄 Testing	1.5
Brukertester	16	📄 Testing	1
Cleanup	17	📄 Diverse	1
Brukertester	17	📄 Testing	3
Rapportskriving	17	📄 Dokumentasjon/administrasjon	5
Rapportskriving	17	📄 Dokumentasjon/administrasjon	4
Rapportskriving	17	📄 Dokumentasjon/administrasjon	11

Kristiane

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Aa Aktivitet	Σ Uke	↗ Kategori	Σ Timer
Møte (features, modellering)	2	↳ Dokumentasjon/administrasjon	1
Arbeid med Notion setup	3	↳ Dokumentasjon/administrasjon	2
Team meeting, planned low-fidelity Wireframe	3	↳ Diverse	2
Meeting with lecturer (Grethe)	3	↳ Dokumentasjon/administrasjon	0.5
Team meeting, features and modelling	3	↳ Modellering	1
Team meeting	4	↳ Diverse	3.75
Team meeting, planned roles, collaboration agreement, client	5	↳ Dokumentasjon/administrasjon	1
Møte (arbeidskontrakt)	5	↳ Dokumentasjon/administrasjon	1.33
Arbeid med arbeidskontrakt	5	↳ Dokumentasjon/administrasjon	2
Research	6	↳ Research	0.75
Team meeting, work on wireframe	6	↳ Modellering	1.75
Ukentlig møte	6	↳ Dokumentasjon/administrasjon	1.41
Sette opp gantt, skrive rollebeskrivelser	7	↳ Dokumentasjon/administrasjon	1.41
Team meeting, planned meetings and other organization	7	↳ Dokumentasjon/administrasjon	3.41
Møte, planlegge kundemøte	7	↳ Dokumentasjon/administrasjon	2.5
Meeting with client	7	↳ Dokumentasjon/administrasjon	1
Møte og jobbing	8	↳ Dokumentasjon/administrasjon	4.5
Team meeting, work on vision document	8	↳ Diverse	3.75
Team meeting, final touches on wireframe before meeting with client	9	↳ Modellering	1.75
Meeting with client	9	↳ Formidling	1
Jobbing med vision document	9	↳ Dokumentasjon/administrasjon	3
Jobbing med visjonsdokument	9	↳ Dokumentasjon/administrasjon	3.25
Team meeting, made standard procedure for testing	10	↳ Diverse	2.7
Report writing	11	↳ Dokumentasjon/administrasjon	6
Front end work	12	↳ Programmering	3
Front end work	13	↳ Programmering	2.83
Front end work	13	↳ Programmering	1.41
Report, Design document	14	↳ Dokumentasjon/administrasjon	4.5
Front end work	15	↳ Programmering	3.66
Front end work	15	↳ Programmering	3.91
Team meeting and work	16	↳ Devops	8
Front end work	16	↳ Programmering	4.66
Front end	16	↳ Programmering	10
Report writing	17	↳ Dokumentasjon/administrasjon	4.66
Front end work	17	↳ Programmering	10

Knut

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Aa Aktivitet	Σ Uke	↗ Kategori	Σ Timer
Team meeting, planned low-fidelity Wireframe	3	📄 Diverse	2
Meeting with lecturer (Grethe)	3	📄 Dokumentasjon/administrasjon	0.5
Team meeting, features and modelling	3	📄 Modellering	1
prototyping	4	📄 Modellering	1.5
Team meeting	4	📄 Diverse	3.75
Team meeting, planned roles, collaboration agreement, client	5	📄 Dokumentasjon/administrasjon	1
Research javaFX	6	📄 Research	1
Team meeting, work on wireframe	6	📄 Modellering	1.75
Research JavaFX	7	📄 Research	4
Team meeting, planned meetings and other organization	7	📄 Dokumentasjon/administrasjon	3.41
Meeting with client	7	📄 Dokumentasjon/administrasjon	1
Team meeting, work on vision document	8	📄 Diverse	3.75
Team meeting, final touches on wireframe before meeting with client	9	📄 Modellering	1.75
Meeting with client	9	📄 Formidling	1
Team meeting, made standard procedure for testing	10	📄 Diverse	2.7
Research JavaFx	11	📄 Research	4
Research Scene builder	12	📄 Research	7
Programming frontend	12	📄 Programmering	12
Programming frontend	12		4
Programming frontend	16	📄 Programmering	5
Report	16	📄 Dokumentasjon/administrasjon	5
Usability testing	16	📄 Testing	0.5
Report	16	📄 Dokumentasjon/administrasjon	4
Programming frontend	16	📄 Programmering	6
Programming frontend	17	📄 Programmering	7
Report	17	📄 Dokumentasjon/administrasjon	8
Usability testing	17	📄 Testing	4
Writing on the Wiki	17	📄 Dokumentasjon/administrasjon	2
Report	17	📄 Dokumentasjon/administrasjon	3
Report	17	📄 Dokumentasjon/administrasjon	8

Henrik

Team 6 - Budgeting Application

Aa Aktivitet	Σ Uke	↗ Kategori	Σ Timer
Team meeting, planned low-fidelity Wireframe	3	📄 Diverse	2
Meeting with lecturer (Grethe)	3	📄 Dokumentasjon/administrasjon	0.5
Team meeting, features and modelling	3	📄 Modellering	1
Modelling prototypes	3	📄 Modellering	1
Research on MySQL	3	📄 Research	5
Research on JavaFX	4	📄 Research	1.11
Modelling prototypes	4	📄 Modellering	2
Team meeting	4	📄 Diverse	3.75
Research on GUI in JavaFX	4	💻 Programmering	2
Research on GUI in JavaFX	5	💻 Programmering	1
Team meeting, planned roles, collaboration agreement, client	5	📄 Dokumentasjon/administrasjon	1
Team meeting, work on wireframe	6	📄 Modellering	1.75
Team meeting, planned meetings and other organization	7	📄 Dokumentasjon/administrasjon	3.41
Meeting with client	7	📄 Dokumentasjon/administrasjon	1
Work on vision document	8	📄 Dokumentasjon/administrasjon	2
Work on wireframe	8	📄 Modellering	4
Team meeting, work on vision document	8	📄 Diverse	3.75
Team meeting, final touches on wireframe before meeting with client	9	📄 Modellering	1.75
Meeting with client	9	📞 Formidling	1
Work on wireframe	9	📄 Modellering	8
Work on domain model	9	📄 Modellering	1
Team meeting, made standard procedure for testing	10	📄 Diverse	2.7
Work on application	11	💻 Programmering	3
Work on application, GUI and model	12	💻 Programmering	9.5
GUI work on application	16	💻 Programmering	1
Work on application	16	💻 Programmering	11
Work on application	16	💻 Programmering	11
Work on application	17	💻 Programmering	1
Writing on report	17	📄 Dokumentasjon/administrasjon	2
Writing on report, result chapter	17	📄 Dokumentasjon/administrasjon	4.16
Team work, report and wiki	17	📄 Diverse	9.08
Final touches to report and wiki	17		6.75

Magnus

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Aa Aktivitet	Σ Uke	↗ Kategori	Σ Timer
Planlegging av prosjekt	2	↳ Dokumentasjon/administrasjon	2
Team meeting, planned low-fidelity Wireframe	3	↳ Diverse	2
Meeting with lecturer (Grethe)	3	↳ Dokumentasjon/administrasjon	0.5
Møte med Grethe	3	↳ Dokumentasjon/administrasjon	0.5
Team meeting, features and modelling	3	↳ Modellering	1
Feature og modelleringsmøte	3	↳ Dokumentasjon/administrasjon ↳ Modellering	1
Prototyping av applikasjon	3	↳ Modellering	1
Reaserching av SQL	4	↳ Dokumentasjon/administrasjon ↳ Research	4
Prototyping av applikasjon	4	↳ Modellering	2
SQL DB Design prototyping	4	↳ Modellering	4
Planleggingsmøte - Arbeidskontrakt og design / planlegging av applikasjon	4	↳ Dokumentasjon/administrasjon ↳ Diverse ↳ Modellering	3.75
Team meeting	4	↳ Diverse	3.75
DB Design og oppsett av Gitlab	5	↳ Dokumentasjon/administrasjon ↳ Modellering	0
Team meeting, planned roles, collaboration agreement, client	5	↳ Dokumentasjon/administrasjon	1
Møte med gruppen	5	↳ Dokumentasjon/administrasjon	0
Møte med gruppen	6	↳ Dokumentasjon/administrasjon	1
Team meeting, work on wireframe	6	↳ Modellering	1.75
Team meeting, planned meetings and other organization	7	↳ Dokumentasjon/administrasjon	3.41
Planlegging til møte med BnBank	7	↳ Dokumentasjon/administrasjon	2.75
Meeting with client	7	↳ Dokumentasjon/administrasjon	1
Team meeting, work on vision document	8	↳ Diverse	3.75
Team meeting, final touches on wireframe before meeting with client	9	↳ Modellering	1.75
Meeting with client	9	↳ Formidling	1
Team meeting, made standard procedure for testing	10	↳ Diverse	2.7
Backend	10	↳ Programmering	4
Backend	10	↳ Programmering	2
Møte	11	↳ Diverse	1
Backend	14	↳ Programmering	3
Backend	15		4
Work on application	15	↳ Programmering	2
Work on application	15	↳ Programmering	1
Work on application	16	↳ Programmering	4
Work on application	16	↳ Programmering	2
Work on application	16	↳ Programmering	2
Work on application	16	↳ Programmering	4
Work on application	16	↳ Programmering	2
Work on application	17	↳ Programmering	4
Work on application	17	↳ Programmering	6
Work on application	17	↳ Programmering	6
Fixing bugs	17	↳ Programmering	13

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4.6 Issueboard

To reduce the amount of tools used for project management, the team decided to use Notion for the Issue board. The issue boards were mainly used for major milestones, to keep track of major components.

The table below, on the other hand, is an example of how smaller tasks were divided amongst team members during meetings. Here, smaller, less crucial tasks were handed out to specific team members.

The screenshot shows a Notion Issue board titled "Issue board". At the top, there are filter options: "Wireframe" (selected), "MVP", "Finished product", and a "+" button. Below the title, there is a dropdown menu set to "Milestone: Wireframe" with a "Add filter" button. The board is divided into three columns: "To Do" (1 item), "In Progress" (1 item), and "Done" (6 items). Each column has a "+ New" button at the bottom.

To Do	In Progress	Done
Påbegynne metode-del	Påbegynne teori-del	Gruppekontrakt Wireframe Assistent page Wireframe Overview page Wireframe Transaction page Wireframe Login page Visjonsdokument, 1. utkast
+ New	+ New	+ New

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Wireframe MVP Finished product +

Issue board

Milestone: MVP + Add filter

To Do	In Progress	Done
GitLab Wiki	Skrive på teori-del	JavaFX Login page
+ New	+ New	JavaFX Transaction page
		JavaFX Overview page
		JavaFX Assistent page
		Finpuss visjonsdokument
		Database, setup
		Mappestruktur, 1. utkast
		JavaFX Budget Page
		+ New

Wireframe MVP Finished product +

Issue board

Milestone: Final product + Add filter

To Do	In Progress	Done
+ New	+ New	FXML Budget Page
		FXML Overview page
		FXML Login page
		FXML assistant Page
		FXML profil page
		rapport, teori-del
		brukertesting
		gitLab Wiki
		Samle vedlegg

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"Work session" 9, 24.04.2023

Hvor	Hva	Hvem
Login	<ul style="list-style-type: none"> - Flytte error label - Hover state - Enter focus listener - Demo side - Symerti I knapper 	Magnus
Reg bruker	<ul style="list-style-type: none"> - Hover state 	Knut
Transaction	<ul style="list-style-type: none"> - Hover - Søyleoverskrift - Bytt add till egg til - Set tekst på kategori - Feilmeldinger - Hover inne på legg inn og ednre. - HjelpeTekst inne på transaksjoner - Transaksjon mellom konto (lavere pri) - Vindu forsvinne om klikket ut (lav pri) - Fast eller ikke, gjør tydeligere - Bytte plass på plassen på fast og utgift - Se også over endre fanen når den legges til. - Scrollbar finere, men har begrensninger. - Melding/beskrivelse test med brukertester hva som gir mest mening. 	Henrik

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Assistent	<ul style="list-style-type: none"> - Radio button - Forvirring i design som ser ut som knapper på assistent?? - Forklar hvorfor den ikke er klar, i rapporten. - Brukertest og forvirring rundt hva som er knapper. - Personofisering, med navn på assistenten. - Fiks scrollbar 	Melissa
Budget	<ul style="list-style-type: none"> - Fiks bug - Hover knapper - Legg in budsjett fordelt på mnd - Fiks farger - Tall i tabell - Hover over med navn og sum på kategori - Fjern hbar - Fjern ramme på scroll - Slider vibes? Ja nei? - Svar tekst? - De er knapper, gjør dette tydelig - Finger på knappene - Bytt omm inntekster og utgifter - Padding på overskift i legg til - Sett navn på legg til til tab navigering - Hjelpetekst i add - 	Kristiane

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Overview	<ul style="list-style-type: none"> - Årsoversikt - Hvordan er tabellene? De ble satt sånn, brukertestene sa dette. Til neste gang hadde vi endret dette pga lærdom i tilbakemeldingene. - Endre tabell linje fargene lysere, men med kontrasten mellom annenhver beholdt - Sorterings pil tilstede (Gikk ikke, skriv dette som en javafx til som stopper oss. Samt skriv om hvordan man bruker denne knappen i manual) - Større skrift - Større boks - Istedentfor hoverfarge endre bakgrunn eller ramme. - Kanskje høyrer kontrast mellom linjene - Scrollpane lengde før ferdig. - Sett inn rød scrollpane på hovedsiden, sjekk også dette med brukertest 	Melissa
Alt	<ul style="list-style-type: none"> - Tab navigering - Pass på forskjell på mnd info og all info - Se om info på de forskjellige slidsene samkjører. - Nødvendighetstabell - Case sensitivitet ved kategori - Skriv om språk. 	<ul style="list-style-type: none"> - Knut - Magnus - - - Magnus - - - Melissa - ????? - Lav pri

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NavBar	<ul style="list-style-type: none">- Logo- Finger med snarvei til overiew- Hoverstate ekller noe på de andre valgene- Bytt om plass på transactions og overiew- Understrek under siden man er på.	
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4.7 Design Document

Design Document - Budgeting Application

Established in the project planning phase, adjusted as necessary.

Overall Design

The image displays three screenshots of the BN Bank mobile application:

- Front Page (Pocket Plan):** A red screen featuring the BN Bank logo and the tagline "Financial Freedom". Below the logo is a button labeled "Logg inn med BankId".
- Transaction History:** Shows a list of transactions under categories like Income and Expenses. For example, under "Inntekter" (Income), there are entries for "Stipend" (8 000 kr), "Lønn" (10 000 kr), and "Gave" (200 kr). Under "Utgifter" (Expenses), there are entries for "Faste utgifter" (7 000 kr), "Mat og drikke" (3 000 kr), and "Fritidsaktiviteter" (1 000 kr). Each transaction entry includes a date (e.g., 13.02.2023) and a "Endre" (Edit) button.
- Budget Summary:** A dashboard showing budget details. It includes a "Total: 18 200" label, a breakdown of income (Stipend: 8 000 kr, Lønn: 10 000 kr, Gave: 200 kr) and expenses (Faste utgifter: 7 000 kr, Mat og drikke: 3 000 kr, Fritidsaktiviteter: 1 000 kr), and two donut charts representing the distribution of these amounts. Below this, sections for electricity (Strøm), fuel (Bensin), and inflation (Inflasjon) provide analysis and budget updates.

Pages

- Overview page (front page)
- Transaction page
- Budget page

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- My profile
- Login page

Standardized

Integration with BN Bank website

The application may at a later date be integrated into BN Bank's existing website. Design decisions should reflect this, and (when possible) follow the visual profile established by the bank's website.

Sizes

- Sizes should follow css/html standards (divisible by 16 when possible, otherwise by 4). This is done to facilitate a transition to html and CSS, to integrate the application with BN Bank's existing website.
- Window size: 1366 x 768px
- Navigation bar: 1366 x 80px
- Rounded corners: 16px

Fonts

Font, BN Bank: faricy-new-web

Colors

Red (BN Bank): #dc0428

Dark red (BN Bank): #ca0728

Light gray (BN Bank): #f0f3f5

Light blue (BN Bank): #e7edf2

Dark grey (BN Bank): #212529

Background (BN Bank): White/#ffffff

Diagrams

- [Fill in at a later date]

Interaction Design

Continuity

- Buttons
 - Interactive buttons will follow standardized design across pages when possible. Deviation from standards
- Icons
 - Icons (when used), must carry consistent meaning, across uses and pages. Examples: edit-icon, 'my profile'-icon

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- Navigation
 - The application is navigated via a navigation bar, with buttons accessing the various pages, and no drop down menus.
 - Should additional navigation prove necessary, this will be implemented in the relevant pages, and the user will be presented with ‘bread crumbs’ to inform them of their current position

Responsiveness

Buttons

- Darker background
- Bold text
- Cursor shape

Navigation bar

- Hover: Darker background, change mouse cursor, bold text
- Current page: underlined button text

Donut charts

- Accompanying list providing associated information
- Colors can not be the only source of information (see section XX - Universal design)
- Hover state
 - Amount and section name on each “slice”
- Total sum in donut center

Universal Design

- Screen reader support
- Information provided by colors should also be found elsewhere
- Sufficient contrast between text and background
- Navigation possible with keyboard

Future development

- Multiple languages
- Resizeable window
- Replace button text with icon, for “endre”-buttons and “min profil”-button
- Color blind mode, alternatively: custom colors

Team 6 - Budgeting Application

Vision Document

1. Introduction

1.1 Purpose, scope and overview

The purpose of this vision document is to provide a clear and distinct description of the type of application to be developed, so that both the development team and the customer (BN Bank) can have a systematic overview of the product. This document must also ensure that both parties are working towards the same goal.

This document describes a vision for a stand alone application that helps users with financial management. It includes information about the user environment, user needs, competitors, features, limitations, and documentation requirements. It also describes a risk analysis and a cost-benefit analysis. In addition, a user manual which describes how the application will work for customers, and how it will help them create, monitor, and adjust their budgets based on their individual needs and goals, will be added.

The document will describe the goal for the application with its basic functions and characteristics, as well as a vision for further development, especially with regard to further integration. It will also elaborate on what kind of unique features the application has that make it different from other budgeting tools on the market. In addition, the document will also have a description of the new product for the bank and their customers and how it can contribute to strengthening the bank's position in the market.

The document has been designed in connection with a project in the subject System Development - Idatt1002.

1.2 Definitions, Acronyms, and Abbreviations

Phrase	Explanation
API	Application Programming Interface
Integration	
Database	Organized electronic method for storing data
assumptions and dependencies	What the product needs to work
User environment	Where the user will use the system

2. Positioning

2.1 Business Opportunity

Some of the business opportunities that are presented to the developer team during this project are possibilities for further development and improvement of the application. In addition the developer team will gain experience from working with business operators as well as experience from working with bigger systems with full stack systems. The team will also have the opportunity to grow their connection to this client as well as leaving the possibility to grow connections with other business operators as well.

2.2 Problem Statement

The problem of BN Bank's lack of a simple solution to budgeting and managing personal finance affects their customers. The impact of which is customers lacking understanding of spending and budgeting, thereby not

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taking control of their finances, and potentially reducing trust in their bank. A successful solution would be to simplify the budgeting process, by providing an easy-to-use application that visualizes and simplifies budgeting and spending overview.

2.3 Product Position Statement

The product will primarily be developed for individuals, who seek a better understanding of their personal finances. The application is a budgeting tool that reduces abstraction by visualizing personal budgets and spending. Unlike existing products, such as DNBs “Min Økonomi”, this application will provide financial advice, based on the individual user’s spending patterns and market developments.

3. Project goals

3.1 Impact goals

Impact from development work:

- Research and analyze the market budgeting applications to identify gaps and determine the feasibility of developing a new budgeting application.
- Achieve largely positive feedback on ease of use in final round of user testing
- Gain insights into potential users’ behavior, preferences and feedback through user testing.

Provided product launch:

- Increase the amount of customers who make use of BN Bank’s personal finance tools

3.2 Result goals

By the project’s end (April 2023):

- Deliver a finished product according to this vision document.
 - The application will visualize and simplify personal economy.
 - The application will provide financial advice based on the individual user
- Deliver a project report detailing the development, containing findings from user tests, grounds for decisions made, as well as other, relevant components.

During development:

- Deliver iterations of the product at key milestones in the development.
- Conduct user testing on the product’s iterations to ensure that the budgeting application is developed, tested and launched within the designated timeline.

3.3 Process goals

- Share and exchange personal resources amongst team members
- Improve cooperation skills
- Obtain and make use of market and professional resources
- Facilitate and encourage cooperation in the group
- Networking
- Gain relevant work experience in project work for a customer
- Use feedback from user testing to improve the budgeting application’s user-friendliness and interaction design.

4. Stakeholder and User Descriptions

As a smaller bank with approximately 200 000 customers, BN Bank does not currently provide a tool for personal financial management. A such tool would help customers at BN Bank better manage their funds, improving the relation between bank and customer. Though this application might not prove relevant to all

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customers at BN Bank, a well working budgeting application could potentially attract new customers to the bank.

4.1 Market Demographics

BN Bank's existing customers constitute the primary group of potential users. However, the application will also be available to individuals who are not customers at BN Bank, further increasing the potential customer base. In conversation with representatives from BN Bank, target audience was discussed. During the recent bouts of financial unrest, the bank would see some customers seek out financial assistance from the bank, concerned with their financial situation. However, concerns were raised around those who did not seek the advice of the bank, the fear being that this group lack an understanding of their financial situation. This group may benefit from a budgeting tool that presents financial data as graphs and diagrams, rather than numbers and spreadsheets. The application would make it less daunting to increase understanding of personal finance, as well as minimize the level of abstraction associated with finance. In regards to individuals who already have an overview over their financial situation, the application would provide them with a tool to quickly and simply get an overview of budget and spending, simplifying the process they are already familiar with. During this phase of development the product decisions will largely be made to cater for a student demographic, as the developers are all students themselves, and as such already have an understanding of the demographic's needs.

4.2 Stakeholder Summary

Name	Description	Responsibilities
Development group	Students at NTNU	- Develops the application - Prepare the final report
Student assistants	Students at NTNU hired by NTNU	- Oversees the project
Teacher	Employees at NTNU	- Oversees the project

- Prepare the final report || Student assistants | Students at NTNU hired by NTNU | - Oversees the project || Teacher | Employees at NTNU | - Oversees the project |

4.3 User Summary

Name	Description	Responsibilities	Stakeholder
BN Bank	BN bank manages the final product	- Set requirements for the functionality and design of the application - Provide feedback on work done by the development team	Self-represented
Customer of BN Bank	BN banks customers who want to use the application	- None	Self-represented

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Testers	Random people that tests the application	- Tests the user experience of the application and provides feedback for further development	Self-represented
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- Provide feedback on work done by the development team | Self-represented || Customer of BN Bank | BN banks customers who want to use the application | - None | Self-represented || Testers | Random people that tests the application | - Tests the user experience of the application and provides feedback for further development | Self-represented |

4.4 User Environment

The application is used individually, with each user managing their own personal finance. This could be subject to change, as the possibility of expanding the application for families and households has been discussed. A design goal for the product is simplicity for the users, stripping the UI down to the most essential features. As a result of this each task cycle will be relatively short. The product is currently planned as a computer application, but could be expanded to include a mobile version at a later date. The application does not entail any environmental constraints, though personal finance is generally considered relatively private. In order to follow some of the financial advice provided by the financial assistant, the application can be used together with online banking to carry out transactions and payments.

4.5 Key Stakeholder or User Needs

Need	Priority	Concerns	Current Solution	Proposed Solutions
Financial control	high	The customers of BN Bank		The application will reduce the steps needed to set up a budget, thus making it easier to keep track of personal finances.
Financial initiative	high	The customers of BN Bank		The data will be presented in a more visual and clear way making it easier to understand one's finances.
Financial guidance in daily life	high	The customers of BN Bank	BN bank have in person financial guidance	The application will provide suggestions for changes based on previous spending habits and global price changes. This will help with smaller decisions that do not require direct contact with the bank

4.6 Alternatives and Competition

4.6.1 DNB

DNBs major strength over BN Bank is their active development team and development resources. As BN Bank uses Tieto Every, a consulting group, DNB have their own developers. This provides better help, resources and guiding, as we now alternatively have to contact the consultant group, instead of the key BN Bank Team. DNB also have a more developed developer portal, that provides better documentation for their PSD2 API endpoint, as well as API keys and certificates needed to access PSD2.

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4.6.2 Sparebank 1

Sparebank 1 has their own system to categorize expenses and to visualize this data. In addition they allow customers to create and categorize different savings. Their method of categorizing is however unreliable and does not always categorize correctly.

5. Product Overview

5.1 Product Perspective

The project is to be developed as its own standalone application. The application is developed for BN Bank, however regarding the scope of this project it will not be integrated into the larger BN Bank system. In the event of future integration with BN Bank the application will be developed to most similarly resemble an application as a component of BN Bank's system.

5.2 Summary of Capabilities

Supporting Features	Customer Benefit
Budgeting page	The customer will gain a sense of control over what the money goes to, as well as the possibility for better planning.
Automated assistant	Customers can save time setting up and managing their budget, and also get help to make more informed decisions about their economy
Overview page	Easy-to-understand visualization of budgeting and spending data. Customers can easily gain an understanding of their personal finance

5.4 Risk analysis

Event	Likelihood	Impact	Preventative Measures
Insufficient user tests	low	Poor design of application	Conduct user test on both the design and functionality of the application. Use the same testers to test the features. This helps simulate a customer of the bank continuously using the application.
Access to APIs	medium	Features that require these APIs will not be finished	Make sure not all features rely on access to APIs. Features that do use the APIs are not needed to develop the MVP.
Team experience			
Time constraints	High	Unfinished product	Prioritise which features are essential to the product. Focus on these features during the development of the MVP to ensure a product with basic functionality.

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Data security	high	Unable to use required data in the application	Generate own test-data, get test data or anonymised data from the client.
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5.5 Cost

As the application is developed in conjunction with a school project, the company/BNBank will not have any costs during this collaboration. They will have to donate some of their time, and may have some costs later on if they wish to properly further develop the product. Else, there is only something to gain as the developer team can make a base application that later can be used, or draft some ideas that may be to their liking.

5.6 Quantifiable and non-quantifiable benefits

There are several goals and benefits that can be achieved by making an economic/budget application, which is to be available for clients of a bank. These goals can be divided into quantifiable and non-quantifiable benefits for both the bank as the provider, but also the clients of the bank.

Quantifiable Bank: Some of the quantifiable benefits for the bank is the possibility for an **increased revenue**. The increased revenue could come from potential new customers, as the application will be limited to the costumers of this specific bank.

Another benefit could be improved **costumer satisfaction**. Offering the users of the bank a useful tool such as a budgeting application, could possibly help and improve the costumer's economy. This again could likely lead to recommendations, which could give the bank further more costumers. Keeping up the costumer's satisfaction, could also lead to loyalty to the costumer, that again would make it more likely for already existing costumers to stay in the bank and conduct further business with them.

The bank could **reduce costs** by costumers having better control over their own finances, as they would be more likely to pay their bills in time, and bank wouldn't have to send out reminders and debt collection notices, which can be costly.

Non-quantifiable Bank: A non-quantifiable benefit would be the possibility for an **improved reputation**. Making more offers for the costumers, and focus on customer satisfaction, could separate this smaller bank from the bigger ones. Generally having a good reputation "on the streets" has a lot to say as most costumers usually try new products based on their reputation, rather than finding out themselves.

There is also the possibility for **increasing trust** between the bank and the costumer, as the tool is a way to provide economical help to the costumers. This can increase the trust between the two parties as it can help the costumer view the relationship as a "partner" in their financial success, rather than just a provider of financial services.

How the application is being set up, there is a hope that the user will use the application regularly, which can **increase the engagement** the costumer has to the bank. This can lead to more exposure as the logo will show all through the app, but also an association to the bank when the colour is seen elsewhere. Also, by having an easy-to-use application, the costumer can spend more time on the application, which can lead to a deeper relationship and increased customer loyalty, as well as more use of the bank's other services.

Costumer benefits: As the customers' needs is the main goal of the application, there will naturally be some benefits for them as well.

The main selling point for the application, is for the costumer to receive tips and gain control over their own economy. This can lead to a costumer that has an **improved financial outcome**, by properly being able to organise their income, debt, credit scores and so on, as well as feel good about their economy as there will be more room for spending money on something that matters to the costumer, rather than not noticing all the less noticeable money thieves that could be robbing them from this freedom.

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By gaining control the costumer could **avoid paying unnecessary overdraft fees** because of poor planning or lack of overview. These feed can often add up over time and be costly for the costumer, as well as the bank.

By having an easy to access and use application, the costumer could **save time** on trying to organise their economy by themselves. Whether the costumer has some form for previous overview or not, it could be time saving as all economical information would be gathered in one place. This is time could be better spent with someone they love or by doing something they love. This will also leave the costumer more satisfied.

Lastly, having a proper overview over ones financial situation, could lead to **increased financial confidence and better decision making**. By gaining help from an virtual assistant, the costumer could more confidently make more well informed decisions on their own economy,

All of which will **leave the costumer satisfied** if executed correctly, which is both good for the bank as well as the costumer.

5.7 Licensing and Installation

An easy installation process is important for an application to become successful. Having to download, configure, and install multiple dependencies to run the application can be a big hassle for active users. The application need to be as simple to install as possible. As the applications main language is java, and its build with multiple dependencies like JavaFX and maven, the installation process has to be made simple before giving access to any potential user.

At the beginning of the project we discussed a fair bit about this, and how we could make the application as attractive as possible for users. Our main takeaway was that the application had to be a web-app or an IOS/android app, to be viable for our primary target group. As the project assignment dictates that we have to use Java, our customer BnBank suggested we built a prototype in Java for testing the features and user ting tang

Licensing issues can directly impact the development of the product. Many of the product features require access to different APIs. Securing access to these APIs will affect the coding and development of these features.

6. Product Features

The list below provides descriptions of the features of the system.

6.1 Check if users will go over budget

The system should be able to check the monthly or weekly economic history of the user.

Using this information the system should check if the user will go over their budget if they continue spending as they have.

6.2 Login

The user has to be able to log into the system. This will be done through a third party application in order to retrieve the necessary information

6.3 Display budget

The user gets a complete overview of their budget

6.4 Change budget

The user must be able to manually change their budget. The user wil be redirected to a page where they can change any element of their budget.

6.5 Visualized economic overview

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The system needs to check the users transactions within a certain time frame. Their income and expenses should be presented to the user graphically, sorted by category. The representations include pie charts, bubble charts and line charts.

6.6 Display all transactions

The system needs to display all transactions the user has done.

6.7 Edit transactions

If a transaction has incorrect information, the user can press a button to edit the transaction.

6.8 Overview of users' economic history

The system keeps track of the users economic history. It needs to check the dates of all the transactions and sort them together bases on specified time frames, e.g. monthly.

6.9 Manually add transactions

The user adds their transactions manually to the system. This includes adding the transaction amount, date, category and a small description.

6.10 Automatically add transactions

Transactions are gathered from users bank, this is then used to add all their transactions automatically.

6.11 Retrieve market information on prices

The system will use APIs to track the price of electricity. The system has to check the users electricity costs and check if there are cheaper options.

6.12 Advisor

A financial advisor that examines the transaction history, budget and market data and gives suggestions to make changes if necessary.

7. Constraints

- The application must be a standalone java application
- Graphical interface of the application must be made in JavaFX
- As the application is developed for BN Bank, the user interface should match the company's existing visual profile
- Databases are constrained to NTNUs own MySQL database.

8. Quality Ranges

Through two rounds of user testing the application will be iterated upon to improve both user experience and system performance. Additionally, the application will be tested by developers outside the development team, to test edge cases and eliminate potential points of failure in the finished application. Through the use of these test methods the system will be fault tolerant and usable. Furthermore, usability is improved by designing the application with simplicity in mind. Though the system behind the application will be more complex, the user is only shown what is relevant in order to use the application.

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9. Precedence and Priority

The system features are categorized by three levels of priority, divided into high, medium and low priority. Features listed as high priority are needed to develop the medium and low priority features. The high priority features are all included in the MVP.

High priority

- display budget
- change budget
- manually add transaction
- edit transaction
- visualized economic overview
- login
- fundamental financial advice

Medium priority

- Check if users will go over budget
- Advisor

Low priority

- Retrieve market information on prices
- Automatically add transactions

10. Other Product Requirements

10.1 Applicable Standards

The product is required to follow the WCAG 2.1 (Web Content Accessibility Guidelines). These guidelines will help outline the Graphical Interface of the application.

10.2 System Requirements

The application is needs these to run:

- Java JDK 17
- JavaFX
- Maven
- Git

10.3 Performance Requirements

The system should be able to handle multiple thousand customers, who potentially are logged in at the same time.

10.4 Environmental Requirements

It is important that the application can handle different environments without impacting performance or usability, such as screen size. The application should also be able to handle different levels of resource availability, such as memory or processing power. Errors need to be handled gracefully, with clear and concise error messages and a recovery process in place to prevent data loss or system crashes.

11. Documentation Requirements

11.1 User Manual

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The user manual will primarily be provided as a separate tutorial document, with instructions and screenshots from the application. In the event of further development of the application at a later date, it would be relevant to implement these instructions as a tutorial within the application itself.

The document will guide the user through the login process, as well as setting up a budget and logging expenses. When these features are developed, the user manual will also include instructions for the financial assistant, as well as connecting the user's bank accounts to the application.

11.2 Online Help

As a smaller bank, BN Bank offers less extensive customer support in comparison to competitors such as DNB and Sparebank 1. Due to this, the application will not provide an online help system, though this may be developed at a later point, should it prove necessary.

11.3 Installation Guides

The installation guide will help users install the application as a separate tutorial document. The instructions will use screenshots to help instruct the user. In the event of future integration with BN Bank's systems the installation guide will need to be revised, as it no longer will be a standalone application, but an integrated application.

11.4 Labeling and Packaging

As this application is developed in collaboration with BN Bank, the graphical interface will align with the bank's already existing profile, such as colors, fonts, dialog boxes and BN Bank's logo. The graphical interface will consist of a navigation bar, present through the application's various sub-pages, some containing donut diagrams.

11.5 Domain model

A model of the domain structure. This will give an overview of how the different entities in the system work together.

11.5 Class diagram

A diagram of the Java classes used to develop the application.

11.6 Database model

A model of the database structure. This model gives an understanding of how the database works and interacts with the rest of the application.

11.7 Use case model

The Use case model helps to give the development team an understanding of how the users may use the application.

11.8 Sequence diagram

A Sequence diagram provides an understanding of how different components communicate together during a process.

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GitLab Wiki

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User Testing

Brukertester

Dato	Alder	Kjøn n	Jobb/Studi e	Hvor	Tilbakemeldinger
25.04.23	21	Gutt	Filmproduk sjon	Budget page	Knappen der man skal endre summen ser ut som en "toggle" knapp og skaper forvirring.
					Er også utdydelig at det er en knapp I det hele tatt. Forslag var å bytte ut svartfargen med en annen som ikke skiller seg så mye fra rammen. Dette kunne oppklare I følge brukeren.
					Et annet forbedringsforslag var å kunne dobbeltklikke på fargene, tittelen og tallene på knappen, for å kunne endre disse.
					Svartfargen på knappene stikker ut og skaper forvirring og ubalanse hos bruker.
					Litt mye bruk av farger som ikke samkjører med hverandre. Eks tallene på knappen. Tabellen er bra.
					Liten kontrast I de fargene som er brukt
					Litt mye bruk av farger. Foreslo knaksje færre kategorier.
			Overview page		Litt utydelig hva de forskjellige sirkeldiagrammene viser
					Dårlige overskfifter på forbruk 1 og 2
					Vil ha en tabell som viser hvor mye som er brukt totalt på en mnd. Dette finnes, men bruker så det ikke fordi det ikke var intuitivt å scroll ned. Tydeligere scrollbar kan være en løsning.
					Visste ikke at det går ann å sortere tabellen. Ville ha piler som illustrerte det, eller en tydelig gjøring på en annen måte som viser at det er en knapp. Et annen forslag er å lage en knapp inni ved siden av teksten, eller over tabellen som det er på windows.
				Innlogging	Ikke mulig å trykke enter
					Feilmelding på innlogging sto rart
				Genereltt	Forvirrende da tallene som var satt inn ikke var realistiske
					Et symbol på min profil, da det kanskje var litt vaskelig å se den når det bare var tekst. Den var også litt langt unna de andre valgene.
25.04.23	23	Jente	Psykologi	Genereltt	Alt var intuitivt, bruker forsto til og med hvilken funksjonalitet som kunne være på steder hvor det ikke var

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					lagt til funksjonalitet enda.
					Hun sytes man kunne bruke litt lenger tid generelt på å tilpasse farger, animasjoner og generelt ting på design som hadde gjort siden penere å se på. Hun hadde forslag om animasjoner på knapper, tabeller, en mer 3d look, andre fargevalg og likte ikke det at det var så mye rødt.
25.04.23	21, 21	Jente r	Statsvitensk ap	Generelt	Utelig hvilken av sidene man er på.
				Transaksjo ner	Endre knappen fungerer ikke
					Legg til knappen var litt stor i forhold til resten
				Budsjett	Den svarte delen av knappen burde være lenger unna midten, og fargene mindre.
					For like farger
					Vil se totalsummen i charts
				Overview	Sorteringspilene kan være synlige hele tiden. Så ikke denne funksjonen i det hele tatt.
					Vil se totalsummen i charts
					Funksjonaliteten til ok ikke ok tabellen burde komme tydligere frem. Sånn som den står ville de ikke bruke den.

					Diagrammene generelt er litt utydelige hva som vises. Etter forklaring var de fornød
					De to grønne tabellene kunne man enten fjerne, eller sette sammen i et diagram som er inni et annet diagram.
					Scrollbaren var utydelig.
25.04.23	21, 21, 22	Jente r	Psykologi	Budsjett	Siden var veldig tydelig. Funksjonaliteten på knappen trodde at det skulle være toggle, men når de prøvde 1 gang så fikk de vite at det ikke var det og så ikke noe problem med designet.
					I steden for å ha en knapp på togglebutton, kan man heller ha en glideknapp hvor man endrer på summen når man drar den.
				Overview	Veldig glad i ok ikke ok tabellene.
					Sliter litt med å se sammenhengen mellom forbruk1 og 2 tabellene. Grunnen til dette var fargebruken. Et forslag var å bruke egne farger på ok ikke ok tabellene, og egne farger på de siste.
					Synlig pil til sortering på tabellen.
					Så ikke scrollbar

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						De likte linjediagrammet. Hun ene ville endret det til et søylediagramm.
						Kunne tenkt seg at det kom kategorinavn over kakedelene når man hovrer over. Både på budsjett og overview siden.
25.04.23	24	gutt	Psykologi	Generelt		Utydelig scrollbar der det finnes.
				Transaksjoner		Utydelig hva man ser på transaksjoner.
				overview		Usikker på sammenhengen mellom diagrammene. Kunne tenkt en forklaring eller noe som tydeliggjorde hvilke som henger sammen.
						Kunne tenkt seg å gjøre ok sirkeldiagrammene til en som bærer info til begge.
						Sorter etter knappen er utsatt. Han vil ha noe widows liknende
						Ville ha enda et diagram som illustrerte om man har brukt for mye eller for lite i en måned, men klarte ikke ordlegge seg på hvordan han kunne tenkt seg å ha det.
				Budsjett		Utdype hva som menes med inntekt og utgift. En mer forklarende overskift eller spmtegn med forklaring
						For like farger i diagrammet
						Et tegn som symboliserer rediger knappen
						Ville ikke at man skulle måtte scrolle i utgifter på budsjettet. Enig med at utgifter skal overst.
						Han ønsket en funksjon som gjorde det mulig å se hvor mye av budsjettet man har distribuert. Man tjener totalt 1000 kr i måned, jeg fyller inn 300 til mat. Han vil ha et felt som viser hvor mye man har igjen å fylle ut av.
						Navn på bitene i diagrammet
						Knappen ser ut som toggleswitch
25.04.23	25	jente	psykologi	Generelt		Utydelig hvilken side man er på
						Forvirring mellom transaksjoner og budsjett. Mente at begge kunne vært begge. Hvordan kan man tydeliggjøre dette? Hun hadde ikke forslag.
						Designet var plain. Som i flatt, kjedelig bruk av farger, med unntak av overview.
				Budsjett		Mente siden ble for mørk og rotete pga den svarte fargen på knappene
						uoversiktlig å ikke kunne se flere kategorier, men måtte bla nedover.
				Overview		Ser ikke scrollpane

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					så ikke knappene der man velger hvilken mnd man vil se
					Tabellen som viser mnd ble forvirrende når ikke alle dagene fra 1-30/31 vistes med en gang.
					Søylediagramm i steden for linje, med mulighet til å trykke på de ulike søylene og se en dagssoppsummering av forbruk den dagen.
25.04.23	23	Gutt	Historie	Generelt	Mangler markering som viser hvilken side man er på
					Mangler tab navigering
					Mangler noe ikon på profil
				Overview	Bedre navn på forbruk 1 og 2
					Så ikke kanppene på toppen.
					Kjedelig bakgrunn. Det var en selvsfølge at bakgrunnen ikke skulle være slik og at dette kun var en prototypfarge.
					Forvirring i hva de nederste diagrammene er.

					Mente søylediagramm hadde vært bedre enn linjediagrammer.
				Budsjett	Toggle knapper
					Forvirring i hvordan man setter inn data.
					Kunne tenkt seg et resiger ikon et sted ved knappene.
				Assistant	Kjedelig med radiobutton.
					Minner litt om toggleswitch på knappene til venstre.
25.04.23	23x3	jenter	Barnehag elærer (Ikke noe økonomisk orienterte)	Transaksjoner	Ikke tydelig at siden handler om transaksjoner. Skjinte ikke hva man skulle med siden. Litt forvirring i at de er på samme slide? De ville likt å ha 2 separerte slides for inntekter og utgifter.
					Ser ikke scrollpane
				Overview	Utydelig hva som er forskjellen mellom forbruk 1 og 2
					Tabellen burde ha piler som alltid synes eller noe knapp rundt som viser det tydligere.
					Ser ikke scrollpane
					Ser nesten ikke knappene på toppen, med minde man nevner dem.
					I nederste diagrammet var det forvirring rundt hva y aksen er. Sett inn valuta.

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					Tydeligjør at x aksen er datoer og evt dager. Eks Onsdag 1 Jan
				Budsjett	Knappene ser ut som toggle buttons. En løsning de nevnte var å gjøre fargen mindre så man ikke tror man kan slide den der.
				Generelt	Skjinte ikke hvordan ting fungerte uten å få en liten forklaring først.
07.04.23	51	Man n	Byggeni ør	Login	Mangler tab navigering mangler enter kan ikke registrer bruker lang tid på å laste, og irritert klikking
				Overview	For mange farger som gjorde at han ikke brydde seg. Det ikke ok var greie. Likte diagrammet, og skjinte at man kan sortere.
				Budsjett	For klumpete
				Transaksjoner	Likte ikke at inntekter og utgifter er splittet. Er uvant fra det banken hans har.
05.04.23	40	Kvin ne	Sykepleier	Generelt	Mye tekst, lite symboler Tab navigering enter navigering flatt design, mangler animasjoner eller noe som "vekker" siden overview "mest sannsynlig det eneste jeg vil se", men mange diagrammer uten forklaring
				Assistant	Veldig aktuellt. Kunne gjerne tenkt seg denne funksjonen
				Tillegg	Kunne tenkt seg en egen side hvor man sparer
					Et sted man kan trykke for å få en mnd rapport i en tabell
21.04.23	21	Jent e	Dataingeniø r	Budjsett	Rediger symbol som en penn. Hover med info i kakediagrammene også i overview Totalsum i midten Tydeligere farger som samkjører. Så ikke at de samkjørte siden fargene var så like. Splitte opp knappen i 2 eller 3 enkle deler i steden for en stor knapp.

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				Generelt	Lite spmtegn man kan trykke på om man ikke skjørner noe
21.04.23	19	Jente	Dataingeniør	Budsjett	Fjern fargene på togglebutton. Gjør det tydelig at det er en sammenheng mellom knappene på en annen måte.
					En egen knapp adskilt fra den som ser ut som toggle, og gjøre dette til en knapp, og resten som bare info.
21.04.23	22	Jente	Dataingeniør	Budsjett	En egen knapp adskilt fra den som ser ut som toggle, og gjøre dette til en knapp, og resten som bare info.
20.04.23	26		Jente Bevege		checkbox "Fast" bør være på bunnen eller toppen av sida
					Ordet "Fast er missvisende/mangelfult
					Ordet "Navn" er missvisende
				Budsjett	Ønsker å se om man går i pluss eller minus
					vill ha oppsumering fra transaksjoner
				Assistant	Ser ut som de røde boksene kan dras på
					Likte ikke personifisering av assistenten, ble forvirrende
					uforventet innhold, tenkte at assistant var et chattevindu til en AI

				Oversikt	ville heller ha søylediagram
					vanskelig å lese tabell, burde endre farger og fjerne skygge
					unødvendig med kontoversikt
				generelt	burde ha lik stil gjennom hele programmet
					mangler forklaring
25.04.23	21	jente	Sykologi	Transaksjoner	forsto ikke at legg til knappen var til både inntekt og utgift
					skjønte ikke hva checkbox "fast" var
					ny transaksjon burde dukke opp øverst i lista
				budsjett	Knapper ser ut som sliders
					flytt + knappen
					likte at diagramfargene var lik i knappene
				Oversikt	Syntes det generelt var uoversiktig/vanskelig å skjønne
					trenger forklaring på hva de ulike tinga er
25.04.23	21	gutt	Sykologi	Transaksjo	prøvde å legge inn transaksjon i assistenten. Skjønte ikke

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			n	hvem side han var på
				trykte på endre knappen når han skulle legge til ny transaksjon
				ønsket en separat legg til knapp for inntekt og utgift
		budsjett		trodde knappene var sliders
				skjønte ikke hva tallene var, burde legge til "kr"
		Oversikt		skjønte ikke diagram
				likte tabellen
25.04.23	19,21 ,22	jente produksjo		vil ha overskrift
				trodde eksempladataen var kategorier man skulle endre, og at man ikke kunne legge til egne transaksjoner
			oversikt	formye på sida
				skjønte ikke hva forbruk 1 og 2 var
				trenger forklaring på hva de ulike tinga er
		Budsjett		mangler forklaring
			generelt	for mye trykking

Fellesfaktorer

Hvor	Hva	Løsningsforslag	Prioritet	Endret?
Budget Page	Toggle switch knapp inntrykk		// //	
	Ikke intrykk av at det er en knapp	** Bytte ut sortfargen med en annen som ikke skiller seg så mye fra resten av knappen. **Mindre buet kanter kunne hjelpe	XXX	
	Mer funksjonalitet ved å kunne dobbelttrykke på farge, tittel eller sum for å endre dette.			
	Liker ikke den sorte fargen på knappene			
	Færre kolliderende farger			
	Liten kontrast i fargene som er brukt		/	
	For mye bruk av sterke farger i diagram	**Færre farger/kategorier		ok

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	Magler totalsum I charts			
	Vil ha noe som viser hvor mye penger man har å distribuere og hvor mye man har igjen etter å ha fordelt pengene utover kategorier underveis.		(GOOD)	
	flytt +(legg til) knapp			ok
	legge til kr på tall			
Overview	Utydelig hva sirkeldiagrammene viser		//	
	Dårlig overskift på forbruk I og 2			
	Tydeliggjør at tabellen kan sorteres	**alltid synlige piler **En tydelig knapp **noe liknende som på windows system	/	
	Magler totalsum I charts			
	Poenget med ok charts må bedre frem, hvis ikke vil de ikke brukes.			
	Samle okdiagrammene til 1 diagram			
	Heller søylediagram enn linjediagram, hvor man kan trykke på søylene og se oversikt over bruken den dagen			
	Enda et diagram som tydeliggjorde om man har bruk for mye eller for lite den mnd.			
	Utydelig hva x og y knappene holder på av data.	Y = valuta og x = onsdag 4 april		
	formye på sida			
Generellt	Lite tydelig scrollbar		/	
	Enter navigering			
	Tab navigering		/	
	Forvirring rundt at tallene i tabellen ikke var realistiske		/	
	Symbol på min profil			

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	Min profil var for langt til høyre			
	Finere design med bedre farger, animasjoner, 3d look, mindre rødt			
	Utydelig hvilken side man er på			
	Et spm tegn rundt om kring som forklarer hvordan det skal brukes		//	
	Enda en side til sparingsmål.			
	for mye trykking			
Login	Rar feilmelding. Sto feil på siden			
	Mangler passordkrav			
	Lang tid på innlastning, fører til irritert klikking			
Transaksjoner	Legg til knappen var for stor i forhold til de andre knappene.			
	bedre navn givning			ok
	ny transaksjon må komme øverst i lista			
Assistant	Kjedelig med radiobuttons			
	Togglebuttons liknende knapper			

Totalt	18	brukertester,
Fordelt på	24	brukere

X	Meget viktig	
/	Nr 2	
	nevnt relativt ofte	
	nevnt av få, mer enn 2	
	Aktuelt, men lite nevnt	
	Lite nevnt, og ikke aktuelt	Ble ikke skrevet opp.

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Project structure

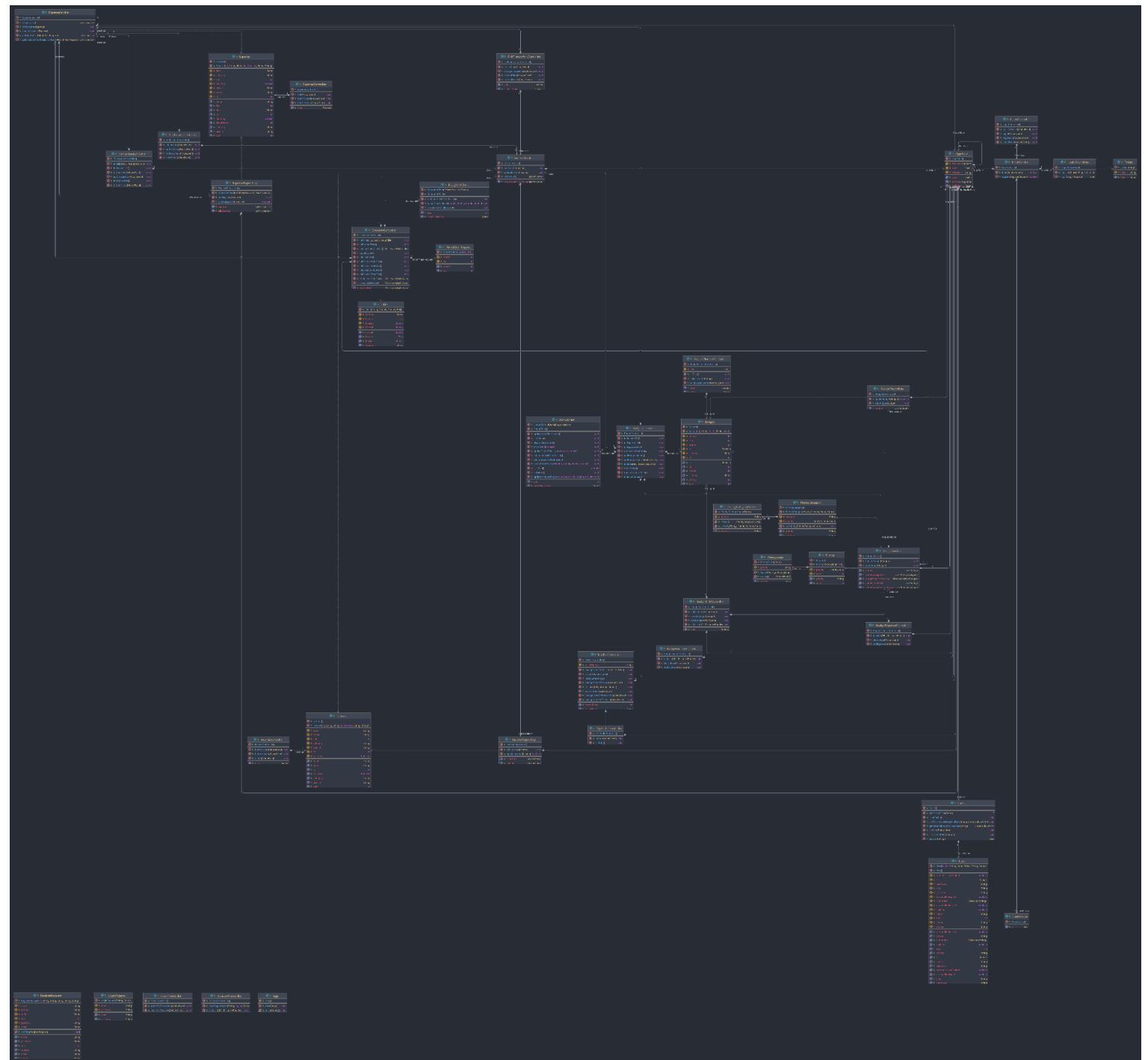
Application

```
budgetplan
├── Backend17.jar
├── Backend19.jar
├── demo.iml
├── dependency-reduced-pom.xml
├── Endpoints.txt
├── NewBackend19.jar
└── pom.xml
src
└── main
    └── java
        └── no
            └── idatt1002
                ├── App.java
                ├── AppState.java
                └── controller
                    ├── Assistent
                    │   └── AssistentController.java
                    ├── Budget
                    │   ├── BudgetController.java
                    │   ├── BudgetEditController.java
                    │   ├── BudgetElementController.java
                    │   ├── BudgetExpenseController.java
                    │   └── BudgetIncomeController.java
                    ├── LoginController.java
                    ├── MyProfileController.java
                    ├── NavBarController.java
                    ├── Overview
                    │   └── OverviewController.java
                    │       └── Table.java
                    ├── SceneController.java
                    └── Transaction
                        ├── AddIncomeController.java
                        ├── EditTransactionController.java
                        ├── ExpenseController.java
                        ├── IncomeController.java
                        └── TransactionController.java
                ├── DonutChart.java
                ├── DoughnutChart.java
                └── Model
                    ├── Budget.java
                    ├── Expense.java
                    ├── Income.java
                    ├── Priority.java
                    ├── PriorityCategory.java
                    ├── PrioritySum.java
                    ├── Token.java
                    └── User.java
            └── LineChart.css
            └── Navbar.css
```

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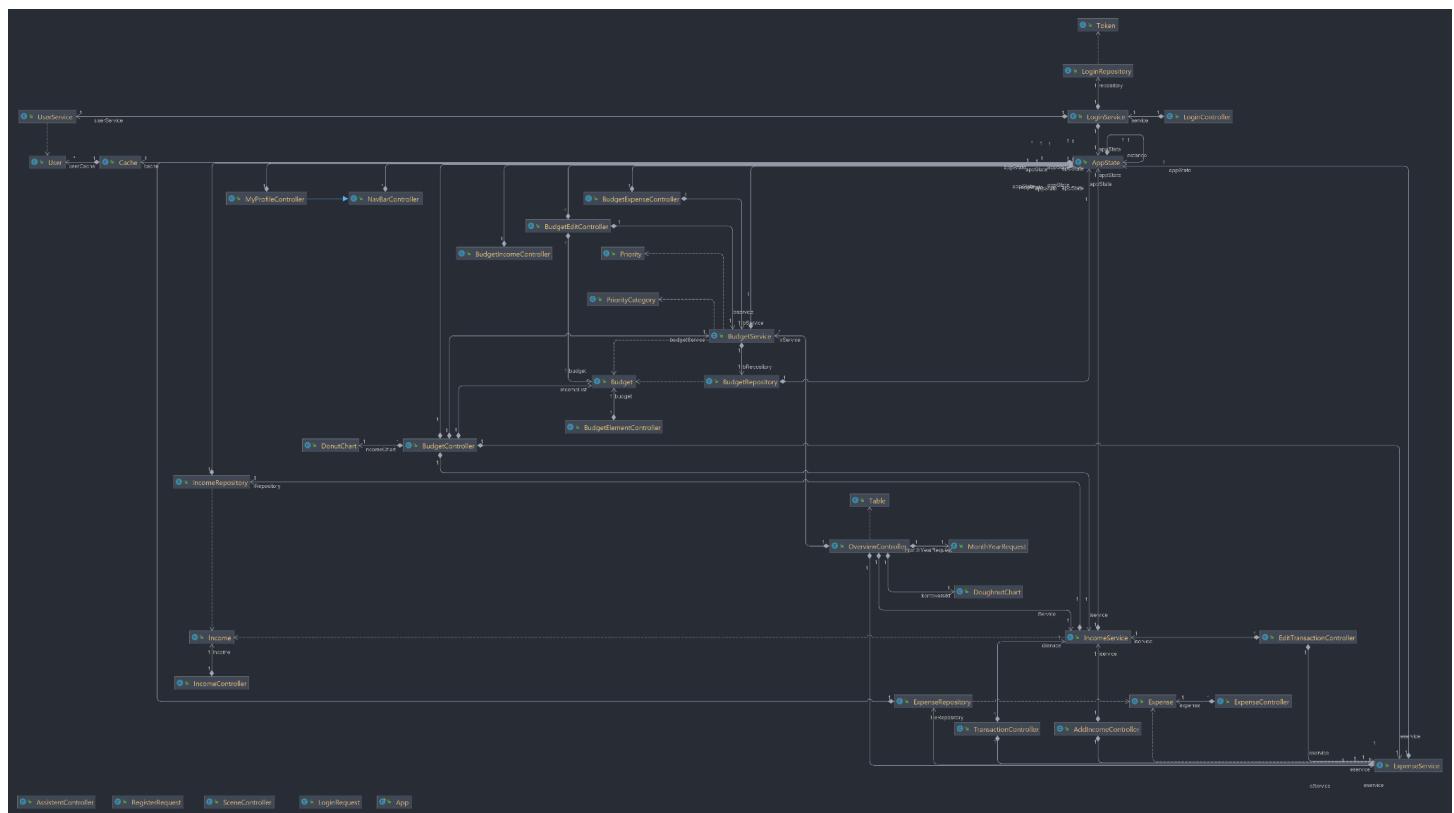
Class diagram

Class diagram containing all project classes, with attributes and methods.

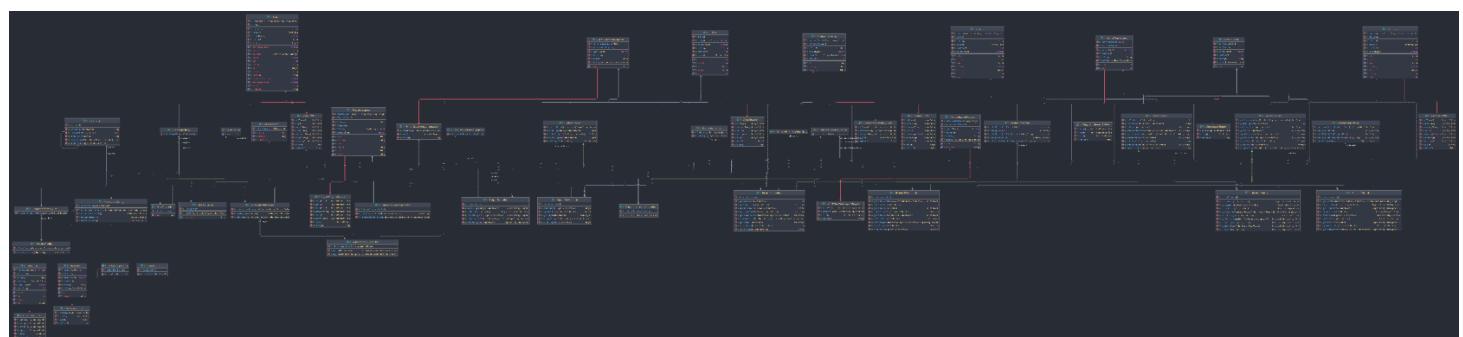


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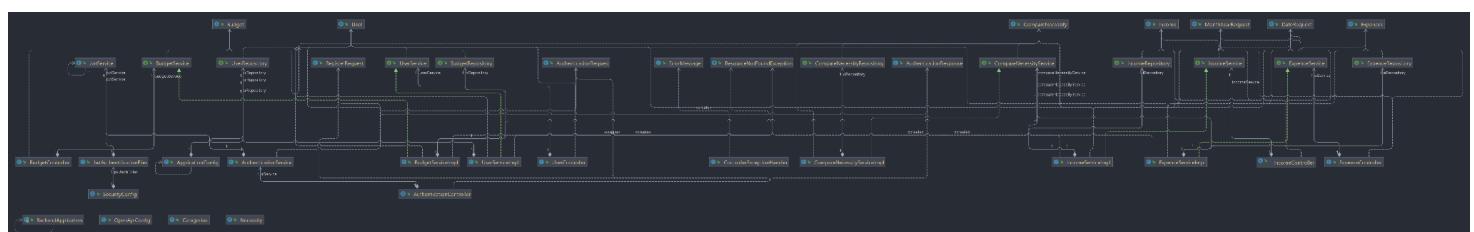
Class diagram containing all project classes, without attributes and methods.



Back-end class diagram containing all project classes, with attributes and methods.



Class diagram containing all project classes, without attributes and methods



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Presistance

Database model

expenses		Budget		income	
expence_id	integer	id	integer	expence_id	integer
name	varchar	category	varchar(255)	name	varchar
sum	integer	sum	integer	sum	integer
recurring	bit	user_id	interger	recurring	bit
date	date	ie	bit	date	date
user_id	integer	priority	0	user_id	integer
category	varchar			category	varchar

user	
id	integer
name	varchar
age	varchar
email	varchar
password	hash
phone	varchar
address	varchar

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Source code

<https://gitlab.stud.idi.ntnu.no/group-6/budgetplan/-/tree/Application>

Team 6 - Budgeting Application

Installation manual

This guide shows how one can install and use the application. The application is split up into two branches, one for the Application, and one for the Backend.

In a production build, the backend is supposed to be hosted by a server. But for the sake of the project assignment and sensors, we have decided not to.

For the application to run, you need to run both the backend, and Application.

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- [Database URL](#)
- [Prerequisites:](#)
 - [Important: The Backend has to be run from the NTNU network.](#)
- [Install using Git](#)
 - [SSH](#)
 - [HTTPS](#)
- [Start the backend:](#)
- [Build the application](#)
- [Backend](#)

Test user for application

- olanormann@gmail.com
- [bigstrongpassword123](#)
- email: sander@gmail.com
- password: 123

Database URL

```
mysql://mysql.stud.ntnu.no/magngje_personal_budget_db
```

Prerequisites:

To install and run the application you need the following

Important: The Backend has to be run from the NTNU network.

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If you are not on the network, follow NTNUs guide for installing an [VPN](#)

- [Java JDK 17](#)
- [Java FX](#)
- [Maven](#)
- [Git](#)

You will also need access to the git repository

Install using Git

1. Open CMD, or on Mac / Linux, open the terminal.
2. Use the command `cd` to move to a designated folder where you want the application located. You can also use the command `ls` in Mac / Linux, or `dir` in Windows, to list directories in the path you are in.
3. Download the files using SSH or HTTPS with access token, using the following commands:

SSH

```
Git clone git@gitlab.stud.idi.ntnu.no:group-6/budgetplan.git
```

HTTPS

```
Git clone  
https://<username>:<personal_token>@gitlab.stud.idi.ntnu.no/group-6/budgetplan  
.git
```

Start the backend:

The backend can be run by moving into the downloaded BudgetPlan folder using `cd`, and run using the following command

```
java -jar Backend17.jar
```

- To modify or to test out the backend further, you can checkout the Backend branch, using the command:
 - `git checkout Backend`
 - To run the backend from the Backend Branch, run the command - `mvn spring-boot:run`
 - [See further backend configuration](#)

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Build the application

To build and run the application, use the following command in a new terminal window `mvn javafx:run`

To build the application to a Jar file, use the following command `mvn clean package` The packaged jar file will now be located in the `Target` folder

To run the packaged jar file, `cd` into the target folder, and write `java -jar budgetPlan-1.0-jar-with-dependencies.jar`

Important: Remember to add JavaFX to your pc's environment. If not, use the following command when starting the application `java --module-path /path/to/JavaFX/lib --add-modules javafx.controls,javafx.fxml -jar budgetPlan-1.0-jar-with-dependencies.jar`

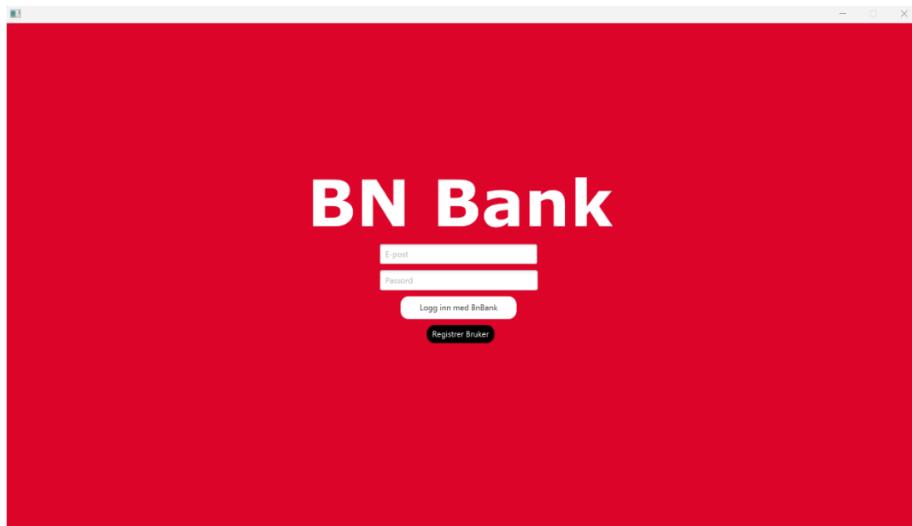
Backend

The backend has multiple REST endpoints that are documented and can be tested by opening up <http://localhost:8080/api/v1/swagger-ui/index.html#> when running the backend.

The Backend Branch also has pre-configured PostMan collections that can be run to test the endpoints. [see](#)

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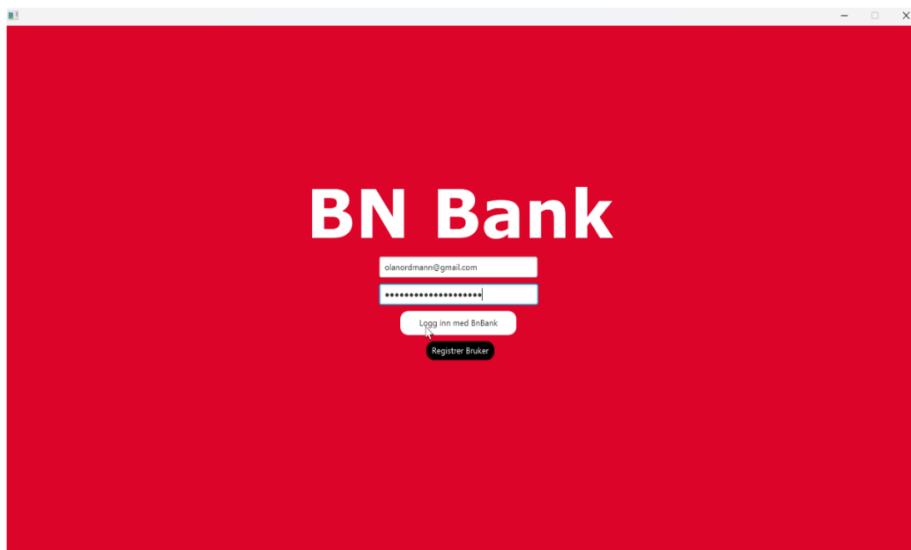


To login to the system, you need to write a valid email and password. Move the mouse over to the field labelled "E-post", click it by pressing the left mouse button and write the email.

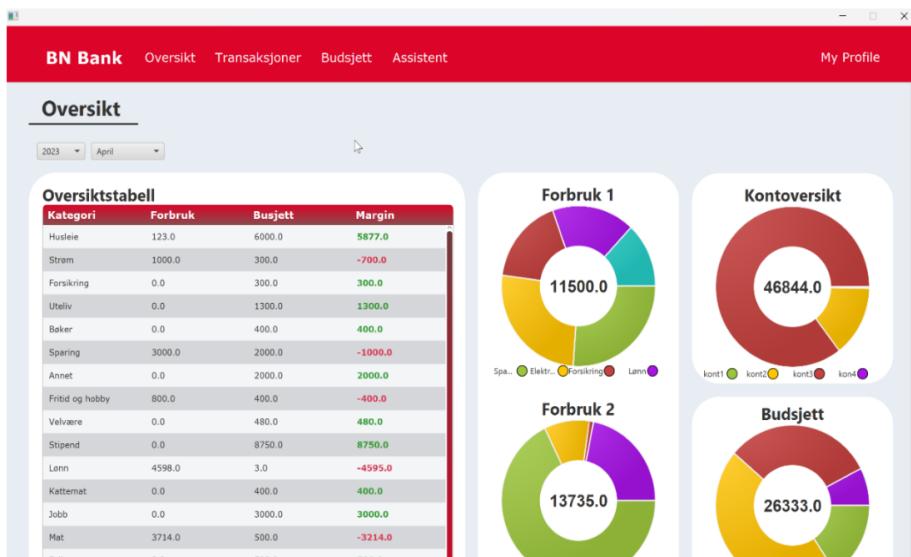


Move the mouse over to the field labelled "Passord", click it by pressing the left mouse button and write the password.

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Put the mouse over the button «Logg inn med BnBank» and click it with the left mouse button. This will take you to the overview page.



This is the overview page.

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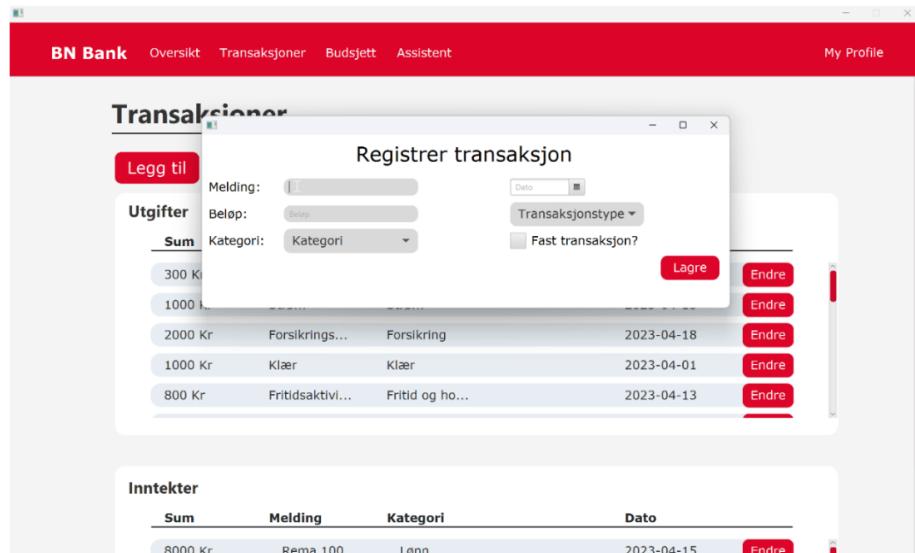
The screenshot shows the BN Bank budgeting application interface. At the top, there is a red header bar with the logo 'BN Bank' and navigation links: 'Oversikt', 'Transaksjoner', 'Budsjett', and 'Assistent'. On the right side of the header is a link 'My Profile'. Below the header, the main content area has a title 'Oversikt'. It includes a date selector showing '2023' and 'April'. To the left is a table titled 'Oversiktstabell' with columns: 'Kategori', 'Forbruk', 'Budsjett', and 'Margin'. The table lists various categories like 'Sparing', 'Mat', 'Fritid og hobby', etc., with their respective values. A small triangle icon is visible next to the 'Margin' column header. To the right of the table are four circular charts: 'Forbruk 1' (11500.0), 'Kontoversikt' (46844.0), 'Forbruk 2' (13735.0), and 'Budsjett' (26333.0). Each chart has a legend below it.

Move the mouse over to the text "Margin" and click it by pressing the left mouse button to sort the "Overview table" by margin. The triangle next to the text "Margin" is pointed up or down to show when it is sorted ascending or descending. By moving the mouse over to the text "Budsjett", "Forbruk" or "Kategori" to sort the table by these.

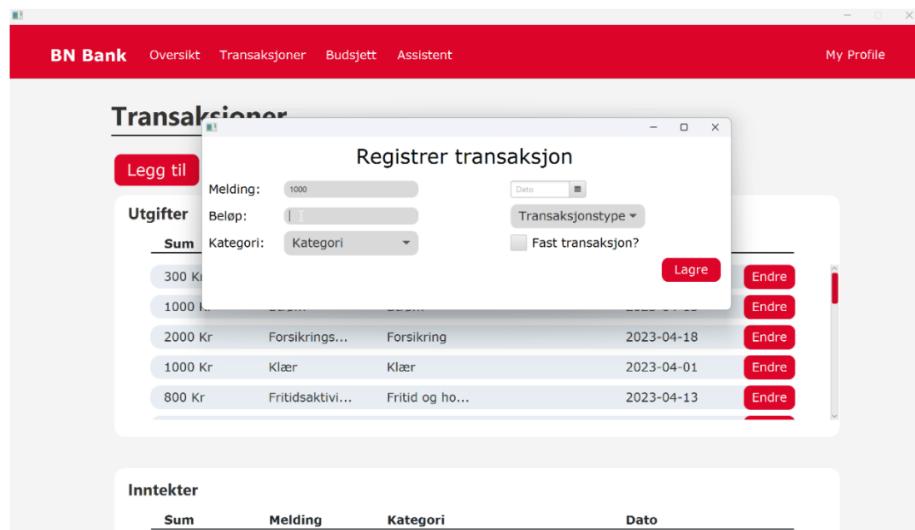
This screenshot is similar to the previous one, showing the 'Oversikt' page of the BN Bank budgeting application. The main difference is the presence of a vertical scroll bar on the right side of the main content area, indicating that the page can be scrolled vertically. The table 'Oversiktstabell' and the four circular charts ('Forbruk 1', 'Kontoversikt', 'Forbruk 2', 'Budsjett') are identical to the first screenshot.

Move the mouse over the scroll bar on the right side of the page, click and hold it down by clicking and holding the left mouse button. You can drag this down or up to move the page.

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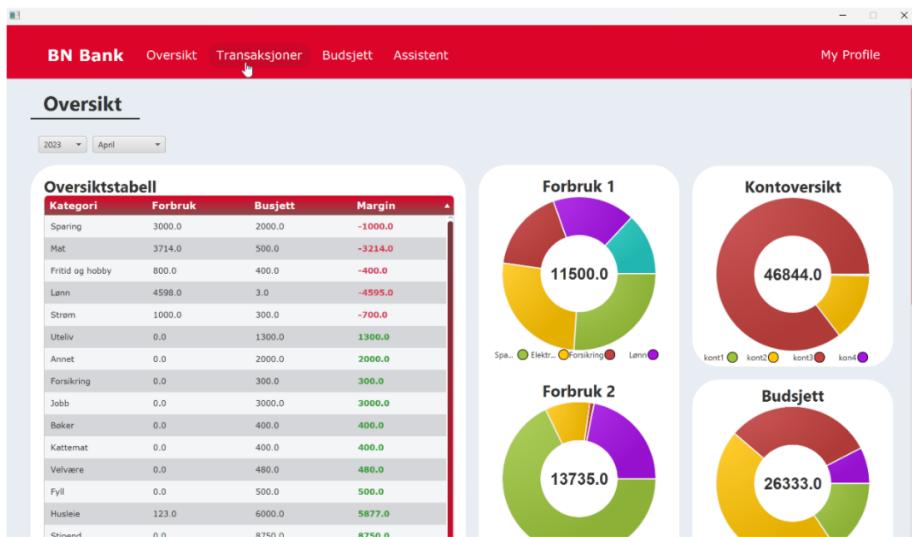


Click the field labelled “Melding” by moving the mouse over to it and pressing the left mouse button to add a description to the transaction. This description could for example be where the transaction took place.

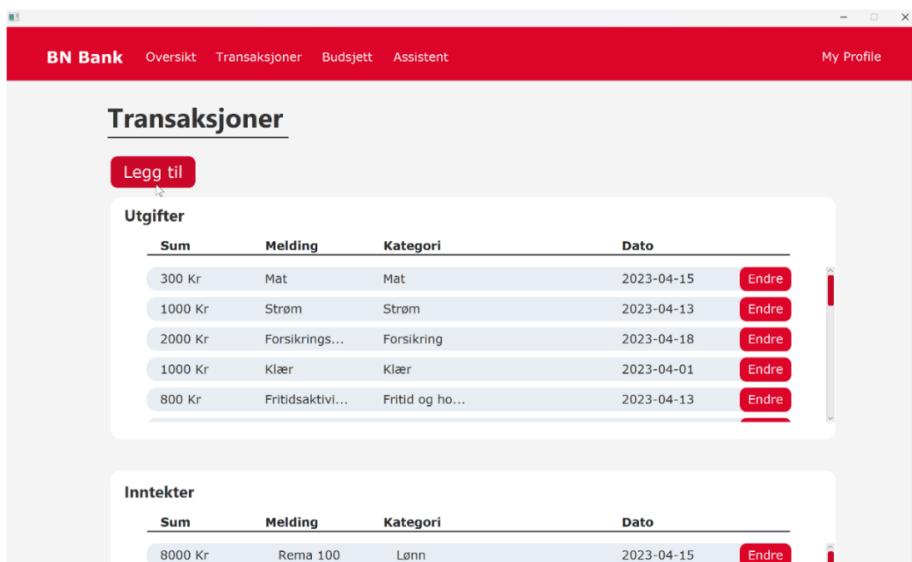


Click the field labelled “Beløp” by moving the mouse over to it and pressing the left mouse button to add the transaction amount.

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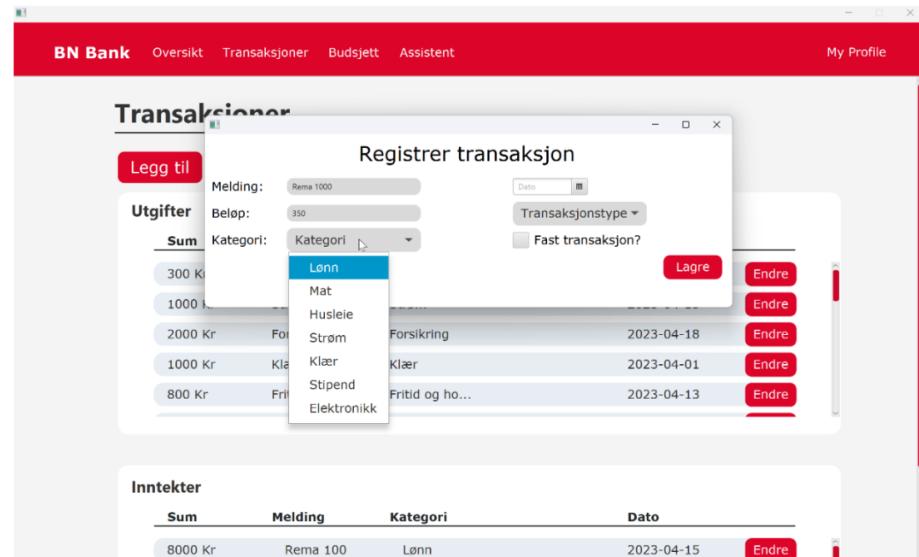


Move the mouse over to the text "Transaksjoner" in the top. Press it by clicking down the left mouse button. This will take you to the transactions page.

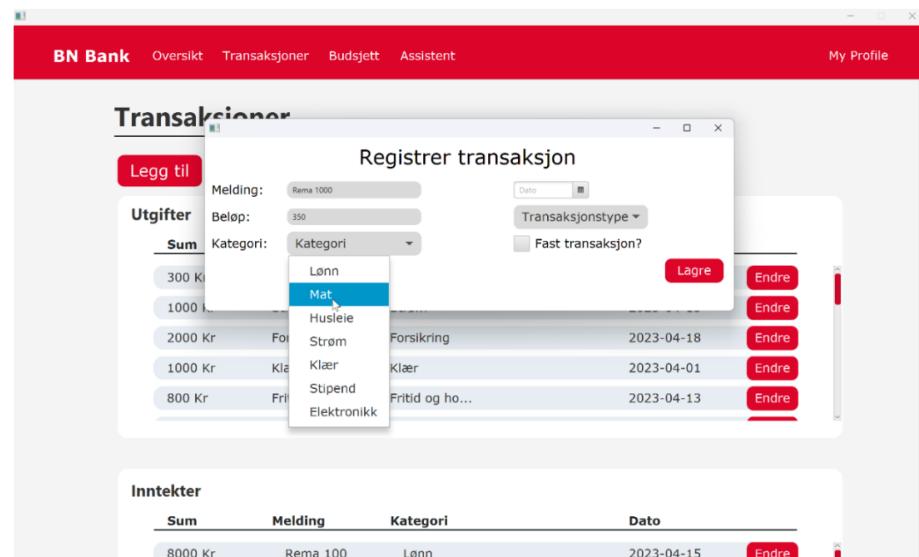


You are now at the transactions page. To add a transaction move the mouse over to the button with the text "Legg til" and click it by pressing the left mouse button.

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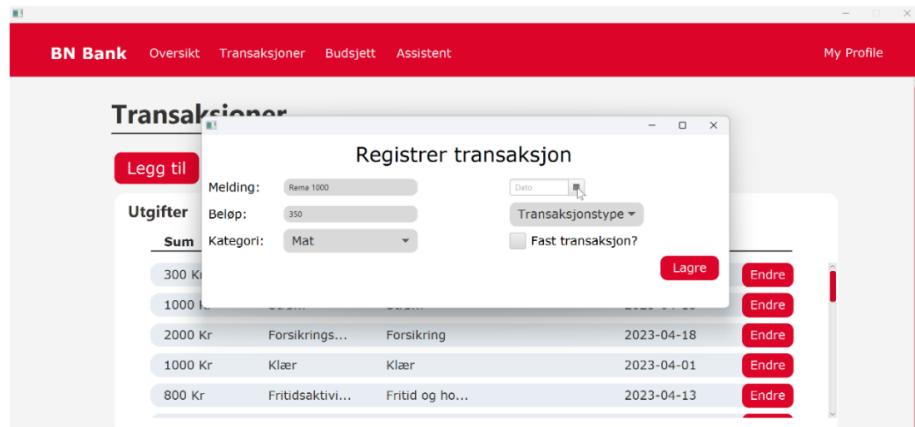


To select the category move the mouse over to the bar labelled "Kategori" and click it by pressing the left mouse button. A list will drop down and you can move your mouse over any of these items.



Click the left mouse button over the category you wish to select it.

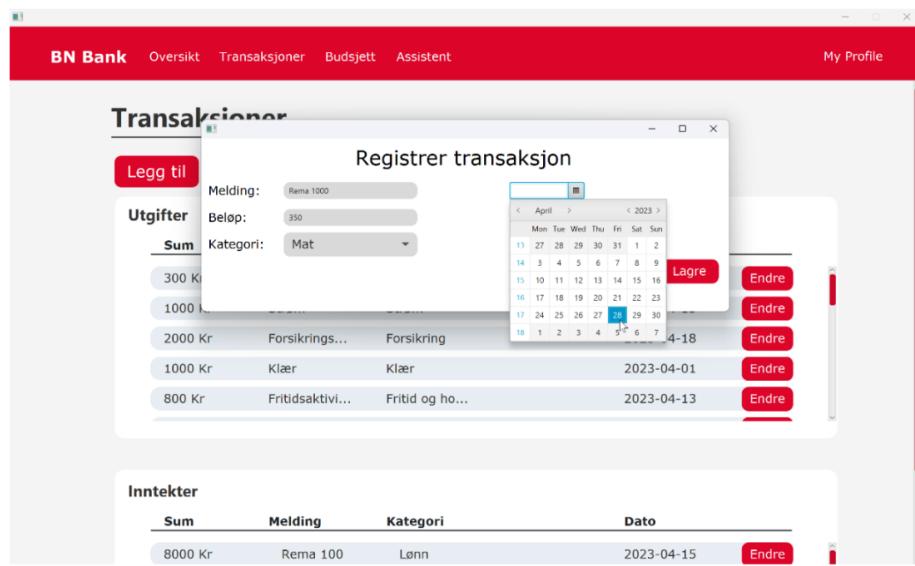
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Inntekter

Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

Move the mouse over to the calendar symbol and click it by pressing the left mouse button to choose the date the transaction took place.

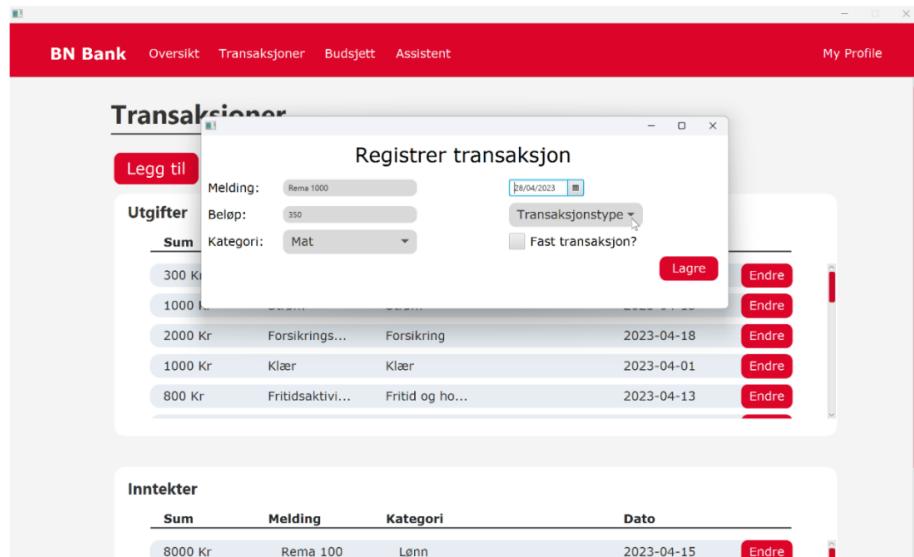


Inntekter

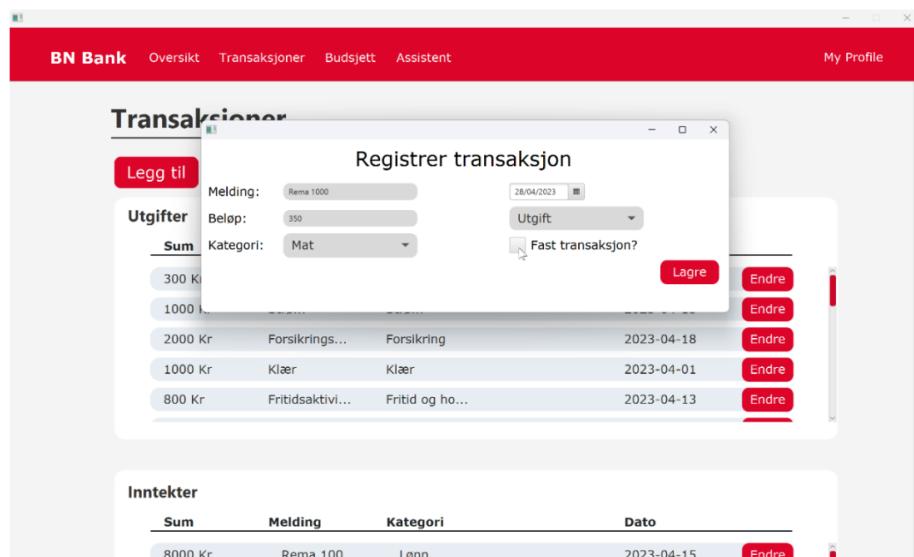
Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

Move the mouse over to the date you wish to select. To select it click the left mouse button.

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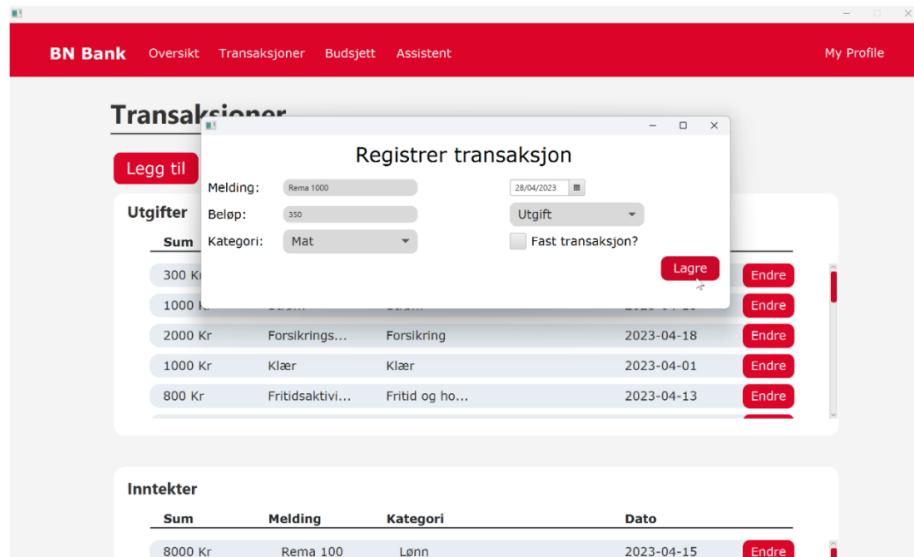


Move the mouse over to the bar labelled “Transaksjonstype” to choose between income and expense. A list will drop down. Move the mouse over to either “Utgift” or “Inntekt” and click the one you wish to select by pressing the left mouse button.

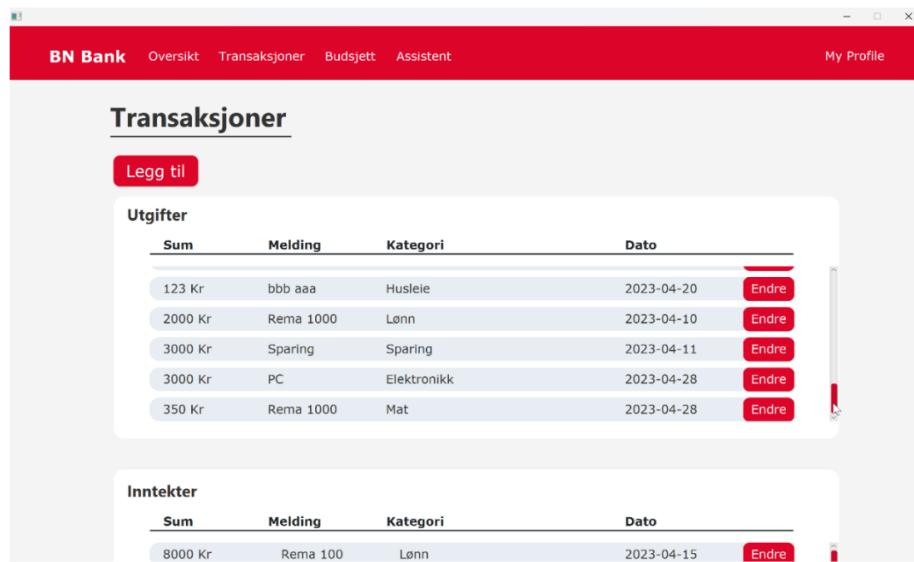


If you want to make it the transactions reoccurring move the mouse over to the box next to the text “Fast transaksjon” and press it by clicking the left mouse button.

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To save the transaction move the mouse over to the button with the text “Lagre” and press it by clicking the left mouse button.



To scroll through the transactions, you have two options. 1. Move the mouse over to the scroll bar to the right in the white boxes. click and hold by pressing the left mouse button and holding it down. You can now move the mouse up and down to scroll through the transactions. 2. Move the mouse to the middle of the white box and use the mouse wheel to scroll through the transactions.

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The screenshot shows the BN Bank budgeting application interface. At the top, there is a red header bar with the BN Bank logo and navigation links: 'Oversikt', 'Transaksjoner', 'Budsjett', and 'Assistent'. On the right side of the header, it says 'My Profile'. Below the header, the main content area has a title 'Transaksjoner' and a 'Legg til' (Add) button. There are two sections: 'Utgifter' (Expenses) and 'Inntekter' (Income). The 'Utgifter' section contains five rows of transaction data:

Sum	Melding	Kategori	Dato	Action
123 Kr	bbb aaa	Husleie	2023-04-20	Endre
2000 Kr	Rema 1000	Lønn	2023-04-10	Endre
3000 Kr	Sparing	Sparing	2023-04-11	Endre
3000 Kr	PC	Elektronikk	2023-04-28	Endre
350 Kr	Rema 1000	Mat	2023-04-28	Endre

The 'Inntekter' section contains one row of transaction data:

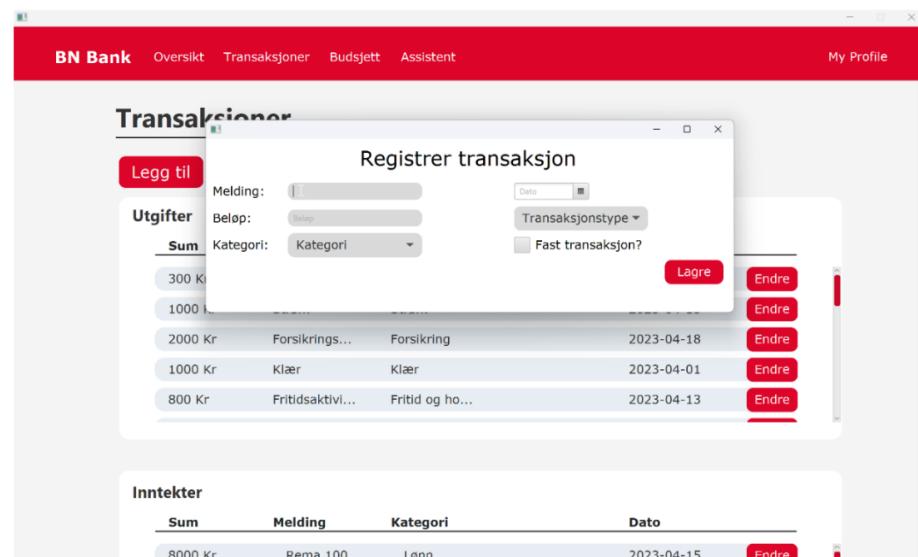
Sum	Melding	Kategori	Dato	Action
8000 Kr	Rema 100	Lønn	2023-04-15	Endre

To edit a transaction, move the mouse to the button with the text "Endre" of the transaction you want to edit. Click the button by pressing the left mouse button.

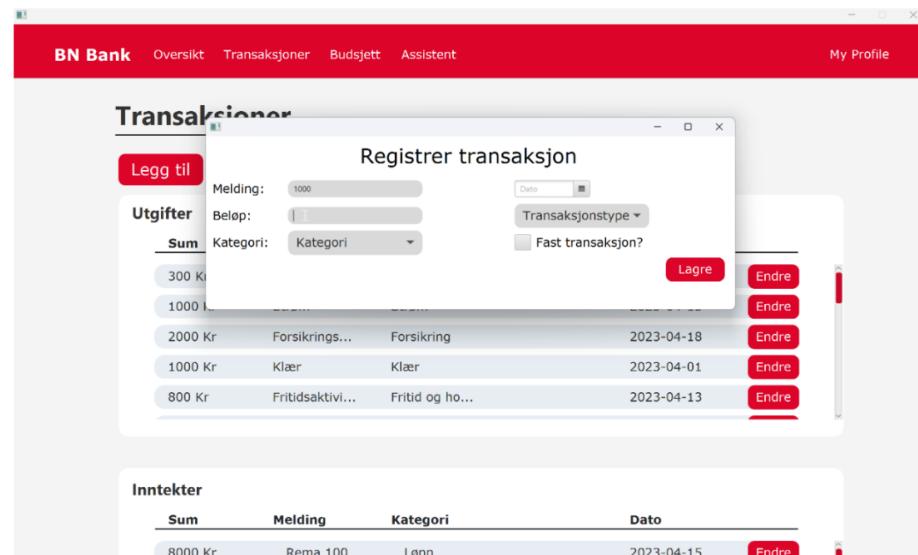
The screenshot shows the BN Bank budgeting application interface with a modal dialog box titled 'Endre transaksjon' (Edit transaction) overlaid on the transaction list. The dialog contains fields for 'Melding' (Message), 'Beløp' (Amount), 'Kategori' (Category), and a dropdown menu for 'Fast transaksjon?'. The transaction list below shows the same data as the previous screenshot, with the 'Endre' button for the first expense transaction highlighted with a red box. The 'Inntekter' section is also visible at the bottom.

Click the field you want to edit by moving the mouse over to it and pressing the left mouse button. You can now set the new value.

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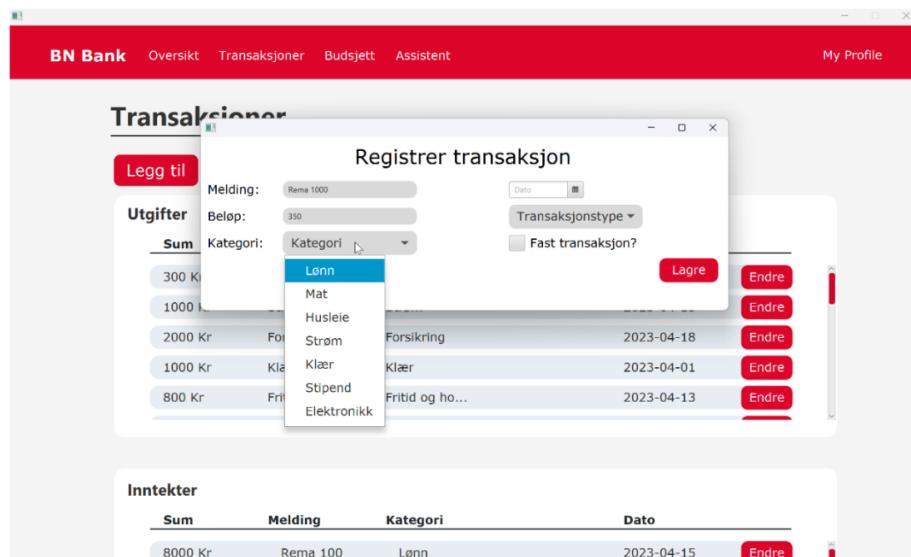


Click the field labelled “Melding” by moving the mouse over to it and pressing the left mouse button to add a description to the transaction. This description could for example be where the transaction took place.

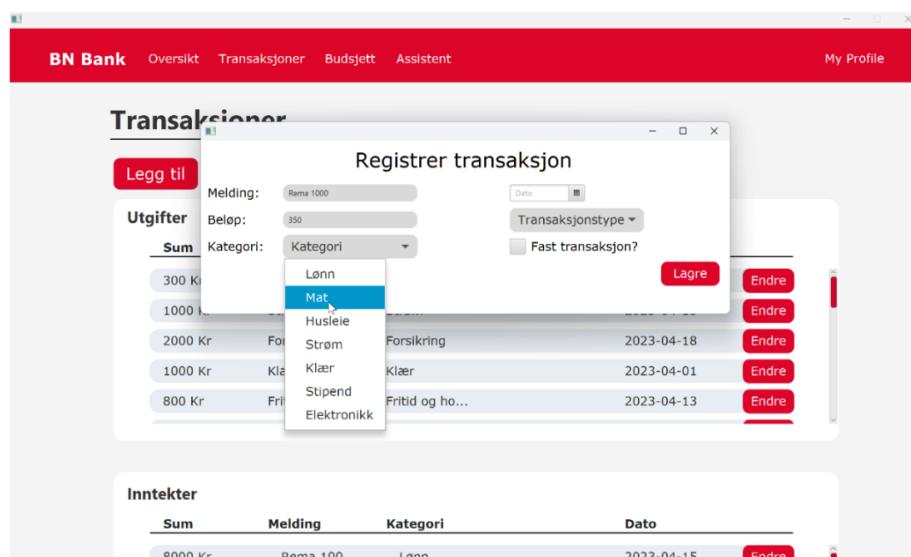


Click the field labelled “Beløp” by moving the mouse over to it and pressing the left mouse button to add the transaction amount.

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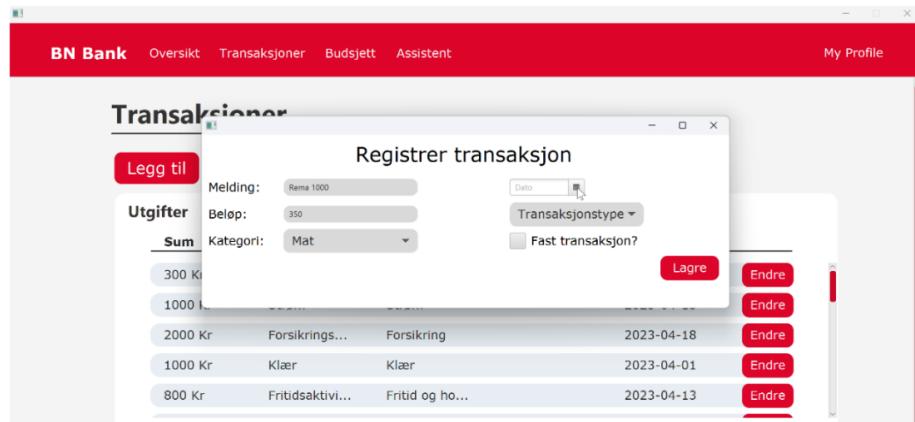


To select the category move the mouse over to the bar labelled "Kategori" and click it by pressing the left mouse button. A list will drop down and you can move your mouse over any of these items.



Click the left mouse button over the category you wish to select it.

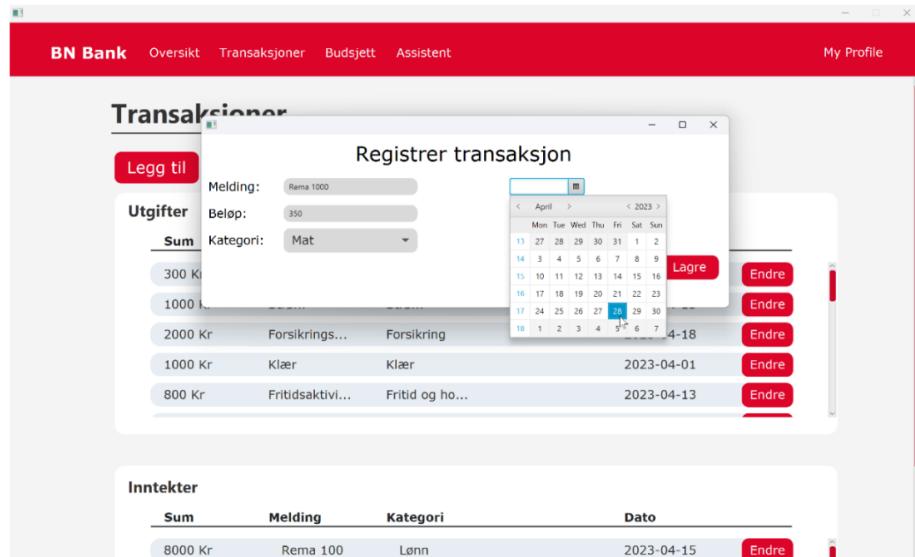
Team 6 - Budgeting Application



Inntekter

Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

Move the mouse over to the calendar symbol and click it by pressing the left mouse button to choose the date the transaction took place.

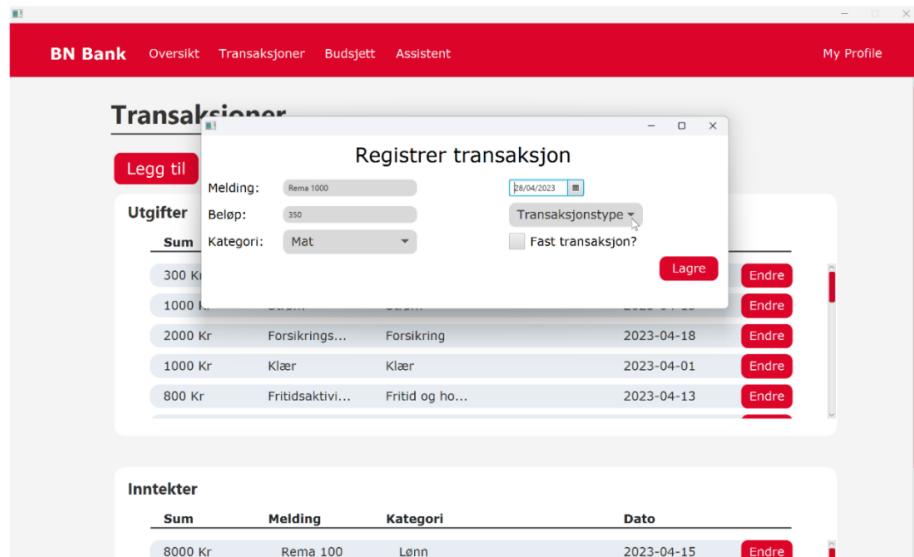


Inntekter

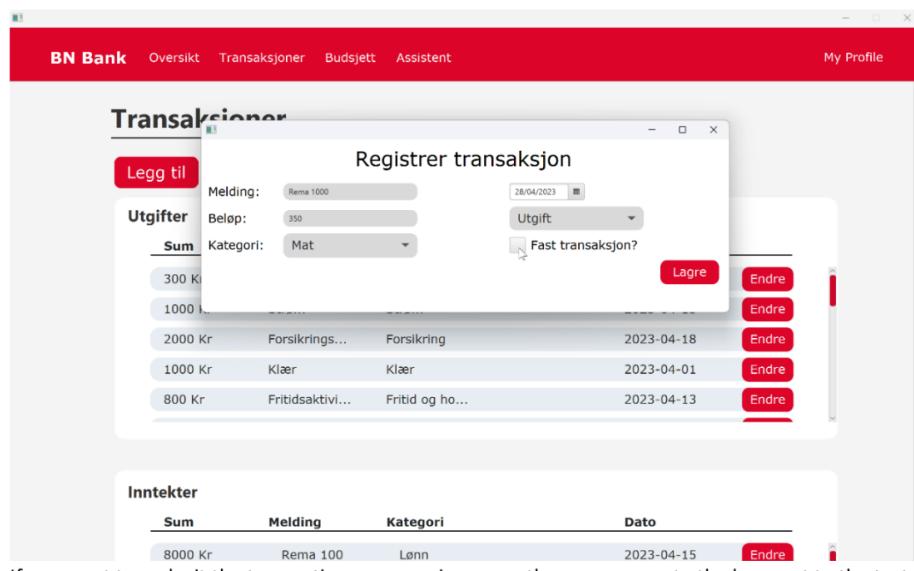
Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

Move the mouse over to the date you wish to select. To select it click the left mouse button.

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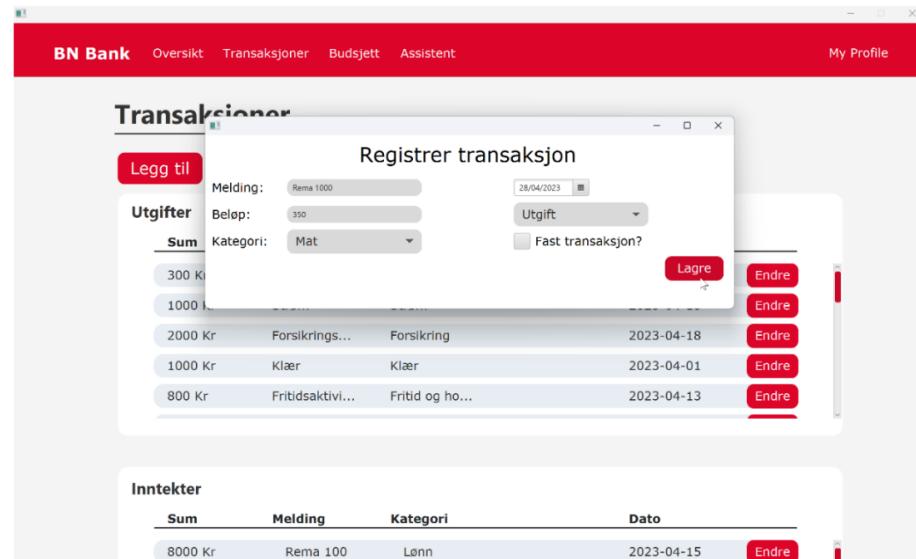


Move the mouse over to the bar labelled “Transaksjonstype” to choose between income and expense. A list will drop down. Move the mouse over to either “Utgift” or “Inntekt” and click the one you wish to select by pressing the left mouse button.

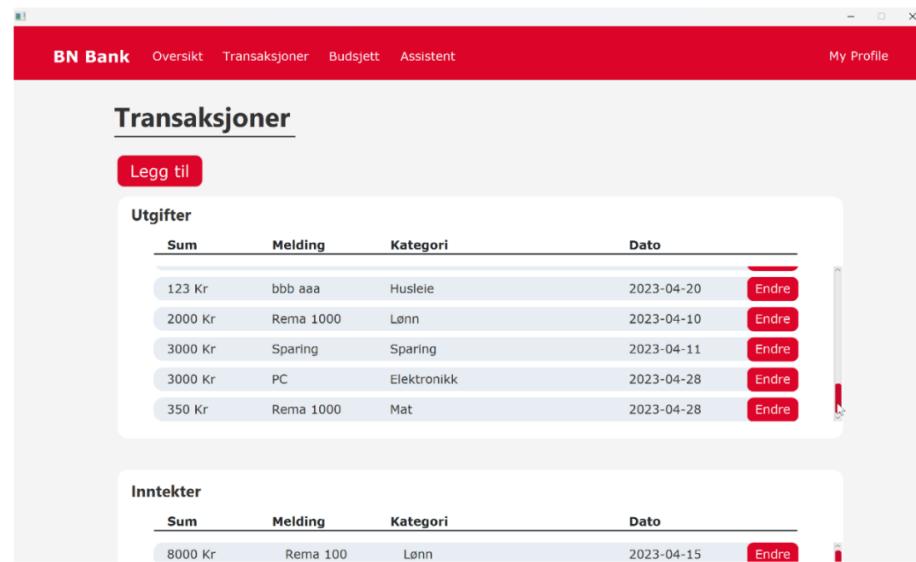


If you want to make it the transactions reoccurring move the mouse over to the box next to the text “Fast transaksjon” and press it by clicking the left mouse button.

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To save the transaction move the mouse over to the button with the text “Lagre” and press it by clicking the left mouse button.



To scroll through the transactions, you have two options. 1. Move the mouse over to the scroll bar to the right in the white boxes. click and hold by pressing the left mouse button and holding it down. You can now move the mouse up and down to scroll through the transactions. 2. Move the mouse to the middle of the white box and use the mouse wheel to scroll through the transactions.

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The screenshot shows the BN Bank budgeting application interface. At the top, there is a red header bar with the text "BN Bank" and navigation links: "Oversikt", "Transaksjoner", "Budsjett", and "Assistent". On the right side of the header, it says "My Profile". Below the header, the main content area has a title "Transaksjoner" and a "Legg til" (Add) button. There are two sections: "Utgifter" (Expenses) and "Inntekter" (Income). The "Utgifter" section contains a table with columns: Sum, Melding, Kategori, and Dato. The "Inntekter" section contains a table with columns: Sum, Melding, Kategori, and Dato.

Sum	Melding	Kategori	Dato
123 Kr	bbb aaa	Husleie	2023-04-20
2000 Kr	Rema 1000	Lønn	2023-04-10
3000 Kr	Sparing	Sparing	2023-04-11
3000 Kr	PC	Elektronikk	2023-04-28
350 Kr	Rema 1000	Mat	2023-04-28

Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

To edit a transaction, move the mouse to the button with the text "Endre" of the transaction you want to edit. Click the button by pressing the left mouse button.

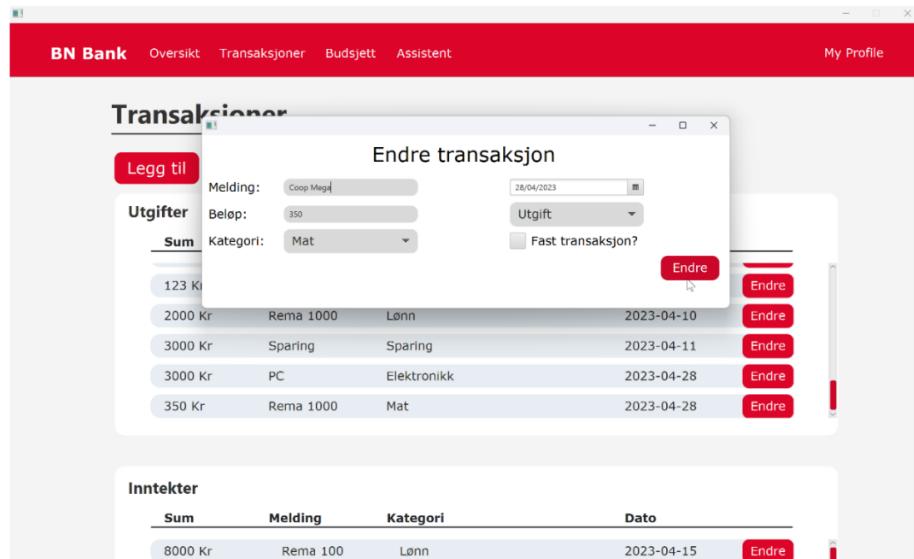
The screenshot shows the BN Bank budgeting application interface. The "Utgifter" section is highlighted. A modal window titled "Endre transaksjon" (Edit transaction) is open over the transaction list. Inside the modal, there are fields for "Melding" (Rema 100), "Beløp" (350), "Kategori" (Mat), and a dropdown menu for "Fast transaksjon?". The transaction list below shows the same data as the previous screenshot, with the "Endre" button for the 350 Kr entry highlighted.

Sum	Melding	Kategori	Dato
123 Kr	bbb aaa	Husleie	2023-04-20
2000 Kr	Rema 1000	Lønn	2023-04-10
3000 Kr	Sparing	Sparing	2023-04-11
3000 Kr	PC	Elektronikk	2023-04-28
350 Kr	Rema 1000	Mat	2023-04-28

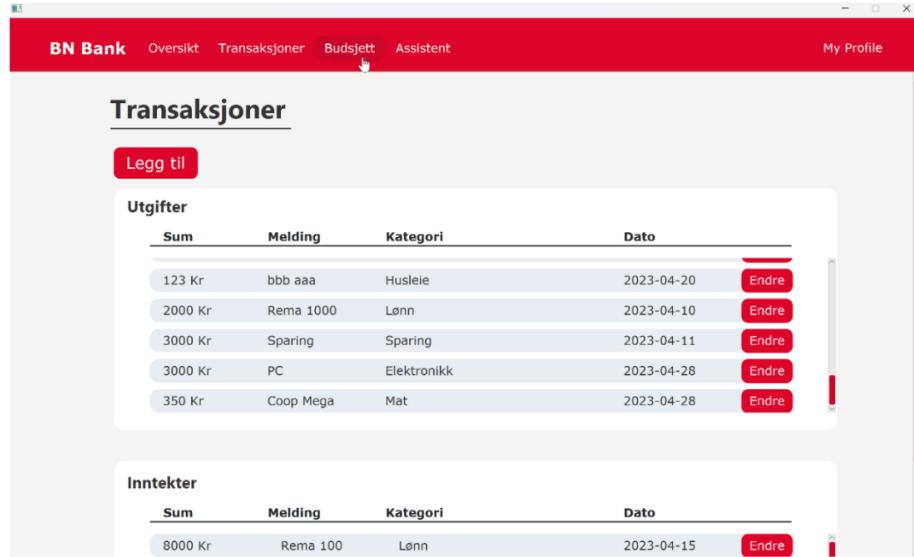
Sum	Melding	Kategori	Dato
8000 Kr	Rema 100	Lønn	2023-04-15

Click the field you want to edit by moving the mouse over to it and pressing the left mouse button. You can now set the new value.

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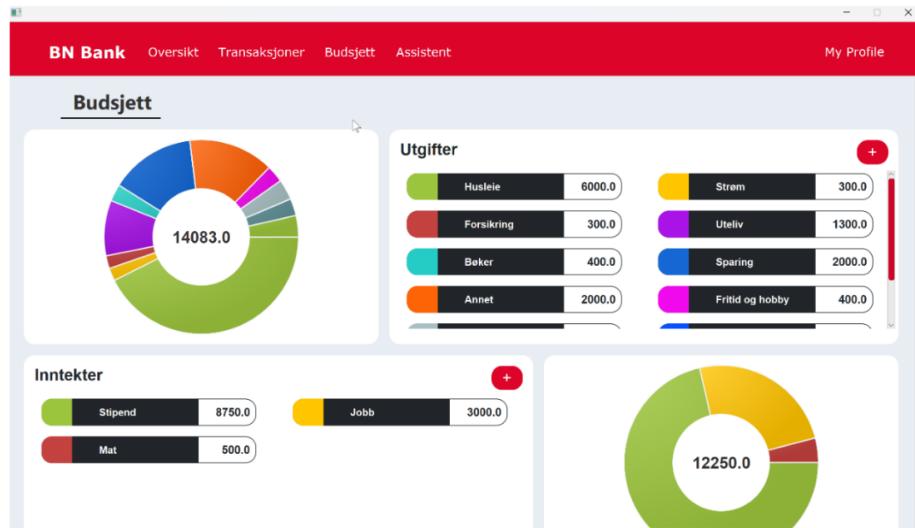


Move the mouse over to the button with the text "Endre". Press it by clicking the left mouse button to apply the changes.

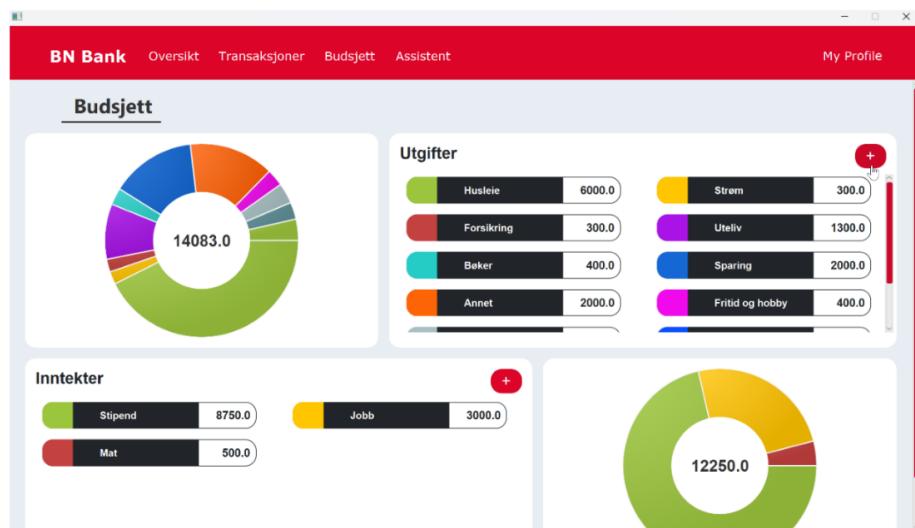


To go to the page budget move the mouse over to the text "Budsjett" and click it by pressing the left mouse button.

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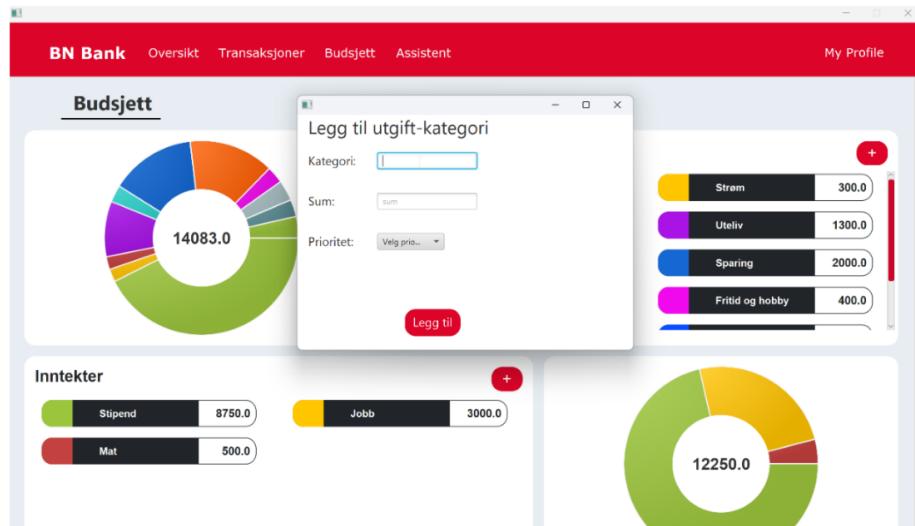


You are now at the budget page.

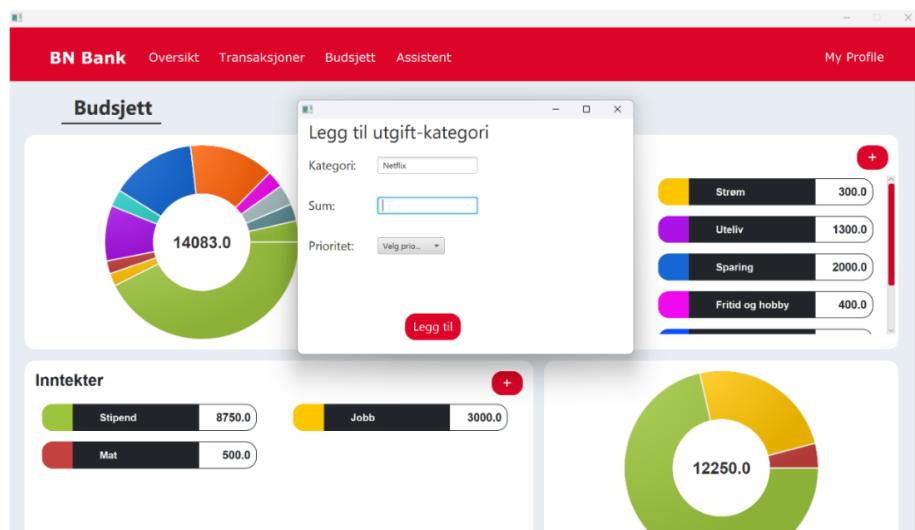


To add an element to the budget, move the mouse over to the plus symbol and click it by pressing the left mouse button.

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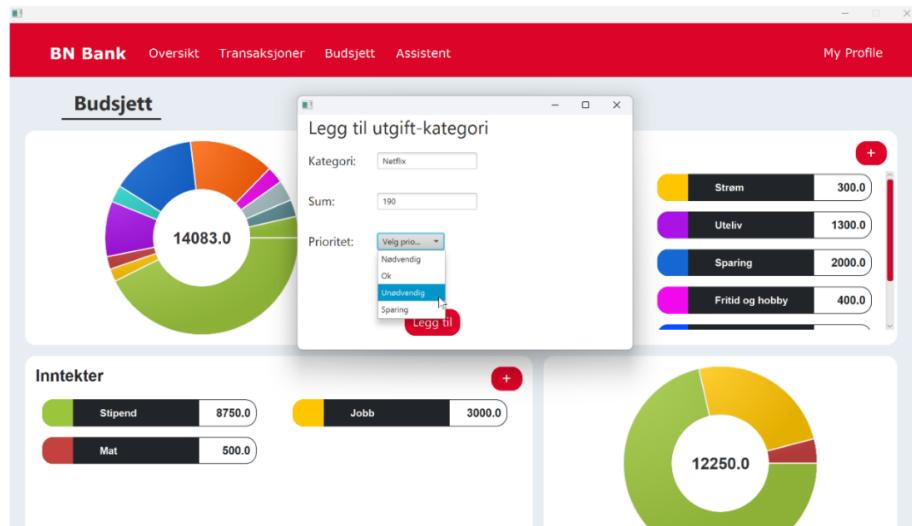


To specify the category move the mouse over to the text field with the text "Kategori" and write the category.

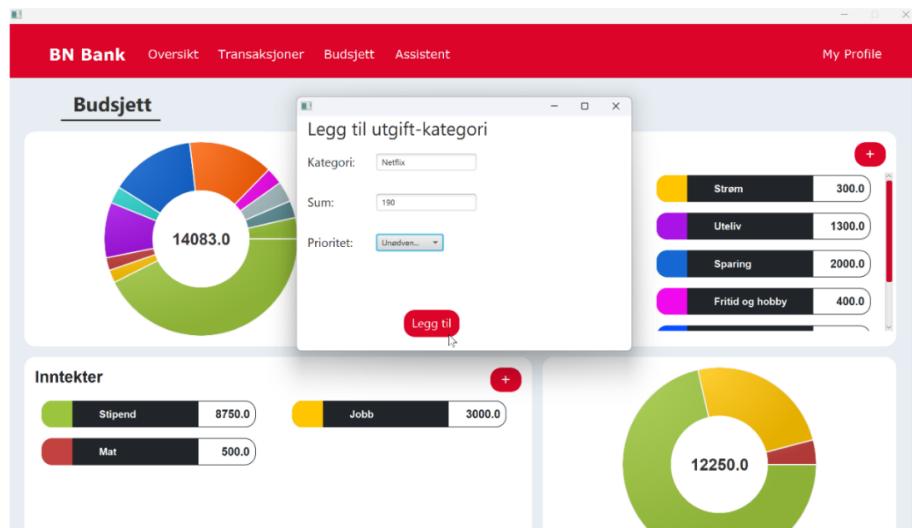


To specify the sum move the mouse over to the field with the text "sum" and click it by pressing the left mouse button.

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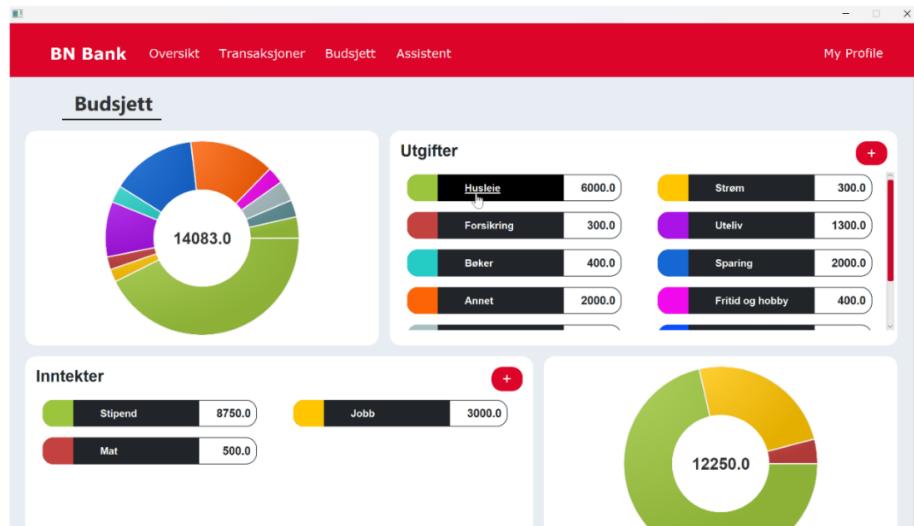


To choose the necessity of the budget element move the mouse over to the bar labelled “Velg prioritet” and click it by pressing the left mouse button. A list will drop down. You can choose the necessity by moving the mouse to the desired necessity and clicking it by pressing the left mouse button.

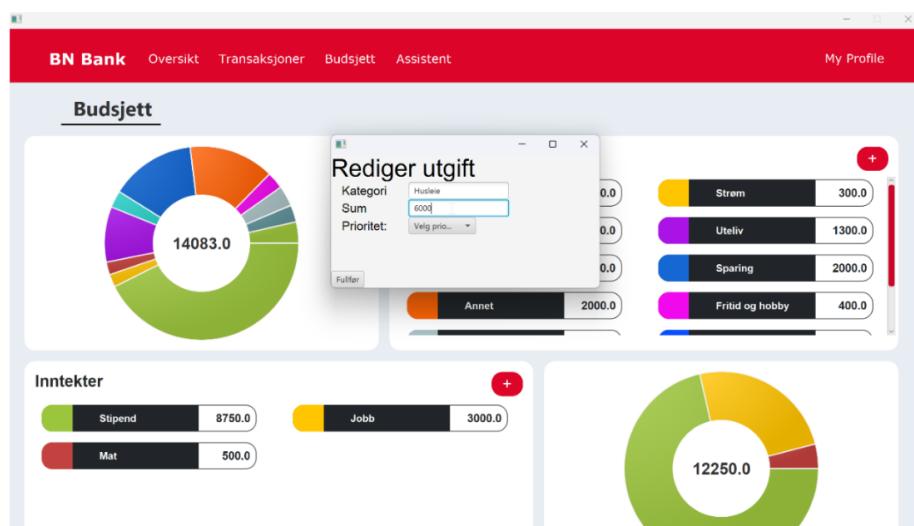


Move the mouse over to the button with the text “Legg til” and click it by pressing the left mouse button to add the budget element.

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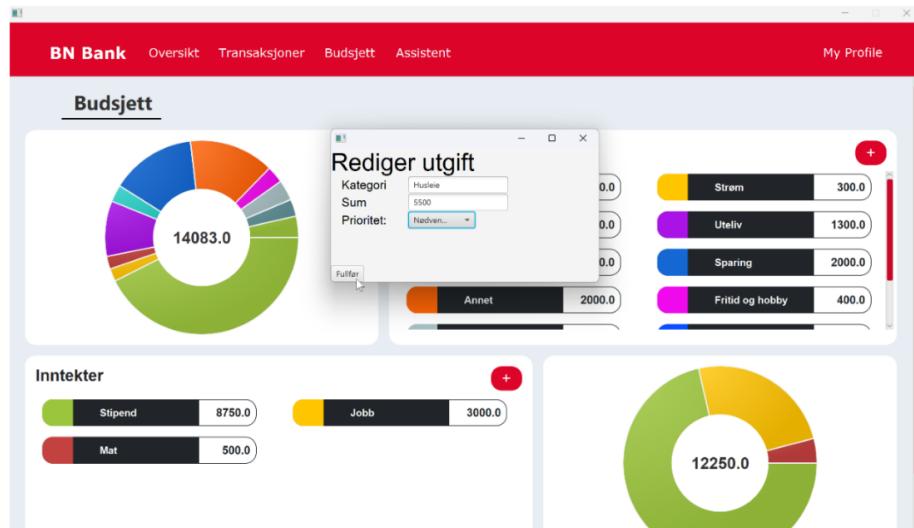


To edit one of the budget elements move the mouse over to the budget element you want to edit and click it by pressing the left mouse button.

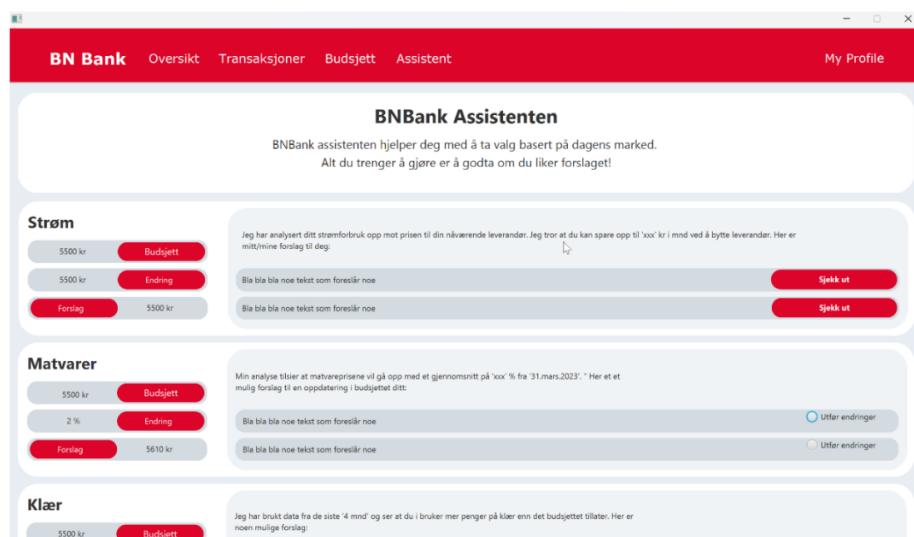


Move the mouse over to the field you want to edit and click it by pressing the left mouse button to change it.

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To complete the edit move the mouse over to the button with the text "Fullfør" and click it by pressing the left mouse button



This is the Assistant page, functionality not implemented.

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Testing

Both negative and positive tests, as well as functional and non-functional tests have been carried out on the program.

A number of unit tests were created that cover the multiple layers of the backend. Each endpoint has been tested with Postman. Compared schema, status and response time

Toward the end of the project, a performance test was carried out that focused on testing both the response data returned for the endpoints and the response time for the designated REST endpoints.

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Requirements

- [Use-Case diagram](#)
- [Sequence diagram](#)
- [Wireframes](#)
- [Domain Model](#)
- [Usability test](#)
- [Universal design](#)

System

- [Project structure](#)
- [Class diagram](#)
- [Persistence](#)
- [Source code](#)
- [Installation manual](#)
- [User-manual](#)
- [Testing](#)

Vision document

Use Case Diagram

- [Use Case 1](#)

Use Case 1

name

Add transaction

Prosecutor
User

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Trigger	The user buys something at the store
Pre-condition	The user is logged in and is on the transaction page
Post-condition	A new expense has been added to transactions
Normal flow of events	User presses the "Add" button, fills in all the fields in the window and presses save
Exception	The user enters something invalid in the text fields

- Use Case 2

Use Case 2

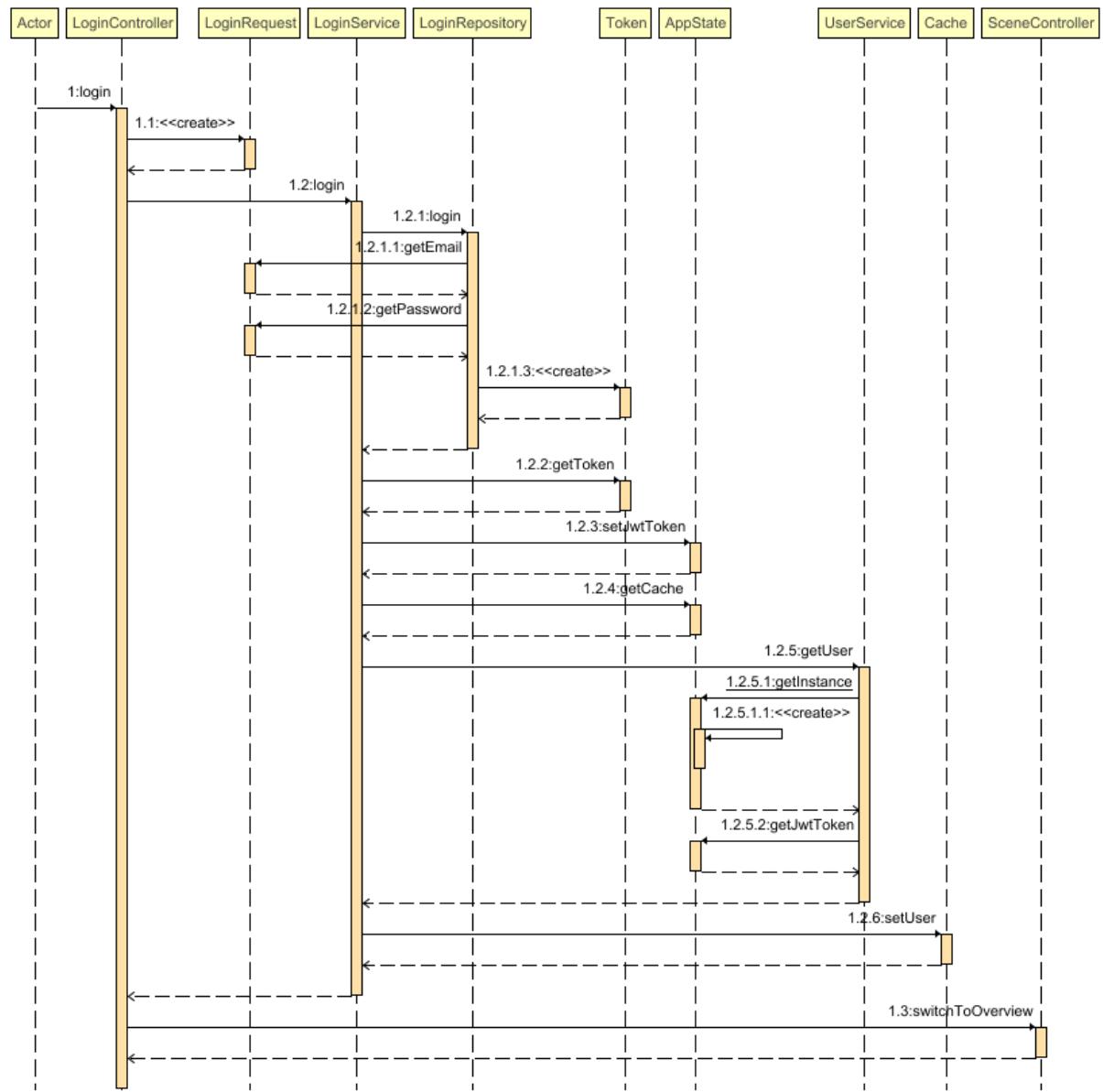
Add Budget element

Prosecutor User

Trigger	The user wants to add a budget element
Pre-condition	The user is logged in and is on the budget page
Post-condition	A new budget element has been added to budget
Normal flow of events	User presses the "+" button, fills in all the fields in the window and presses save
Exception	The user enters something invalid in the text fields

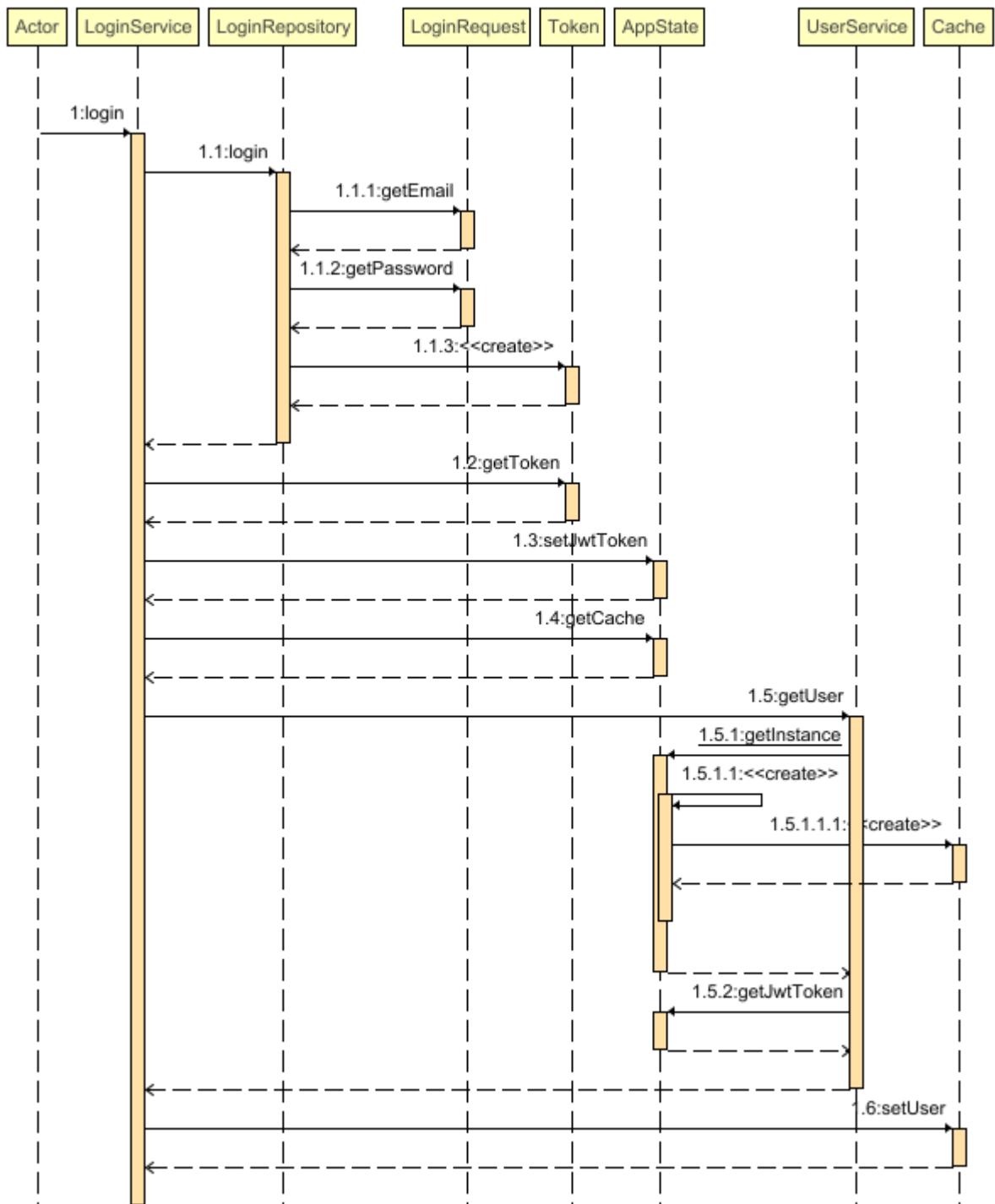
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[LoginController_login](#)



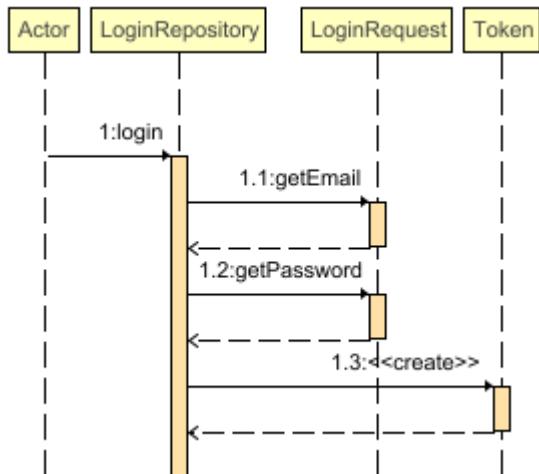
[LoginService_login](#)

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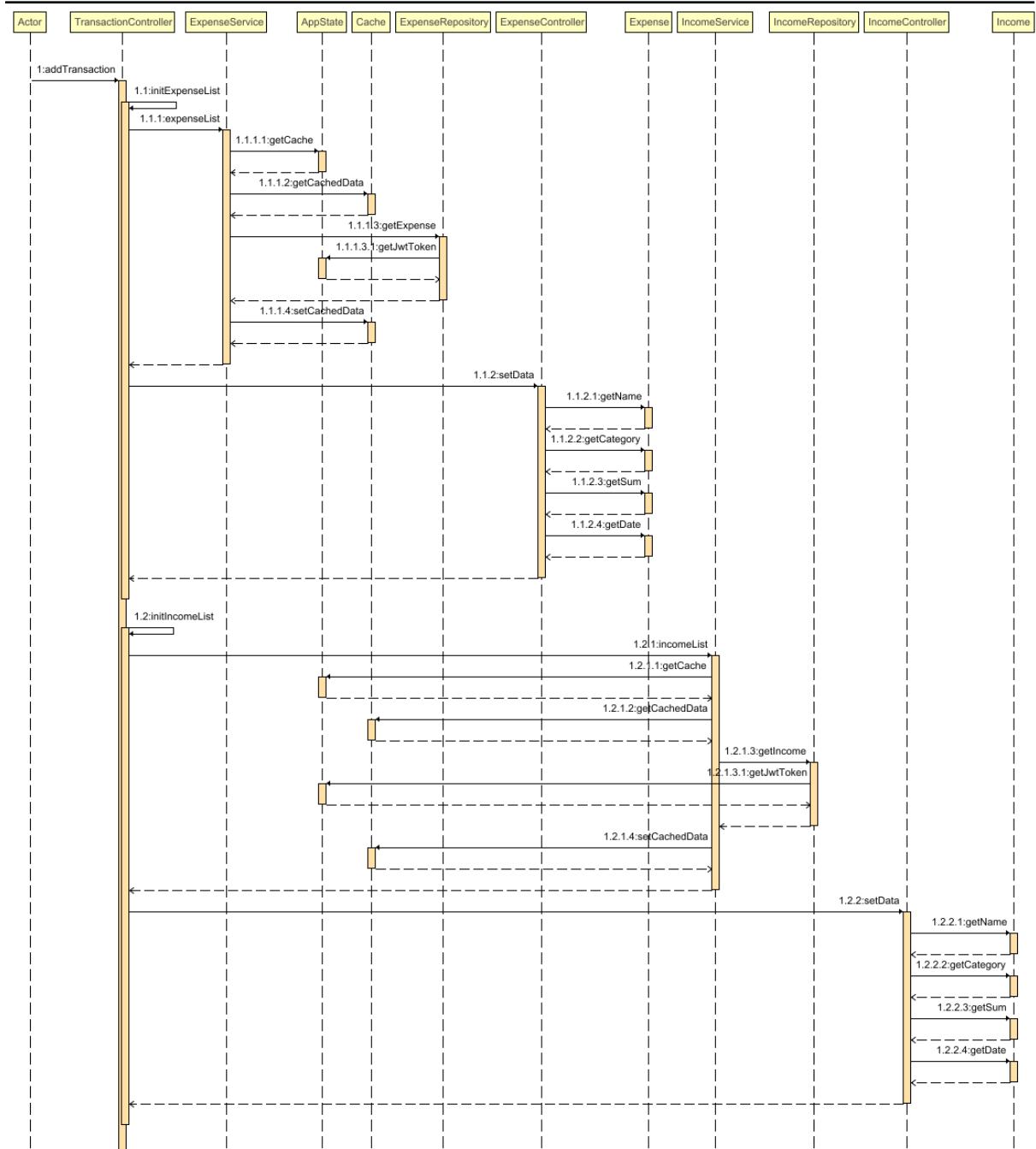
[LoginRepository_login](#)

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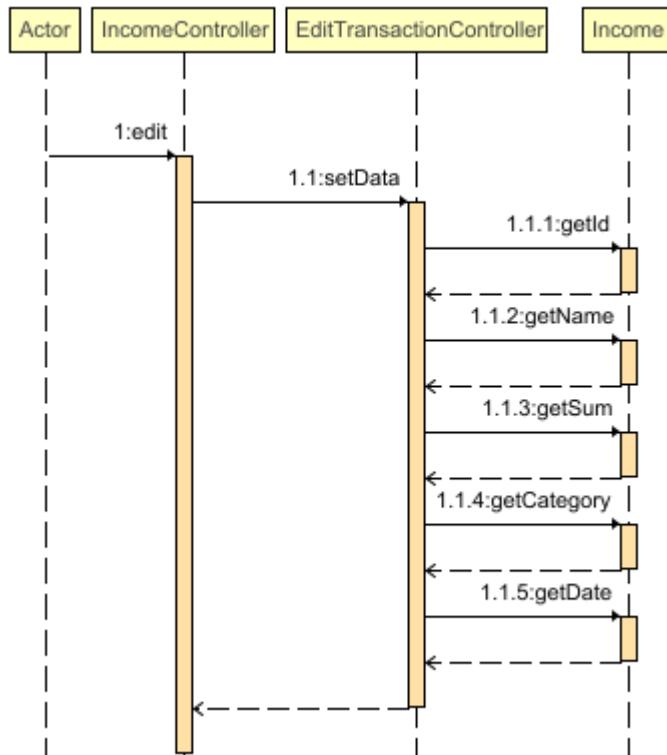
[TransactionController addTransaction](#)

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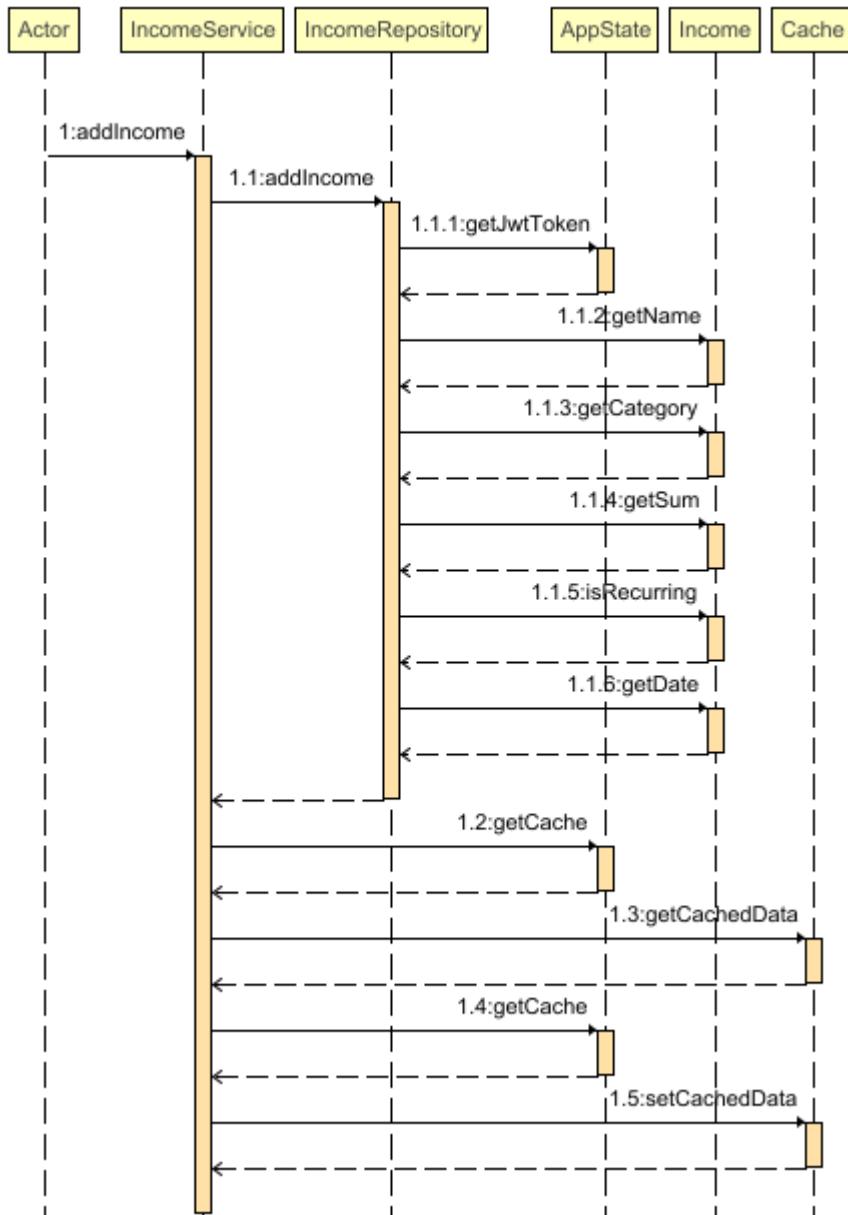
[IncomeController_edit](#)

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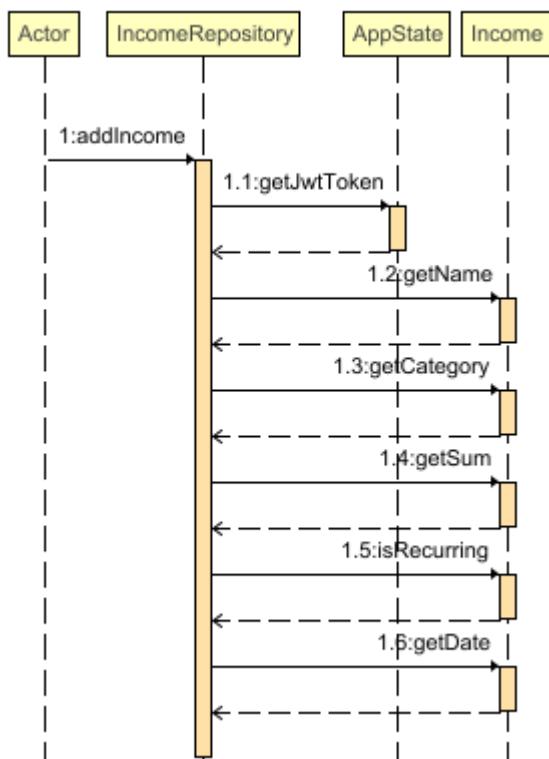
[IncomeService_addIncome](#)

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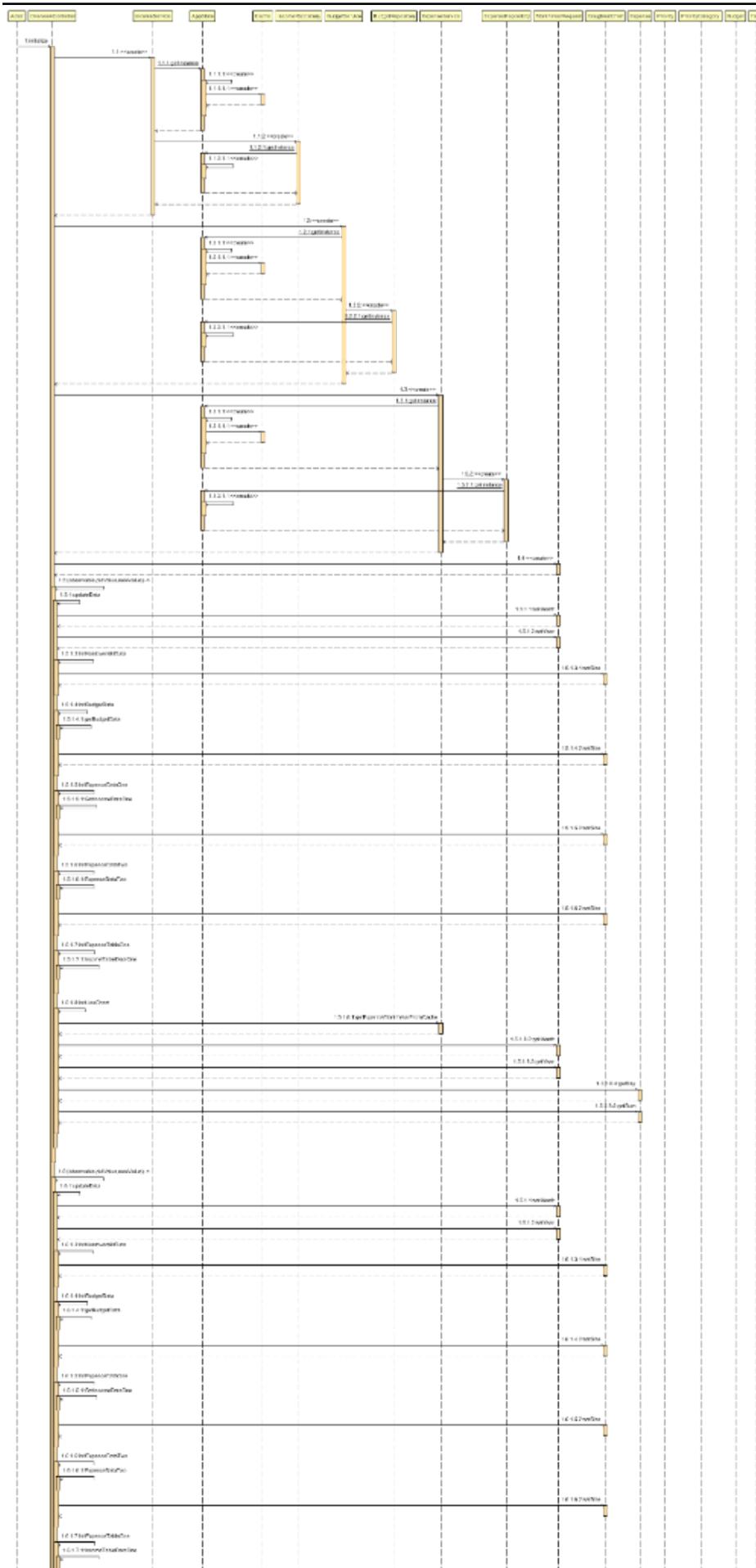
[IncomeRepository.addIncome](#)

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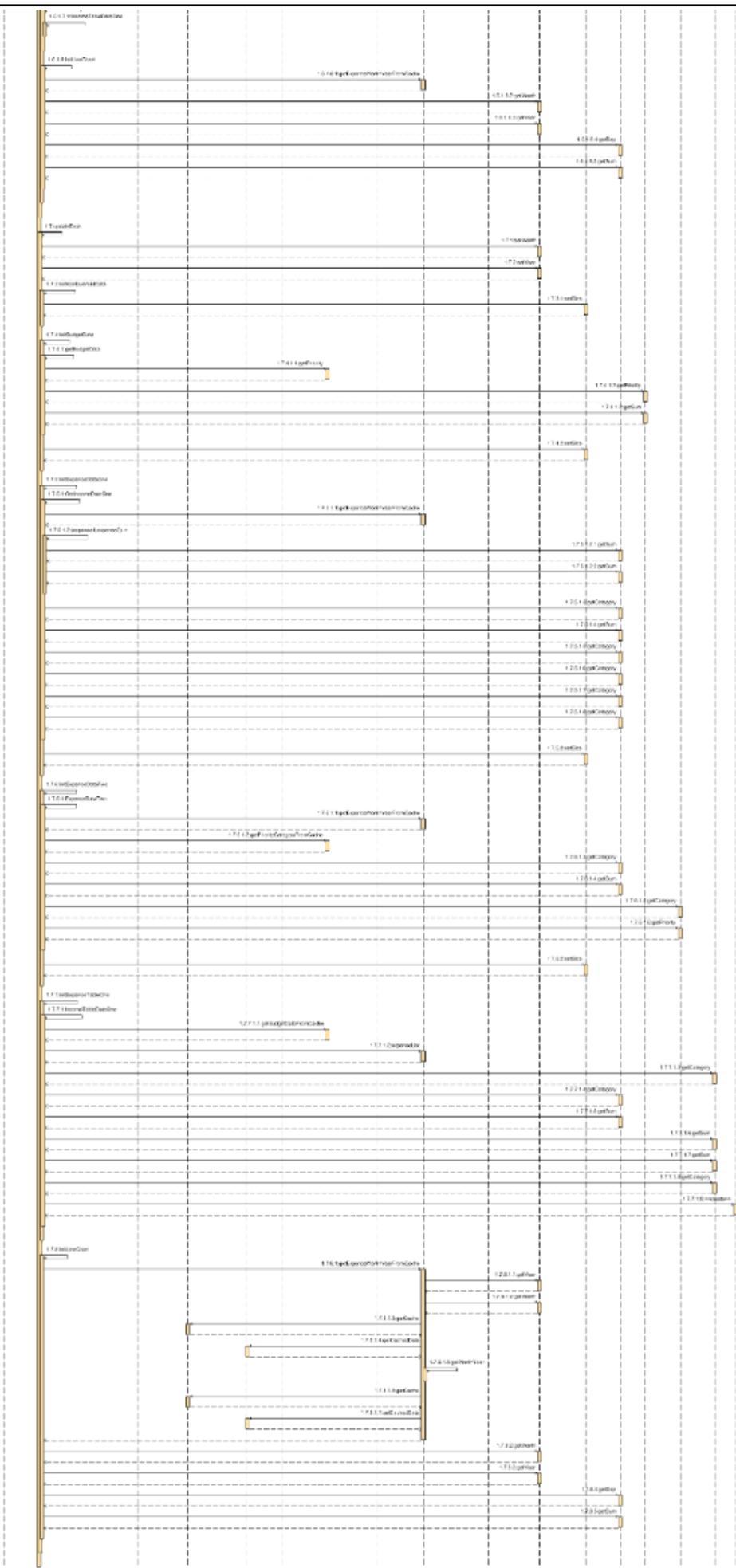


[BudgetController Initialize](#)

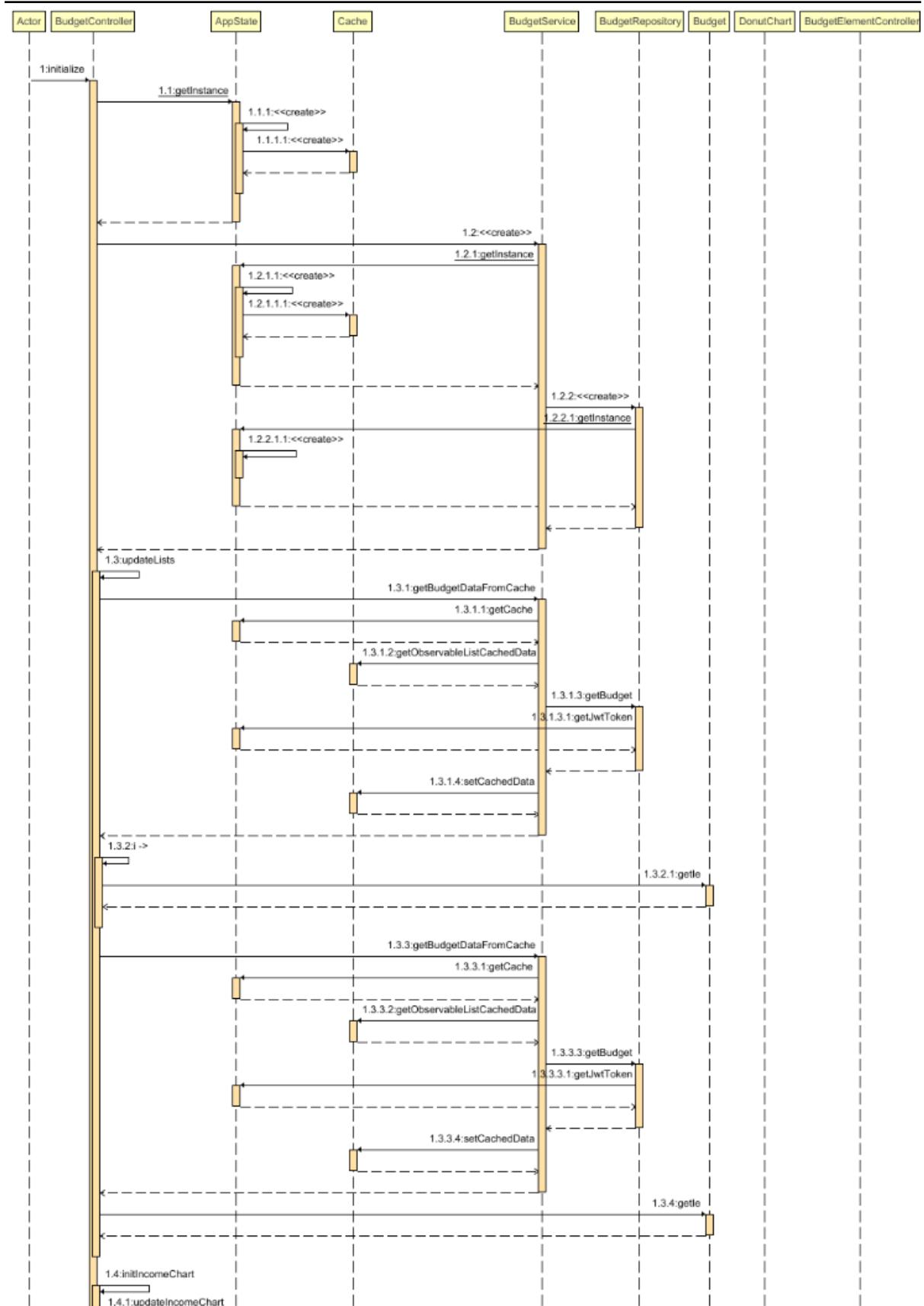
Team 6 - Budgeting Application



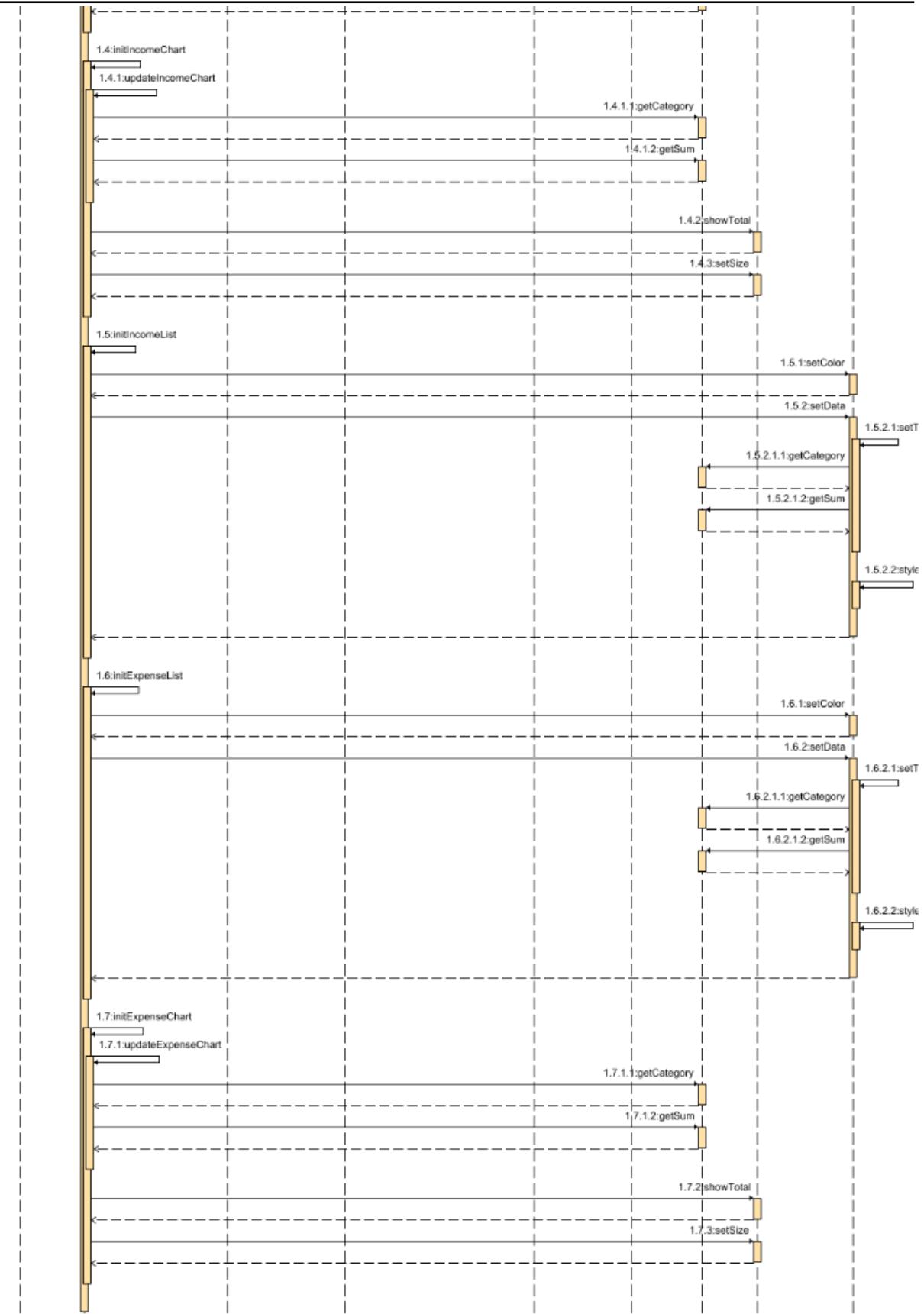
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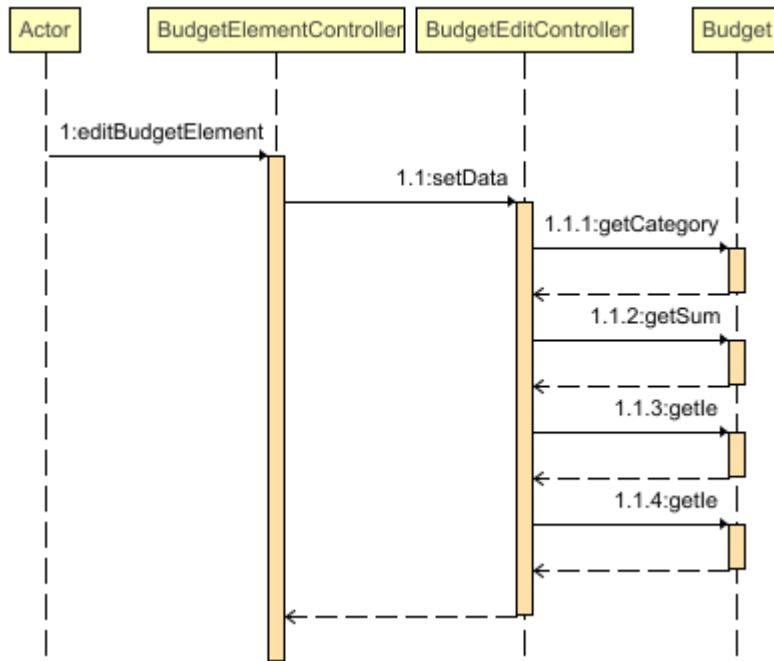


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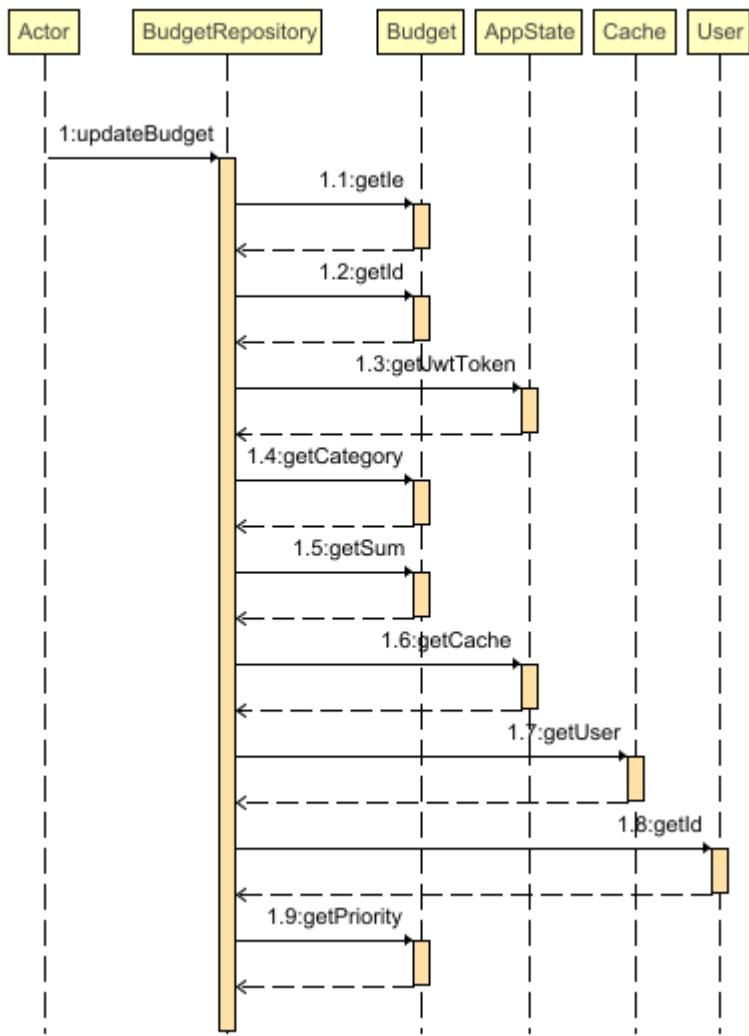
[BudgetElementController_editBudgetElement](#)

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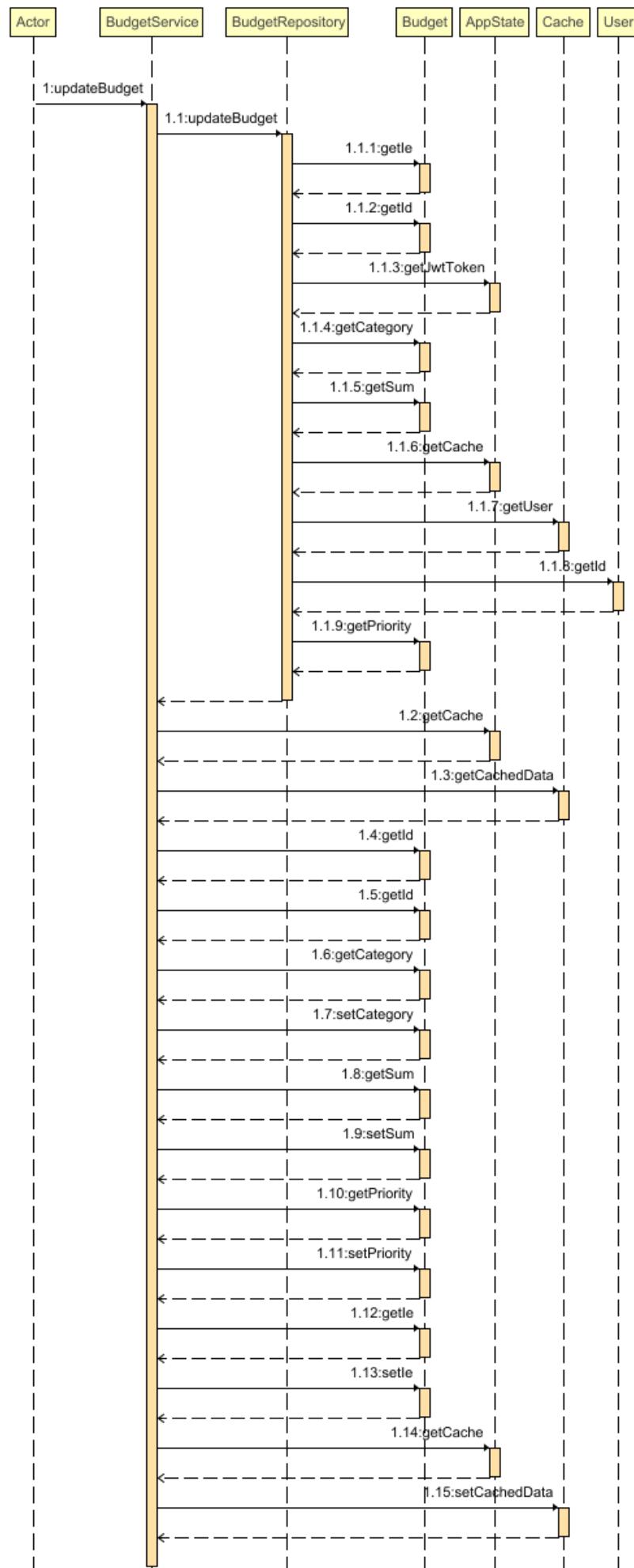
[BudgetRepository updateBudget](#)

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[BudgetService_updateBudget](#)

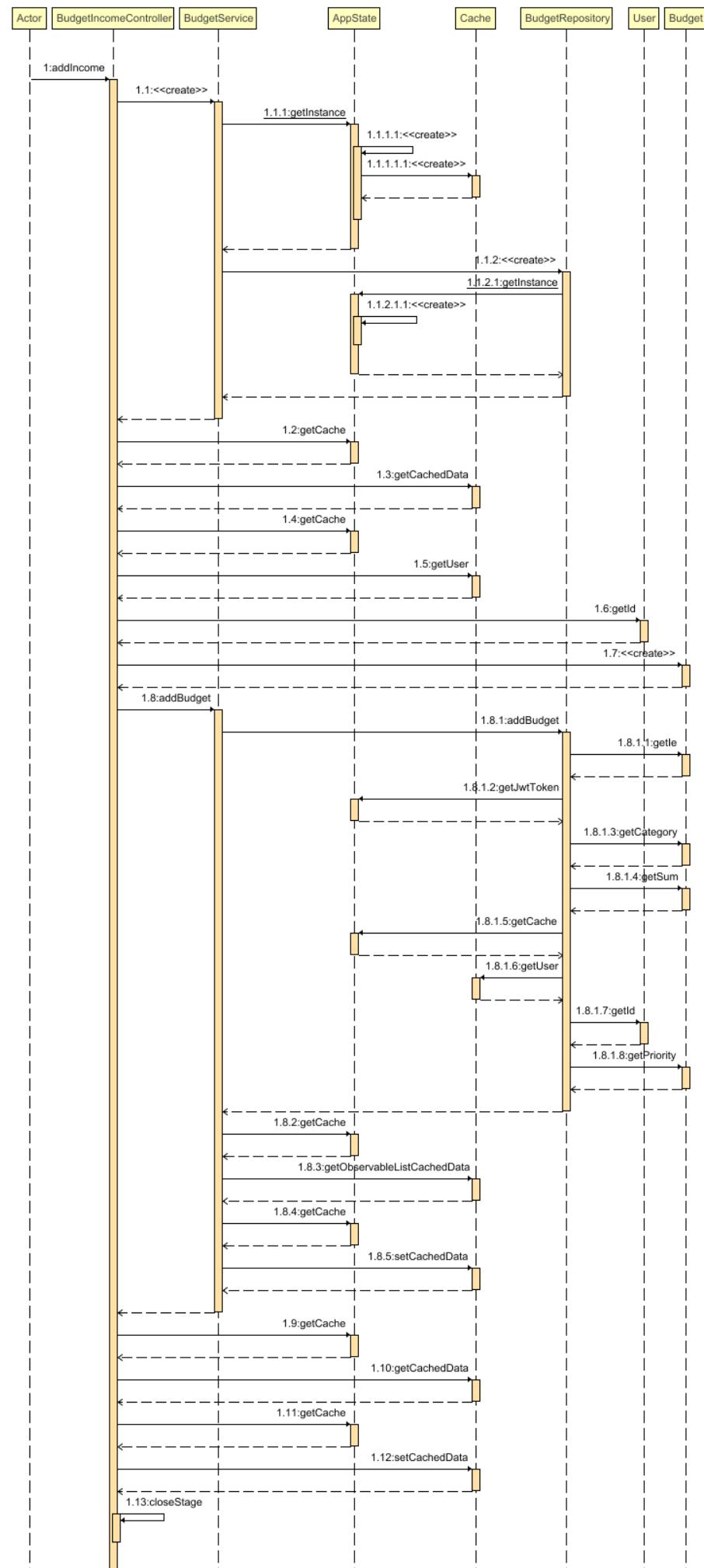
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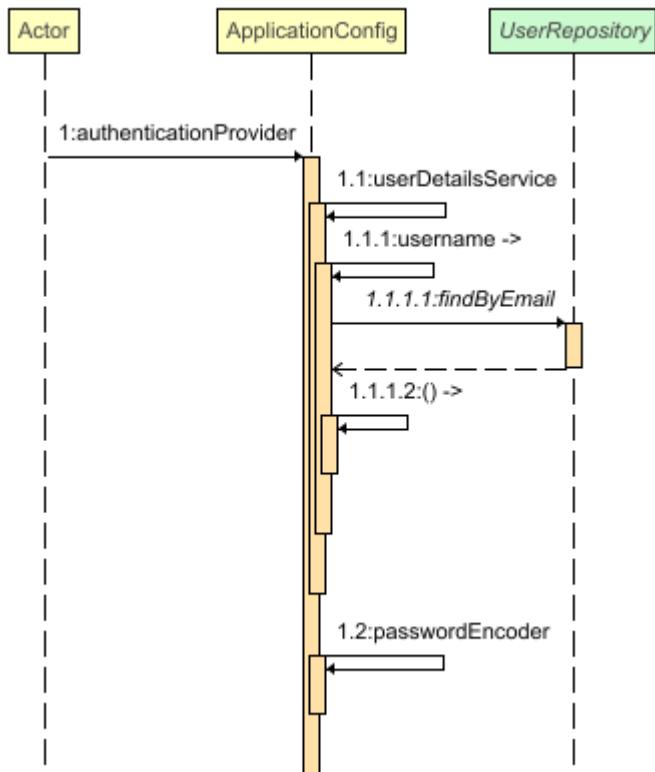
[BudgetIncomeController_addExpense](#)

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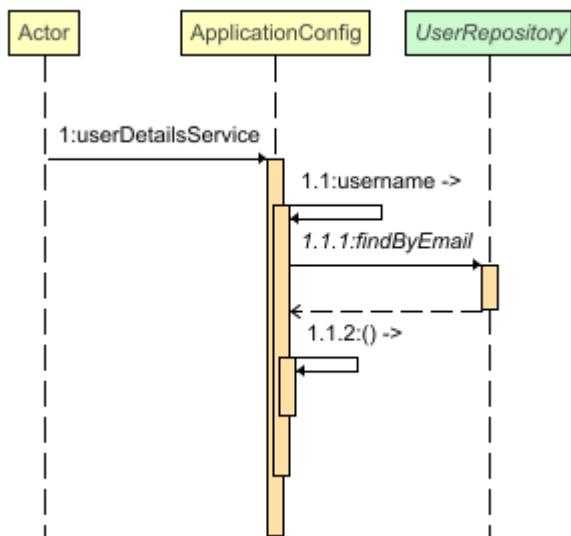


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[ApplicationConfig_authenticationProvider](#)

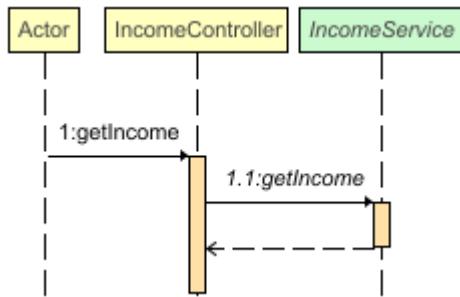


[ApplicationConfig_userDetailsService](#)

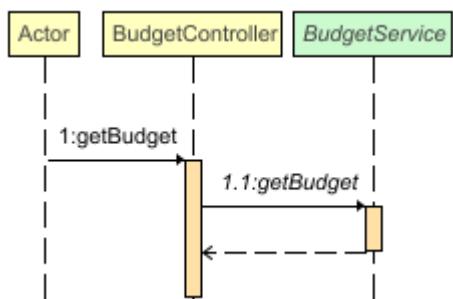


[BackEnd_IncomeController_getIncome](#)

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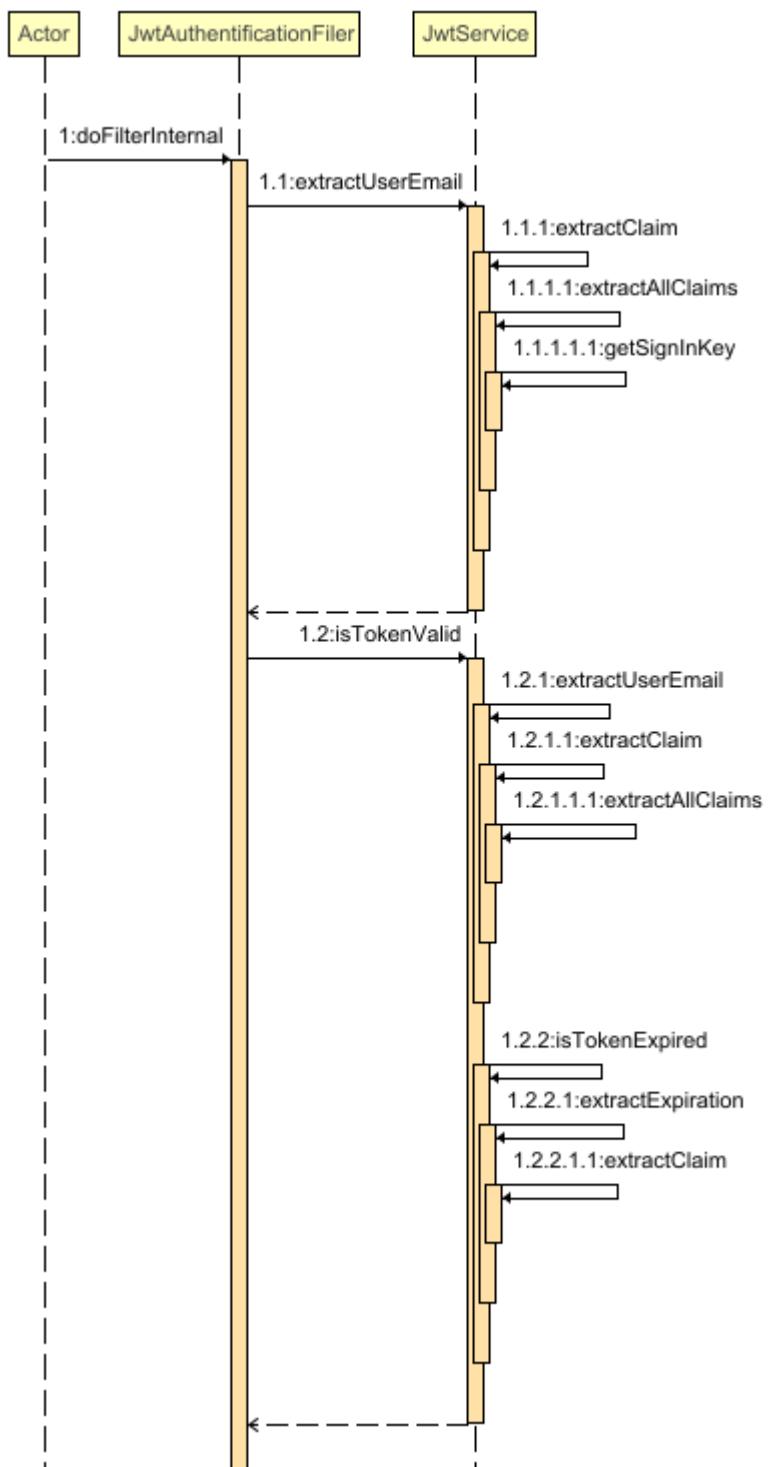


[BackEnd_BudgetController_getBudget](#)

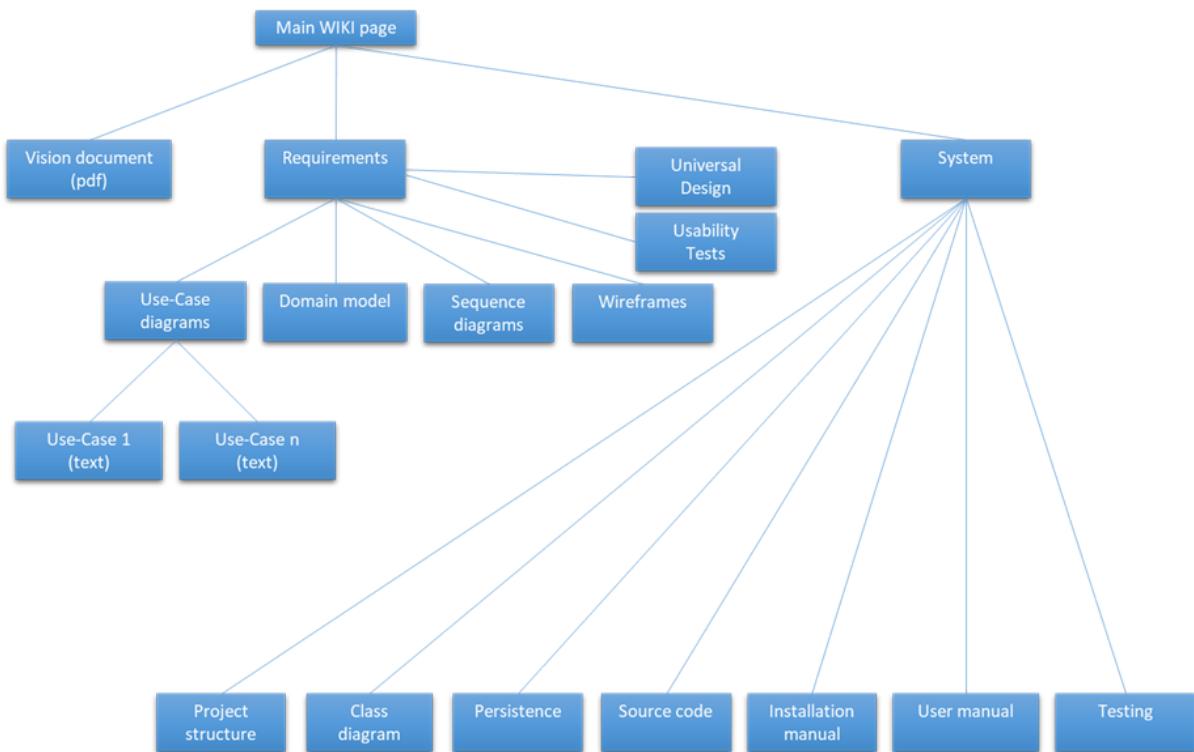
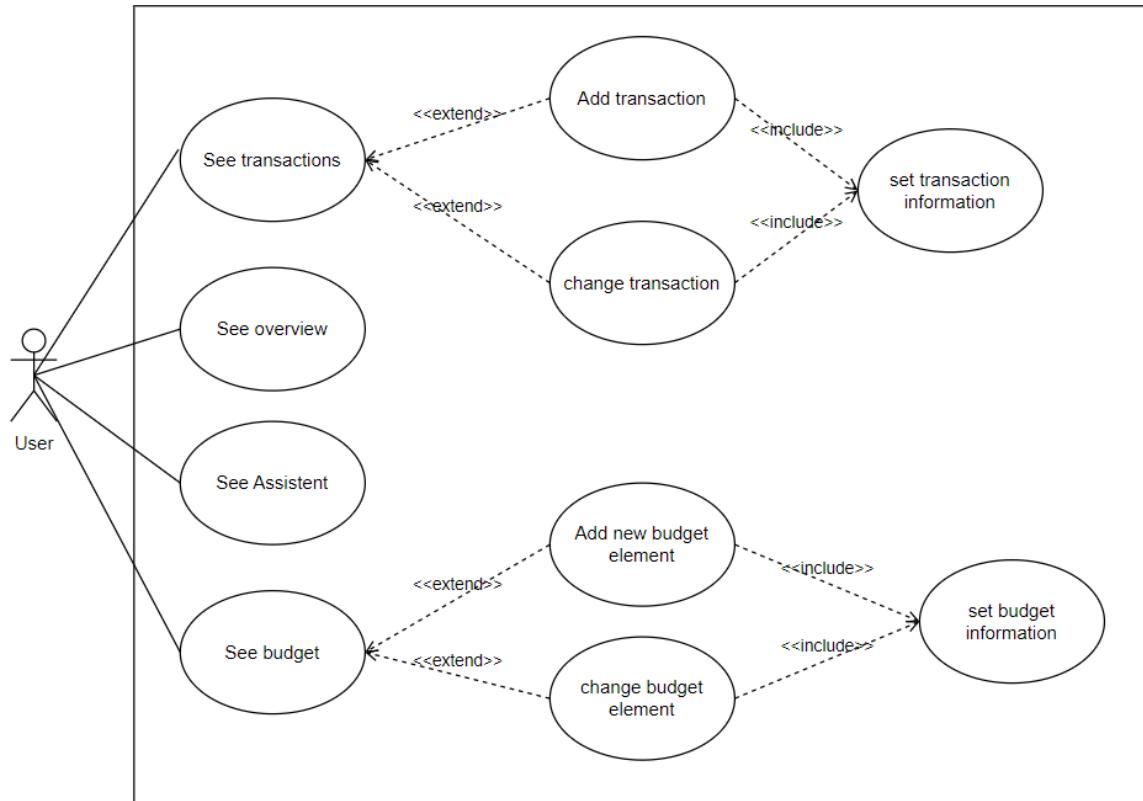


[BackEnd_JwtAuthentificationFiler_doFilterInternal](#)

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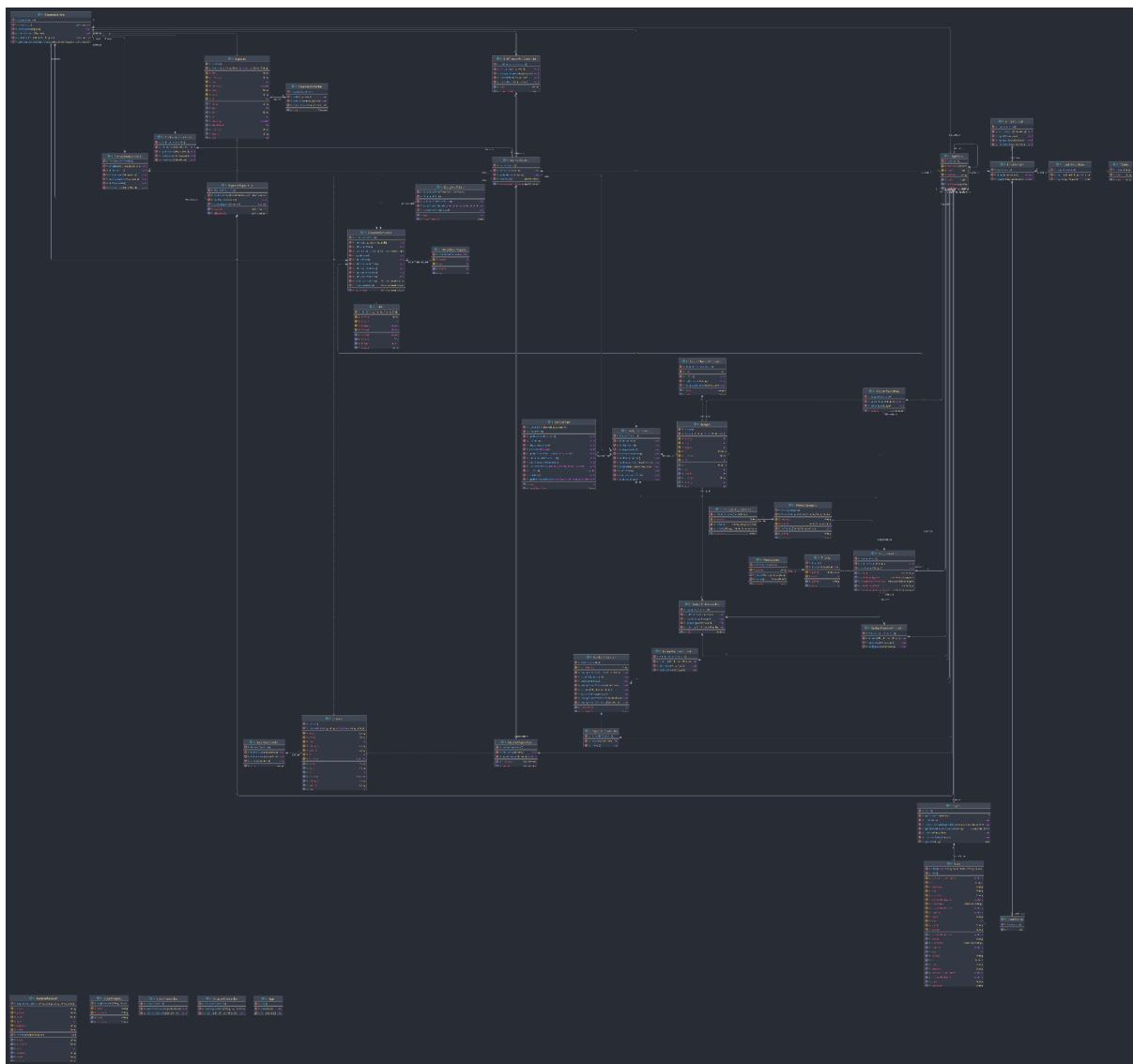


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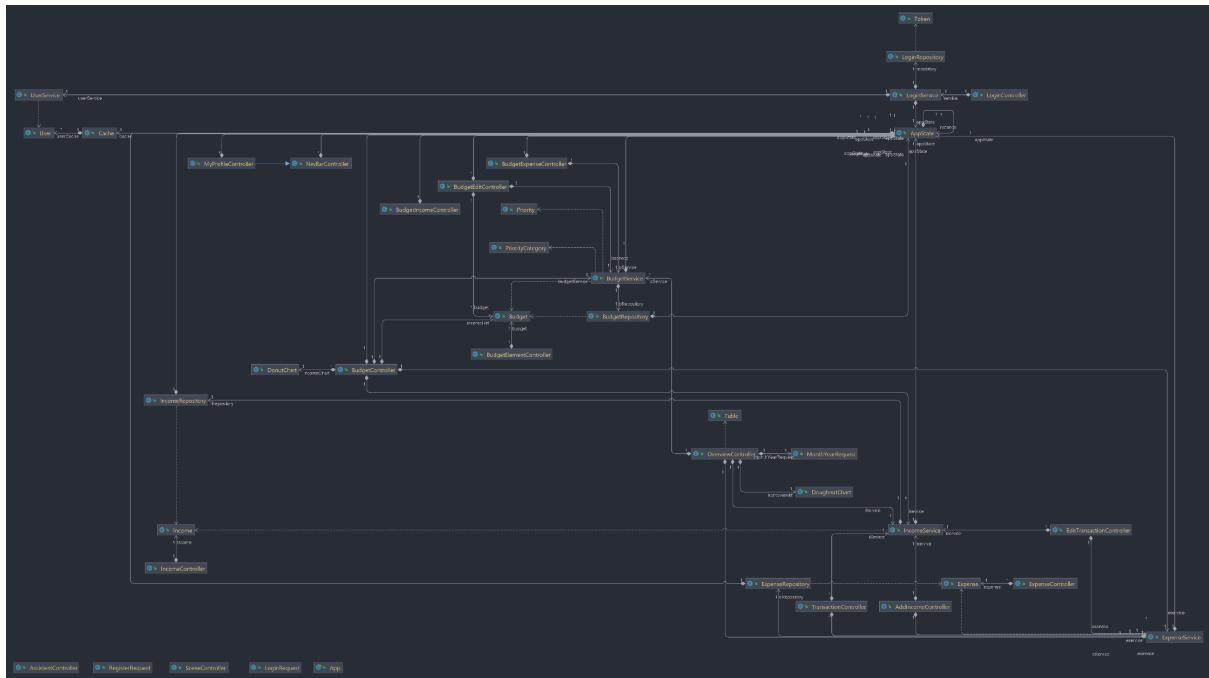
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Class diagram containing all project classes, with attributes and methods

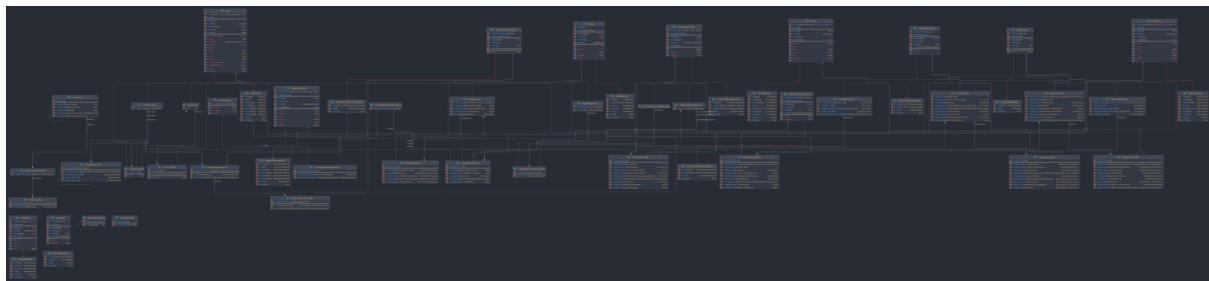


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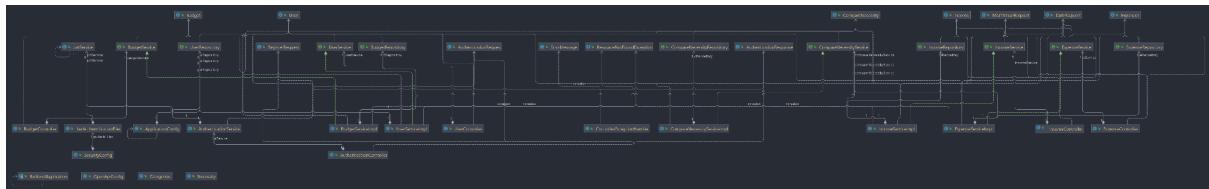
Class diagram containing all project classes, without attributes and methods



Back-end class diagram containing all project classes, with attributes and methods

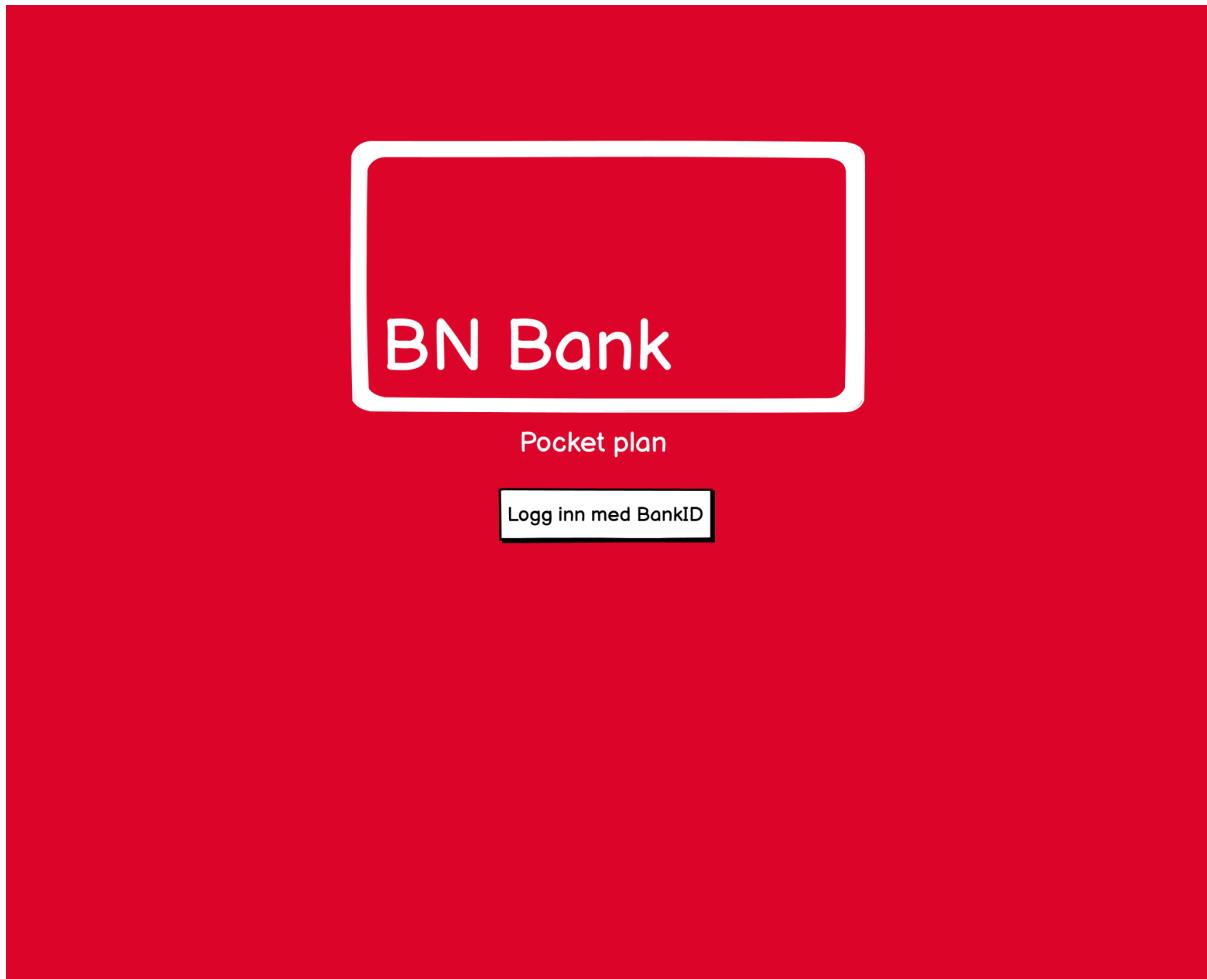


Class diagram containing all project classes, without attributes and methods



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Wireframes



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BN Bank

Transaksjoner Oversikt Budsjett Assistent Min Profi

Januar

Inntekter

Total: 18 200

Stipend

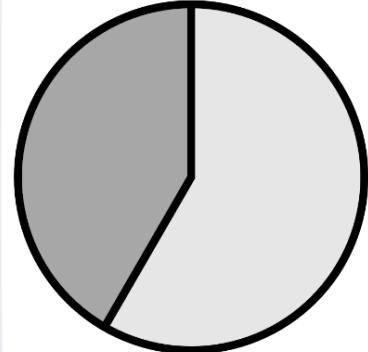
8 000

Lønn

10 000

Gave

200



Utgifter

Total: 16 500

Husleie

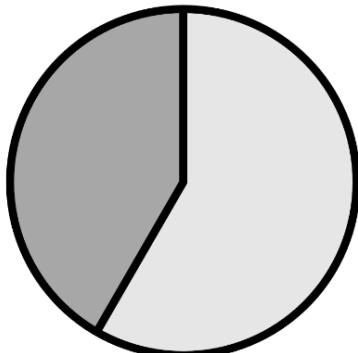
5 500

Mat

10 000

Klær

1000



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BN Bank

Transaksjoner Oversikt Budsjett Assistent Min Profi

Legg til

Inntekter

8000 kr	Stipend	13.02.2023	Lån	Endre
10 000 kr	Lønn	13.02.2023	Lønn	Endre
200 kr	Bursdag	13.02.2023	Gave	Endre

Utgifter

50 kr	Bussbillett	13.02.2023	Transport	Endre
299 kr	Burger King	13.02.2023	Mat	Endre
200 kr	Rema 100	13.02.2023	Mat	Endre

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BN Bank

Transaksjoner Oversikt Budsjett Assistent Min Profi

Navn

Dato

Beløp

Utgift

Inntekt

Kategori

Legg til

Februar 2023 

Søk

50 kr Bussbillett

13.02.2023

Transport

Utgift

Endre

8000 Stipend

13.02.2023

Lån

Inntekt

Endre

200 kr Rema 100

13.02.2023

Mat

Utgift

Endre

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BN Bank

Transaksjoner Oversikt Budsjett Assistent Min Profi

BN Bank Assistenten

BnBank Assistenten hjelper deg med å realisere hva endringer i økonomien faktisk utgjør for ditt budsjett

Strøm

536 kWh pr. mnd

1200 kr pr. mnd

Leverandør Nordkraft

Vi har analysert ditt strømforbruk med leverandøren og prisen du betaler, og sammenlignet den med andre konkurrenter i markedet. Disse kan gi deg et bedre tilbud

Fortum 900 kr pr. mnd Sjekk ut

NTE 1000 kr pr. mnd Sjekk ut

Bensin

2000 kr pr. mnd

2% prisendring

Endring 2040 kr

Den 24. mars går bensinprisen opp med 2%. Dette vil gjøre at ditt budsjett øker. Etter endringer i prisen, vil dit nåværende budsjett gå opp. Nedenfor kan du velge å oppdatere ditt budsjett med den prosjektierte prisveksten

Bensin 2040 kr pr. mnd Oppdater budsjett

Inflasjon

4000 kr pr. mnd

2% prisendring

Endring 4080 kr

Den 24. mars går Inflasjon opp med 2%. Dette vil gjøre at ditt budsjett øker. Etter endringer i prisen, vil dit nåværende budsjett gå opp. Nedenfor kan du velge å oppdatere ditt budsjett med den prosjektierte prisveksten

Mat 3040 kr pr. mnd Oppdater budsjett

Snacks 1040 kr pr. mnd Oppdater budsjett

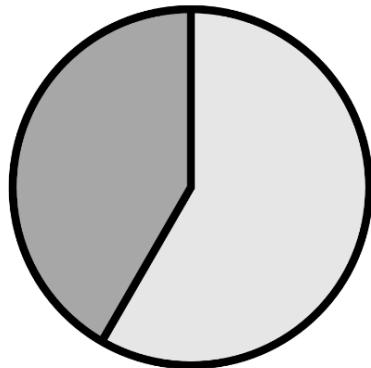
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BN Bank

Transaksjoner Oversikt Budsjett Assistent Min Profi

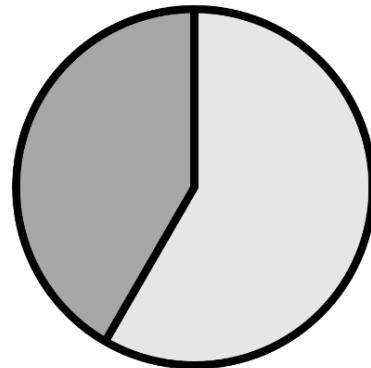
Desember 2022

Forbruk



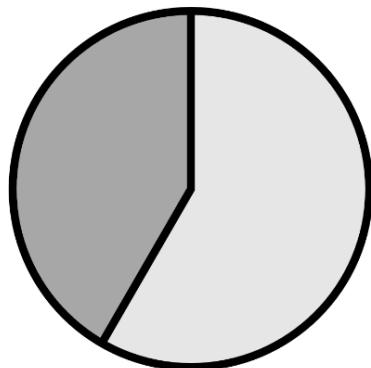
- Faste utgifter
- Helse
- Mat og drikke
- Klær

Budsjett

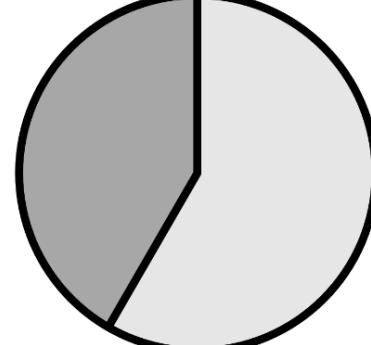


- Essensials
- ok
- Non-Essentials
- Saving

Kontooversikt



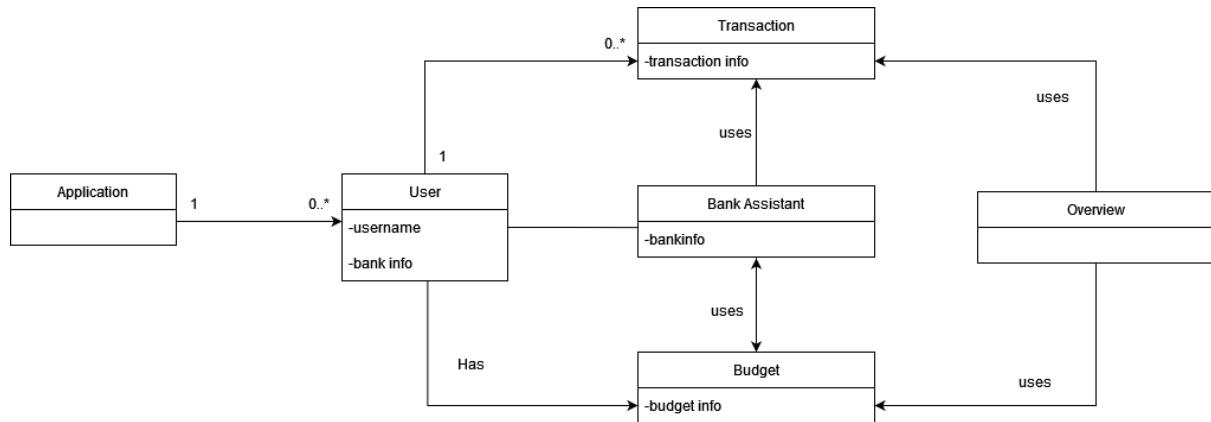
- Essensials
- ok
- Non-Essentials
- Saving



- Spare
- Bruk
- BSU

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Domain Model



Usability Test

[Usability test](#)

Universal Design

The application was designed to implement features suggested in the Web Content Accessibility Guidelines (WCAG) 2.1, published by the World Wide Web Consortium (W3C). Some examples of this include:

Not limited to a single sense

- Screen reader support Distinguishable
- Info communicated through not just colors
- Contrast (ref. Contrast check) Navigable and consistent
- Consistent, simple navigation Input assistance
- Input suggestions
- Error identification
- Error prevention