DTU

KRAVSPECIFIKATION & PROGRAMDESIGN

02161 SOFTWARE ENGINEERING 1

Afleveringsgruppe 13:

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github.com/rwiuff/02161ExamProject

19. marts 2023

INDHOLD

Kravspecifikation & Programdesign
Kursus 02161
Software Engineering 1
19. marts 2023

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1 | KRAVSPECIFIKATION

1.1. INDLEDNING

Denne del af eksamensopgaven dokumenterer vores planlægningsproces, der skal tilvejebringe et tids/projektstyrings-program der møder Softwarehuset A/S' ønsker. Det gøres ved hjælp af ideer og modeller fra Behavior- og Test Driven Development, der ved hjælp af brainstorming lader os gå fra kundeønsker til scenarier, fra scenarier til tests og fra tests til kode (tests og kode i næste rapport), alt sammen med rod i beskrivelsen af Softwarehusets ønsker.

1.2. ORDLISTE

Medarbejder	*[Employee]* En medarbejder er en person ansat i Softwarehuset A/S, som er tildelt aktiviteter. En medarbejder kan udføre aktiviteter og registrere arbejdstid brugt på aktiviteter, uagtet om medarbejderen er tilknyttet aktiviteten. Hver medarbejder har et medarbejder ID.
Projekt aktivitet	*[Project activity]* En delopgave af et projekt. Hver aktivitet er tilknyttet en medarbejder.
Fast aktivitet	*[Regular activity]* Aktivitet der ikke kan pålægges et projekt. F.eks. ferie, sygdom, kurser.
Projekt	*[Project]* Udviklingsarbejde udført for en kunde (eksternt) eller for Softwarehuset A/S (internt). Et projekt administreres af en projektleder og er inddelt i aktiviteter. Hvert projekt har et projektnummer.
Kunde	*[Customer]* En ekstern entitet som bestiller og er modtager af projekter.
Projektleder	*[Project leader]* En medarbejder der har ret til at oprette og tildele aktiviteter for et givent projekt.
Softwarehuset A/S	*[Softwarehuset A/S]* Entitet som er modtager af et projekt, hvis projektet er internt.
Medarbejder initialer	*[Employee initials]* Unik identifikation for hver enkelt medarbejder, bestående af fire bogstaver. To første fra fornavn efterfulgt af to første fra efternavn. F.eks. "rawi". Hvis initialer allerede er taget, vælges bogstav et og tre i efternavn, derefter et og fire, osv.
Projektnummer	*[Project number]* Identifikation for hvert enkelt projekt. Har formen årstal efterfulgt af et trecifret løbenummer. F.eks. 23001
Budgetteret tid	*[Time budget]* En aktivitets estimerede antal hele timer.
Arbejdstid	*[Work time]* Mængde tid i inkrementer af halve timer, brugt på en aktivitet. Kan registreres af den medarbejder som har brugt arbejdstid på en given aktivitet.
Start- og sluttid	*[start- and end week]* En periode med opløsning på uge-niveau til aktiviteter. Begge tider angives som år og uge, ved formatet "ÅÅUU". F.eks. 2304 for uge 4 i 2023. En starttid afgrænser starten af en given uge, en sluttid afgrænser ved slutningen af en given uge. Start- og sluttid kan derfor godt være ens.

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1.3. USE CASE DIAGRAMMER

Dette afsnit starter med Figur 1 som viser hvilke aktører der kan udfører hvilke cases. Herefter kommer en oversigt (Tabel 1) over de detaljerede use cases og hvilke sider der indeholder Cucumber features (Sider 3 til 16) og sekvensdiagrammer (Afsnit 3.2).

Figur 1: *Use case diagram for programmet hvori de tre aktører inkluderet er Gæst, Medarbejder og Projektleder.*
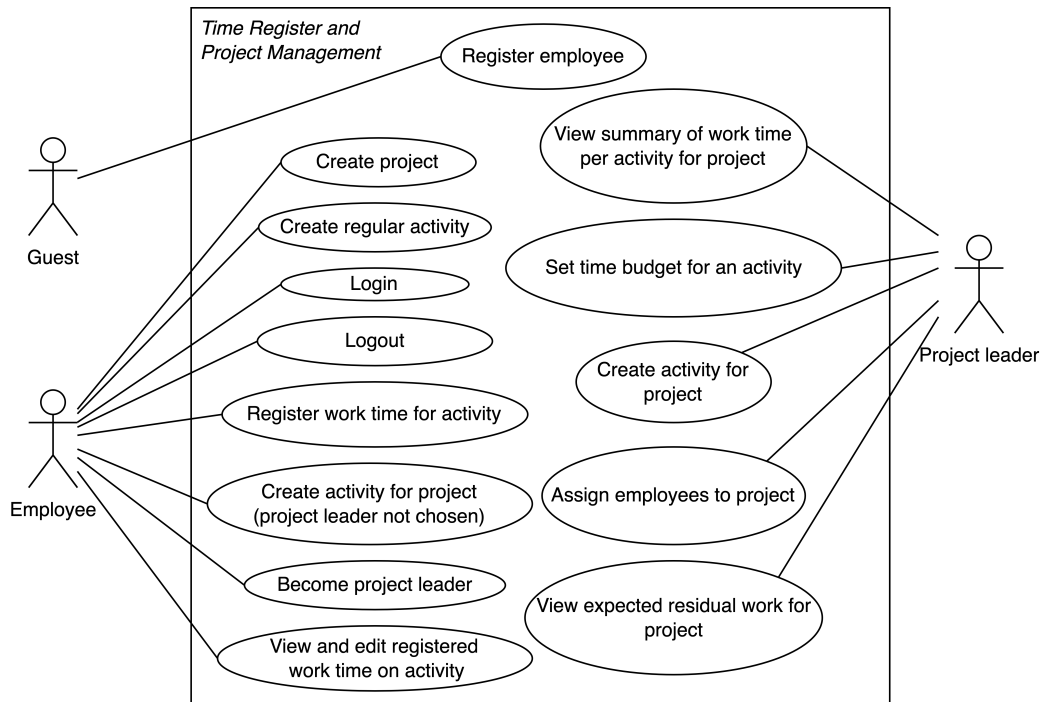
Tabel 1: *Use cases for programmet*

Detaljeret use case	Cucumber feature	Sekvensdiagram
Opret Medarbejder	Listing 1	Figur 3
Log in	Listing 2	Figur 4
Log ud	Listing 3	Figur 5
Opret projekt	Listing 4	Figur 6
Opret fast aktivitet	Listing 5	
Opret Aktivitet for projekt uden projektleder	Listings 6 og 7	Figurer 7 til 11
Opret Aktivitet for projekt med projektleder	Listing 8	Figur 12
Påtag projektleder stilling	Listing 9	Figur 14
Registrer arbejdstid på projekt aktivitet	Listing 10	
Se og rediger i registreret arbejdstid på aktivitet	Listings 11 og 12	
Se oversigt over registreret arbejdstid på aktivitet	Listing 13	
Anfør budgetteret tid til løsning af aktivitet	Listing 14	Figur 9
Tilknyt medarbejdere til projekt	Listing 15	
Se forventet restarbejde på projekt	Listing 16	

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1.4. DETALJEREDE USE CASES

Listing 1: Use case: Opret medarbejder

```
1  Feature: Register employee
2  Description: A new employee is added to the application
3  Actors: Guest
4
5  #MAIN SCENARIOS
6  Scenario: 1. Register an employee
7      When the user registers
        ↪ an employee with first first name "Michael", last name "Laudrup" and initials "mila"
8      Then an employee with first
        ↪ name "Michael", last name "Laudrup" and initials "mila" exists in the application
9
10 #ALTERNATIVE SCENARIOS
11 Scenario: 1a. Employee already exist
12     And the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
13     When the user registers
        ↪ an employee with first first name "Michael", last name "Laudrup" and initials "mila"
14     Then the error message "Medarbejder med initialer mila ekisisterer allerede" is given
15
16 Scenario: 1b. First and last name is required to register an employee
17     When the user registers an employee with first name "", last name "" and initials "mila"
18     Then the error message "For- og/eller efternavn mangler" is given
19
20 Scenario: 1c. Initials is required to register an employee
21     When the user registers the
        ↪ employee an employee with first name "Michael", last name "Laudrup" and initials ""
22     Then the error message "Initialer mangler" is given
23
24 Scenario: 1d. Employees with same name can be registered
25     And the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
26     When the user registers
        ↪ an employee with first name "Michael", last name "Laudrup" and initials "milb"
27     Then an employee with first
        ↪ name "Michael", last name "Laudrup" and initials "milb" exists in the application
```

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Listing 2: *Use case: Medarbejder log in*

```
1  Feature: Employees can login
2  Description: An employee logs in to the application
3  Actors: employee
4
5  #MAIN SCENARIOS
6  Scenario: 1. Login using initials
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      When the user logs in using initials "mila"
9      Then the user with initials "mila" is logged in as an employee
10
11 #ALTERNATIVE SCENARIOS
12 Scenario: 1a. Employee does not exist
13     Given the user logs in using initials "mila"
14     Then the error message "Ukendt medarbejder" is given
15
16 Scenario: 1b. Login is case insensitive
17     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
18     When the user logs in using initials "MiLa"
19     Then the user with initials "mila" is logged in as an employee
```

Listing 3: *Use case: Medarbejder log ud*

```
1  Feature: Employees can log out
2  Description: An employee logs out of the application
3  Actors: employee
4
5  #MAIN SCENARIOS
6  Scenario: 1. Logout
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And the user with initials "mila" is logged in as an employee
9      When the user logs out
10     Then none is logged in
```

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Listing 4: *Use case: Opret projekt*

```
1   Feature: Creating a project
2   Description: An employee creates a project in the application
3   Actors: employee
4
5   #MAIN SCENARIOS
6   Scenario: 1. Creating a project
7       Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8       And the user with initials "mila" is logged in as an employee
9       And the year is 2023
10      When the user creates a project with title "Projektplanlægning"
11      Then a project
        ↪ with title "Projektplanlægning" with project number 23001 exists in the application
12
13  Scenario: 2. A project can have a customer
14      Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
15      And the user logs in using initials "mila"
16      And a project
        ↪ with title "Projektplanlægning" with project number 23001 exists in the application
17      When the user sets customer "El-Giganten" on project 23001
18      Then the project 23001 has customer "El-Giganten"
19
20  Scenario: 3. A project can be an internal project
21      Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
22      And the user logs in using initials "mila"
23      And a project
        ↪ with title "Projektplanlægning" with project number 23001 exists in the application
24      When the user sets the project as an internal project
25      Then the project is an internal project
26
27  Scenario: 4. A project can have a start week
28      Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
29      And the user logs in using initials "mila"
30      And a project
        ↪ with title "Projektplanlægning" with project number 23001 exists in the application
31      When the user sets the start week to 2304
32      Then the project has start week 2304
33
34  #ALTERNATIVE SCENARIOS
35  Scenario: 1a. A guest is not able to create a project
36      Given none is logged in
37      And the year is 2023
38      When the user creates a project with title "Projektplanlægning"
39      Then the error message "Kun medarbejdere kan oprette et projekt" is given
40
41  Scenario: 1b. A title is required to create a project
42      Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
43      And the user logs in using initials "mila"
44      When the user creates a project with title ""
45      Then the error message "En projekttitel mangler" is given
```

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***Listing 5:** Use case: Opret fast aktivitet*

```
1  Feature: Creating a regular activity
2  Description: An employee creates a regular activity in the application
3  Actors: employee
4
5  #MAIN SCENARIOS
6  Scenario: 1. Creating a regular activity
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And the user logs in using initials "mila"
9      When the user creates the regular activity "Ferie" with start week 2304 and end week 2306
10     Then the
       ↪ user has a regular activity with title "Ferie" with start week 2304 and end week 2306
11
12 #ALTERNATIVE SCENARIOS
13 Scenario: 1a. A guest is not able to create a regular activity
14     Given none is logged in
15     When the user creates the regular activity "Ferie" with start week 2304 and end week 2306
16     Then the error message "Kun medarbejdere kan oprette en fast aktivitet" is given
17
18 Scenario: 1b. A title is required to create a regular activity
19     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
20     And the user logs in using initials "mila"
21     When the user creates the regular activity "" with start week 2304 and end week 2306
22     Then the error message "En titel mangler" is given
23
24 Scenario: 1c. A start week is required to create a regular activity
25     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
26     And the user logs in using initials "mila"
27     When the user creates the regular activity "Ferie" with start week "" and end week 2306
28     Then the error message "En start uge mangler" is given
29
30 Scenario: 1d. An end week is required to create a regular activity
31     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
32     And the user logs in using initials "mila"
33     When the user creates the regular activity "Ferie" with start week 2304 and end week ""
34     Then the error message "En slut uge mangler" is given
35
36 Scenario: 1e. Start week needs to be before end week
37     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
38     And the user logs in using initials "mila"
39     When the user creates the regular activity "Ferie" with start week 2304 and end week 2303
40     Then the error message "Start uge skal være før slut uge" is given
41
42 Scenario: 1f. Same start and end week is allowed
43     Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
44     And the user logs in using initials "mila"
45     When the user creates the regular activity "Ferie" with start week 2304 and end week 2304
46     Then the
       ↪ user has a regular activity with title "Ferie" with start week 2304 and end week 2304
```

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Listing 6: *Use case: Opret projekt aktivitet for projekt uden projektleder. Fortsætter på Listing 7*

```
1  Feature: Creating a project activity for a project without a project leader
2  Description: An employee creates a project activity for a project without a project leader
3  Actors: employee
4
5  #BACKGROUND
6  Background:
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And the user logs in using initials "mila"
9      And a project with title "Video Game" with project number 23001 exists in the application
10
11 #MAIN SCENARIOS
12 Scenario: 1. Creating a project activity
13     When the user assigns the project activity "Graphics design" to project 23001
14     Then the
       ↪ project with the project number 23001 has a project activity titled "Graphics design"
15
16 Scenario: 2. A time budget can be added to a project activity
17     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
18     When the user sets the time budget to 50 hours
       ↪ on the project activity with the title "Graphics design" and project number 23001
19     Then the project activity with
       ↪ the title "Graphics design" and project number 23001 has a time budget of 50 hours
20
21 Scenario: 3. A start week can be set to a project activity
22     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
23     When the user sets the start week to 2304 on the
       ↪ project activity with title "Graphics design" on the project with project number 23001
24     Then the project
       ↪ activity with the title "Graphics design" and project number 23001 has start week 2304
25
26 Scenario: 4. An end week can be set to a project activity
27     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
28     When the user sets the end week to 2304 on the
       ↪ project activity with title "Graphics design" on the project with project number 23001
29     Then the project
       ↪ activity with title "Graphics design" and project number 23001 has end week 2304
30
31 #ALTERNATIVE SCENARIOS
32 Scenario: 1a. A guest is not able to create a project activity
33     Given none is logged in
34     When the user assigns the project activity "Graphics design" to project 23001
35     Then the error message "Login krævet" is given
36
37 Scenario: 1b. A project activity title is unique in a project
38     Given the user logs in using initials "mila"
39     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
40     When the user assigns the project activity "Graphics design" to project 23001
41     Then the error message "Projekt aktivitet findes allerede" is given
```

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Listing 7: Use case: Opret projekt aktivitet for projekt uden projektleder. Fortsat fra Listing 6

```
42  Scenario: 2a. A guest is not able to set a time budget on a project activity
43      Given none is logged in
44      And an activity with the title "Graphics design" exists within the project 23001
45      When the user sets the time budget to 50 hours
        ↪  on the project activity with the title "Graphics design" and project number 23001
46      Then the error message "Login krævet" is given
47
48  Scenario: 3a. A guest is not able to set a start week on a project activity
49      Given none is logged in
50      And an activity
        ↪  with the title "Graphics design" exists within the project with project number 23001
51      When the user sets the start week
        ↪  to 2304 on the project activity with title "Graphics design" and project number 23001
52      Then the error message "Login krævet" is given
53
54  Scenario: 3b. A start week needs to be before or the same as the end week
55      Given the user logs in using initials "mila"
56      And an activity
        ↪  with the title "Graphics design" exists within the project with project number 23001
57      When the user sets the start week to 2304 on the
        ↪  project activity with title "Graphics design" on the project with project number 23001
58      And the user sets the end week to 2304 on the
        ↪  project activity with title "Graphics design" on the project with project number 23001
59      Then the error message "Starttid skal være før eller ens med sluttid" is given
60
61  Scenario: 4a. A guest is not able to set an end week on a project activity
62      Given the user is logged in as "mila"
63      And an activity
        ↪  with the title "Graphics design" exists within the project with project number 23001
64      When the user sets the end week to 2304 on project
        ↪  activity with the title "Graphics design" on the project with project number 23001
65      Then the error message "Login krævet" is given
66
67  Scenario: 4b. An end week needs to be after or same as start week
68      Given the user is logged in as "mila"
69      And an activity
        ↪  with the title "Graphics design" exists within the project with project number 23001
70      When the user sets the start week to 2304 and end week to 2303 on the project
        ↪  activity with the title "Graphics design" on the project with project number 23001
71      Then the error message "Sluttid skal være efter eller ens med starttid" is given
```

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Listing 8: Use case: Opret projekt aktivitet for projekt med projektleder

```
1  Feature: Creating a project activity for a project with assigned project leader
2  Description: A project leader creates a project activity for a project
3  Actors: employee, projectleader
4
5  #BACKGROUND
6  Background:
7      Given the application has a
       ↪   registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And the application has a registered
       ↪   employee with first name "Mette", last name "Frederiksen" and initials "mefr"
9      And a project with title "Video game" with project number 23001 exists in the application
10     And "mefr" takes the role as project leader on project 23001
11
12 #MAIN SCENARIOS
13 Scenario: 1. A project leader can create a project activity
14     Given the user logs in using initials "mefr"
15     When the user assigns the project activity "Graphics design" to project 23001
16     Then the
       ↪   project with the project number 23001 has a project activity titled "Graphics design"
17
18 #ALTERNATIVE SCENARIOS
19 Scenario: 1a. An employee is not able to create a project activity
20     Given the user logs in using initials "mefr"
21     When the user assigns the project activity "Graphics design" to project 23001
22     Then the error message "Kun projektlederen kan redigere denne projekt aktivitet" is given
```

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***Listing 9:** Use case: Medarbejder udpeger sig som projektleder*

```
1   Feature: Take on the role of project leader
2   Description: An employee can,
    ↪  when no project leader is assigned to a project, appoint themselves as project leader.
3   Actors: Employees
4
5   #BACKGROUND
6   Background:
7       Given the application has a
        ↪  registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8       And the application has
        ↪  a registered employee with first name "Brian", last name "Laudrup" and initials "brla"
9       And a project with title "Video game" with project number 23001 exists in the application
10
11  #MAIN SCENARIOS
12  Scenario: 1. An employee can appoint themselves as project leader
13      Given the user logs in using initials "mila"
14      When "mila" takes the role as project leader on project 23001
15      Then "mila" is the project leader on project 23001
16
17  #ALTERNATIVE SCENARIOS
18  Scenario: 1a.
    ↪  An employee appoints himself as project leader on a project where there is already one.
19      Given "brla" takes the role as project leader on project 23001
20      And the user logs in using initials "mila"
21      Given "mila" takes the role as project leader on project 23001
22      Then the error message "Der kan kun være en projektleder" is given
23
24  Scenario: 1b. An employee appoints himself as project leader on a project that does not exist
25      Given the user logs in using initials "mila"
26      And "mila" takes the role as project leader on project 25001
27      Then the error message "Projektet kunne ikke findes i samlingen af projekter" is given
```

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Listing 10: *Use case: Registrer arbejdstid på projekt aktivitet*

```
1  Feature: Register work time on a project activity
2  Description: An employee registers their work time on a project activity.
3  Actors: employee
4
5  #BACKGROUND
6  Background:
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And a project with title "Video game" with project number 23001 exists in the application
9      And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
10     And the user logs in using initials "mila"
11
12 #MAIN SCENARIOS
13 Scenario: 1. Register work time on project activity
14     When the user registers a work time of 6 hours to the
       ↪ project activity with title "Graphics design" in the project with project number 23001
15     Then the user has 6 hours of registered work
       ↪ time on the project activity with title "Graphics design" and project number 23001
16
17 #ALTERNATIVE SCENARIOS
18 Scenario: 1.a Register worktime in half-hour increments
19     When the user registers a work time of 6.5 hours to the
       ↪ project activity with title "Graphics design" in the project with project number 23001
20     Then the user has 6.5 hours of registered work time on the
       ↪ project activity with title "Graphics design" in the project with project number 23001
21
22 Scenario: 1.b Project not found
23     When the user registers a work time of 6 hours to the
       ↪ project activity with title "Graphics design" in the project with project number 23002
24     Then the error message "Ukendt projekt" is given
25
26 Scenario: 1.c Project activity not found
27     When the user registers a work time of 6 hours
       ↪ to the project activity with title "Regndans" in the project with project number 23001
28     Then the error message "Ukendt projekt aktivitet" is given
```

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Listing 11: Use case: Se og rediger i registreret arbejdstid på aktivitet. Fortsætter på Listing 12

```
1   Feature: View and edit registered work time on a project activity
2       Description: An employee wishes to view or edit registered work time on an activity
3       Actors: employee and guest
4
5   #BACKGROUND
6   Background:
7       Given the application has a
        ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8       And a project with title "Vide game" with project number 23001 exists in the application
9       And an activity
        ↪ with the title "Graphics design" exists within the project with project number 23001
10      And the employee with initials "mila" has registered 6 hours of work
        ↪ time to the activity titled "Graphics design" in the project with project number 23001
11      And the employee with initials "mila" has registered 10 hours of work
        ↪ time to the activity titled "Graphics design" in the project with project number 23001
12
13  #MAIN SCENARIOS
14  Scenario: 1. An employee can view a list of work time registrations for an activity
15      Given the user logs in using initials "mila"
16      When the list of work time registrations is requested
        ↪ for the activity titled "Graphics design" in the project with project number 23001
17      Then a list containing 2 items with the values 6 and 10 is returned
18
19  Scenario: 2. An employee can view the total amount of registered work time for an activity
20      Given the user logs in using initials "mila"
21      When the total amount of registered work time is requested
        ↪ for the activity titled "Graphics design" in the project with project number 23001
22      Then 16 hours is returned
23
24  Scenario: 3. An employee can edit the total amount of registered work time for an activity
25      Given the user logs in using initials "mila"
26      And the user edits the total amount of registered work time to 18 hours
        ↪ for the activity titled "Graphics design" in the project with project number 23001
27      When the total amount of registered work time is requested
        ↪ for the activity titled "Graphics design" in the project with project number 23001
28      Then 18 hours is returned
29
30  Scenario: 4. An employee can edit individual work time registrations for an activity
31      Given the user logs in using initials "mila"
32      And the user edits the first registered work time registration to 7 hours
        ↪ for the activity titled "Graphics design" in the project with project number 23001
33      When the list of work time registrations is requested
        ↪ for the activity titled "Graphics design" in the project with project number 23001
34      Then a list containing 2 items with the values 7 and 10 hours is returned
35
36  #ALTERNATIVE SCENARIOS
37  Scenario: 1a. Guests are unable to view the list of work time registrations for an activity
38      Given none is logged in
39      When the list of work time registrations is requested
        ↪ for the activity titled "Graphics design" in the project with project number 23001
40      Then the error message "Login kræves" is given
41
42  Scenario:
    ↪ 2a. Guests are unable to view the total amount of registered work time for an activity
43      Given none is logged in
44      When the total amount of registered work time is requested for
        ↪ the project activity titled "Graphics design" in the project with project number 23001
45      Then the error message "Login kræves" is given
```

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Listing 12: *Use case: Se og rediger i registreret arbejdstid på aktivitet. Fortsat fra Listing 11*

```
46  Scenario:
    ↪  3a. Guests are unable to edit the total amount of registered work time for an activity
47      Given none is logged in
48      When the user edits the first registered work time registration to 7 hours
        ↪  for the activity titled "Graphics design" in the project with project number 23001
49      Then the error message "Login kræves" is given
50
51  Scenario: 4a. Guests are unable to edit individual work time registrations for an activity
52      Given none is logged in
53      When the user edits the total amount of registered work time
        ↪  for the activity titled "Graphics design" in the project with project number 23001
54      Then the error message "Login kræves" is given
55
56  Scenario: 1b. An employee wishes
    ↪  to view the list of work time registrations for an activity with no work time registered
57      Given the user logs in using initials "mila"
58      And an activity
        ↪  with the title "Implement physics" exists within the project with project number 23001
59      When the list of work time registrations is requested
        ↪  for the activity titled "Implement physics" in the project with project number 23001
60      Then
        ↪  the error message "Ingen arbejdstid er registreret for denne aktivitet endnu" is given
61
62  Scenario: 2b. An employee wishes to
    ↪  view the total amount of registered work time for an activity with no registered work time
63      Given the user logs in using initials "mila"
64      And an activity
        ↪  with the title "Implement physics" exists within the project with project number 23001
65      When the the total amount of registered work time is requested
        ↪  for the activity titled "Implement physics" in the project with project number 23001
66      Then
        ↪  the error message "Ingen arbejdstid er registreret for denne aktivitet endnu" is given
67
68  Scenario: 3b. An employee wishes to
    ↪  edit the total amount of registered work time for an activity with no registered work time
69      Given the user logs in using initials "mila"
70      And an activity
        ↪  with the title "Implement physics" exists within the project with project number 23001
71      When the user edits the total amount of registered work time to 18 hours
        ↪  for the activity titled "Implement physics" in the project with project number 23001
72      Then
        ↪  the error message "Ingen arbejdstid er registreret for denne aktivitet endnu" is given
73
74  Scenario: 4b. An employee wishes
    ↪  to edit individual work time registrations for an activity with no registered work time
75      Given the user logs in using initials "mila"
76      And an activity
        ↪  with the title "Implement physics" exists within the project with project number 23001
77      When the user edits the first registered work time registration to 7 hours
        ↪  for the activity titled "Implement physics" in the project with project number 23001
78      Then the error message "Ingen arbejdstid er registreret for denne aktivitet endnu"
```

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***Listing 13:** Use case: Se oversigt over registreret arbejdstid på aktivitet*

```
1  Feature: View summary of registered work time pr. activity
2  Description: A project leader can view a summary of registered work time per activity
3  Actors: Project leader and employee
4
5  #BACKGROUND
6  Background:
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And the application has
       ↪ a registered employee with first name "Lars", last name "Svendsen" and initials "lasv"
9      And a project with title "Video game" with project number 23001 exists in the application
10     And "lasv" takes the role as project leader on project 23001
11     And multiple activities
       ↪ with registered work time for "mila" exists within the project titled "Video game"
12
13 #MAIN SCENARIO
14 Scenario: 1. The project leader can view a summary of registered work time pr. activity
15     Given the user logs in using initials "lasv"
16     And "lasv" is the project leader on project 23001
17     When "lasv" wishes to view a summary of the work time for the project titled "Video game"
18     Then a summary
       ↪ of registered work time pr. activity under the project titled "Video game" is shown
19
20 #ALTERNATIVE SCENARIO
21 Scenario: 1a. An employee
   ↪ recieves an error message when attempting to view the summary of registered work time
22     When "mila" wishes to view a summary of the work time for the project titled "Video game"
23     Then the error
       ↪ message "Kun projektlederen kan tilgå oversigten af arbejdstid for projektet" is given
24
25 Scenario: 1b. A project leader can only
   ↪ view the summary of registered work time for the project to which the person is assigned
26     Given a project
       ↪ with title "Web development" with project number 23002 exists in the application
27     When "lasv"
       ↪ wishes to view a summary of the worktime for the project titled "Web development"
28     Then an error
       ↪ message "Kun projektlederen kan tilgå oversigten af arbejdstid for projektet" is given
29
30 Scenario: 1c. The project leader recieves an error message if no work time has been registered
31     When "lasv" wishes to view a summary of the worktime for the project "Video game"
32     Then
       ↪ the error message "Ingen arbejdstid er registreret under dette projekt endnu" is given
```

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Listing 14: *Use case: Budgetteret tid til aktivitet*

```
1  Feature: Set time budget for a regular activity
2  Description: Project leader assigns the time bugdet for a given activity
3  Actors: Project manager
4
5  #MAIN SCENARIO
6  Scenario: Project manager assigns a time budget
7      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And a project
       ↪ with title "Projektplanlægning" with project number 23001 exists in the application
9      And "mila" takes the role as project leader on project 23001
10     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
11     And the user logs in using initials "mila"
12     And the user assigns a time budget of "32" hours to the activity titled "Graphics design"
13     Then the activity titled "Graphics design" has a time budget of "32" hours
14
15  #ALTERNATIVE SCENARIOS
16  Scenario: Employee assigns time buget
17      Given the application has a
       ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
18     And a project
       ↪ with title "Projektplanlægning" with project number 23001 exists in the application
19     And an activity
       ↪ with the title "Graphics design" exists within the project with project number 23001
20     And the user logs in using initials "mila"
21     And the user assigns a time budget of "32" hours to the activity titled "Graphics design"
22     Then the activity titled "Graphics
       ↪ design" returns the error message "Only project managers can assign timebudgets"
```

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Listing 15: Use case: Tilknyt medarbejder til projekt

```
1  Feature: Assign employees onto project
2  Description: Project leader assigns emplyees for a project
3  Actors: Project leader
4
5  #BACKGROUND
6  Background:
7      Given the application has a
         ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And a project with title "Video game" with project number 23001 exists in the application
9  #MAIN SCENARIO
10 Scenario: Project manager assigns an employe
11     Given the user logs in using initials "mila"
12     And "mila" takes the role as project leader on project 23001
13     And the application has
         ↪ a registered employee with first name "Brian", last name "Laudrup" and initials "brla"
14     And "mila" assigns "brla" to the project titled "Video Game"
15     Then the employee "brla" is assigned to the project titled "Video Game"
16
17 #ALTERNATIVE SCENARIOS
18 Scenario: Employee assigns employee to project
19     Given the user is logged in as "mila"
20     And there is an employee
         ↪ in the application with first name "Brian", last name "Laudrup" and initials "brla"
21     And "mila" assigns "brla" to the project titled "Video Game"
22     Then the project titled
         ↪ "Video Game" returns the error message "Only project managers can assign employees"
23
24 Scenario: Employee doesn't exist
25     Given user is logged in as "mila"
26     And "mila" takes the role as project leader on project 23001
27     And "mila" assigns "brla" to the project titled "Video Game"
28     Then the project titled "Video Game" returns the error message "Employee not found"
```

Listing 16: Use case: Hent restarbejde

```
1  Feature: Get reamining activity progress
2  Description: Project leader gets remaining time on activity
3  Actors: Project manager
4
5  #MAIN SCENARIO
6  Scenario: Project manager gets remaining time on activity
7      Given the application has a
         ↪ registered employee with first name "Michael", last name "Laudrup" and initials "mila"
8      And a project with title "Video game" with project number 23001 exists in the application
9      And the user logs in using initials "mila"
10     And "mila" takes the role as project leader on project 23001
11     And an activity
         ↪ with the title "Graphics design" exists within the project with project number 23001
12     And the user assigns a time budget of 32 hours to the activity titled "Graphics design"
13     And the user registers a work time of 6 hours to the
         ↪ project activity with title "Graphics design" in the project with project number 23001
14     When the user gets the remaining time on "Graphics design"
15     Then the activity returns 26 hours
```

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2 | DISKUSSION: KRAVSPECIFIKATION

2.1. OPLÆGSMÆSSIGE OVERVEJELSER OG AFGRÆNSNINGER

2.1.1. En admin rolle Oplægget nævner som udgangspunkt ikke et krav om en administrator rolle, men derimod at det er et internt system og at der ikke er behov for et sikkerhedslag. Ofte er det oplagt at have en admin facilitet, og i dette projekt kunne det som eksempel give mening til oprettelse af medarbejdere. Men i forbindelse med en kortlægning af projektet samt afgrænsning af funktioner, ser vi større værdi for kunden i at fokusere på de ønskede funktioner i stedet for at *gætte* på at de vil have en admin. Desuden kan en sådan rolle laves senere, hvis nødvendigt. At en gæst kan oprette en medarbejder er dermed et eksempel på brugen af K.I.S.S. *(Keep It Simple Stupid)* ved at anskue denne funktionalitet som en mock admin-klasse, der eksisterer udelukkende i forbindelse med udviklingen af arbejdstidsregistrering og projekthåndtering, de centrale ønsker.

2.1.2. UI og fokus på business logik Oplægget har ingen krav til bruger interface, men derimod rigeligt med krav til funktionalitet. Vi ønsker at levere noget brugbart til kunden hurtigt, og have K.I.S.S. i fokus for vores beslutninger og afgrænsning. Fra tidlige leverancer kan vi bruge kundens feedback til at videreudvikle på softwareløsningen iterativt, og bedre kunne prioritere udvikling af funktioner løbende. Derfor har vi i første ikke noget grafisk bruger interface, men derimod et program der køres i et CLI *(Command Line Interface)*.

2.1.3. Medarbejdere med samme navn For at tilgodese at medarbejdere kan hedde det samme vil medarbejder-objekter blive gemt ud fra deres initialer **som derfor skal være unikke**.

2.2. TEKNISKE OVERVEJELSER

2.2.1. Abstractions og compositions Disse to begreber bliver kun brugt i abstrakt forstand, da man i Java ikke har direkte kontrol over objekter. De kan konstrueres, men eksistere selv når objekter der peger på dem slettes. Java har en garbage collector der jævnligt analysere pointers i programmet og fjerner objekter der ikke bliver peget på.

2.2.2. UI UI'en er som nævnt tekstbaseret. Dette betyder at vi til at starte med ikke har en *Viewer*-klasse, da alt printes til konsollen. Bliver UI-delen for kompliceret kan en *Viewer*-klasse let implementeres.

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3 PROGRAMDESIGN

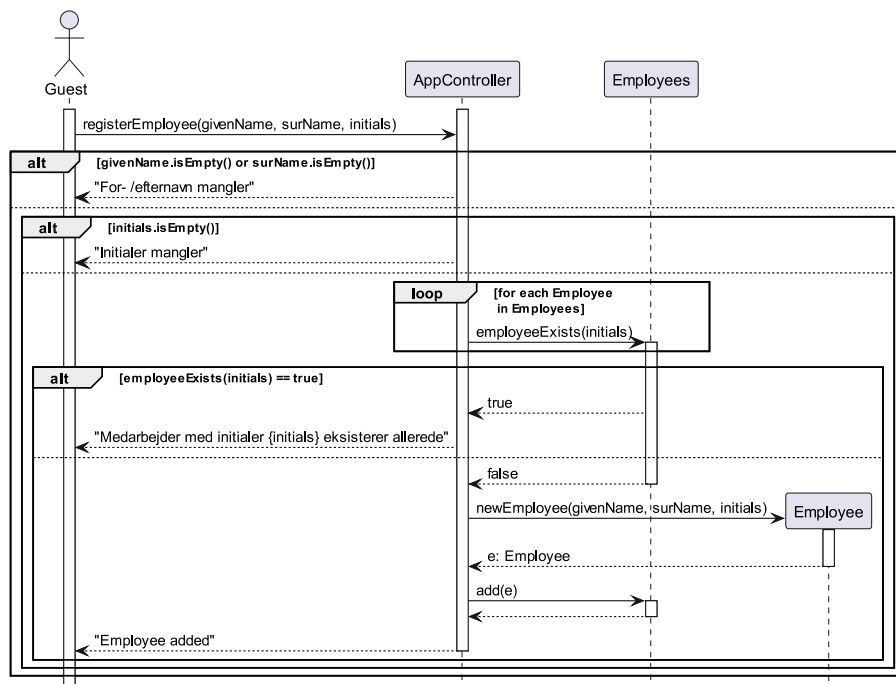## 3.1. KLASSEDIAGRAM AF PROGRAMDESIGN

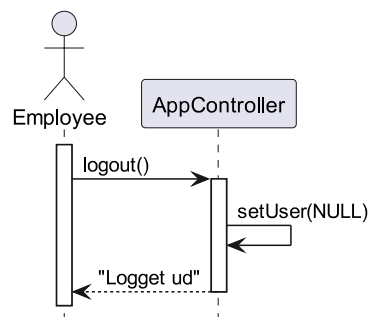*Figur 2: Klassediagram med MVC arkitektur*
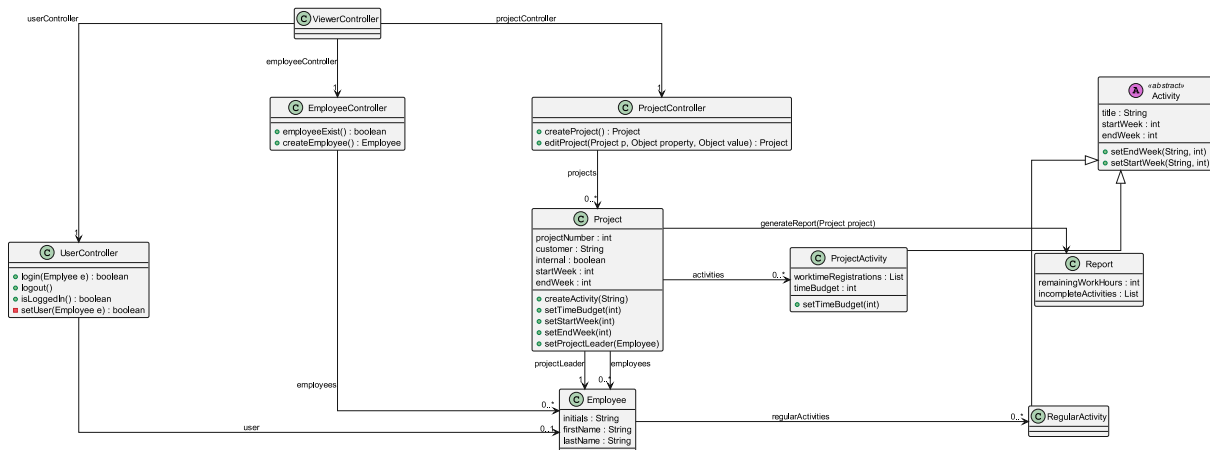
3.2. SEKVENSDIAGRAMMER

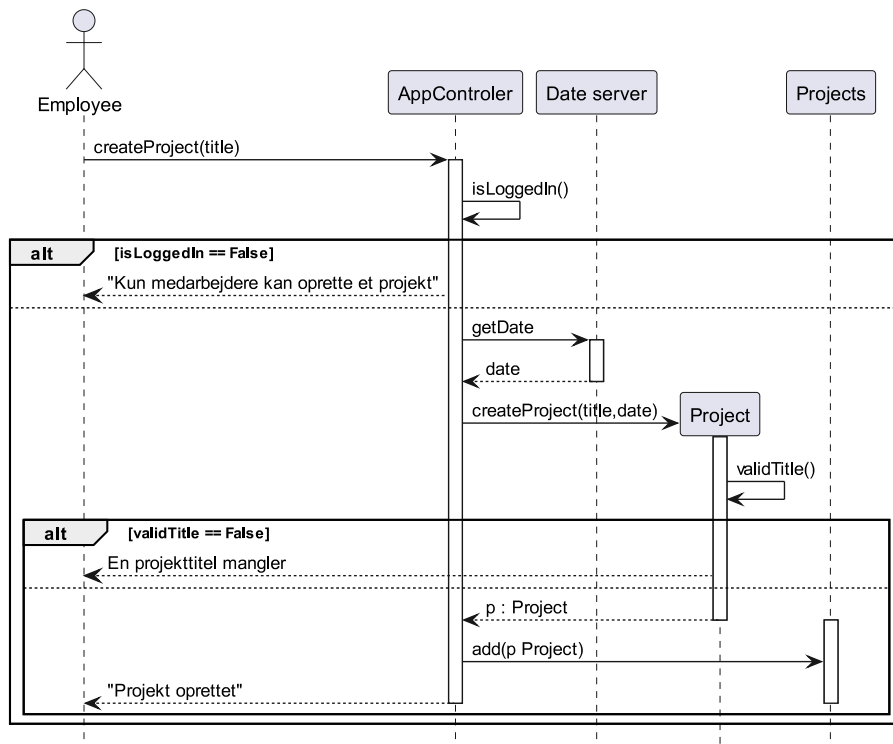*Figur 3: Sekvensdiagram: Opret medarbejder*

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Figur 4: *Sekvensdiagram: Medarbejder login*
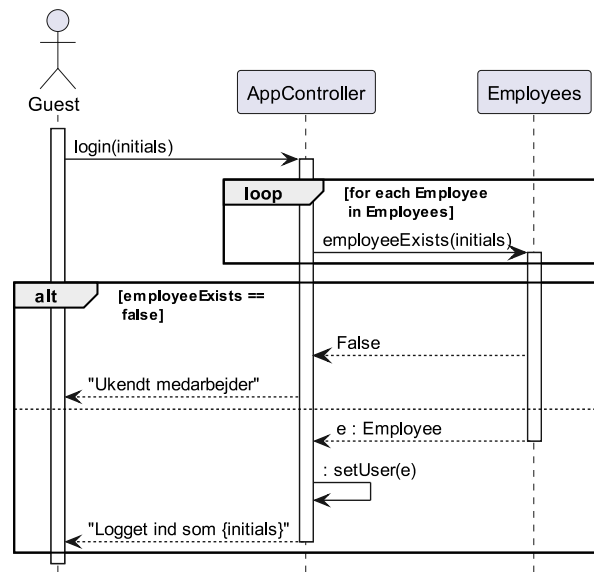
Figur 5: *Sekvensdiagram: Medarbejder log ud*

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Figur 6: *Sekvensdiagram: Opret projekt*

Figur 7: *Sekvensdiagram: Forsøg på at oprette en projektaktivitet som gæst*

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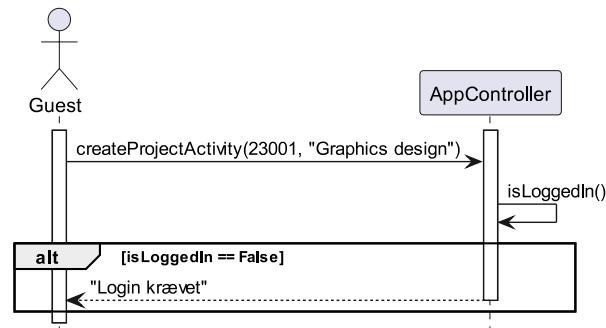
Figur 8: Sekvensdiagram: Forsøg på at oprette en projektaktivitet på projekt uden projektleder
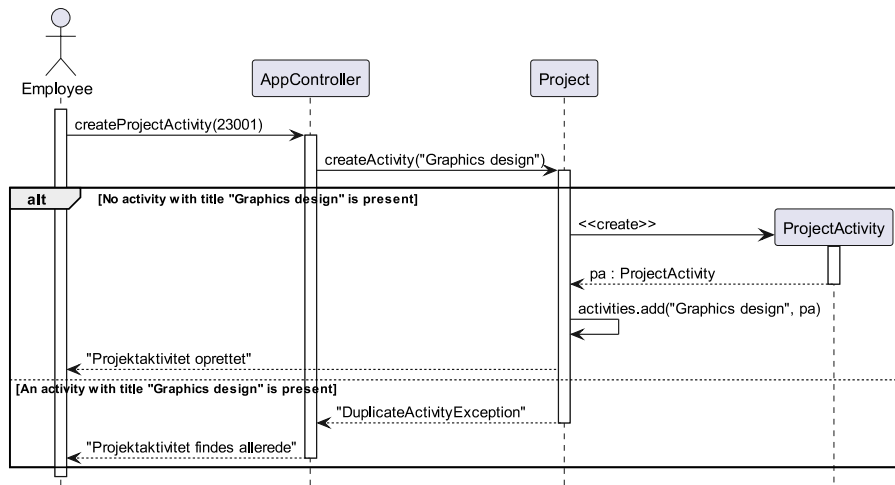
Figur 9: Sekvensdiagram: Forsøg på at fastsætte timebudget på projekt uden projektleder
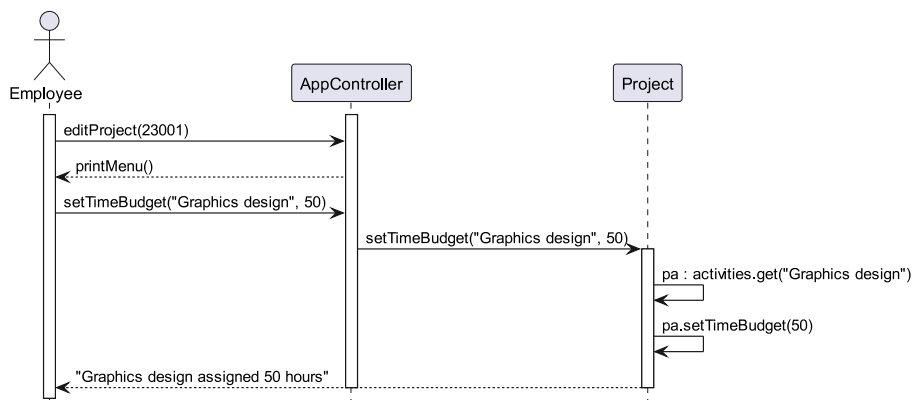
Figur 10: Sekvensdiagram: Forsøg på at fastsætte startuge på projekt uden projektleder

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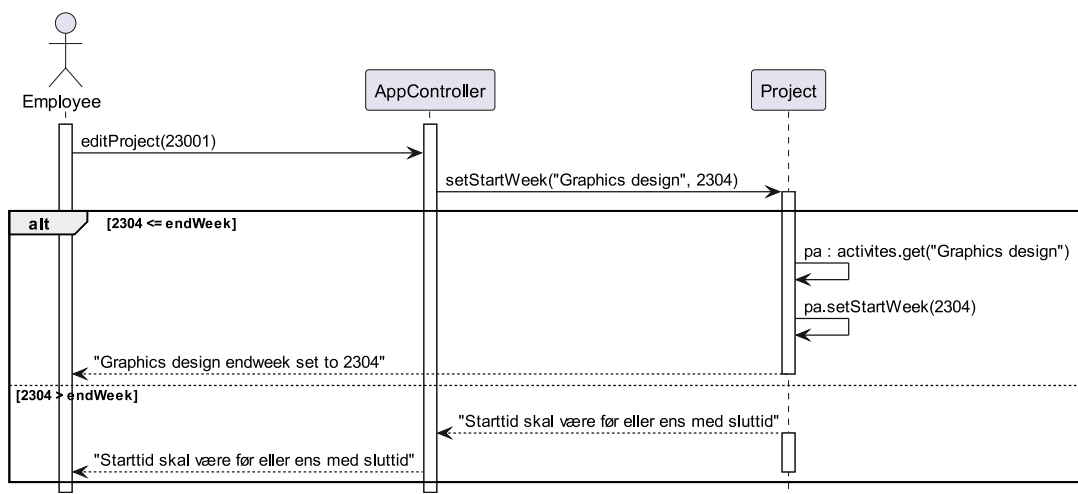
Figur 11: *Sekvensdiagram: Forsøg på at fastsætte slutuge på projekt uden projektleder*
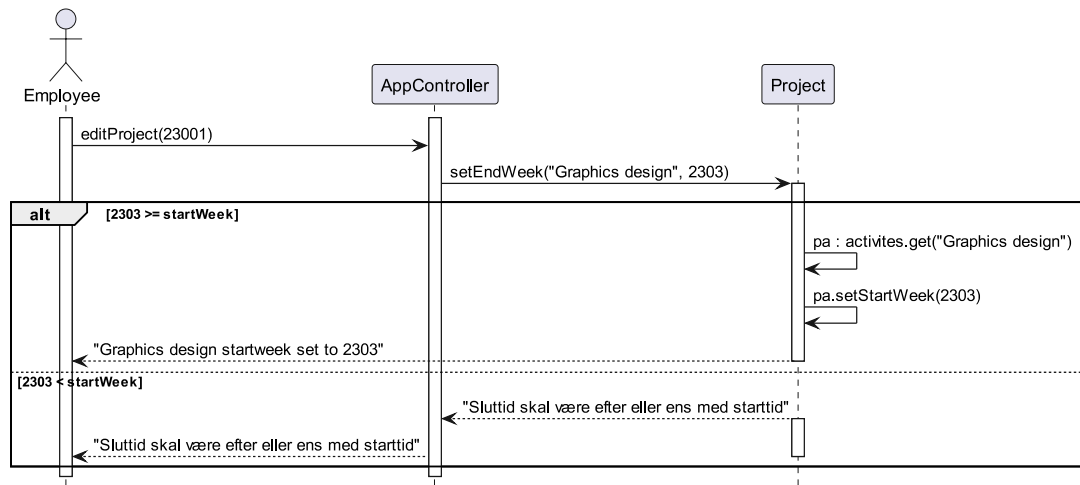
Figur 12: *Sekvensdiagram: Forsøg på at oprette en projektaktivitet på et projekt med en projektleder*

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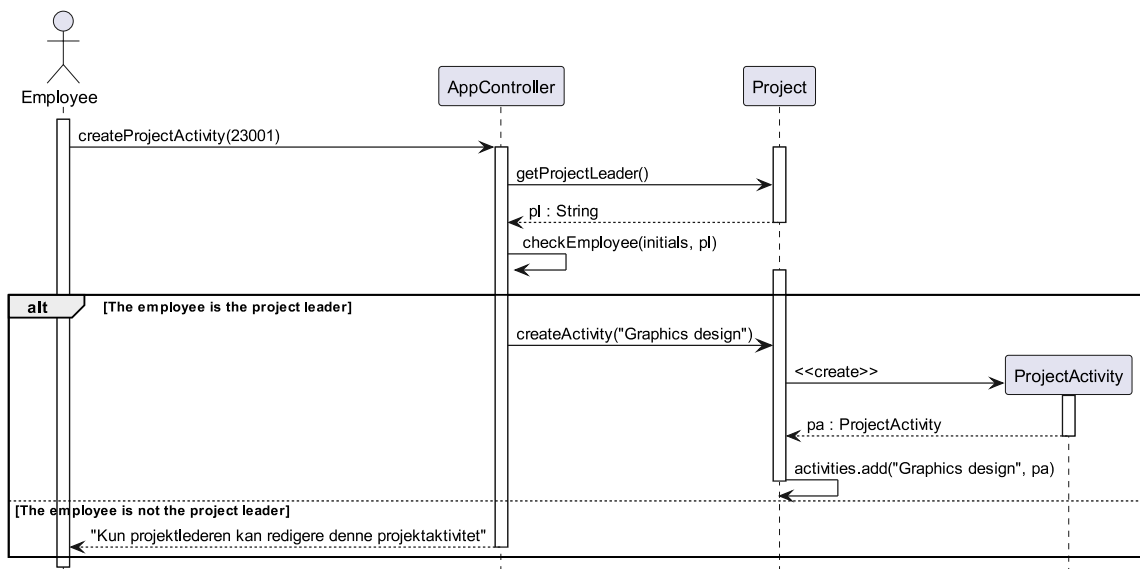
Figur 13: *Sekvensdiagram: Rediger projekt*
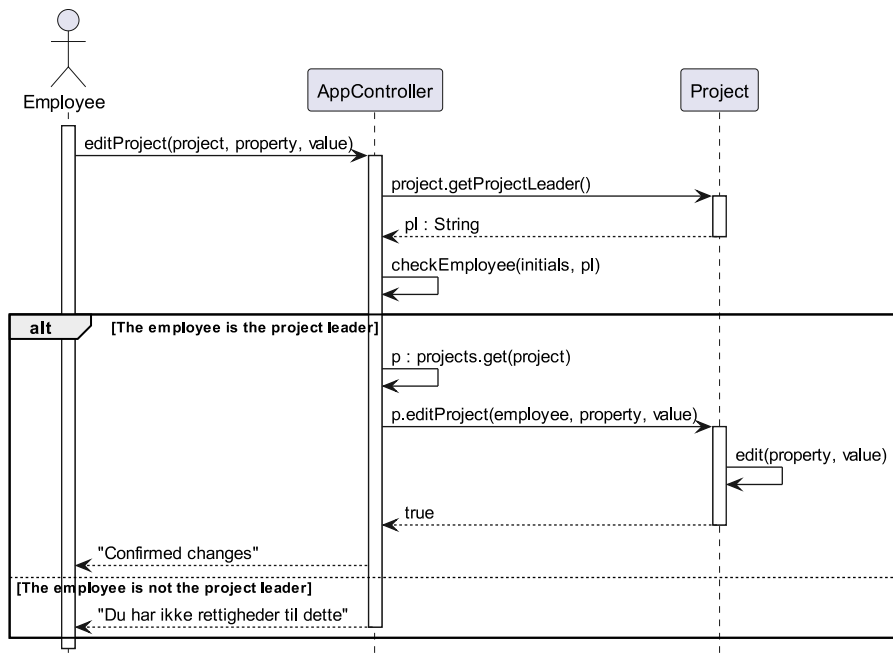
Figur 14: *Sekvensdiagram: Medarbejder udpeger sig som projektleder*

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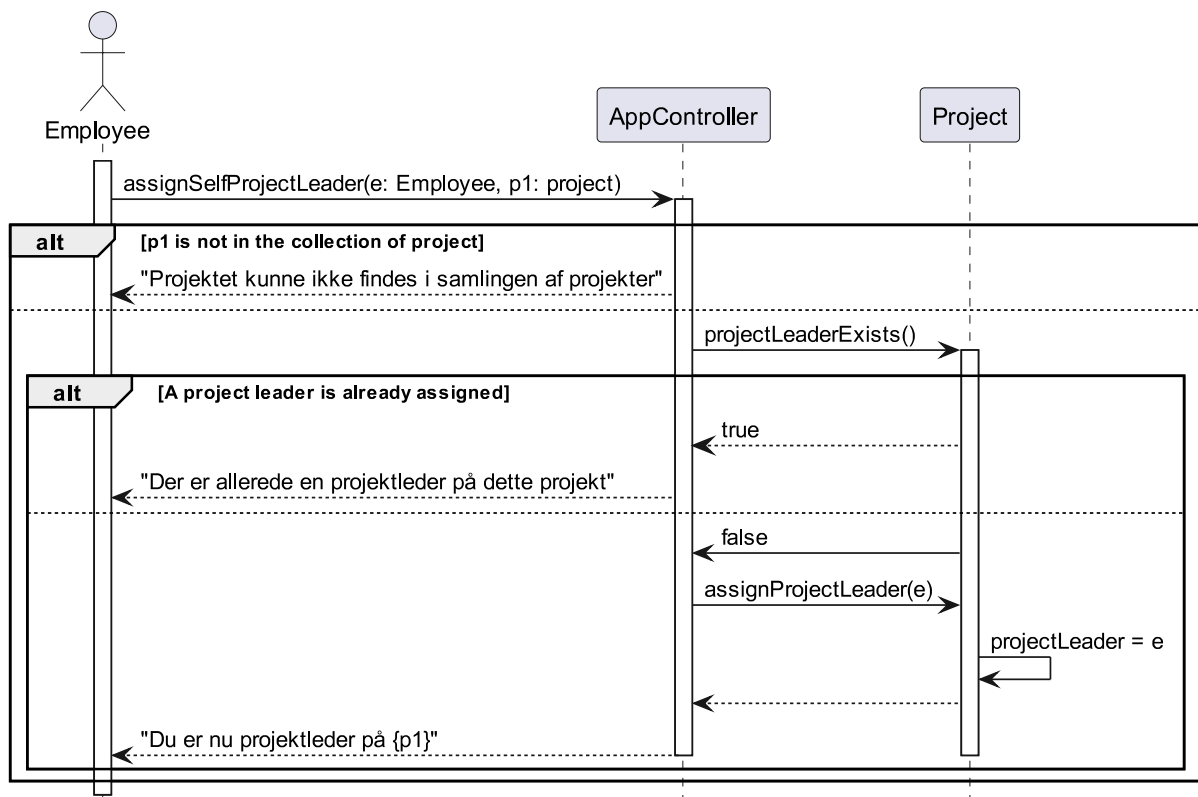
4   DISKUSSION: PROGRAMDESIGN

I dette afsnit bearbejdes to ting kort:

1. Valg af datastrukturer

2. Valg af klassestrukturer

4.1. DATASTRUKTURER

I valg af datastrukturer er det vigtigt hvorledes vi henter og gemmer data. I programmet bliver medarbejdere og aktiviteter defineret med en unik streng, mens projekter bliver defineret med et løbenummer. Hvis man for nemheds skyld konverterer løbenummeret til en streng, er der mulighed for at alle tre objekter kan gemmes i Map strukturer. Dette gør det nemt at hente objekter med `.get(key)`, udføre operationer på objekterne og overskrive objekterne i Map'et med `.put(key, Object)`. Er det nødvendigt at iterere over et Map, kan man også nemt bruge Java's `.stream()` metode. Ønsker man at gemme brugt arbejdstid på en aktivitet er det derimod nemmest at gemme denne i en List, da arbejdstiden kun akkumuleres.

4.2. KLASSESTRUKTURER

Programmet skal holdes simpelt og objekter skal nødvendigvis eje hinanden på en simpel måde. Det er besluttet at en *Controller/Model*-klasse varetager programmets busniessstruktur. Hvis klassen bliver for kompliceret kan der senere indsættes en *Viewer/Controller*-klasse som udelukkende varetager UI. Controller klassen indeholder Maps med projekter, medarbejdere og rapporter. Aktiviteter eksistere som en abstrakt klasse der nedarves til en fast aktivitet (f.eks. ferie), og projekt aktiviteter. De faster kan så ejes af et medarbejder objekt. Projektaktiviteter ejes af projekt objekter. Dermed bliver aktivitetsobjekter så ens som muligt, men ejes af de objekter der skal bruge dem. Med valget af MVC (Model-View-Controller)-arkitektur er der fare for at man som udvikler kan gøre controller-objekter til "gudeklasser", dog egner denne abstraktion sig særligt godt til planlægningsarbejdet, da man ved opmærksomhed på denne fare tvinges til at betragte cohesion og coupling endnu nærmere, end man måske ville have gjort uden den. Ligeledes deler den data og handlinger på de data naturligt (og ansvar), hvilket er en central idé i objektorienteret programmering. Endeligt er det et arkitekturmønster der naturligt passer på denne opgave jf. Softwarehuset's requirements; modellen er i vores tilfælde objekter der repræsenterer projektdata, viewet er vores brugergrænseflade og lader bl.a. Softwarehuset skabe overblik gennem rapporter, og kan vise hvilke medarbejdere er ledige til et projekt. Controlleren udbyder muligheden for at ændre objekterne (f.eks. til registrere arbejdstid, registrere ferie/sygdom og modifikation af projekter).

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FIGURER

TABELLER

LISTINGS