TDT4175 Information Systems

Group 19

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1 Introduction

Information is one of the most valuable resources of an organization. The NTNU's information system is a computer-based information system, it is composed of several actors (figure 1.1) that, put together, fill the role of an effective information system. However, the information doesn't seem to be always easily accessible with the current NTNU's information system.

The information system in the university is set up to help and to provide students with every kind of information they need. That is why the information must be accessible, accurate and complete. But, having good information is not enough, the system must be efficient, effective and have good performance standards to display properly and constantly the right information.

So, in order to avoid being misled by wrong information, the current system needs to be improved. The present report highlights some current problems and the solutions that can be brought.

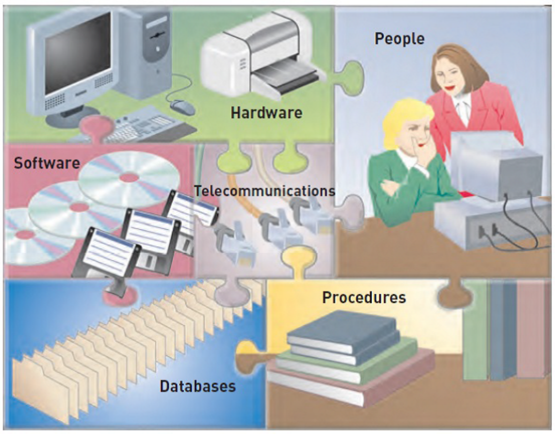


Figure 1.1: Computer-based information system components

2 Today's system

The situation as it is today is that It's Learning, Examweb, and Student web are three separate systems with a common database on the back-end. This back-end system is called Felles Sudentsystem (FS) and powers many universities and university colleges in Norway.

2.1 Description

2.1.1 Innsida

Innsida is the platform that connects every other systems used by NTNU. This is the centre of all applications you can use as a NTNU student, first you go to innsida and then you are redirected wherever you want to go. The main page display your messages, links to other applications and your calendar.

Also, there is a news feed page one click away from the main page where you can send a message, see all the news about the university, your studies, see events that will occur during the next days.

Finally, a profile webpage is also available, where you can write basic stuff about yourself,change your contact details and password.

2.1.2 It's Learning

While Innsida is the main site for NTNU, It's Learning main platform for students on a day-to-day basis. This is where they all information regarding courses they take, like assignments, lecture slides, curriculum and last student assistant hours. This system also where students deliver the assignments , receives feedback and grading on said assignments.

It's Learning is a system created by an external company, and is used widely as an teaching-platform among both high schools, universities and other higher educational institutes throughout the world.

Since It's Learning is a bought LMS, NTNU has very little say in the design and customization of the system. This has led many lecturers to creating their own systems, and using those instead. Example of this is most math-courses and TDT4120 (Algorithms and Datastructures)

2.1.3 Eksamensweb

Eksamensweb is accessible from the innsida web-page. It gives everything you need to know about exams. The main web-page contains two parts. First, a static part giving contact details, location, postal address and examination regulations (i.e. such information as arrival time, calculators and dictionaries allowed and so on). Then a dynamic part containing 4 sub-parts listed below :

Registration

In this sub-part you can check your exam dates, register for exams (you will be redirected on Studentweb to keep going over this task) and check about exam dates and locations.

Also, you have information about the deadlines for registration for both semesters, about courses that have a ”re-sit” or re-schedule exams and even if you need to register after the deadline (only special cases).

Below the previous section, there is insights about canceling your registration for exam in both semesters. This will also redirect you on Studentweb and you have to do it before the deadline otherwise you'll have to take the exam.

Final section is about special accommodations, this concerns you if you have health problem or a disability and then you can ask for special accommodations during your examinations. However, you will need to ask for it and there are deadlines for both semesters.

Preparations

This sub-part permits you to deal with the organization of the exam. You can access reading rooms and study hall locations in order to study beforehand.

Then, you are given a link to courses information about date, time and room for you to know where and when to go and take your exam. If you lack specific information, you'll be redirected on Studentweb again for further details.

Finally, you can have details on previous examinations (organization details too) and how to master your examinations, that is to say getting help and improve your exam-taking skills and how examiners assess your work

During examination

This sub-part deals with the very moment of the exam, it explains how the attendance works : you must arrive 10 minutes before the beginning of the examination, bring a photo identification and show this one to the invigilators before you can sign the attendance list.

You have a link that shows you the permitted examination aids, same link as the on in the static part of the webpage.

Then, some insights about how it is during the exam, if you are all of a sudden overwhelmed by some illness, if you ever try to cheat on an examination and some details on the presence of teaching staff during examinations.

Last section helps you to find the examination room. Indeed, it gives you a link of an overview of the lecture halls and rooms, a map of NTNU's campuses and the map of Trondheim Spektrum.

Examination results

Last sub-part of the dynamic part, it deals with the results. It gives you the examination result deadline, the explanation of grades and appeals and grade scale. Once the results are posted online, you can check them on Studentweb.

You are also given a transcripts and diplomas/certificates details. Here you can order a transcript or diploma/certificate and you can also ask for a diploma supplement.

Last section concerns the new examination, if you ever need to retake an exam in order to improve your grade, you have the information you need. The very last point is about the re- sit examination.

2.1.4 Student web

Student web is a portal where NTNU students can manage their course participation, register their personal information, check their grades, register in which faculty they wish to use their vote in student elections. Studentweb is in use at NTNU and several other education institutions in Norway. It is developed by NTNU and the other institutions that make use of the system.

2.2 Current problems

Using the information system of NTNU on a daily basis provided us with the knowledge of few weaknesses. In order to try and improve it we gathered some problems that occurred to us so that we will be able to get rid of those once we build the structure of the new system. Here are the main problems we have seen:

- All the systems (i.e. innsida, studentweb, itslearning) are separate, making information more difficult to access, too spread.
- Studentweb generates new links every time you go to a new site.
- Masterstudents use a different page, the system in whole is unintuitive since you also need information from other systems.
- Impossible to check your grades for assignment and exam on the same page. If the assignments count towards your final grade you have to make an extra step to find the grade you have just got.
- Need to login separately on every site, even though it is the same FEIDE-login.
- Some redundancies, figure 2.1 is an example.
- The daily update must occur if you changed anything that needs communication between systems, otherwise it won't be displayed
- Many of used systems have fields and services that are almost not used or simply unnecessary, like calendar on It's learning, emails on Student web or course table on Innsida.

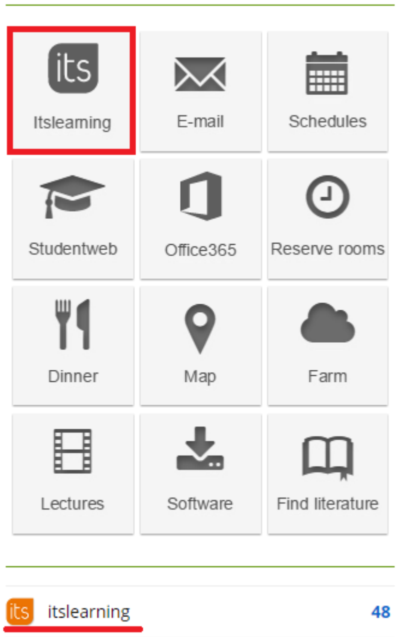


Figure 2.1: Redundancy in innsida

Using the current system, a BPMN model has been made through the process of registering for a course and exam, an check afterwards whether the user has been accepted to the course or not. See figure 2.2.

The actors involved in this process are the user, Studentweb and Itslearning. That's two different systems for one process that is only about one course. The tasks that the user has to accomplish are easy and not annoying so far, this side of the process is quite good. Only two databases are updated, that is also fine. The issue is one listed above, Since the user has to register on Studentweb and check on Itslearning, a communication has to be done between them. The fact is a maintenance occurs daily, and from that, all the information is updated.

As a result, to check any information on the course you just added, you have to wait the daily maintenance other you won't be able to see if you are even accepted to this course.

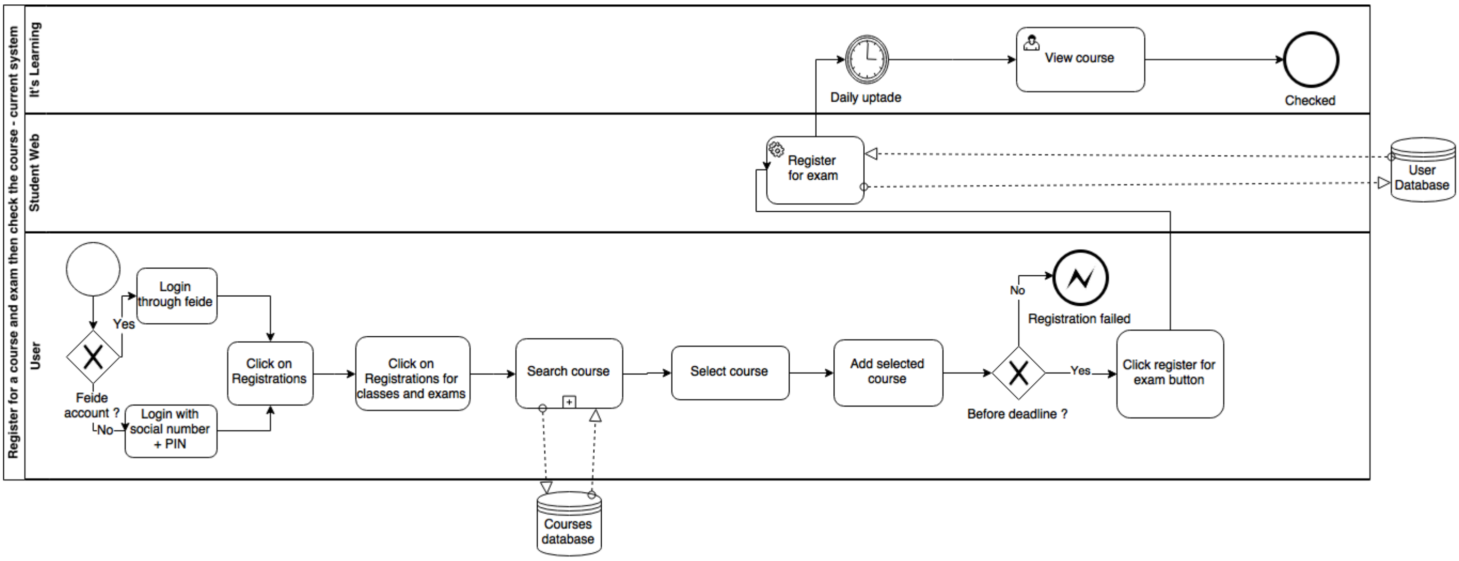


Figure 2.2: Register for a course and exam then check - current system

This matter will be discussed in the next part, a BPMN model will show how it will be in the new system. Also, some other improvements will be stated through BPMN models such as a new way to send e-mails and to complain about a grade.

3 New system

The most important change we plan to make is to gather all the existing system under one site. Since Innsida already exists and contains external links to other systems like Student Web, It's Learning, Email etc., it would be natural to use it as our base. Our new system will work as the front-end and FS (Felles Sudentsystem) will continue to serve as the back-end. All the functionality that is today covered by different systems will be moved to tabs, that will be accessible through every page in the system. Users will no longer wait too long for updates and they will have to log in once to access the system as a whole. We assume that it is secure enough to log in only via feide using username and password.

3.1 News feed - main page

Innsida as it is now consists of all the systems used by NTNU, but redundancy and confusing structure makes it hard to comprehend. News feed is the biggest part of the page, and we see it as a useful field, but its content in today's system is not consisting of important information and it's not systematized. We would like to keep the news feed as the only field on the main page, divided into subfields. Each subfield would have different function: one for general news, one for notifications for student taking specific courses (like warnings about closing deadlines), news sent by a faculty in which they belong, and possibly more. This way users will be alerted when something important is going on. Figure 3.4 presents an example sketch of the whole system.

3.2 Email

Users are already provided with Microsoft Outlook as Email system. It is a standard solution to use an existing service for that, and we intend to keep with a few changes. As it happens a lot in today's system that user has to log in two times to access different services (for example Innsida first, then Outlook), we would like to have Outlook as an underlying system accessed via a tab on the main page. That way logging in would be no issue, and other services would be available at any time. Figure 3.1 shows BPMN model for sending an email.

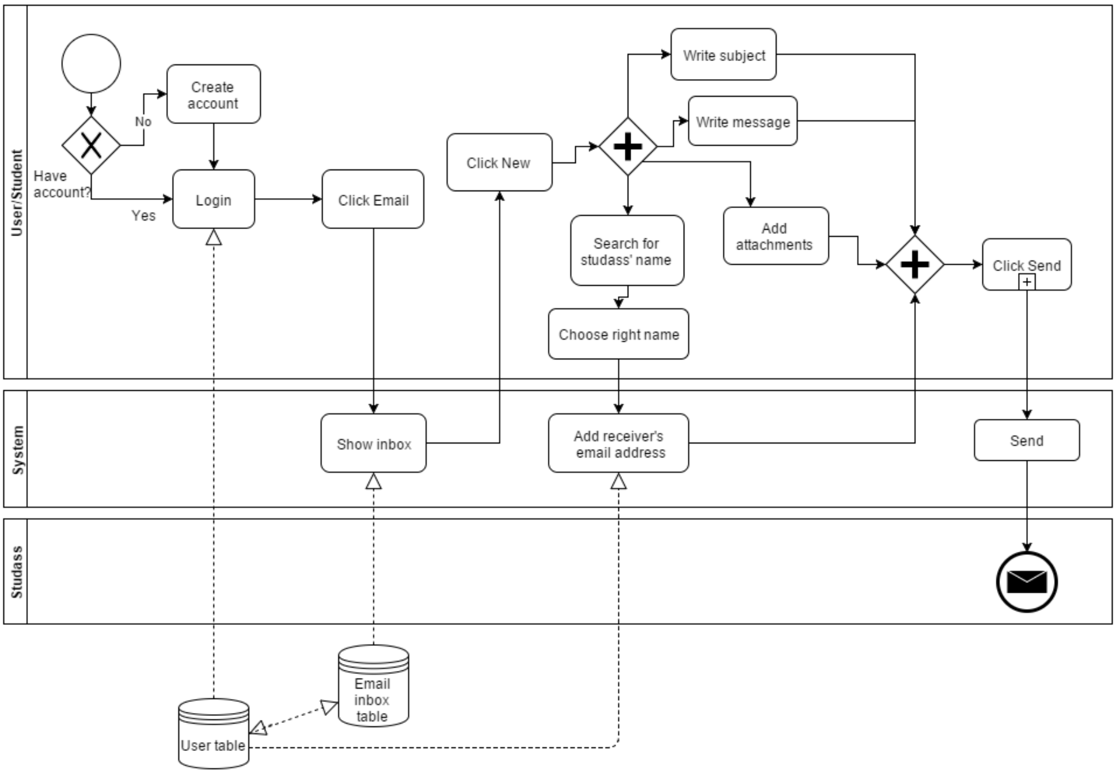


Figure 3.1: Sending email to studass

3.3 It's Learning

As we see it It's Learning provides little to no functionality needed in the system. Message system is already taken care of by Email system, and many courses use other systems for assignment evaluation and storing other important files (like TDT4120 has a simple website). Link to the library is also unnecessary - it can be accessed via ntnu.no. Some of the courses still use It's learning, which means that we need an alternative that covers functionality that is actually used. We were thinking of making a tab under main page called "Courses", where all the courses a user has something to do with at the moment (student, lecturer etc.) are listed. There would be possibility to deliver an assignment or evaluate it, depending on the kind of user. It would be also possible to deliver assignments in a group using participant overview (if teacher allows it). Important information like closing deadlines or new evaluation are supposed to be displayed in the feed on main page. A simple file system would be also provided. On top of that, students may easily add or remove courses directly from the list, given the deadline for that hasn't passed. This way one doesn't have to use two systems for that (i.e. It's Learning and Student Web), log in twice or wait for daily update. Figure 3.2 shows the approach.

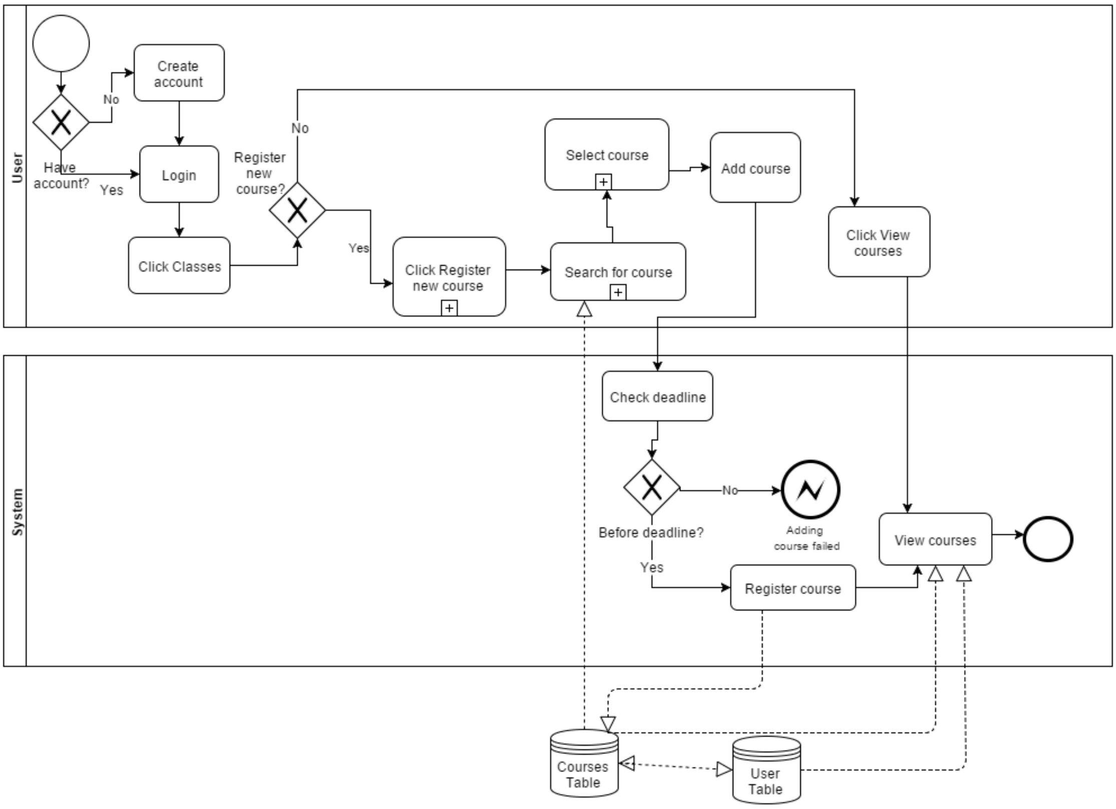


Figure 3.2: Register or view course

3.4 Student Web

Since Student web is mostly a front-end to FS, it should be no problem to replicate the utility you can find on this site in our system. We want to keep some services provided by it, where editing course list would be done as described in section 3.3. All the functionality that is course related will be accessed via ”Courses” tab. There will be fields for past courses and actual courses. The last essential function that needs to be covered is semester fee payment. Student web’s existing solution for that can be included in a tab called ”Payments”.

3.4.1 Past courses

For students, past courses will display courses that one has taken that have complaint deadline expired. It shows a list consisting course names, assignment statuses, assignment grading (if they count for the final grade), exam grades and calculated final grade. It will be possible to display the list in study plan view, with specified semesters and years. This approach makes it easy to have a clear overview and access all the information relevant to courses in one place. This kind of overview also makes it easier for students to choose future courses.

3.4.2 Actual courses

This section displays courses taken in current semester, along with assignment statuses (grades) and exam date. If a student has taken an exam in a course and is waiting for evaluation, the course will be displayed as pending. After receiving exam grade, final grade will we calculated, and course will stay in the subsection until complaint deadline has passed. As for past courses, overview is clear and access is easy.

3.5 Eksamensweb

Eksamensweb is a service accessible only for IME students, while others faculties each have a site including complaint form. In our solution students can complain directly through the main system in Actual courses subsection. As long as the grade has been calculated and deadline hasn't passed, there is Complain button next to it. System checks which faculty courses belongs to, so that user is redirected to right form. The form is partially filled in based on information from the system, so that grade complaining is as easy and intuitive as possible. Student can also be sure that all the information is correct. Issuing a complaint is showed in figure 3.3.

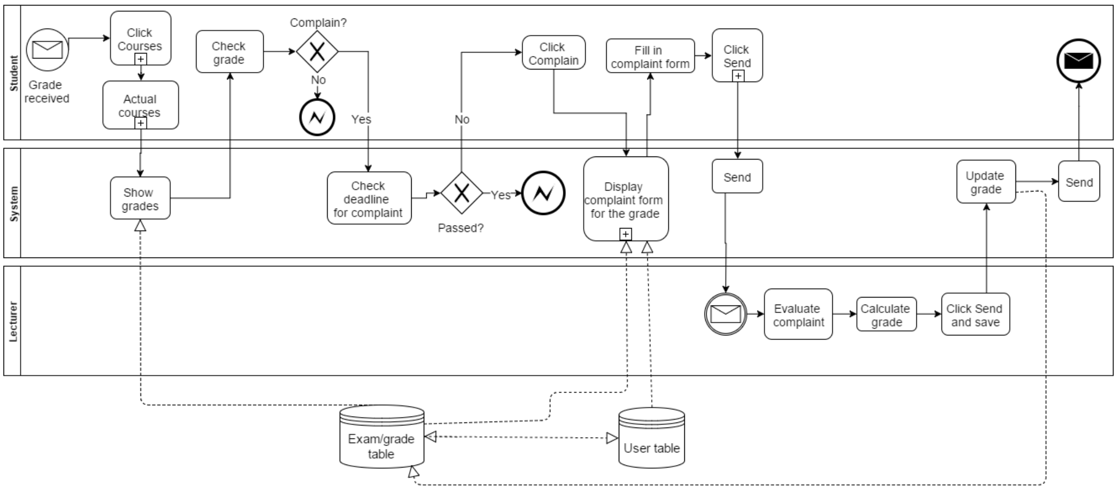
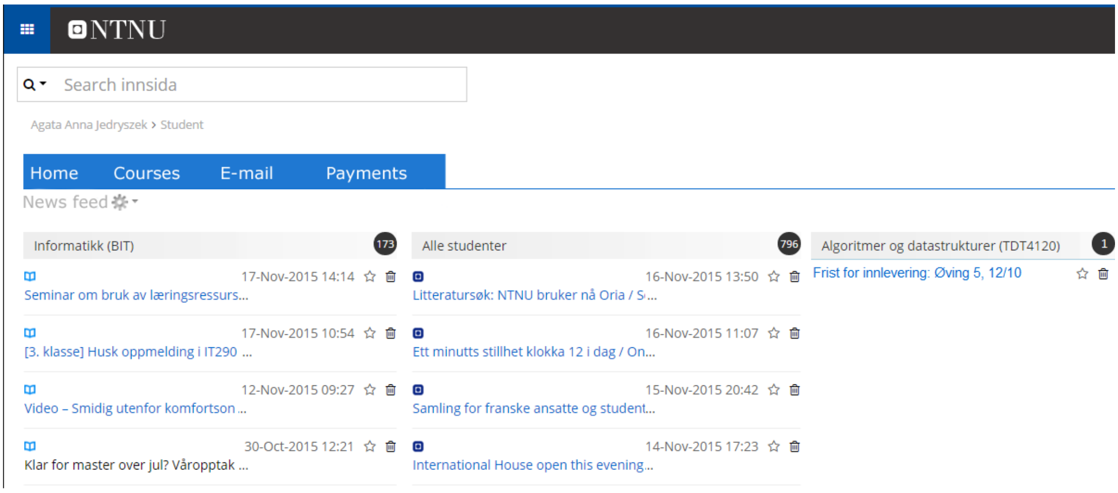


Figure 3.3: Grade complaint (given user is logged in)


NTNU

Search innsida

Agata Anna Jedryszek › Student

Home Courses E-mail Payments

News feed

Informatikk (BIT) 173

17-Nov-2015 14:14
Seminar om bruk av læringsressurs...

17-Nov-2015 10:54
[3. klasse] Husk oppmelding i IT290 ...

12-Nov-2015 09:27
Video – Smidig utenfor komfortson ...

30-Oct-2015 12:21
Klar for master over jul? Våropptak ...

Alle studenter 796

16-Nov-2015 13:50
Litteratursøk: NTNU bruker nå Oria / S...

16-Nov-2015 11:07
Ett minutts stillhet klokka 12 i dag / On...

15-Nov-2015 20:42
Samling for franske ansatte og student...

14-Nov-2015 17:23
International House open this evening...

Algoritmer og datastrukturer (TDT4120) 1

Frist for innlevering: Øving 5, 12/10

Figure 3.4: Sketch of possible solution - main page

4 Requirements

The functional and non-functional requirements are often used in software engineering to specify functions and how the system operates respectively.

The functional requirement more concretely should define what a system should accomplish. They are descriptive and should be written in such a way the reader immediately understands why the requirement is in place and how it pertains to the system.

The non-functional requirement should resemble the functional requirement in readability, however they instead specify how a system should be. This includes: security, usability and maintainability among others.

4.1 Use cases

Use case 1: Log in to Innsida

Task: Establish a secure and authenticated session with Innsida

Frequency: 150/hour

Critical: January and August

Sub task	Solution
Login	Login through Feide

Use case 2: Sign up to course

Task: Sign up in a course

Frequency: 100/hour

Critical: August, September, January, and February

Sub task	Solution
Log in	Log in through feide
Find course	Go to actual courses and select desired course
Sign up	Sign up in course if student has access to course

4.2 Functional requirements

Name	FR1
Priority	High
Requirement	User shall be able to log in and log out
Input	When prompted user will enter their username and password
Output	User shall have been logged in
Previous Requirements	Be a registered user of NTNU.

Name	FR2
Priority	High
Requirement	Student shall be able to sign up for courses
Input	Student will select the courses they want and click the Sign Up-button
Output	Student shall be signed up for the course
Previous Requirements	FR1

Name	FR3
Priority	Medium
Requirement	Student shall be able to read course information
Input	Enter the course page, and hit the News-button
Output	The news, if any, should be displayed
Previous Requirements	FR2

Name	FR4
Priority	High
Requirement	Student shall be able to check their exam grades
Input	When in the Courses tab, click into the course you want see the grade in
Output	The grade, if any, shall be displayed
Previous Requirements	FR2

Name	FR5
Priority	High
Requirement	Student shall be able to check assignment evaluation
Input	When in the Courses-tab click into the course you want to see the assignment evaluation for
Output	The evaluation is displayed on this page
Previous Requirements	FR2

Name	FR6
Priority	Medium
Requirement	Send in complaint regarding exam grades
Input	When in the Courses-tab click into the course you want to complain about your grade. Click the Complain-button
Output	A complaint will be sent to the lecturer
Previous Requirements	FR2

Name	FR7
Priority	Low
Requirement	Create and cancel room reservations
Input	Click the room-reservation tab, then choose the room, date and time
Output	If the room is available on the given date and time the room shall be reserved
Previous Requirements	FR1

Name	FR8
Priority	High
Requirement	Student shall be able to upload finished assignments
Input	Click the courses-tab, choose the assignment you want to deliver, and upload the file
Output	The file is uploaded
Previous Requirements	FR2

Name	FR9
Priority	High
Requirement	Lecturer shall be able to upload the results for an exam
Input	Fill out the form for exam grades, and upload it to the website
Output	All exam grades will be uploaded, and available for viewing
Previous Requirements	FR1

Name	FR10
Priority	Medium
Requirement	Lecturer shall be able to receive complaints regarding the exam grade
Input	None
Output	When a student sends a complaint in a given course the lecturer will automatically be notified
Previous Requirements	FR1

Name	FR11
Priority	High
Requirement	Lecturer shall be able to evaluate an assignment and upload the results
Input	In the courses tab, choose the assignment that you want to evaluate and click the Evaluate-button and enter the evaluation
Output	The evaluation will be uploaded to the website and be displayed
Previous Requirements	FR1 and FR8(for the student)

Name	FR12
Priority	Medium
Requirement	Lecturer shall be able to create new events, such as assignments, lectures with guest speakers etc
Input	When in the Courses-tab, click the “Create New Event”-button. Input all relevant information
Output	A new event is created, in which all relevant information is displayed
Previous Requirements	FR1

Name	FR13
Priority	Medium
Requirement	Lecturer shall be able to upload files that students might need, such as compendium, extra reading materials, etc
Input	When in the Courses-tab, click the “Upload File”-button. And choose the documents to upload
Output	The document will be visible to all participants of the course
Previous Requirements	FR1

Name	FR14
Priority	Medium
Requirement	The user shall be able to send emails
Input	Click on the Outlook-tab, and click the “Compose”-button
Output	A new window will be opened where you can write the email
Previous Requirements	FR1

Name	FR15
Priority	Medium
Requirement	The user shall be able to read emails
Input	Click on the Outlook-tab
Output	All received emails will be displayed
Previous Requirements	FR1

Name	FR16
Priority	High
Requirement	The user shall be able to read general news regarding NTNU or the faculty in which they belong
Input	None
Output	When Innsida is loaded all the latest, relevant news will be displayed
Previous Requirements	FR1

4.3 Non-functional requirements

Name	NFR1
Priority	High
Requirement	The system shall have an uptime of at least 95%
Measure	The system will be built robustly, and have a maintenance staff that will be available at all times

Name	NFR2
Priority	High
Requirement	The user shall be able to use the entire website without having to log in again(unless timed out)
Measure	Due to the way our solution is built this is essentially a non-issue, but it is very central to our idea

Name	NFR3
Priority	Low
Requirement	The user shall receive a clear and concise error message if an error occurs
Measure	This will require some testing as all of the most common errors need to be documented, and given an appropriate error message

Name	NFR4
Priority	High
Requirement	All personal information regarding students and lecturers shall be protected
Measure	The system shall monitor if it is under attack, it shall also be tested for security vulnerabilities

4.4 Risk analysis

Risk	**Probability**	**Severity**	**Importance**	**Preventive measures**	**Reactive measures**
The site goes down due to a spike in server workload	5	8	40	to use appropriate hardware	to replace hardware
Requirements are changed after finishing the project	2	9	18	to use modules and interfaces	to have programmer for extra work
Data from old system don't run on a new system	7	4	28	to launch system at beginning of the semester	to copy data manually
Users accounts are hacked	3	6	18	to use framework and good encryption	to generate a new password
Software is not user friendly	1	8	8	to spend enough time by implement GUI	to fix it by requirements of students
High number of software defects	7	7	49	to spend enough time by planning	to provide support
Rules for the selection of courses are changed	3	4	12	to create admin interface	to change it by programmer

5 Possible problems with the new solution

One of the biggest weaknesses with our suggested changes, is that it has more of a single point of failure than the current system. With the changes we propose, it would be impossible for NTNU-students to register for courses if the system is down. The same goes for other parts of our system, but it is more important for the functionality today governed by Student Web, since there are set deadlines for every student in Norway. That is, if the Student Web suffer system failure, then it would affect all users equally. With the changes, there is a possiblity that only NTNU students are affected, and would be punished for it.

A second problem is that a system like this, would not be trivial to maintain. It is quite possible that NTNU would be unable to run such a system. This is because they would have to hire people to design, program and maintain it. Since it is not part of our task to determine if implementing the changes outlined in this report, we will neglect this point. However, we feel, that with an unlimited budget, our system would be better than the current one. More servers is also needed, because of the increased server load on the main

Increased

6 Conclusion

List of Figures