Høgskolen i Østfold

BACHELOROPPGAVE

Development of Makerspace Management System
Group BO17-G14

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Informatikk / Digitale medier / Informasjonsystemer
Avdeling for informasjonsteknologi

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BACHELOROPPGAVE

Prosjektkategori: Kategorien her	X	Fritt tilgjengelig
Omfgang i studiepoeng: 20	(30/12 2029)	Fritt tilgjengelig etter
Fagområde: Fagområdet her	(X)	Tilgjengelig etter avtale med oppdragsgiver

Tittel: LaTeX mal for bacheloroppgaven	Dato: March 20, 2017
Forfatterere: Gunnar Misund	Veileder: Børre Stenseth
Avdeling / Program: Avdeling for Informasjonsteknologi (alle programmer)	Gruppenummer: BO17-G14
Oppdragsgiver: HiØ/IT	Kontaktperson hos oppdragsgiver: Monica Kristiansen

Ekstrakt:
Det har vært en økende vektlegging på dokumentasjonen i bacheloroppgavene ved HiØ, slik at hoveddokumentet nå er grunnlaget for karaktersettingen. Formålet med dette prosjektet er å gjøre det enklere for studentene å produsere dokumentasjon med hensiktsmessig innhold, tradisjonell struktur, og profesjonell utforming. Rapporten starter med å redegjøre for generelle krav til vitenskapelige og tekniske rapporter. Det blir lagt spesielt vekt på kravene som stilles ved HiØ. Det gies en kort oversikt over hvordan man produserer og vedlikeholder dokumenter, både analoge og digitale. Deretter blir det utformet en mal som angir struktur og innhold i hoveddokumentet. Etter en ha utviklet en sett med minimumskrav til programvarene som skal brukes, blir det klart at kun to verktøy er aktuelle: LaTeX og *OpenOffice Writer*. En selvforklarende mal blir implementert i dokumentverktøyet LaTeX (en mer eller mindre identisk mal for OpenOffice er beskrevet i prosjektet *OpenOffice mal for bacheloroppgaven*).

3 emneord:

Foo
Bar
FooBar

Forord[1]

Dette er en mal beregnet til bruk i Bacheloroppgaven ved HiØ/IT. Malen gir en pekepinn om både struktur og innhold, og hvordan ting kan løses rent skriveteknisk, typisk ved å klippe og lime.

Malen er utformet som dokumentasjon på et fiktivt prosjekt, der formålet er å gjøre det lettere og enklere å dokumentere en bacheloropppgave (og liknende prosjekter). De fleste kapitler er innledet med generelle retningslinjer for hva som skal med (dette er uthevet i grått).

Det er tenkt at malen skal kunne brukes i alle de ulike prosjekttypene: utvikling, utredning og medieproduksjon. Dermed er mange overskrifter generiske, og må selvfølgelig tilpasses de enkelte prosjektene. Det kan også være aktuelt å slå sammen enkelte deler av malen, eller legge til kapitler.

Det er ikke obligatorisk å bruke malen.

[1] Dette forordet skal som du skjønner ikke med i det endelige dokumentet ☺

Sammendrag

Sammedraget er hele rapporten komprimert til max 1 side. Sammendraget skal gi leseren et godt og tilnærmet komplett bilde av innholdet i dokumentet. Akademiske sammendrag kalles på engelsk for “Abstract”, og i mer kommersielle sammenhenger heter det gjerne “Executive Summary”. I det siste tilfelle har sammendraget som hensikt å gi ledelsen i en bedrift nok informasjon til å ta økonomiske og/eller administrative avgjørelser. . . uten å lese hele rapporten (!). Tradisjonelt blir sammendraget formattert som et sammenhengende avsnitt. I et bachelorprosjekt, vil hovedformålet være å gi leseren (kanskje i første rekke sensor?) et informativt (og appetittvekkende) bilde av prosjektet. Det er ikke vanlig å bruke litteratur- eller kryssreferanser i sammendraget. Som en regel kan vi si at alt som står i sammendraget, kan det leses mer om i rapporten. Dermed blir utfordringen å belyse alle viktige hovedpunkter, kort og presist. For denne rapporten, kan det f.eks. bli som dette:

De nye retningslinjene for evaluering av bacheloroppgaver ved Høgskolen i Østfold/IT legger større vekt på hoveddokumentet enn før. Denne rapporten er resultatet av et prosjekt der formålet var å gi studentene en mulighet for å forenkle og forbedre dokumentproduksjonen. Rapporten er en selvforklarende mal som tar for seg innhold, struktur og layout av hoveddookumentet i bacheloroppgaven. I tillegg er den et konkret eksempel på hvordan man kan bruke LaTeX som dokumentverktøy. Dokumentet er en mal, dvs. et stilsett som brukes for å gi dokumentet ønsket layout. Det blir gitt eksempler på de viktigste teknikkene, slik som bruk av kryssreferanser, kildereferanser, figurer og tabeller, og eksempler på formattering av spesielle elementer, som lister, sitater, definisjoner og matematiske uttrykk. I de tilfellene eksemplene ikke er selvforklarende, blir det gitt råd om hvordan man skal få det til. Intensjonen er at malen kan brukes for alle de tre hovertypene av bachelorprosjekter ved HiØ/IT: Utredninger, mediaproduksjoner, og utvikling av programvare, maskinvare eller systemer. Der det er naturlig å differensiere innholdet i de enkelte kapitlene, blir det skissert mulige løsninger for alle typene prosjekt. Formgivingen er enkel, oversiktlig og tradisjonell. Utgangspunktet for strukturen er den generiske oppbyggingen av et teknisk-vitenskapelig dokument, slik det er beskrevet i *Mayfield Handbook of Technical & Scientific Writing*. Innholdet i denne rapporten er en (kanskje forvirrende) blanding av generiske retningslinjer og konkret eksemplifisering relatert til prosjektet med å utvikle malen.

Takk Til

Det er vanlig, men ikke nødvendig, å nevne personer og miljøer som har hatt en positiv betydning for prosjektet, f.eks. på denne måten:

Jeg ønsker å takke gode kolleger ved Høgskolen i Østfold, Universitet i Oslo, og Høgskolen i Oslo og Akershus for interessante og fruktbare diskusjoner om utforming, gjennomføring og evaluering av bachelor- og masterprosjekter. I tillegg retter jeg en varm takk til pansermallene Ole, Dole og Doffen for uvurderlig støtte under arbeidet med prosjektet.

Innhold

Sammendrag **i**

Takk Til **iii**

List of figures **vii**

List of tables **ix**

List of code **xi**

1 Introduction **1**
1.1 The Group 1
1.2 Employer 2
1.3 Task 2
1.4 Report structure 4

2 Analysis **5**
2.1 The task 5
2.2 MakerSpace 5
2.3 Program tools 5

3 Design **7**
3.1 Leveransene og malen 7

4 Evaluation **9**

5 Discussion **11**

6 Conclusion **13**

Bibliografi **13**

Register **15**

A Meeting notes **15**
A.1 Meeting 24-1-17 16
A.2 Meeting 31-1-17 17
A.3 Meeting 7-2-17 18
A.4 Meeting 14-2-17 19

A.5 Meeting 21-2-17 20
A.6 Meeting 28-2-17 21
A.7 Meeting 28-2-17 22

List of Figures

2.1 Graph about document complexity. 6

List of Tables

Kodeliste

Chapter 1

Introduction

1.1 The Group

The group consist of 4 third year students. 1 informatics 2 digital media production and 1 information-systems. Most of the group have worked with each other on multiple occasions. Be it in student organisation or school projects. 3 member of the group also share apartment. All member have a high interest in the project where they themselves have spent much time.

1.1.1 Thomas Magelssen Bergby

A student who has been interested in everything regarding IT and technology since he was a kid. Thomas has been a leader for "Lær Kidsa Koding" (A group of students who teach coding for kids) and a leader for student assistants in web-development and JavaScript courses.

Thomas studies Informatics, and has gained skills within JavaScript, Java, PHP, CSS, Linux and Python. During his studies, he has taken courses like

- Algorithms and data-structures
- Software Engineering
- Object Oriented Programming
- Android Programming

He also enjoys traveling, and hopes to eventually get a job in the United Kingdom or USA.

1.1.2 Nicolai Naglestad

Studied International Baccalaureate at Skagerak International School in Sandefjord. Nicolai has an above average interest in technology and is always looking for something new to learn. Beside his studies he works as a student assistant in the subjects introduction to programming, web development, object-oriented programming and lastly he works at the schools MakerSpace where the latter is a position where he helps students get started on projects and with the use of the 3D printers. Nicolai has great interest with most aspects the are to be found inside the MakerSpace and you will find him there mosty of the time.

Nicolai studies digital media production at Østfold University College, but has taken subjects such as OOP, Software Engineering and .NET. He also enjoys learning new systems and languages.

1.1.3 Espen Ottar Skjeggestad

He has a broad field of interest, but the main one is IT and Biology. He is an active person that likes jogging, training, diving and trips. He is also politically active in the student politics and has roles as elected representative for the class, member of the student counsel and member of the executive committee for the student-democracy. He is currently a student vara-member of the University College Board. In work roles he was a student assistant for GRIT and is now working at the school library.

Espen studies Information Systems with focus on IT and code, but also includes business leadership and classes about economy.

1.1.4 Simon Chen Dybvik

Simon has been interested in technology his whole life. As a curious child, he often disassembled products to see what's inside and how it worked. He is over average interested in Apple and their products. During his studies at Østfold University College he has exchanged a semester abroad to California State University, Monterey Bay, where he focused on web development using CMS, JavaScript, jQuery, HTML and CSS, and graphic design. He is former vice-president of NITO Studentene Halden. NITO is a union for engineers and technologists.

Simon studies Information Systems with emphasis in web development. He has taken courses like project management, marketing, business economics and graphic design.

1.2 Employer

The employer for this project is MakerSpace (MS) which is a room located in Østfold University College (HiØ). The MakerSpace is a playroom for creating all types of technology, everything from electronics and robotics, to programming and 3D-printing. The room is currently funded and managed by the IT department.

Here, students and lecturers can use the rooms equipment to experiment with technology to further educate themselves within topics that they find interesting, and that are not necessarily related to any ongoing subject at the university college. The space is open for all students and staff of the university college, but is mainly used by the IT department.

The employers for this project are Staff Engineer Espen Teigen and University College Teacher Michael Andersen Lundsveen.

1.3 Task

The task of this project is to develop an inventory- and loan-system for Østold University College's MakerSpace. The purpose of this is to make it easier for employees at MakerSpace to keep track of inventory at all times. A full inventory-system will help both students and staff to find equipment

when a student assistant or department Engineer is not available. The system should preferably be able to know where equipment is in MakerSpace at any time. Simultaneously the employers of this project want to have a system for users of the MakerSpace to be able to loan out the equipment in the MakerSpace.

1.3.1 Purpose

The purpose of this system we are creating is to make maintaining the MakerSpace easier for all parties, but mainly for the University College employees of the MakerSpace. This means that less time is used for maintaining inventory, and helping to find different equipment. It also benefits the school in saving money, as the student assistants don't need to be used as often. They currently help with mundane tasks like finding equipment and counting inventory, and decide what needs to be ordered to fill up stocks.

1.3.2 Project delivery / Prototype

This group aims to supply the employer a website (front-end) and server (back-end) that is both user tested, and to the employers and users specification.

The website will support the following features:

- View all items (Name, Location, Description, Amount in stock)
- Create/Update/Delete items (CRUD)
- Register/Modify/Delete/View users
- User registration either via custom system or via OAuth 2.0
- The ability to loan set items defined by admins (list editable)
- See currently loaned items (all items or based on user)

Additionally to this there will be a REST API based on Node.js and MongoDB to provide a system for storing the information for the website and possible future apps or other systems.

Documentation

Each separate prototype/system will also include full documentation on how the system is to be used and in the case of the REST API, how it can be used in other systems. This documentation will be hosted on the same location as where the code is stored (GitHub). As with our main project page the document will be a web page generated by Jekyll hosted by GitHub Pages.

1.3.3 Method

We will be using the incremental method for development of the system. This method focuses on development piece by piece and works really well for modular systems. It also works for quantitative and qualitative testing of the parts that are done. These parts can also be used, and delivered to the employer.

The method is that you work on one piece of the system at a time. E.g you make the database-system first, and finish it. You can then move on to the next part.

This method has a lower risk of total failure and no delivery, because of the fact that is made up by working pieces.

1.4 Report structure

In chapter analyse will we go through what how the Østold university college define the task. How the discussion with employer and consoler changed the development direction. After that we will look at how different sites solved the issue. We will also look at the theory on development of item organisation sites and the tools we need to use, and why we choose to use these tools. We will present our design choices in the design chapter, and will show our implementation prosses in the Implementation chapter. The evaluation of the system will be addressed in the evaluation chapter, and the report win end with a conclusion chapter

Chapter 2

Analysis

2.1 The task

The task is from a need to get a control over the items that exists in MakerSpace. What they are and an approximately how many there are. It is also a need to get a control on the items student loan. The system will need the student assistants that work on MakerSpace to add and remove items. The boss of MakerSpace will need to have the same right and the possibility to add and remove student assistants. There will not be a need to get an exact cont on items like small leds and screws. But for bigger and more expensive equpment like raspberry pi or drones will need a count.

2.2 MakerSpace

MakerSpace is manly manned with by student assistants Around 3 people. It has a large room with usually many visiting through the day. Many of the student visiting make do by them self but occasionally need student assistants to find something or get advice on how to do a project. Manly the student assistants work with making sure the MakerSpace room is in order. They also have courses in relevant discipline for MakerSpace like 3D printing and drones.

2.3 Program tools

2.3.1 MongoDB

(add informastion here on why we use node.js)

2.3.2 Node.js

(add informastion here on why we use node.js)

2.3.3 Git

We use git as version control

2.3.4 Latex

The group chose to use LaTeXfor writing the report, and the documentation. The Minutes are also written in LaTeX.

The group chose to use LaTeXover other text editors, because of the usability. When it comes to large projects and reports, LaTeXis superior to other editors.

It is proven[1] that LaTeXis easier to use and more manageable on larger reports and projects, over e.g. Word. When a document becomes complex, it is a lot easier to use LaTeX. See graph (figure 2.1).

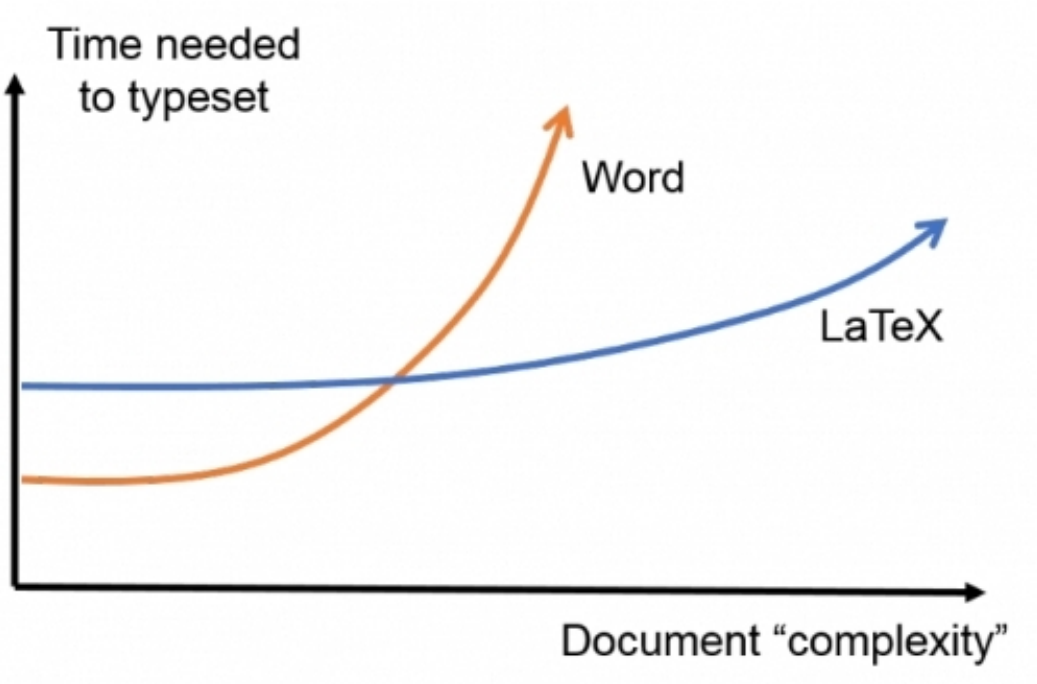

Figure 2.1: Graph about document complexity.

Chapter 3

Design

DB model
- classe modell?
- site map?

3.1 Leveransene og malen

Første versjon av hoveddokumentet bør bestå av introduksjonen og analyse- og designkapitlene (Kapittel 1, 2 og Kapittel **??**), og andre versjon bør være en mer eller mindre komplett beskrivelse av selve resultatet (Kapittel **??**). Endelig leveranse tilsvarer den komplette rapporten pluss selve produktet (og poster og presentasjon).

Chapter 4

Evaluation

Chapter 5

Discussion

Chapter 6

Conclusion

Bibliography

[1] J. Blanco, *Word or latex typesetting: Which one is more productive? finally, scientifically assessed — computer science — mapping ignorance*, 2015. [Online]. Available: http://mappingignorance.org/2015/04/06/word-or-latex-typesetting-which-one-is-more-productive-finally-scientifically-assessed/.

Appendix A

Meeting notes

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A.1 Meeting 24-1-17

BO17-G14 Guidance meeting

Minutes for January 24, 2017

Present: S. Børre (Chair), S. Espen, N. Nicolai B. Thomas

Absent:

Reports

The pre-report is delivered and approved

Last meeting points

1. Create pre-report
2. Create project contract
   The minutes of the previous meeting were approved.

New Business

1. Define tools we are going to use
2. Have perimeter meeting with employer.

Next Meeting: Thursday, January 31, at 10:30

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A.2 Meeting 31-1-17

BO17-G14 Guidance meeting

Minutes for February 31, 2017

Present: S. Børre (Chair), S. Espen, N. Nicolai B. Thomas

Absent: B. Thomas *(Travelling)*

Reports

Nothing notably to report.

Last meeting points

1. Create high fidelity wireframes

   The minutes of the previous meeting were approved.

New Business

1. Create wireframes
2. Define work roles
3. Meeting with employer to discuss wireframes

Next Meeting: Thursday, February 07, at 10:30

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A.3 Meeting 7-2-17

BO17-G14 Guidance meeting

Minutes for February 07, 2017

Present: S. Børre (Chair), S. Espen, N. Nicolai B. Thomas

Absent:

Reports

Wireframes

Landingpage and Itempage — We have created wireframes of landingpages and itempages. These pages have also been discussed with employer.

Last meeting points

1. Create wireframes
2. Have meeting with employer on what the system should contain.

   The minutes of the previous meeting were approved.

New Business

1. Create web page usable for user testing
2. Define therms

Next Meeting: Thursday, February 14, at 10:30

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A.4 Meeting 14-2-17

BO17-G14 Guidance meeting

Minutes for February 14, 2017

Present: S. Børre (Chair), S. Espen, N. Nicolai B. Thomas

Absent:

Reports

Webpage

Database — We now have a server. MongoDB is no created and with some dummy-data. It used Json files.

HTML page — The HTML landing page is now created and show dummy data and has a standard navigation menu that follow on all pages.

Last meeting points

1. Check the webpage
2. Defining therms

New Business

1. Start to fill out main report.
2. continue a prototype webpage so we can start user-testing.
3. Start to create a user-test.

Next Meeting: Thursday, February 21, at 10:30

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A.5 Meeting 21-2-17

BO17-G14 Guidance meeting

Minutes for February 14, 2017

Present: S. Børre (Chair), S. Espen, N. Nicolai B. Thomas

Absent:

Reports

Site

HTML page —

- The page now speaks with the API
- Created item page and admin page

Database — Continud working on the API

- Fix database form by empty items.
- Fix models
- tarted working on authentication for API

Main report

Added some parts form pre-report to main-report. Gone through the main structure for the template. Checked existing hall of fame reports to se best practise for the main-report.

Last meeting points

1. Start to fill out main report.
2. continue a prototype webpage so we can start user-testing.
3. Start to create a user-test.

New Business

1. Make a design on the webpage to make it ready for user testing.
2. Create the structure and fill out what we can on the main report. Add discussion of why we chose to focus on a easy to update site rather then a heavy administrated site.

Next Meeting: Thursday, February 28, at 10:30

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A.6 Meeting 28-2-17

BO17-G14 Guidance meeting

Minutes for October 5, 2011

Present: S. Børre (Chair), N. Nicolai, B. Thomas

Absent: S. Espen *(Travelling)*

Reports

Website

- We now have a detailed item view (not all info included)
- Search implemented (still testing)

Meeting discussions

New group member

We have been asked by a member of another bachelor group if he can join our group. We discuss this matter during the meeting, where our supervisor states that this decision is up to us te members of the group. Between now and next meeting we will make a decision if he will join our group or not.

Website / System

We discussed different aspects of the website, what it still needs and how we will solve different issues.

We discussed the following points that we need to implement on the website:

- Items
  - View (done)
  - Item out of stock / messaging system
  - New items (semi done) / Edit items
  - Tags on item page and in search
- Messaging system
  - Item out of stock
  - Loaned item
  - General messages
  - Need assistance
- Box location

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A.7 Meeting 28-2-17

- Users
  - Unauthenticated
    - View items
    - Send messages
  - Authenticated
    - Same as Unauthenticated
    - CRUD items
  - Admin
    - Same as Authenticated
    - CRUD news
    - CRUD users
- Login System
  Here it was discussed if we need a complicated login system as the majority of users on the system are unauthenticated users.

Report

The deadline for the report is March 9, but our supervisor states that this date is not that important as we can review the report every meeting.

Until next meeting

1. Continue work on website, to prepare it for user testing
2. Continued work on the report.

Next Meeting: Tuesday, March 7, 10:30