Customer driven project, TDT4290

Automatic Import of Completed Ads

Adresseavisen AS

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1 Abstract

This paper describes the process of developing a framework for Automatic Importing of Completed Ads, on request from Adresseavisen AS, which is a major regional newspaper. It will describe the project, from the preliminary study phase and project management/organization, to implementation and completion.

The goal is to create a framework which will facilitate automatic importing of completed real estate ads in the form of pdf-files and associated data, with possibility to expand to other types of ads. The accompanying data will be placed into the internal database of Adresseavisen and their internal order system for ads, and the pdf is to be saved in their archives.

Adresseavisen, as a customer, is interested in the framework in itself, with accompanying developer documentation for possible further development. In addition to this, we will produce full documentation of the process as a deliverable in the course which this project is for.

2 Preface

This document was written for the project-based course *TDT4290 Customer Driven Project*, at the *Norwegian University of Technology and Science, NTNU* during the fall semester of 2013.

The project team consisted of four students from the Department of *Computer and Information Science* at *NTNU*. The project was *Automated Importing of Completed Ads*, on behalf of *Adresseavisen AS*.

The team would like to thank customer representative Asle Dragsteen Liebech for great support, as well as our supervisor Zhu Meng for excellent supervising.

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3 Introduction

3.1 Project name - Automatic Import of Completed Ads

The project is named *Automated Importing of Completed Ads* by the customer; *Adressavisen AS.* The team is to create a framework for automatic import of real estate ads into Adresseavisens internal database and order system.

3.2 Customer - Adresseavisen AS

Adresseavisen is a regional newspaper in Trondheim, Norway. It publishes it's newspaper in Trøndelag and Nordmøre on a daily basis except for Sundays. It is an independent, conservative newspaper with a daily circulation of approximately 85000 NOK. Stocks in Adresseavisen are traded on the Oslo Stock Exchange.

"In addition to the main newspaper, Adresseavisen owns several smaller local newspapers in the Trøndelag region. They also own and operate a local radio station, Radio-Adressa, and a local TV station, TV-Adressa (prior to 30 January 2006: TVTrøndelag). They also have a stake in the national radio channel Kanal 24. In addition, the newspaper owns the local newspapers Fosna-Folket, Hitra-Frøya, Levanger-Avisa, Sør-Trøndelag, Trønderbladet and Verdalingen." [4]

3.3 Project Purpose

The purpose of this project is to create a framework for automated import of complete ads in the form of pdf-files. The pdf-files will be accompanied by data, which shall be added to the database, and used to create an order in Adresseavisens internal order system for ads. This framework will also be able to provide customers with certain information that is to be supplied when they wish to have an ad featured in Adresseavisen, such as available dates and ad-packages.

3.4 Project background

Adresseavisen currently uses a system where ads to be featured on website or published in newspapers are created in their internal order system, with the use of one of very many templates. This is very complex and an increasing amount of customers uses their own fully completed ads, in the form of pdf-files.

Adresseavisen now has the need for a system which can automate and simplify the process of receiving these ads into the system, with the purpose of eventually replacing the old system.

3.5 Problem Description

Webassistenten will take a completed ad in the form of a pdf file and save it to the appropiate folder. These folders will have the ID of the customer so that Adressa can easily identify which pdf belongs to which customer.

Webassistenten will require certain data along with the pdf, such as date, module etc. These data will be saved into a database internally in their system.

3.6 Existing Technology

<Already existing technology that the customer could have used rather than employing us to develop new software. This is where we will write that we found no such technology and how we found that information.>

3.7 Stakeholders

3.7.1 Customer

Customer: Adresseavisen AS

Customer representatives:
Asle Dragsten Liebech - asle.dragsten.liebech@adresseavisen.no
Jostein Danielsen - josetein.danielsen@adresseavisen.no

The customer is, along with our group, the most important stakeholder of our project. The project supplies the customer with a product that hopefully will improve their business, as well as saving them money they would otherwise have had to spend developing the product themselves.

It is important for the customer that we have a successful project resulting in a good product because delivering a poor product would require unnecessary work on their end.

3.7.2 Group Members

Group Members:
Audun Skjervold - audunskj@stud.ntnu.no
Erlend Løkken Sigholt - erlendsi@stud.ntnu.no
Hong-Dang Lam - hongdang@stud.ntnu.no
Truls Hamborg - trulsbjo@stud.ntnu.no

The members of our group are the other most important stakeholders of the project. This is mainly because the course gives course credit equivalent to two regular courses, making it more important to achieve a good grade.

3.7.3 Course Staff

Group Supervisor:
Meng Zhu - zhumeng@idi.ntnu.no

The course staff are the final stakeholders. The staff wants satisfied customers, and for the course to achieve good results. To accomplish this, we need to deliver a well written report with good documentation of the project. We also need to keep our supervisor satisfied throughout the project, supplying him with good under-way documentation.

3.8 Measure of Project Effects

The completed ads produced through our product will not be distinguishable from completed ads produced without it. For this reason, we will not see any effects of this project.

We do however hope that Adressa and their customers will see effects in the form of time and money saved. We also believe that the real estate agents to a larger extent will find the submitted ads being accepted in the format they want them to be.

3.9 Duration

The introduction to the course started on Wednesday 21.08.2013 when we all met in S6 for information and were introduced to the customer and the project. The project presentation is three months past the course start, on 21.11.2013. The final delivery is due on 22.11.2013.

4 Project Management

4.1 Terms and Resources

4.2 Roles

Role	Name	Responsibility
Scrum Master	Truls Hamborg	Scrum master/process manager leads the stand-up meeting. Makes sure the team follows the agreed-upon process.
Documentation Manager	Truls Hamborg	Ensures documentation coherency.
Product Owner (scrum role)	Adressa	The customer, owns the product
Lead coder	Erlend Sigholt	Oversees coding conventions and makes sure we follow the "clean coding" principles.
Secretary	Erlend Sigholt	Takes notes during meeting(s)
Implementation manager	Audun Skjervold	Takes care of learning the framework and implementation of the code.
Customer and supervisor contact	Hong-Dang Lam	Contact-person for customer and supervisor
System Architect	Hong-Dang Lam	Create and maintain the architecture of the system

Test Manager: Everyone is responsible for testing their own code.

4.3 Time schedule

In this section follows the time planning and schedule, in the form of a Work Breakdown Stucture (WBS), and a Gantt diagram. The Gantt diagram contains the implementation packages in the form of sprints, seeing as the project paln called for a agile-like organisation of the implementation phase, with multiple iterations on each implementation package, and the corresponding detailed architecture. More information on that can be found in the overall project plan chapter.

#	Package	Sub-package	# persons	Hours/person	Total # of hours	Hours per main package	Person-days(5h)/P assigned
1	Pre-study					174	9
1.1		Choice and study of software/-tools	4	2	8		0.4
1.2		Technology learning and acclimatization	4	25	100		5
1.3		Overall planning/-management	4	8	32		1.6
1.4		Role distribution	4	1	4		0.2
1.5		Process/Sprint planning	4	5	20		1
1.6		Standards	1	2	2		0.4
1.7		Milestone planning and review	4	2	8		0.4
2	Requirements					20	1
		Functional requirements	4	2.5	10		0.5
		Non-functional requirements	4	2.5	10		0.5
3	General project management					152	7.6
3.1		Meetings with customer(s)	4	3	12		0.6
3.2		Advisor meetings	4	5	20		1
3.3		Meeting with the group (internal meetings not directed	4	5	20		1

4.4 Overall project plan

4.5 Issues

The project didn't go as smoothly as we had hoped. The group agreed on pretty much everything, but the issues we had were mostly related to the software and tools not cooperating or working as we expected.

4.5.1 C# Compiler

When we tried to add the database to our project via the entity framework we had troubles with the C# compiler not being found. This was due to the installation of the Visual Studio 2012 Release candidate edition (which had expired), so we had to uninstall this RC version to install the "normal" Visual Studio 2012 which lead to the compiler not working - we couldn't add new items, compile or make a new project There was however a quickfix to repair the compiler by using the gacutil utility software included with Visual Studio 2012. This command in cmd fixed it:

```
gacutil /u Microsoft.VisualStudio.CSharp.Services.Language.Interop
```

4.5.2 GitHub DDoS

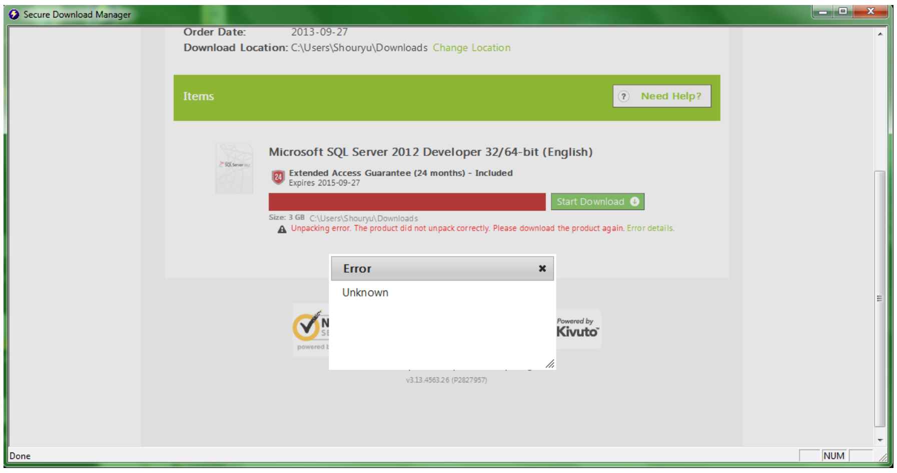
On October 14, the day of the midterm delivery, GitHub experienced a DDoS attack. This resulted in some of the files we were working on for the report becoming locked mid-commit and mid-pull, and preventing us from performing a new git pull. This also prevented some of us from compiling, due to a previous commit containing errors having been pulled.

4.5.3 Windows on Mac

Mac is not Windows.

4.5.4 SDM

NTNU gurutjeneste offers free MSDNAA account which we can use to download Microsoft software from MSDN software center (Microsoft developer network). To download software from MSDN we had to use Secure Download Manager (from now on referred to as SDM), by opening the .SDX file obtained from the MSDN webpage. The download went find however the unpacking of the files gave us an unknown error without further information.


Secure Download Manager

Order Date: 2013-09-27
Download Location: C:\Users\Shouryu\Downloads Change Location

Items

Microsoft SQL Server 2012 Developer 32/64-bit (English)
Extended Access Guarantee (24 months) - Included
Expires 2015-09-27

Size: 3 GB C:\Users\Shouryu\Downloads
Unpacking error. The product did not unpack correctly. Please download the product again. Error details.

Error
Unknown

v3.13.4563.26 (P2827957)

Done

Figure 1: SDM error

4.5.5 MSSQL

DB

4.6 Internal Risks

4.6.1 Low experience with the development process

What:	The group doesn't have much experience with lengthy projects
Probability:	High
Impact:	Low-High
Action:	Reduce by regularly reviewing progress and making use of supervisor meetings etc.

4.6.2 Unfamiliarity with technology

What:	Some members of the group have no experience with the programming language in use, and only one has used the relevant framework. Will require extra time for learning.
Probability:	Moderate
Impact:	Low-Moderate
Action:	Reduce by group members with experience coaching others in the relevant technology and practices. Set time aside for learning.

4.6.3 Unfamiliarity with tools

What:	Some members of the group have no experience with the tools we're using, it's complicated to install due to the different versions of the tools & there's so many tools needed to start.
Probability:	Moderate
Impact:	Low-Moderate
Action:	Reduce by group members with experience coaching others in the relevant technology and practices. Set time aside for learning. Debugging via Google.

4.6.4 Illness

What:	As winter approaches, the probability of group members becoming ill increases. Being a small group, this might be critical.
Probability:	Moderate
Impact:	Low-High
Action:	Do not tailgate deadlines. Work steadily, and have margins and practices. Expect some members to not produce at 100% every week.

4.6.5 Other engagements

What:	Group members have extracurricular activities that require time certain dates during the semester. This might cause absence and/or reduced work-output.
Probability:	Moderate
Impact:	Low
Action:	Plan for it well in advance. It seems however that the time required is fairly concentrated and/or pre-planned, so it should be easy to plan around.

4.6.6 Other subjects

What:	Customer driven projects isn't the only subject we're assigned to this semester, the other subjects might have projects too so we might not be able to allocate enough time for the project.
Probability:	High
Impact:	Moderate
Action:	Try to plan for it in advance. All the courses have clear deadlines and we should be able to plan ahead.

4.6.7 Underestimation of implementation

What:	We have estimated that the implementation scope is not a significant majority of the project, and possibly even smaller than the process and documentation parts. If we somehow have misjudged this, we will face significant delays/increased workload when the plan will have to be adjusted.
Probability:	Low
Impact:	High
Action:	Ensure to plan for more time for the project than we expect to need. Do not rush the pre-study, and familiarize ourselves sufficiently with all aspects. Ensure we have time to work overtime if necessary during the implementation period/sprints.

4.7 External Risks

4.7.1 Deaths

What:	There's always a chance of a family member passing away, leading to absence.
Probability:	Low
Impact:	High
Action:	Be understanding, try to reschedule working hours.

4.7.2 Customer

What:	Customer might be on vacation, in a meeting or not able to respond instantly. Database setup
Probability:	Medium
Impact:	Low
Action:	Wait and call again or send and email or short message service Set up our own local database

4.8 Procedures for Quality Assurance

5 Preliminary Studies

This section contains the information we found in our preliminary studies, and the choices we made from the information we gathered. Covered here are process-related topics such as development methodology, pros and cons of these, and which we chose, as well as technology-related topics such as frameworks and standards.

5.1 Development Methodology

The course compendium proposes two types of development methodologies: the sequential method *Waterfall*, and the agile method *Scrum*. This subsection supplies a brief introduction to these two approaches, followed by our argumentation for and against the two approaches in the case of our particular project. This subsequently followed by a conclusion as to which approach(es) we chose for our project.

5.1.1 Waterfall

The Waterfall development method is a sequential design process. It is divided into clearly defined, mostly separated phases, although there often is some overlap between them. The first phases focus on gathering requirements and writing initial documentation like design/architecture. Later phases move on to actual implementation, then testing, followed by final report. Maintenance after a "completed" project might also in some cases be part of the process. <add figure depicting process>

5.1.2 Scrum

The scrum development method is an agile approach to development. It is an iterative process consisting of several cycles, each containing most of the phases of a sequential method, and resulting in a functioning prototype. <add figure depicting process>

5.1.3 Our choice

Each of the proposed methods have their own advantages and disadvantages, that make each of the methods respectively a better or worse fit for our project than the other.

While the different methods have various advantageous features, not all of these are applicable to our particular project, and others are negligible.

Below we have highlighted the most important advantages and disadvantages of each method, while discussing whether or not the particular point is relevant to our project, leading to a conclusion and our choice of method.

Waterfall

The following points are advantages of using the Waterfall method for projects, both in general and for ours specifically.

- Waterfall is suitable for small projects because they are manageable to fully plan. This fits our project description.
- It is easier to get every involved party on the same page with a thorough plan, such as provided through the Waterfall method's early phases. This is beneficial to any project, but even more so in one such as ours, where the team consists of students who may have other projects in other courses running in parallel with this.

These next points are generally advantages of the Waterfall method, but are mostly not applicable for our project for various reasons.

- Waterfall is a good method if you know everything about the project beforehand, or are able to acquire the required information and the full project specification before the implementation phase. Due to the course schedule and the relatively limited time frame of our project, we felt we needed to start implementation earlier than a long planning and requirements phase would allow.
- Sequential methods require little underway feedback. This give them the edge over agile methods when access to the customer is restricted but specifications are expected to remain the same. While the specifications for our project were expected to remain unchanged, our goal was to include the customer in the process.
- The method supplies strong documentation as the first phases are focused entirely on creating these documents. However, while the course relies heavily on documentation, the customer had no use for most of this documentation, making this point less important for our project.

Lastly we have the biggest disadvantage of following a sequential method, which applies to any project doing so.

- Sequential methods don't handle change to the requirements particularly well, making this approach risky in the case of the customer wishing to modify the requirements during the implementation phase.

Scrum

Advantages of agile methods such as scrum include the following:

- Agile methods support rapid production of prototypes to present to the customer. This allows for easier correction of misunderstandings, because they become apparent earlier in the process through the functioning prototypes.

- The method utilizes stand-up meetings, a scrum master, and optionally (and preferably) a kanban/scrum board. These things do carry overhead, but provide both the team and customer with frequent feedback, making the benefit much greater than the disadvantage of the overhead.
- The approach is highly supported by online tools - e.g. Trello for the kanban board - that let both parties (the team and the customer) stay up-to-date on the planning and prioritization of tasks during implementation.

While the next point generally is an advantage of agile development over a sequential process, it does contain some risks for a small project such as ours, as explained below.

- Agile methods handle change to requirements very well, due to the high level of underway involvement of the customer. The risk of weighting this point when deciding on an approach is the possibility that there simply will not be many changes, making this point irrelevant. Because we expected there to be necessary changes to the requirements and specification during the implementation, we decided this was important for our project.

There is one major disadvantage - or rather, risk - of choosing an agile approach.

- Agile methods rely on team members - or at least the project manager - having experience with the full development process, assuming the entire project is to be completed in agile fashion.

There is another important point when using an agile method, which can be the deciding factor for some projects.

- Iterative approaches are heavily reliant on easy access to the customer for continuous feedback and extraction of requirements. This is okay for our project, as our customer is readily available through both e-mail and phone.

From our analysis of the two methods, we concluded that neither were a perfect fit for every part of our project. We felt that our inexperience with projects such as this one made it too difficult to complete the entire project through an agile process, but we felt too unsure about the scope of the project to plan everything ahead and do a straight sequential process. We did, however, wish to plan an outline for the project, create a general architectural overview and gather the most important requirements before we started implementation.

This led us to a decision of employing the waterfall method, or at least something similar, for the complete process, with a relatively long period of planning before starting implementation.

The customer suggested using an agile approach for implementation because it is the same as they use. Using the same method as the customer might be beneficial to the project, as it improves communication and workflow. We decided to complete the implementation phase as an agile process, divided into two-week sprints, each consisting of a sprint planning meeting, then several days of implementation, with semi-daily stand-up meetings, and ending in a sprint review meeting and a functioning prototype.

5.2 Frameworks

5.2.1 Software Development Model

5.2.2 Programming languages, Communication Protocols and File Formats

5.2.3 Web Api

5.2.4 Server

5.2.5 Database

We had a lot of problems with the database, the customer said he'd put up a database server for us to use. However this turned out to be difficult to achieve due to the security/confidentiality issues on their server. We had to try to set up the database server ourself on our local machine, this proved to be rather difficult due to microsoft tools not giving enough information, and thereby not installing the necessary tools. The customer uses a MSSQL server and they provided an 11GiB .bak file which we could use to restore the database.

5.3 Technology

This subsection covers the technology we utilized during our project. It covers the various operating systems our group members have been working on, editors and IDEs for documents and code, as well as frameworks and platforms used in development. Additionally it covers tools for version control and file sharing between the group members, as well as communication platforms.

5.3.1 Windows 7, 8

Microsoft Windows 7 and - 8 are operating systems by the Microsoft Corporation. They logically provide good support for .NET developments, seeing as .NET targets the Windows platform and is made by Microsoft. Visual Studio is made for Windows, and was our main IDE, so all group members had access to PCs with Windows installed.

5.3.2 Ubuntu Linux

This OS is perhaps the most widely used distribution of Linux, developed by Canonical Ltd. It provides good support for many development tools, except of course Windows development. However we did find support for using it for some Windows development. This operating system was used by one group member on a laptop, when working on-site at NTNU. For coding, Mono with MonoDevelop was used, while other tasks were mostly unaffected. The operating system provides good support for other parts of the process, such as Git and LaTeX.

5.3.3 Mac OSX

5.3.4 Visual Studio 2012

Visual Studio is Microsofts IDE for development for their platforms. This is the main IDE we developed the framework on, seeing as it has very good integration with C# and .NET platforms, which we were required to use. We decided to use the ultimate version because this version provides everything we might need.

5.3.5 .NET and Mono

We were required to use ASP .NET MVC for our framework. ASP .NET MVC is a framework for web applications which enables the use of the Model View Controller (MVC) pattern. It is part of Microsofts .NET Framework suite, which is the preferred way of interactiong with Windows systems and OSes.

Mono is the open source-, cross-platform version of the .NET suite, which we used when not developing on Windows machines. It is available both for Windows, OS X, most Linux Distributions, Android, and various other operating systems.

5.3.6 MonoDevelop

This is an open source IDE for development with Mono, available for OS X and most Linux distributions. This was the IDE used when not developing on Windows machines.

5.3.7 Doxygen

Doxygen is a documentation generator that generates software reference documentation directly from source file comments and tags. It supports multiple programming languages, and outputs documentation in several formats, including, but not limited to: HTML, LaTeX,and man pages.

We used Doxygen in our project to generate the API documentation requested by the customer. It was chosen due to easy setup and configuration, support for C#s XML-comments and tags, as well as multi-platform support (Windows, Linux and Mac OSX).

5.3.8 LaTeX

We quickly chose LaTeX for our typesetting, due to it being the de-facto standard for academic typesetting, with good support for both code snippets, tables, references and bibliography.

Most of our group also had at least some experience using it, and some were quite experienced, which made the choice easier.

5.3.9 Git

For our version control and source repository, we chose Git. This because we had most experience with it, and found it easy to set up via GitHub (where we all had accounts already). It also has the advantage of being distributed, so we could avoid a single point of failure, and having a staging area where one can selectively commit files according to whether they're ready or not, instead of risking accidental changes which might break something.

Both the source code and the entirety of the report source files were stored on GitHub, since both would be catastrophical to lose, and were quite important to have under version control in case we needed to track problematic changes.

5.3.10 Trello

To support our agile process and sprints, we used Trello for planning and control of workflow. It is an online Kanban Board tool, where we can create work packages and issues, while tracking who does what, and tracking backlog, finished modules, and work in progress.

5.3.11 Web API

ASP.NET Web API is a framework for building web APIs on top of the .NET Framework, it lets you create calls from the browser to the methods in the

5.3.12 Dropbox

Dropbox is a syncing service that let you choose a local folder on your machine that will be synced to the cloud. Dropbox lets you share folders and files inside a shared Dropbox folder.

We used Dropbox for sharing and synchronizing internal documents that usually were only useful for a limited time, but might be referenced later.

5.3.13 Google Drive

Google Drive is Google's productivity suite/office pack. The difference between Drive and other office solutions (like Microsoft Office, OpenOffice/LibreOffice) is that Drive exists in the cloud and lets the user simultaneously work on a document.

Google Drive was used for simultaneous collaboration on documents, where the content was up for discussion, or it was advantageous to see what the others where writing, as well as for dynamic internal documents like work logs.

5.3.14 Microsoft SQL server

The customer uses Microsoft SQL server as their database, and we received a backup dump of their database.

5.3.15 Entity Framework

The customer's preference was that we utilized Microsoft's entity framework to connect to the database. The entity framework is an object-relational mapper that enables .NET developers to access the database without writing the typical data-access code that developers typically need to write. EF lets the developer work with domain specific object and properties without worrying about the underlying database table.

5.4 Extra Tools

5.4.1 LaTeX Editors

We have used several editors for our LaTeX documents. Some members have used TeXstudio, others have used TeXworks, while others again have used Gummi.

TeXworks is a simple, lightweight working environment for LaTeX documents, and is modeled on TeXShop. It provides several compilers, and a raw text editor, as well as a pdf viewer, but little else.

TeXstudio, a fork of Texmaker, is better described as an integrated development environment (IDE). Relative to TeXworks, it better supports simultaneous work on several LaTeX documents. It also supplies multiple compilers, a pdf viewer and a text editor, but it includes some nice-to-have features that are not available in TeXworks. Some examples of these features are:

- Easy navigation between included files
- Compilation of main document directly from included files
- View included images through hover

Gummi is a free, open-source, lightweight working environment for LaTeX which is available in the repositories of most widely used Linux distributions, and for Windows as well. It provides live preview of the document without manual compilation, support for multiple compilers, bibliography management, and SyncTeX support. It also provides easy insertion of tables and images.

5.4.2 LaTeX Compilers

We have also used several LaTeX compilers, most notably pdfLaTeX and BibTeX. We have used BibTeX specifically to handle citations and references, and pdfLaTeX for general compilation of our documents.

5.4.3 Git Tools

We have used various tools for Git, such as Git Bash and GitHub For Windows, as well as Git for Linux. GitHub For Windows is a graphical user interface for Git, and provided good visualization of branching, while Git Bash and Git for Linux were used for straight-forward commit, pull and push.

5.4.4 Raw Text Editors

A variety of raw text editors were used, mainly for meeting notes and similar small and temporary documents. Sublime Text was used by most of the group, allowing us to read and edit text files with no file ending. Some also chose to use gedit.

5.4.5 Communication

Various software was used for communication when the group members were at separate locations. Foremost of these were Facebook Messenger and e-mail. We also used IRC, to which some connected through means such as PuTTY, to connect through ssh to a server running irssi in screen, while others ran mIRC locally or connected through ssh in another terminal (such as the native terminal of their OS).

5.5 Templates

We have created the following templates for documents used in the process:

- Foo
- Bar

We have established several standards for the project, as seen in the rest of this section.

5.6 Documents

For internal documents we have established the naming standard:
MM_DD_<Description>_<Version if applicable>
This is to ensure documents are properly sorted, and that they are easily identifiable.

5.7 Coding

We will be using C# as a programming language, and will consequently be following the C# coding standards, as outlined by Microsoft. [3]

The guidelines are summarized in the following section.

5.7.1 Documentation

All public classes, methods, and preferably properties/fields shall be documented with comments which will enable generation of documentation. Example:

```
/// <summary>
/// This is a summary of what the class contains and
   its intended function
/// </summary>
/// <author>Author Name</author>
public class ExampleClass
{
        /// <summary>
        /// This summary tells what the method does,
           any side-effects, and how/why to use it.
        /// It should NOT say how the method does what
           it does, unless this is absolutely
           neccessary.
        /// </summary>
        /// <param name="intName">int</praram>
        /// <param name="stringName">String</praram>
        /// <returns>String</returns>
        /// <author>Author Name</author>
        public abstract String ExampleMethod(int
           intName, String stringName);
}
```

5.7.2 Naming and variables

Use CamelCase for classes, method names and properties. Example:

```
public class ExampleClass
{
        public abstract void ExampleMethod(int intName,
           String stringName);

        private int ExampleProperty { get; set; }
}
```

Variables shall be named after the lowerUpper scheme, where the first word is in lowercase, and any others starts with an uppercase letter. Example:

```
int exampleVariable = 1;
int stringExample = "This is an example";
```

5.7.3 Comments and layout

Blocks shall start and end with curly brackets on their own line.

Comments shall have a space between the double slashes and the actual comment. Continuation lines shall be indented. All comments shall start with a capital letter, and end with a period.

There shall be only one statement per line. The same goes for declarations. Parantheses shall be used to separate clauses in expressions, to ease understanding.

```
// This is a single line comment
void Foo()
{
        // The following is correct:
        int x;
        int y;

        // The following is incorrect:
        int x,y;

        // This is a multi line comment, with more text
           this is line two of a multi line comment


        if(true)
        {
                StatementOne();
                StatementTwo();

                if ((var1 && var2) || (var3 && var4))
                {
                        Bar();
                }
        }
}
```

5.7.4 Variables, types, and declaration

Implicitly typed local variables can be used when the right hand side clearly indicates type, or it's not important.

Use in-line instantiation with constructors when possible, instead of instantiation and assignment.

Short strings shall be appended with the use of the + operator. Longer ones in loops shall use StringBuilder.

Example:

```
// Apparent use of string. Use of var ok:
var name = "SampleString";

// Type inconsequential:
foreach(var v in collection)
{
        //Type-independent method:
```

```
        handleVar(v);
}

// Array instantiation with constructor:
int[] numbers = { 1, 2, 3, 4 };

//Use of var requires explicit instantiation
var numbers2 = new int[] { 1, 2, 3, 4 };

//Avoid this if you could have used the above:
int[] numbers3 = new int[4];
numbers3[0] = 1;
numbers3[1] = 2;
// Etc.

//Short string example
string simpleString = "This is our " + var1 +
   "test-string." + var2 + "something."

//String builder example
string longString = "LongLongLong";
var longBuilder = new StringBuilder();
for(int i = 0; i < 1000; i++)
{
        longBuilder.Append(longString);
}
```

5.7.5 Try-catch, exceptions and using

Exception handling shall be done by try-catch statements. Code shall not unexpectedly throw exceptions; only when something unrecoverable has happened.

In the case of a try-finally statement, a using statement shall be used instead, if the only function of the finally-block is disposing/closing of the used object.

```
Socket socket = new Socket();
try
{
        socket.SomeMethod();
}
finally
```

```
{
        socket.Close();
}
// Can be replaced by:
using (Socket socket = new Socket();)
{
        socket.SomeMethod();
}
```

5.8 Static Members

Static members shall always be called by class name, and never accessed in a derived class when defined in a base class.

5.8.1 Clean Coding

We have also endeavoured to follow the ten Clean Coding principles, as outlined by one extra pixel's post. [2] The ten principles are as following:

1. Revise your logic before coding
2. Clearly expose the structure of the page
3. Use the correct indentation
4. Write explanatory comments
5. Avoid abusing comments
6. Avoid extremely large functions
7. Use naming standards of functions and variables
8. Treat changes with caution
9. Avoid indiscriminate mixing of coding languages
10. Summarize your imports

5.9 APIs

5.9.1 ASP .NET Web API

One of the agreed upon requirements for the project was that we conform to ASP .NET Web API. This to make it easier to interact with our framework from other systems (both existing and future ones). An introduction to using this API can be found at http://www.asp.net/web-api or http://msdn.microsoft.com/en-us/library/hh833994(v=vs.108).aspx.

5.10 Summary

6 Requirements

Key

A = Availability
I = Interoperability
M = Modifiability
T = Technology requirement
F = Other functional requirement

Functional Requirements

ID	Requirements	Priority	Complexity
F1	Receive PDF-files and store them in an appropriate folder	H	L
F2	Insert the data accompanying a submitted ad into the database	H	M
I1	Create an order in the internal order system for a submitted ad	H	M

Functional Requirements

ID	Requirements	Priority	Complexity
M1	The software must support easy addition of other types of ads	H	L
S1	The product should provide a high degree of stability, so the customer can meet their availability demands when our product is integrated into their systems	M	M
T1	The software must be developed on the .NET platform	H	L

6.1 User Stories

We created the following user stories from the customer-provided project description, and meetings with the customer.

Actor	C1.Customer
Description	Customer submits a completed ad
Example	Real estate agent sends a completed ad in pdf-format to the system, with accompanying data. The data is automatically put in the correct databases/tables

Actor	C2.Customer
Description	Customer reviews and selects product options
Example	A Real estate agent wants to insert an ad in the system. The system displays available products, and when one is selected, will list the next five available booking dates for this product, and its options.

Actor	D1.Developer
Description	Decides to develop a plugin for the system
Example	Starts IDE of choice, and develops a plugin/extension, using the interfaces and polymorphism provided.

Actor	D2.Developer
Description	Developer wishes to use framework in/with other application
Example	The developer, being already familiar with Microsoft Web API, quickly integrates the Web API compliant framework with his intended target.

Actor	D3.Developer
Description	Wishes to quickly understand system components for extension
Example	Reads attached developer documentation in IDE, or as attached html/xml. Quickly sees what each individual method does, and can easily extend the system.

Actor	C3.Customer
Description	Customer tries to submit an ad with insufficient information
Example	The customet tries to add a pdf-file, but doesn't provide the necessary data; I.e. didn't specify a price or place. The system rejects the ad. The database remains coherent.

6.2 Non-functional Requirements

From these user stories, the following Non-Functional Requirements can be extracted.

- Compliance (with Microsoft Web API)
- Extensibility (through polymorphism)
- Documentation (for Developers)

7 Architecture

7.1 Stakeholders

7.1.1 Customer

Our goal with this course was to create a product that not only works the way the customer intended, but does so with satisfactory performance. It also needed a clear, logical and functional architecture to make it easy to maintain. Our code needed to be written following the clean coding standard and make use of interfaces and general polymorphism, so that their developers could further develop this solution with ease.

7.1.2 Implementers

We wanted an architecture that would be easy to implement and would make sense to the coders of our own team as well as to those of the customer.

7.1.3 Course Staff

The course staff wants a clear and well-documented architecture that is easy to understand and evaluate.

7.2 Quality Attributes

The customer was very specific when it came to what they wanted.

7.2.1 Modifiability

While we were the create the solution for real estate ads specifically, the solution will be used for other ads as well. Therefore we need to make it modifiable so that other developers later on can further develop using our solution as a base.

7.2.2 Performance

We wanted the system to function with a satisfactory performance, even though the customer did not set any specific requirements for performance.

For this reason, we decided to merely strive to achieve this goal by writing as efficient code as we could manage, making necessary changes to keep performance at a reasonable level.

7.2.3 Availability

The system should be available for the users when they need it. Therefore we needed to minimize the possible points of failure and the probability of these failing.

7.2.4 Interoperability

Our solution was only a part of the larger Webassistenten solution, and needed to inter-operate with already-existing order system. To achieve this goal, we used the same technology as requested by the customer, including Web API, MSSQL and so on.

7.2.5 Readability

The customer wanted us to write readable code. They requested that we used polymorphism by creating interfaces so that other developers can easily develop it further by developing plug-ins for the system. Readability is therefore important for easier further development of this system.

7.3 Views

7.3.1 Process view

There is no need for us to supply a process view, because we do not have access to their server. We are only supposed to write the code for their system, without taking into account how the processes inter-operate.

7.3.2 Logical view

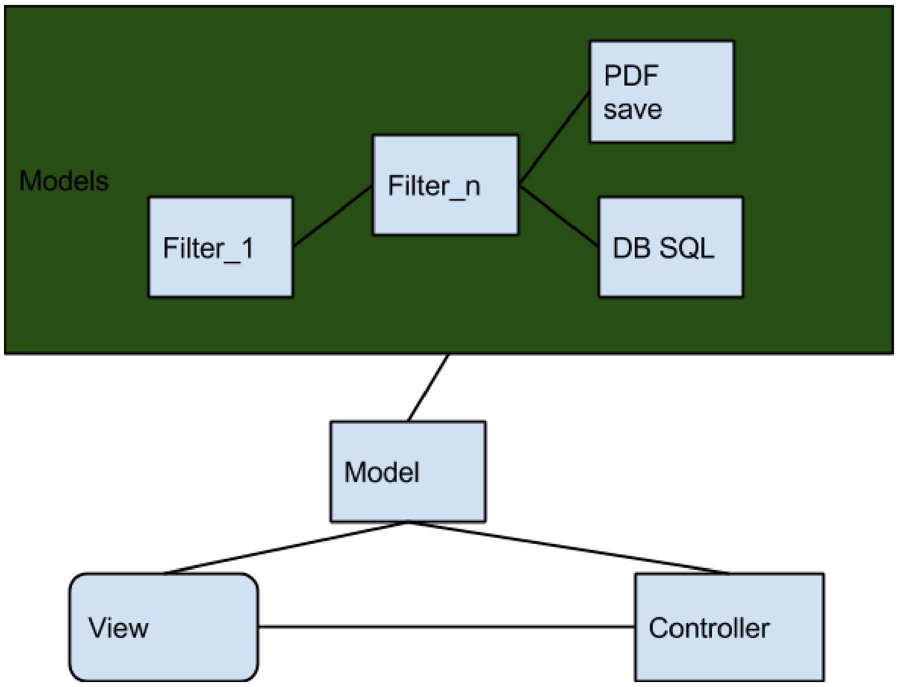


Figure 2: Logical view

7.3.3 Scenario view

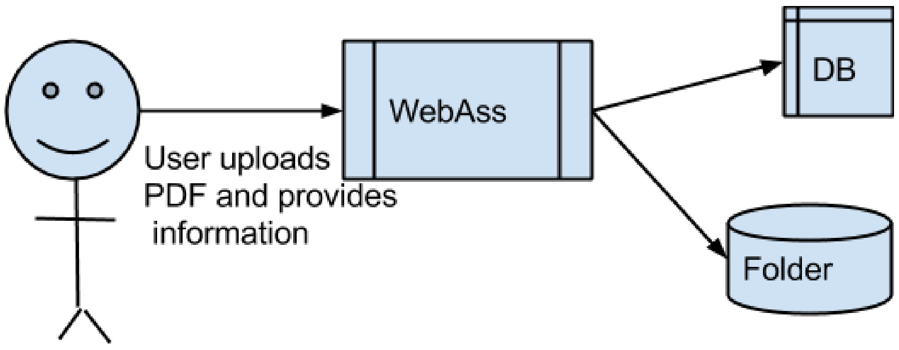


Figure 3: Scenario view

7.3.4 Physical view

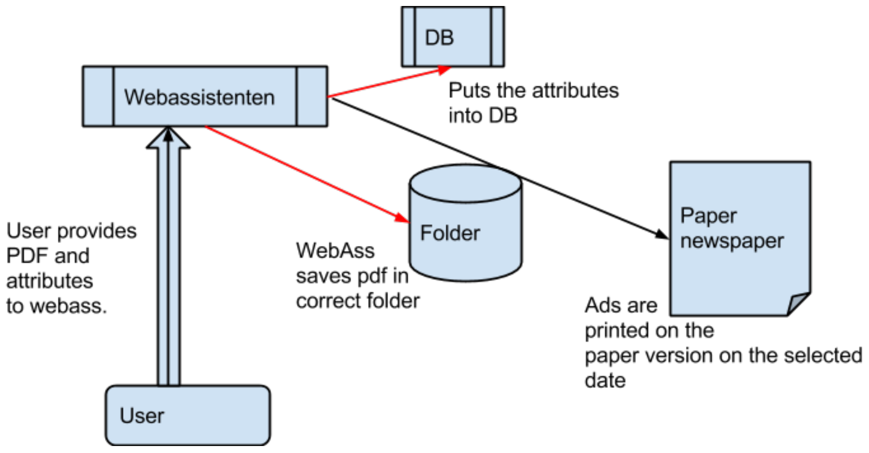

DB
Webassistenten
Puts the attributes into DB
Folder
Paper newspaper
User provides PDF and attributes to webass.
WebAss saves pdf in correct folder
Ads are printed on the paper version on the selected date
User

Figure 4: Physical view

we implement the red arrows

7.4 Class diagram

From these views, we made this class diagram.

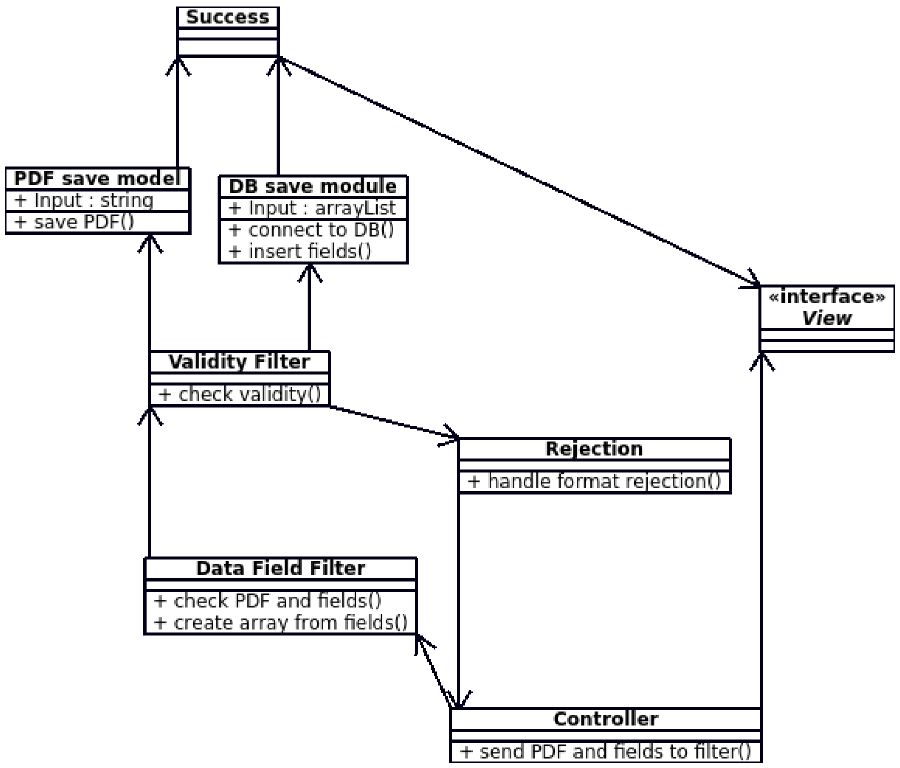


Figure 5: Digital class diagram

7.5 Patterns

MVC due to the technology and pipe & filter to filter the data and due to the modifiability requirement.

7.6 Tactics

7.6.1 Modifiability

- Increase semantic cohesion
- Decrease coupling
- Split modules

7.6.2 Performance

– Write optimal code

7.6.3 Availability

– Our code should not crash the customer's system, but it's their responsibility that the system is available.

7.6.4 Interoperability

– The technology and tools we're using should be sufficient to ensure interoperability.

7.6.5 Readability

– We will follow the clean coding principle and use camelCase coding. Refer to 5.5 Templates and Standards section on page 27

7.7 Changes to the architecture

When we started to implement the system we quickly found out that the we had architectural drift because the architecture we designed in the start didn't fit well into the web api framework. After we got an overview of the system we had change the architecture to a MVC pattern.

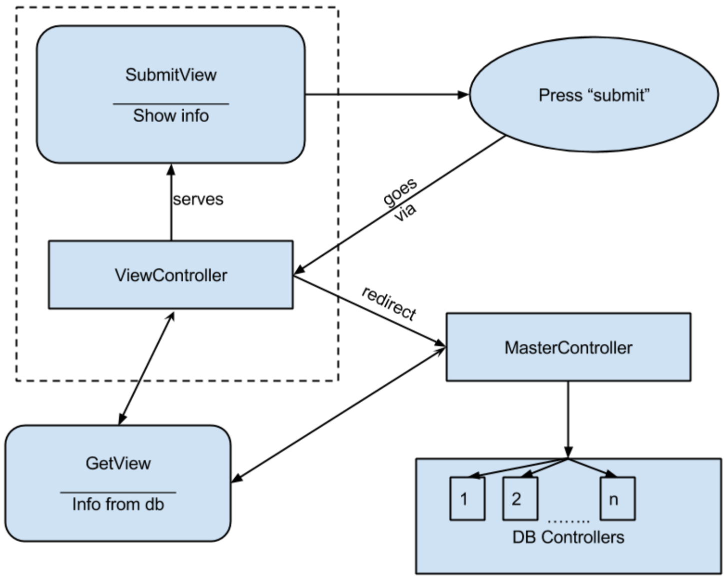


Figure 6: New diagram showing the information flow

We tried to follow this MVC pattern when we implemented the system, however we quickly found out that the getView-Controller was not necessary.

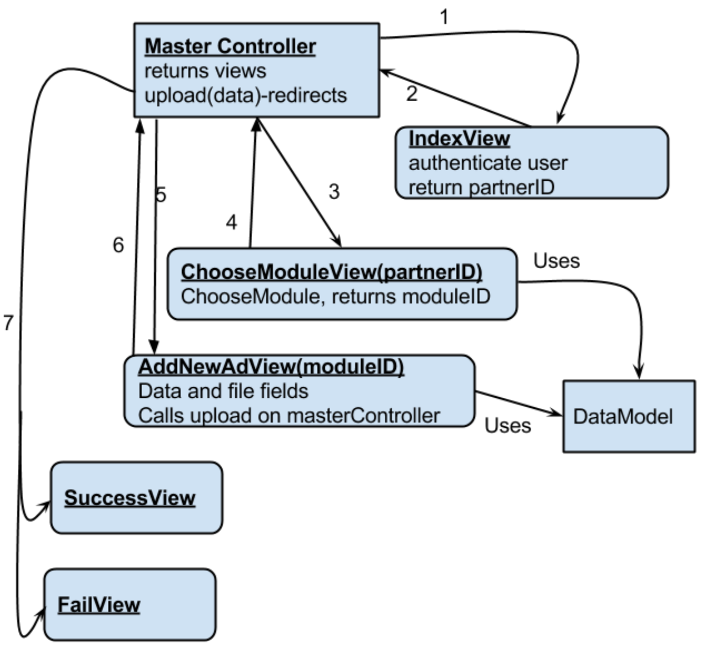


Figure 7: The final architecture

6 calls the upload method with files and data
7 is the upload method redirecting either to a FailView or a SuccessView

8 Sprint 1

8.1 Time Frame

The time frame for Sprint 1 was week 38 and 39. We started the sprint on September 16th with a weekly supervisor meeting, followed by a sprint plan meeting. We finished the sprint on September 27th, with the sprint review meeting postponed to the following Monday.

8.2 Original Plan

From our Work Breakdown Structure, we had the following tasks planned for this sprint:

- Enable display of available products (no GUI is to be implemented)
- Listing the next 5 available booking dates for a selected product
- Listing modules available for a selected product

8.3 Revised Plan

At the sprint plan meeting, we added more tasks to our Trello board (see subsection 5.3.10 in the chapter on Technology) beyond those from our WBS. Most notably, we added the following:

- Database connection interface
- Database submission logic

We did not revise the plan for the first sprint beyond adding more tasks. Being quite unfamiliar with the process, we were unaware at the time that we would not be able to complete all - or even any - of the planned tasks.

8.4 Development

The development started off with the creation of an ASP.NET MVC project. In this project we created data objects for the ad info described in the assignment.

Towards the end of the sprint, we received a database dump from the customer, which we spent the entire rest of the sprint attempting to restore. Please refer to Appendix A for more information on this.

8.5 Other Work

In addition to the development, we also completed a draft of the outline for this report and improved on our architectural documentation by adding new and removing unused views.

8.6 Backlog

Of the tasks planned at the beginning of the sprint, the following remained in our backlog at the end of the sprint:

- Enable display of available products (no GUI is to be implemented)
- Listing the next 5 available booking dates for a selected product
- Listing modules available for a selected product
- Database connection interface
- Database submission logic

These tasks were incidentally all of the tasks we had planned for the sprint, as we were a bit optimistic in our planning. Some of these were included in the revised plan for sprint 2, while others were postponed to be included in a later sprint.

8.7 Customer Meeting

<Add important notes from the customer meeting here, as well as new conclusions made> We also asked the customer about their opinion on this architecture.

8.8 Retrospective

While we had initially planned to complete some of the "easy" parts of the implementation during this sprint, this turned out to be a lot harder than expected. We only managed to get started before we ran into problems related to unfamiliarity with the technology.

We also spent less time both on development and on the project in general than we had originally planned, partly due to projects in other courses also taking up a lot of our time.

What we learned from this sprint was more about how much we would actually be able to do in a single sprint, and that we were still quite far away from being able to implement specific parts of the requirements. We started doubting that we would be able to finish in three sprints, but remained hopeful. We also learned a lot about the tools we used.

9 Sprint 2

9.1 Time Frame

The time frame for Sprint 2 was week 40 and 41. We started the sprint on September 30th with a weekly supervisor meeting, followed by a sprint plan meeting. We finished the sprint on October 11th with a sprint review meeting.

9.2 Original Plan

From our Work Breakdown Structure, we had the following tasks planned for this sprint:

– Receiving pdf-file and save in correct folder
– Putting accompanying data in Webassistenten database (table "prospekt")
– Checking accompanying data for required fields
– Placing an order in the internal order system

Additionally, the following tasks were carried from the previous sprint:

– Database connection interface
– Database submission logic

9.3 Revised Plan

At the sprint plan meeting, we planned the following for this sprint:

– Set up Entity Framework
– Modify start page
– Implement saving of pdf-files
– Prepare report for midterm delivery

9.4 Development

At the end of the first sprint, we received a database dump from the customer. The majority of sprint 2 development was centered around setting up a connection to this database through Entity Framework.

Near the end of sprint 2, we realized that we had created the wrong type of project. We had missed the fact that the solution was supposed to use Web API, and had created an MVC project. Some time was therefore spent creating a new Web API project, and porting the code from the previous project into the new one.

9.5 Other Work

The deadline for the mid term delivery of the report was originally October 14th, but was at one point in time moved to October 8th. This date coincided with the middle of sprint 2, so a relatively big part of the sprint was spent preparing the report for this delivery. When the deadline was moved back to its original date, more time was spent on improving the report.

9.6 Backlog

What we planned for the sprint that we either did not complete, get time to start, or that was simply pushed back.

9.7 Customer Meeting

<Add important notes from the customer meeting here, as well as new conclusions made>

9.8 Retrospective

<How we feel about the sprint. What we learned, what we are satisfied with, and what we are dissatisfied with.>

10 Sprint 3

10.1 Time Frame

The time frame for Sprint 3 was week 42 and 43. We started the sprint on October 14th with a weekly supervisor meeting, followed by a sprint plan meeting. We finished the sprint on October 25th with a sprint review meeting.

10.2 Original Plan

From our Work Breakdown Structure:

- Database communication interface
- Version control system
- Bugfixing
- Testing

10.3 Revised Plan

At the sprint plan meeting, we planned the following for this sprint:

- Stuff

10.4 Development

We created the master controller which communicated with the database through the entity framework, it also took care of passing models to the view(s) and handle user request. This master controller was a MVC-type controller which is mostly used as a prototype and for us to test that the data we submit actually reach the system.

10.5 Other Work

After creating and finishing the master controller, the final architecture was made.

The first Friday of this sprint we attended a technical writing course organized by the course staff, where we received pointers on writing our report.

These included both general tips as well as concrete improvements for our report specifically.

10.6 Backlog

What we planned for the sprint that we either did not complete, get time to start, or that was simply pushed back.

10.7 Customer Meeting

<Add important notes from the customer meeting here, as well as new conclusions made>

10.8 Retrospective

How we feel about the sprint.

11 Sprint 4

11.1 Time Frame

When we didn't finish implementation by the end of Sprint 3, we had to add another sprint. The time frame for Sprint 4 was week 44 and 45. We started the sprint on October 28th with a weekly supervisor meeting, followed by a sprint plan meeting. We finished the sprint on November 8th.

11.2 Original Plan

Because we had planned to finish within three sprints, there were originally no plans for Sprint 4.

11.3 Revised Plan

At the sprint plan meeting, we planned the following for this sprint:

– Stuff

11.4 Development

We converted the existing MVC controller of our implementation to a Web API controller. We created a new architecture which corresponds to the actual implementation.

11.5 Other Work

Other work we did during the sprint, such as producing documentation or attending courses.

11.6 Backlog

What we planned for the sprint that we either did not complete, get time to start, or that was simply pushed back.

11.7 Customer Meeting

<Add important notes from the customer meeting here, as well as new conclusions made>

11.8 Retrospective

How we feel about the sprint.

12 Testing

This chapter will describe the methods used for testing the requirements, the reasoning behind their choice, and the results of the testing.

12.1 Testplan

<Unsuitability of TDD or Unit Testing> <About testing of functionality>

12.2 Test Results

<Whatever the results of the testing was, and thoughts about it>

13 Evaluation

14 Conclusion and future work

References

[1] Yusuf Arslan. Is agile and scrum really better than waterfall? http://yusufarslan.net/agile-and-scrum-really-better-waterfall. Read on 26 August, 2013.

[2] Pamela Rodríguez Domínguez. 10 principles for keeping your programming code clean. http://www.onextrapixel.com/2011/01/20/10-principles-for-keeping-your-programming-code-clean/. Read on 2 September, 2013.

[3] Microsoft. C# coding conventions (c# programming guide). http://msdn.microsoft.com/en-us/library/vstudio/ff926074.aspx. Read on 26 August, 2013.

[4] Wikipedia. Adresseavisen. http://en.wikipedia.org/wiki/Adresseavisen. Accessed 7 October, 2013.

1

A Database setup

The database dump we got from the customer was a 10.8GiB .bak file which contained the existing internal database of the adressa system - a MSSQL database. We thus had to install MSSQL locally on our own computers to be able to restore this backup file before we could integrate the database into our project via the entity framework. To manage and restore the database, we had to use SQL Management Studio. Found here: http://www.microsoft.com/en-us/download/details.aspx?id=8961

This package let us install the 2012 version of the management studio, or choose to update from an existing 2008 version of MSSQL Management Studio which it claimed was already installed. However, this package did only the install the SQL management studio but no SQL server instance was installed.

It was therefore impossible to connect to a MSSQL server instance because none existed, which made it impossible to restore the .bak file (database backup dump), because there were no SQL server instances to restore to. We then tried to install "SQL server with tools express" which did in fact install a SQL server instance and we were allowed to connect to a it via the management studio, and we were able to click "restore database". We then navigated to the appropriate folder and chose the .bak file to restore. When we clicked "OK", it started to restore the database, but after a few minutes we got an error message saying that the database was too big to be restored, this was due to the express version can only restore a database up to 10.2GiB while the .bak file we got was 10.8GiB. Thus we had to install the non-express version to be able to restore the database. The last tool we tried to install was "Microsoft SQL Server 2012 Developer 32/64-bit", this installation had a server instance which we could restore the database to. To integrate the database into our development tools (Visual studio using web api) we had to use the entity framework by adding an ADO.NET Entity data model of the database. This let us treat database tables as objects, and it converts objects manipulation to SQL query syntax for the particular database.