Student report

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Title:

Project title

Theme:

Theme

Project Term:

P6, spring 2012

Project Group:

sw60xf12

Students:

Name name
Name name
Name name
Name name

Synopsis:

Synopsis synopsis ....

Supervisor:

Ulrik Nyman

Copies: 6

Pages: 25

Finished: December 19th, 2011.

Name name

Name name

Name name

Name name

Preface

Quotations are the words of another person along with a source. The source of the citation will either be in the text immediately before or after, or could potentially be incorporated into the quote as shown in the example below:

> “ This is an example of a quotation. ”
>
> — X, p. Y

References are references to sections, figures, code snippets, chapters or parts written elsewhere in the report. This could look like the following:

This is explained in Section X.Y.

Code examples are written in a special environment so they are easy to read and recognize. Examples can be seen in Code snippet 1. Whenever there is a sequence of three dots (“...”) in a code snippet, it means that we have omitted some content, which is not important in that specific context.

```
1 #include<stdio.h>
2
3 main()
4 {
5     printf("Hello World");
6 }
```

Code snippet 1. Code example of a hello world program written in C.

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Part I

Introduction

Introduction 1

1.1 Motivation

This is a student report written as part of a learning project. We are required to comply with the study regulation, which states that the main focus of this semester is multi-project management and quality assurance in the form of requirements analysis, requirements management, and testing.
The goal is to create a comprehensive software system, across multiple project groups, in order to enhance our competences in analysis, design, implementation, and evaluation of software applications in regards to the system requirements. [17]

To create a comprehensive system that will be usable in real life scenarios, this project will build on top of a previous multi-group project and will also be built with the aim of having other students continue its development later. Picking up and passing on application development within the system will make it possible to make them far more complex and by extend provide them with all of the necessary functions for them to be viable alternatives to tools that may exist already, as opposed to creating only "single semester sized" apps within the same system.

The multi-group project we are building on top of is aimed at creating a touch based tablet system to support children with autism and their guardians in every day scenarios. In order to describe the context of this system we will in rest the introduction we will explore:

Target Group: The group of people we hope to assist with our system.

Target Platform: What platform will be the best for our system.

Development Method: Which method that will serve us best in developing the system.

System Description: The description of the areas we will be developing.

External Component Structure:

1.2 Target Group

–The system that we will be developing will base on the daily lives of children within the Autism spectrum, and we expect that the tools we develop will be usable both in their homes and in the various institutes that they spend their days. As such, potential customers would most likely be parents in collaboration with the various institutions for use in care taking and education.–

Autism is a spectrum disorder meaning that, the degree of disorder can be different [14]. Autism can affect people in different ways, i.e. it can make them more chatty or silent, more methodical or disorganized. Lisa Jo Rudy, researcher, consultant, and mother to a child with autism, states [13] that: "if you've met one person with autism, you've met one person with autism".

The Autism Society of America defines autism as follows:

> "Autism is a complex developmental disability that typically appears during the first three years of life and is the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills. Both children and adults with autism typically show difficulties in verbal and non-verbal communication, social interactions, and leisure or play activities.
>
> Autism is one of five disorders that falls under the umbrella of Pervasive Developmental Disorders (PDD), a category of neurological disorders characterized by severe and pervasive impairment in several areas of development." [1]

Children with autism are usually very fixated in a single area, meaning that they can become very interested in one area and thereby completely forget or ignore the world around them, which can lead to unintended behavior. This fixation can be used by educators or teachers to motivate the children to learn, by including this area of interest into the learning process.

Children with autism may also have difficulties socializing with people, feeling empathy, and understanding other peoples feelings. Lastly children with autism often want to structure everything because they have a need for a structured environment, which is also an important aspect during the planning of their daily life.

1.2.1 Working with Children with Autism

This section is based upon the statements of a woman with autism [9], explaining what it is like to live with autism, and an interview with an educator at Birken, a special kindergarten for children with autism (see appendix .1 for interview notes).

People with autism are often more visual in their way of thinking. Rather than visualizing thoughts in language and text, they do it in pictures or visual demonstrations. Pictures and symbols are therefore an essential part of the daily tools used by children with autism

and the people interacting with them. Also, children with autism can have difficulties expressing themselves by writing or talking, and can often more easily use electronic devices to either type a sentence or show pictures, to communicate with people around them.

Different communication tools for children with autism already exist, but many of them rely on a static database of pictures, and often these has to be printed on paper in order to use them as intended. Other tools, such as hour glasses of different sizes and colors, are also essential when working with children with autism, and these tools are either brought around with the child, or a set is kept every place the child might go, being at an institution or at home. Because this need of many different tools exist, it is relevant to explore the possibilities in using android tablets with customizable software as a tool for children with autism and the people working with them.

1.3 Target Platform

In this learning project we are developing applications, for children with autism, using the android platform. The android platform was chosen because this project is part of a multi project, which began the development of the Giraf system.[12]
—The initial decision decision to work with the android platform seems to be based on the availability of mobile devices to the students.[**?**] However, with the budget supplied by AAU, we had the opportunity to exchange the hardware used in the 2011 6'th semester reports, however this has not included smart phones.
In selecting a new tablet we had to make considerations:

- Popularity of the tablet type can help in distributing the system. Both among early adapters and potential customers.
- Accessibility of the OS is a big factor, whether or not we can construct a system on it.
- Design and Variety of the physical tablet can figure in.

As seen in figure1.1, the two leading operating systems for mobile devices are Apple's iOS and Google's Android. Being the more widespread of the two, Apple's iOS tablet, the iPad could have been a viable candidate to replace android tablets based entirely on popularity.
However, there are some limitations when developing for iOS. For one, the iOS Development Environment Xcode currently only runs on Macintosh computers, compared to Android that can use the more universal Eclipse environment.[4][7]
There are also only 3 variants of the iPad, where two are earlier variants of the latest design, as apple has a monopoly on developing for iOS. Android Tablets are far more diverse, having many different manufacturers such as HTC[10], Samsung[16] and Medion.[11] The more variety in manufacturers, will allow us to shop around for the best possible fit.
All this is overshadowed by that transforming the system into iOS would most likely leave very little time to create new features.

We decided to stay with android, but to upgrade to version 3.2[5]. This version has been chosen because, it is the first version developed mainly for tablets, and it is going to be supported for the duration of the project. So ordering several Samsung Galaxy Tablets 10.1, based on its larger screen, the android 3.2 OS and the apparent good results the last semester group had with the older Samsung Tablets.—

Android is an open-source platform developed for mobile devices. The Android Open Source Project(AOSP) is maintained and further developed by the Open Handset Alliance(OHA), which is led by Google [8]. The companies from the OHA contributes to the project, these contributions are often made in form of engineering resources.

Android has a large community, spread over various websites, with different areas of expertise. This provides developers of android applications, with a community where they can find help with their niché [6]. Google, which is head of the android development, also has a website for teaching application developers how to program for the android platform [7]. On Google's website they also provide various tutorials, so one can easily get started developing for the android platform.

In this project we have been provided with several Samsung Galaxy Tablets 10.1 [15]. The firmware on the tablets is version 3.2

NOTE: Stod der ikke noget andet her? Jeg kan ikke finde det mere.

1.4 Development Method

As mentioned earlier this is a learning project and we therefore have been required to use the same development method in our multi project groups. We have looked into two different methods *XP*(eXtreme Programming) [18], and Scrum [2], both are agile development methods. As a part of our courses we have been further introduced to how each of the methods works and how they could be implemented in the development process.

Global Tablet Operating System Shipments and Market Share in Q4 2011

Global Tablet OS Shipments (Millions of Units)	Q4'10	Q4'11
Apple iOS	7.3	15.4
Android	3.1	10.5
Microsoft	0.0	0.4
Others	0.3	0.5
Total	10.7	26.8

Global Tablet OS Marketshare %	Q4'10	Q4'11
Apple iOS	68.2%	57.6%
Android	29.0%	39.1%
Microsoft	0.0%	1.5%
Others	2.8%	1.9%
Total	100.0%	100.0%

Growth Year-over-Year %	N/A	150%

Figure 1.1. Shipments refer to sell-in. Numbers are rounded. The definition of tablet does not include e-book readers.[3]

With the knowledge of both XP and Scrum, we in the multi project decided to use Scrum (Seen in Figure 1.2) along with Scrum of Scrums.

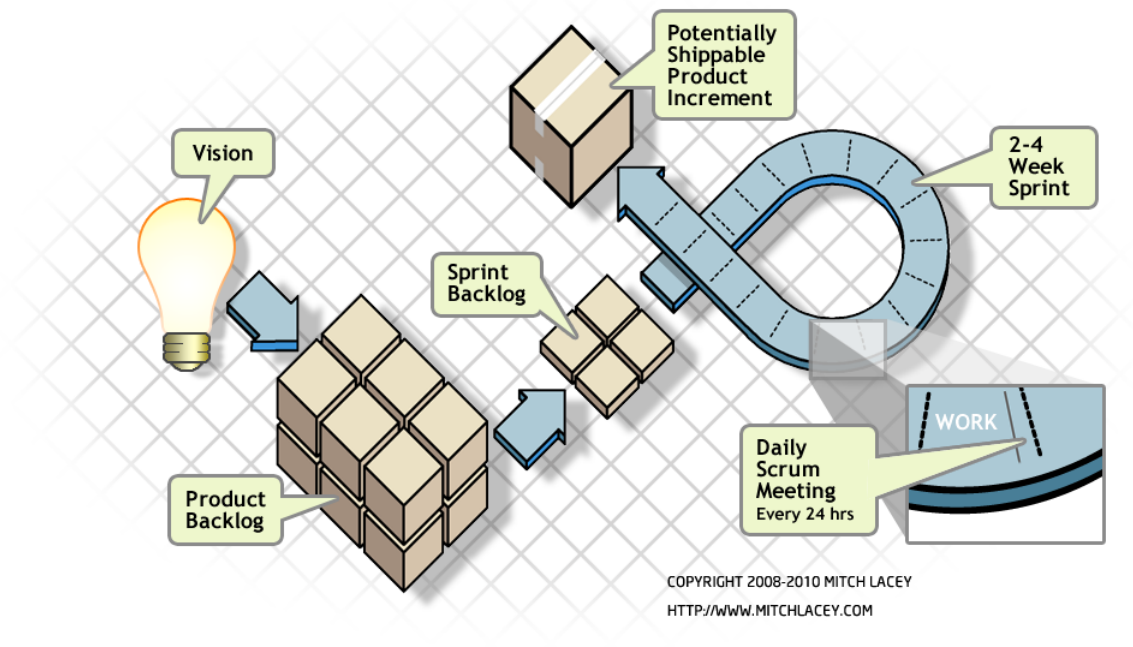

Figure 1.2. An Overview of the Scrum Framework. This image is from http://www.scrumalliance.org/system/resource_files/0000/3827/Scrum_Framework_Flow_3.png

To enhance our use of Scrum, we customized elements of Scrum to fit our project. The changes in the customized version of Scrum, and Scrum of Scrums are:

- The sprint length have been shortened to approximately 7 - 14 half days.
- Some degree of pair programming have been introduced.
- There is no project owner because this is a learning project.
- Everyone is attending the Scrum of Scrums meetings.
- The Scrum of Scrums meetings are only held once at sprint planning.

The benefits from choosing Scrum, and Scrum of Scrums with the customizations are that everyone, at all times, will be able to know what the vision of the project is, and how close every group is to achieving their individual goals of the vision.

As a part of Scrum we maintain close contact with the customers. This helps keep the product backlog up to date and correctly prioritized. The customers are presented with the vision of the project, as well as sprint demonstrations of the different incrementation of the product.

1.5 Problem Definition

In the multi project group, we have defined a preliminary problem statement, on which the individual project groups can expand. The problem statement is worded as follows:

> "How can we ease everyday life for children with autism and their guardians, through development on our target platform, while optimizing our development process by implementing a recognized project management method."

This problem statement is necessarily vague to allow the individual groups some freedom in their projects, while we maintain the overall structure of the multi project, however there are limiting factors. We are limited by resources and time available, as we are only working on this project for a single semester. However, all work done in this multi project will be passed on to the next line of students, which means we can make a full system design and pass on anything we do not have the time or resources for. This also requires that our work need to be of such quality that it is understandable by students of the same educational level as ourselves. While not an actual limitation, we must adhere to the requirements of our customers, rather than working strictly with our own ideas as we may have been use to in previous projects.

1.6 System Description

GIRAF is a collection of fully and partially interdependent applications for the Android platform, designed for use by children with Autism Spectrum Disorder.
GIRAF consists of 5 projects with various degree of interaction. These projects are named Savannah, Oasis, GIRAF-Launcher, PARROT and WOMBAT. Each of these projects have produced individual products, which are parts of a greater project, GIRAF.

Savannah: Savannah is a server designed for use with the GIRAF system. The server is meant to be available for users of GIRAF, and gives the functionality of data handling. For instance, Savannah will store all the data for a given department, making it available for everyone in the department to use on their Android tablet with GIRAF, through the Oasis Component.

Oasis: Oasis is an extra layer of functionality provided by the GIRAF project. It provides the Android tablet with a database for storing data, as well as functionality for synchronizing the database with that of the Savannah server, if it is available.

GIRAF-Launcher: The GIRAF-Launcher is the main platform for GIRAF. It handles execution of GIRAF apps, and at the same time it provides safety features to ensure that a user that is not authorized to interact with the rest of the system will not be able to do so. When the launcher executes an app, it will provide it with profile information, specifying which child is currently using the app, as well as which guardian has signed in.

PARROT: PARROT is an application for the GIRAF platform meant as a digital version of the pictures used for communication. PARROT provides the user with access to all his pictograms (meaning pictures with associated information such as sound and text), which can be used for communication. PARROT also gives guardians functionality for adding additional pictograms, as well as organizing the pictograms into categories for ease

of access, based on the needs of the individual child.

WOMBAT: WOMBAT is an application for the GIRAF platform. Its purpose is to help the children to understand the aspect of time, by visualizing it. WOMBAT provides many different ways of displaying time, as well as the possibility to configure the app for the needs of the individual child. Such features include choosing between different representations of time, such as hour glasses and progress bars, as well as choosing the color of them.

1.7 Architecture

. We build our Architecture primarily on our understanding of how the original system was meant to function. From there the system was simply developed organically, the architecture forming after the supply and demand for functionality as described in the previous section.

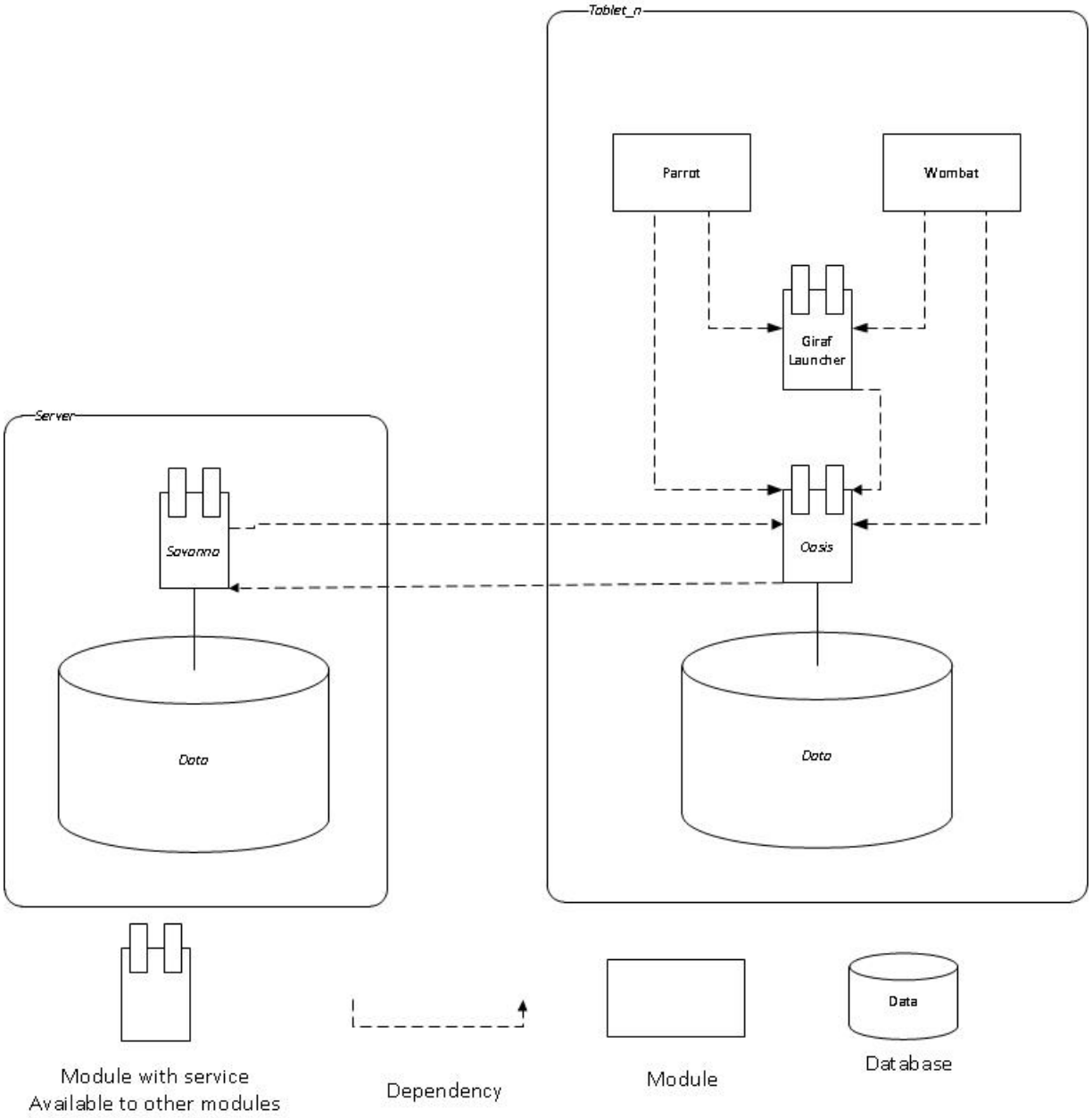

Figure 1.3. Component Structure of the Giraf Multiproject

Part II

Analysis

Part III

Design

Part IV

Implementation

Part V

Epilogue

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[18] Don Wells. extreme programming, 2009.

Appendix

.1 Notes from Interview

This is notes from an interview with Mette Als Andreasen, an educator at Birken in Langholt, Denmark.

Når tiden løber ud (kristian har tage et billede):
Færdig - symbol
Gå til skema - symbol
Taget fra boardmaker

Kunne være godt hvis man kunne sætte egne billeder ind som start/stop symboler.

Rød farve = nej, stop, aflyst.

De har sådan et ur på 60 minutter hvor tid tilbage er markeret med rød, og så bipper den lige kort når den er færdig.
Det ville være fint hvis de kunne bruge sort/hvid til dem der ikke kan håndtere farver, men også kan vælge farver.

Stop-ur:
en fast timer på 60 minutter + en customizable som ikke ser helt magen til ud, som f.eks, kan være på 5, 10 eller 15 minutter for en hel cirkel.

timeglas:
skift farve på timeglassene, men ikke nødvendigvis gøre dem større. Kombinere med mere/mindre sand. Eventuelt kombinere med et lille digitalt ur, til dem der har brug for det, skal kunne slåes til og fra.

Dags-plan:
ikke særlig relevant til de helt små og ikke særligt velfungerende børn. Men kunne være rigtig godt til de lidt ældre.
En plan går oppefra og ned, og hvis der så skal specificeres noget ud til aktiviteterne, så er det fra venstre mod højre ud fra det nedadgående skema.

Til parrot:
Godt med rigtige billeder af tingene, som pædagogerne selv kan tage, eventuelt også af aktiviteter, så pedagogerne kan have billeder af aktiviter som de kan liste efter skeamet.

Der var mange skemaer rundt omkring, og der henviser det sidste billede i rækken til næste skema, som hænger f.eks. på badeværelset eller i garderoben.