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Institute for Information Systems and Computer Media

Master's Thesis
from Telematics

Social Networks: Information and Virtual Goods

submitted by

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Soziale Netzwerke: Informationen und virtuelle Güter

vorgelegt von

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Abstract

This thesis is about 'Social Networks: Information and Virtual Goods' and deals specifically with the subject of user's information and virtual currency inside a virtual social network. At this point the question arises, if it is possible to change real money into virtual one and send it to a friend or another user on the platform. It is possible to change the currency back into a real one, or not.

Furthermore, the growing of virtual social networks will be exposed. This thesis also covers the development from the beginning of social networks and platforms until they finally changed to the current virtual social networks, as they are today. The description of genesis is based on virtual worlds and shows the transition to virtual, social platforms. In the following sections, some platforms will be described and compared to each other in detail. In addition the aim of this thesis is to find an API that allows reading out information about users and the operation of exchanging virtual goods and currency.

Using a well-known virtual social platform called Facebook the basics on how to develop a Facebook application will be explained. Moreover the thesis shows how to make various settings and individual important points which should be followed. After this section a Facebook user is able to create an application independently. Finally, it is shown how a data exchange between different users could be performed.

Kurzfassung

Das Thema dieser Arbeit trägt den Namen „Social Networks: Information and Virtual Goods" und beschäftigt sich mit der Thematik der Userdaten und virtuellen Währung innerhalb eines virtuellen, sozialen Netzwerkes. Dabei stellt sich die Frage, ob es denn vielleicht möglich sei, reales Geld in virtuelles umzuwandeln und es an einen Freund oder anderen Anwender einer sozialen Plattform zu senden. Falls dieser die virtuelle Währung in Empfang nehmen kann, stellt sich weiter die Frage, ob es denn möglich sei, die empfangene virtuelle Währung wieder zurück in reales Geld zu tauschen.

Es wird gezeigt, wie virtuelle, soziale Netzwerke entstanden sind und wie sie sich weiter entwickelt haben, bis sie schlussendlich zum aktuellen Netzwerk wuchsen. Bei der Beschreibung der Entstehung wird von virtuellen Welten ausgegangen und den Übergang zu den virtuellen, sozialen Plattformen gezeigt. Es werden einige wichtige Plattformen beschrieben und miteinander verglichen. Dabei wird versucht, eine API zu finden, mit der das Vorhaben, Informationen über einen angemeldeten Users auszulesen und den Tausch einer virtuellen Währung ermöglichen.

Anhand einer der bekanntesten sozialen Plattform, die den Namen Facebook trägt, wird gezeigt, wie man eine Anwendung erstellt. Dabei werden die Grundlagen zur Erstellung einer Facebook Anwendung beschrieben. Es wird gezeigt, wie diverse Einstellungen vorgenommen werden und auf welche einzelnen Punkte geachtet werden muss. Dadurch wird es einem Facebook User möglich gemacht, eine Anwendung selbstständig zu erstellen. Dabei können auch einige, auf Facebook sehr populäre, Funktionen eingebaut werden und verwendet werden. Des Weiteren wird

gezeigt, wie es dabei möglich ist, einen Datenaustausch zwischen verschiedenen Anwendern durchzuführen.

Acknowledgement

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date (signature)

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List of Abbreviations

AJAX	**A**synchronous **J**ava and **X**ML
API	**A**pplication **P**rogramming **I**nterface
APP	**A**pplication
BBC	**B**ritish **B**roadcast **C**orporation
BEBO	**B**log **E**arly **B**log **O**ften
CEO	**C**hief **E**xecute **O**fficer
CNY	**C**hinese **R**enminbi **Y**uan
CSS	**C**ascading **S**tyle **S**heet
CTO	**C**hief **T**echnology **O**fficer
CURL	**C**lient for **U**niform **R**esource **L**ocator
DOM	**D**ocument **O**bject **M**odel
DST	**D**igital **S**ky **T**echnologies
FBJS	**F**acebook **J**ava**S**cript
FQL	**F**acebook **M**arkup **L**anguage

GmbH	**G**esellschaft **m**it **b**eschränkter **H**aftung
GWT	**G**oogle **W**eb **T**oolkit
HTML	**H**yper **T**ext **M**arkup**L**anguage
IDE	**I**ntegrated **D**evelopment **E**nvironment
IIS	**I**nternet **I**nformation **S**ervice
ISS	**I**nstruction **S**et **S**imulator
JSON	**J**ava**S**cript **O**bject **N**otation
MMORPG	**M**assively **M**ulti-Player **O**nline **R**ole **P**laying **G**ame
OS	**O**peration **S**ystem
PDA	**P**ersonal **D**igital **A**ssistant
PDT	**P**HP **D**evelopment **T**ools
PHP	**P**HP: **H**ypertext **P**re-processor
PHPDA	**PHP D**ocumentation
REST	**R**epresentational **S**tate **T**ransfer
RMB	**R**en**m**in**b**i
SDK	**S**oftware **D**evelopment **K**it
SNS	**S**ocial **N**etwork **S**ite
SQL	**S**tandard **Q**uery **L**anguage
URL	**U**niform **R**esource **L**ocator
USD	**US D**ollar
WPI	**W**eb **P**latform **I**nstaller

WTP   **W**eb **T**ools **P**latform

WWW   **W**orld **W**ide **W**eb

(X)FBML   **(C**ross**) F**ace**b**ook **M**arkup **L**anguage

XHTML**E**xtensible **H**ypertext **M**arkup **L**anguage

XML   **E**xtensible **M**arkup **L**anguage

YASNS   **Y**et**A**nother **S**ocial **N**etworking **S**ervice

Chapter 1

Introduction

In the year 1997, the first social network was created and was called *SixFegrees.com*. At that time the internet was still in its infancy and so it was only possible to create a user profile and a list of friends. Compared to present social networks no major changes have been made. Unfortunately this social network site had no good future because it was not common to meet friends on a virtual platform and the internet access was not as good as today. Before the turn of the century other virtual platforms have been evolved. Two of them were LiveJounal and AsianAvenue. With these social network sites it was possible to create a profile as well as adding information and friends to it. That was the starting point of the social network sites, as known today.

From then on lot of different types of virtual Social Network Sites were immerging. Amongst the most famous one can find Facebook, MySpace, QQ, VZnet Networks and Habbo Hotel, which are described below in more detail. Each of them has special advantages and disadvantages and many different possibilities how the user can interact on these platforms.

VZnet Networks can be divided into three networks that differ in type of users and in range of age. One part is for pupils and has the name *SchülerVZ.* The second type is

called *StudiVZ* and the age of users is mostly between 18 and 30. The third part is called *MeinVZ* comprising users from 25 and beyond. These networks are more commonly used amongst the German speaking society.

QQ is a very famous platform from China. It is a combination of chat and Social Network Site and has about 500 million users, however the estimated number is said to be around 700 million. It provides only the Chinese language and no specific age group can be defined.

The next type of Social Network Site is called *Habbo Hotel,* which is aimed for teenagers. It is more a virtual world as a virtual platform. On this particular network it is possible to create an avatar and walk around with him. Lots of other avatars are walking around personifying other users. Within this world one may chat, create and design an own avatar and apartment.

MySpace is one of the biggest Social Network Sites and works in range of audio and video. This platform is mostly used in USA and Europe and the users are between 13 and 36 years old.

The fourth Social Network is the most famous in the world and this site is Facebook. It is offered in more than 70 languages and the users are from all over the world. The main interactions Facebook provides to its users, is finding friends and building virtual relationships. In addition it is possible to post messages (status, news) and the user can use lots of applications.

Every platform offers many applications which can be used by the users. Most of them are free but it could be that the user has to pay for different specials. For this reason a few Social Network Sites have established virtual currencies. In case of Facebook this currency is called *Facebook Credits*. With this virtual money it is possible to pay special virtual gifts in applications for sending them as a present to friends. Additionally one can also buy goods in online playing games like FarmVille. The aim of this game is to manage a farm. It is also possible to earn FarmCoins by sowing and harvesting vegetables. When playing such online games like FarmVille, the user can earn virtual money that can be used inside the respective game only. So the user plays such games for a very long time but these FarmCoins cannot be used anywhere else. Therefore the question arises, if it is possible to exchange the earned money into Facebook Credits or

other goods that could be used in other applications. Perhaps it is possible to create an application which allows it to work as an exchange office for different virtual currencies and goods inside a social network.

1.1   Motivation and Objectives

In recent years, virtual social network sites became more and more famous. Facebook has to date over than 500 million registered users makes it number one leader on the market of social networks. Not so long ago, virtual currency has entered the social network's world which implicated a huge financial potential. The virtual currency of Facebook is   called 'Facebook-Credits' which has been accepted gratefully by a couple of users. This results in the question is it possible to send a special amount of virtual currency from one user to another?

The second point is related on the saved user's information. Due to the continuous development of virtual social platforms the number of offered applications raised too. In the first instance special online real-time games that have an internal currency and also allow Facebook Credits as a payment system rule the market in regards to social network sites. Therefore, aim of this thesis is to show the transparency of a user, registered to a social network and the way for getting access to its data by developers of an application.

1.2   Thesis Structure

Generally, the paper is divided into several parts. It begins with three chapters of theoretical research, followed by the practical part and of the project 'trade Goods' and ends with 'Lessons Learned' and 'Summary and Outlook'.

In detail, the first part starts with social networks, followed by the historical background and the description of the different well-known virtual, social network sites. Chapter 2 attends to the definition of general social networks. In chapter 3, a short report about the historical way of social network sites is explained. It is an overview of the growing of social network sites from the starting point to the present status. It also shows the different changes of name, type, design and desired requirements inside a virtual social platform.

The different social network sites are discussed in chapter 4 as well as important details about market value, payment systems and their owners. It should give an overview about different types of social platforms all over the world.

The second part of this work is about the practical development. The research work for setting up the development environment is explained in chapter 5. It describes the choice of API, programming tool, web-server, database and different programming languages. After adjusting the environment it is possible to create an application that affords the requested information. Chapter 6 contains the items (i) Authentication, (ii) User-Information, (iii) Functions and (iv) Database.

Chapter 2

Social Networks

2.1   Definition

The term 'Social Network' originally comes from the study of sociology. It could be defined as the combination of '*a finite sum or a sum of actors and the relationship or the relationship between them*' (Wasserman & Faust, 1994). Studies about the human interaction began about 200 years ago and social networks are an important part of it. According to (Wasserman & Faust, 1994) the focus of social network analyses lies in the understanding of "relations, their patterns and implications, between social entities" (Fernandes, 2010).

Single Person
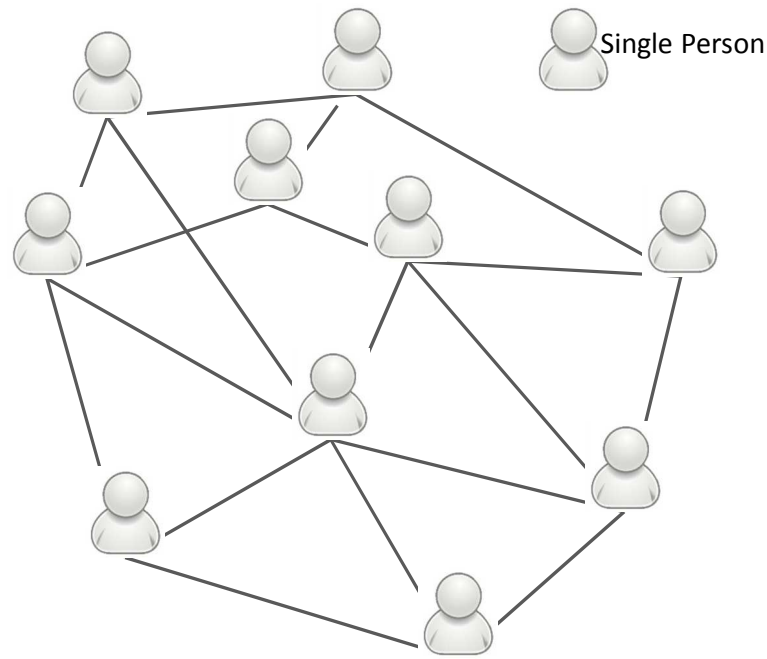
Figure 1: Simplified Illustration of an Individual in a Social Network

The human race is of a social nature and is therefore surrounded by an invisible network, which consists of direct and indirect relations. The first social network, from which one depends at birth, is the family. Later different relations to other individuals will be counted to this relation. Figure 1 shows this relation, where every person represents one point of the network and the lines are the relations between them.

Another social term, which is related to social networks, is called Small World Problem. That means even if two people do not know each other, they are connected through others. If person A does not know Person B, they are still connected through a chain of others. Lot of studies even those of Milgram confirms the hypotheses of a 6-degree distance between all people. "*While many studies in social science show how the individual is alienated and cut off from the rest of society, from the perspective of this study a different view emerges: in some sense, at least, we are all bound together in a tightly knit social fabric*"(Sherif & Sherif, 2008).

A complex diagram of such connection is shown in Figure 2. Often such entities are displayed as nodes and the connections between these nodes are shown as

connection lines. So you can see that a node is connected to others if they have a relation (Fernandes, 2010).
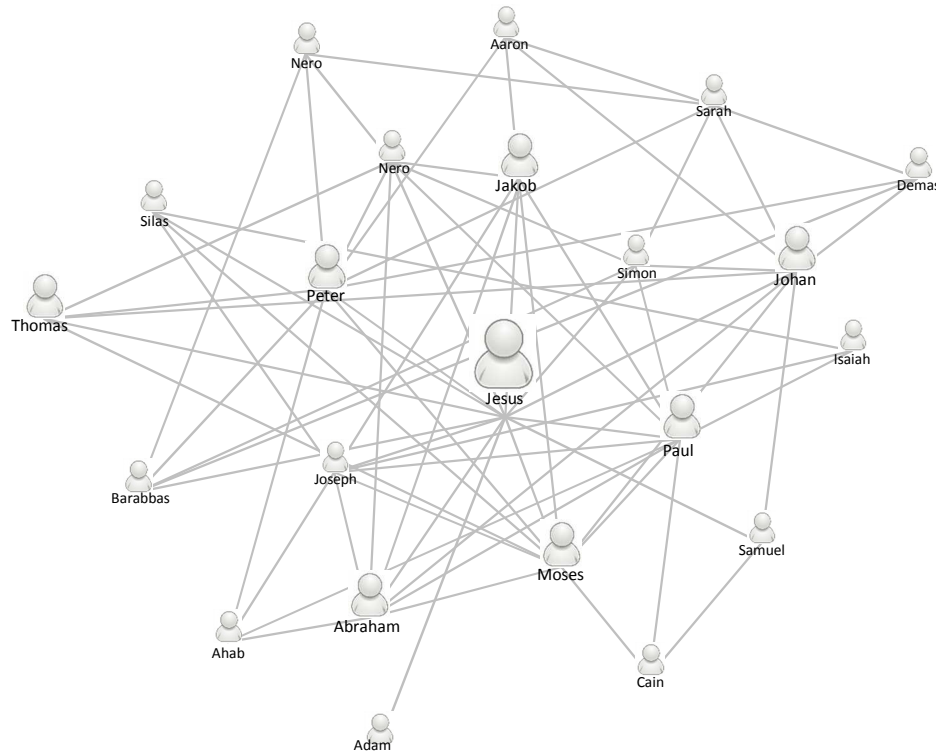
Figure 2: Small World Problem: Connection between individuals

The social networks online are similar to those in everyday life(SNS). (Boyd & Ellison, 2007) defines Social Network Sites as a web based service that allows people to create a public or semi-public profile inside a system. *"We define social network sites as web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site"* (Boyed & Ellison, 2007).

With these online networks it will be much easier to contact other people and include them into their own system of contacts. By the use of these sites it has shown that it is not as important to find new friends and expand their friendships, than to communicate with members of whom they are talking on the internet to. The

uniqueness of such social network sites is that the social networks between humans become invisible (Fernandes, 2010).

Chapter 3

The Starting Point of Virtual Worlds

In this section the growing of two kinds of socio-technical phenomena will be described. These are the online-gaming and the social-networking phenomena, which led to the today´s virtual worlds.

3.1   The Beginning in Electronic Gaming

In the last 40 years there was a vast advance in the electronic gaming area. The first electronic game was called "pong". Countless handheld systems and game consoles have taken the industry to a higher level. Gaming companies worked together and invested $18.85 billion in global sales in 2007. The forecast for 2010 is that sales could rise by almost double. This growth can be explained by the development of the console technologies over the years as well as the possibilities how people play games, where they play and with whom they play them. All the games can be divided into three categories. The first one is strategic and tactical games where the gamer has to solve object-oriented tasks. The second category contains thematic and fantasy roll-

playing games and the third category of game-types are testing the reflexes of the player. In the table below are a few interesting milestones in the increasing of electronic games (Messinger et al., 2009).

Game	Year of Release	Platform	Important developments
Pong	1972	Arcad	Coin-operated video games which were standing in arcades; followed by Indy 500, Tank, Space invaders and Pac-Man
Super Mario Brothers	1986	Video game console	Originally from Nintendo; it created popular characters like Mario, Luigi, Donkey Kong, Zelda and Popey
Populous	1989	PC and console	The first ‚God game' where the player has the role of the Almighty.
Doom	1993	LAN (Local Area Network)	LAN games allowed an interconnected play where the gamer can play together or fight against each other; internet access was wished for
Quake	1996	Internet	The first game, that needs the internet to allow players to interact with others in this first-person shooter
The Sims	2000	PC and Internet	This is the most famous best-selling game series of all time; many versions of this game exist, which expanded into shared online environments; most content of this game is made by the user
World of Warcraft	2004	Internet	Most famous online gaming environment; actually there are more than 11.5 million active users which are sharing an online world

Table 1: Important points in electronic games

It took years to turn electronic game platforms from big coin-operated arcade games to smaller console systems, single-person application for personal computers, to LAN games and finally to games that are played over the internet. With these smaller console systems people started playing games alone or with friends in their homes. With Local Area Network games user reached a new dimension to play with groups of people. By 2004 gamer made big LAN-parties where about 1200 people played one game. In the year 2000 and 2001 Nintendo brought out the PlayStation 2 and Microsoft put Xbox on the market. With these two consoles, the user has the opportunity to connect to the internet and play games against other games all over the world.

The highly successful game "The Sims" and their continuations "The Sims Online" and "The Sims2" makes it possible to control their own environment as well as creating their own content. This includes skins of the avatar, decoration of the homes and the environment. The producer company EA (Electronic Art) say that over 80% of the users make their own content.

An important part of online games are the massive multi-player online role playing games (MMORPGs). The user attains higher levels to get harder challenges. There are lots of online worlds. The best known are Everquest, Lord of the Rings Online, City of Heros/Villains, Age of Conan and the most famous, World of Warcraft. In these worlds, the user can go with their avatars where ever they want. But the area where they can walk is limited by the danger of the next level and their area.

Again, here are the most important points that show the advance and evolution of the gaming-industry. These innovations include the development of user-controlled avatars, multi-user interactions, 3D animations, and MMORPGs, as well as a user-generated content (Messinger et al., 2009).

3.2   History of Social NetworkSites

In the following part the definition and growing of Social Network Sites is described, to get a better insight into the world of online SNSs. It is shown from which parts a SNS consists and how they work together.

3.2.1   Definition

Social Network Sites are web-based services that allow user three points. The first one is to create a profile (private or public) within a bounded system. As second point the user could create a list of users with whom he wants to keep in touch. The third one is to see the connections made by their own and others who are in this system. The design of the relationships varies between the different sites.

What makes social network sites unique? Not the meeting with strangers, but the chance to enable an already known user for the own social network. On many of these social network sites the goal is not necessarily to meet new people, but the important key is to communicate and keep in contact with those that are on your social network. Social network sites consist of many technical features, but the skeleton of each SNS consists of the same. These are the visible profiles, which display a list of friends who are also users of the same network. Profiles are sites, where the user presents him. During the building of a profile the user has to fill out lot of questions. With the answers about name, age, location, interests, hobbies and more about me, a profile will be generated. Most sites also allow user to upload a profile photo and multimedia content. Another page, called Facebook, allows user to add small modules, which are called Applications to upgrade their profile (Haythornthwaite, 2005).

The visibility of a profile is optional and varies by site and also depends on his or her discretion. On sites like Friendster and Tribe.net the profile of a user can be found via search engines like Google and yahoo, wherein the user has no account on these sites. On other sites like LinkedIn and 123people the network is controlled with paid accounts and determines what a user may or may not see. MySpace is a site, where the user can decide if his or her account will be public or for friends only. Facebook has a different approach to other social network sites. Every user who is part of a network could see the others profile, unless a profile owner has decided otherwise. The differences between visibility and access on each social network site are the primary ways to differ between the single platforms.

After visiting and registering on a social network site, members have to identify others with whom they are linked. Such relationships are labelled with different designations like "Friends", "Contacts" or "Fans". On most sites the communication relationship between users is bi-directional. But on some sites there is only a one-directional agreement and these labels are mostly called "Fan" or "Follower"(Boyd & Ellison, 2007), (Boyd, 2006a).

A very important part of such a social network site is the public display of relations. This allows friends to navigate through the list of members and see the friend's

profiles. On most sites the list of relationship is visible for everyone who is in the list of friendship and has the permission to view the profile. Most sites have an option for user to leave messages, private messages or notes for friends. This application differs among the various social network sites. The most popular features are private messages and notes, but they are not on every network site commonly available. Not every social network sites started as such. LunarStorm started as a community site, Cyworld, at the beginning was a tool for a Korean discussion forum, QQ was previously an instant messaging service for China and Skyblog, or later Skyrock started as a French blogging service before they got the social network site feature. AsianAvenue, MiGente and BlackPlanet were popular community sites with limited functions for interacting with friends before re-launching them in 2005 with structures and features of social network sites. Apart from profiles, friends, notes and private messaging, social network sites differ from features, applications and target groups. The one have picture-sharing and video-sharing and the other have blogging and messaging services. For instance Facebook, MySapce and Cyworld are web-based social network sites, but they also support limited mobile interactions. The difference between all social network sites is the tagged group. Some sites are designed for religious, different sexual orientations, political or specific ethnic groups.

Most sites are designed that they can be made accessible for the public. So it is not atypical or rare to find groups on these public sites who isolate themselves by building groups for nationality, age, religion, hobbies, or other factors, even if it was not the plan of the designers (Boyed & Ellison, 2007).

3.2.2 Birth and History of Social Network Sites

The Beginning

If it is assumed the definition above, the first serious social network site started in 1997 and was called SixDegrees.com. This site allowed the person to create a profile, list their friends and in 1998 it was possible to browse the list of friends. Of course,

each of these features existed in several community sites, but it was not combined in one site before. For instance it was already possible to create a profile on several dating and community sites. On ICQ, it was possible to make a list of friends in which the own friends were not visible to others. Classmates.com allowed people to connect to their high school or college and surf there through the network. SixDegrees.com was the first social network site which combined all these features. This site sponsored itself as a network for connecting people and send messages to them or others. SixDegrees reached a population of several millions of users, but they missed the step to become a profitable business and so they closed their service in 2000. Afterwards the creator thought, that this service was ahead of its time.

Between 1997 and 2001a series of community tools promoted combinations of profiles and visibly listed friends. On the social network sites AsianAvenue, BlackPlanet and MiGente it was possible to create personal, professional and dating profiles. So users were able to identify friends on their personal profiles without authorisation for this relation. In 1999 the Korean virtual world site Cyworld went online and in 2001 they added features for a social network site. In 2000, LunarStorm was used by the Swedish community as a social network site that supported friend lists, guestbook and diary pages (Boyed & Ellison, 2007).

Also in 2001 the next step of social network pages started with Ryze.com which was to leverage the own business contacts. The creator of Ryzer told that he first initiated the site to his friends, who were members of a community for business and technology in San Francisco. Each of his friends were businessmen or investors behind some future social network sites. More precisely the people behind LinkedIn, Tribe.net, Friendster and Ryze where all closely linked personally and professionally together. So they thought they can support these sites without challenging. In accordance, Ryze never reached mass popularity. LinkedIn became the status of a powerful business service and Friendster was titled as "one of the biggest disappointments in Internet history" (Chafkin, 2007, p.1), (Festa, 2003).

Launch Dates of Major Social Network Sites

Year	Sites
1997	- SixDegree.com
1998	
1999	- LiveJounal - AsianAvenue - BlackPlanet
2000	- LunarStorm (SNS relaunch) - MeGente
2001	- Cyworld - SixDegrees.com ... closed - Ryze
2002	- Fotolog - Friendster - Skyblog
2003	- CouchSurfing - LinkedIn - MySpace -Tribe.net -Last.FM - Hi5
2004	- Orkut & Dogster - Flickr, Piczo, Mixi, Facebook (Harvard only) -Multiply & aSmallWorld - Dodgeball, Care2 (SNS relaunch) - Catster -Hyves
2005	- Yahoo! 360 - YouTube, Xang (SNS relaunch) - Cyworld (china)

Launch Dates of Major Social Network Sites

	- Bebo
	- Facebook (High School Networks)
	- Ning
	- AsianAvenue, BlackPlanet (re-launch)
	- QQ (relaunch)
	- Facebook (co-operate Networks)
	- Windows Live Spaces
2006	- Cyworld (USA)
	- Twitter
	- MyChurch
	- Facebook (everyone)
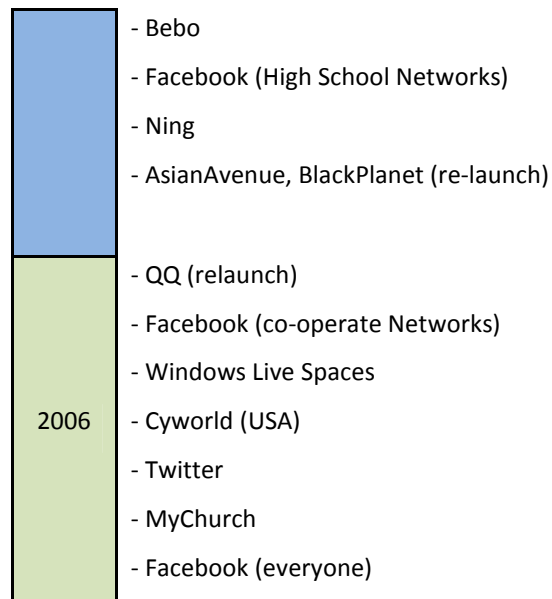
Figure 3: Evolution of online Social Network Sites

Three very important social network sites are MySpace, Facebook and Friendster, which formed the areas of business, cultural and research (Boyed & Ellison, 2007).

Friendster

Friendster started in the year 2002 as a compliment to Ryze and was designed as a rival for Match.com. This lucrative social network site for dating is designed to bring together people and strangers with similar interests. Friendster however is designed to bring together friends with friends of friends. This idea is based on the hypothesis that friends and friends of friends would fit better together than strangers would. Friendster increased traction in three categories of user. These were gay men, bloggers and visitors of the Burning Man festival whereby the social network site reached about 300000 users only through telling friends before in May 2003 the modern way of advertising started.

When popularity of Friendster was rising, the technical and social problems grew more and more. That means the servers and databases were too weak to deal with the rapid growth. That was the reason why the site was increasingly faltering. Such an

exponential growth was the reason for a collapse in social background. The users had to list the bosses, colleagues and friends in one single list. Furthermore, Friendster began to control the activities of the most active user. The early aim of Friendster was that users weren't allowed to visit profiles of users who are more than four levels away. Accordingly, users began adding strangers to their friends list, so they could broaden their search range. Due to this, people began adding other people so they had more friends and could be named as the most popular user on the network. The biggest collectors were fake profiles with strange characters. The company was displeased about this and outsourced these profiles and the feature called "most popular".

Unfortunately Friendster deleted not only fake profiles, but also user profiles that had a non-realistic cover on their profile. This looked like a lack of interest from the company in regards to the users. Because of the combination of technical and social problems and a breach of trust, many users left the social network site Friendster. But at the same time the popularity of this platform exploded in the Philippines, Singapore, Malaysia and Indonesia (Boyed & Ellison, 2007).
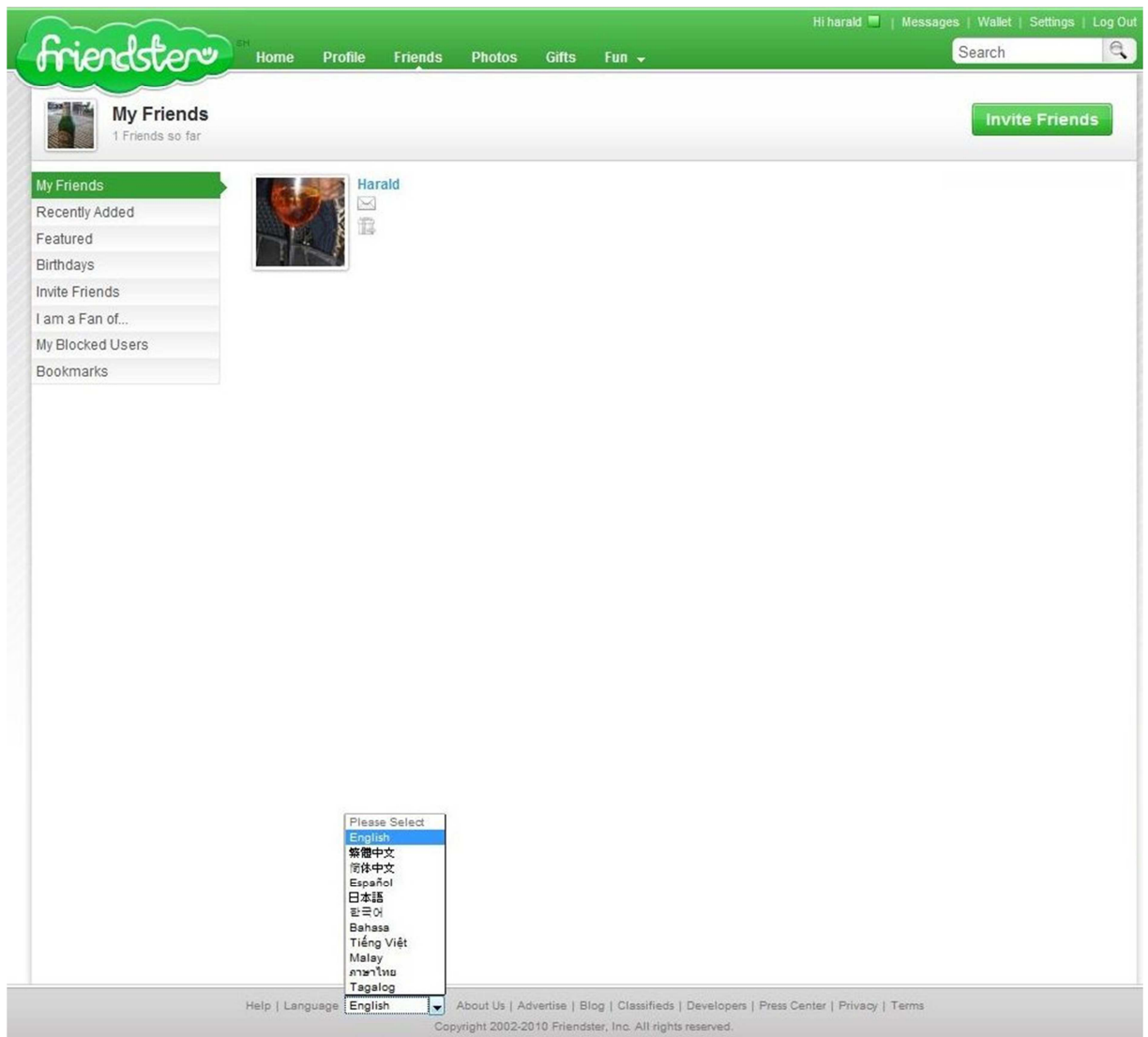
Figure 4: Profile of Friendster[1]

Social Network Sites became typically

Since 2003 many new social network sites started, and so the software analysts designed a term for this, called YASNS (Yet Another Social Network Site). Most of them tried to reach the success of the beginning of Friendster. While social orientated network sites focused on social, public and professional sites like LinkedIn, Xing or Visible Path they also tried to gather business people. In addition to this, there are social network sites which are specializing in certain groups like Dogster or MyChurch. Dogster is a platform that helps bringing strangers with same interests together and

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[1]http://www.friendster.com/

MyChurch is for Christian and their churches. At the growing of the phenomena of social media and user-generated content, websites which were focused on media sharing began to implement features from social network sites on their own site so they became such a site too. Such examples for this are Flicker which is for photo sharing, Last.FM is for habits of listening to music and YouTube is for video sharing.

MySpace was started in 2003 where they competed with sites like Friendster, Xanga and AsianAvenue. The founders of MySpace wanted to get the estranged users of Friendster. After the rumour that Friendster was to become a paid system, users posted Friendster messages, saying that they will switch to other social network sites like MySpace or Tribe.net. Because of this MySpace was able to grow very fast. One special group that called users to leave the Friendster platform, were the indie-rock bands, who were excluded from Friendster because they failed to abide by the profile rules.

However, MySpace was not implemented to control bands like Friendster, they were then welcomed. So bands from the California area began to create profiles and so the promoters used this platform to advertise for popular clubs. Not only were the bands the reason of growth, but the relationship between bands and their fans helped MySpace to getting users beyond the platform Friendster. This enormity of bands and fans were a great advantage, because of bands wanted to be able to contact fans and fans wanted to signal their affiliation to special bands.

MySpace differs itself by adding features on interviews of users. So users are allowed to personalize their own page by adding a HTML code into the frames which creates the profile. (Boyd, 2006)With the option of a HTML code, users are able to create their own backgrounds and layouts (Perkel, in press).

In 2004, teenagers began to help with the publicity of MySpace by signing up. Most of them had never been on Friendster, others switched, because they wanted to join with their favourite bands and still others were introduced to this site through family members. When MySpace noticed that there are a lot of teens that logged on this page, they changed the user policy to allow minors.

In July 2005, the News Corporation1[2] bought MySpace for $580 million and drew the attention to himself (BBC, 2005). Then there were great security problems that plagued MySpace. The site was occupied with a series of sexual contact between adults and minors and so they were asked for legal action (Consumer Affairs, 2006). A fear of sexual predator growth, but research showed that the amplification was overdone (Bahney, 2006), (Boyed & Ellison, 2007).

A worldwide trend

While MySpace has reached the biggest part of their users in USA and beyond, SNSs began to rise worldwide. Friendster reached attraction in the Pacific Islands like Philippines, Singapore, Malaysia and Indonesia. The platform Orkut grew into the leading SNS in Brazil, before it became very popular in India. The social network site Mixi was in Japan, LunarStorm reached the user in Sweden and the Dutch users logged into Hyves. Poland took the site Grono, Hi5 was accepted in Latin America, South America and in few countries in Europe. The SNS Bebo became very popular in the English colony countries United Kingdom, New Zealand and Australia.

Furthermore, services for communication and community began to implement features from SNSs to become popular again. The Chinese instant message service QQ grew with adding profiles and showing friends to the largest SNS worldwide (Ewers, 2006).

Also blogging services which contain SNS functions became trendy. The American blogging tools like XANA, VOX or LiveJournal, which contains SNS features, involved much of the public. Another blogging tool is Skyrock, which leads the market in France. A tool called Windows Live Space leads many markets all over the world, like Italy, Mexico and Spain. The SNSs, QQ, Orkut and Live Space are at least equal if not greater than MySpace, but there is little usage in the U.S and other English speaking areas. That is the reason, why it is difficult to follow their trend (Boyed & Ellison, 2007).

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[2] Is one of the world's largest media conglomerates (http://www.newscorp.com/)

Growing market gap communities

At the beginning there have been open services and other SNSs which started as a small community before they were open for the general public. However, the platform Facebook was designed to support separate college networks only. In the beginning of 2004, Facebook started as a social network site for Harvard only. To log in on this platform the user had to have a Harvard.edu mail address. After this Facebook began supporting other schools too, however those users also had to have university email addresses which are connected with those institutes. This was a condition, which kept the site relatively closed, that's why it became an intimate, private community.

From the beginning of 2005 Facebook opened their platform for High-School students, specialists form company networks and after this, for everyone else. Opening the access rules did not mean that every new member could access users in closed networks. One feature of Facebook which is different to other SNSs is that users are not able to make their full profiles open to every user. Another feature which differ Facebook from others is that outside developers are able to create their own applications to personalize their profiles and perform other tasks.

There are not only SNSs which want to grow broadly and exponentially. Some social network sites exist, which want to address a smaller but different public. Other sites there are activity-centred like CouchSurfing, identity-driven like BlackPlanet or affiliation-focused like MyChurch have their own specific features to target their preferred audiences. At last there is another site called Ning, where everyone can create their own niche social network. Figure 5 shows the monthly visitors on the top 25 Social Network Sites It shows how many people have visited different sites in January 2009.

Currently no one can say how many people use SNSs, however marketing researcher promise that social networks are growing in popularity worldwide. This forecast results show that many companies invest lot of time and money in creating, purchasing, advertising and promoting SNSs. Although a lot of companies block the access for their employees to these communities.

Top 25 Social Networks Re-Rank

(Ranked by Monthly Visits, Jan '09)

compete.com

Rank	Site	UV	Monthly Visits	Previous Rank
1	facebook.com	68,557,534	1,191,373,339	2
2	myspace.com	58,555,800	810,153,536	1
3	twitter.com	5,979,052	54,218,731	22
4	flixster.com	7,645,423	53,389,974	16
5	linkedin.com	11,274,160	42,744,438	9
6	tagged.com	4,448,915	39,630,927	10
7	classmates.com	17,296,524	35,219,210	3
8	myyearbook.com	3,312,898	33,121,821	4
9	livejournal.com	4,720,720	25,221,354	6
10	imeem.com	9,047,491	22,993,608	13
11	reunion.com	13,704,990	20,278,100	11
12	ning.com	5,673,549	19,511,682	23
13	blackplanet.com	1,530,329	10,173,342	7
14	bebo.com	2,997,929	9,849,137	5
15	hi5.com	2,398,323	9,416,265	8
16	yuku.com	1,317,551	9,358,966	21
17	cafemom.com	1,647,336	8,586,261	19
18	friendster.com	1,568,439	7,279,050	14
19	xanga.com	1,831,376	7,009,577	20
20	360.yahoo.com	1,499,057	5,199,702	12
21	orkut.com	494,464	5,081,235	15
22	urbanchat.com	329,041	2,961,250	24
23	fubar.com	452,090	2,170,315	17
24	asiantown.net	81,245	1,118,245	25
25	tickle.com	96,155	109,492	18

Figure 5: Ranking of visits on SNSs in January 2009[3]

The rise of SNSs shows a change in the organisation of online communities. Websites which belong to communities of interests are still growing, but SNSs are primarily built around people and not interests. The first public communities and discussion forms are sorted by topics or topical hierarchies. But SNSs are sorted as personal networks with the user as the centre of their own community. In Figure 6 it is easy to see the running of visits from March 2008 till December 2009 on the most famous SNSs. The installation of SNS features has built a new organisational framework for online communities and with it a new research development (Boyed & Ellison, 2007).

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[3] http://blog.compete.com/2009/02/09/facebook-myspace-twitter-social-network/
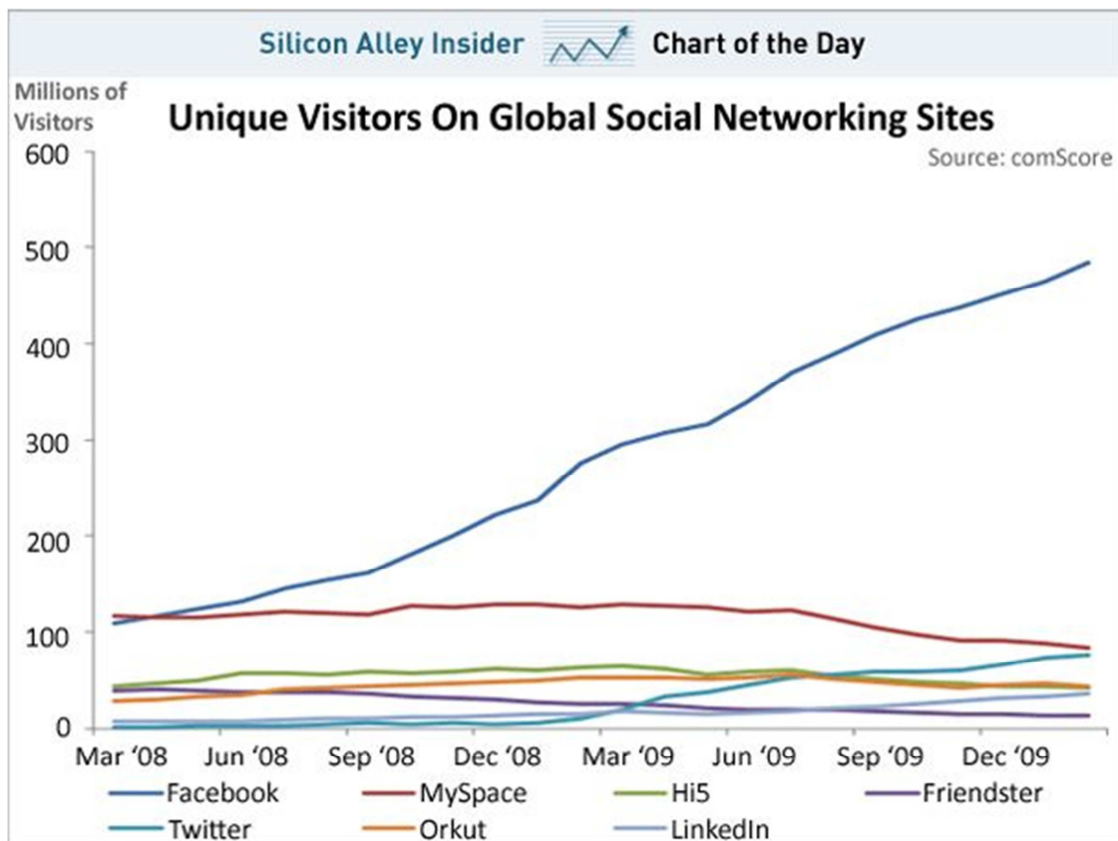
Figure 6: Running of visits on different SNSs[4]

3.3 Summary

In the last 40 years, the gaming sector has been developed strongly. In 1972 the first electronic game had been brought out, which was the starting point for computer gaming era and the collaboration between gaming companies. In 2007, because of this team it earned $18.85 billion and the forecast for 2010 promising double that figure.

Over many years electronic game platforms turned from coin-operated arcade games to small console systems. LAN-games also transformed into online games. An important part of such games are the massive multi-player online role playing games

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[4] http://www.businessinsider.com/

(MMORPGs) where users can walk with their avatars wherever they like. The only border is the difficulty of the level. Very famous names of such games are Lord of Rings, Age of Conan or World of Warcraft.

The next point in this chapter is the history of social network sites. Such networks allow users to generate profiles, invite friends and see connections between them. In the year 1997 SixDegree.com started the era of Social Network Sites where it was possible to generate an account and invite friends. After this point lot of new networks had been created and changed constantly. The most famous of them are Friendster, MySpace, Hi5, Flickr or Facebook. This possibility to stay in touch with friends went all over the world and so Social Network Sites became very famous.

Chapter 4

Different Social Network Sites

4.1 MySpace

4.1.1 History, Description and Information

Primarily MySpace was a supplier for free data storage on the internet. In July 2003 Tom Anderson founded the community MySpace.com with the same address. In July 2005 Rupert Murdoch's media company News Corporation bought the Community for $580 million USD.

The special feature on MySpace since the establishment is that they specialised in music. The founder Anderson used his connection to artists and bands and convinced them to create their own "MySpace". This allowed the fans to come in contact with their bands what was at the beginning the biggest success factor. Today the web spaces are not administrated from the different bands but from their fans. These sites inform their fans about tour dates and new albums. Often they also can listen or download several songs. Through the balance point of music individual scenes were

grown. One benefit of this is that similar bands made friends and advertised for each other. A second advantage of these connections is that the record companies took notice of the bands (BBC, 2005), (Blodget, 2010).

4.1.2 Focus, User-Numbers and User-Age

MySpace is a social network site which allows the user to upload, share and store music, videos and personal profiles. MySpace also allows connection of users via games and mobile phones.

The number of users grew very fast and on the 9th of August 2006 they recorded 100 million customers. The social network was well known in the North American and English speaking areas, so Murdoch decided to build a German beta version and in January 2007 they counted more than 2.5 million users. By late 2007 and beginning 2008 MySpace was the leader of the Social Network Sites and were in front of Facebook which was the biggest competitor. After this Facebook launched new features and reached the attention of the users. At this point MySpace found itself in a continuing decline of members. The result of this was that in July 2010 MySpace was on the 25th rank of internet traffic, with Facebook on the 2nd position and they reduced their number of users to 66 million (Boyd, 2006b).

4.1.3 Application, Payment and virtual Currency

Facebook's rival MySpace doesn't offer its own currency for virtual goods like MySpace but is exploring such a service, according to a spokeswoman. People close to the company, which is owned by News Corp, publisher of The Wall Street Journal and The Australian, say game developers would be charged a fee below 30 per cent.

In the year 2008 MySpace added an API which made it possible for other users to post on their profile. In May 2008 MySpace added security options in regards to photos and other media. Many of the apps which are popular on MySpace like Mafia Wars are

provided on Facebook too and vice versa like FarmVille. These applications were created by Zynga or Slider, which are third party apps provider.

In early 2006 MySpace started the MySpaceIM. This is an instant messenger which is standalone software for Microsoft Windows and the user can log in with its MySpace-email address. Other features of this social network site are MySpace Mobile which is started 2006 with the American mobile company Helio, MySpaceTV which started in 2007 which is similar to YouTube video sharing.

4.1.4 Owner, Market value and Revenue

The owner of MySpace is the media mogul Rupert Murdoch. He was born on the 11th of March 1931 in Melbourne. He studied at the Oxford University and took over his Father's media group. He is the principal shareholder of the News Corporation and on the 20th of July he bought Intermix Media Inc., which held MySpace.com and other popular social network sites, for $580 million USD.

In August 2006 MySpace and Google entered into an agreement that "Google search" and "Google AdSence" will be integrated into the MySpace site. For this agreement they produced $900 million USD from 2007 to 2010.

MySpace's revenues are exclusively from advertising which means that the features are free for the user. Through the web site and its included ad networks, MySpace collects lot of data about its users and their surfing behaviour on the web site. So they are able to show advertising which is tailored to each user. A source reported that the revenue from 2009 is between $500 and $600 million USD (Blodget, 2010).

MySpace was a lucky chance for smaller companies like RockYou!, Slide.com and YouTube to provide their widgets and accessories on such a social network giant. In November 2008 MySpace reported that user-uploaded content that breaks the rules of copyrights which were held by MTV and their subsidiary would change the places of their advertisement that would generate revenues for the companies of the uploaded content. While MySpace lost popularity to other social networks like Facebook or

Twitter in last months, the owner Rupert Murdoch did not think about a selling. In the year 2009 MySpace added a new update feature from Twitter. If the user has a Twitter-Account the tweet also updates the MySpace status and vice versa. The result of advertising, marketing and use of applications is an estimated market value between $ 500 million and $1.2 billion US Dollar.

4.2 VZnet Networks (MeinVZ, StiduVZ, SchülerVZ)

4.2.1 History, Description and Information

The VZnet Networks was founded in August 2009 and consists of three parts. The first one is called StudiVZ and was founded on 11th November 2005 by Dennis Bemman (CTO) and Ehssan Dariani (CEO). This platform is mainly for students. Here they can build profiles with information about themselves and their University. So the students are able to find friends and colleagues from the same college and courses for learning, reviewing and talking.

In fall 2006 the platforms StudiQG (France), StudiLN (Italy), EstudiLN (Spain) and StudentIX (Poland) were launched. This social Network (StudiVZ), which focused on the German speaking area was growing very fast and soon had more than 2.3 million users. The design of this platform was very similar to another one which is very famous in the English speaking area and is called Facebook. StudiVZ had a red skin and Facebook a blue one. In Facebook it is possible to "poke" somebody, what means to say "hello" and on StudiVZ it is called "gruscheln", which means the same. In January 2009 StudiVZ closed the platforms in France, Italy, Spain and Poland and in November 2009 StudiVZ counted 6.2 million users.

The second platform of VZnet Networks is called meinVZ and was founded in February 2008. In principle it is the same as StudiVZ, but rather for non-students or students who finished their study. StudiVZ and meinVZ has a direct connection, which means if

a student has finished, he could change from StudiVZ to meinVZ without creating a new profile. This platform counted 6 million users in November 2009.

The third and last platform of the network is called SchülerVZ. This is also very similar to the other two, but there are a few differences. While in StudiVZ and meinVZ nearly everyone could create a profile, on SchülerVZ the user must have an invitation from another schoolboy/ -girl. Without this invitation it is not possible to create a profile. The pupils of this network are between 12 and 21 years and have to leave the platform when they have finished school or studying. Another important difference from the other two social networks is that the data privacy is much harder than normal. In February 2010 SchülerVZ counted 5.5 million users (Frickel, 2010), (Göbel, 2009).

In August 2009 these three platforms were merged and called VZnet Networks. This VZnet Networks Ltd. is a German company which is focused on web based social networks and since 2007 belongs to the publishing group Georg von Holtzbrinck. Since the 2$^{nd\ of}$ January 2007 the company was completely attained from Holtzbrinck Networks for a reputed €120 million. According to previous information VZnet Networks has more than 16.6 million users and is the biggest European social network (Frickel, 2010), (Göbel, 2009).

4.2.2 Application, Payment and virtual Currency

VZnet, which consists of three social network parts, is a freely accessible commune without any virtual currency. In the whole VZnet – Social Network has 42 applications. Not every part has the same features. SchülerVZ has only 24 and in meinVZ are 40 different apps. In each of these three networks is it possible to upload photos, put information of themselves on their profile or play games. They also have private messaging services, discussion groups and groups of interests. However, the private policy is in the networks different. SchülerVZ due to the minority has the most strict safety rules.

4.2.3 Owner, Market value and Revenue

Since 2007, the owner of VZnet – Network is the publishing group Georg von Holtzbrinck. The publishing group, Georg von Holtzbrinck was founded in Stuttgart in1948 and in 2008 had 17000 employees. The transaction volumes from 2008 are approximately €2.56 billion. In February 2007 the Holtzbrinck Publishing Group bought StudiVZ.net for €85 million. Different internet portals such as StudiVZ.net, Netdoktor.de and golem.de have belonged to VZnet.com since July 2007.

At the beginning of StudiVZ they had no advertising but meanwhile they have a special banner advertising system which is designed by IQ Media Marketing Gmbh, which is a sub company of the Trade Journal Publishing Group. Nowadays the company is in the position to create banner advertisements which are customized to each user because they know their interests and special group memberships. A very special gift is on the main screen. Different employers show the working possibilities for students. The result of advertising, marketing and use of applications is an estimated market value between $100 million and $302 million US Dollar (Grehan, 2010).

4.3 Habbo Hotel

4.3.1 History, Description and Information

In 1999, two Finnish men Sampo Karjalainen and Aapo Kyrola created a mobile disco for a band as a hobby. The mobile disco made is possible for users to chat with other fans and band members. This disco was only a leisure activity, but as it was started on the internet, it became a big attraction for all visitors. In 2000 the first hotel, which had the name Hotelli Kultakala, was created. The company Sulake asked an advertising company to find a new name. During brainstorming a colleague fetched lemonade

called "Happo", changed the "pp" into "bb" and the new avatar name Habbo was decided upon. Since then the social network has been called Habbo Hotel. The two Finnish men founded a company called Sulake Corporation Oy and in January 2001 the first Habbo Hotel opened its doors in Great Britain. A second one was opened in October 2001 in Switzerland and after a short time Habbo Hotel had about 1.6 million registered users. In the meantime, there are only 15 Habbo hotels for 31 countries left, because of several location were not as popular as anticipated. On 25th of August 2007 the Chinese Hotel closed their doors. The next two close-down were the Russian and the Japanese Hostel on 10th of February 2009 and 16th of April 2009.At the beginning 2010 the Hotels of Canada, Australia, Singapore and England were merged to one Habbo Hotel called Habbo.com and today there are about 200 million registered users (DeMott, 2011).

90% of the users are between 13 and 18 years old. Every Habbo could create and set up his or her own home base and place notices, stickers, list of friends and guest books with information about themselves.

The purpose of this social virtual network consists of two points. The first one is to create a Habbo, open a room and design it. The user can buy the facility of an apartment in a shop and show his unique style. The second point which is important for communication is the acquaintance with other Habbo users. The visitor can walk with his avatar through different rooms and chat with other people, because of the 3D effect of the game. However, it should be used with caution, because of chat addiction and escape from reality it could be dangerous for children and teens (Ashby, 2011), (Sulake, 2011), (Wikipedia, 2011b).

4.3.2 Application, Payment and virtual Currency

Habbo Hotel is a place to meet friends, build new friendships, play games and simply have fun. It's a colourful, multi-dimensional virtual community and game. Users join

this game by creating a fully customized virtual character called Habbo. The Habbo environment consists of multiple parts, which are all inseparably linked.

The Habbo Hotel can be visited via local site or the largest social networking site called Facebook. Through the Facebook account, Habbo users can easily find their friends in the Hotel. Living in the Habbo Hotel is free, but to design the own apartment with virtual furniture, buying gifts, using homepage gadgets or other premium services the user has to pay with Habbo Credits. This is one of two virtual world's currency.

The first one is called Habbo-Pixels. The currency, which was introduced in October 2008, cannot be bought with real money, but the user gets every 15 minutes 10 Pixels. It cannot be traded with it, but it is possible to get some effects for the own avatar.

The second currency is called Habbo-Credits or –Coins. This type of virtual money can be received only by real money. The bill can be paid by credit card, phone services or SMS. For one Habbo Credit the player has to pay about €0.15Euro. In trading centres the user has the possibility to buy, sell or change furniture. Since late January 2010 it is possible to trade on a flea market. There, the Habbo can sell his stuff and get an average price. Sulake also integrated a recycling-system called Ecotron. With this latest innovation old furniture could be changed into "Rares", which means they are old and infrequent.

User can also join two kinds of clubs. The first one is called "Habbo Club", which is a premium subscription and the Habbo has to pay 15 Credits per month. For this fee the user gets monthly one present for free, can invite up to 600 friends to his list and has more outfits for his avatar. The second club is called VIP-Club, with that the user has to pay 25 Habbo-Credits monthly or for three months 60 Credits. It is similar the Habbo-Club, but with a few upgrades. The user can invite up to 900 friends to his list. He also gets monthly two presents for free, has more outfits for the avatar and few more goodies (Sulake, 2011).

4.3.3 Owner, Market value and Revenue

The forerunner was founded in 1999 and the first official social network Habbo-Hotel was founded in late January 2001 by two Finnish men called Sampo Karjalainen and Aapo Kyrölä. The first one, Sampo was born on the 23rd of March 1977 in Tampere. He studied literature, theoretical physics and information processing at the University of Helsinki and today he is the Chief Creative Officer of Sulake. Aapo Kyrola was born in 1979 and studied Science and Ecomonics at the same University as Sampo Karjalainen, the University of Helsinki. He graduated in September 2007 with a Bachelor of Science and since September 2009 he has a PHD and was a candidate for Computer Science at the Carnegie Mellon University in Pittsburgh. These two are the founders of the Sulake Corporation to which Habbo Hotels belongs.

The BusinessInsider[5] said that the estimated value of Habbo Hotel is about $880 million. They also estimated that the company makes about 70% to 75% of its revenue from virtual goods, which enabled it to achieve about 10% top-line growth this year to $110 million in revenue. Habbo's revenue was 8 times the estimated market value which took the value of the company to $880 million (Business, 2009).

4.4 Hi5

4.4.1 History, Description and Information

Ramu Yalamanchi is an Indian entrepreneur, who founded the company Hi5 in which he is also the CEO. This was the starting point of a social network platform which will be effective in the coming years.Hi5, with the main company based in San Francisco, increased their popularity from year to year and so they are now one of the world famous social networks. Although they have the headquarters in USA, the platform is

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[5] http://www.businessinsider.com/

better known in other parts of the world. The biggest parts of registered users are from Latin America, like Peru, or Portugal and Romania from Europe or Thailand and Mongolia from Asia. Since the beginning of Hi5, it has been a platform where users can generate profiles. In these profiles the occupant can describe himself, his hobbies and interests. The user also can upload photos and build photo albums, invite people to his list of friends, play online games and much more. At this place which is focused on self-expression and interactivity, about 67% of the users are between 18 and 34 years old.

In April 2009, the CEO changed to Bill Gossman, a serious entrepreneur who most recently was the chief executive of behavioural ad-targeting company Revenue Science (since renamed Audience Science). The old CEO Ramu Yalamanchi assumed the role of the new Chief Product Officer to lead the company's product strategy in the social entertainment sector. In November 2009 Hi5 employed Alex St. John in the position of the chief technology officer (CTO). He is a pioneer in the video game industry, a Microsoft game evangelist and founder of the online game firm Wild Tangent.

4.4.2 Application, Payment and virtual Currency

The social network site is a place to meet friends, or build new friendships. Therefore, it is possible to post interests about one's self and create photo albums. The user can play lot of online games, use other applications for music or just use the site for fun.

In December 2008 Hi5 started with their virtual currency called Hi5-Coins. The user can change real money into this virtual one, which enables the Hi5-members to purchase virtual gifts to friends and family. The user gets 80 Hi5 coins for 1 USD. The Hi5-Gift-Shop offers a diverse range of virtual gifts, which are often focused on culture, holiday traditions and customs. For instance, in winter the user can find in the gift shop a "Rosca", which is a traditional Mexican cake for the Tree Kings' Day on 6th of January.

With this kind of virtual currency, the Hi5-member can unlock premium goods and services on this site. It is a key enabler for virtual gifts. Hi5-Coins are offered in 30 currencies with about 60 possibilities for pay. The easiest way to purchase Coins is via

Credit Card or Debit Card (ClickandBuy). Another way to get the virtual money is via SMS. This payment method is mainly for younger people without credit cards.

In January 2010, Hi5 had about 47 million registered members, which is a decrease of 22% compared to the previous year.Atul Bagga, an analyst of ThinkEquity[6] says, *"Online Games are an interesting model for Hi5. I don't think Hi5 or other networks can compete with Facebook, so they're trying to position themselves as an entertainment-focused social network"*. By reconstructing, Hi5 is going to take part in the large growing market of virtual goods, which was worth more than $5 billion globally in 2010 (MacMillan, 2010b).

The social network platform Hi5 is going to generate an attractive social gaming platform by making the Hi5-network compatible with games which are primarily designed for Facebook. This means, Hi5 supports Facebook-compatible APIs. Developers were not making their social games specifically for Facebook. However, they have not had time to port or adapt their games and applications to other platforms. With this new API is it easier for developers to create games which are running on both, Hi5 and Facebook. Hi5 has lots of games already, but no one of them could keep up with games like FarmVille, the best known game on Facebook. This new concept is not for getting the top games on Facebook, but the aim is to work with those companies that are coming out with the newest games. Right now, a couple of selected companies are trying out Hi5's Facebook-compatible interfaces. This may be the source of future hits (Takahashi, 2010a).

4.4.3 Owner, Market value and Revenue

Ramu Yalamanchi is an Indian entrepreneur, who founded the Hi5 Company and became CEO in June 2003.

Prior to starting Hi5, Ramu was growing up in the suburbs of Chicago. In this time he learned about company building and business leadership from his entrepreneurial

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[6] http://www.thinkequity.com/

father. In his last college year he helped launch Sponsornet, which was the web's first advertising network. After this he succeeded in technology companies that have worked with online advertising and the advance of internet communities.

Ramu holds a B.S. in computer science from the University of Illinois – Urbana, Champaign.

In July 2007 the company raised $20 million project capital from Mohr Davidow Ventures and $15 million in external finance. With a subsidy of $3 million from investor Mohr Davidow, the funding has been raised up to $38 million. In July 2010 followed a financial subsidy over $14 million for a shift into the direction of virtual goods and social games. So the funding of Hi5 has increased to $52 million. According to Eric Eldon, an employee of VentureBeat, Hi5 has previously projected around $25 million in revenue this year which comes from a mix of advertising and games. The result of this is an estimated market value, which lies between $350 million and $583 million (Davidow, 2010; Eldon, 2009; Business, 2010; Finch, 2010; Takahashi, 2010b; Takahashi, 2010c).

4.5   QQ/Qzone

4.5.1 History, Description and Information

Two study colleagues named Zhang Zhidong and Pony Ma Huateng, who aretoday's CEO of Tencent, created an instant messenger Service, called OICQ and launched it in November 1998. The company Tencent Holdings Ltd. manages this service till today and also one of the largest web portals called QQ.com. The success of this instant messenger platform was enormous. In only one year, they had 5 million registered users. Because of the rapid growth of users, they needed more servers, but there was no money available. So Pony Ma was forced to sell OICQ but he couldn't find a partner. However, he got €1.7 million venture capital from IDG (International Data Group) and Pacific Century CyberWorks Ltd. for a 40% stake. After this the name changed from

OICQ to QQ, which means in the USA "quite quality". To cover running costs, Tencent worked with well-known companies like Nike or Nokia and they also created premium rate services like QQshow. This concept was very effective and in May 2008 they reached over 782 million registered users. Although the competition on this sector is very hard, in June 2010 QQ still had 612 million registered users (Huateng, 2010; Ma, 2007).

4.5.2 Application, Payment and virtual Currency

During the first four years the registration of QQ was free, but 2002 they stopped it and charged a small fee. After a while QQ noticed that the users drifted to other platforms. Under the pressure from other rivals like Windows Live Messenger or Sina UC, QQ had to open the registration again. The first step for Tencents' income was to make advertising contracts with big companies like Nike or Nokia. It followed that a lot of users registered on QQ.com downloaded the instant messenger. The next step was to create applications which were not for free. To buy such apps, Tencent had to establish something like a payment system for its platform. After this the company brought in a virtual currency called Q-Coins.

The price of such a Q-Coin is one Renminbi (RMB), which is the official Chinese currency. Converted into European currency, the user gets 10 Q-Coins for 1€. To purchase this virtual currency, the user can pay with credit card, TenPay or mobile phone. TenPay works in a similar manner to PayPal. In the year 2003 the social network site QQ.com which belongs to the messenger opened. This platform combines news, a search engine, a free mailbox, software downloads, online games, short message service and much more. With the application QQmail is it possible to get an e-mail address with qq.com as a domain name for a small sum of money. Tencent created lots of applications with costs, such as QQshow. With this small app the user can create an avatar with which the user can move freely around in the virtual world, go shopping or dress him or her as the user likes. The incurred costs could be paid with

the virtual currency Q-Coins. Next to these apps, Tencent created eight different memberships, which are called Diamond-Level-Memberships with different names (Red, Yellow, Blue, Purple, Pink, Green, VIP and Black).The purple level includes three Tencent games which are a Korean dancing game (QQNana), an action game (QQTang) and a speed game (QQSpeed). Another membership is the green level. With this account is it possible to use QQMusic for music listening without downloading.

By the popularity of QQ among the young Chinese, this virtual currency is accepted by more and more online shops and gaming sites in exchange for "real" merchandise like small gifts, which increases the fear of replacing real currency in these transactions. Reportedly this currency has been traded on the black market and used for other, less savoury services, such as online gambling and private chats with "QQ girls". When the Chinese Central Bank noticed this, they suggested improvements for control to stop this transaction and prevent Q-Coins being used for real goods.

Tencent argued that Q-Coins are a regular commodity and no currency (Ewing, 2006; Xinhua, 2007, Yingxue, 2007, Sinocast, 2009).

4.5.3 Owner, Market value and Revenue

The name of Chief Executive Officer of Tencent Holdings and founder of Tencent instant messenger QQ is Ma Huateng. He was born in 1971 on the island Hainan in China.

In the time from September 1989 to July 1993 he studied computer science in the University of Shenzhen. At the end of his study, in April 1993 he began to work at China Motion Telecom Development Co., Ltd., as an Engineer and stayed there for over five years. During this time Zhang Zhidong and Pony Ma Huateng worked on a project, which launched in November 1998 and was called OICQ, but later known as QQ. Initially, OICQ was only one of many IM services in China and did not have a big market share. As Ma changed the OICQ to a free download, many young users noticed and began to use it. The demand grew high and within one year the instant messenger had over five million registered users. This number of users increased and in the year

Tencent was the largest IM in China with over 335 million fans, which are over 74% of the market used Tencent's services. A few years later, in June 2010, the number of registered followers grew to 612 million.

In the last published financial report of the company they listed the unaudited values of revenues, cost of revenues, total equity and liabilities and much more over the first six months in 2010.

The total revenue of this social network site consists of four parts. The first and biggest part of these is "Internet value-added services", valued at approximately ¥7 billion CNY (Chinese Renminbi Yuan) which are about €800 million. The second part of revenueis called "Mobile and telecommunications value-added services", which generates about ¥1.3 billion CNY or €149 million Euro. The third and fourth parts are "online advertising" and "others". These two units together harvest ¥632 million or around €72.4 million. These four parts together make a total income of ¥8.895 billion, which is equivalent to approximately €1.02 billion. According to the numbers of this financial report, is it an increase of revenue by 65.3% for the first half of 2010 compared with the first half of 2009. Of course there are also costs of revenues, which are about ¥2.8 billion, which is a little more than €320 million (Huateng, 2010 p. 60).

The summary of the documents shows, that the total assets, which consists of current and non-current assets, amounts to ¥24 billion or €2.82 billion, which is an increase about 40.54% compared to the audited total assets of 2008 (Huateng, 2010 p. 2; Lukoff, 2010).

4.6 Orkut

4.6.1 History, Description and Information

In the year 2003 Google made an offer to purchase Friendster for over $30 million, which they declined (Terdiman, 2004). Since this defeat, Google started with their own project, in which the result should be a social network site which is similar to that of Friendster. The result of this project started on the 24th of January 2004 and was named after the creator Orkut Büyükkökten. At the beginning there were only a few users registered, because the registration was only permitted with an invitation of an already registered member.

"Orkut is unique and fun, because it's an organically growing network of trusted friends. That way we will all have at least one person to vouch for them. If you know someone who is a member of Orkut, that person can invite you to join as well. If you don't know an Orkut member, wait a bit and most likely you soon will. We look forward to having you as part of the Orkut community", citation of Google[7].

In the first year of Orkut, America was the leader for number of members, but the word of mouth in Brazil was higher and so the USA had been overtaken. It followed, that more and more users spoke Portuguese and the American users changed to Facebook, MySpace and others. On 31st of March 2004, the distribution of members from Orkut was as followed: USA had 51.36%, followed by Japan with 7.74%, Brazil with 5.16% and others with 35.74%. However, in December 2009 a review concluded that Brazil had 51%, followed by India with 20% and America had only 17.28% of Orkuts' members. In August 2010 there have been more than 100 million users registered on this social network site. Everyone above 13 years could join Orkut and so most of the users are between 15 and 25 years old (Kharif, 2007).

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[7] http://www.theinfow.com/2011/02/orkut-is-owned-by-google-inc.html

In the year 2007 Orkut brought out an application called m.orkut.com, which made it possible to log in via mobile phone. After this, the company created an application for slower internet connections to view Orkut in a simpler version.

4.6.2 Application, Payment and virtual Currency

Orkut is a social network site, which is similar to Friendster. It is possible to find friends, make lists of friendships, invite friends into special groups, upload videos and music. It is also possible to talk with other friends via instant messenger called G-Talk (Google Talk).

In August 2007 Orkut advised the first design renovation, which included light colours for profiles, smaller logos, a more rounded layout, new features and six new languages like Hindi, Bengali or Marathi. A very helpful new feature was a little button, which allows users to add friends in an easier way. In June 2008, the time had come, that Orkut, as well as many other social networks introduced photo tagging.

More than one year later, on 28th of October 2009, a second design renovation was been executed. The result of this was a very new design and a new User Interface (UI). In the new version, the last six visitors are shown on the user's main page. Also new is the use of the Google Web Toolkit (GWT), which makes extensive use of AJAX (Asynchronous JavaScript and XML) in the new UI possible.

To use applications it is mostly necessary to pay with Gold Coins (Moedas de Ouro). This virtual currency can be obtained on Orkut directly. For $1 USD the user gets 19.84 Gold Coins and the user can spend up to $199.99 USD which gives them 3999 Gold Coins. The obtained coins could be paid with credit card, PayPal, PaySafe Card and PayMo. The last one is the possibility to pay the bill via mobile phone.

4.6.3 Owner, Market value and Revenue

In January 2004 Google Inc. started a project to compile a social network site, which is similar to Friendster. It should be a network, for an easy connection to friends and friends' networks of friends build new friendships and use different applications which will be offered. The Company assigned Orkut Büyükkökten to plan and create such a platform. He was born on the 6th of February 1975 in Konya, Turkey. He studied on the Bilkent University in Ankara and finished Computer Engineering and Information Science study with a B.Sc. degree. After this he obtained a Ph.D in Computer Science with focus on web search and efficient PDA usage at the University of Stanford and finished it in 2001.

Most of the revenue from Orkut is produced by banner advertising. With help from data about user interests, the Company Google Inc. is able to produce advertisements, which could be displayed in form of banner ads. Additional sources of income for this social network site are virtual goods. There are lots of applications, for which the user has to pay. The currency for these payments are called "Gold Coins", or in Portuguese "Moedas de Ouro". The user has to pay real money for this virtual payment possibility. After this, the user is able to invest it into different applications or games, which are offered on the site. With these incomes, the investments from advertising companies, the number of registered users and the variety of the offered application can be calculated on a market value. These are often estimated numbers and in the case of orkut.com the value lies between $180 million and $450 million USD (Kharif, 2007; MacMillan, 2010a; Orkut, 2010; Mohsin, 2009).

4.7 Facebook

4.7.1 The company

Facebook is a private Company which was founded in February 2004 from Mark Zuckerberg. With Headquarter in Palo Alto, California Facebook is a SNS with more than 500 Million active users. Today, Facebook is on the second place in the ranking of the "500 Top Sites on the Web"[8].

In the year 2003 Zuckerberg was studying on the Harvard University when he created an intern website called Facemash. "The website used photos compiled from the online facebooks of nine Houses, placing two to each other at a time and asking users to choose the "hotter" person" (Kaplan, 2003).

So Zuckerberg had uploaded pictures from his student colleagues without consent and so he broke the copyright agreement. A disciplinary procedure followed and he was almost suspended from University.

One year later, in February 2004, he created a new site with the name TheFaceBook.com. But this time the students could register themselves. This site was only for students of Harvard University, but in a short period of time many students had signed up. After Zuckerberg left University he focused on the project – Facebook. The popularity of this site was growing continuously and so the site was opened for Universities of USA and Canada. In the year 2005 High school students and employees from big companies got access to this network too. One year later, the website Facebook.com, as we know it today was recognised. Everyone with a registered e-mail address and over the age of thirteen could sign up to this site.

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[8] http://www.alexa.com/

Figure 7: TheFaceBook - The first version of Facebook

Today Facebook is the most visited Social Network Site, but there is also competition. The most famous rival is MySpace. Although there are a lot of SNSs, they are often known internationally. For instance, Orkut is known in Southern and Central America, ShockRock is known in France, Mixi is from Japan and VZnet is best known in the German speaking area.

Finally, there are few critical facts that are the reason for Facebook's success. A big part of Facebook's success was being in the right place at the right time. Other facts are following in the next point (Locke, 2007).

1. A great, nearly free market was available. Friendster was largely popular in the age range of twenty. That means this SNS didn't capture the high school students. In 2004 Friendster was descending on the market because the users were tired of experiencing with Friendster. But there was the very big market segment of younger users which Facebook captured.

2. The site was designed for college students by college students

3. Privacy

   A very critical component was that Facebook walled its networks. Students could create their own profiles for their community, for instance other students on their campus. The fact that their audience only could see their profiles created trust in this site.

4. Socioeconomic motives

   At the beginning of Facebook only students of Harvard could access to this site. This was a critical fact for Facebook, because this class of privileged youth who could attend a four-year college could find their friends. A study shows that high school students are building different groups of interests. These different groups could be transplanted in the virtual place which is for members only. Compared with MySpace or Friendster Facebook is a SNS on which user will not be thrown into a pot with all other users. This made the transition for these privileged four-year college students to this SNS much easier.

5. Features and Experience

   A very important factor on this list is the fact that Facebook was designed by students for students. Facebook has a number of features integrated which makes the service slower. The most important features of this SNS are

   ➢ Organisation by classes

      Facebook allowed users to upload their time tables and browse it. That means students who visit a special lesson could see all profiles from students of the same lesson. So you can browse the profile of the person next to you. There you see his hobbies, his interests and his friends who could be in common with yours. This feature was a very important part of the early success of Facebook.

➢ The Poke or low-involvement communication

In Facebook you can poke other users. This means everything or nothing. A poke to someone means hello in a low-involvement way of communication or simply to gain their attention. There are no documentations about this feature but the users involved it and made it to a key factor of Facebook.

➢ Groups

Groups are a very interesting feature, because this is a way to say everything or nothing about you. With this feature people can come together and represent a part of them. It is another funny thing for users to browse endlessly, where the group names are mostly in-jokes.

➢ Directory Service

Facebook has a big directory. As it came out, the user found out how to use this directory for contacting each other.

➢ Simplicity

Facebook is basically a simple website. It uses a global design feature, the text links are for feature navigation and the site is mostly understated. In short, students learn fast how to work with this site.. Facebook isn't overloaded with Ajax or complicated functions.

➢ Speed

Those who were irritated by browsing through Friendster very slowly or for those who were annoyed by surfing MySpace on FireFox know how important speed is. Facebook was fast from beginning. This was very important for the brand. When users browse on Facebook, they do not follow a strict path. They are rather stumbling around. A fast response is very important for this funny stumbling process. The fact that such stumbling processes go consequently fast is a positive impression for users (Stutzman, 2006).

A very interesting fact for Facebook to get users was the development of a Facebook API. With this tool it is possible for everyone to write programs for Facebook. This tool

allows the user to build programs on their own site for the use of others. Another tool is Facebook Connect with which it is possible to reach other sites with their own Facebook-Account.

The aim of this SocialNetwork Site has always been to bring the friends network to the site. This means to bring the friends network from the real world into the social network and not to find strangers.

To quote Zuckerberg: *"What we're trying to do at Facebook is take that social graph which already exists and map it out. Then we can take that map we've constructed and connect everything through applications… That concept is deep in the company's philosophy. In fact, we thought of building a platform for social applications before there was ever a Facebook. And it might take 30 years or tens of years before it's a mature application. But it's really amazing how quickly it's taken off so far"*(Calore, 2007).

Figure 8: Facebook Homepage[9]

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[9] http://www.facebook.com/

4.7.2 Capital

Facebook is a private company and so it is not necessary to show the public their financial reports. In a report, Marshall told: "Facebook is a private company, so as a matter of policy, we don't typically share details about our financial plans or comment on rumour and speculation" (Marshall, 2009). That means, if anyone talks about data, it is mostly speculation. What concerns the public they get their information by interviews from Zuckerberg or other chairmen.

According to information from the company, in summer 2004 the first round of funding was started:

"Round one: $500,000 from Peter Thiel, Summer 2004; Round two: $12.7 million from Accel Partners, April 2005; Round three: $27.5 million from Greylock Partners leading the round, Meritech Capital Partners participating, and Accel Partners and Peter Thiel increasing their investment in the company", citation of Facebook[10].

In the following are a few other investors, which are not listed on this Facebook Site. The Russian company Digital Sky Technologies (DST) invested $200 million whereby the total financing of Facebook raised at least $640 million. In the year 2007 Microsoft increased the capital by $240 million. Therefore they got 1.6% of the company and built a strategic alliance. This valued the company at $15 billion. A Chinese billionaire called LiKa-Shing invested about $100 million in early 2008. In January 2008, Germany's Samwer brothers invested few million dollars into Facebook. In May 2008 Facebook took a bank credit of about $100 million from Menlo Park's TriplePoint Capital for Server Farms.

The $200 million investment from DST brings Facebook's total debt and equity financing raised to date to at least $640 million. In addition to the $200 million

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[10] http://www.facebook.com/press/info.php?factsheet

announced today, Facebook raised $240 million from Microsoft in 2007 as part of a preferred equity investment and strategic alliance that valued the company at $15 billion. This included the $100 million investment from Chinese billionaire Li Ka-Shing in early 2008, $100 million loan from TriplePoint in May 2008, and an undisclosed investment by Germany's Samwer brothers early last year (Smith, 2009).

In the year 2007 Facebook had 27 million registered users. This number of registered people enlarged till beginning of 2009 to 250 million and on the 5th of February 2010, which was the 6th birthday of Facebook, the company announced that they reached the 400-million border. The aim of every SNS is to have such a massive increase, but this also means growing costs to hold the quality, because every Facebooker should have the same capacity for pictures, music, applications and so on.

The primary sources of income are "Facebook-Ads" whereby Facebook presents them as advertising platform. These ads are always shown on the right side and are fitted to the user. That means the user has to say that he likes any topic and the ads which belongs to these different topics will be shown in the advertising sector as shown in Figure 9.

Figure 9: Profile on Facebook with advertising on right side

The ads that are shown in a profile are designed so that they don't intrude. If they do in anyway the user can stop showing this ad by clicking on X on the upper right corner. After the user decides to cancel the ad by clicking the X, a message with the text "You have removed this advert which is shown on figure 10. Why didn't you like it?" appears. Then the user can vote one of five points which are: uninteresting, misleading, offensive, repetitive and other. With the result of this question the company can react on the changing users' advertising behaviours.
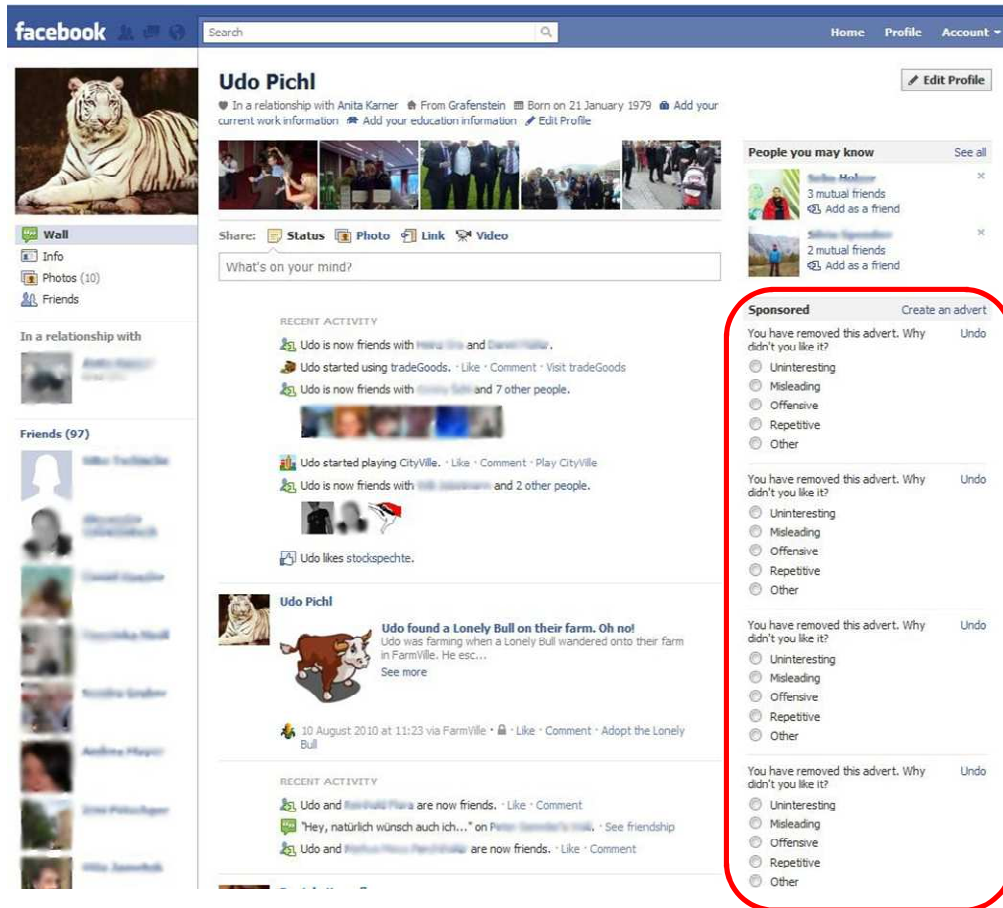
Figure 10: Removing advertising

If the user checks the answer "uninteresting", he will not get any ad from this branch. But if the he likes it he can rate the advertising positive, which is then displayed to his friends. Facebook is leading in the advertising category on SNSs because the user can decide if he wants to see advertising and what kind of advertisements he wants see. This makes the Social Network Site very inviting for the user and with a database that has over 400 million users. It is a viable option for customers who wish to place their advertisements on Facebook.

On the Social Network Site Facebook is it possible to divide the ads in categories like religion, country, age, town, terms in profile, schools, status and interests. Although the advertising is the main source of income, but there are also other possibilities to get financial income. One of these is Facebook-Virtual-Gifts which produced $30-40 million in 2008. These virtual presents costs 10 credits, which is about $1 or €0.81. It is

possible for the users to send each other virtual gifts plus a message. Furthermore, the operator can choose whether this present is private or public as shown in Figure 11. An interesting fact is the more there is on a platform the more potential there is for virtual presents. Facebook has already started the possibility to send real gifts like flowers, but this costs much more than $1 or €0.81. The virtual currency Facebook Credits, whereby 10 Credits = $1 or €0.81 is another very interesting point which is a component of Facebook's future plan (Smith, 2008).
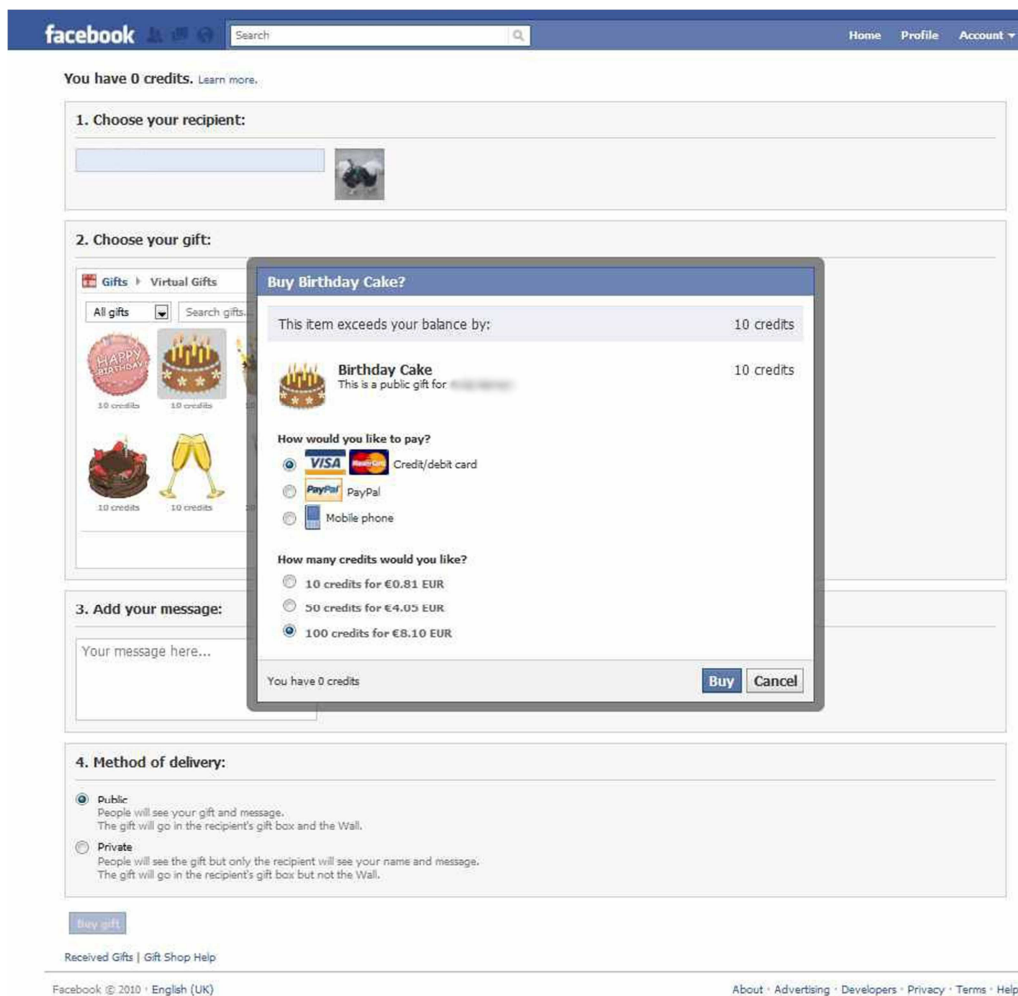

Figure 11: Facebook Gift Shop

Facebook is a private company which makes it impossible to get the exact income. According to some source, the profits of Facebook were in the year 2005 about $10 million. The following year, Facebook increased the profit to $50 million. According to rumours, the income in the year 2007 was about $150 million. The estimated income in the year 2008 was between $300 and $350 million. However,(Swisher, 2008) said that they are a bit lower, somewhere between $230 and $280 million. According to (Trayhorn, 2010) for the year 2009 the revenues were between $600 and $700 million and in the year 2010 the revenue should exceed the billions bracket (Arrington, 2009). The upwards climb of this company can be seen through the number of employees. At the beginning of the year 2008 Facebook had about 450 workers what increased to 800 at the end of that year. Today there are more than1400 employed to work for Facebook.

Now the question is: How did Facebook earn money last year? The answer is: Due to advertising.

Income Stream	rumours; July 2009	Estimate; End of Year 2009
Brand Advertising	$125.000.000	$225.000.000
Microsoft Advertising	$150.000.000	$50.000.000
Virtual Goods (Credits)	$75.000.000	$10.000.000
Performance Advertising	$200.000.000	$350.000.000
Total	$550.000.000	$635.000.000

Table 2: Revenue 2009

Income 2009[11]:

Brand Advertising: Facebook continued to upgrade advertising on the home page and they are testing out new features like the engagement sampling ads. At the end of the year 2009 it showed that the monthly active users increased from 150 million to 350 million. A lot of these users came to the website due to ads. The two regions US and Europe are the two markets where brand advertising brings in the most money. (Eric Eldon, 2010)says that the $125 million from July could be increased to $225 million by the end of the year.

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[11] http://www.insidefacebook.com/

Microsoft Advertising: The income in this area is not entirely clear. Microsoft has put their ads on Facebook for years, which has been a benefit for them, because of the strategic investment in the company. Facebook and Microsoft ended their cooperation on 1st January 2010 which was one year before it normally ended. But this won´t change the income from 2009.

Virtual Goods: This is bit confusing because the branded virtual goods is part of the branded advertising. So the revenues are approximately $10 million, which is much lower than internal sources expected. The users made the online gift shop very popular, where the Facebook credits have been in testing mode throughout the year. The use of this currency to buy things in third-party applications has been the lowest. Many business sources have calculated the income for virtual goods at about $75 million for the whole year. This resulted in the virtual gift shop incomes and the estimated revenues from the credits. Besides these rumours and estimates social games and online applications from the Facebook's platform brought hundreds of million dollars for employees.

Performance Advertising: The biggest success was probably the performance advertising which brought an increase to $150 million after July. In first place stands FarmVille, which is am framing game made by Zynga[12]. This game had a very large increase in June because the company had a lot of advertising on Facebook. After that success other companies followed very quickly.

Other performance-focused advertisers, like direct marketers and local businesses, increased their costs. So there was a big increase in international market, because the companies like 77 Agency or Tradimax used Facebook's advertising API to make a larger scale of advertising. These and other companies have their headquarters in Europe and use that Facebook application to reach users of different regions and languages all over the world.

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[12] http://www.zynga.com/

Income estimate of 2010:

Generally it is assumed that the same advertising trends are continuing. Brand and self-server advertising should rise. So a large number of sources said that it is possible for Facebook to reach an income between $1- $1.1 billion. The problem with this data is that it is an assumption and information from sources, but there are not enough data on Facebook's traffic to display each income stream.

Brand Advertising: Facebook will continue to invest in its sales team, open new offices in US and abroad and organize new advertising deals with agencies in different parts on world. It is a fact, that the traffic is growing, but how much is the unknown question. The result of this is that the ad inventory and the value to big brands could potentially rise to $350 million.

Microsoft Advertising: Microsoft still makes advertising on Facebook but the platform is able to make money. Microsoft had made a big strategic investment in the company which will be worth if they build as their own business. In addition Microsoft has other deals inside Facebook.

Virtual Goods: Facebook is making advertising for credits on the developer's platform. The company encouraged the developers, to use this virtual currency as an option to pay. There are rumours about Facebook that they could make their virtual currency called Credits obligatory. It is not clear if this will happen, but it is true that Facebook will increase the advertising this year.

Performance Advertising: To reach Facebook users, the social games have to make more advertising than before because of the growing competition.

The costs of building new functions for advertising APIs, the training of third-party tools provider and the growing interest in advertising should guarantee an improved growth which lies between half a billion and $600 million (Eldon, 2010).

4.8   Summary

Over the years, more and more virtual social network sites have appeared: Some increase in popularity whereas the popularity of others declines. The preference to a platform depends also on the geographical location. In German speaking countries are the social network sites VZnet homelike. This network combines three others called StudiVZ, SchülerVZ and MeinVZ. All three together have more than 16 million registered users and the common market value is higher than $300 million Dollar.

In contrast the most famous virtual social network site in Asian regions is called QQ. It has more than 600 million registered users and the market value is more than $1.2 billion. The problem for user from non-Asian territory is that the platform is provided exclusively in the Chinese language and a registration is not that easy than in common social network sites. It is necessary to have an identity card and a principle residence in China.

In the Russian-speaking territory the well-known social platform is called VKontakte.ru and has more than 80 million registered users. During the research and testing of this platform the similarity to Facebook is identifiable. The only possibility for opening an account is the invitation of a registered friend.

> *"You can become a **VK** user by receiving an invitation from one of the members. When one of your friends invites you, a message with the login and password will be sent to your mobile phone. No additional actions are required – you can start using your new profile right away by entering your login and password."*[13]

This virtual social network site is available in over 60 languages including German and English and has a market value of more than $230 million.

On the South American continents, especially Brazil and its neighbouring regions, the best known social network platform is Orkut. It has more than 100 million registered users and the current value of Orkut stands at more than $100 million.

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[13] http://vkontakte.ru/

The following figure shows an image of a world map and the distribution of individual virtual social network sites.
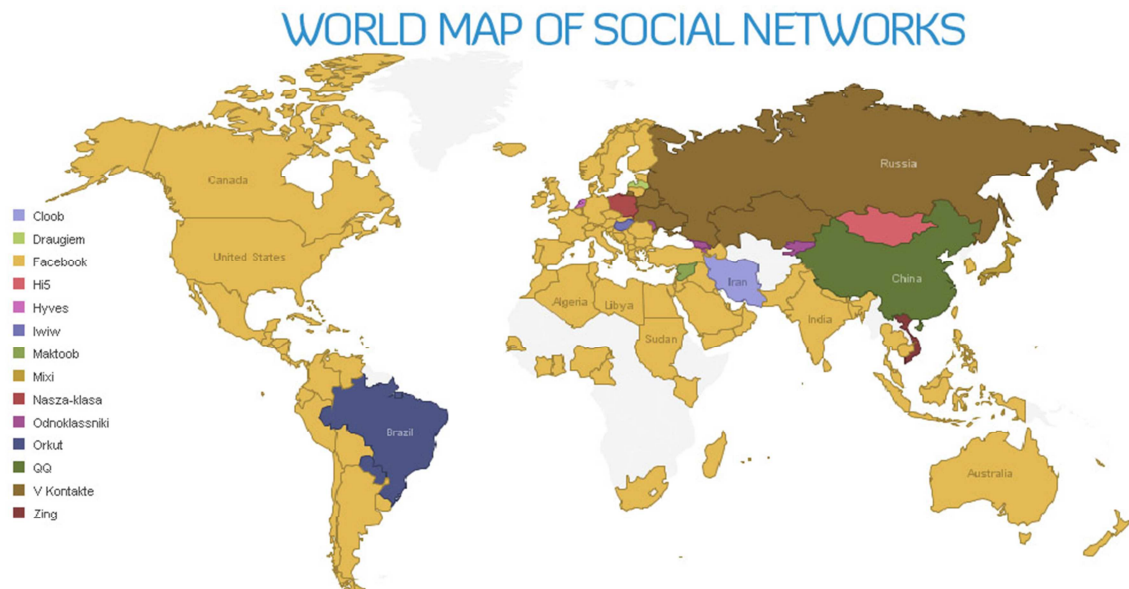

Figure 12: World Map of Social Networks

Globally Facebook is the most famous virtual social network site. It has more than 500 million registered users and the market value is higher than $2 billion. It is offered in more than 70 languages and is market leader in North American, Central American, African, Australian and European territories. Additionally, Facebook offers a unique virtual currency called Facebook-Credits which can be used within a few of the 350 000 applications.

Most of the mentioned virtual social network sites use a virtual currency. Facebook uses the *Facebook-Credits*, QQ has introduced the *Q-Coins*, inside Orkut the *Moedas de Ouro* are in use and Hi5 has named its virtual currency *Hi5-Coins*. By using this special currency it is possible to buy different articles like gifts, games or music.

Chapter 5

Technologies and APIs

Since the start of virtual network sites many people are using these sites as means of staying in contact with friends or finding old colleagues. Over the years social networks grew more and more and Facebook is the best known social network site today. According to the owner Mark Zuckerberg Facebook has more than 500 million registered users. This virtual social network site has more than 350000 applications whereby most of them are for free. A few of these applications have their own currency. Very famous examples for such apps are FarmVille and CityVille. It was not long before Facebook created a virtual currency to use in online games and other applications. These virtual Facebook-Credits can be purchased by real money and used everywhere on Facebook. That means a user is able to buy a gift in a virtual shop and send it to a friend. This present, whether real or virtual has to be paid for by using Facebook-Credits, which is handled like real money inside the social network.

In games like FarmVille or CityVille it is possible to buy special goods like rare flowers, fruits or special equipment by using Facebook-Credits. Each of these applications has more than 80 million registered users. For every purchase in virtual games FarmCoins,

CityCoins or Facebook credits are used. So it is easy to see the potential of such virtual currency.

5.1 Selecting the API

The fundamental task of this work is to analyse which Social Network Sites are available. Furthermore it is important which of them provides a possibility for using an Application Programming Interface (API) and respectively supports the possibility of developing applications. In addition it should be possible to find an API and therefore be able to send data like virtual money or goods inside a network from one user to another. An interesting aspect of this work is the possibility of attaining a user's data.

During the search of useful information, online payment-systems with their own API have been taken into consideration. Inside the virtual social network site Facebook the application *Buxter*[14] could be used for making virtual transactions. This application is part of the *Click&Buy*[15] payment system which is very similar to other online payment systems like PayPal and Moneybookers. With help from the application above it is possible to include a virtual payment-system into another implemented application. The payment can be made via this app but the real transactions runs in background of the *Click&Buy* Company. For this the user has to open an account at the platform of the online payment-system. For unlocking, a one cent money transfer has to be made from the registered bank account. With this transaction the user gets an activation code that confirms the authenticity of the specified bank account.

Click&Buy offers an API, but embedding Buxter into ones application is possible. Thus, there is no way of making changes for one's own use within the API or to use as a template.

Therefore, it was necessary to search for another API which makes changes within the API itself. Among the tested social networks only two provide a useful API. The first is called Hi5 and is used mostly in Latin America, Spanish and Mongolian regions. With

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[14] http://www.buxter.com/
[15] http://clickandbuy.com/

this particular API registered users can create their own applications and provide these for other users. The second useful platform is called Facebook. A registered user is able to be acknowledged as a developer for creating applications. The difference between these two API possibilities is the pre-defined programming language. For implementing an application nearly every common language can be used. Facebook has a big advantage, because of pre-defined functions that can be used by addressing them with their own programming language. The first is named FQL (Facebook Query Language) which is similar to SQL and has different possibilities for querying special data. The second language type is called FBML (Facebook Markup Language) and is similar to HTML. It offers different tags which facilitates the access to a Facebook user's data.

For this reason Facebook's API was chosen for a small application that shows which user information is attainable. The second point which has to be checked for this example is if it is possible to send virtual money or goods from one user to another.

5.2   Used Technologies

For solving the given task, several points must be considered. The first one is to find a programming environment for implementation and tests. In this case the choice fell on Eclipse Helios[16] as the programming environment and XAMPP[17] for database and webserver. The second point in solving the given task is to find a social network site where it is possible to implement an application. The suitable social network site should meet certain criteria. The first one is the degree of popularity, the second one is the amount of registered users and applications and the third one is the possibility of using the given API to implement an application. These three points are combined in one social network site called Facebook.

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[16] http://www.eclipse.org/
[17] http://www.apachefriends.org/

5.2.1 Chosen programming environment

Eclipse

Eclipse IDE is an open source programming tool for developing software of various kinds. Originally, Eclipse was used as an integrated development environment for Java. Today it is possible to use it for many other development tasks because of a number of enhancements, both as open source and commercial providers available. In this thesis Eclipse Helios 3.6.2 was used.

XAMPP

This is a combination of various free-software primarily in LAMP-Systems. LAMP is an acronym for the combined use of programmes based on Linux to provide dynamic web pages. The individual letters of this acronym stands for the components which are used.

Linux

Apache

MySQL

PHP (or Perl or Phyton)

XAMPP is the easy way of installing and configuring a webserver Apache with the database MySQL or SQLite and the programming languages PHP or Perl. The *X* stands for the various operating systems like Linux, Solaris or Windows where it can be used. The letter *A* stands for the Apache Tomcat 7 server which allows using JavaServer Pages and Java Servlets.

➢ MySQL

The used online database is a social database management system and is recognised as a MySQL[18] database in version 5.1. The reason for using MySQL is the simple handling and the previous knowledge of the developer.

➢ Apache Server

This HTTP server is a product of the Apache[19] Software Foundation and is the most used webserver on the internet. Previous knowledge and easy usage were the reasons for selecting this server.

The aim of this package is it to get the installation done as easy as possible. For the operating system Windows has a version with an installation routine. The other operating systems which are listed above have a detailed manual. This combination of software is not for use as a public webserver because of the restricted security of *XAMPP*. It is only for developers who want to set up a test system as quickly as possible.

5.2.2 Used Languages

PHP

To work with the programming language PHP (**P**HP **H**ypertext **P**reprocessor), it is necessary to use the PDT (**P**HP **D**evelopment **T**ools) from the Eclipse Foundation[20]. This tool is a completely open and modern development environment for working with PHP. It provides most of the features, like auto-completion, syntax-highlighting, source code tracking, project views and task lists. However, a professional debugging tool is still missing in PDT, due to licence reasons. However, "Zend Debugger" and "Xdebug"

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[18] http://mysql.com/
[19] http://httpd.apache.org/
[20]http:///www.eclipse.org/pdt/

are for free use and also compatible to the PDT. Thanks to the integrated WTP (**W**eb **T**ools **P**latform), the same functions, which are available for PHP, are included for HTML, CSS, XML and JavaScript. Due to the modular architecture, lot of other functions could be upgraded with plugins.

FQL

FQL (**F**acebook **Q**uery **L**anguage) is a query language, which is similar to SQL (**S**tandard **Q**uery **L**anguage). This type of language should be helpful for querying social data. It is not possible for FQL to get more data than with REST API, but the way of request is easier and much cheaper. Even complex queries could be done in one motion, which can minimize the amount of requests.

The advantages of FQL in comparison to equivalent API – methods are clear:

➢ Saving resources and time

The returned data is summarised in XML. This saves time and traffic. It needs not to transfer unimportant data, because FQL only sends required data.

➢ Minimize requests by complexity

It is possible to insert in one FQL – query, two or more sub queries. If the developer works with an API, it is often necessary to make two or more requests for one task. In contrast, it is possible to solve a task with only one request. This saves time, traffic and is comfortable for the developer.

➢ Uniform interface for all data

If all data are retrieved by FQL, it is possible to make all calls with one interface. So it is not important to learn lot of different methods with their return format. The advantage of FQL is the uniform query and return format.

➢ Big advantage for SQL – experts

Because of the SQL similarity of the interface, it is easier for database experts to use and does not change dramatically.

(X)FBML

With the help of FBML (**F**ace**b**ook **M**arkup **L**anguage) it is possible to include applications and contents in Facebook completely. The reason for this is the fitted design to Facebook and it is simple to use. FBML is a part of HTML. A few functions and elements were removed and other functions and elements are included for an easier way of implementing an application. It is also offered to developers to define FBML-Tags of their own. It is possible to use self-made or public elements, which were implemented by other developers, if there are not enough tags in Facebook available. To use this FBML in extern and IFrame – applications too, it has been created XFBML (Cross-FBML). This functionality is provided inside the JavaScript library. (X)FBML-Tags are classified in different categories, which are:

> - Dialog
> - Form
> - bulletin board
> - social widgets
> - status messages
> - tools
> - security on profile
> - navigation
> - users and groups.

FBJS

JavaScript is generally a security risk, because of the possibility of spying data and manipulating information and contents. This is the reason that Facebook deactivated it for standard applications inside the platform. JavaScript has a few methods, which could be helpful and interesting when implementing applications. To use these methods anyway, Facebook has released FBJS (**F**ace**b**ook **J**ava**S**cript).

This is not a new and independent implementation of a script language type. It is more a parse, which allows only access to well-known methods and optimizes the source code for Facebook, as upgrades for developing FBJS allows multitude of libraries and functions. The access to a DOM – element is only allowed with the help of wrapper-methods. That can be used for DOM-Requests, events, AJAX or animations. For debugging FBJS the best add-on is called Firebug and can be plugged into the Firefox browser.

Libraries

➢ Facebook PHP SDK[21]

The Facebook Platform consists of a couple of APIs for making an application more social. With help of this SDK the developer gets Facebook Platform support for PHP-based web apps. This library helps the user to add Facebook Login and Graph API support to a website.

➢ GoogleChartPHPLibrary

For displaying charts inside an application lot of libraries exists. In this case the GoogleChartPHPLibrary[22] was chosen to show graphics of amounts and different kinds of data transfer inside an application. The whole library consists of four main and several subclasses. The structure is shown in figure 13.

- GoogleChartAPI
  - GoogleChart
    - GoogleBarChart
    - GooglePieChart
    - GoogleMapChart
  - GoogleChartIcon

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[21] https://github.com/facebook/php-sdk
[22] http://googlechartphplib.cloudconnected.fr/

- GoogleChartIconNote
  o GoogleQRCode
- GoogleChartAxis
- GoogleChartData
- GoogleChartMarker
    o GoogleChartCandlestickMarker
    o GoogleChartLineMarker
    o GoogleChartRangeMarker
    o GoogleChartShapeMarker
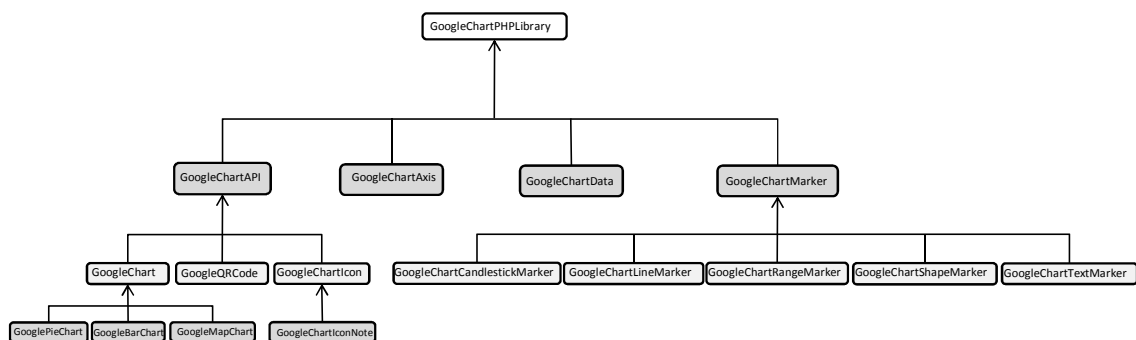   o GoogleChartTextMarker

Figure 13: Structure of the GoogleChartPHPLibrary

The first main class is called *GoogleChartAPI*. It consists of three subclasses which then have other subclasses. The structure of this class is shown in figure 14.It implements basic features to query Google Chart API using GET or POST as well as setting and retrieving parameters. Every object that has characters like a chart must succeed from this class. For setting or retrieving parameters like *$name* or *$value* the public member functions _set($name, $value), _get($name) and _unset($name) are needed.
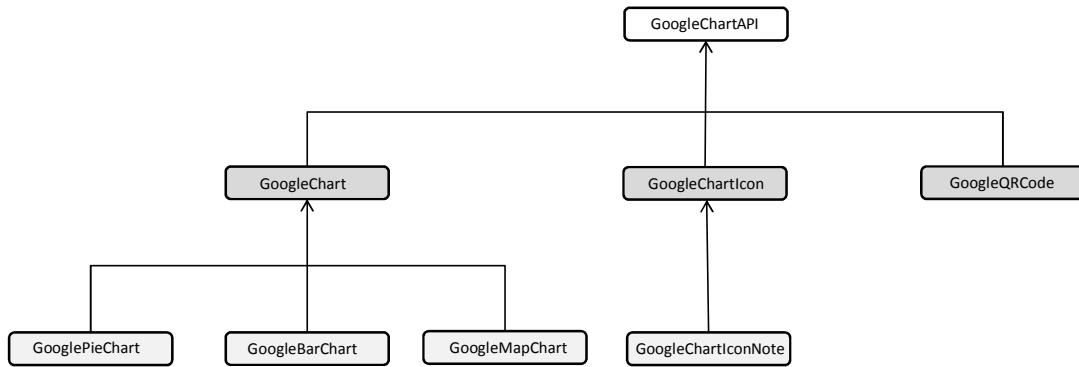
Figure 14: Structure of the GoogleChartAPI

One important subclass is called *GoogleChart* and contains useful functions for modelling charts.

- Construct ($type, $width, $height)

  This function lets the developer generate a new chart, where the parameters are:

  $type (string) describes the type of chart, *$width (int)* and *$height (int)*. This library contains three line chart types.

    lc: This is a chart, where the data points on the x-axis always have the same distance between each mark. The axis lines are shown as default. For showing values on the axis, the developer has to specify this with the *chxt* parameter.

    ls: The definition is similar to that of lc, but by default there are no axis lines displayed. This chart type is also known as spark-lines.

    lxy: The definition is similar to the ls-type but here the user can specify both, x- and y-coordinates for each point. To specify such data points the user has to specify series in multiples of two. The first series specifies the x-coordinates and the second series are the corresponding

y-coordinates of the line. For example the description of two lines looks like the following schema:

chd=t:<line_1_x1>,<line_1_x2>,...|<line_1_y1>,<line_1_y2>,...|

<line_2_x1>,<line_2_x2>,...|<line_2_y1>,<line_2_y2>,...

- setDataFormat ($format)

  Set the data format, which is used by the chart.

- addData ($data)

  This function makes it possible to add a data line to a chart.

- addAxis (GoogleChartAxis $axis)

  It adds a visible axis to the chart.

- addMarker (GoogleChartMarker $marker)

  This function adds a marker to a chart.

- addDynamicMarker (GoogleChartIcon $marker)

  With this function the developer can add a dynamic icon marker to their chart.

- setGridLines ($x_axis_step_size, $y_axis_step_size, $dash_length=false, $space_length=false, $x_offset=false, $y_offset=false)

  With the *chg* parameter the user can choose between solid or dotted grid lines. The syntax of this parameter is

  chg=<x_axis_step_size>,<y_axis_step_size>,<opt_dash_length>,<opt_space_length>,<opt_x_offset>,<opt_y_offset>

  <x_axis_step_size>,<y_axis_step_size> These two parameters are useful for calculating the number of x- and y-grid lines. 100/step_size results in the number of lines in the chart.

  <opt_dash_length>,<opt_space_length> This parameter is optional and is used for defining the dashed grid lines. The first parameter gives the length of each line dash in pixels and the second parameter gives the spacing between dashes.

  *<opt_x_offset>,<opt_y_offset>*The offset parameter gives the number of units for offset the x- and y-grid lines according to the chart scale.

Another main class is called *GoogleChartMarker*. The *GoogleChartMarker* class is an abstract that is very complex and is used by all marker types. Such an implementation in *GoogleChartAPI* is quite complex. There exists many different types of markers and everyone has other parameters. So each type has its own class which extends the *GoogleChartMarker* class. For displaying a marker the user has to set a data series by using the *setData()* function. A data series is, as already described before, a *GoogleChartData* object which contains points used by the marker. The user can take an existing data series or make a new one which will be added to the chart with *GoogleChart::addData()*.Two interesting functions for generating a chart are:

- GoogleChartMarker::setColor($color) with the parameter $color which is a string. An example for this function could look like the following statement where the colour #002500 is dark green.

  $data->setColor('002500');

- GoogleChartMarker::getColor() which returns the colour in form of a string.

5.3   Basics for Facebook-Applications

Facebook applications or other applications have previously been mentioned. In sense of Facebook, it defines any application which allows one or more users special functions. Creating apps on Facebook also means that it has to run in a special framework and different areas. Furthermore, it is possible to run such an application outside the platform and just link it to Facebook.

5.3.1 Application Structure

An application for Facebook can be implemented in every programming language. To run a web application on Facebook it is important that it gets adapted with the Facebook-Base on the Facebook-Platform (see Figure 15). This fundament can be seen in an IFrame or FBML and gets positioned as an integration point. The choice of base and language depends on preferences of the user and size of the application.
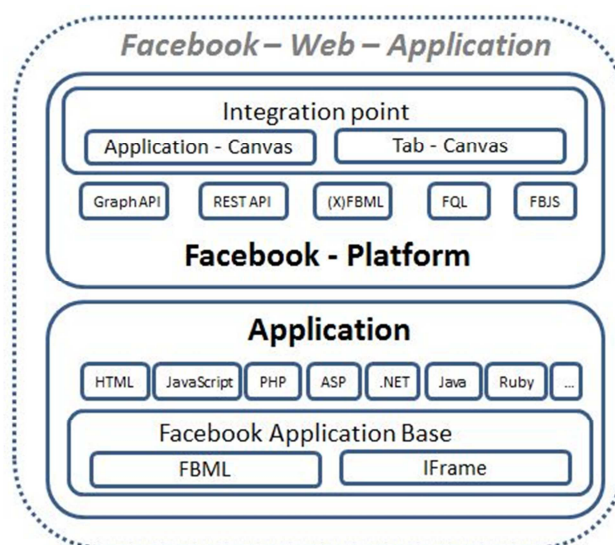

Figure 15: Anatomy of an internal Web application

Facebook does not only offer an internal access to the platform. It also allows the building of external web applications, as well as desktop apps that are able to communicate and interact with the platform. With help of the Facebook-APIs it is possible to create applications for nearly each type of platform and computer. As example mentioned here is the computer (Server, Desktop, Notebook …), mobile devices (mobiles phones, PDAs …) and pads (game pad, TV …). It does not matter which operating system is used, but it is essential to have internet access.
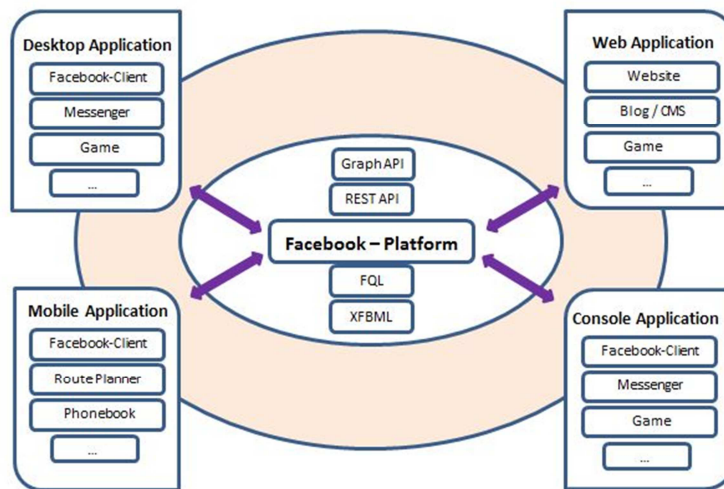
Figure 16: Anatomy of an external web application

5.3.2 Components

The Facebook-Platform contains a lot of different components. Therefore, it is possible to hold the communication between the platform and the application in different channels and technologies. Five of these Facebook platform components are Graph API, REST API, FBJS, FQL and (X)FBML. The programming languages have been explained above and the missing two APIs from Facebook are coming next.
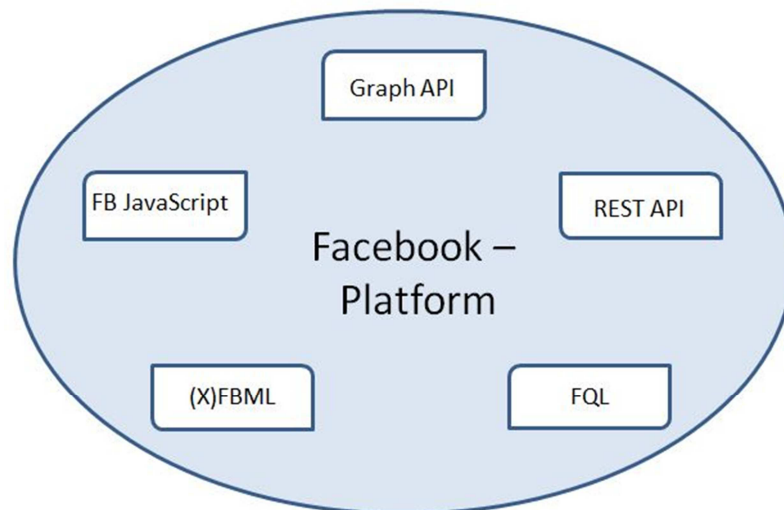
Figure 17: Facebook Platform with Components

> Graph *API*

The new component *Graph API*[23] represents the main channel for communication with the entire Facebook-Platform and is the main part of each application. The most important feature of this API is that all data is organised in similar objects and presented in JSON-format. The protocol for authorisation is called OAuth2.0, which is a standardised and open source. The API itself is compatible to the REST. This means, that every call runs over the internet via HTTP and can be worked through with standard DELETE-, GET- and POST-requests. It also means each object plus corresponding connections get a unique address. Due to this, the HTTP works with this API as a transport protocol and a high compatibility is given for every programming language. The reason is that nearly all languages can communicate and send information via HTTP. The Graph API is normally included in the client's library automatically. The different objects, which can be invoked, are users, pages, events, groups, applications, photos, videos, notes and photo albums.

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[23]https://graph.facebook.com/

➢ REST *API*

The predecessor from *Graph API* is the *REST API*[24] (**R**epresentational **S**tate **T**ransfer **A**pplication **P**rogramming **I**nterface). It is an additional channel for representing the communication and information transport. This is a REST-compatible web service, which opens an access to all information and methods. This system is accessed to the platform via HTTP by GET- and POST- requests. The differences to Graph API are the various methods by which this API works. The objects are individual and not standardized. For authentication to work a security application must be made by Facebook. The methods are classified in name spaces for a better overview. The API supports different representations of data by a corresponding return. Next to JSON it is also possible to specify XML as a return format. The compatibility to Graph API gives a better overview and a unique source code which makes it more logical to use JSON instead of XML. The Facebook API is normally included in the client libraries automatically too. The different API methods are classified in the categories administration, login and authentication, retrieve and publish data, photos, mobile and events.

5.3.3 Positioning an application

For an application to exist inside the Facebook platform different positioning points are required. These points are called *Application-Canvas* or *Tab-Canvas*. Different points of integration allow different limitations. This can lead to problems for the developer while implementing different functions. Affected from this is the layout because of security reasons for the user. An overview is not only important for developer, but also experts for public relation and marketing can profit from this. That means the customer previously knew what is possible. One can say it is based on the slogan: "To know what and how something is achievable, you have to know how it works".

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[24]http://api.facebook.com/

The main integration point is the applications' canvas, which grows to the standard integration point because of the lowest limitation in the application area. Inside this canvas everything is possible as long as the guidelines are followed.
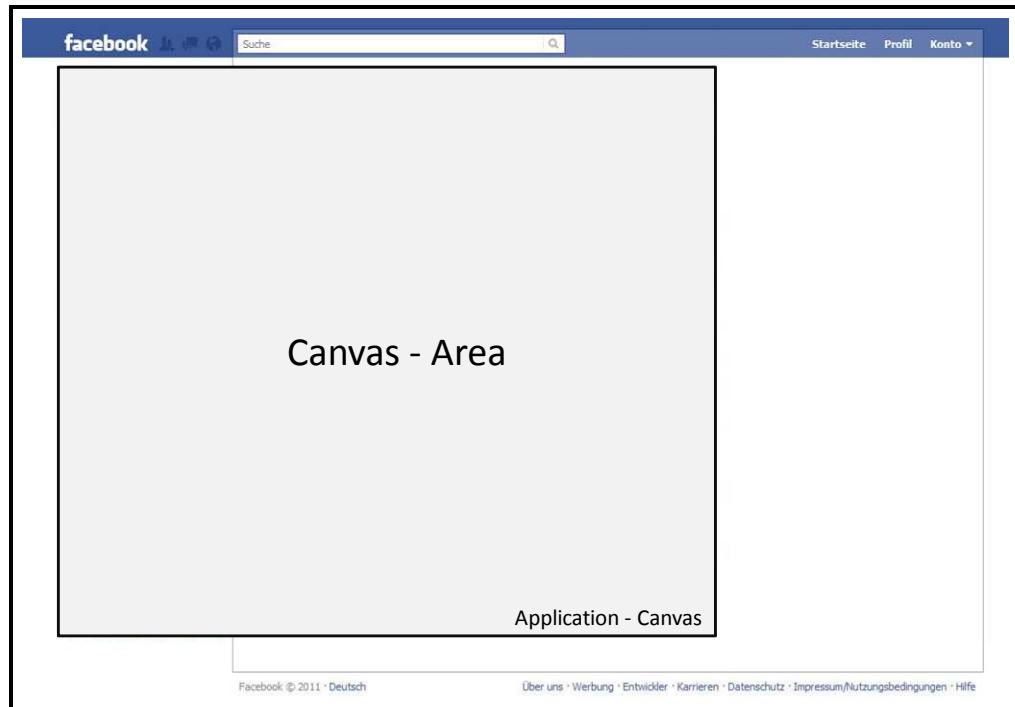

Figure 18: Application - Canvas

The base for a canvas of an application can be seen with help of FBML or an IFrame. The maximum width of the canvas is 760 pixels. The height as no limit, but the developer needs to consider that the application should be user friendly.

The second integration point is called Tab – Canvas which is located on the users profile or Facebook sites from companies, applications or products. With a tab it is possible to integrate the application inside a profile or site. The integration of an application inside a profile is only allowed to be a tab.
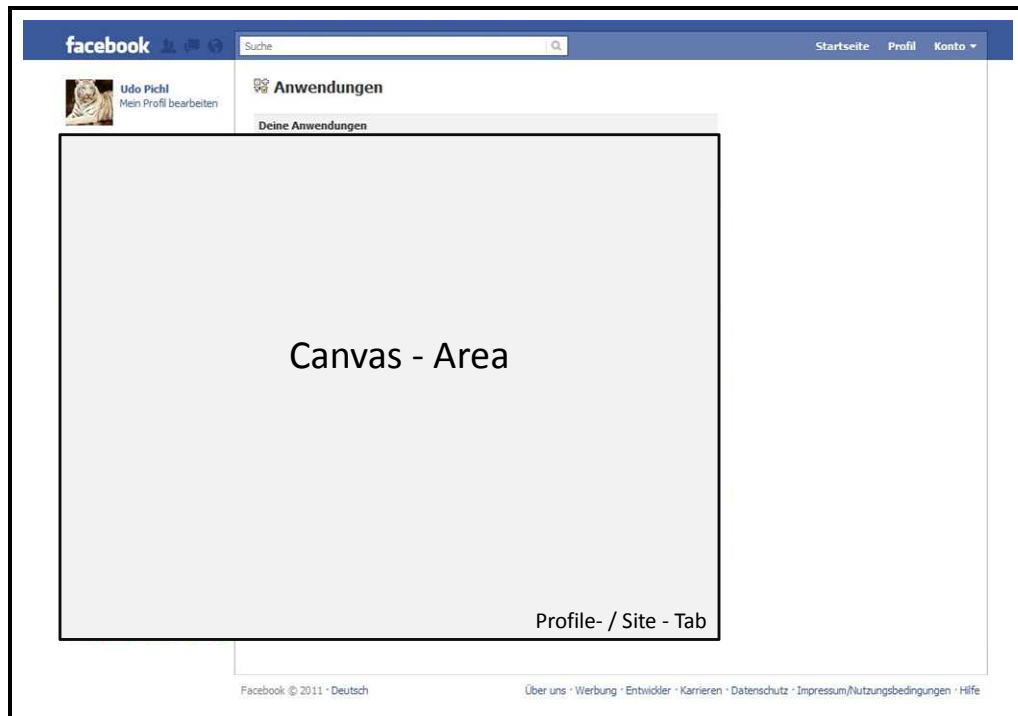
Figure 19: Tab - Canvas

The application possibilities of a Tab – Canvas are a combination of a standard Application – Canvas and the old profile fields. A Tab has a maximum width of 520 pixels and the following limitations, which form the security and do not violate the guidelines:

➢ It is not possible to use an IFrame as a base. It only can be done with FBML.

➢ The application is able and is also allowed to send AJAX – requests

➢ The viewer cannot be determined. It is only possible to find out the Tab of the application.

➢ Information about the user, like his ID, can only be reached if he interacts on the Tab – Canvas and accepts a form or an AJAX – request.

➢ The viewer can only interact with the application, if he accepts to use it.

➢ The application uses the session – key of the profile owner.

➢ Advertising is not permitted in a Tab.

➢ It is not possible for an application to use Flash or Silverlight immediately. Only after the viewer makes an action in the application, like a mouse-click, dynamic contents can be started.

5.3.4 External Application Positioning

Next to positioning an application inside Facebook, it provides an external and independent access to the Facebook – Platform via different interfaces too. Facebook can be used in ones websites and applications, as well as on desktop or mobile devices.
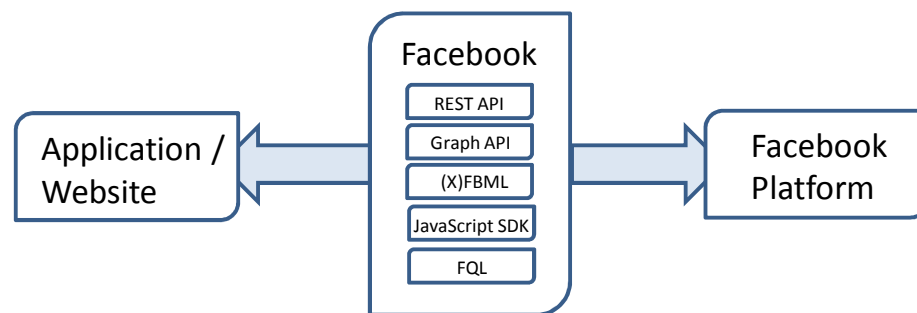

Figure 20: External Application

It is every type of application and platform imaginable but internet access is required. Facebook manages all interaction on a Facebook account and even on created application accounts. So it is not necessary to provide account management for all users.

If an application is connected with Facebook, it has the same possibilities as a regular Facebook application has. Among other things it is access to the Facebook account, fetching contacts, writing into a stream, leaving news for friends and much more. The final allowance is that the creator has complete control over their data which creates a trustworthy application and service.

A few application possibilities are:

- Connecting the user from outside of Facebook with his contacts or to inform about the use of applications.
- Connecting users with other objects via Open-Graph-Protocol.
- Update the social content and write streams via an application.
- Involve the connection from an application and the users' Facebook site from both sides.
- Making a user action public. This could be the information from uploading a picture, buying a product or other events.

It can be seen, that a website or a web application can be connected with Facebook and communicate in an intensive way. Such an integration of Facebook in another application could be very simple or complex. It depends on the desired area and the application. The easiest way is to use the given XFBML widgets which could be set up and integrated with a wizard. The other way is the complex type. This means the complete integration of the API makes it possible to use the whole package of platform functions.

Normally, the following components can be used by external applications:

- Graph API
- REST API
- JavaScript Library (SDK)
- (X)FBML
- FQL

5.4   Summary

To summarize this chapter it is essential to reflect the start of the practical part of this thesis.

The research of literature and tests of social network sites defined the requirements of this project. The application should show three main points. The first one is to find a possibility to discover user's data from a profile. There it is important to see, which data can be found out and how this information can be used. The second point is to find out if it is possible to get access to the virtual currency of the social network. The third important point is the possibility to send data, like virtual goods from one user to another inside a social network site. The last two points can be handled as one. It should be shown, if it is possible to implement an application from using these two points.

The result of the literature study has shown that the most valuable social network site Facebook provides a rather useful API for all aspects. The advantage of this API is the possibility that a user can register as a developer and is able to implement applications for this network. Before beginning the implementation it is important to adjust the right environment. For this project the programming tool Eclipse Helios was chosen which is quite easy and practicable to use and understand. With the right libraries it is possible to develop this in nearly every programming language. In this case PHP was chosen because Facebook's API provides a PHP library as the interface. For fixing the environment problem XAMPP was chosen as the solution for the database and web server. The MySQL database is combined with an Apache web server and has the option to use the PHP programming language too. The reason for choosing the MySQL database was the possibility to use FQL. This is like SQL but with few modifications. It enables the developer to use an SQL-style interface for querying data shown by the Graph API. It is also possible to handle simple mathematics, AND or NOT logical operators, basic Boolean operators and ORDER BY or LIMIT clauses.

With those environment settings it is possible to start creating a Facebook application. However, to do this it is necessary to include some settings. The first step is to know

the name of the application in order to secure the name and prevent it being used again. After this the site domain, Canvas URL, Canvas Page and the site URL must be entered for connecting the application to the web server and to Facebook. After saving all these settings, the developer can start creating an application by using Graph API and REST API on Facebook.

The Graph API works as main channel for communication with the entire Facebook-Platform and is the main component of each application. The most important feature of this API is the organisation of data which are presented in a JSON-format.

The forerunner of the Graph API is called REST API. It is also a channel for communication and information transport. This web service is compatible to the REST API, which gives full access to all information and methods.

The most important things for implementing an application on Facebook is to know are:

- What the application should do
- What user information is needed for use
- how to deal with authentication and authorization
- which development environment is required

Chapter 6

Task of Practical Part

The problem of the given task was that only few of the tested Social Network Sites provided an API. Most of them which allow an access to the API are very complex and don't consent to giving out information about users.

Amongst the social network sites there are two of them, Hi5 and Facebook that make it possible to work as developer and implement applications on your own. For this reason and the popularity of this social network site, Facebook was chosen as an example during this thesis. The aim of this work was to show, if there is a possibility to get access to and work with user's data. While generating an application it is possible to get access to user's data and list of friends. But there is no way to get information about the actual Facebook-Credits or other stored data of user's goods. That means, the only possibility for dealing with Facebook-Credits or other goods is, if developer of the social network site implements an option for it inside an application.

This makes it possible to send virtual goods or a certain amount of a virtual currency from one user to another. The type of program could be a gift shop, a place for trading or an option inside a game.

6.1   Application

To register and activate an account on Facebook is the first step for using an application provided on Facebook. This procedure needs to fill out information about the user on Facebook, entering a registered email address and following the link inside an archived email. Once the registration is done, it is possible to use an application on the given platform.

6.1.1 Authentication

In order to make Facebook safe, the platform uses the OAuth 2.0 – Protocol[25]for authorization and authentication. It is an open-source protocol for regulating an API – authorisation. There are a number of different OAuth flows, which can be used within a website, mobile or desktop application. It helps protect data without fear that a third party has the real access-data from a user. The following points give a common description of the protocol and show the different mechanism that Facebook uses to support each of these flows.

OAuth 2.0 Authorization Protocol

The well-known client-server authentication model works with the resource owner's credentials for accessing protected resources on the server. If a third-party provides an access to protected resources, the owner's certifications are stored at the third-party. Therefore, resulting in several problems, one of them is being to store access-data for future use like passwords in clear-text. Another major issue is to revoke access to an

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[25] http://tools.ietf.org/pdf/draft-ietf-oauth-v2-12.pdf

individual third-party application. For this to work, the user has to change the password so it prevents access from all third parties.

The OAuth 2.0 Protocol solves these problems by implementing an authorization layer. This separates the role of the client from the resource owner. In this protocol the client asks for access to resources that are controlled by the owner and hosted by the server. That means, a different set of certifications are exposed to those of the recourse owner.

The result of this is the use of an access-token instead of their source owner's credentials for accessing protected resources. A token is a string that consists of a specific scope, duration and other specific attributes. An authorization server exposes an access-token for third-party clients by permission of the resource owner. The client uses this token for accessing the protected data that is stored in the resource server.

The OAuth Protocol consists of four parts that work together for gaining access to protected resources where an authentication is required. This is shown in figure 21.

The *resource owner* (Facebook User) has the permission to access the protected resources. The second segment is the *resource server* (application database) which is able to accept and respond to protected resource requests by using access tokens. The third part is the *client* (tradeGoods) that makes protected resource requests by order of the *resource owner* and its given permissions. The fourth and last part is the *authorization server* which delivers the access tokens to the client after a successful authentication of the Facebook user and its given authorizations.
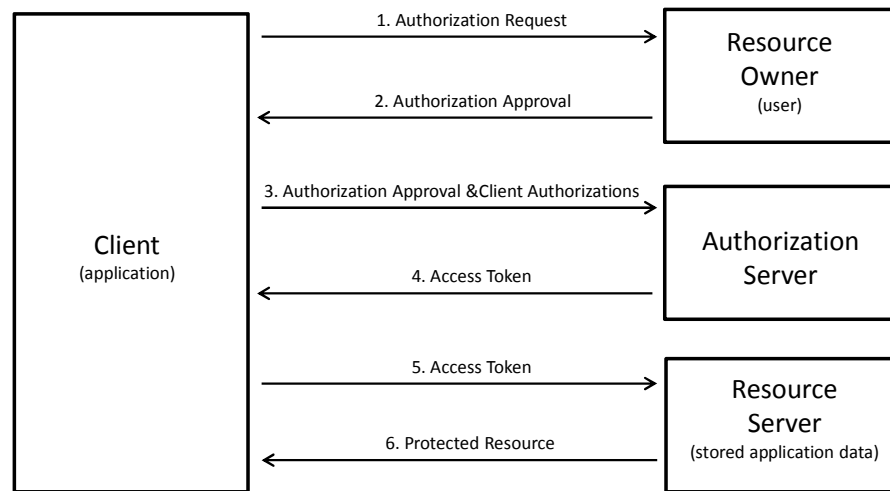
Figure 21: OAuth 2.0 Protocol Flow

The interaction between the four segments is divided into six steps.

1. The application (client) requests the authentication of the user (resource owner). The authorization request can be handled in two ways. The first one can be done directly by the user as shown in figure 20. The second possibility is the indirect way via a middle section like an authorization server.

2. The application receives an authorization approval which symbolizes the permission given by the user. The given authorization approval type depends on the method that is used by the application and supported by the authorization server to get it.

3. The application requires an access-token by authenticating with the authorization server. For doing this, the client needs its credentials and the authorization approval.

4. The server checks the credentials and the authorization grand, and if everything is correct it issues an access-token.

5. After this step the client (application) wants to access to the protected resource of the resource-server, where the data are stored. This is possible by presenting the access-token.

6. The last step is the validation of the access-token by the resource-server. If the token is correct and legal, the server gives the request.

User Login

For a user login, two different OAuth 2.0 flows exist which are supported by Facebook. The first one is called *server-side* or authentication code flow and the second one is the *client-side* or implicit flow. The server-side flow is used, if the Graph API has to be called from a web server. The second flow, client-side is used, if the developer needs to make calls to the Graph API from a client. This could be, if JavaScript runs in a web-browser.

The implementation of Facebook's OAuth 2.0 involves three steps.

- *user authentication*
  This step ensures that the logged in user is who they say they are.
- *app authorization*
  It ensures that the user exactly knows what data and functions are provided on the user's application.
- *app authentication*
  It guarantees that the given user information is archived from the user's app and not from someone else.

If all three steps are finished the developer's application creates a *user access token* that makes it possible to access the user information and perform actions on their behalf.

Server-side Flow

The two steps, *user authentication* and *app authorization* are completed at the same time by rerouting the user to Facebook's OAuth Dialog[26]. By call of this dialog the developer has to submit the app_id (**client_id** parameter) that is generated by creating an application in Facebook's Developer App[27]. That finishes the URL which redirects the user's browser back to the *app authorization* (**redirect_uri** parameter). This redirect_uri has to be in the same domain as the site URL that the developer has registered in the *site URL* tab of the Developer APP.

The following example shows the common form and how the URL looks like:

https://www.facebook.com/dialog/oauth?
client_id=YOUR_APP_ID&
redirect_uri=YOUR_URL

In this application the URL form looks like the following one:

https://www.facebook.com/login.php?
api_key=151707638212593&
cancel_url=http://localhost/tradeGoods/trade/

If the user is already logged in, the stored login cookie from the user's browser will be checked to verify the user. There is also the possibility that the user is registered but not logged in. So the user has to login with their login-data (email and password).

---

[26] http://developers.facebook.com/docs/reference/dialogs/oauth/
[27] http://www.facebook.com/developers/

Figure 22: Login for App use

After the successful user authentication the OAuth Dialog will ask the user to authorize

Figure 23: Request for Basic Information

Normally the user is prompted to authorize the application to allow the access for retrieving their basic information that is available publicly or by default on Facebook. If the implemented application needs more user information than what is provided, the developer must ask for specific permission from the user. This is achieved by adding the parameter *scope* to the OAuth-Dialog request. The followed list of needed permissions is split by a comma. The following example shows the common way to ask for access.

```
https://www.facebook.com/dialog/oauth?
client_id=YOUR_APP_ID&
redirect_uri=YOUR_URL&
scope=email,publish_stream,user_birthday,
        user_location,user_work_history
```

Applied to the created application called *tradeGoods,* the URL looks like the following:

```
https://www.facebook.com/login.php?
api_key=151707638212593&
cancel_url=http://localhost/tradeGoods/trade/
scope=email,publish_stream,user_birthday,
        user_location,user_work_history
```

After the user is authenticated and starts the application for the first time, a dialog with the required information and permissions appears. The result of this is shown in Figure 24.
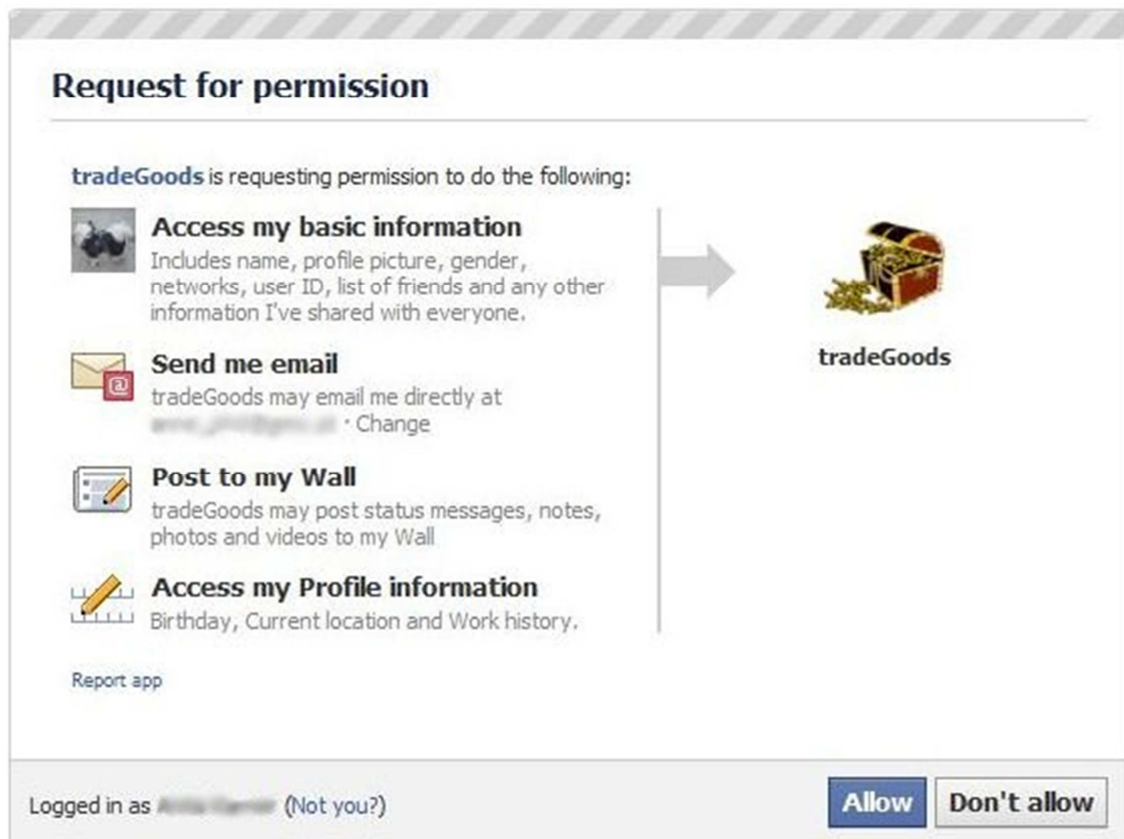
Figure 24: Request for Permission

A full list of available permission can be found in the permission reference[28]. The relation between the needed number of permissions for an application and the number of users that allow these permissions is quite inverse. The higher the number of requested permissions, the lower the number is of users that accept them. The smartest way for an application is to ask only for those permissions that are really necessary.

If the user clicks on the *"Don't allow"* – button, the created application is not authorized. The OAuth leads the user's browser back to the URL that had been registered in the *redirect_uri* parameter with an error message.

If the user presses the *"Allow"* – button the created application will be authorized. The OAuth will also lead the user's browser back to the URL that had been registered in the

---

[28] http://developers.facebook.com/docs/authentication/permissions/

redirect_uri parameter with an authorization code. With this code it is possible to authenticate the application for getting the *access token* and making API calls. Therefore, the developer has to pass the authorization code and the *app secret* to the *token endpoint*. The *app secret* is available at the *Developer App*[29] and should be kept in confidence.

If the implemented application is successfully authenticated and the authorization code from the user is valid, the authorization server will answer with the *access token*. In this case the token looks like the following one

access_token=151707638212593%7C2.0uKVskVYVl0JeSX50qIvDw__.
3600.1303243200.1-100000461412150%7C2jgiLA1QW9f67d-X5xMXkB8_QMI

After the authentication the response contains the number of seconds until the validation of the token ends. If the token is invalid, it is necessary to run the last steps again for getting the new *code* and *access_token* again. However, if the user is already authorized at the application, it is not possible to get the code and token again.

If there is a problem with the authentication of the application the server will return the error in form of an exception, which looks like the following:

```
{
  "error": {
    "type": "OAuthException",
    "message": "Invalid verification code format."
  }
}
```

client-side flow

The second flow at the user-login is on the client side. It also uses the OAuth Dialog for authentication and application authorization. The difference to the *server-side* flow is the *response_type* parameter that has to be specified with a value of the token.

---

[29] http://www.facebook.com/developers/

https://www.facebook.com/dialog/oauth?client_id=151707638212593&

redirect_uri=http://localhost/tradeGoods/trade&response_type=token

Through the use of the *scope* parameter it is also possible to request additional permissions like on server-side flow.

https://www.facebook.com/login.php?
api_key=151707638212593&
cancel_url=http://localhost/tradeGoods/trade/
scope=email,publish_stream,user_birthday,
   user_location,user_work_history&
response_type=token

If the user is authenticated and the provided application is authorized the browser will link to the *redirect_uri*. In the server-side flow, the redirection passes an authorization code (*code* parameter), but in this case the *redirect_uri* passes the *acces_token* in an URI fragment (*#access_token*). The construction of the link is shown here:

http://localhost/tradeGoods/trade/#access_token=151707638212593%7C2.0uKVskVYVI0JeSX50qIvDw_
_.3600.1303243200.1-100000461412150%7C2jgiLA1QW9f67d-X5xMXkB8_QMI

Since the access token is passed in an URI fragment, the only possibility to retrieve the token is via the client-side code. In this case the application authentication could be done by controlling that the *redirect_uri* has the same domain as the site URL in the Developer Application (Facebook, 2011).

Application Login

Next to the user login, Facebook also supports an *App Login* which uses the OAuth 2.0 Client Credential flow. This version of login makes various administrative actions

possible. For instance it is possible to retrieve Insights[30]data or approve requests. API calls that require an *app access token* are defined in the API reference.

It is possible to get the *app access token* via the Graph API *token_endpoint*. The URL https://graph.facebook.com/oauth/access_token and the specification of *Application ID*, *App secret* and *client_credentials* in the *grant_type* parameter is the common form of this demand. In case of the *tradeGoods* application the request is defined as:

https://graph.facebook.com/oauth/access_token?client_id=151707638212593&client_secret=77849ff0 04c50415ffe3dc7d2e84696f&grant_type=client_credentials

This returns an *access_token*,which is shownas follows (Facebook, 2011).

access_token=151707638212593|--V0mDwEWGyTNBNamjdjCT_MKZ4

Page Login

Flow of the page login is a little different to user- or app – login. Every page has one or more administrators that can perform different actions on the page. To perform these operations on the implemented application, the user has to grant the *manage_pages* permission. The common form of this request is similar to the following:

https://www.facebook.com/dialog/oauth?
        client_id=YOUR_APP_ID&
        redirect_uri=YOUR_URL&
        scope=manage_pages&
        response_type=token

Applied to the *tradeGoods* – application it means:

https://www.facebook.com/dialog/oauth?
        client_id=151707638212593&

---

[30] http://developers.facebook.com/docs/reference/api/insights/

redirect_uri=http://localhost/tradeGoods/trade&

scope=manage_pages&

response_type=token

The response of this demand is followed here and is shown in figure 25.

http://www.facebook.com/connect/uiserver.php?app_id=151707638212593&method=permissions.req
uest&display=page&next=http%3A%2F%2Flocalhost%2FtradeGoods%2Ftrade&response_type=token&f
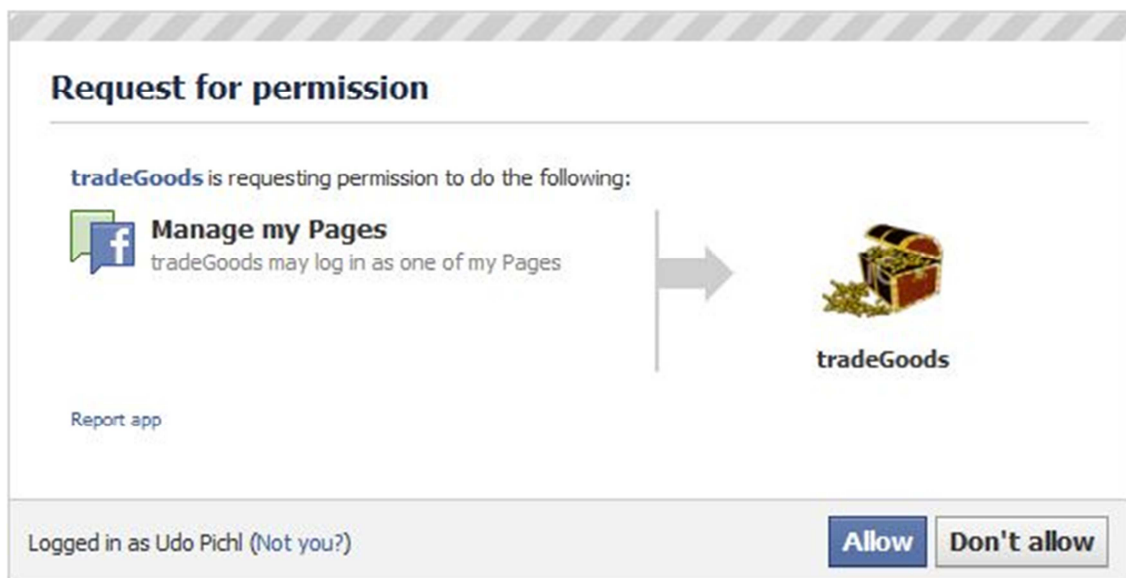bconnect=1&perms=manage_pages

Figure 25: Request for Permission

After pressing the *Allow* – button, the application is led to the following address that
includes the *#access_token* parameter.

http://localhost/tradeGoods/trade/#access_token=151707638212593|2.Y0Dz5TeCbKtnU_3Xj9kBvw__.

3600.1303333200.1-100000461412150|Ph1Sn76rMWxxEgn

23raFDeszlbo&expires_in=4009

The developer gets a token parameter that could be used for getting information about all pages the developer administrates, including specific *access_token* of all pages. Used in the common URL:

https://graph.facebook.com/me/accounts?access_token=TOKEN_FROM_ABOVE

The result leads the developer to the following URL

https://graph.facebook.com/me/accounts?access_token=151707638212593|2.Y0Dz5TeCbKtnU_3Xj9kB

vw__.3600.1303333200.1-100000461412150|Ph1Sn76rMWx

xEgn23raFDeszlbo&expires_in=3962

This shows the specific *access tokens* of all developer's registered applications (Facebook, 2011).

```
{
  "data": [
    {
      "name": "world",
      "category": "Application",
      "id": "200831293265046",
      "access_token":"151707638212593|2.Y0Dz5TeCbKtnU_3Xj9kBvw
                          __.3600.1303333200.1-100000461412150|
                          200831293265046|VC3K_g-DT_VmhzKiU2cw34cWTcw"
    },
    {
      "name": "tradeGoods",
      "category": "Application",
      "id": "151707638212593",
      "access_token":"151707638212593|2.Y0Dz5TeCbKtnU_3Xj9kBvw
                          __.3600.1303333200.1-100000461412150|
                          151707638212593|s_6G_GlLWaCQrjlrFWFsKxxHbA4"
    }
  ]
}
```

6.1.2 User - Information

For obtaining information of a user the object *User*from the Graph API may be helpful. By implementing an application, the developer uses the function *api* from the facebook.php which allows the application connection to the Graph API. The following command shows the information of an active user.

$fbme = $facebook->api('/me');[31]

The result is an array *$fbme* with the selected information of the active user. This means for developers of an application that they archive lot of data from every user who gives their authentication for working with the proposed application. This way the developer or the application provider can read out user data which is available in the following structure.

```
Array
    {
        "id": "10000046141215",
        "name": "Udo Pichl",
        "first_name": "Udo",
        "last_name": "Pichl",
        "link": "http://www.facebook.com/Udo.Pi",
        "username": "Udo.Pi",
        "birthday": "01/21/1979",
        "hometown": {
            "id": "112673078744711",
            "name": "Grafenstein"
         },
        "gender": "male",
        "relationship_status": "In a relationship",
        "significant_other": {
            "name": "Anita Karner",
            "id": "1294054378"
        },
```

---

[31] http://developers.facebook.com/docs/reference/api/user/

"timezone": 2,

"locale": "en_GB",

"verified": true,

"updated_time": "2011-03-29T02:13:57+0000"

}

Table 3 shows the properties of a user account which are possible to read out. Some of them return a JSON string (JavaScript Object Notation), which is a compact data format and is helpful for data interaction between applications (Facebook, 2011).

Properties

Name	Description	Permission	Returns
id	Facebook id from the user	publicly available	JSON string
name	full name of the user	publicly available	JSON string
first_name	first name of the user	publicly available	JSON string
last_name	last name of the user	publicly available	JSON string
gender	user's gender	publicly available	JSON string
local	user's location	publicly available	JSON string + ISO language code + ISO country code
link	user's profile link	for every Facebook user available	JSON string contained a URL
user name	Facebook name of the user	publicly available	JSON string
third_party_id	id for the user which is anonymous and unique	for every Facebook user available	JSON string
timezone	timezone offset from UTC from a user	for every Facebook user available	JSON number
update_time	the last time, a user has updated his profile	for every Facebook user available	JSON string + datetime
verified	status of the user's account verification	for every Facebook user available	JSON Boolean (true or false)
about	information text under the user's profile picture	user_about_me friends_about_me permission needed	JSON string
birthday	the Facebook user's birthday	user_birthday or friends_birthday permission needed	JSON string
education	list of education	user_education_history or	JSON string

	history	friends_education_history permission needed	
email	by the user specified email address	email permission needed	JSON string + available email address
hometown	hometown of the Facebook user	user_hometown or friends_hometown permission needed	JSON object with name and id (starts and ends with { })
interested_in	hobbies the user prefers	user_relationship_details or friends_relationship_details permission needed	JSON array (starts and ends with [ ]) + JASON string
location	current location of the Facebook user	user_location or friends_location permission needed	JSON object + name and id
political	political few	user_religion_politics or friends_religion_politics permission needed	JSON string
quotes	favourite quotes of the Facebook user	user_about_me permission needed	JSON string
relationship_status	relationship status	user_relationship or friends_relationship permission needed	JSON string
significant_other	partner	user_relationship_details or friends_relationship_detail permission needed	JSON object + name and id
website	user's Personal website URL	user_website or friends_website permission needed	JSON string + URL
work	user's work history	user_work_history or friends_work_history permission needed	array of JSON objects + other fields (employer, location, position, start_date and end_date)

Table 3: List of Facebook Properties

This list shows the need of several additional permissions to get some of Facebook user's information. This authorization can be archived in two ways. For example, to get the permission for using the *about* variable the developer has to ask for *user_about_me-* or *friends_about_me-* permission. This problem is handled on the first time of using the application. There the user is asked to authorize the application to access *basic information* which is registered and available in the user profile on Facebook.

It is not only possible to read-out user's Facebook basic information. Data about behaviour, preferences or connections are also possible to archive. The needed permissions are shown in table 4. Some data is public, others need various authorizations but a few of them require the use of an access-token.

Connections

Name	Description	Permission	Returns
picture	user's profile picture	publicly available	HTTP 302 with the URL of the user's profile pic
friends	user's friends	for every Facebook user available	JSON object with name and id (starts and ends with { })
accounts	Facebook pages of the current user	manage_pages permission and the access_token to query the Graph API on behalf on the page needed	JSON array containing id, category and name fields
apprequests	outstanding requests of apps	can only be accessed with an app access token	array of app requests
activities	user's activities which are listed on profile	user_activities or friends_activities permission needed	JSON array containing id, name, category and create_time fields
albums	user's created photo albums	user_photos or friends_photos permission needed	array of A*lbum* objects
books	user's listed books on profile	user_likes or friends_likes permission needed	JSON array containing id, name, category and create_time fields
checkins	user's checked-into places	user_checkins or friends_checkins permission needed	array of *Checkin* objects
events	user's attended events	user_events or friends_events permission needed	JSON array containing id, name, start_time, end_time, location and rsvp_status
feed	user's wall	read_stream permission needed for non-public posts	array of *post* objects, which contains last 30 days or 50 posts
friendlists	user's friend list	read_friendslists (reading) and manage_friendlists (writing) permission needed	JSON object array containing id and name fields of friendlist

home	user's news	read_stream permission needed	array of *post* objects, which contains last 30 days or 50 posts
inbox	threads of user's inbox	read_mailbox permission needed	array of threads
Interests	list of user's interests	user_intertests or friends_interests permission needed	JSON object array containing id, name, category and create_time fields
likes	user's "I like" pages	user_likes or friends_likes permission needed	JSON object array containing id, name, category and create_time fields
Links	user's posted links	read_stream permission needed	array of L*ink* objects
movies	list of user's movies on profile	user_likes or friends_likes permission needed	JSON object array containing id, name, category and create_time fields
music	list of user's music on profile	user_likes or friends_likes permission needed	JSON object array containing id, name, category and create_time fields
notes	user's notes	read_stream permission needed	array of *Note* objects
outbox	user's outbox messages	read_mailbox permission needed	array of messages
photos	user's photos and/or user's tagged photos	user_photo_video_tags, friends_photo_video_tags, user_photos or friends_photos permissions needed	array of P*hoto objects*
posts	user's posts	read_stream permission needed for non-public posts	array of *Post* objects
statuses	user's status updates	read_stream permission needed	array of *Status Messages* objects
tagged	photos, videos and posts where user is tagged	read_stream permission needed	array of *Photo, Video or Post* objects
television	television list on User's profile	user_likes or friends_likes permission needed	JSON object array containing id, name, category and create_time fields
updates	user's inbox updates	read_mailbox permission needed	array of messages
videos	videos where user is tagged	user_videos or friends_videos permission needed	array of *Video* objects

Table 4: List of Facebook Connections

6.1.3 Invite friends

Invite

The *<fb:request-form>* – tag is helpful by inviting friends to an application. With this form it is possible to send requests to a list of friends to use the application. For sending such invitations to more than one friend it is necessary to use the *<fb:multi-friend-selector>* – tag inside the request form. Before submitting the web form, the user has to authorize the request.

Basically, the developer has to choose the *<fb:multi-friend-selector>* – tag for selecting a large number of people and sending their requests. The *<fb:friend-selector>* – tag or *<fb:multi-friend-input>* – tag is more suitable in situations where the user wants to invite a rather small amount of friends to the application. Each of these three tags is able to invite non-Facebook friends as well with help of an email contact importer.

For developers that use iFrames, it is possible to use the XFBML – tag *<fb:serverFbml>* for rendering the *fb:request-form*. Furthermore, it is possible to send requests by using the *multi-friend-selector* for rendering a specific Canvas pages with FBML.

Developers who want to use more form parameters can be formed by setting the *fb_protected* attribute *true* within any *<fb:request-form-submit>* – tag. This attribute avoids FBJS to contact with secure elements in the form.

In this project, the XFBML method was chosen to invite friends to use the application. Inside the *request-form* – tag some parameters are available for use.

Name	Type	Description
type	string	generates the type of invitation or request; should be the application's name that is shown on the user's homepage
content	string	content of the invitation to be sent; the FBML formation should be formed so that it contains links and the *<fb:reg-choice url=" " label=" "/>* - tag. It specifies the buttons that are included in the request.
invite	bool	is the attribute *true*, an invitation or a *false* request will be sent;the difference between these two possibilities is, the content that the user sees. The default value is *false*.
action	string	place where the user gets linked, after it has submitted or skipped the form. The

		default link is http://apps.facebook.com/yourapp
method	string	the attribute can have the values: GET or POST; depends on the desired form

Table 5: request-form parameter

Applying the mentioned parameters to the project a source code is generated which may look like the following one. It shows the way how to include the *<fb:request-form>* - tag inside a *<fb:serverFBML>* - tag for generating an invite function.

```
<fb:serverFbmlstyle="width: 700px;">
<scripttype="text/fbml">
        <fb:fbml>
        <fb:request-form
                action="<?phpecho $fbconfig['appBaseUrl']?>/invite.php"
                target="_top"
                method="POST"
                invite="true"
                type="tauschegeld"
                content="iFrame"<fb:req-choice url='<?phpecho$fbconfig['appBaseUrl']?>'
                        label='Accept' />
                <fb:multi-friend-selector
                showborder="false"
                actiontext="Invite friends to test this app">
        </fb:request-form>
        </fb:fbml>
</script>
</fb:serverFbml>
```

6.1.4 Database

For implementing this example a SQL database is used to store user's application data. It is divided into the three tables, these are: user, friends and transfer. Each of them contains information for the application's functionality. The structure and links inside the database are shown in figure 26.
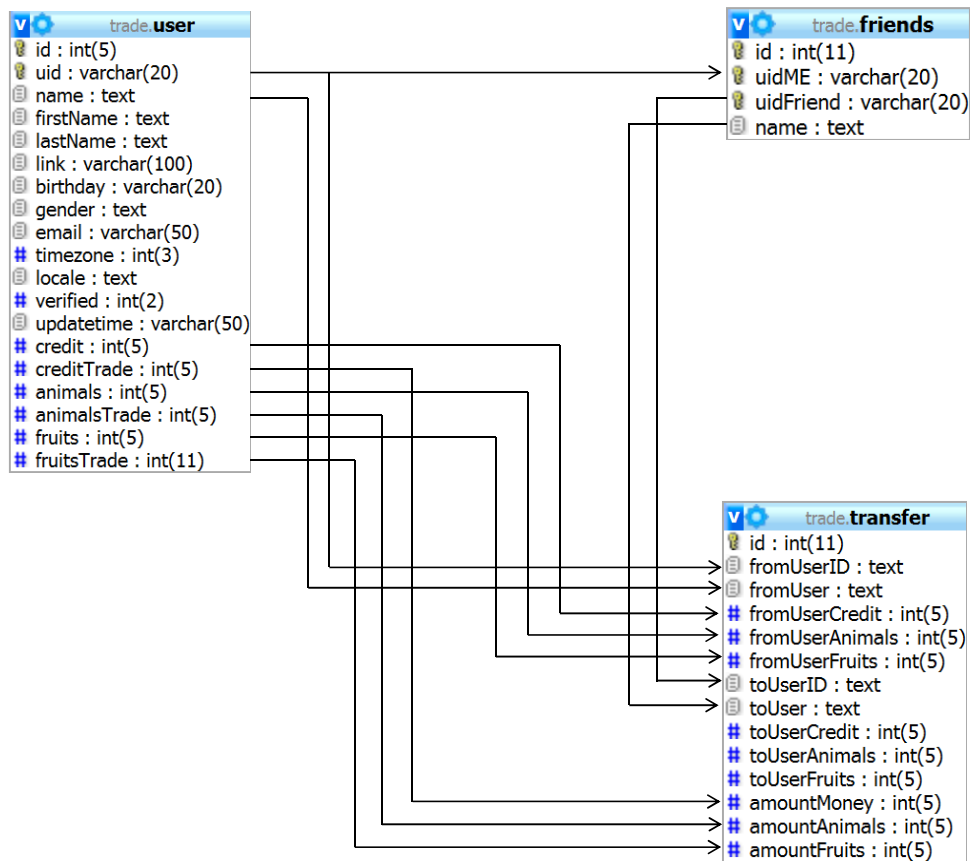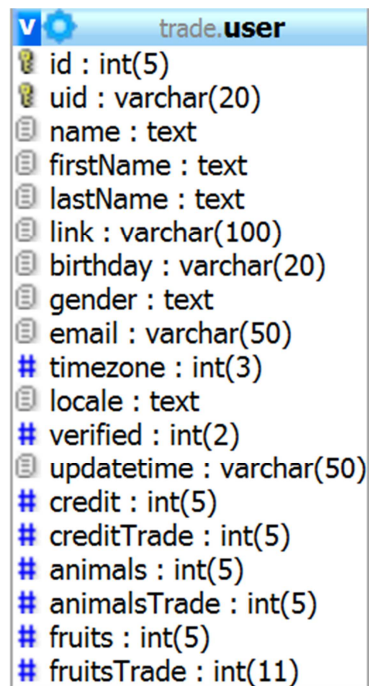
Figure 26: Database Schema

1. User

The table *user* consists of different information which is able to be read out. By accepting the authentication request the user gives the agreement for access to profile information and makes it storable. Via the *uid* (user ID) it is possible to make contact with the individual users and get their profile information that is accessible for nearly every user. The most interesting information is *uid*, name, user name, link, email, birthday, gender and location or hometown. All the available information is shown in tables three and four.

In this application the user gives the authentication for reading out user data by clicking the *allow* button at the permission request. If a user begins working with the app, the resulted data and application relevant information like the amount of goods, are stored in the table *user* in the database *trade*.

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Figure 27: User's Information

2. Friends

By reading out the user's data it is also possible to get information about the friends list. This list is very helpful for promoting an application and inviting other users. For this reason the list's content has been stored in the variables *uidFriend* and *name* of the table *friends*. To know which friend is in a relationship with a user, it was also necessary to store the user's ID in the variable *uidMe*. Thus making it possible, to show only registered friends of the user inside the application.
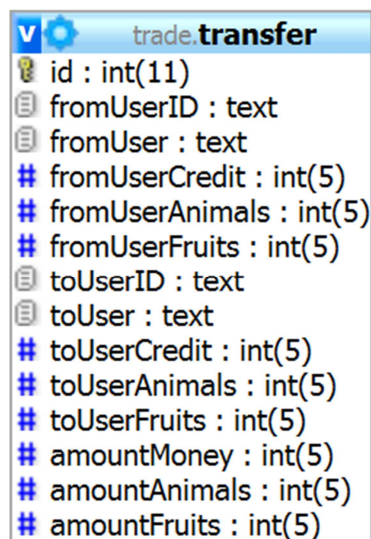
Figure 28: User's Friends

3. Transfer

The next table inside the database is called *transfer*. It contains the entire application's transfer data. That means if user 1 wants to send a gift to user2 for instance 20 credits, the 20 credits will be stored inside this table. So the amount of credits from user1 who is described by *fromUserID* and *fromUser* reduces by 20. It follows that user2's account that is defined by *toUserID* and *toUser*increases by the same amount. Figure 29 shows the whole *transfer* table with all variables. It includes the actual amount of different goods like credits, animals and fruits. The values are given for both the giver and the recipient and it also shows the amount of transferred products.

Figure 29: Application Data

Data transfers like this are stored in a table and it is also possible to build a graph of all transactions. It shows the transferred products and the different amounts of virtual goods that a user has sent to another one. In this application a diagram is created with

the help of GoogleChartPHPLibrary and is shown in figure 30. This is only a small example to show one possibility of data transfer inside an application.

Figure 30: Process of Revenue and Outgoing

6.2   Summary

In this chapter all the requirements regarding the safety, user information, database and functions are defined. The requirements are based on the literature research presented in previous chapters, various information about the API and brainstorming results. Generally, there are four important parts in developing a Facebook application.

- register as a developer
- implementing an application
- authorization and authentication
- user information

As already described in a previous chapter it is necessary to register as developer on the virtual social platform Facebook in order to implement an application. After this, it is possible to announce an application name. By doing that Facebook creates an *Application ID, API Key* and an *Application Secret Key* which allocates the chosen name. The next step is to organize the development environment by choosing the right programming tool, programming language, web server and database. If these segments are selected, it is possible to implement an application and connect it with the social network via the provided API by using the three created keys.

Afterwards the construction phase of an application is necessary to make it public. The easiest way to do this is sending requests to friends. The sending of these requests leads to another important part the data safety. By accepting the request the user makes the protected information public which can be read-out by the developer. Facebook uses the OAuth 2.0 Authorization Protocol which works as an authorization layer for protecting user data. This layer separates the role of the application user and the resource owner. The result of this is the use of an access-token instead of the resource owner's credentials for accessing protected resources. A token is a string that consists of a specific scope, duration and other specific attributes. An authorization server exposes an access-token for third-party clients with permission from the

resource owner. The client uses this token for accessing the protected data that is stored in the resource server. After accepting the request, the user is able to utilize the provided application.

The enabled user information can be read-out and stored in a database. It is possible to get lot of information about a Facebook user but most of them are only accessible if the user makes it public. Although, if there are explicit requests for special information, they are only accessible if the user marks them as open to the public. This stored data can only be accessed by the application's developer.

During developing the application *tradeGoods* a database with three tables was created. Inside these tables all the application's necessary data is stored and controlled. This is just a small example of a trading system. In this system it is possible to send a virtual currency or goods from one registered user to another. By having user information access to the friends list is feasible. When they have access to friends list it broadens the number of user names and Ids and this is known as the snowball effect.

The implementation of an application shows it has potential to archive a lot of user data by sending requests. Within the program, the developer's creativity allows many possibilities and all data from the user is stored in the application's database. This makes access to the virtual goods by a third-party impossible. This method is well known in a lot of Facebook applications. The two most famous are FarmVille and CityVille.

The difference between these games and *tradeGoods* is that Facebook provides the possibility to use its virtual currency inside for buying special goods. All of the application's data is stored securely in the developer's database. Also, the information about the user's Facebook-Credits stays within the protected database of Facebook.

Chapter 7

Lessons Learned

Overall, this topic taught me lot about social network sites including the user's transparency, network security and application development. The following summary describes my experience and developments in detail.

At the beginning of this project the definition of *virtual social network sites* was for me the same like for most users. It is a way of, connecting friends, finding old friends again reading news about them and getting information about general topics. For me, the most popular networks were Facebook, VZnet group and MySpace. During the research I found many different social network sites across the globe. It was interesting to see the differences of each network and to see the popularity in different regions all over the world. Every virtual social network site differs in language, design, themes, interests, religion, target group and functions. I began to encounter problems in regards to information searches and retrieval. It was not difficult to find the most popular social networks. However, many sites were in other foreign languages. However, these sites had the option of the English language but it was still not always accessible. QQ was one of these examples. QQ is a social network

for those in Asian regions. This site also happens to be one of the world's most famous and largest online virtual networks. The homepage for QQ had the option for English translation but even then the entire login page was not translated. After logging in, everything is shown in traditional Chinese. The virtual world that belongs to QQ is called HiPiHi. It could be said it is a Chinese Version of the well-known Second Life. Luckily, I found a Chinese user who spoke English very well and he was able to help by giving me personal information for logging in. So, it was possible for me to use this social network and virtual world with the help of a Chinese user.

After testing different social network platforms only two came into the shortlist. The first was Hi5 and the second one was Facebook. The choice for Hi5 failed in two points. The first one was the API. It was possible to create application of my own, but the API was very complex and did not offer the same or even similar possibilities to those of Facebook. The second point was the declining number of registered users. This was one of the plus points for choosing Facebook's API. Another plus point was the pre-defined functions and tags which are available by using FQL and FBMAL.

Another problem throughout the development of an application was the rapid changing interface. During the development time the interface changed twice which resulted in a restart. This resulted in the implementation and testing being impossible.

An interesting part was learning about how to read out information from different users and their friends. It was intriguing to see how the material of users is archived and then can be used for target advertising and other applications. In order to get authentication and authorisation to this data it was necessary to use the OAuth 2.0 Security Protocol. To see how protected data is handled by social networking sites was also very interesting.

Chapter 8

Summary and Outlook

This document describes the emerging and development of virtual social network sites over the years. While researching, it has shown the user's transparency inside a social network and how to read-out user profile information by a developer. It also illustrated and explained the type of authorization and authentication system which the tested network is working with.

During recent years it was clear that the number of social networks on the virtual market was increasing. Some of them evolved and increased but there were also virtual social network sites that had to close their portal. On the sector of these platforms the geographical territory is as important as target groups or the thematic focus for becoming successful. The result of this was that there are only few virtual social network sites that were already well known and large. Three of these very famous platforms are MySpace, QQ and Facebook.

The real focus of a social network platform lies on building and reflecting friendships and social relations among people. Every network has special topics for drawing the attention of users. MySpace is a multimedia based site where music, photos and videos are promoted to entertain the users. Otherwise QQ is primary an instant

messenger service that is provided exclusively in Asian regions. It also has another social network branch named QQzone which provides a private web-site where it is possible to write blogs and lead a guest book for each registered user. The main difference to other platforms is the geographical localisation of QQ. Facebook which is among the three most famous networks focuses on building and maintaining social relationships as well as application use and informing friends about recent news. It grew quickly in popularity because it provides a vast range of applications and the possibility to inform friends about activities.

Most of the tested social network sites have a virtual currency. By using these currencies it is possible to buy virtual articles inside the platform. There raises the question: Is it may be possible to access the private user profile to send a certain amount of virtual currency from one user to another by using a self-implemented application? This possibility can be used for more than virtual currency because several of the applications have many different virtual goods inside.

Two analysed virtual social network sites offer the possibility to use their API for developing applications. Due to the complexity of Hi5's API, it failed and Facebook's API was chosen for the project test.

The fifth and sixth chapter deals with the option to read-out useful user profile information and to use them for special purposes in that application. The first step was to define the right development environment. It was necessary to find an implementing tool, a web server and a database which work well together and can handle the Facebook APIs. The next step was to check which user information can be read-out and saved. Therefore, it was important to research and save the data's structure. At this stage of the project it was necessary to check, with help of the OAuth 2.0 Authorization Protocol about an amount of different virtual goods.

The implemented application called *tradeGoods* was able to send requests to invited friends. By accepting these requests various, private user information was able to be read-out and collected in a database. The most useful material was the friends list, which made it possible to send requests for invitations to friends of the application's registered user.

And now, what will bring the future?

One can say Facebook is no fad like fashion or trends which can change day by day. It is also possible to use Bing instead of Google as search engine. Therefore it is necessary to type Bing instead of Google and the use is possible. According to recent data, Facebook has more than 600 million registered users. It is possible to change the virtual social network for few single users. But it is improbable to settle all friends and whose once. At the social network site Facebook are no tokens for decreasing growth or decimate number of registered user. Mark Zuckerberg supposed the more user register on Facebook the harder it will be to get away or to push Facebook off.

However, one big question is how the network will look like in five years. Maybe the virtual social network continues to grow and the domain Facebook.com is only a small part of the whole empire. In course of time, it could be observed that uses stay on a platform as long as a new, a better alternative is given. That also will happen to Facebook because of this social network site also has a weakness which others will not have.

It is not easy to say how such famous social network site like Facebook might look like in a couple of years. Nevertheless social networks will become more and more involved into any webpages. The social user's information will get very important for big companies like Google or information News Companies. With this kind of material the Companies can adapt advertising, links or news to any costumer. The Like-button generates lot of information about a user's surf behavior and their preferences and can be seen as a kind of user's fingerprint. Maybe in five years, you and your parents will visit the same online news paper and not see any stories that overlap (Suster, 2010), (Manjoo, 2011), (Marriner, 2011).

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