

A Study of a Elgg Framework for Social Networking Application Development

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Abstract

Nowadays, online socialization has become a regular activity for most people around the world. People don't need to meet with their friends, colleagues, families, and co-workers physically every time in order to communicate with each other. The social networking media has gained an increasing popularity that has changed every person's way of dealing with their personal social behaviors. This paper deals with the study of Elgg social networking framework for the development of a social networking application. The Elgg is an open source software development framework that can allow individuals, organization, and enterprises to share files, blogging and microblogging, and communicate through groups and networks. A case study of architecture of a social networking site will be provided in order to show the features of Elgg social networking framework.

Keywords: *Elgg social networking framework, software development, social networking*

1. Introduction

The rapid growth of the Internet has brought the online era of socialization to the people. Social networking applications and websites (*e.g.*, Twitter, Facebook, Instagram, LinkedIn, Cyworld, Flickr, Pinterest, Tumblr, BAND, Flixster, *etc.*) have gained an unprecedented increase of demand for various individuals, organizations, and enterprises. The growing number of social networking applications ranges its focus from general to specific areas or fields such as art community, blogging sites, social investments and financing, movies and TV series, photo and video sharing community, language learning social networks, shared hobbies and interests, computers and video games, music community, business community, and many more. Social networking has also been popular for use in educational and research communities such as Academia.edu, iTalki, Students Circle Network, *etc.*

This emerging trend has been paralleled with the evolution of handheld devices (*e.g.*, smart phones, PDAs, notebooks, tablets, *etc.*) and the increasing speed and bandwidth of wireless communications. The proliferation of wireless communication technologies has allowed social networking to reach its peak of popularity. Anybody can communicate, share stories, check their friend's status, and expand their social network without boundaries at any time, and anywhere.

This paper presents architecture of an Elgg based social networking application development. The concepts of software development processes were discussed and integrated in order to optimize the features of Elgg open source social networking

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framework to develop a social networking application. It can allow the application users to share, collaborate, and discuss topics with shared interests. The users can also extend their network with other communities.

The rest of this paper is organized as follows: Section 2 explains the concepts of software development frameworks; Section 3 outlines the features of Elgg social networking framework; the architecture for the development of an Elgg based social networking application is outlined in Section 4; and the concluding remarks in Section 5.

2. Software Frameworks

Software development includes all processes from the formulation of a software concept until the delivery of the desired software in a planned and structured way [1]. It includes the process of concept formulation, specification of requirements, comprehending, designing, prototyping, programming, documenting, testing, bug fixing, delivery, and maintenance of software applications, frameworks, and software components. A software development is undergone with a series of stages known as software development methodology (*i.e.*, model or life cycle) being utilized in order to plan, manage, and structure the development of software applications [2].

In software development, the developers often utilize an abstraction of a specific software that can provide its basic functionalities and to which they can selectively modify or customize (*i.e.*, by changing user-written codes) in order to fit their desired specifications. This software abstraction sometimes refers to as a software framework that can provide a standard for building specific software applications. It is considered as a universal and reusable software environment that bring together the components of an application-specific software. It contains a complete package ranging from compilers, code libraries, tool sets, application programming interfaces (APIs), support programs, and security modules that allows for the development of software system [3].

The features of software frameworks include [4]:

- Inversion of control. The software framework dictates the flow of control of the overall program.
- Extensibility. The specific functionalities can be selected by the software developer, thus, extending the capabilities of a software framework.
- Non-modifiable framework code. The software framework can be extended but its code cannot be modified.

In the development of social networking applications with a wider scope of functionalities, open source social networking frameworks or development platforms are available. The following has been listed as among the popular frameworks with pre-defined tools for customizing an efficient social networking website.

- Oxwall. It has a flexible content management system (CMS) that uses PHP and MySQL environment. It includes plugins for customizing the functionalities of a social networking website which could include photo and video sharing, blogging, messaging, and many more [5].
- Elgg. It has been considered as the best social networking engine in the last 10 years which features user management, data modeling, activity streams, powerful API, and access controls. It operates using the LAMP (Linux, Apache, MySQL, PHP) environments [6].
- XOOPS. It has a web content management system used for small to big community social networking sites. It also runs on the LAMP (Linux, Apache, MySQL, PHP)

environments [7]. It includes features such as pictures, friends, mp3 tracks, walls for posting, YouTube, *etc.*

- SocialEngine. It is a social networking software platform in developing personal social networks and social media websites. The features are likened to that of popular existing social media sites such as Twitter, Facebook, and LinkedIn. It allows customization that enables software developers maintain the user's demands [8].
- BuddyPress. It is an open source social media service software that enable developers to build a social networking website with the use of WordPress. The CMS includes features such as user profiles, connecting with friends, a place for discussion, private messaging and many more [9].



Figure 1. Social Networking Frameworks

3. The Elgg Social Networking Framework

The Elgg social networking framework is an open source platform for the development of social networking websites. The components needed for creating an online social networking environment can be provided by this framework and is considered as the first that brought the features of commercial social networking platforms to online education or e-learning [6, 10]. It offers a numerous number of features such as file sharing, blogging and microblogging, networking with groups or communities, *etc.*

Elgg Data Model

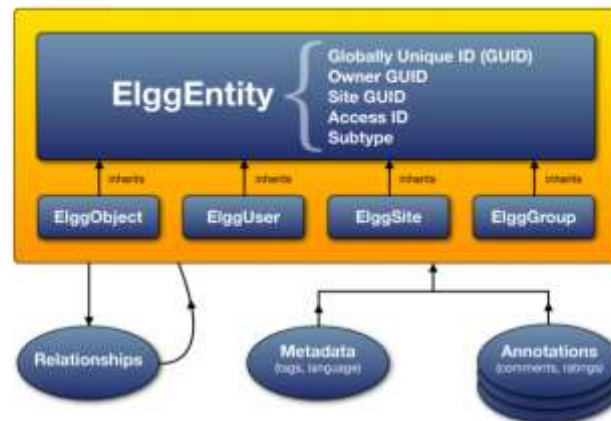


Figure 2. The Elgg Data Model [6]

Elgg was founded by Ben Werdmuller and Dave Tosh in 2004 through their written informal papers. It is free to download and use under the licenses of GNU General Public License (GPL) and Massachusetts Institute of Technology (MIT) License.

The users of Elgg based applications can be provided with an online profile and an RSS reader, file repository, and they can have their own weblog. The users can also easily expand its network with other users sharing the same interests through keyword tags on the user's contents. However, the user contents can also be restricted from fully public to limited view by specific individuals, groups, or communities [10].

4. Case Study of a Social Networking Application Development

The proliferation of social networking sites (SNSs) have become a mainstream medium for millions of people around the world to exchange information, share pictures and videos, use blogs, and private messaging to communicate. People with similar interests (*e.g.*, hobbies, religion, political affiliations, *etc.*) can create small communities or even with the world at large. Even the gaming industry, educational industry, or commercial industries have incorporated social networking to their websites in order to enhance the effectiveness of their information dissemination campaigns. By providing the users with their own personal profiles, and allowing them to use blogs, e-mail, chat rooms or instant messaging, they are able to communicate within their own groups, community, and even globally.

The social networking websites are normally free for use which allows the rising of awareness for individuals, organizations, and enterprises which is much faster than any other form of communication media. The SNSs functions similar to an online community of Internet users.

4.1. SNS Application Functionalities/Features

The Elgg framework architecture for a social networking site can provide necessary functionalities allowing its members and other users to share, collaborate, and discuss topics of the same interest. The following functionalities can be included:

- **Blogging.** A member of the social networking site is allowed to post comments or publication of a description of events or news in an orderly manner.
- **Social Networking.** Groups among common friends or with common interests are allowed all throughout the world. The group is capable of gathering and share first-hand information and experiences about any number of topics, developing friendship, or to start professional relationships.
- **File Repositories for Individuals and Communities.** The file repository allows users to upload supported kinds of files. It can support multiple file formats, file versioning, file metadata capabilities, and threaded comments that discuss the contents of files making tacit knowledge available to all users. The uploaded files are filtered by tags and restrict access so that they're only visible for the people the user want to be. Comments can be attached for each uploaded file. The different uses of a file repository includes:
 - **Photo gallery.** When a user uploads photographs or other pictures, they are automatically collated into a photo gallery that can be browsed through. Users can also see pictures that their friends have uploaded, or see pictures attached to a group. Clicking into an individual file shows a larger version of the photo.
 - **Podcasting.** The file repository RSS feed automatically doubles as an RSS feed, so you can subscribe to new audio content using programs like iTunes. Using the zaudio plugin, MP3 audio files are also directly playable in the page
 - **Special Content.** It is possible for other plugins to add to the players available for different content types. It's possible for a plugin author to embed a viewer for Word documents, for example.
- **Podcast Support.** Support for broadcasting digital audios or videos in series or episodes are also available. A member can subscribe to new audio content using programs like iTunes through RSS feed. Using the zaudio plugin, MP3 audio files are also directly playable in the page.
- **Full Access Controls.** The users are grated with full access controls on messaging allowing them to freely collaborate with others for document creations (*i.e.*, both for reading and writing).
- **Supports Tagging.** The use of tags is recommended in order to make it easier to find shared contents such as pictures or videos.
- **User Profiles.** A member could customize his own profile provided with Avatars and CSS scripts which provides information about a user. The users are capable of choosing which other users can see the individual element of its profile since each profile field has its own access restriction. Some of the fields contain tags (for example skills); limiting access to a field will also limit who can find a particular user by that tag.

An SNS member or a group is represented by an avatar throughout the site [6]. It includes a context sensitive menu allowing other users to perform specific actions on the avatar of another user. For example, you can add them as a friend; send a private message, and more.

- Full RSS Support. The RSS is considered as a family of web feed formats and is commonly known as "Really Simple Syndication" or "Rich Site Summary". It is used to publish frequently updated works in a standardized format (*e.g.*, blog entries, news headlines, audio, and video) [11]. An RSS document is also known as a feed, web feed, or channel which includes a summarized or summarized text with metadata (*e.g.*, authorship, publishing dates, *etc.*). It lets the publishers syndicate automatically the contents. The web feeds are also aggregated into a single place allowing readers to have timely updates from favored websites.
- RSS Aggregator. It allows RSS feeds to be read.
- Create Communities. A member of the SNS can search for thousands of social communities that they can join with. They can use standard searching and they can join as many communities as they like.
- Collaborative Community Blogs/Message Board. This is an area for collaboration among groups and users to create set of documents and participate in writing process among other groups or network community. Other users can then post messages that will appear on the message board wherein they can directly reply to any message and view the history between them and the person posting the message.
- Create "Friends" Network. Once a user has found other members with similar interests - or perhaps as part of a research groups or a course/class - they may want to have a more structured setting to share content and discuss ideas.
 - An SNS member can create and moderate as many groups as they like.
 - An SNS member can limit the group activity into private or they change it to public option for a wider audience.
 - It is easy to follow group developments since each group produces granular RSS feeds.
 - Each group has its own URL and profile, file repository, forum, pages, and message board.
- Import Content. The users are allowed to import contents of their profiles from other sites which is considered an additional feature of a Social Networking Web application.
- Publish to Blog. The users are allowed to publish blogs; however, there could be restrictions from the Webmaster.
- Multilingual. The SNSs allows "translation" with multiple languages.
- Branding/Customization. The branding and customization of user profiles can be allowed that needs CSS and HTML codes.
- OpenID Support. OpenID is used access control in order to allow users to login with different services using the same digital identity. It is a decentralized standard for authenticating the SNS users.
- Messages. Private messaging can be sent to users through clicking on their profile link or avatar as long as they have the user's permission. Through the TinyMCE editor, message formatting becomes possible. Each user has their

own inbox and sentbox. Notification of incoming messages through e-mail is also possible.

4.2. SNS Application Uses and Applications

The following are the common uses and applications of a social networking site web application:

- Social Networking. The SNS web application functions as an online community of Internet users. The online community members share a common interest such as hobbies, religion, or politics. The socialization among members may include reading the profile pages of other members and possibly even communicating with them.
- Forum. Message board, instant messaging, online discussion. It allows users to participate on online discussions upon selected topics to cultivate social bonds and interest groups.
- Blogs. Entry of commentaries or descriptions of events or news or publication of personal diaries. Blogs could be textual or in the form of art, photographs, sketches, videos, music or audio.
- Messages. Private messaging among members.

4.3. SNS Web Architecture

The SNS Web application architecture is outline in Figure 3. It becomes an intermediary among individuals and organizations in establishing relationships with one another in order to build a professional and social network. It includes features that allow individuals to interact with each other, thus, creating an online informal community enabling them to exchange information, share pictures and videos, send private messages, and even discuss a common interest.

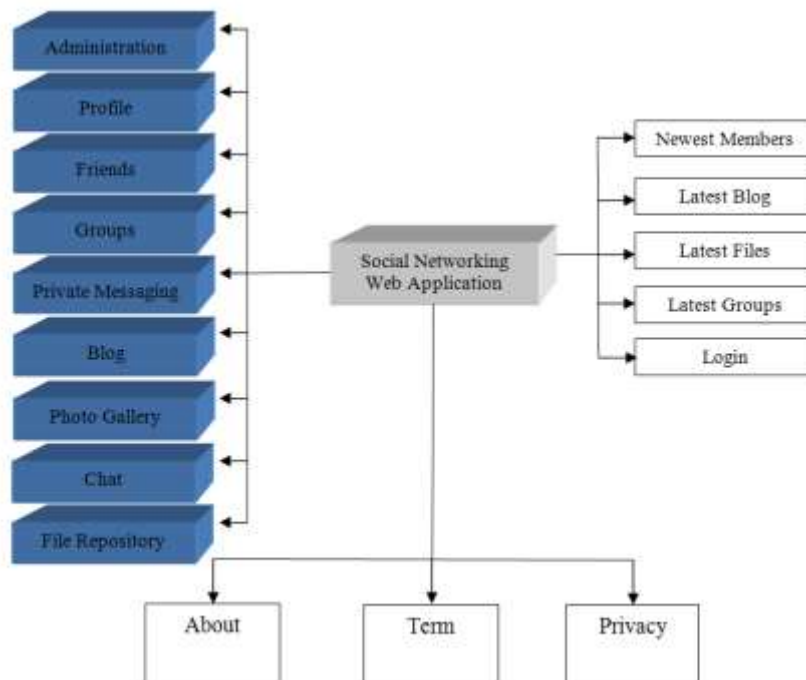


Figure 3. The Social Networking Web Architecture

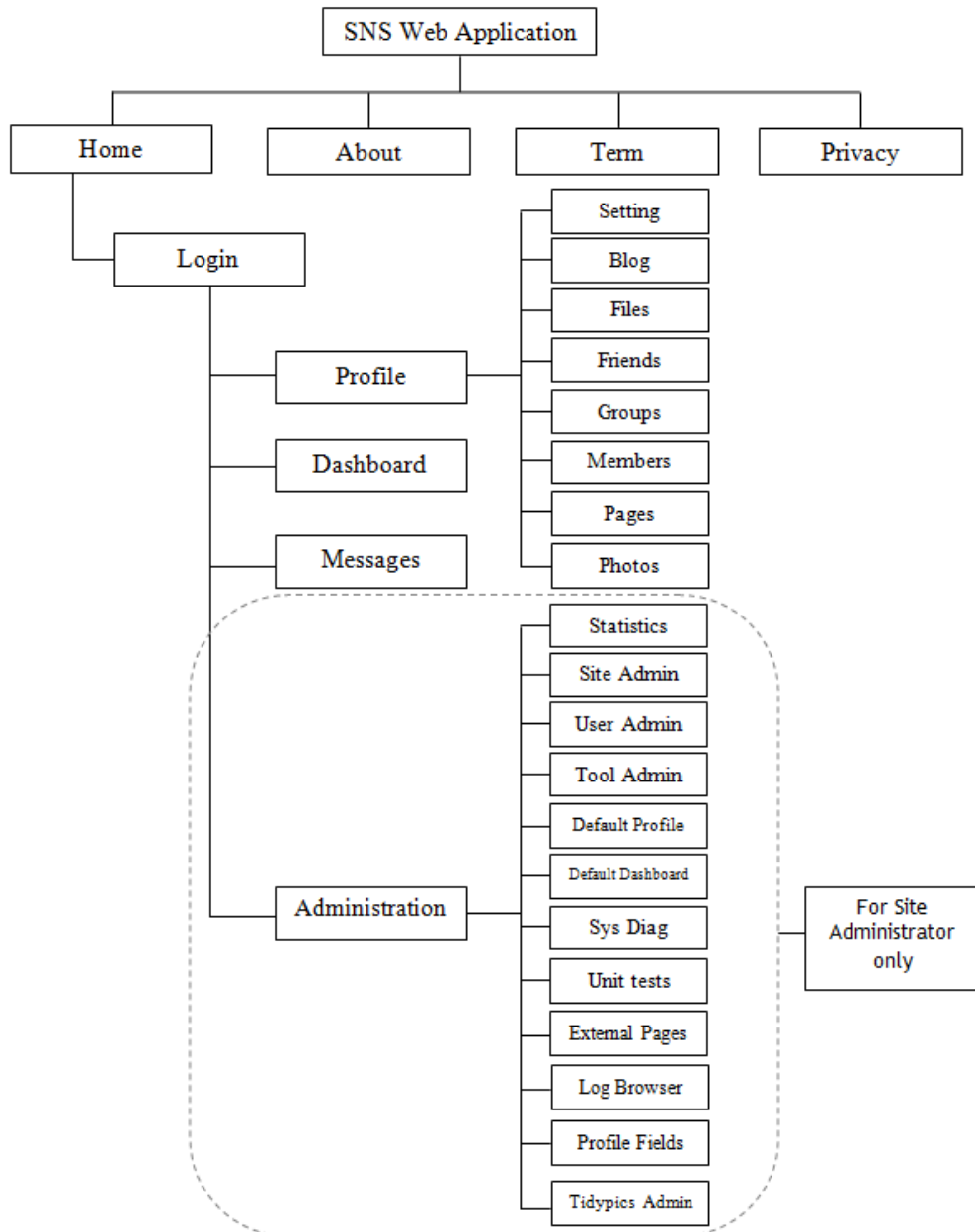


Figure 4. The Social Networking Decomposition Chart

The SNS has become a mainstream and an established communication platform. In the last few years have seen social media propel itself as a platform to market services, deploy public relations campaigns, for individuals to promote themselves and moreover it became one of the best places to find a job. SNS provides the ideal platform for workers to communicate, share information and discuss real issues affecting the business. Business management can also use these platforms to in order create healthy staff communities, provide interactive company news and bring together the resources from former colleagues. The SNS have been very useful for organizations, businesses, schools and religious groups, political campaigns, and many more.

4.4. Security

4.4.1. Password Security

The SNS web application security is based on the implemented security measures of the Elgg social networking framework [12].

- Password validation. Passwords need to be at least 6 characters in length.
- Password salting. The Elgg social networking framework salts passwords using a unique random string of 8 characters. Each time the password is set, Elgg generates the salt. Salting prevents attackers from accessing the SNS database.
- Password hashing. The hashed password is computed using md5 from the user's password text and the salt.
- Password storage. The users table stores the hashed password and the salt.
- Throttling. Throttling prevents dictionary attacks from the outside. For example, 5 login attempts are only allowed for a user in a 5-minute period.
- https login. Login over SSL is also provided.
- Password Resetting. A new random password can be requested by the user whenever he forgets his password. An e-mail can be received by the user with the new random password.

4.4.1. Session Security

The PHP's session handling is used with the custom handlers. The session data is stored in the SNS database while the session cookie contains the session ID that links the user to the browser. Sessions automatically end whenever a browser has been closed.

- Session Fixation. Regeneration of the session id when a user logs in is provided to protect against session fixation.
- Session Hijacking. Elgg includes a further check in order to prevent session hijacking whenever a session identifier has been compromised.
- Remember me Cookie. A super session identifier contained in a cookie can allow a user to stay logged in for a longer period of time.
- Secure Forms. A unique private token is generated with each session and stored in the session data.
- On your Form.
- In your Action.
- URL Links to Action.
- Filtering. Filtering is used to make XSS attacks more difficult.

4. Conclusions

This paper presents Elgg based architecture for a social networking web application. Elgg is considered as a powerful social networking framework that could provide software developers with an open source engine for the development of social networking web applications. It has offered a complete package of social networking tools such as blogging, file sharing (pictures and videos), messaging,

user profiles, podcasting, forums, and many more. It also comes with security packages in order to ensure authentication, validation, and other security measures.

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