THIRD EYE

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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CITY UNIVERSITY
DHAKA, BANGLADESH
SEPTERMBER 2017

CERTIFICATION

This is to certify that the work presented in this project entitled **Third Eye** is the outcome of the work done by **Md. Rubel Hosen** under the supervision **Sadia Jahan**, Lecturer, Department of Computer Science and Engineering, City University during 20th May 2017 to 23rd September 2017. It is also declared that neither this project/report nor any part of it has been submitted or is being currently submitted anywhere else for the award of any degree or diploma.

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Signature: ………………………

Date: ……………………………

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DECLARATION

I hereby declare that project titled **THIRD EYE** is an original record done by me at **CITY UNIVERSITY** affiliated to the partial fulfillment of requirement for the award of degree of Bachelor of Computer Science and Engineering during the period of 2013-2017 in CITY UNIVERSITY and I also state that this project has not been submitted anywhere in the partial fulfillment for any degree of this or any other University.

Signature: ………………………

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ABSTRACT

This paper presents the developing process and outcomes of a web browser named “Third Eye”. The main function of a browser is to present the web resource, by requesting it from the server and displaying it in the browser window. The resource is usually an HTML document, but may also be a PDF, image, or some other type of content. The location of the resource is specified by the user using a URI (Uniform Resource Identifier).

The way the browser interprets and displays HTML files is specified in the HTML and CSS specifications. These specifications are maintained by the W3C (World Wide Web Consortium) organization, which is the standards organization for the web. For years, browsers conformed to only a part of the specifications and developed their own extensions. That caused serious compatibility issues for web authors. Today most of the browsers more or less conform to the specifications.

Browser user interfaces have a lot in common with each other. Among the common user interface elements are:

- Address bar for inserting a URI
- Back and forward buttons
- Bookmarking options
- Refresh and stop buttons for refreshing or stopping the loading of current documents
- Home button that takes user to his home page

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Chapter 1

Introduction

1.1 Project/Thesis Title

Third Eye

1.2 Introduction

This is the era of modern science & technology. Things are better now, smarter than before. Jobs can be done easily through a computer inside our home, do not need to go outside, do not need to panic. All we need is a computer and of course an active internet connection. Almost every task can be accomplished with the help of the internet. For example, teaching, learning, shopping, paying and lots more can be done with the help of the internet. Not only for works, internet can help us to entertain as well. We can enjoy music, watch video, play games, and share our words with our friends through internet. It has become a part of our life. To access internet we must have a web browser. This is where my project comes to life. Without a browser, it is not possible to access any information about anything.

A web browser (typically known as browser) is a software application, which enables a user to display and interact with text, images, videos, music, and other information that could be on a website. Text and images on a web page can contain hyperlinks to other web pages at the same or different website. Web browsers allow a user too quickly and easily access information provided on many web pages at many websites by traversing these links. Web browsers format HTML information for display so the appearance of a web page many differ between browsers.

Web browser uses search engine to retrieve information. Three are couple of search engine like Google, YouTube, Bing, and Yahoo. However, google is the most used search engine in the world. A user can type web address in the address bar and can be directed to that website. If the user does not know where the content can be found that he is looking for he may type the keywords and search for those, search engine will return him relative information.

1.3 Problem Statement

There are so many web browsers. According to Wikipedia, WolrdWideWeb is the first web browser, which was developed by Tim Berners-Lee in 1990 and was introduced in March 1991. In 1991 after the release of WorldWideWeb, Nicola Pellow developed the first cross-platform web browser, Line Mode Browser, which is credited for making the internet accessible to consumers for the first time. In 1992, Tony Johnson released the MidasWWW browser. Based on Motif/X, MidasWWW allowed viewing of PostScript files on the Web from UNIX and VMS, and even handled compressed

PostScript. But these were primary level browsers. In 1994, Netscape was developed and in two years, it had 86% market share. However, as Microsoft interacted Internet Explorer with their operating system and Netscape was not supported any more it dropped down to 10% and Internet Explorer reached 75% of the market share. Later on very powerful web browsers have been created. For example, Chrome, Mozilla Firefox, Opera, Safari etc. Chrome is the most used web browser now with the market share of 62.09%.

Having this much browsers yet the users are not fully satisfied. They still lack some features like any of the browser does not have built in download manager. Users cannot download video neither audio from YouTube. Though it is against you tube's privacy policy but still users download third party software do download from YouTube. There are no custom log in system in the web browsers. If a web browser can come out with all these features, it would be great. And, I am taking that initiative.

1.4 Project Scope

In software development world, before we develop any application we take serious measures to define our objectives. We always ensure that our application has something new, especially when we are developing an existing application. We try providing something new that will help the users of the application, something that will meet their requirements. My browser will have some additional information that existing browsers does not provide.

1.5 Project Objective

After projecting for a certain time, I have found out some new requirements which the users of the web browser will love to have. My objectives is to build a browser with along with the following features:

- To create a browser that will be lightweight with fast data processing
- To create a browser that will have built in download manager
- To create a browser that will have built in YouTube video downloader
- To create a browser that will be able to download audio from YouTube
- To create a browser that will have password protected login system for better security

1.5.1 Target User

The users of the software includes scientists, teachers, students, doctors, engineers, businessperson, employees, general people and many more. Every people that surfs internet for work, entertainment or social communication will be found this software useful. The software will help every kind of people to navigate to their desired website and will help to find information they will be looking for.

1.5.2 Technology

The toolset I have used to build this software are as follows:

Language	:	C#
Frameworks	:	.NET, Cefsharp, Bunifu .NET UI
Libraries	:	YouTube Extractor
ID	:	Microsoft Visual Studio

1.6 Project schedule

Year	2017				
Task\Month	May	Jun	Jul	Aug	Sep
Project Planning	▨				
Project Analysis	▨	▨			
Documentation				▨	▨
Initial Prototype		▨			
Project Progress Presentation				▨	▨
System Design		▨	▨		
System Implementation		▨	▨	▨	
Testing					▨

Figure 1.1: Development Schedule of the Browser

1.7 Expected outcome/Benefits of the project

This project will bring some extra features to web browser that will minimize the use of third party software that users currently use beside the regular browsers now like IDM, YTD. This project will also strengthen the security as I am providing password based login system. In case the user forgets the password, it will be directly mailed to users email address.

1.8 Project Background

This project has been done in order to add some must have features that present browser should come with. To give some extra options for which users install third party software and interact them with the browser. The features added in this browser surely will decrease the use of third party software and will satisfy the users with newly added options.

The features added in this browser are built in *Download Manager*, *YouTube Video Downloader*, *YouTube Audio Downloader* and password based login system. Thus, user will not need to install a third party download manager to download file from internet. Using *YouTube Video Downloader* user will be able to download video from YouTube in 360p, 480p and 720p. Using *YouTube Audio Downloader* user will be able to download audio version of any YouTube video in mp3 format. This entire three download manager comes with a context menu using that user will be able to open the downloaded file when downloading progress completed. User also will be able to open file location of the downloaded file. User will be able to cancel download and remove the file from download history. The most exciting feature is password based login system. Meaning, user can use a password to use the browser if the user wishes.

Chapter 2

Literature Review

2.1 Purpose of Literature Review

When conducting project, a literature review is an essential part of the project because it covers all previous project done on the topic and sets the platform on which the current project is based. No new project can be taken seriously without first reviewing the previous project done on the topic.

2.2 A Literature Review of Browsers

An internet browser, also known as a web browser or simply a browser, is a software program that we use to access the internet and view web pages on our computer. We can think of our browser as our gateway to the internet. If we want to enter online sweepstakes, for example, we must first open the giveaways' websites in your internet browser.

Web browsers come in many different styles, each with their own nuances. However, the main purpose of a web browser is to translate, or render, the code that websites are designed in into the text, graphics, and other features of the web pages that we are all used to seeing today.

2.2.1 Introduction

To preview the aspects of a browser, first we have to know what kinds of browsers exist in the market. What are the main features the came with, what are the impact of those browser on the market and how much satisfied the users of those browser.

2.2.2 The First Web Browser

The first web browser was called WorldWideWeb, and later changed its name to Nexus. Created by Sir Tim Berners-Lee, it was released in 1990, and at least gave people a basic way to view web pages. But it was a long way from the immersive online experience we have today.

Without browsers, the internet as we know it today would be impossible. Before the first popular graphical browser, Mosaic, was released in 1992, the internet was text-based, bland, and required technical knowledge to use. Because of this, the number of people who had the ability and the interest to use the internet was limited.

Mosaic helped make the internet ubiquitous. The graphical interface made navigating the web easy to understand and the ability to display graphics next to the text on websites made web pages more interesting to browse. In addition, people no longer needed to have deep technical knowledge to be able to go online.

With more people online, companies were quick to follow. E-commerce, online sweepstakes, social media, and many other things we take for granted today would be impossible without internet browsers.

2.2.3 Modern Web Browsers

Internet browsers have developed into powerful tools that let you safely and quickly access your favorite websites. Most browsers are available for free download. The six most popular internet browsers today include:

- Mozilla Firefox
- Google Chrome
- Internet Explorer
- Safari
- Microsoft Edge
- Opera

2.2.3 Market Share

The three most popular desktop browsers, according to Net Market share, is Chrome, followed by Microsoft Internet Explorer and Firefox. Other major browsers include Apple, Safari and Opera. While most commonly use to access information on the web, a browser can also be used to access information hosted on Web servers in private networks.

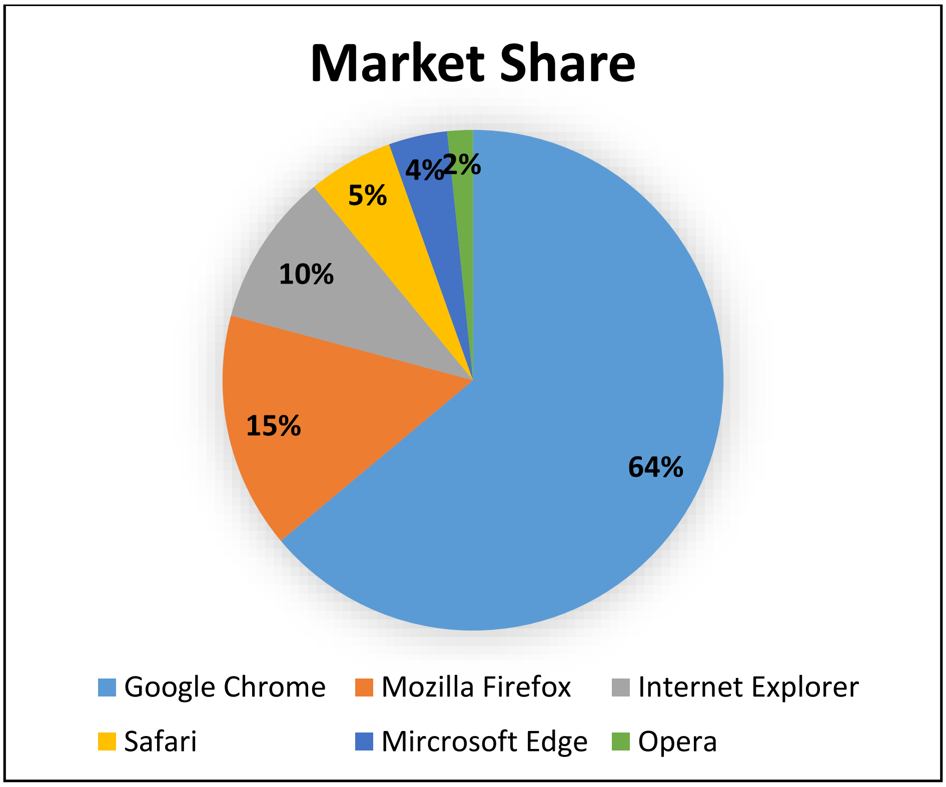


Figure 2.1: Market Share of the Browsers

2.3 How A Browser Retrieves A Web Page

The browser application retrieves or fetches code, usually written in HTML (Hypertext Markup Language) and/or another language, from a webserver, interprets this code, and renders (displays) it as a Web page for you to view. In the majority of cases, user interaction is needed to tell the browser what website or specific Web page he or she would like to view. One way this is done is via the browser's address bar.

The web address, or URL (Uniform Resource Locator), that we type into the address bar tells the browser where to obtain a page or pages. For example, let us say that we typed the following URL into the address bar: http://about.com/compute/. In this case, we are attempting to reach the How To section of Lifewire.com. The browser looks at this particular URL in two main sections.

The first is the protocol, which in the address shown is "http://". HTTP, which stands for Hypertext Transfer Protocol, is the standard protocol used to request and transmit files on the Internet, mostly Web pages and their respective components. Since the browser now knows that the protocol is HTTP, it knows how to interpret everything located to the right of the forward slashes.

It now looks at "lifewire.com", which tells the browser the location of the Web server it needs to retrieve the page or pages from. Many browsers no longer require that the protocol be specified when accessing a Web page. Next, once it reaches this Web server, it retrieves the index page of the "/compute" directory. Once the browser retrieves this page, it is interpreted and rendered in the browser's main window for you to view.

2.4 Importance of Web Browser in Our Daily Life

The importance of web browser cannot be described in words. Every now and then, we are using web browser. It will not be possible for us to lead a single day without using web browser. Some uses of web browser are as follows:

- Scientists use web browser to gather information about their project
- Teachers use web browser to prepare their lecture
- Students use web browser for their project and study
- Businessmen use web browser to operate their operations online
- Bankers use web browser to make online transaction
- People use web browser for online shopping
- People use web browser to listen music, watch video
- People use web browser to communicate with their family and friends
- People use web browser to transfer data online

2.5 Difference between Chrome, Firefox and Third Eye

Topic	Chrome	Firefox	Third Eye
Basic features	Chrome comes with all the basic features a browser should have like add new tab, close tab, and reload.	Firefox also contains these features.	Third Eye have all the basic features that an advance browser should come with.
Build in Download Manager	Chrome doesn't come with built in download manager	Neither Firefox comes with built in download manager	Third Eye Have download manager feature.
YouTube Video Downloader	Chrome does not have YouTube video downloader.	Firefox doesn't have this feature	Third Eye comes with YouTube video downloader.
YouTube Audio Downloader	User cannot download audio from YouTube.	Firefox doesn't contains this feature	Third Eye provides an option to download video from YouTube.
Password Based Login System	No such option available in chrome.	Firefox does not provide this feature.	User can set a password to log in Third Eye
Extension	Chrome have a web store from where user can download various extension.	Firefox have a similar option, which is called add on using that user can download various extension.	No such feature is available in Third Eye.

Chapter 3

Methodology

3.1 Introduction

Developing systems requires a smart management that keeps the development away for falling apart. Without an efficient procedural, way it will waste both money and labor. To bring my project into life I will follow several methodologies to ensure organized game development.

3.1.1 Browser Architecture

The browser's main components are:

1. **The user interface**: this includes the address bar, back/forward button, bookmarking menu, etc. Every part of the browser display except the window where you see the requested page.

2. **The browser engine**: marshals actions between the UI and the rendering engine.

3. **The rendering engine:** responsible for displaying requested content. For example if the requested content is HTML, the rendering engine parses HTML and CSS, and displays the parsed content on the screen.

4. **Networking**: for network calls such as HTTP requests, using different implementations for different platform behind a platform-independent interface.

5. **UI backend**: used for drawing basic widgets like combo boxes and windows. This backend exposes a generic interface that is not platform specific. Underneath it uses operating system user interface methods.

6. **JavaScript interpreter**. Used to parse and execute JavaScript code.

7. **Data storage**. This is a persistence layer. The browser may need to save all sorts of data locally, such as cookies. Browsers also support storage mechanisms such as localStorage, IndexedDB, WebSQL and FileSystem.

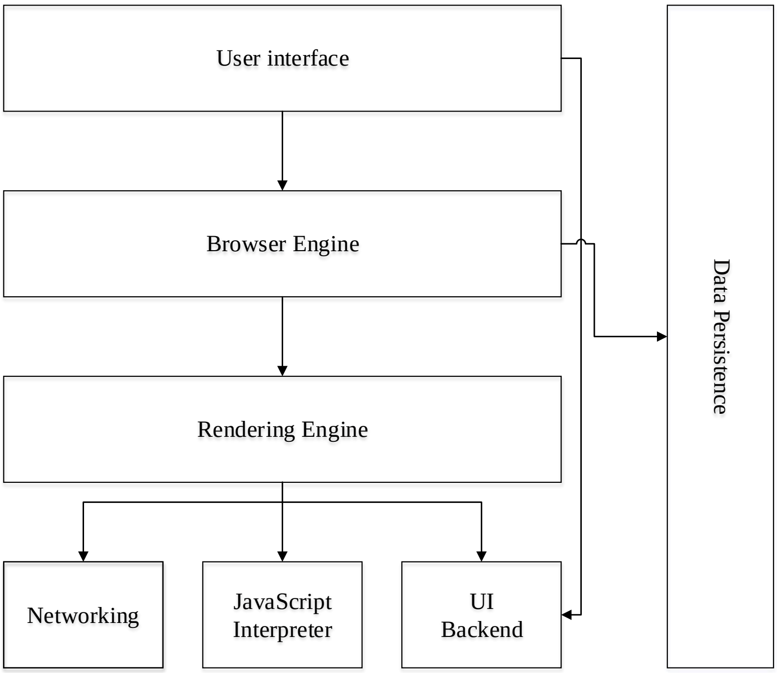


Figure: 3.1 Browser Architecture

3.2 Data Collection and Retrieval

As I am building this project from scratch without any prior knowledge or experience on the mechanism of web browser, I have collected a huge amount of data from internet. YouTube and Stack overflow are two resources that really helped me to gather the information I needed to build this application.

3.3 System Development Models

Systems development is the process of defining, designing, testing, and implementing a new software application or program. It could include the internal development of customized systems. There are six types of model used to demonstrate the software development life cycle. Those are waterfall model, V-Shaped model, Iterative model, spiral model, big bang model and agile model. I choose waterfall model to implement my project.

3.3.1 Waterfall Models

As this process is sequential, once a step has been completed, developers cannot go back to a previous step – not without scratching the whole project and starting from the beginning. There’s no room for change or error, so a project outcome and an extensive plan must be set in the beginning and then followed carefully. To complete the project in time we use this model to progress.

3.4 Phases in Methodology

Phases in methodology determine the specific stage or period of the development process. Waterfall model divided into seven phase which are illustrated as follows.

3.4.1 Phase 1: Planning & Problem Definition

To make a web browser I have to consider what elements will be present in the application. Before dive into large designing, I projected what will be the main component of my browser like back, forward, home, reload or bookmark button. Moreover, I tried to figure out as much problem as possible in this phase. I also finished my sketch up model on paper for my project in this phase.

3.4.2 Phase 2: Problem Analysis

Problem analysis involves identifying the overriding problem and establishing the causes and effects related to that problem. A key element of this analysis will ensure that "root causes," not just the symptoms of the problem, are identified and subsequently addressed in the project design. Projects that only address the effects of the problem, and not its underlying causes, are unlikely to produce sustainable benefits. One important tool for identifying our project's overriding problem and its root causes is the "problem tree."

In this phase, I have analyzed the problem set that I had earlier. I made a problem tree based on those problems. I planned how I am going to solve this problem and I have fixed the initiatives that I am going to take to implement those problems into an accepted solution.

3.4.3 Phase 3: Documentation

In this phase, I documented my development phase in order to keep record of our progress. It is essential for a software engineers to keep documentation of current progress that will help to make changes in the future and will keep the workflow solid.

3.4.4 Phase 4: Framework Definition

As I have used Cefsharp Framework to develop my application, I took a step back and give it some time to get used to and understand the basic of Cefsharp Framework. I have also used some other framework like .NET framework, YouTube Extractor and Bunifu .NET UI Framework. Therefore, it took me some time to get started. I have installed this framework from NuGet (Microsoft Visual Studio Package Gallery) as I used Microsoft Visual Studio for writing code.

3.4.5 Phase 5: System Design and Architecture Specification

This is the most crucial part because if I fail to manage an effective design architecture for my project then all the hard work that I have done up to now will go in vain. To make and efficient design we have to project a lot. Despite our limitation of time and people, I will do my best to make the design as user friendly as possible.

3.4.6 Phase 6: Implementation

Implementation is the phase where I put all the different pieces together. I had to be extra careful in this part to avoid as much mistakes as possible.

3.4.7 Phase 7: Testing

Finally, I ask our friends, family and teacher to perform the role quality assurance taster of my application and to give us the valuable feedback. Testing is necessary because developing a system for a long time some time ignore some error where a fresh eye is always helpful.

Chapter 4

System Analysis

4.1 Introduction

Systems analysis is a problem-solving method that involves looking at the wider system, breaking apart the parts and figuring out how it works in order to achieve a particular goal. This is the process of observing systems for troubleshooting or development purposes. It is applied to information technology, where computer-based systems require defined analysis according to their makeup and design.

4.1.1 How Browser Works

First, the browser has to find the IP address of the web server. It asks the Operating System (OS) to translate the server name. The OS uses its local cache or the DNS server if the address it's not known yet.

After finding the IP address, the browser sends an HTTP request to the server requesting the appropriate file (web page). If no file was specified, the server responds with the "default file" (index.html, index.php, index.asp or any other that is configured in the web server). For regular web browsing, the file will be a text file formatted in HTML. However, it may be any kind of file.

After getting the requested file, the browser has two things to do: interpret and render the HTML page, and obtain the remaining objects (images, flash files, JavaScript files, cuss files, audio, video, etc.) and interpret and display them.
Some browsers will begin to interpret and render the HTML file immediately and request the objects in parallel, filling in the objects as they are received. Others will wait to receive all objects and, just then, will render and display the HTML file.

4.1.2 Rendering Engine

The responsibility of the rendering engine is rendering, that is display of the requested contents on the browser screen. By default, the rendering engine can display HTML and XML documents and images. It can display other types of data via plug-ins or extension; for example, displaying PDF documents using a PDF viewer plug-in. However, in this chapter we will focus on the main use case: displaying HTML and images that are formatted using CSS.

Different browsers use different rendering engines: Internet Explorer uses Trident, Firefox uses Gecko, and Safari uses WebKit. Chrome and Opera (from version 15) use Blink, a fork of WebKit. WebKit is an open source-rendering engine, which started as an engine for the Linux platform and was modified by Apple to support Mac and Windows.

4.1.3 The Main Flow

The rendering engine will start getting the contents of the requested document from the networking layer. This will usually be done in 8kB chunks. After that, this is the basic flow of the rendering engine:

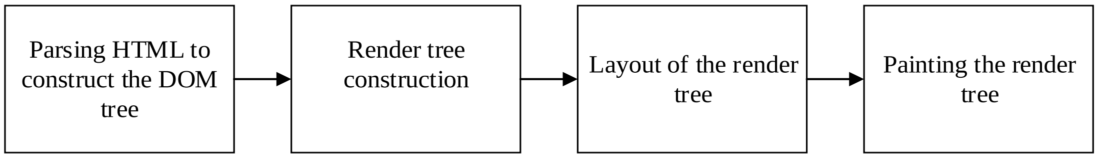

Parsing HTML to construct the DOM tree
Render tree construction
Layout of the render tree
Painting the render tree

Figure 4.1: Rendering Engine Basic Flow

The rendering engine will start parsing the HTML document and convert elements to DOM nodes in a tree called the "content tree". The engine will parse the style data, both in external CSS files and in style elements. Styling information together with visual instructions in the HTML will be used to create another tree the render tree.

The render tree contains rectangles with visual attributes like color and dimensions. The rectangles are in the right order to be displayed on the screen.

After the construction of the render tree, it goes through a "layout" process. This means giving each node the exact coordinates where it should appear on the screen. The next stage is painting–the render tree will be traversed and each node will be painted using the UI backend layer. It is important to understand that this is a gradual process. For better user experience, the rendering engine will try to display contents on the screen as soon as possible. It will not wait until all HTML is parsed before starting to build and layout the render tree. Parts of the content will be parsed and displayed, while the process continues with the rest of the contents that keeps coming from the network.

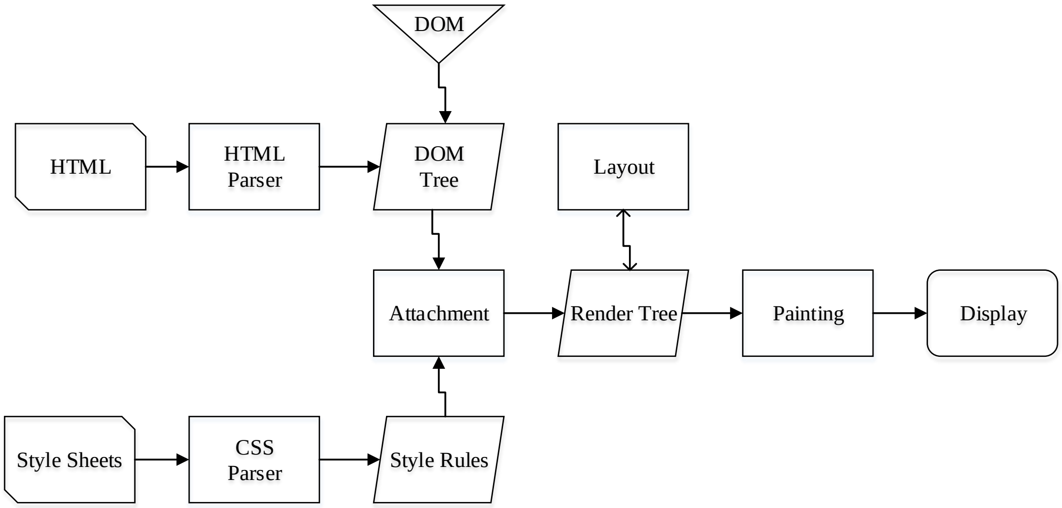


Figure 4.2: Webkit Main Flow

4.1.4 Parsing

Parsing a document means translating it to a structure the code can use. The result of parsing is usually a tree of nodes that represent the structure of the document. This is called a parse tree or a syntax tree.

4.1.5 Grammar

Parsing is based on the syntax rules the document obeys: the language or format it was written in. Every format you can parse must have deterministic grammar consisting of vocabulary and syntax rules. It is called a context free grammar.

4.1.6 Parser Lexer Combination

Parsing can be separated into two sub processes: lexical analysis and syntax analysis. Lexical analysis is the process of breaking the input into tokens. Tokens are the language vocabulary: the collection of valid building blocks. In human language, it will consist of all the words that appear in the dictionary for that language. Syntax analysis is the applying of the language syntax rules. Parsers usually divide the work between two components, the **laxer** (sometimes-called tokenizer) that is responsible for breaking the input into valid tokens, and the **parser** that is responsible for constructing the parse tree by analyzing the document structure according to the language syntax rules. The lexer knows how to strip irrelevant characters like white spaces and line breaks.

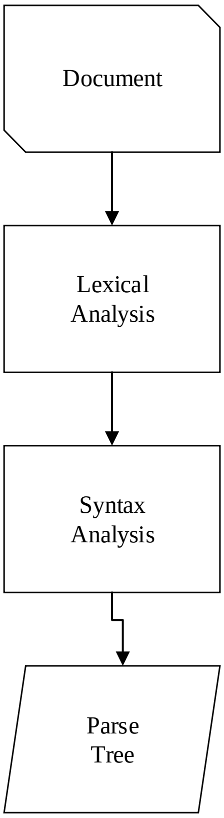


Figure 4.3: Source Document to Parse Trees

The parsing process is iterative. The parser will usually ask the lexer for a new token and try to match the token with one of the syntax rules. If a rule is matched, a node corresponding to the token will be added to the parse tree and the parser will ask for another token.

If no rule matches, the parser will store the token internally, and keep asking for tokens until a rule matching all the internally stored tokens is found. If no rule is found then the parser will raise an exception. This means the document was not valid and contained syntax errors.

4.1.5 Translation

In many cases, the parse tree is not the final product. Parsing is often used in translation: transforming the input document to another format. An example is compilation. The compiler that compiles source code into machine code first parses it into a parse tree and then translates the tree into a machine code document.

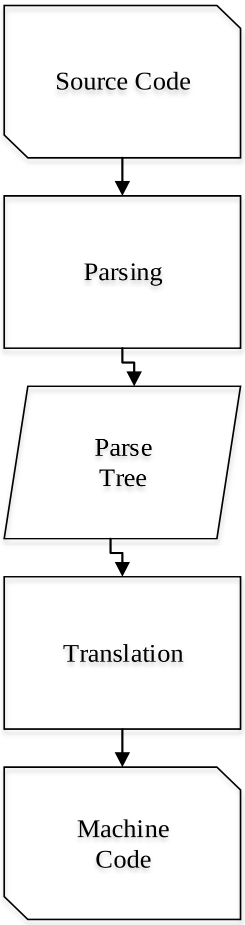


Figure 4.4: Compilation Flow

There are two types of parsers: top down parsers and bottom up parsers. An intuitive explanation is that top down parsers examine the high-level structure of the syntax and try to find a rule match. Bottom up parsers start with the input and gradually transform it into the syntax rules, starting from the low-level rules until high-level rules are met.

There are tools that can generate a parser. We feed them the grammar of our language its vocabulary and syntax rules–and they generate a working parser. Creating a parser requires a deep understanding of parsing and it is not easy to create an optimized parser by hand, so parser generators can be very useful.

4.1.6 Document Object Model

The output tree (the "parse tree") is a tree of DOM element and attribute nodes. DOM is short for Document Object Model. It is the object presentation of the HTML document and the interface of HTML elements to the outside world like JavaScript. The root of the tree is the "Document" object. This markup would be translated to the following DOM tree:

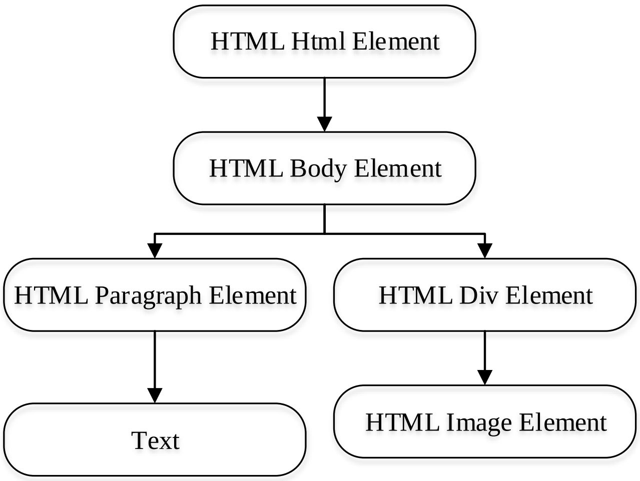
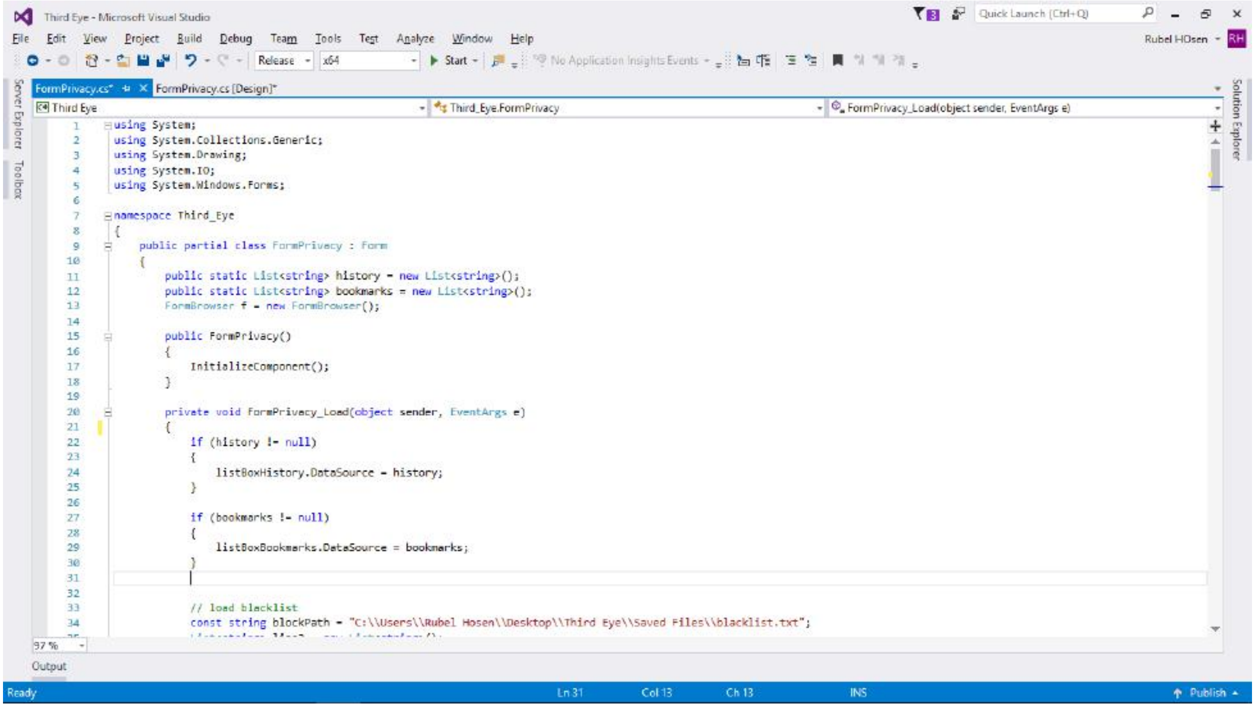


Figure 4.5: DOM Tree of the Example Markup

4.2 IDE for Coding

An integrated development environment (IDE) is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools and a debugger. Most modern IDEs have intelligent code completion.

I have used Visual Studio 2015, community edition for writing, compiling and debugging the code. Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, web sites, web apps, web services and mobile apps. Here is screenshot of the IDE.



```
using System;
using System.Collections.Generic;
using System.Drawing;
using System.IO;
using System.Windows.Forms;

namespace Third_Eye
{
    public partial class FormPrivacy : Form
    {
        public static List<string> history = new List<string>();
        public static List<string> bookmarks = new List<string>();
        FormBrowser f = new FormBrowser();

        public FormPrivacy()
        {
            InitializeComponent();
        }

        private void FormPrivacy_Load(object sender, EventArgs e)
        {
            if (history != null)
            {
                listBoxHistory.DataSource = history;
            }

            if (bookmarks != null)
            {
                listBoxBookmarks.DataSource = bookmarks;
            }


            // load blacklist
            const string blockPath = "C:\\Users\\Rubel Hosen\\Desktop\\Third Eye\\Saved Files\\blacklist.txt";
```

Figure 4.6: Visual Studio 2015

4.2 Functional Requirement for Overall System

- Users will be able to navigate to any website
- User will have an option set a custom homepage
- User will be able surf multiple websites at once using multiple tab
- There will be an option to duplicate a tab
- Users will be able to close a tab if needed
- There will have be an option to reload a page
- Users will be able to stop loading
- Users will be able to save a html page
- Users will be able to download content using the browser
- Users will be able bookmark a site
- User will be able to see previous browsing history
- Users will be able to navigate privately
- There will be options to zoom in or out
- Users will be able to edit text
- Users will be able to block a website
- There will be four different built in search engine options to choose
- Users will be able to use a password base login system
- Users will be able to clear the browsing history

4.4 Non-Functional Requirement for Overall System

A non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. They are contrasted with functional requirements that define specific behavior or functions. The plan for implementing functional requirements is detailed in the system design. The plan for implementing non-functional requirements is detailed in the system architecture, because they are usually Architecturally Significant Requirements.

4.4.1 Usability

Usability is the ease of use and learnability of a human-made object such as a tool or device. In software engineering, usability is the degree to which specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use can use a software.

4.4.2 Response Time

Response time is the total amount of time it takes to respond to a request for service. That service can be anything from a memory fetch, to a disk IO, to a complex database query, or loading a full web page. Ignoring transmission time for a moment, the response time is the sum of the service time and wait time.

4.4.3 Platform

The browser can be run in any 64-bit windows operating system and the user will be able to run it with 1GB Memory.

4.4.4 Maintainability

The ease with which a software system or component can be modified to correct faults, improve performance or other attributes, or adapt to a changed environment."

4.4.5 User Friendly

Refers to anything that makes it easier for novices to use a computer. Menu-driven programs, for example, are considered more *user-friendly* than command-driven systems. Graphical *user* interfaces (GUIs) are also considered *user-friendly*. Online help systems are another feature of *user-friendly* programs.

4.4.6 Interactivity

In computers, interactivity is the dialog that occurs between a human being (and possibly another live creature) and a computer program. (Programs that run without immediate user involvement are not interactive; they are usually called batch or background programs.)

4.4.7 Stability

Stability characterizes the sensitivity to change of a given system that is the negative impact that may be caused by system changes.

4.4.8 Portability

Portability in high-level computer programming is the usability of the same software in different environments. The pre requirement for portability is the generalized abstraction between the application logic and system interfaces.

Chapter 5

System Design

5.1 Introduction

System design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

5.2 User Interface

In information technology, the user interface (UI) is everything designed into an information device with which a person may interact. This can include display screens, keyboards, a mouse and the appearance of a desktop. It is also the way through which a user interacts with an application or a website. The growing dependence of many companies on web applications and mobile applications has led many companies to place increased priority on UI in an effort to improve the user's overall experience.

In early computers, there was very little user interface except for a few buttons at an operator's console. The user interface evolved with the introduction of the command line interface, which first appeared as a nearly blank display screen with a line for user input. Users relied on a keyboard and a set of commands to navigate exchanges of information with the computer. This command line interface led to one in which menus (lists of choices written in text) predominated. Finally, the graphical user interface (GUI) arrived. In my project, I am also using graphical user interface.

User Interface is the features of a computer system, which allows the user to interact with it. My browser provides couple of interfaces to accomplish different tasks. Which are:

- Main Window
- Private Window
- Download Tab page
- Bookmarks Tab page
- History Tab page
- Blacklist Tab page
- Clear Browsing Data Tab page
- Download Manager Window
- YouTube Video Downloader Window
- YouTube Audio Downloader Window
- Options Window
- About Window
- Login Window

5.2.1 Main Window

It is the primary interface of the application. When a user will run the application this window will be opened. From this window user will be able to perform every task that my browser provides. This window contains several button control which are *new tab, close tab, home, back, forward, reload, stop, bookmark, download and menu.* Using *new tab* user will be able to open a new tab, *close tab* will help the user to close a tab. Using *home button* user will be able to navigate to the user specified homepage. I have provided *back* and *forward button* so that user can navigate to backward or forward if it is possible. If no websites has been visited before, the *back button* will not work. Similarly, if there is no next page that is navigated by the user then the *forward button* also will not response. A reload button will help the user to refresh the webpage. On next, a stop button can be used when user wishes to stop the browser from loading. After this, there is a *progress bar, which will not be used by the user rather the browser will use this bar to show if the browser has completed loading a webpage,* or not. If the browser loading a webpage then a green line will run through the *progress bar,* otherwise there will be no green line. There is an *address bar* in the browser that will be used to put some particular address the user wishes to visit or any particular keywords user wishes to search for. After this, a download button opens the download manager. Finally, there is a *menu button* that consists a lot of option and I have discussed them in the later part of the report.

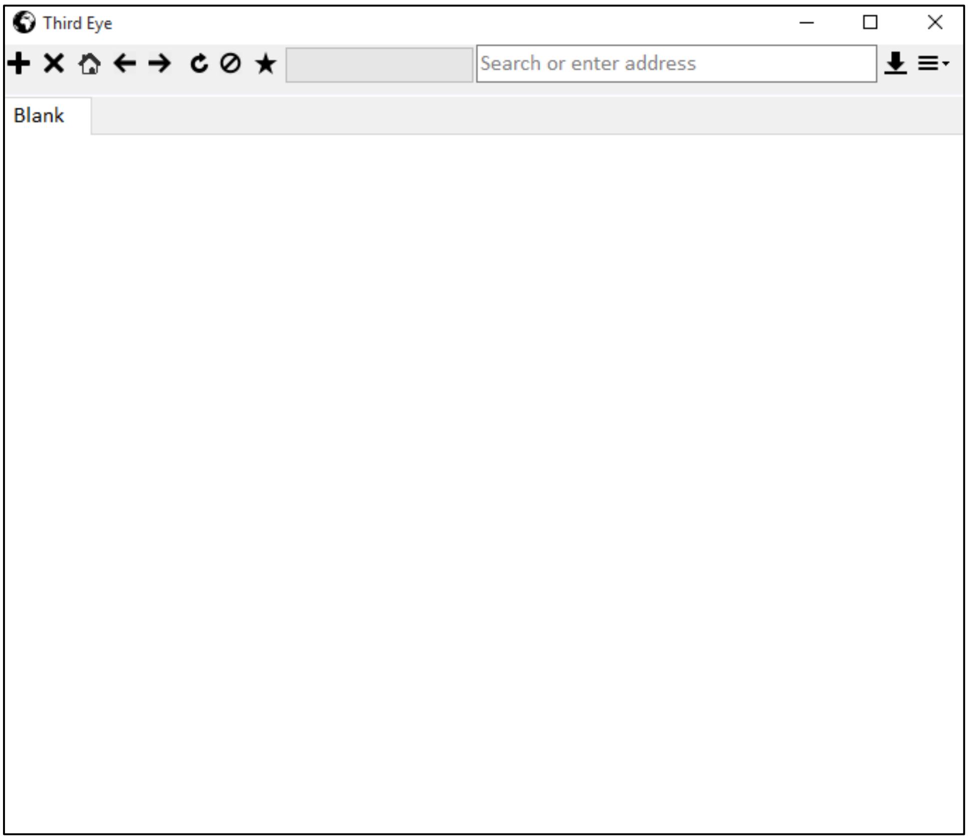


Figure 5.1: Main Window

5.2.2 Private Window

Normally, every website we visit is recorded in our browser's history. However, in private mode none of this will be done. In one words, no records will be saved when we will use the private mood for browsing. When a user will use this window, no browsing history will be saved nor any download history. Therefore, if the user has any privacy concern he will want to use this window instead of the primary window. In general, when we use public computer to use internet then using private window is important. When we navigate through different websites, our navigating history is stored in the browser history along with our password. Therefore, if we do not use private window then other people may see our navigating history. They may also get access to our password, our social status and so on. However, if we use private window no browser history will be stored, our password will not be saved. Therefore, this is a handy tool when we are concerned about public browsing. This windows also have the components which are available in the main window like *new tab, close tab, home, back, forward, reload, stop, bookmark, download and menu.* However, it just lacks some feature, which are available in the main window because we do not need them here. For example, the privacy window is not available here because we do not want to store any kind of browsing history nor we want to bookmark a site here. Since we are not storing any information where so we do not need to provide any mechanism for deleting those histories either. Therefore, we can see the main difference with main window and this window is in the *menu*. In main browser, *menu button* contains more option then the private windows contains in its main *menu*.

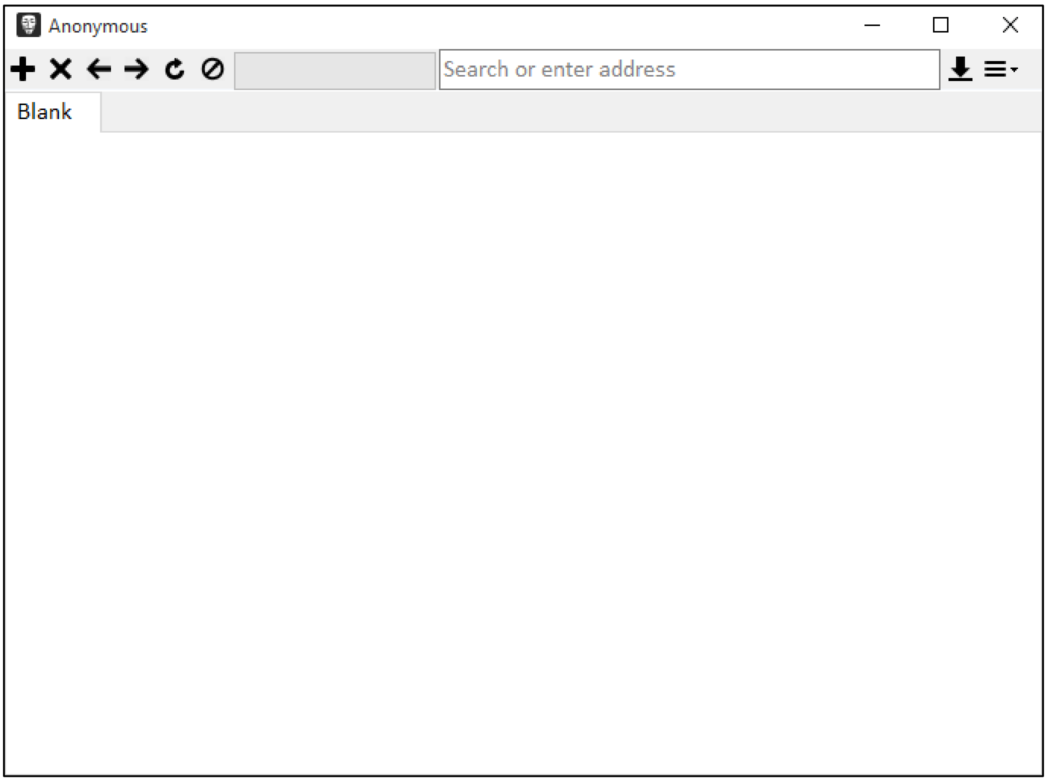
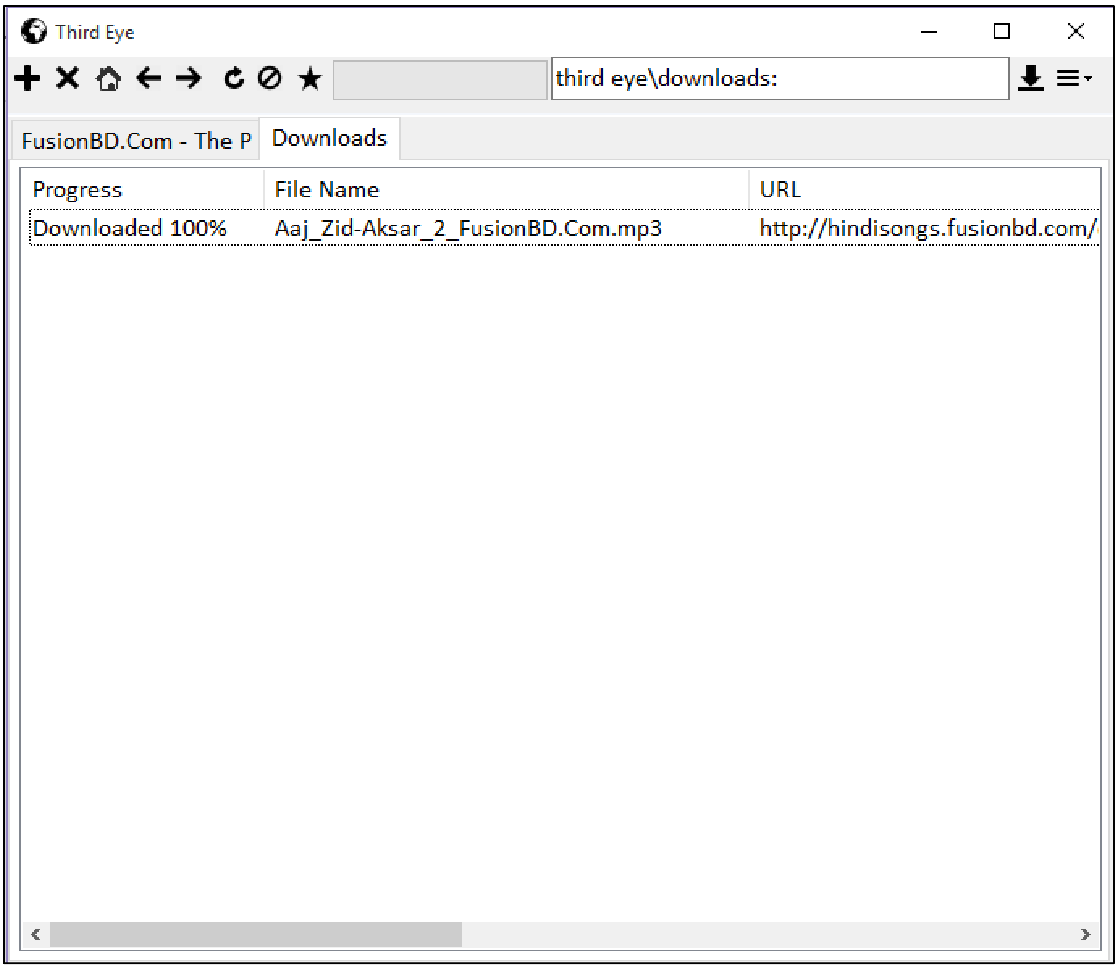


Figure 5.2: Private Window

5.2.3 Download Tab Page

Downloading is the transmission of a file from one computer system to another, usually smaller computer system. From the Internet user's point-of-view, to download a file is to request it from another computer (or from a Web page on another computer) and to receive it. In other words, downloading is the process of copying data from one computer another computer, over either a network or modem. For example, each time we visit a web page on the Internet, you download the information on the page, including any pictures, to your computer. The term download is often associated with pictures, songs, videos, and programs. A good example of this is downloading a video from YouTube so that you can save it to your hard drive. The speed at which your computer downloads a file depends largely on the speed of your Internet or network connection. A faster Internet or network connection typically results in a shorter amount of time to download a file. When a user will download something using the browser this tab will open automatically and will show the download progress. It comes with a context menu, when the user will right click on the mouse in this tab page, the context menu will be opened. Using the context menu the user will be able to play any downloaded content, open file location of that file. The user also will be able to remove the downloaded file from this window.



third eye\downloads:

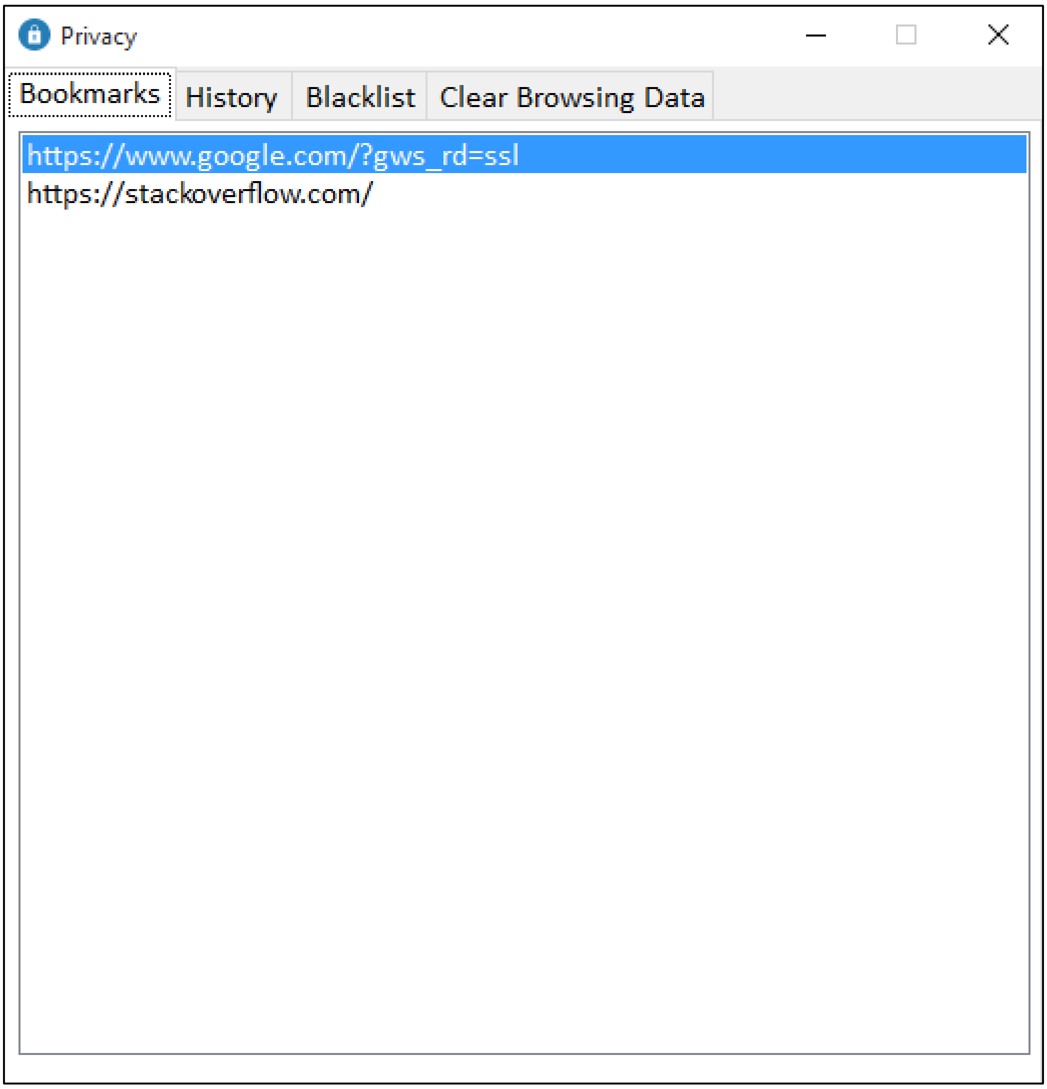
Progress	File Name	URL
Downloaded 100%	Aaj_Zid-Aksar_2_FusionBD.Com.mp3	http://hindisongs.fusionbd.com/

Figure 5.3: Download Tab Page

5.2.4 Bookmarks Tab page

When referring to an Internet browser, a bookmark or electronic bookmark is a method of saving a web page's address. In other words, a bookmark is a saved link to a Web page that has been added to a list of saved links. When we are looking at a particular Web site or home page and want to be able to quickly get back to it later, we can create a bookmark for it. We can think of our browser as a book full of (millions of) Web pages and a few well-placed bookmarks that we have chosen. The list that contains your bookmarks is the "bookmark list" (and sometimes it has called a "hotlist.")

Bookmarks is a tab page of privacy window. On the main widow there is a button named bookmarks using which user will be able to bookmark a site for further visiting. Those bookmarks will be stored here. It comes with a context menu, which will open if the user right click on the mouse on this tab page. The user will be able to remove a bookmark using the context menu.

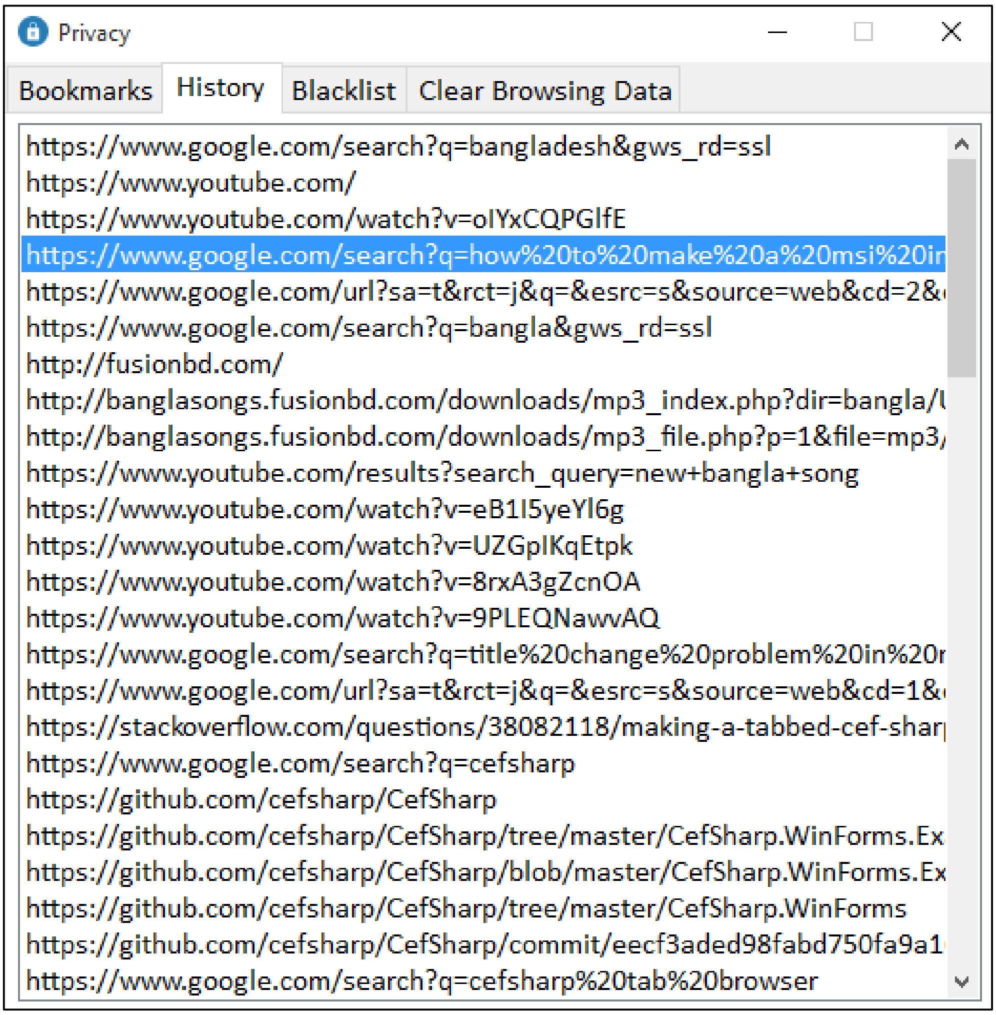


https://www.google.com/?gws_rd=ssl
https://stackoverflow.com/

Figure 5.4: Bookmarks Tab Page

5.2.5 History Tab Page

This is another tab page of privacy window where the browsing history will be stored. The web browsing history refers to the list of web pages a user has visited recently and associated data such as page title and time of visit, which is recorded by web browser software as standard for a certain period. In addition to browsing history, other private data components are also saved during a browsing session. Cache, cookies, saved passwords, etc. are sometimes referred to under the browsing history umbrella. This is somewhat misleading and can be confusing, as each of these browsing data components has their own purpose and format. This history is stored by the browser on our device's local hard drive and can be utilized for a number of purposes, which include providing on-the-fly suggestions as we type a URL or website name into the address bar. By opening this window, users will be able to view all previous browsing history. This tab page comes with the same context menu as the bookmarks tab page. Using the context menu users will be able to copy a particular link or remove it from the history tab page.

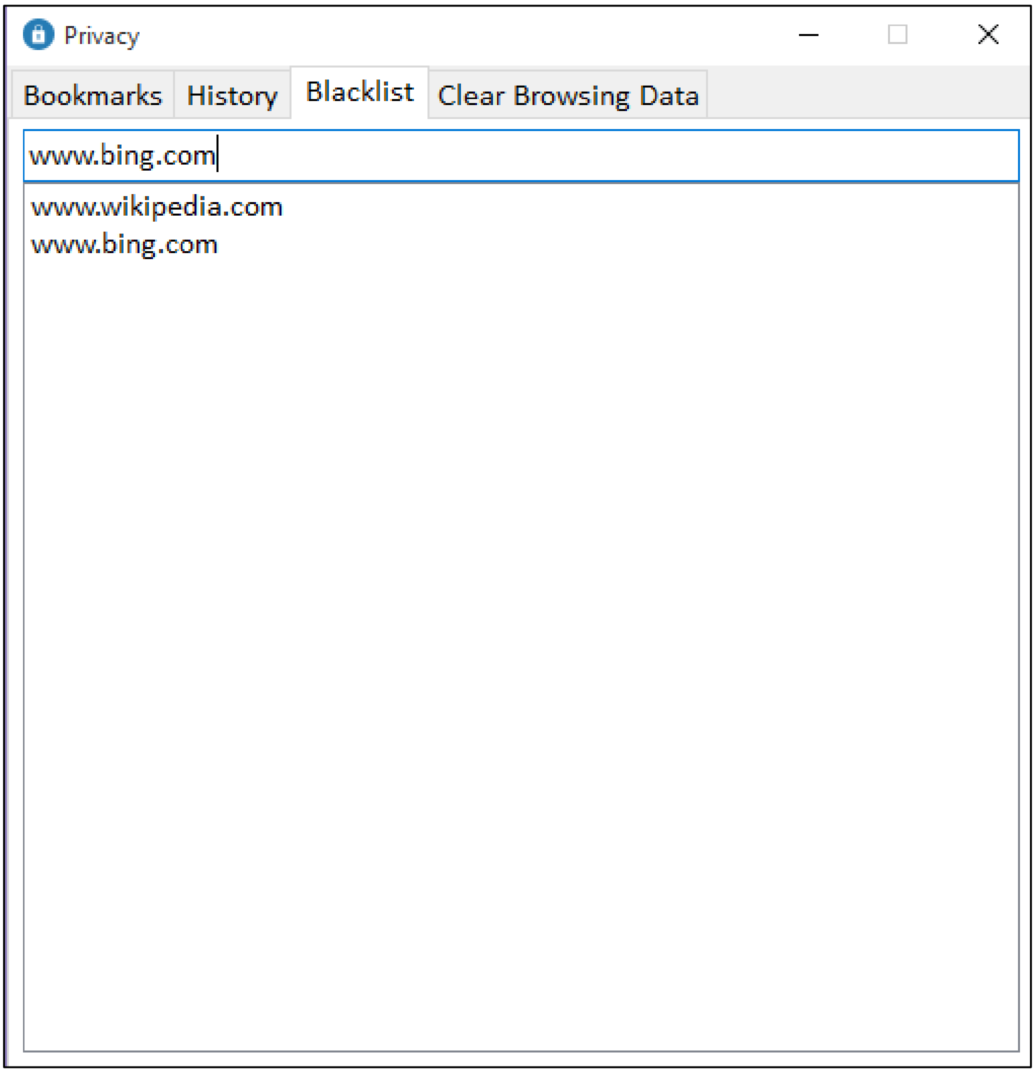


https://www.google.com/search?q=bangladesh&gws_rd=ssl
https://www.youtube.com/
https://www.youtube.com/watch?v=oIYxCQPGlfE
https://www.google.com/search?q=how%20to%20make%20a%20msi%20ir
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&
https://www.google.com/search?q=bangla&gws_rd=ssl
http://fusionbd.com/
http://banglasongs.fusionbd.com/downloads/mp3_index.php?dir=bangla/
http://banglasongs.fusionbd.com/downloads/mp3_file.php?p=1&file=mp3
https://www.youtube.com/results?search_query=new+bangla+song
https://www.youtube.com/watch?v=eB1I5yeYl6g
https://www.youtube.com/watch?v=UZGplKqEtpk
https://www.youtube.com/watch?v=8rxA3gZcnOA
https://www.youtube.com/watch?v=9PLEQNawvAQ
https://www.google.com/search?q=title%20change%20problem%20in%20r
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&
https://stackoverflow.com/questions/38082118/making-a-tabbed-cef-shar
https://www.google.com/search?q=cefsharp
https://github.com/cefsharp/CefSharp
https://github.com/cefsharp/CefSharp/tree/master/CefSharp.WinForms.Ex
https://github.com/cefsharp/CefSharp/blob/master/CefSharp.WinForms.Ex
https://github.com/cefsharp/CefSharp/tree/master/CefSharp.WinForms
https://github.com/cefsharp/CefSharp/commit/eecf3aded98fabd750fa9a1
https://www.google.com/search?q=cefsharp%20tab%20browser

Figure 5.5: History Tab Page

5.2.6 Blacklist Tab page

A blacklist is a collection of entities that are blocked from communicating with or logging into a computer, site or network. Blocked entities are typically identified as IP addresses, user IDs, domains, email addresses, MAC addresses or programs. Blacklisting is a common feature in antivirus programs, intrusion prevention/detection systems and spam filters. Blacklists save effort by limiting interactions with known sources of problems and preventing potential attacks. It is a very important feature to have in any communication software, web browser in particular. This tab page is named blacklist because it contains a list box, which will be containing URL of website, which the users of the browser will not be wishing to visit. If the user wishes to block a website from visiting, the user will be able to block a site just simply typing it in the textbox and hitting enter. The context menu that is available for bookmarks and history is also available here. So. If later user wishes to visit that website, he will be able to remove the website from the blacklist and will be able to visit the web site.



www.bing.com

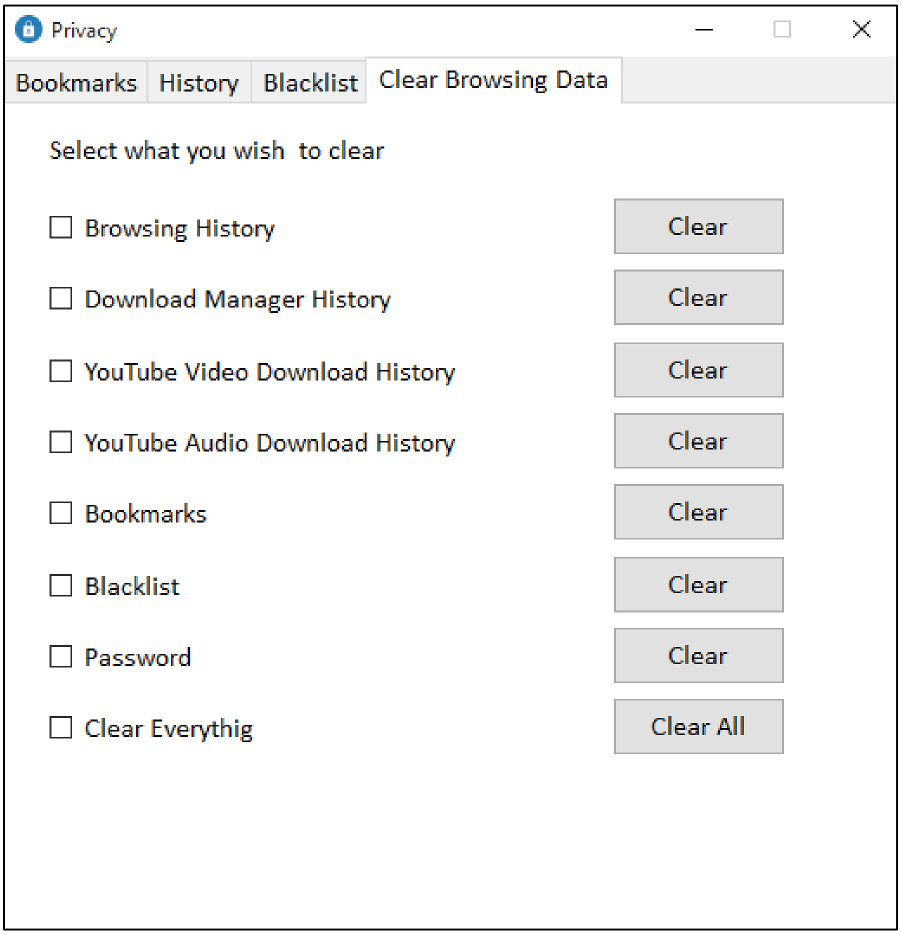
www.wikipedia.com
www.bing.com

Figure 5.6: Blacklist Tab Page

5.2.7 Clear Browsing Data Tab page

When a user will use this browser to navigate through different websites different kinds of histories and data will be saved on his computer's local drive. At some point, he may wish to delete the browsing history that is when this feature will come handy. This is a very important feature to have for any web browser.

This is the final tab page of privacy window, which will allow the user to clear the histories. There are eight difference types of histories which are *browsing history, download manager history, YouTube video download history, YouTube audio download history, bookmarks, blacklist, password, clear everything.* Since there are different, types of histories available in the browser so there are also multiple clearing method available. There are eight checkbox available for eight types of history if the user wishes to delete any particular types of history he has to select the associate checkbox with that history and click on clear, doing so user will be able to remove the history. If the user wishes to delete every types of browsing data, simply he can check *clear everything* check box and click on associate clear and every types of history will be removed.



Select what you wish to clear

□ Browsing History — Clear

□ Download Manager History — Clear

□ YouTube Video Download History — Clear

□ YouTube Audio Download History — Clear

□ Bookmarks — Clear

□ Blacklist — Clear

□ Password — Clear

□ Clear Everythig — Clear All

Figure 5.7: Clear History Tab Page

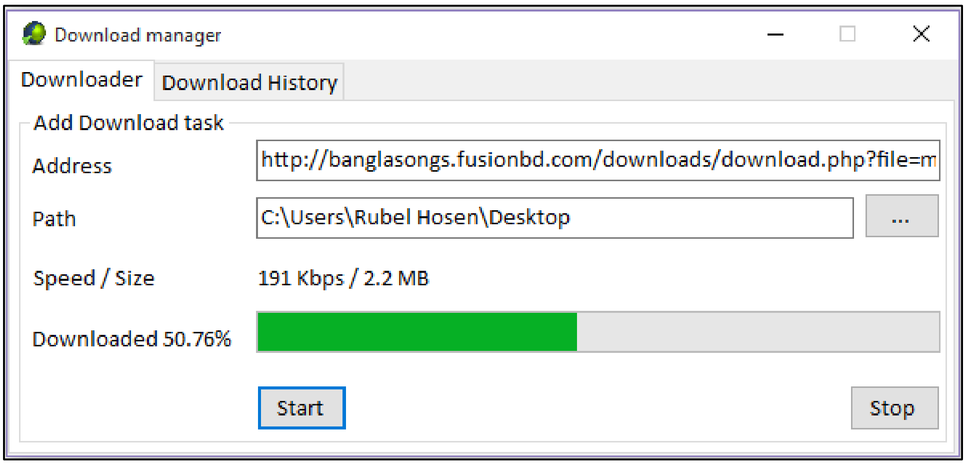
5.2.8 Download Manager Window

This is a new feature, which is not provided by any current browser. It is a built in download manager window. A download manager is a computer program dedicated to the task of downloading (and sometimes uploading) possibly unrelated stand-alone files from (and sometimes to) the Internet for storage. Some download managers can also be used to accelerate download speeds by downloading from multiple sources at once.

Users will be able to download any downloadable content like audio, video or picture using this download manager. This download manager comes with auto catch option. Meaning, after copying the download URL user will not have to type it in the address bar. When the user will hover the mouse over the *address textbox*, the download manager will auto catch the download URL. To start the download process user have to click on *start button.* While downloading user will be able to see the download progress, download percentage, current download speed and download size.

There are two-tab page in the window. The first one is for download and second one for viewing downloaded file. After completing download all the information about downloaded file will be stored in *download history tab page.* The information includes file name, URL, size, date and download path.

There is a context menu available in the second tab page. When a user will right click on the mouse then this context menu will be opened and user will get some operations to perform with the downloaded content. The operation includes *open*, *open file location*, *remove* and *remove all*. Using *open button*, user will be able play or run the downloaded file. *Open file location* will open the file explorer that contains the downloaded content. Using *remove* user will be able to delete that particular item from the download history and *remove all* will remove all the contents in the *download history tab page*.



Address http://banglasongs.fusionbd.com/downloads/download.php?file=m

Path C:\Users\Rubel Hosen\Desktop

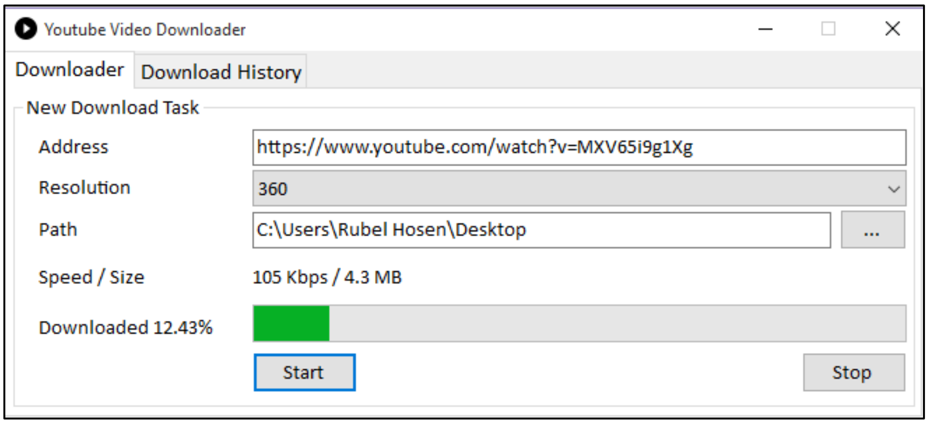
Speed / Size 191 Kbps / 2.2 MB

Downloaded 50.76%

Figure 5.8: Download Manager

5.2.9 YouTube Video Downloader Window

A YouTube downloader is almost like a download manger but the difference is using YouTube downloader we can only download videos, which are available on YouTube. However, we have to remember this that downloading any YouTube content for commercial use is against the privacy policy of YouTube. As long as we download for personal use, it is okay. This is also another new feature in the browser world. Currently, no browser offers built in YouTube video downloader or download option. User use third party software like YTD to download video from YouTube. Therefore, I have added this feature to my browser so that a user can download any video from YouTube. This will save a huge amount of data and will decrease the data cost of the user. Using this download manager, users will be able to download any video that is available on YouTube. This download manager comes with auto catch option. Meaning, after copying the download URL user will not have to type it in the address bar. When the user will hover the mouse over the *address textbox*, the download manager will auto catch the download URL. There is an option available to choose the download resolution from 360p, 480p and 720p. To start the download process user have to click on *start button.* While downloading user will be able to see the download progress, download percentage, current download speed and download size. There are two-tab page in the window. The first one is for download and second one for viewing downloaded file. After completing download all the information about downloaded file will be stored in *download history tab page.* The information includes file name, URL, size, date and download path. There is a context menu available in the second tab page. When a user will right click on the mouse then this context menu will be opened and user will get some operations to perform with the downloaded content. The operation includes *open, open file location, remove* and *remove all.* Using *open button,* user will be able play or run the downloaded file. *Open file location* will open the file explorer that contains the downloaded content. Using *remove* user will be able to delete that particular item from the download history and *remove all* will remove all the contents in the *download history tab page.*



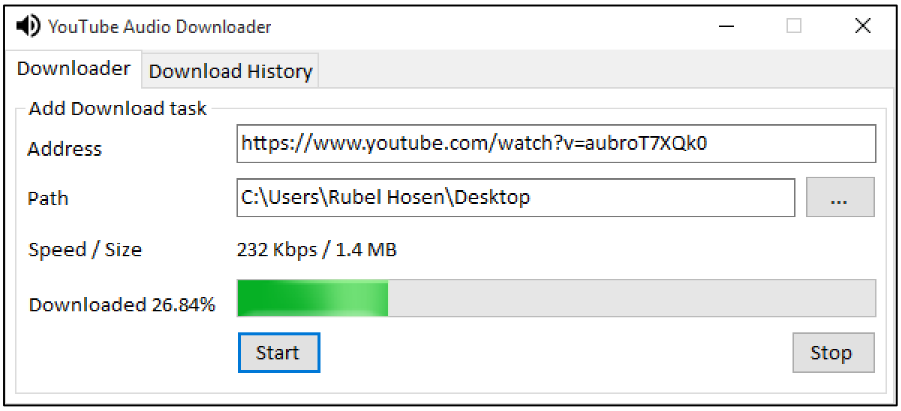
Address: https://www.youtube.com/watch?v=MXV65i9g1Xg
Resolution: 360
Path: C:\Users\Rubel Hosen\Desktop
Speed / Size: 105 Kbps / 4.3 MB
Downloaded 12.43%

Figure 5.9: YouTube Video Downloader

5.2.10 YouTube Audio Downloader

A YouTube audio downloader is a computer program that can be used to download audio version of any video that is available on YouTube. Once again, I would like to remember the reader of this project that downloading YouTube contents for commercial use is entirely prohibited.

Entirely this new feature does not contain in any current browser. This will be handy for those who loves to listen to music. It is not always possible to go to YouTube and play music form there. Therefore, I have added this option so that a user can easily download a YouTube video in audio format and later on, he can listen to that. Using this download manager, users will be able to download any video that is available on YouTube. This download manager comes with auto catch option. Meaning, after copying the download URL user will not have to type it in the address bar. When the user will hover the mouse over the *address textbox*, the download manager will auto catch the download URL. There is an option available to choose the download resolution from 360p, 480p and 720p. To start the download process user have to click on *start button.* While downloading user will be able to see the download progress, download percentage, current download speed and download size. There are two-tab page in the window. The first one is for download and second one for viewing downloaded file. After completing download all the information about downloaded file will be stored in *download history tab page.* The information includes file name, URL, size, date and download path. There is a context menu available in the second tab page. When a user will right click on the mouse then this context menu will be opened and user will get some operations to perform with the downloaded content. The operation includes *open, open file location, remove* and *remove all.* Using *open button,* user will be able play or run the downloaded file. *Open file location* will open the file explorer that contains the downloaded content. Using *remove* user will be able to delete that particular item from the download history and *remove all* will remove all the contents in the *download history tab page.*



YouTube Audio Downloader

Address: https://www.youtube.com/watch?v=aubroT7XQk0

Path: C:\Users\Rubel Hosen\Desktop

Speed / Size: 232 Kbps / 1.4 MB

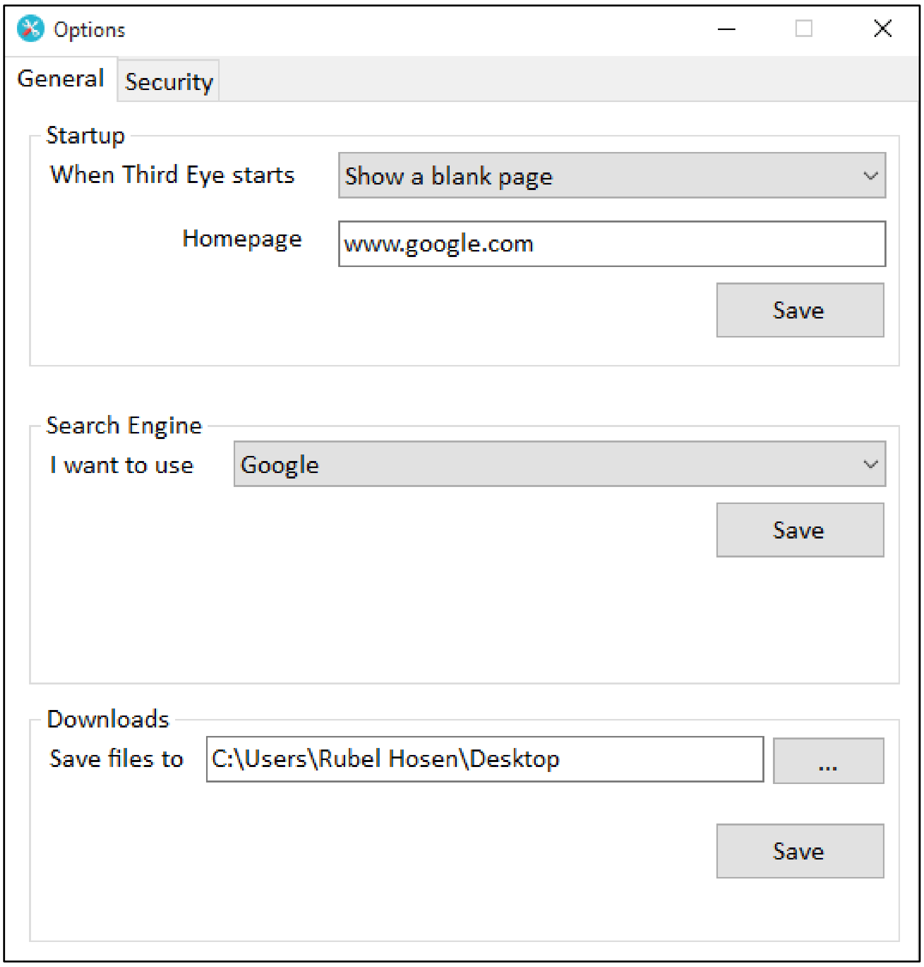
Downloaded 26.84%

Figure 5.10: YouTube Audio Downloader

5.2.11 General Tab Page

This is the first tab page of options window that will help the user to set some settings. *Setting* provides the user to customize the software for creating a user-friendly environment can modify user some tools set that. As a software can have thousands of user and they all may have different test so as a software developer we always try to provide some functionality to the user that can be controlled by them.

In this tab page, there are three settings, which are *startup*, *search engine* and *downloads*. *Startup* provides the user to set an option that is if the user wants to visit any particular website when the user will run the web browser or he wants to see a blank page. There is a dropdown menu available on the top of this page from there user can choose if he wishes to open a blank page or a particular website. If user wishes to set a homepage, he must put the address of that particular website in the textbox next to *Homepage*. The next setting is about search engine. There are four-search engine included in the setting, which are Google, YouTube, Bing and Yahoo. Users can use any of them just by saving their preferred search engine. There is one more setting in this page that provides the user to save the location where the files will be downloaded.



When Third Eye starts: Show a blank page

Homepage: www.google.com

I want to use: Google

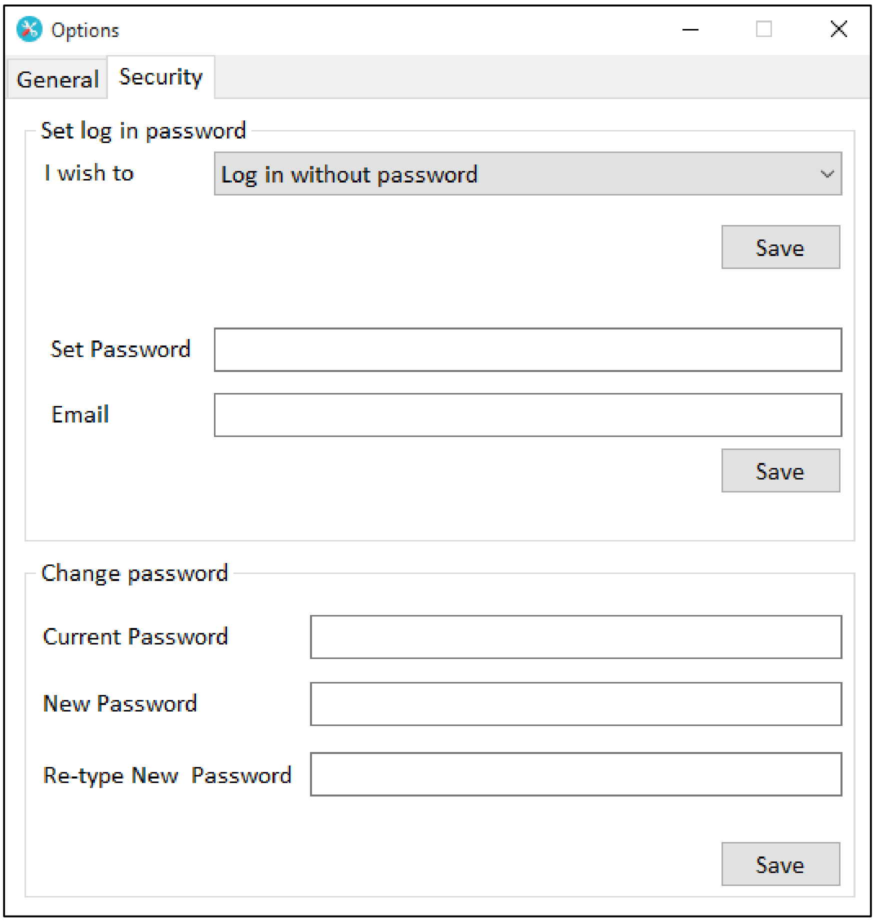
Save files to: C:\Users\Rubel Hosen\Desktop

Figure 5.11: General Setting Tab Page

5.2.12 Security Tab Page

This is the second page of the options window that provides the users of the browser a way to set a password to log in the browser. This is entirely a new feature. Currently no browser have this feature. We should never negotiate anything in terms of security measures of any computer program. Since the web browser contains a lot of sensitive information about the user so I thought it will be a good idea to implement a password base login system and I am sure so many users will love this new feature.

There are two options available in the browser for login. The user can choose to login with password or can choose to login without password. If the user choose to log in with passwords he must set a password that will be asked later when he will be trying to open the browser. To set a password the user first select *I wish to log in using password* and hit save. After that the user has to enter the password in the textbox next to *Set password* and has to put his email address in the textbox next to *Email.* Finally, he has to hit save. The user must provide an email address while setting the password incase he forgets the password it will be mailed to him. There is also an option to renew the passwords.

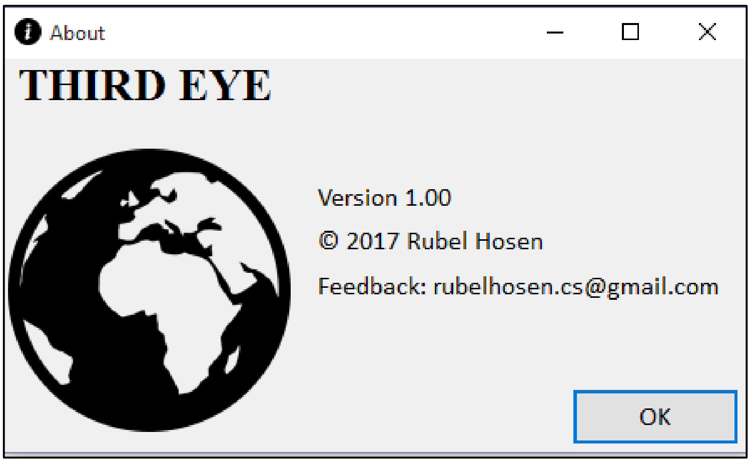

Set log in password

I wish to: Log in without password

Figure 5.12: Security Tab Page

5.2.13 About Window

In every software, the software developer provides a window called *about.* This is a mini window that provides information about the software and the developer of the software. This window contains the browser title, version, copyright info, my name and my email address. The reason behind providing my email address is if the users want to send me any feedback they will be able to do so.



About

THIRD EYE

Version 1.00

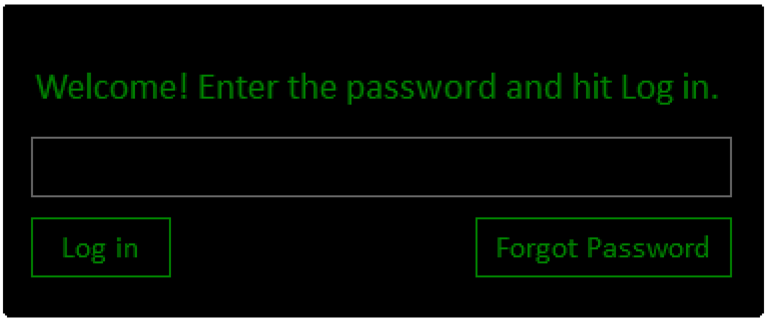
© 2017 Rubel Hosen

Feedback: rubelhosen.cs@gmail.com

Figure 5.13: About Window

5.2.14 Login Window

If the user chooses to log in with password this window will appear when user will try to run the browser. If the user can't provide the correct password he won't be able to use the browser. But if the user successfully inputs the password he will be able to log in to the browser and the main window will appear. If the user forgets the password he can click on the forgot password button. If the user clicks on the forgot password button immdediately his password will be mailed to his email address that he enterd earlier when he set the password. The carchter will be typed in the pawword textbox will appear as asterisk so that other people can't see the password.



Welcome! Enter the password and hit Log in.

Figure 5.14: Login Window

5.3 Main Components of the Interface

A Graphical User Interface (GUI) is made up of four main parts – Windows, Icons, Menus and Pointer. This is sometimes referred to as WIMP system. The key components of my browsers are:

- **New tab button:** This button lets the user to open a new tab. Each tab contains a browser that helps a user to navigate to multiple websites at the same time.

- **Close tab button:** This button helps user to close a tab. When a user done navigating a site and if he wants to close the tab then this button will be used.

- **Home button:** Using the option menu the user will be able to set a page as user's homepage. When a new tab will be opened, the browser will go to that particular website. The user can also navigate to that website by just simply clicking on the home button.

- **Reload button:** This button will be used to refresh a web page.

- **Stop button:** This button will be used to stop a web page from loading.

- **Bookmark button:** If a user wishes to visit a site later again then he can use this button to bookmark the site.
-
- **Address bar:** It is a textbox where user will type the web addresses or keywords to find relative information on the web.

- **Download button:** This button will open download manager window. From there user will be able to download anything or he will be able to view download history.

- **Menu Button:** It is a dropdown button. Which contains the following contents:

    - **New tab:** Using this button user will be able to open a new tab.

    - **Duplicate tab:** Using this button user will be able to duplicate the current tab.

    - **New window:** Using this button user will be able to open a new instance of the browser that is a new window.

- **Private window:** Using this button user will be able to open the private window that will be used for private browsing.

- **Privacy:** This window contains four-tab page, which are Bookmark, History, Blacklist and Clear Browsing Data. Using this tab pages user will be able to view bookmarks and history. User will be also able to block a site and remove all histories.

- **Downloads:** This button will open a tab page that will hold all the records of downloaded contents using the browser's downloader.

- **Download manager:** This button will open the download manager window.

- **YouTube video downloader:** This button will open the YouTube video downloader.

- **YouTube audio downloader:** This button will open the YouTube audio downloader.

- **Zoom:** There are three buttons inside this button, which are, zoom in, zoom out and standard. Using this buttons user will be able to zoom in, zoom out and view standard web page size.

- **Edit:** This button contains five buttons, which are Copy, Cut, Paste, Undo, Redo. Using this buttons user will be able to copy, cut and paste text. He also will be able to undo or redo something.

- **Print:** Using this button user will be able to print a web page.

- **Option:** This button will open Option window that will help user to set couple of important setting for the browser.

- **About:** This button will open the about window.

- **Exit:** Using this button user will be able to exit the browser.

5.4 Use Case Diagram

A use case diagram is a graphic depiction of the interactions among the elements of a system. A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. In this context, the term "system" refers to something being developed or operated, such as a mail-order product sales and service Web site. Use case diagrams are employed in UML (Unified Modeling Language), a standard notation for the modeling of real-world objects and systems.

There are so many use cases of this project and it is not possible to show all of them in a single diagram. Therefore, I have divided them in a different use cases for better understanding, which are listed below.

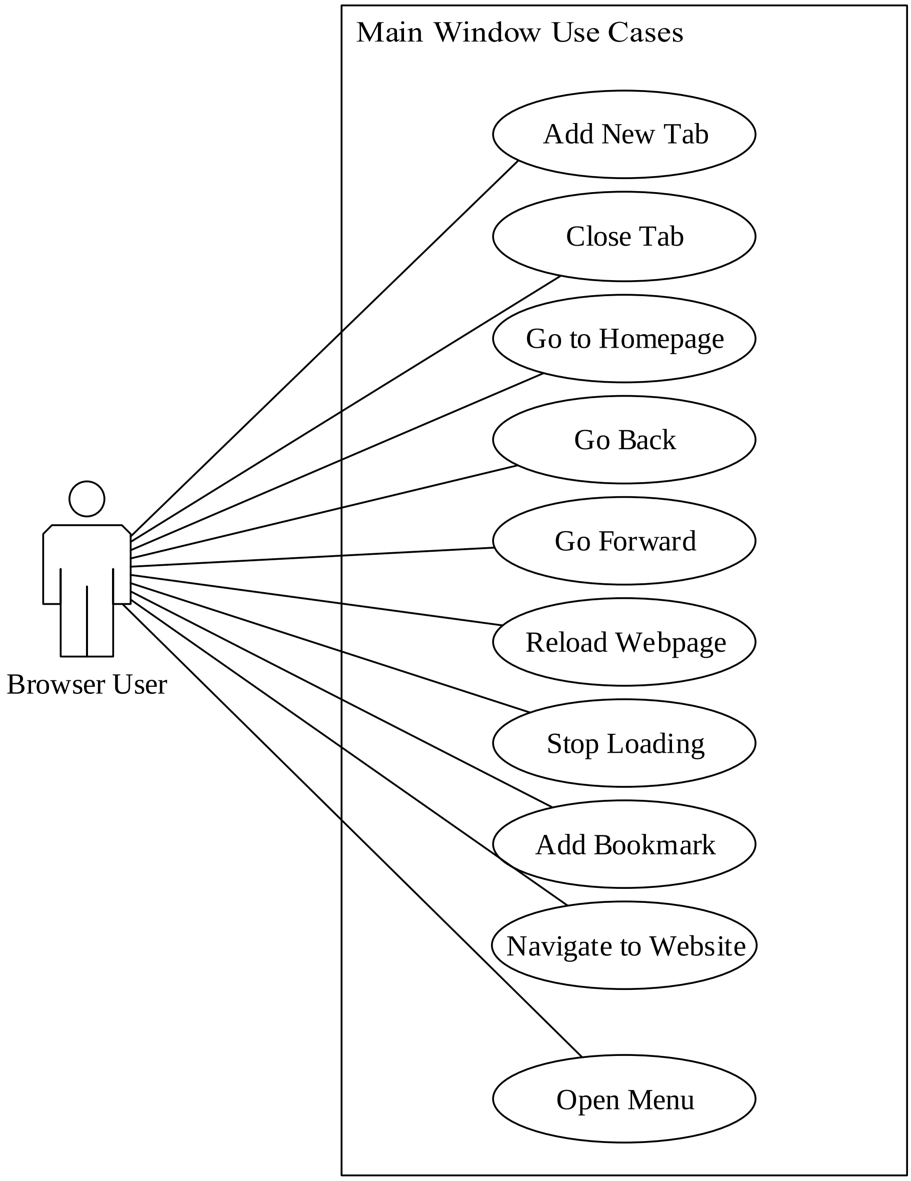


Figure 5.15: Main Window Use Case Diagram

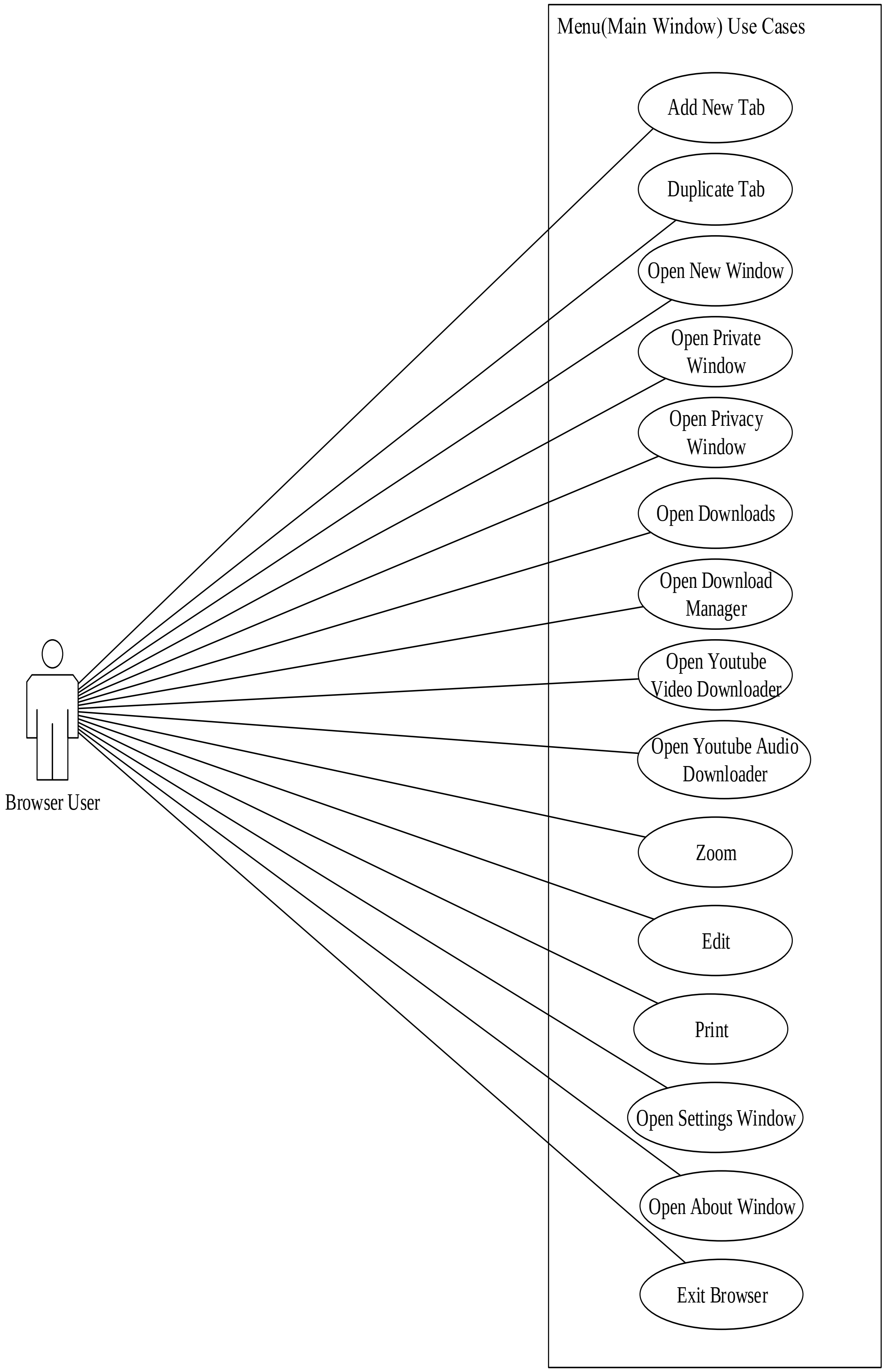


Figure 5.16: Menu (Main Window) Use Case Diagram

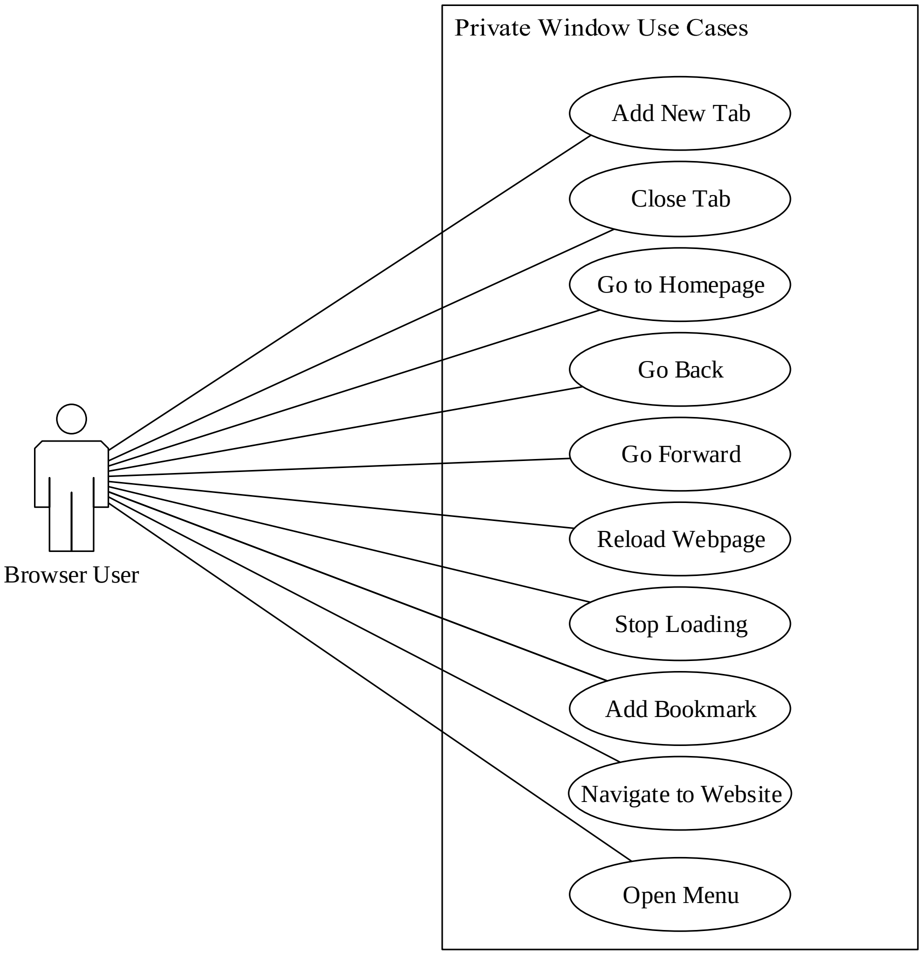


Figure 5.17: Private Window Use Case Diagram

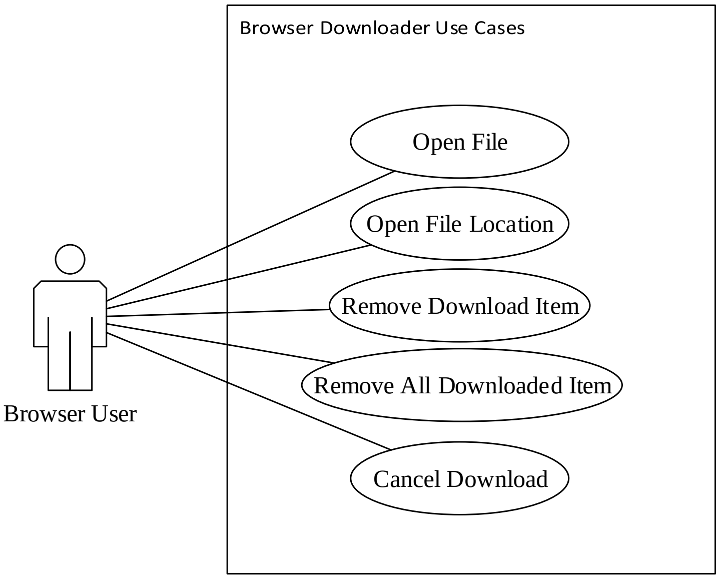


Figure 5.18: Browser Downloader Use Cases Diagram

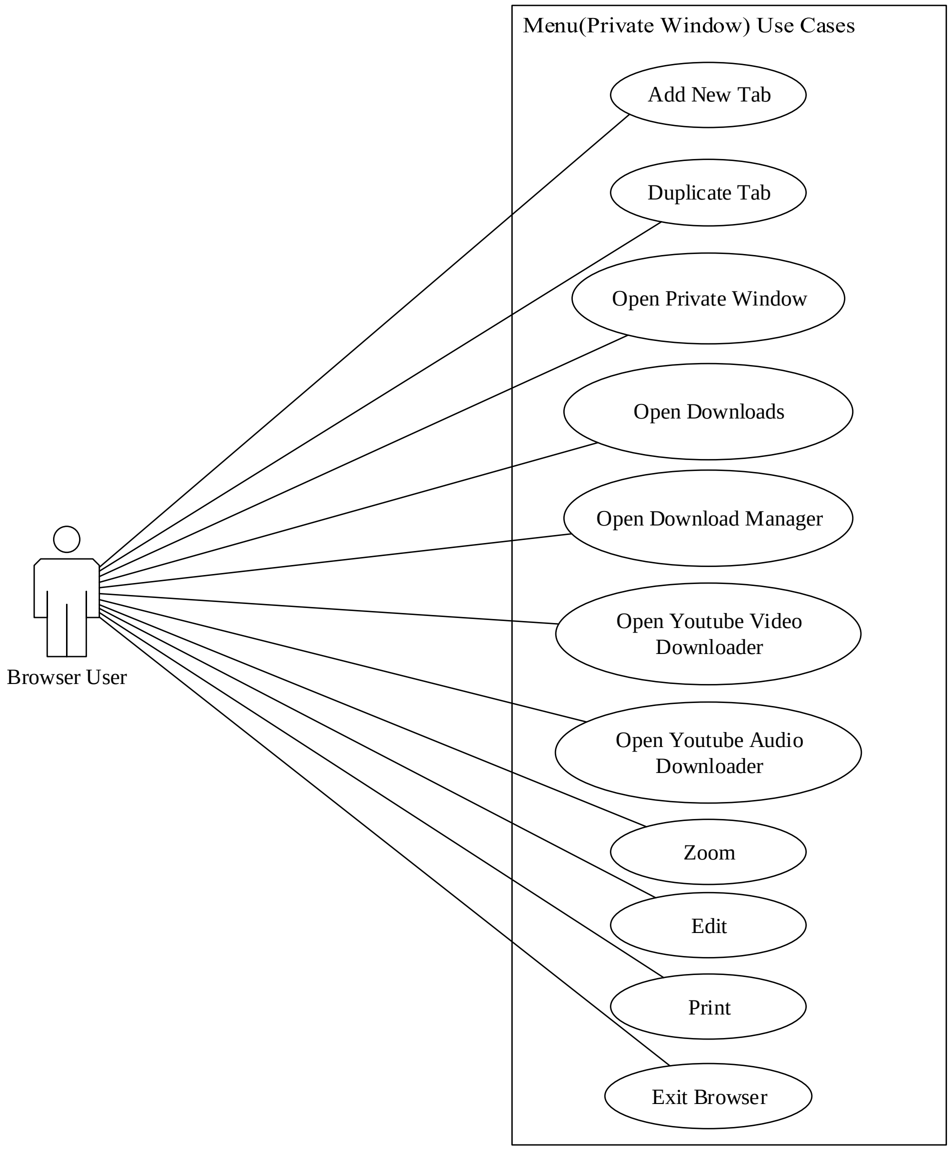


Figure 5.19: Menu (Private Window) Use Case Diagram

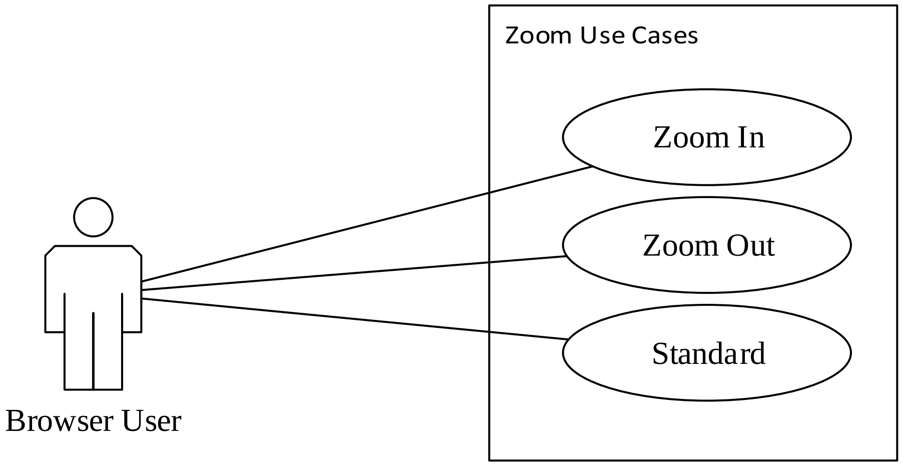


Figure 5.20: Zoom Use Cases Diagram

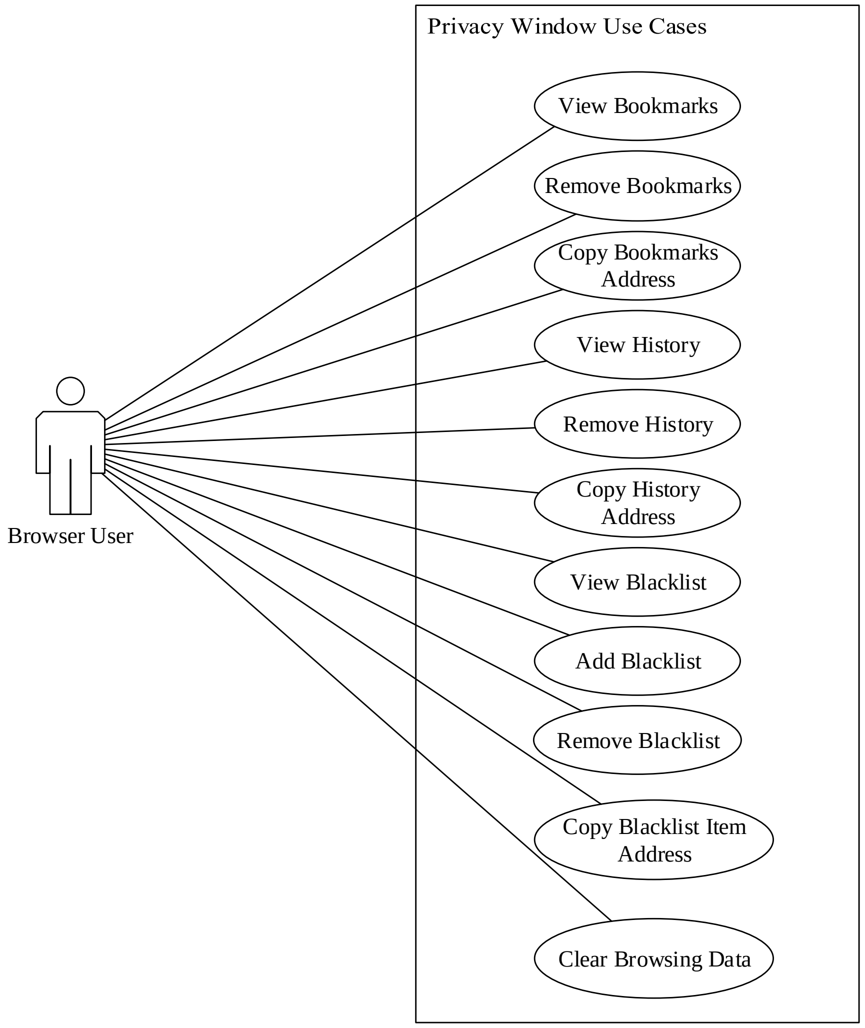


Figure 5.21: Privacy Window Use Case Diagram

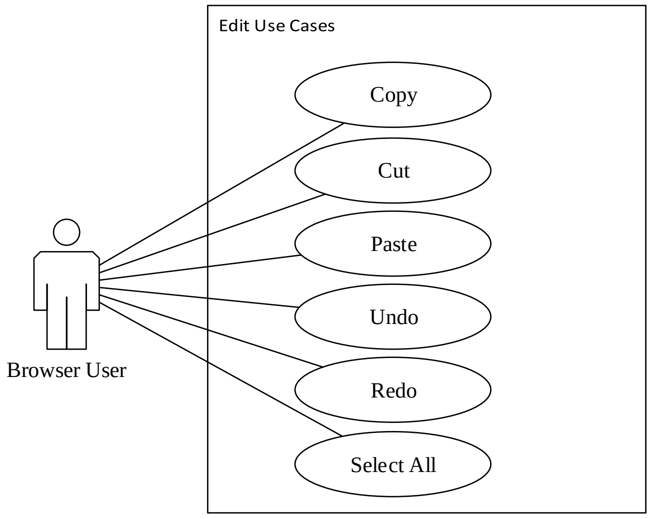


Figure 5.22: Edit Data Use Cases Diagram

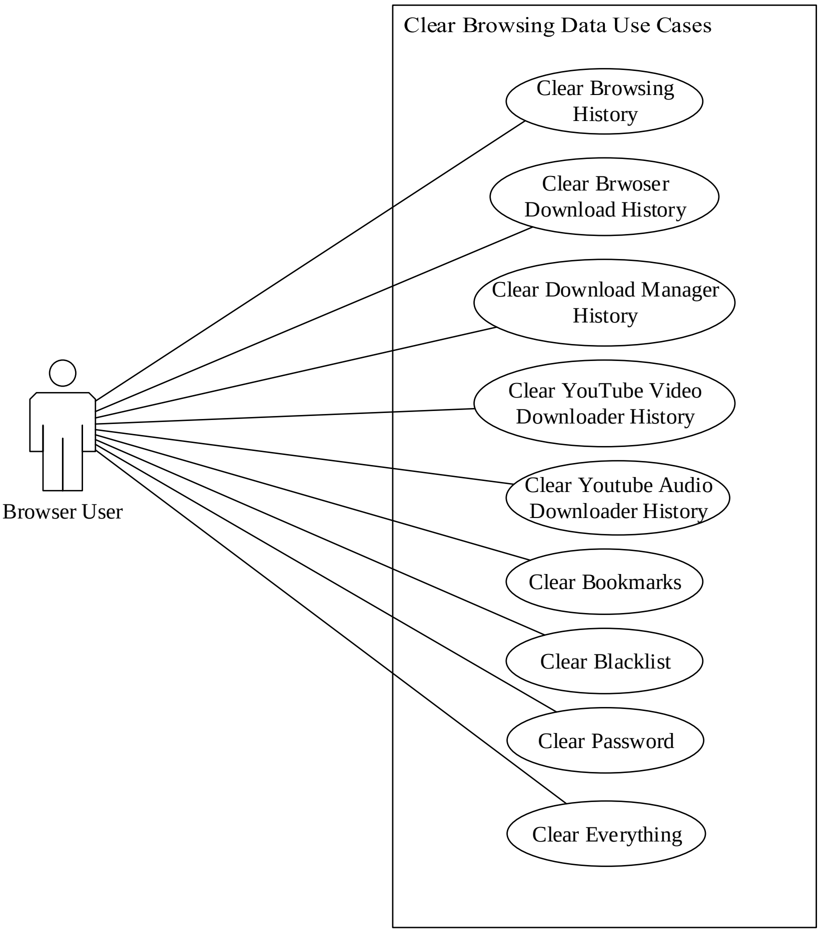

Clear Browsing Data Use Cases
Clear Browsing History
Clear Brwoser Download History
Clear Download Manager History
Clear YouTube Video Downloader History
Clear Youtube Audio Downloader History
Clear Bookmarks
Clear Blacklist
Clear Password
Clear Everything
Browser User

Figure 5.23: Clear Browsing Data Use Cases Diagram

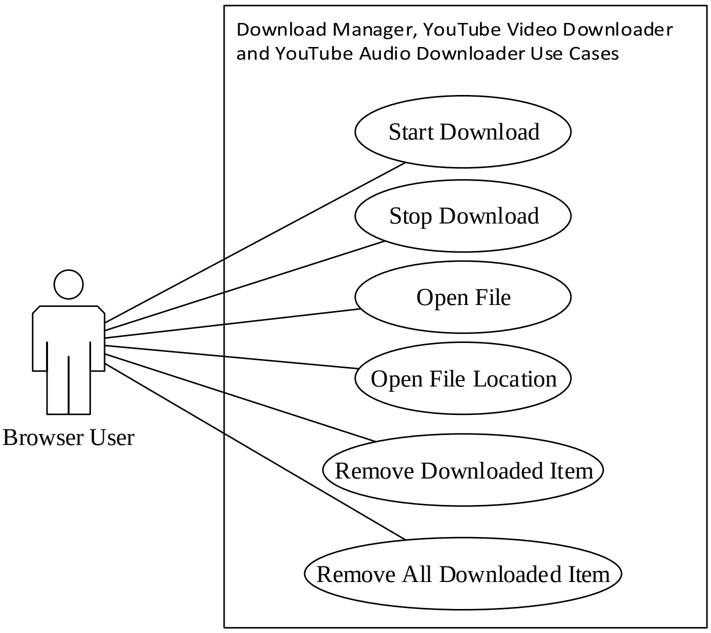

Download Manager, YouTube Video Downloader and YouTube Audio Downloader Use Cases
Start Download
Stop Download
Open File
Open File Location
Remove Downloaded Item
Remove All Downloaded Item
Browser User

Figure 5.24: Download Manager, YouTube Video and Audio Downloader Use Cases Diagram

5.5 Activity Diagram

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc.

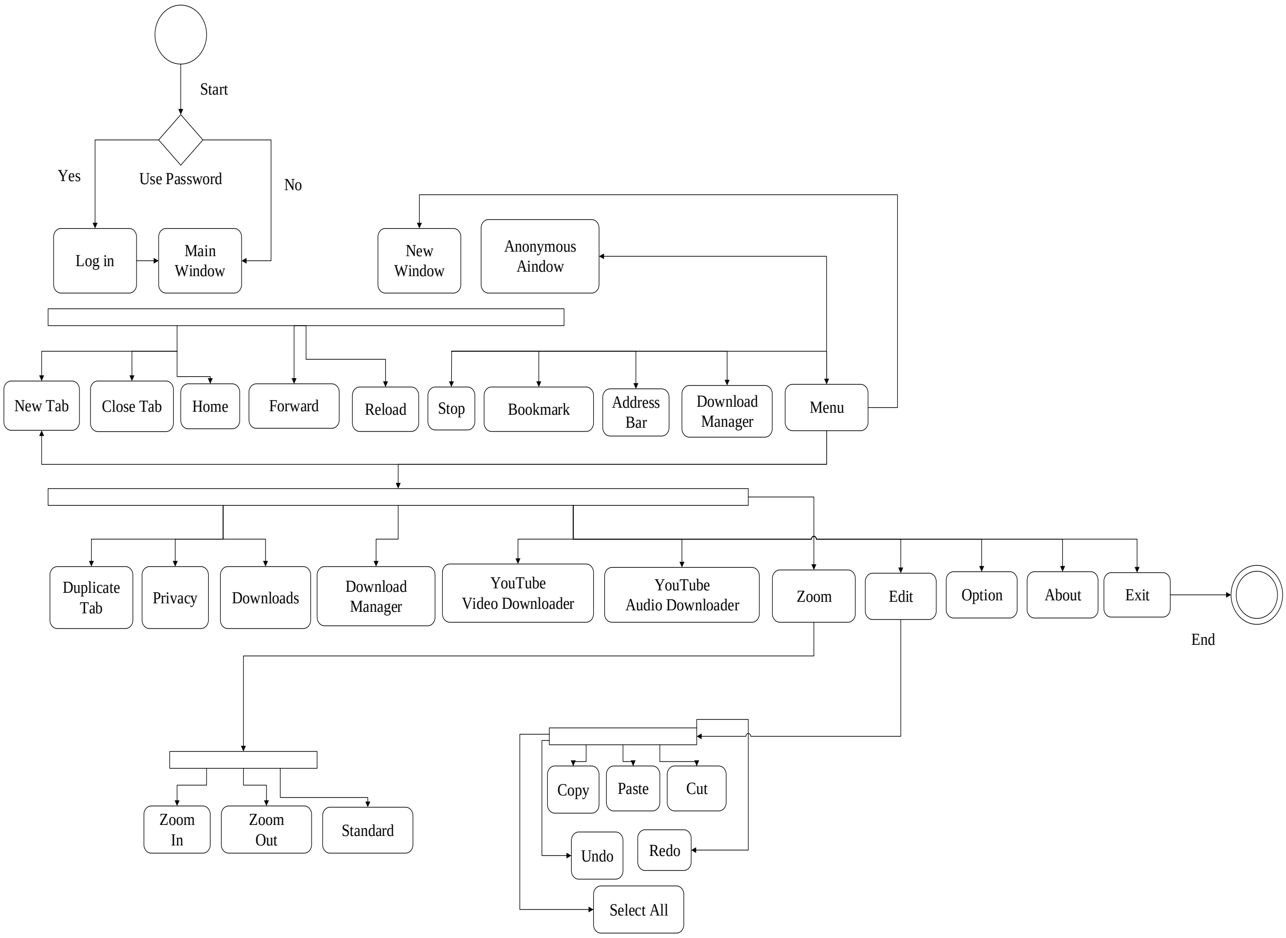


Figure 5.25: Activity Diagram

5.6 Data Flow Diagram

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

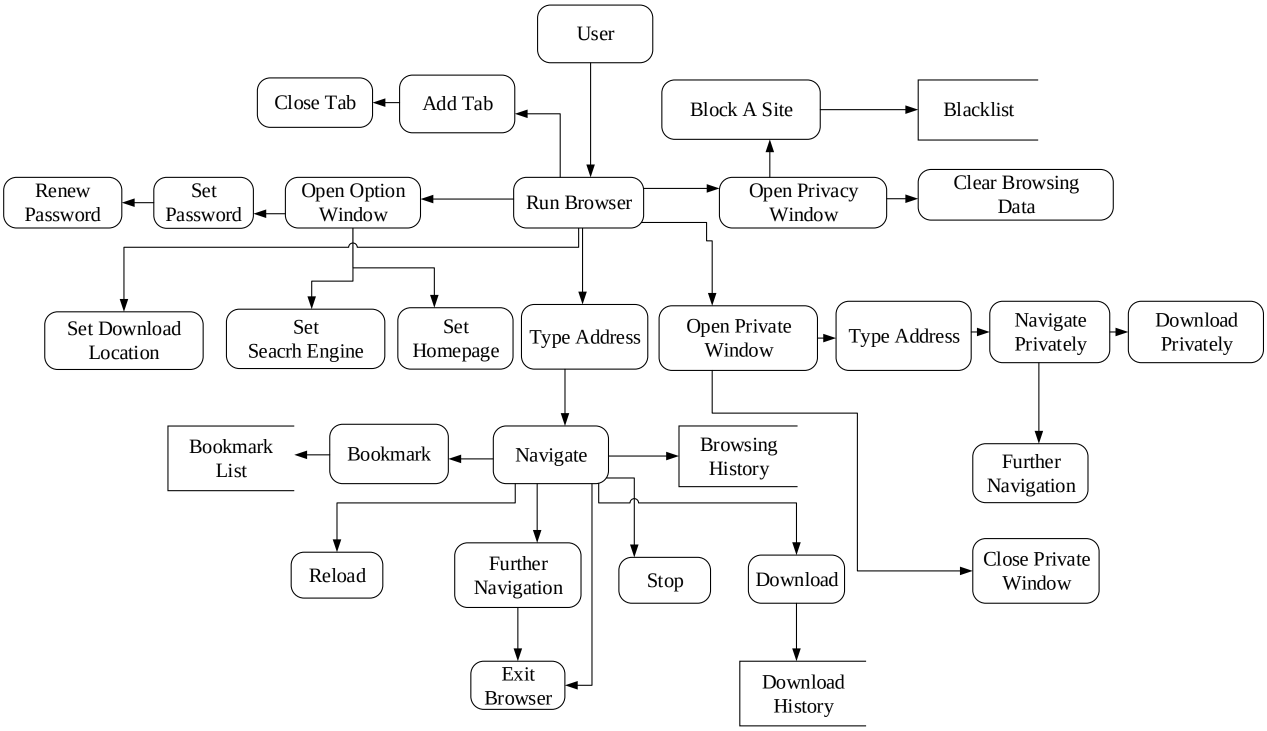


Figure 5.26: Data Flow Diagram

5.7 Class Diagram

A class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

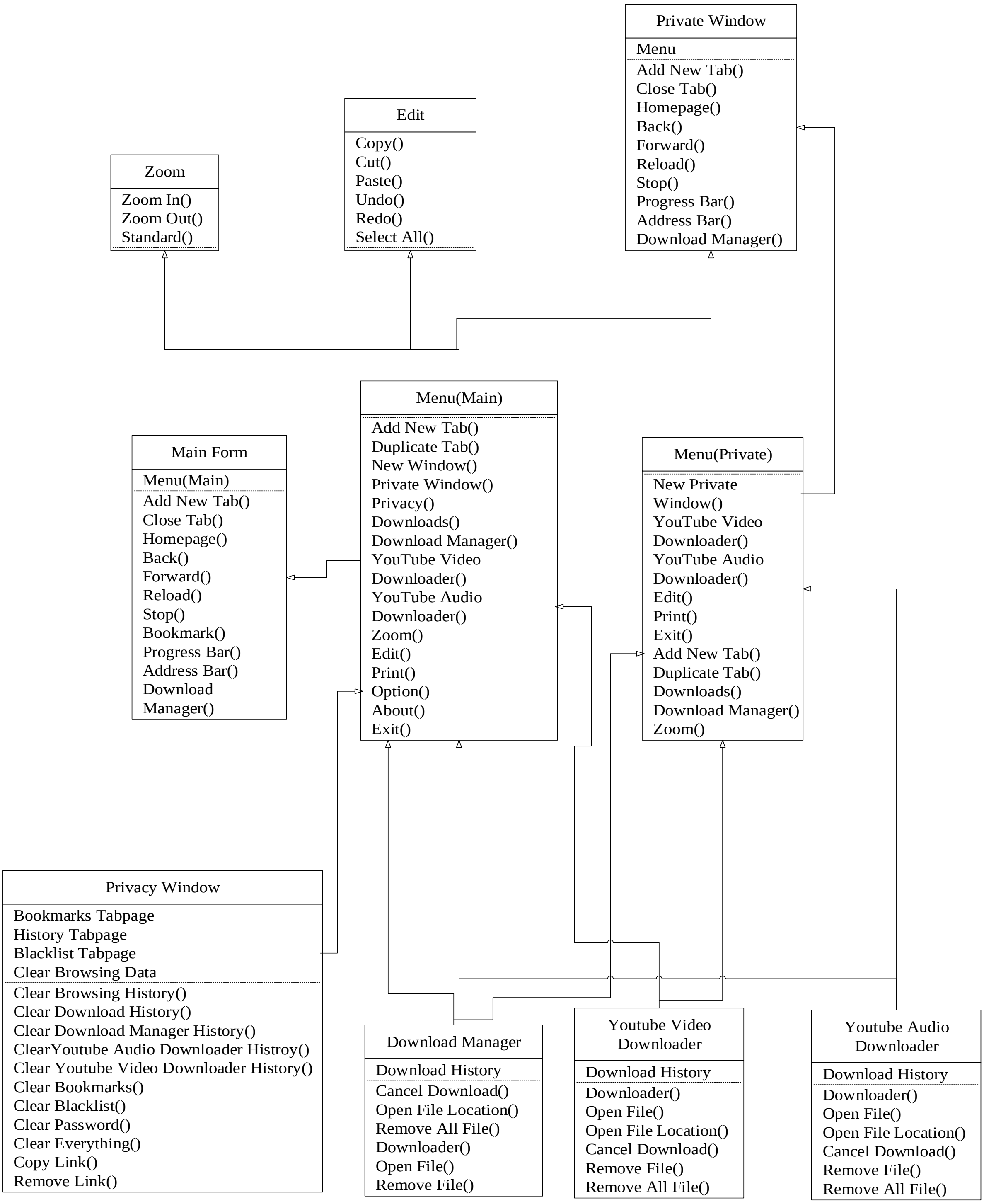


Figure 5.27: Class Diagram

5.8 Entity Relationship Diagram

An entity relationship diagram (ERD) shows the relationships of entity sets stored in a database. An entity in this context is a component of data. In other words, ER diagrams illustrate the logical structure of databases.

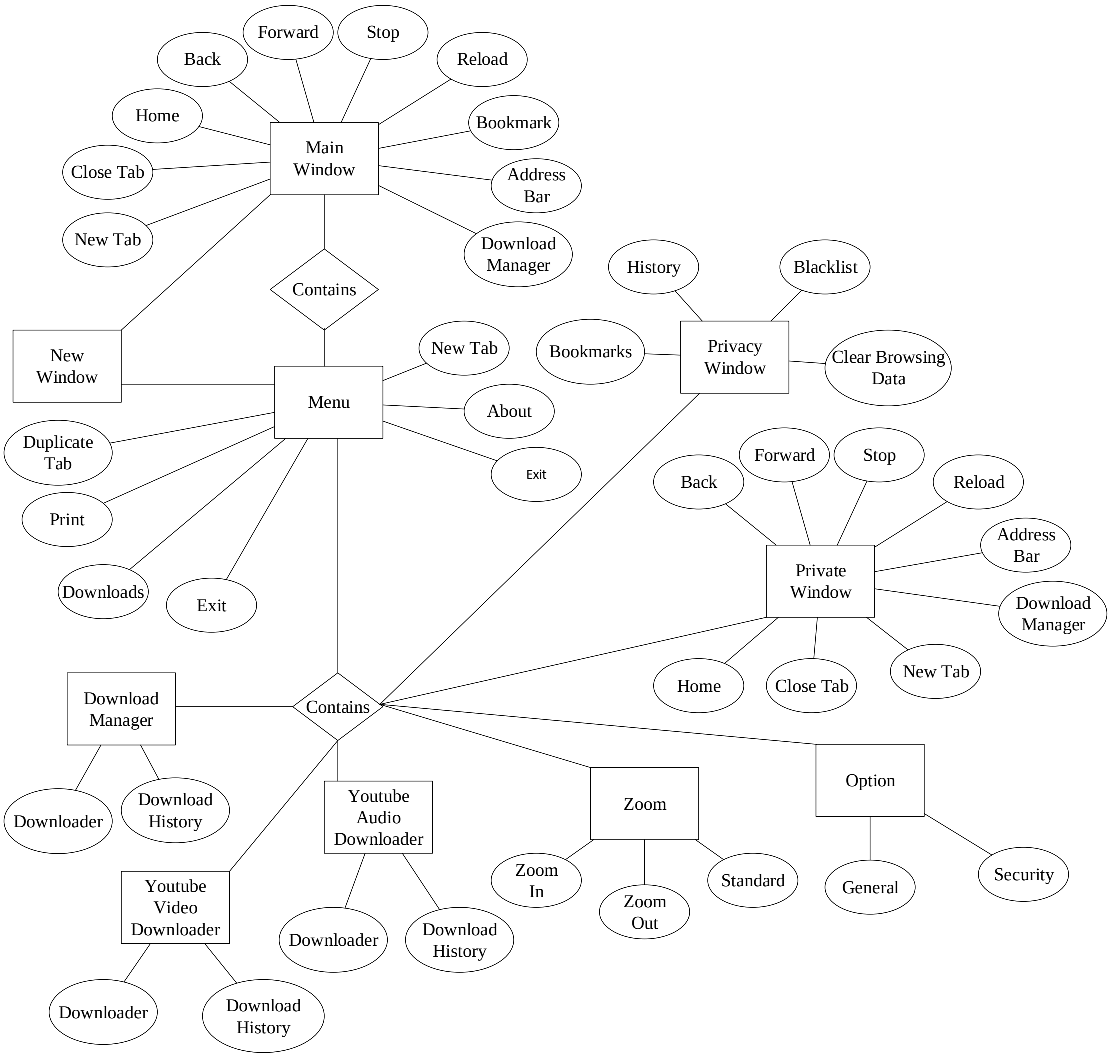


Figure 5.28: Entity Relationship Diagram

Chapter 6

System Implementation

6.1 Introduction

Systems implementation is the process of defining how the information system should be built (i.e., physical system design), ensuring that the information system is operational and used, ensuring that the information system meets quality standard (i.e., quality assurance).

6.2 Hardware Requirement

To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer. These prerequisites are known as (computer) system requirements and are often used as a guideline as opposed to an absolute rule.

The primary objective of this project was to build in a lightweight browser, which will give the users very responsive experience and no heavy graphics used in the browser so it should run fine with dual core processor, and 2 GB RAM.

6.3 Software Requirement

The programs required to run this browser on computer are as follows.

- **Operating System:** Windows 7, 8 and 10.
- **System Type:** 64 bit
- .Net Framework

6.4 Coding

Coding is what makes it possible for us to create computer software, apps and websites. Codes are the life of the games. I have used C# as programming language to develop my project. C# (pronounced "C-sharp") is an object-oriented programming language from Microsoft that aims to combine the computing power of C++ with the programming ease of Visual Basic. I have used Microsoft visual studio to write, edit, compile and run my code.

6.5 Code

The codes of the project can be downloaded from the following link.
https://drive.google.com/open?id=0B2dXP81LQ0gQSEJ4LWZBbnExX0E

Chapter 7

Testing

7.1 Introduction

Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. Testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements.

Software testing is the process of evaluation a software item to detect differences between given input and expected output. Also to assess the feature of a software item. Testing assesses the quality of the product. Software testing is a process that should be done during the development process. In other words, software testing is a verification and validation process.

7.1.1 Verification

Verification is the process to make sure the product satisfies the conditions imposed at the start of the development phase. In other words, to make sure the product behaves the way we want it to.

7.1.2 Validation

Validation is the process to make sure the product satisfies the specified requirements at the end of the development phase. In other words, to make sure the product is built as per customer requirements.

7.2 Basics of Software Testing

There are two basics of software testing: blackbox testing and whitebox testing. Black box testing is often used for validation and white box testing is often used for verification.

7.2.1 Blackbox Testing

Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing.

7.2.2 **White**box **Testing**

White box testing is a testing technique that takes into account the internal mechanism of a system. It is also called structural testing and glass box testing.

7.3 Feature to Be Tested

When a particular feature is activated, it changes the current state of a program, adds new functionality, or modifies existing functionality.

My browser consists of several buttons, which includes *new tab, close tab, back, forward, reload, home, bookmark* and so on. There are several windows in my project like *privacy, downloads, download manager, YouTube video downloader, YouTube audio downloader, option and about.* The browser comes with built in download manager. There are several functionality like *zoom in, zoom out, standard view, copy, cut, paste, undo, redo, and select all.* There are some database features as well like *history, bookmarks, blacklist, and downloaded files.* Therefore, I have made sure each one of them works fine by testing appropriately.

7.4 Types of Testing

There are so many testing. The following testing has been done to examine my project.

- Unit Testing
- Integration Testing
- Functional Testing
- System Testing
- Stress Testing
- Performance Testing
- Usability Testing
- Acceptance Testing
- Regression Testing
- Beta Testing

Unit Testing

Unit testing is the testing of an individual unit or group of related units. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input.

Integration Testing

Integration testing is testing in which a group of components is combined to produce output. In addition, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing.

Functional Testing

Functional testing is the testing to ensure that the specified functionality required in the system requirements works. It falls under the class of black box testing.

System Testing

System testing is the testing to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

Stress Testing

Stress testing is the testing to evaluate how system behaves under unfavorable conditions. Testing is conducted at beyond limits of the specifications. It falls under the class of black box testing.

Performance Testing

Performance testing is the testing to assess the speed and effectiveness of the system and to make sure it is generating results within a specified time as in performance requirements. It falls under the class of black box testing.

Usability Testing

Usability testing is performed to the perspective of the client, to evaluate how the GUI is user-friendly. How easily can the client learn? After learning how to use, how proficiently can the client perform? How pleasing is it to use its design? This falls under the class of black box testing.

Acceptance Testing

The customer to ensure that the delivered product meets the requirements and works as the customer expected often does acceptance testing. It falls under the class of black box testing.

Regression Testing

Regression testing is the testing after modification of a system, component, or a group of related units to ensure that the modification is working correctly and is not damaging or imposing other modules to produce unexpected results. It falls under the class of black box testing.

Beta Testing

Beta testing is the testing which end users, a team outside development, do or publicly releasing full pre-version of the product which is known as beta version. The aim of beta testing is to cover unexpected errors. It falls under the class of black box testing.

All the testing mentioned in this project has been performed sequentially. I have debugged the codes and one by one and I corrected every errors.

7.5 Fault, Error and Failure

However, I expected the project to be error free but as I tested the project piece by piece, I have founded various problems. The problems can be divided into three groups, which are:

- Fault
- Error
- Failure

Fault is a condition that causes the software to fail to perform its required function. It is an incorrect step, process, or data definition in a computer program, which causes the program to perform in an unintended or unanticipated manner. See: bug, defect, error, exception. Commonly refers to several troubles with the software products, with its external behavior or with its internal features.

Error refers to difference between Actual Output and Expected output. An error is a mistake, misconception, or misunderstanding on the part of a software developer. In the category of developer, we include software engineers, programmers, analysts, and testers. For example, a developer may misunderstand a de-sign notation, or a programmer might type a variable name incorrectly – leads to an Error. It is the one, which is generated because of wrong login, loop or due to syntax. Error normally arises in software; it leads to change the functionality of the program.

Failure is the inability of a system or component to perform required function according to its. At the end, all of these errors was solved. It is the inability of a software system or component to perform its required functions within specified performance requirements. When a defect reaches the end customer, it is called a Failure. During development, testers usually observe Failures.

Chapter 8

Results and Discussions

8.1 Introduction

Making a web browser is not easy. It is really a complex and time-consuming project. Firefox was first released in 2004 and Chrome was first released in 2008 still they are being developed. Therefore, it has been thirteen and nine year respectively since Firefox and Chrome is being developed. That says it all. For my project, I barley had 8 month. "It is very ambitious project", said one of my respectable teacher. At first, I did not understand that, I did not understand it is going to be that tough. However, it was, I have really worked hard. Sometimes, I have coded 10 hours a day and it was not easy. I was stuck frequently. Sometimes even, it took me three or four days to solve one particular problem but I did not give up. With all my effort and hard work, I have completed the project. My supervisor and teachers encouraged me all the way. Without their help, I will not be able to complete this project.

8.2 System Outcome

My goal was to develop a lightweight, user-friendly web browser. Eventually, I did. It was never enough to develop an ordinary project that already exists in the market. Therefore, I have to come up with something new. I projected a lot, about what new can be implemented and finally I found some that I can try to implement. With every basic features that a browser should come with, I have developed four new features. Which are built in download manager, YouTube video downloader, YouTube audio downloader and password protected login system.

Besides developing a web browser what I really wanted is to go through a process that is used by professional software developers I wanted to gain the experience of building a world class software that will help later to enhance my career. I wanted to test my programming knowledge that I have gained for last four years. I always loved challenges and it was the biggest challenge I ever had. It really tested my programming skills, mental strength and my temperament. Eventually I finished the project and learned a lot. It gave me so much confident.

8.3 Limitations

Developing a huge project like this and doing it alone is never easy. It was not for me either. It takes huge amount of labor, money and resources to build a web browser. However, I had not much of this. Therefore, it will be fair to say that my browser is never going to replace the current browsers like chrome or Firefox. At least, not now. My browser lack some features they provide. For example, I do not have *webstore* like Chrome or *add-on* like Firefox. However, my browser have some limitations but it has some extra features too. More importantly, my supervisor and I are very satisfied with what I have implemented so far and that what matters most.

Chapter 9

Conclusions

9.1 Future Works

The importance of a web browser cannot be limited into some words. It is the most used software after operating system and will not be replaced in near feature. As the time progressing the features of a web browser is increasing. In android device, we use play store to download app and games to our phone. Similarly, web browser provides similar store to download extension into web browser that can increase the productivity and make it easier to get work done. In Chrome, this store is called *webstore* and in Firefox, it is known as *add-on*. However, my browser does not have these kinds of store. Therefore, this will be the feature work of my project. Developing a store will not only help the users but also will open a new opportunity for developers to develop an extension for my browser.

9.2 Conclusion

I consider myself a lucky person for having such a work experience. From the starting to the end, all the way it was really an adventurous journey to the software development world. I have enjoyed developing this project so much. It was never easy to develop this project. Sometimes I got frustrated but my supervisor and teachers encouraged me a lot. Their constructive criticism and efficient guidance made be doing this successfully. Thanks to my supervisor, thanks to all my teachers who helped me during this software development process. Finally, thanks to the almighty for making this possible.

REFERENCES

[1] Design Patterns: Elements of Reusable Object-Oriented Software Nov 10, 1994 by Erich Gamma and Richard Helm

[2] Learning UML 2.0: A Pragmatic Introduction to UML May 2, 2006 by Russ Miles and Kim Hamilton

[3] C# 6.0 and the .NET 4.6 Framework Nov 8, 2015 by ANDREW TROELSEN and Philip Japikse

[4] Modern Software Development Using C# .NETApr 3, 2006by Richard Wiener

[5] C# 6.0 in a Nutshell: The Definitive Reference 6th Edition by Joseph Albahari (Author), Ben Albahari (Author)

[6] http://openbookproject.net/courses/intro2ict/web/web_browsers.html

[7] https://www.thebalance.com/what-is-internet-browser-892819

[8] https://www.html5rocks.com/en/tutorials/internals/howbrowserswork/

[9] https://www.nuget.org/packages/CefSharp.WinForms/

[10] https://www.nuget.org/packages/MetroModernUI/

[11] https://www.nuget.org/packages/YoutubeExtractor/