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Flex-based PowerPoint

(Volume __1__ of __1__)

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Abstract

Presentation is significance to human lives. According to Wikipedia.org, presentation is **the "process of showing and explaining the content of a topic to an audience"** [1]. It is one of the important ways to communicate with each others in different places. In schools, professors give presentation to student on lectures. In most of the companies, staff presents their ideas to their colleague by presentation. Traditionally, overhead projectors or handouts are used as a visual aid of presentation. And now, software engineers designed a number of presentation software as a substitute. Presentation software is a tool for presenters to create visual slides which can includes text, image, sound, video and transitional effects. By using these slides, audience can take the advantage of the fact that most people learn best visually. And it helps to add interest to the presentation too. In recent years, by the rapid development of computer technologies and Internet, developers are trying to change the desktop application to the web-based applications for overcoming platform dependency, software maintenance, and disk storage problem. In this project, several current presentation programs as well as the current web technologies are evaluated. Result from the project shows a web-based presentation program called Pointer for providing better user experience of creating slide shows.

Acknowledgement

Although the Final Year Project is not a group project, I think it cannot be avoided to seek help from others. I would like to use this opportunity to thank every people who helped me during this year.

First of all, I have to thank my project supervisor, Dr. Andy Chun. He gave me a lot of room to implement the project. Also, his guidelines and materials help me a lot in making the process more smoothly. The most important thing is that he gave me a chance to implement the project using my own ideas.

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Lastly, I would like to show my appreciation here to Lily Ng and Matthew Ho for participating in my user testing. They gave a lot of opinions which are very important for the project success.

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1. Introduction

This chapter includes the introduction to the project as well as the background research done in the earlier stage.

1.1 Background

The predecessor of presentation software is using transparencies on overhead projectors. It is required use this technology to print out the slides on the transparencies and project it by the overhead projector. It is inconvenient to users that they have to do extra work in addition to preparing the slide content. Therefore, software developer is trying to design presentation software to replace the use of transparencies. Today, the presentation software provides a number of features and many people use this kind of software to create slides for their presentation. However, some problems still exist among the current software. The following sections describe the current applications and their existing problems.

1.2 Related Applications

It is important to study related applications for the project. Based on the study, we can find out the existing problems, the pros and cons of them. In this project, the presentation software is divided into the following application types for analysis:

1. Desktop Application
2. Web Application
3. Add-ons

1.2.1 Desktop Application

Desktop Application is the most common type of application for presentation software. The popular applications include Microsoft PowerPoint, OpenOffice Impress, Apple Keynote, and Adobe Reader.

1.2.1.1 Microsoft PowerPoint

Microsoft PowerPoint is one of the oldest desktop presentation programs. It is developed by Microsoft which is one of the leading IT companies among the world. The first version PowerPoint 1.0 was released in 1987 for Mac OS classic [2]. The newest version is 2007 for Window platforms (Figure 1. 1) and 2008 for Mac OS X. In the latest version, Microsoft PowerPoint allows users to create presentation slides that may contain texts, graphics, movies, and other supported formats. The Graphic User Interface (GUI) enables users to add, move or delete objects on the slides freely. Besides, it also provides movement and transition effects on objects and slides. The slides created can be projected on a computer or printed.
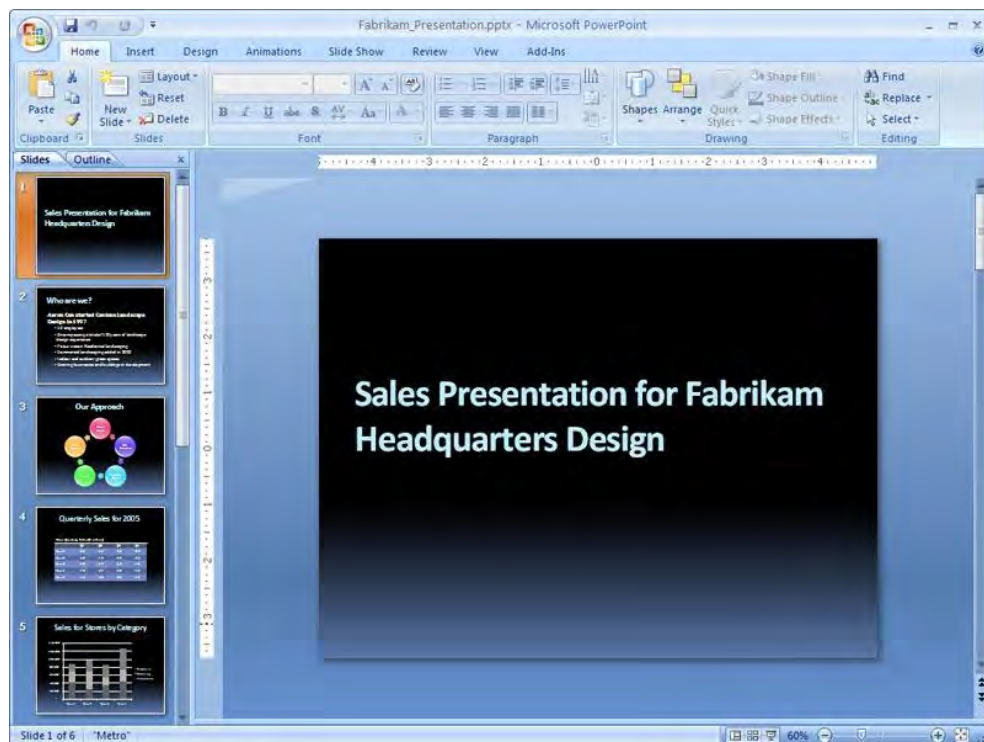
Figure 1. 1 Microsoft PowerPoint 2007

1.2.1.2 OpenOffice Impress

OpenOffice Impress (Figure 1. 2) is another desktop-based tool for creating effective multimedia presentations. It supports most of the features provided by Microsoft PowerPoint, such as 2D and 3D clip art, effects, animation, etc. The major difference between Microsoft PowerPoint and OpenOffice Impress is that OpenOffice is an open-source project which is free and supports multiple platforms including Windows, Mac OS X, and Linux. Besides, it supports common presentation file format likes ODP, PDF, PPT, PPS and even SWF.
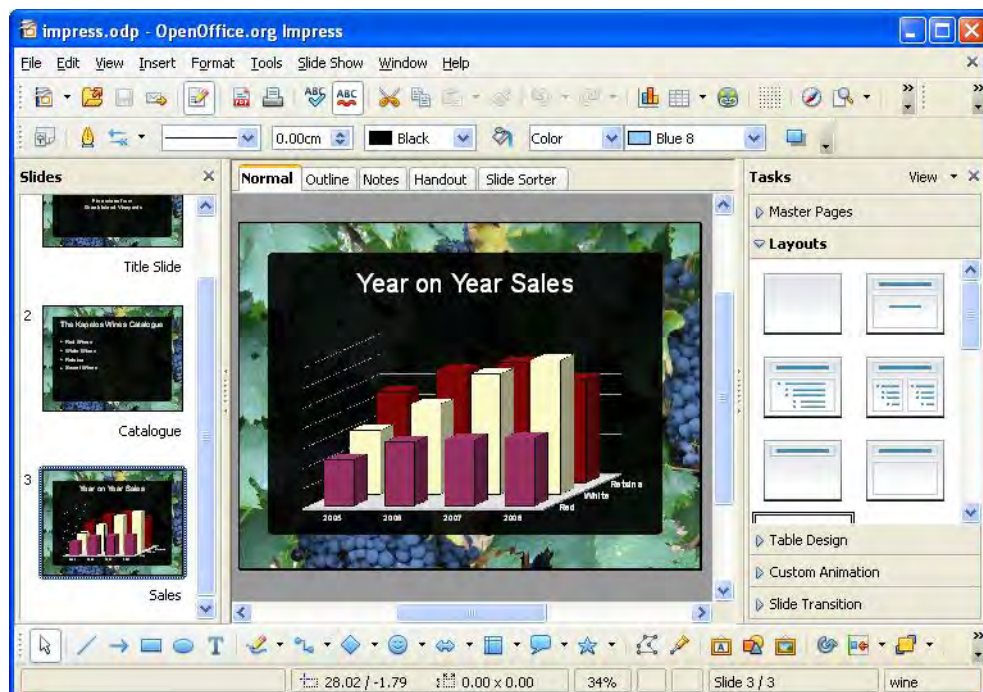
Figure 1. 2 OpenOffice 3 Impress

1.2.1.3 Apple Keynote

Apple Keynote (Figure 1. 3) is a part of the Apple iWork productivity suite. It provides only Mac OS X platforms. The basic features are almost the same as those in the Microsoft PowerPoint and OpenOffice Impress. It supports dual monitor which means the presenter can use the desktop or notes at the same time when showing the presentation on another monitor. Apple Keynote can export the presentation project to various file formats, e.g. PDF, QuickTime, Flash, JPEG, TIFF, PNG, HTML and Microsoft PowerPoint PPT.

Figure 1. 3 Apple Keynote 2008

1.2.1.4 Adobe Reader

Adobe Reader is the software for viewing all PDF documents. PDF means Portable Document Format. The primary objective of using PDF file is that it is readable by anyone with free Adobe Reader and the visual content remains the same in any environment. Another advantage is that it is platform and software independent. At the beginning, PDF document is not used for presentation purpose. Recently, some people start using PDF to give presentations. The latest Adobe Reader supports full screen mode for viewing the PDF files. However, it is just a PDF viewer. If the presenter wants to change the content inside, he/she has to use other programs to regenerate the PDF file. Figure 1. 4 shows one of the examples using Adobe Reader to give a presentation.

Figure 1. 4 Adobe Reader 9

1.2.2 Web Application

Web Application is the trend of software development as the number of Internet users keeps growing. Many companies like Microsoft and Google are going to develop a web version of presentation software.

1.2.2.1 Google Docs

Google Docs (Figure 1. 5) is an example of web-based presentation software. It provides online editor and live presentation with support of PDF, PPT and PPS file format. It is now in beta version and provides only limited functions for creating basic presentation slides compared to those desktop applications. Besides, it has several restrictions on file size: user can upload 10MB maximum for PPT and PPS file format from local computer, 2MB from the web, and at most 500KBby emailing.
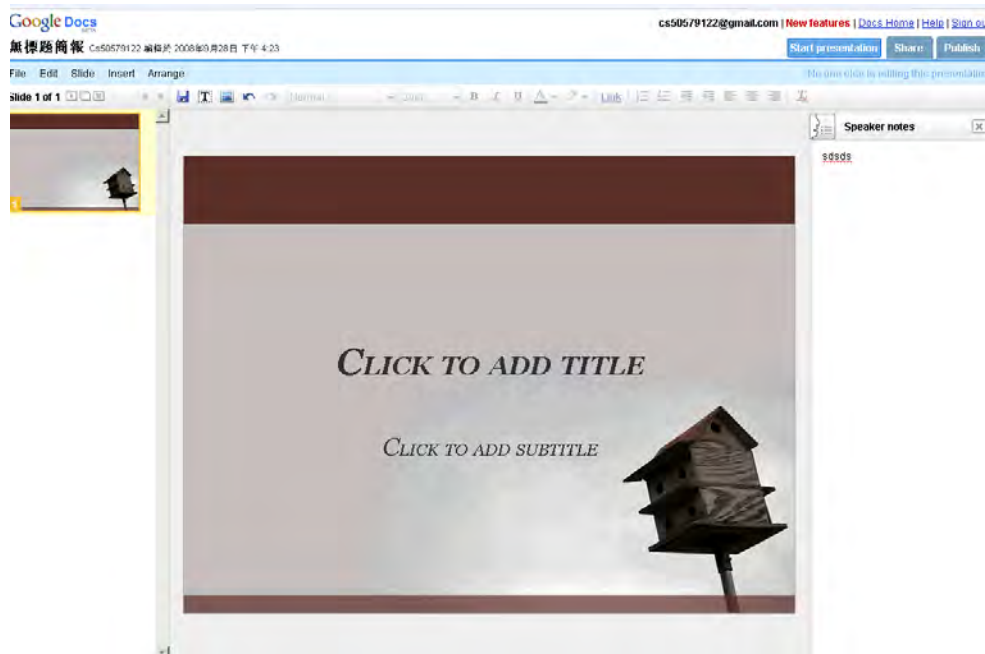
Figure 1. 5 Google Docs

1.2.2.2 Slideshare

Slideshare (Figure 1. 6) is another famous website that allows you to share PowerPoint, OpenOffice and PDF presentation files on the Internet with each other. Slideshare also cooperates with other famous website allowing users to share presentation to those sites directly. The sites include MySpace, Hi5, Friendster, Xanga, LiveJournal, Facebook, Blogger, Tagged, TypePad, Freewebs, BlackPlanet and Twitter. However, it does not provide online editing function. User can only view the presentation online.

Figure 1. 6 SlideShare

1.2.2.3 Office Live Workspace

Office Live Workspace is a free online service provided by Microsoft. It allows user to save, access and share presentations. It works with Microsoft PowerPoint. Users have to download and install a plug-in to enable Microsoft PowerPoint to access to the workspace. Besides, users are required to use Internet Explorer and Mozilla Firefox for opening the application. However, Office Live Workspace can only share and view the file uploaded. Also, the online viewer has compatibility problem that some contents do not appear the same as in Microsoft PowerPoint (see Figure 1. 7 and Figure 1. 8). If users want to edit the file, they still need to use a Microsoft PowerPoint or other compatible programs.
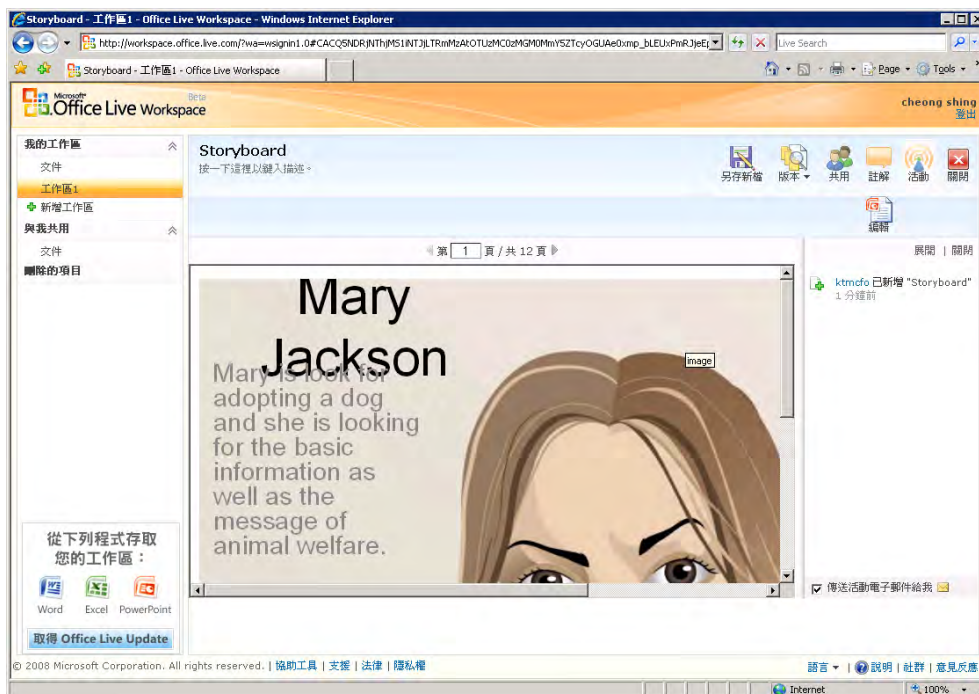
Figure 1. 7 Office Live Workspace

Figure 1. 8 Microsoft Powerpoint 2007

1.2.3 Add-ons

Some products may serve as an add-ons of other application. Adobe Presenter is one of the examples.

1.2.3.1 Adobe Presenter

Adobe Presenter is add-on to the Microsoft PowerPoint. It provides additional features to the Microsoft PowerPoint. Users can create PowerPoint file with rich contents such as Flash video, audio recording control, quizzes or surveys template, PDF format supporting, etc. Figure 1. 9 shows menus of Adobe Presenter 7 in the Microsoft PowerPoint 2007.

Figure 1. 9 Adobe Presenter 7

1.3 Existing Problems

Although the current presentation software provides many useful features, problems still exist. They are divided into the following areas:

1.3.1 Platform Dependency

Most current programs are platform dependent. It means that the program can only be installed and run in a specified operating system or machine and the developer may have to design a dedicated version to each platform.

Figure 1. 10 shows the platform compatibility of common presentation programs. Only OpenOffice 3 Impress can be run and installed in both Microsoft Windows, Mac OS X and Linux among all desktop applications. And all web-based applications do not have compatibility problem. It is because website can behave almost the same in all major browsers and operating systems.

	Microsoft Windows	Mac OS X	Linux
Desktop Application			
Microsoft PowerPoint (2007 for Windows / 2008 for Mac OS)	√	√	
OpenOffice 3 Impress	√	√	√
Apple Keynote 2008		√	
Adobe Reader 9	√	√	√
Web Application			
Google Docs Beta	√	√	√
Slideshare	√	√	√
Office Live Workspace	√	√	√
Add-ons			
Adobe Presenter 7	√	√	

Figure 1. 10 Platform compatibility of presentation programs

1.3.2 Inadequate Functionality

Compared to web-based presentation software, only Google Docs is able to edit slides online. The rest of them are only PowerPoint viewers. It is not convenient to users if they want to edit something before giving a presentation. Although Google Docs allows user to edit slides, it provides only basic features. The advanced features such as animation and multimedia integration are not included. It may not be sufficient enough compared to desktop applications.

1.3.3 Usability Problems

The traditional overhead transparency is a flexible tool because it allows presenters to mark up on the slides and multiple visuals can be shown at once [3]. These are the reasons why few people still use overhead transparencies. Almost all presentation software, such as Microsoft PowerPoint, Open Office Draw, and Apple Keynote, still cannot completely implement these features. The current presentation software can show only one slide at each time in full screen mode. It is very inconvenient that if the presenters want to compare the contents from different slides or other resources like webpage or other documents. Under this situation, they may either switch the screen to **the browser or scale down both windows' size to fit the screen resolution. It may result** that the audience cannot see the text on the screen as it is too small. On the other hand, the current version only provides limited marker options including pen, highlighter during playing of slides. But most of them are difficult to control by mouse. If the presenter wants to add further notes **by using the "pen", the word will definitely be very ugly.**

1.3.4 Data Protection and Copyright

Data protection and copyright is a problem if we share the file online. Although the user may set security options in the server to restrict an unauthorized download or encrypt the document by the built-in function provided by the program. Everyone can still use the materials inside once they obtain the file. Users have to trade-off if they desire to share their material online. Slideshare provides a solution to this problem. It converts the slide content into SWF file format which is more secure. It is because SWF file does

not provide direct copy and paste function, and hence users cannot get the text and images easily.

1.3.5 Software and Update Distribution

Desktop applications require installation. Nowadays, most application is very big in file size. The installation disc may take more than 1 DVDs and those applications usually require a certain amount of disk storage. On the other hand, if there are any bugs or security risks, users have to download and install separately. This problem can be solved if the system is changed to web-based application. It is because web-based application will not notify the **changes to users and does not require user's action for an update.**

1.3.6 Software Dependency

Among the programs evaluated, the exported file can only be opened by relative software. For example, a regular version of PowerPoint or a PowerPoint viewer is required to open a PPT or PPTX (file format of Microsoft PowerPoint) file. Users may not be able to edit or even view the file if they are working in other desktops that do not come with the required program.

1.4 Technology Research

The problems are discussed in the previous part. This part aims to discuss on the pros and cons of the technology related to the project. It helps to define the most suitable technology for further analysis.

1.4.1 Solution Stack

Solution stack means a combination of software subsystems needed to deliver a solution. For example, an operating system, web server, database and programming language are needed to develop a web application. There are many combinations. The most common are LAMP, WISA, MAMP, and SAMP.

1.4.1.1 LAMP

LAMP refers to Linux, Apache, MySQL and PHP [4]. Both of them are free and open source software. This combination defines a basic web server infrastructure. This combination is popular because its cost is low. However, Linux server is usually more difficult to configure and maintain as most operations are done using command line mode.

1.4.1.2 WISA

WISA refers to Windows alternative to LAMP by using Microsoft technologies. They are: Window Server, Internet Information Services (IIS), Microsoft SQL Server, and ASP.NET [5]. These components usually provide good user interfaces that can be controlled and used easily by sever administrator. The disadvantage is that the license costs of these products are very high.

1.4.1.3 MAMP

MAMP refers to the solution stack with using Apple Macintosh operating system. It means Mac OS X, Apache, MySQL and P could be PHP, Perl or Python [6]. The combination is similar to LAMP. The only difference is the operating system. It is also a popular technology for building a web server on a Macintosh server. The disadvantage is that Mac server is not commonly used and the acquisition cost of Mac server is usually higher than a Linux or Window based server. It is because Mac OS X can only be installed at the server sold by Apple.

1.4.1.4 SAMP

SAMP is like LAMP. The operating system is changed from Linux to Open Solaris [7]. Solaris is the Sun's operating system. Linux and Solaris are different in scheduling, schedulers, memory management, paging, file systems, etc [8]. However, it is not much difference for building a simple web server.

1.4.2 Rich Internet Application (RIA) Technology

The term Rich Internet Application (RIA) is first defined by Macromedia (acquired by Adobe Systems Incorporated on Dec 3 2005). It is a model for internet applications **which combines "media rich power of the traditional desktop with the deployment and** content-**rich nature of web applications"** [9]. According to the Adobe.com, rich Internet applications (RIA) are web-based program that can give rich and engaging experience to users. By using the RIA technology, it enhances productivity and satisfies user better [10]. RIAs have the features and functionality of traditional desktop applications. They are run in a web browser, and hence software installation is not required. RIAs are not like PHP and ASP.NET, it is only a client application which co-operates with a separate services layer on the backend. Currently, there are three main RIA technologies: Adobe Flex, Microsoft Silverlight and Sun JavaFX. Figure 1. 11, Figure 1. 12 and Figure 1. 13 show the screenshots of implementing a button and text field by using the three technologies respectively. And Figure 1. 14 shows the comparison between these three.

Figure 1. 12 Adobe Flex

Figure 1. 11 Microsoft Silverlight
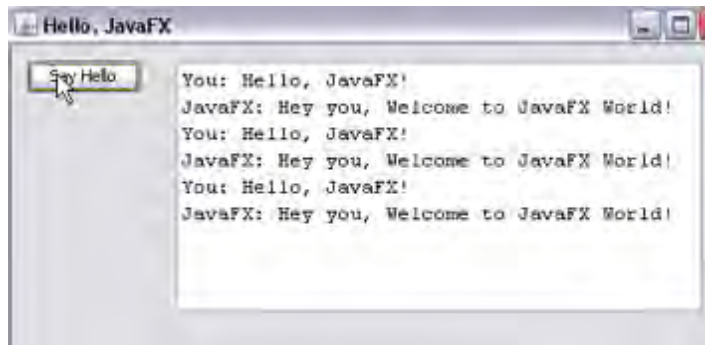
Figure 1. 13 Sun JavaFX

	Adobe Flex	Microsoft Silverlight	Sun JavaFX
Built-in UI Controls	√	√ but limited	√ via swing
IDE	√ Flex Builder (Eclipse based)	√ Visual Studio 2008 .Net 3.5 Silverlight Visual Studio 2008 Template	√ Netbean JavaFX plugin
IDE Visual Design	√		
Browser Plug-in	Adobe Flash Player	Silverlight	Java plugin with JavaFX extension
Programming Languages	MXML ActionScript 3.0	XAML JavaScript	JavaFx Script Java

Figure 1. 14 Comparison of RIA technologies by Moxie Zhang [11]

Although their outputs look quite similar, the codes are quite different. Silverlight and Flex use XML based syntax for defining the UI controls and JavaFX uses scripting language with new syntax. One major disadvantage of using RIA technologies is that browser plug-in is required for running in client side. For this issue, Adobe Flex did the best since more than 99% of Internet-enabled desktop computers have installed Flash Player [12], while Microsoft has just started to distribute the Silverlight media player in October 2008. On the other hand, Silverlight are now less compatible with other web browsers and operating systems. According to Wikipedia, it is current not supported in Linux and Open Solaris [13]. For the above reason, it is better to use Flex in this project.

1.4.3 Storage Method

There are multiple storage methods for an application. In current applications, the main data storage methods are using database or storing data in a local file with specified file format. Database server is commonly used in web content management system. It can be used to manage and store the data. By enabling local file importing and exporting support, users are able to use the data anywhere.

1.4.3.1 Using Database Server

The most popular relational databases are Microsoft SQL Server, MySQL and Oracle. Apart from Microsoft SQL Server can only be installed in Window platform, there are no big differences in usage [14].

1.4.3.2 Using Remote File Server

Most web-based applications provide web storage to their users. For example, in many content management systems like Google Docs, the document is stored in the server's file system. You can download and open the file directly from the server when access.

1.4.3.3 Using Local Storage

The current desktop presentation application, e.g. Microsoft PowerPoint, stores the content in a customized PPT format in local file system.

1.4.4 File Format

Most applications define their own file format. However, it implies that users can open **this file format only once they install appropriate software. The file is not "readable" by** other programs and people. It is also hard for developer if they wish to develop plug-in or extension for the program. To overcome this problem, Extensible Markup Language (XML) can be used instead. It is extensible markup language which allows user to define the mark-up elements [15]. User can simply view and edit the file by any text editor. Moreover, XML is well supported in major technologies, such as Flex, Silverlight, PHP, ASP.NET, all major browsers, etc.

1.5 Solution

In order to overcome the problems stated above, this project is proposed. A rich internet application (RIA) **called "Pointer" is** built with using Flex technology which is able to edit or view presentation. By using the technology, users are allowed to use the application without any platform and compatibility issue. Besides, in order to benefit from enhancing creativity, information sharing, collaboration and functionality [16], a Web 2.0 concept content management system will be developed for storing and sharing the presentation over the Internet. The aim of the project is to provide an environment that allows creation or use of presentations anytime, anywhere, and by any peoples in a simplified, user-centered way.

1.6 Project Scope

This project focuses on the development of the Flex-based presentation software. The scope of the project includes:

- The study of web content management system
- The study of different presentation programs
- The study of web usability and accessibility
- The study of progressive enhancement technique
- The implementation of web interfaces on multiple platforms
- The implementation of search engine optimization in Flash-based application
- The implementation of progressive enhancement framework

The functional requirements, non-functional requirements and potential users of the prescribed software are listed below:

1.6.1 Functional Requirements

- Support basic slide elements. E.g. text, image
- Support extra slide elements. E.g. Flash animation, Video
- Support slide transitions effects
- Provide online editing and online viewing

1.6.2 Non-functional Requirements

- Provide security on online materials
- Able to be used in multiple operating systems
- Provide a user-friendly interface
- Can be found by search engine

1.6.3 Potential Users

The application has 2 main target users:

1. Presenters: people who want to use powerpoint slides as a visual aid to give presentation.
2. Readers: people who want to search for information from the powerpoint slides.

1.7 Project Plan

The project was planned to have 3 milestones, the release date of the milestones are as follows:

1st milestone: 31 January 2009

2nd milestone: 31 March 2009

3rd milestone: 1 April 2009

The detailed project schedule and Gantt chart are put in Appendices.

2. Methodology and Resources

By consideration of the problems and technology research above, it is important to decide how the project will be developed to meet the requirements and solve the problems. The following sections focus on the technology and resources applied to the project.

2.1 Front-end Technology

This part lists all technology used in the project for the purpose of implementing client side. They are Adobe Flex 3, XHTML and JavaScript.

2.1.1 Adobe Flex 3

As stated in the solution, this project will be implemented by using Adobe Flex technologies. The latest version of Flex is 3.2. Adobe Flex application is written by 2 standards-based languages: MXML and ActionScript 3.0. MXML is a declarative XML-based language which is used to describe UI layout and behaviors and ActionScript 3 is an object-oriented language for creating client logic. Flex library contains more than 100 UI components which are usable for creating RIA.

According to Adobe.com, Adobe Flex is a "highly productive, open source framework for building and maintaining expressive web applications that deploy consistently on all major browsers, d**esktops, and operating systems"** [17]. Flex application is enabled for all operating systems once it has installed Adobe Flash Player which is used over 99% of Internet-enabled desktops [12]. This means it can solve the compatibility problem of the current desktop application.

2.1.2 XHTML 1.1
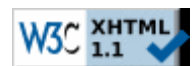
The outcome of a Flex application is a Shockwave Flash (.swf) file. The common method to view SWF file on the Internet is to embed the SWF object into HTML. This project follows the same practice and the html is implemented by the latest HTML standard: XHTML 1.1.

2.1.3 JavaScript & SWFObject

JavaScript is used in the html pages for several purposes. Firstly, the user can navigate the presentation slides in the same page without refreshing and loading other pages. Besides, the site uses a JavaScript library called SWFObject to embed Flash content

into HTML. SWFObject is an open source project. It aims at provide an easy-to-use and standards-friendly API for web developers [18]. **It can be used to detect client's** Flash player version. On the other hand, SWFObject can replace the SWF object to the designated HTML component. This ability plays a very important role to the project under progressive enhancement framework (will be further discussed in section 2.3.2.2 Progressive Enhancement Framework).

2.2 Back-end Technology

In the server side, PHP is the main scripting language to handle the logic and communication between client side and server side.

2.2.1 PHP 5 & AMFPHP 1.2

AMFPHP is an open-source PHP implementation of the Action Message Format (AMF). **AMF is a "binary format based loosely on the SOAP"** [19]. It is designed for communication between Flash application and client side primarily. Zend Framework, Python, PHP, Java, .NET, Ruby on Rails, etc are now offered support to this message format. The reason to use AMFPHP in this project is that it allows binary serialization of ActionScript 3.0 native types and objects to be sent to server side, i.e. it allows Flex to communicate directly with PHP class objects on the server. It does not require the system to parse the data into/from other representation format such as XML or other text based object. As a result, it is more compactable and approximately 4 times faster than using HTTP service and Web service [20].

2.3 System Architecture

This section gives the overview of the system architecture. It includes the work flow of the application and the design pattern of the system.

2.3.1 Application Framework

In order to take the benefit of easy setup and maintenance, Microsoft Window platform is suggested for this project. However, the solution stack discussed in 1.4.1.2 WISA above is not applicable because the project is going to use AMFPHP instead of ASP.NET. Therefore, the stack is changed a little bit from WISA to WASP. It refers to Window Server, Apache, SQL Server and PHP. The basic idea of the framework is described in the following diagram:
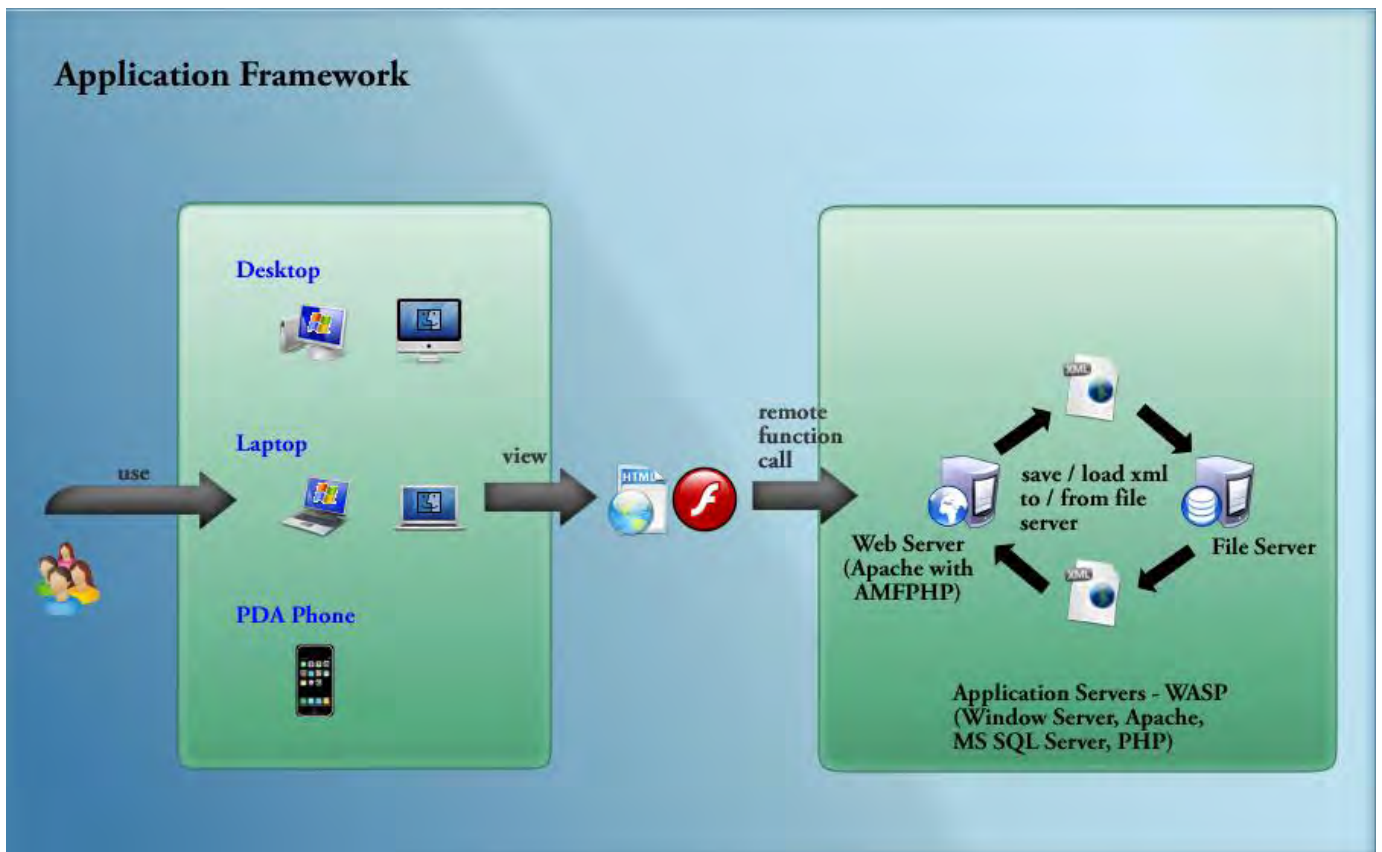

Figure 2. 1 Application Framework of the project

2.3.1.1 Communication Channels (HTTP, RemoteObject)

Figure 2. 1 shows the entire flow of the application. The user can use web browser on most computer devices include laptop, desktop and mobile devices to access to the website. The website is hosted on a dedicated web server using HTTP service. The application then loads the data stored in a XML file via HTTP service.

The communication between client side and server side are using RemoteObject method which supports for AMF encoding. For example, when users try to save their work, the client passes the binary data to the AMFPHP server. Then, saving operations are done in the PHP script.

```
function upload_thumbnail ($b, $name)
{
        $path = "../../../../../files/xml/thumbnail/$name";
        file_put_contents ($path, $b->data);
        return "files/xml/thumbnail/$name";
}
```

Figure 2. 2 Saving image function in AMFPHP

The above figure shows the source code of saving image function using AMFPHP. It only uses around 6 lines of code to save an image in binary format to the systems directly. It does not require any parsing process like encoding and decoding.

2.3.1.2 Data Format (XML)

The project adopts Extensible Markup Language (XML) as the data format. By using this flexible text format, it is very convenience to add or reduce attributes to the data object. The XML file can be edited and readable in major software and programming languages. Also, it enable user to edit the properties of the file even without using dedicated editor.

```
<Image x="10" y="10" width="88" height="24" alpha="1">
        <source>./files/image/1239177078542</source>
        <description>Pointer Logo</description>
</Image>
```

Figure 2. 3 Image definition in the XML file

Figure 2. 3 is the definition of an Image component. The code is simple and easy to understand. The major benefit of using XML is that it is very easy to add or remove attributes or tags. Its flexibility allows the program to extend support in the future (details are discussed in section 4.3 Extensibility and Improvements).

2.3.1.3 Data Storage and Structure

The XML-based file is stored in the file server. The contents are organized as follows:
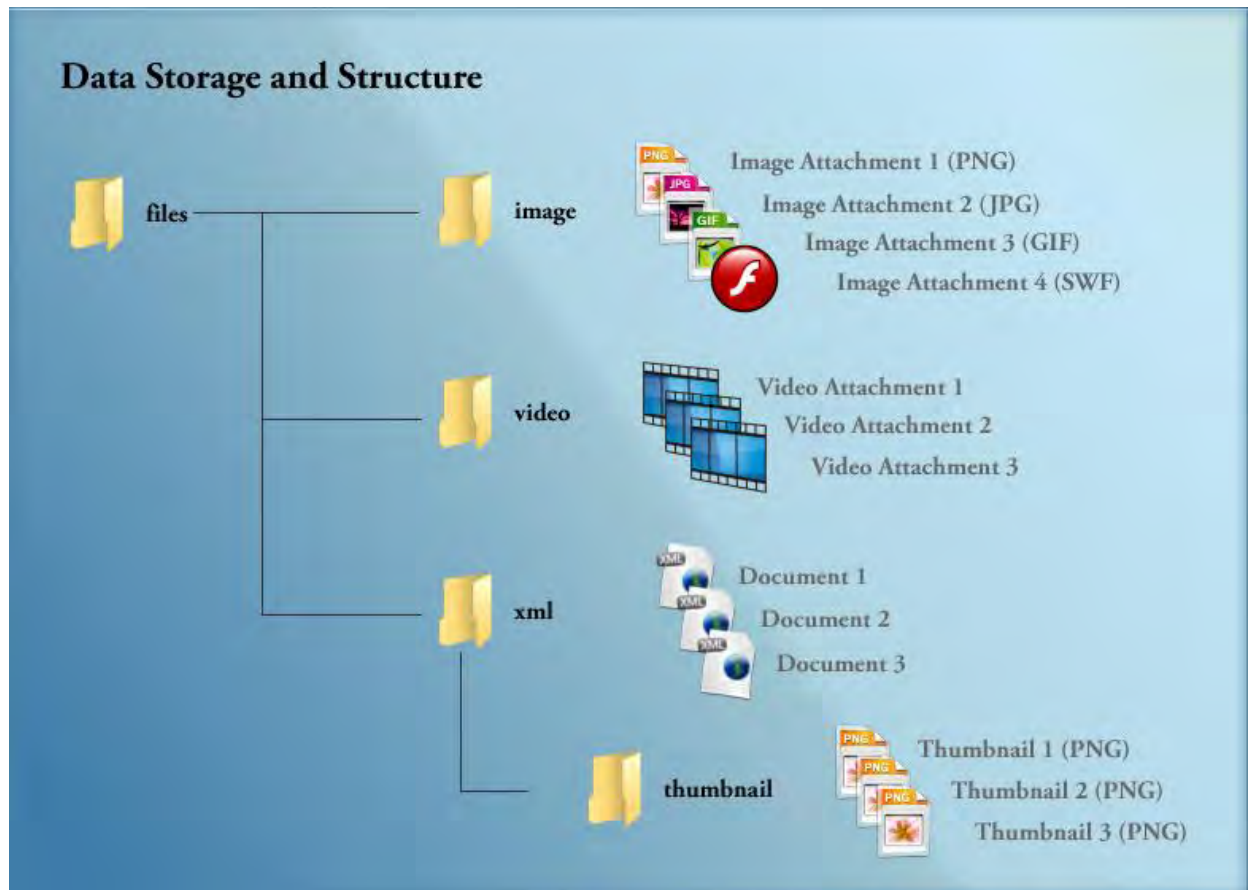

Figure 2. 4 File structure of data

Each document has its own definition file in format of XML. The XML file stores all properties and contents of all slides. While its multimedia components are stored separately, the XML file contains the link to that attachment only (Figure 2. 3). Keeping the links only in the XML file can make it more readable than inserting the binary code. Besides, it can keep the file size small. For example, the size of a file containing information for 90 powerpoint slides is only 44kb.

2.3.1.4 Edit Mode and PPT Mode

In Pointer, there are 2 modes for viewing the same file: Edit Mode and PPT Mode. In edit mode, there is a What You See Is What You Get (WYSIWYG) editor. You can make any changes you want under this mode (features will be included in section 3.1 Features and Screenshots). The slide inside the editor mode appears the same as in the presentation (PPT) mode. While PPT mode is a view only version that users cannot perform any changes to the slides.

2.3.1.5 URL Path Structure

There are 2 unique URLs to access a document in Edit Mode and PPT Mode respectively:

- Edit Mode: http://domainname/*<filename>*
- PPT Mode: http://domainname/*<filename>*.ppt

The tag *<filename>* indicates the name of file. As the filename is part of URL, therefore, there is no additional process needed for opening a file. The application will obtain the filename from the path and open corresponding file automatically.

Changes to Apache configuration file are required to implement above structure. Rewrite module in apache is used to rewrite the URL into other formats.

RewriteRule

^fyp/([^/.]+)?$ fyp/ppt.php?system_name=$1&system_mode=edit

RewriteRule

^fyp/([^/.]+)?.ppt$ fyp/ppt.php?system_name=$1&system_mode=ppt

Figure 2. 5 Rewrite rules of URL

The above settings redirect the user to the "real" entry point *ppt.php* without showing the path to the browser. At the same time, it captures the filename from the URL and passes it to the system.

By separating two different entry points, it provides a room to authors to share their work without opening the source. The author can publish his/her slides by the link with **".ppt" extension.** People who visit the file in PPT Mode can view the content only but do not have permission to edit or even obtain the source such as image and video. Besides, the main purpose of visitors is viewing the slide content rather than edit it. Therefore, a separate mode with simpler user interface is proposed.

2.3.2 Design pattern

2.3.2.1 Cairngorm 2.2.1

In the frontend, an open-source architectural framework called Cairngorm is adopted. **It is the "lightweight micro-architecture for RIAs built in Flex or AIR"** [21]. Cairngorm can be said as an extended MVC model for RIAs. It contains 6 major components: value object, model locator, front controller, command, business delegate and service locator. The value object can collaborate with the model locator. This pattern allows maintaining the state of the client which is frequently used in the RIAs. The **relationship between front controller and command is "Service to Worker" while front** controller listens for the request and command responds to user requests. The business delegate and service locator hold the business logic and are responsible for establishing connections between presentation layer and application layer which is technology independent. The server side can be implemented by LiveCycle Data Services, web services, Enterprise JavaBeans, ColdFusion, etc on IIS, J2EE or Linux Server using FDS/AMF, SOAP, XML-RPC, AMFPHP or XML over HTTP [22]. The logic flow can also be seen in Figure 2. 6.

By using Cairngorm, it enables to reuse the "logics". For example, creating new element such as text, image, chart, etc is frequently performed. A **command called "add an element" is implemented and can be recalled when the author wants to add something** to the slide. Figure 2. 7 shows another example, loading a document, on how to adopt the framework in the project.
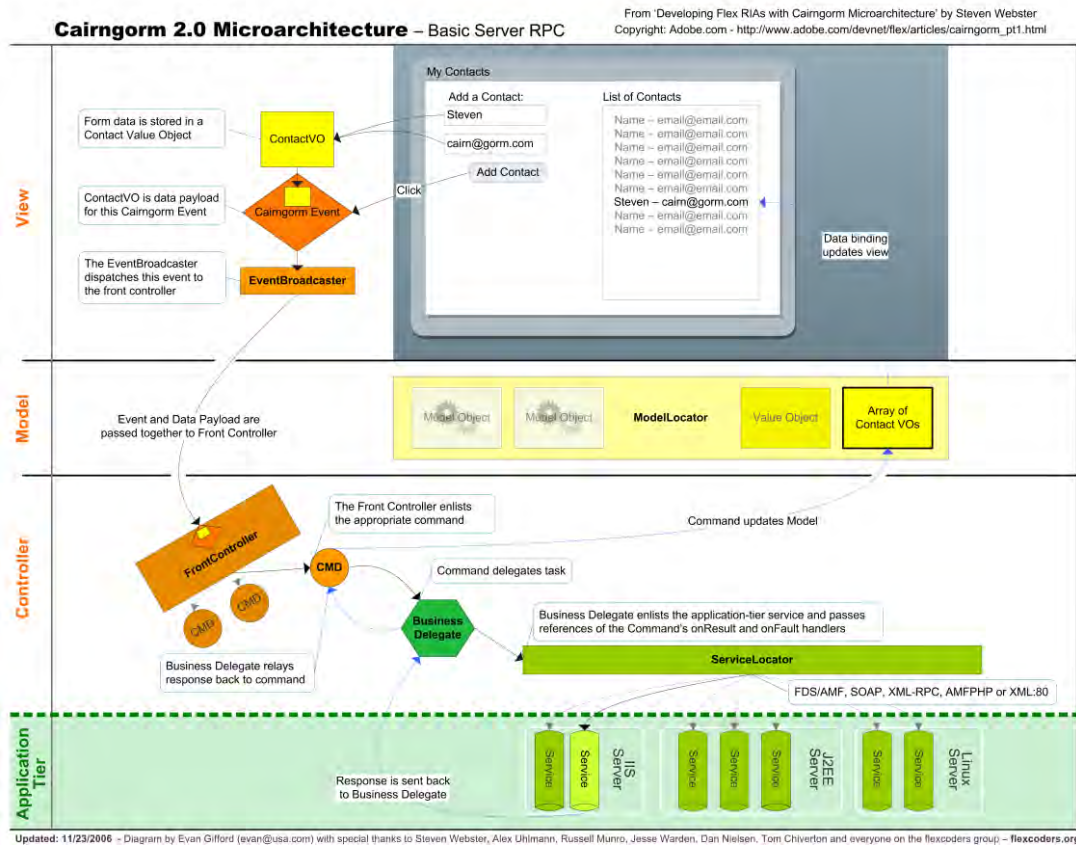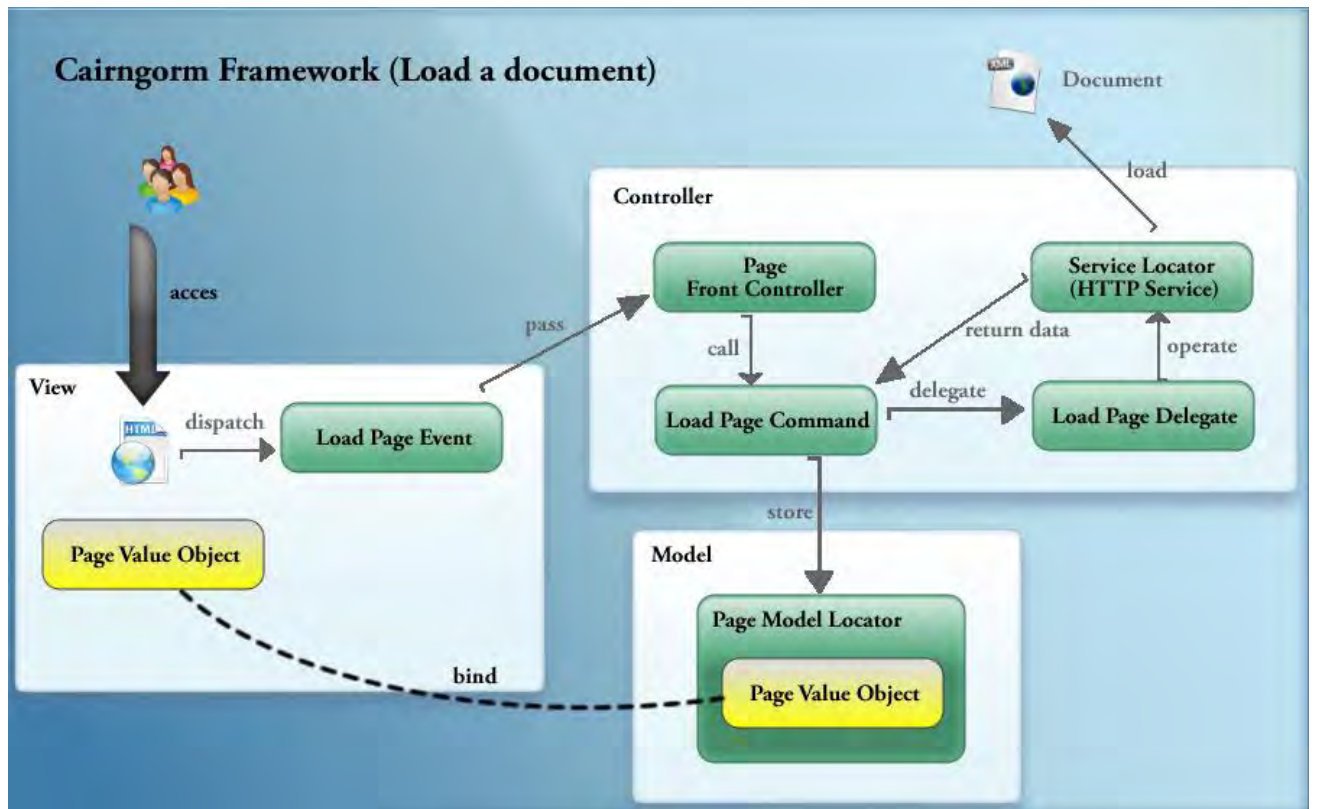
Figure 2. 6 Cairngorm 2.0 Micro-architecture [23]

Figure 2. 7 Flow diagram of loading a document

2.3.2.2 Progressive Enhancement Framework

The distributable of the Flex application is SWF file which is required a Flash player to play. Although using Flash technology can let appearance of a website remains unchanged using different platforms, the technology itself brings searchability and accessibility issue to the project. It is the fact that the searchability of SWF file is very low. Even though Adobe announced that they are teaming up with Google and Yahoo! to optimize Adobe Flash Player to enhance search engine indexing of SWF content on 1 July 2008 [24], it is now still rarely to search the relevant Flash-based contents or websites from the search engine. To overcome this problem, a strategy called progressive enhancement is used in this project.

Progressive Enhancement Framework **is a "web development strategy that ensures that** even a visitor with the lowest common denominator web browser technology can **navigate through a website and read its content"** [25]. By adopting this strategy, a Flash content website should have at least 4 outputs in different situations:

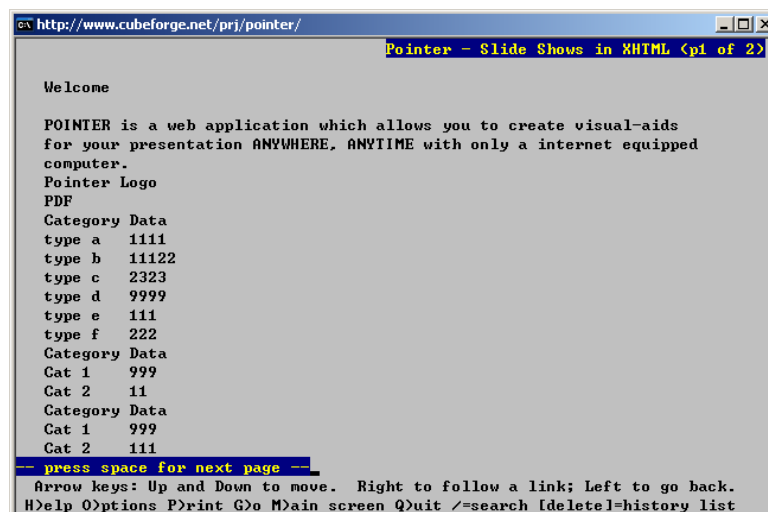(a) An html page that includes text content only without any styles and layout. This is designed for low-tech browser.

Figure 2. 8 Text only output

(b) An html page of (a) that includes layout and styling. Visitors can use a CSS-enabled browsers to access it.
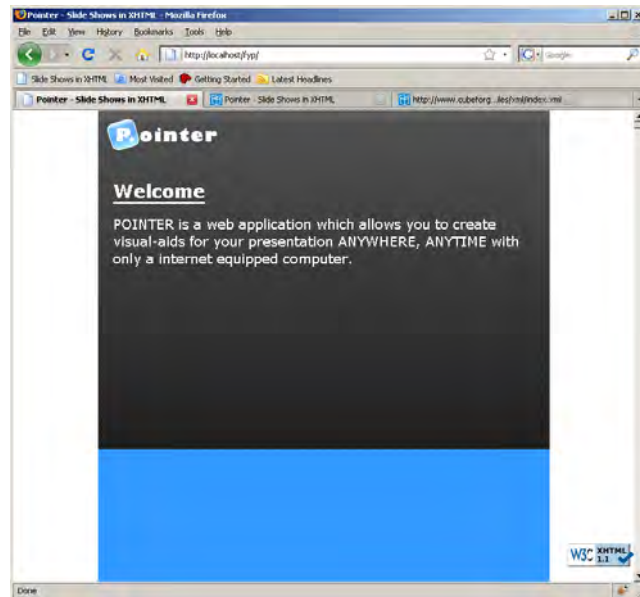

Figure 2. 9 HTML + CSS with no Javascript Support

(c) An html page of (b) that includes JavaScript effects. It is compactable with JavaScript-enabled browsers.
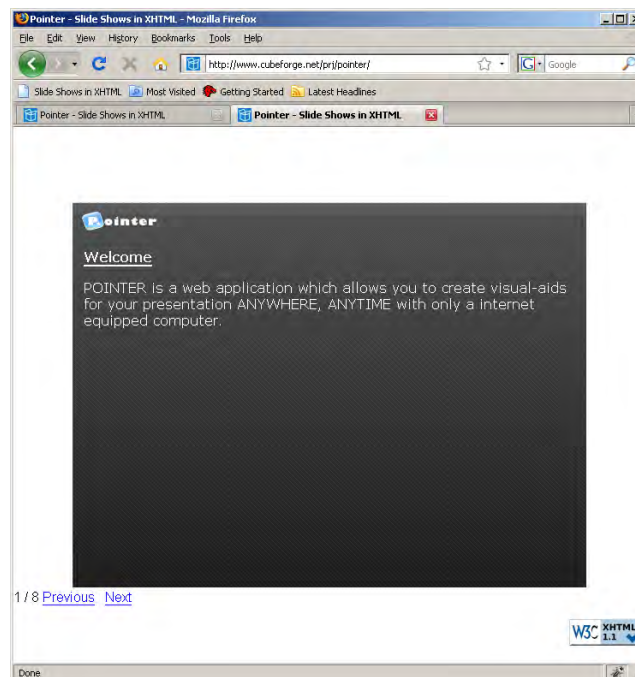

Figure 2. 10 HTML + CSS + JavaScript

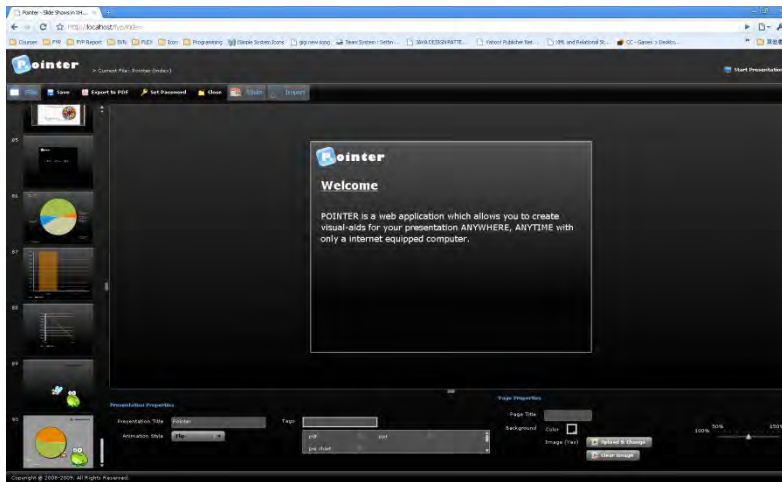(d) An html page of (c) which includes Flash content, i.e. user can enjoy the full functionality of the RIA.

Figure 2. 11 Flash version

In order to generate appropriate format to user in above 4 situations, a gateway concept **is adopted. The "gateway" is written in PHP. When user visits the site, it will first detect** the JavaScript support of the browser. If JavaScript is not enabled or supported at the moment, it generates a HTML page without inserting any JavaScript code (Figure 2. 9). Otherwise, the exported HTML page will include a navigation component written in JavaScript and only one slide is shown each time (Figure 2. 10). Besides, SWFObject (a JavaScript library) is included also. If there exists a Flash plug-in to the browser, SWFObject will automatically embed the Flash object (.swf) into the page and replace the original HTML content. This process will be done only when the browser is capable of playing Flash movie.

By using this approach, it makes the Flash content web available to different kinds of user no matter the setting, version, or plug-in of the **browser and clients' environment.** On the other hand, the web crawler, a special text browser commonly used by search engine to grab the web content, will obtain output (a) which is a basic html page containing all text content under this framework. It means that it is searchable by the major web engines. As a result, the content of the presentation can be shared not only within the application, but also the public internet users by Google and Yahoo! It can probably solve the inadequate searchability of Flash file on the Internet.

2.3.2.3 Class Diagram

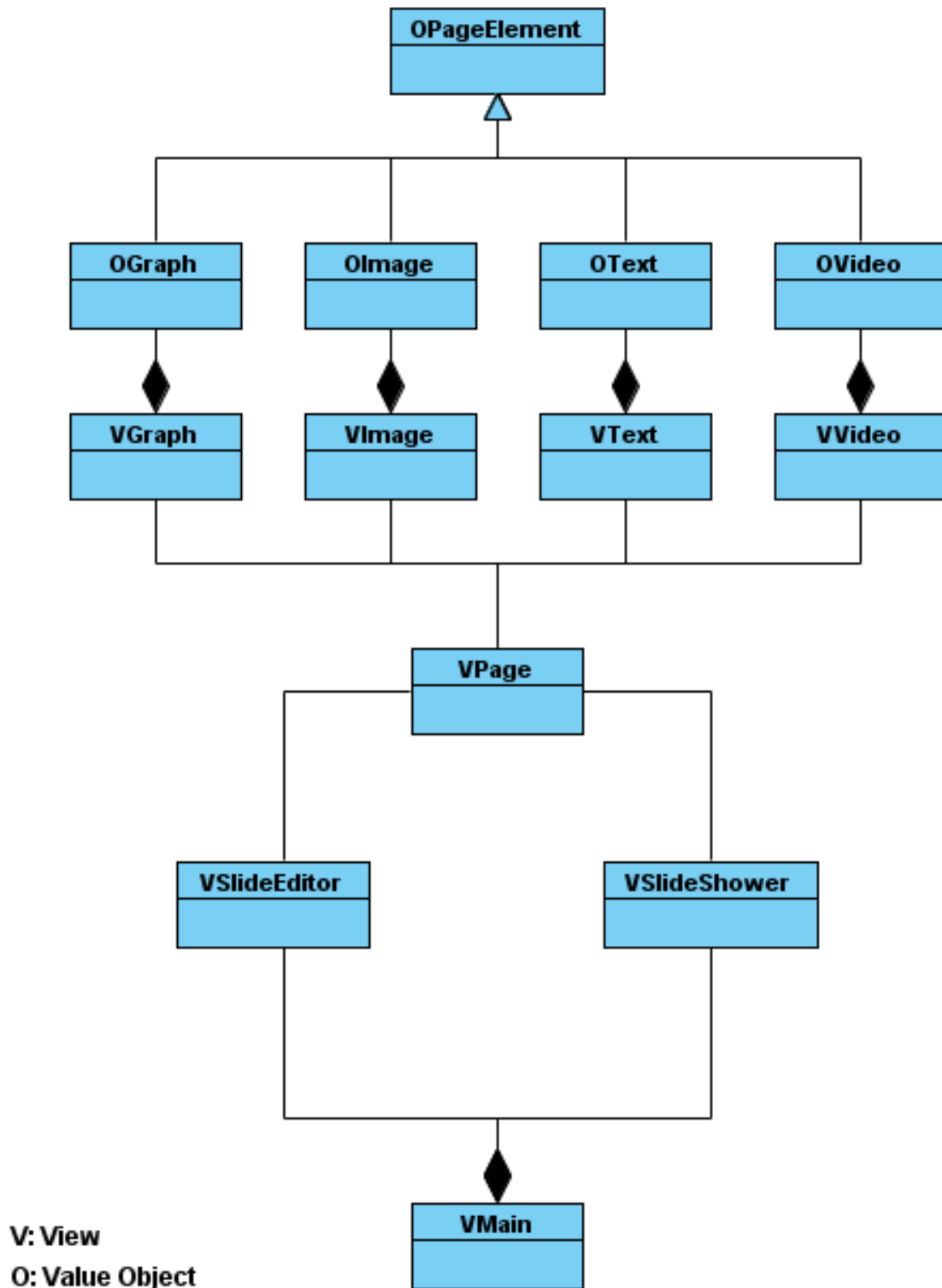The class diagram for the views and value objects is shown below:

Figure 2. 12 Class Diagram

2.4 User Interface Consideration

2.4.1 Edit Mode

The layout of the application is similar to most of the desktop application (see Figure 2. 13). The logo is at the corner and the tool bar is located at the top of the window. Following many presentation tools, the slide thumbnails navigator is presented at the left hand side of the screen. This layout reserves a large rectangular area to display the main content. However, the properties settings are placed at the bottom which is not the same as in Microsoft PowerPoint 2007. It can be found that the screen is very complex due to intensive placement of items (Figure 2. 14).
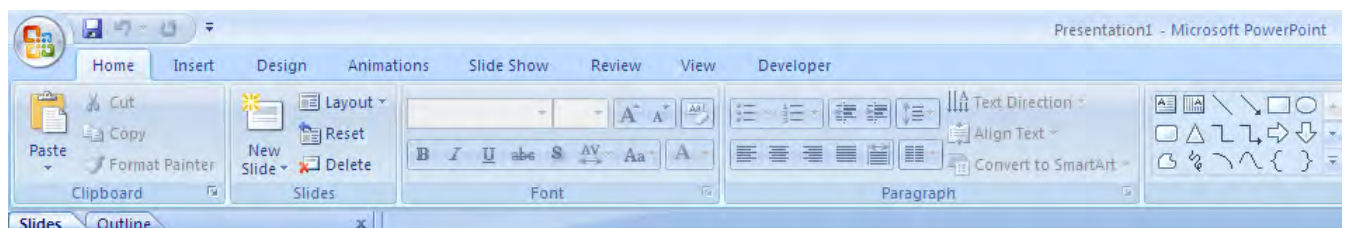

Figure 2. 13 UI Layout

Figure 2. 14 Tool bar in Microsoft PowerPoint 2007

2.4.2 PPT Mode

In PPT mode, the overall layout remains the same as in Edit mode. As mentioned in 2.3.1.4 Edit Mode and PPT Mode and 2.3.1.5 URL Path Structure, the purpose of PPT Mode is to keep a simple user interface to readers. Therefore, there is only a navigation menu and a button for entering full screen mode (see Figure 2. 15).
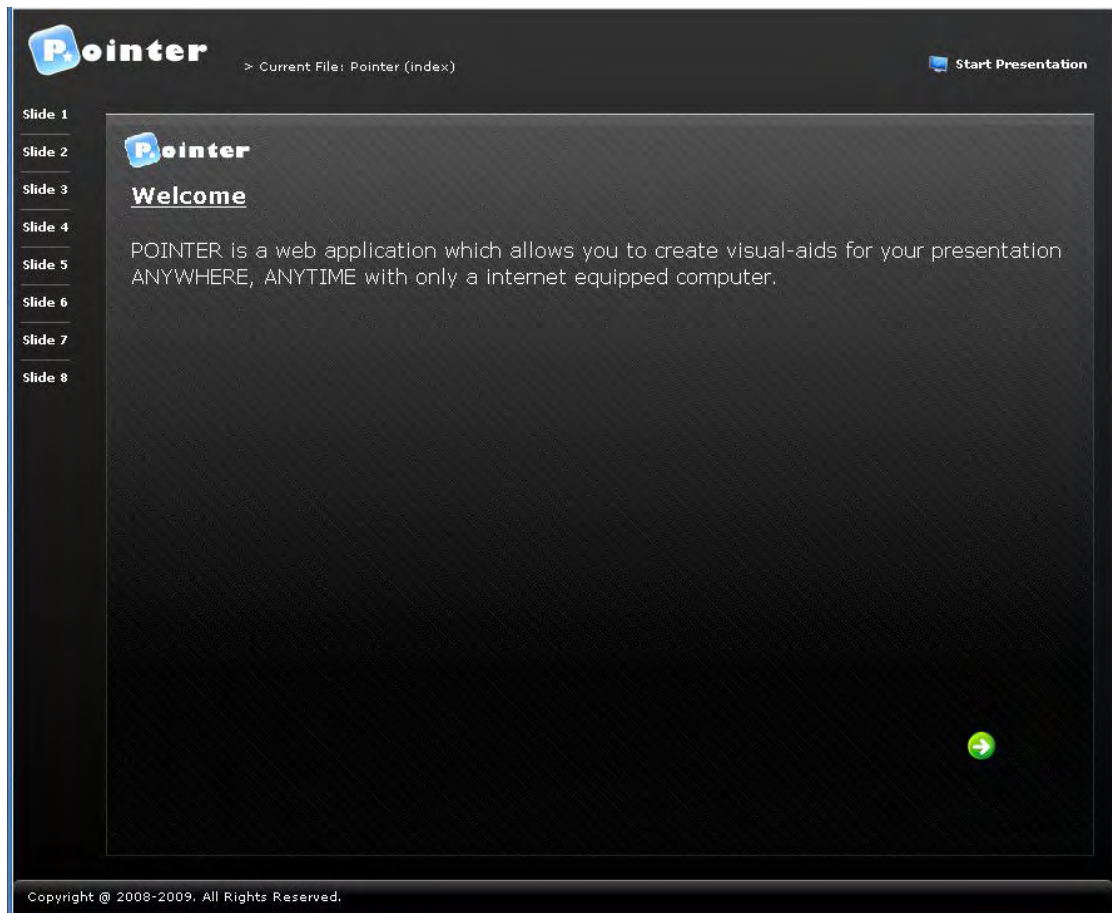

Figure 2. 15 PPT Mode UI

2.5 Search Engine Optimization

In order to optimize the ranking of search result of the document, the author is allowed to input keywords to describe the document (Figure 2. 16). Similarly, he/she can describe an image with some text (Figure 2. 17).
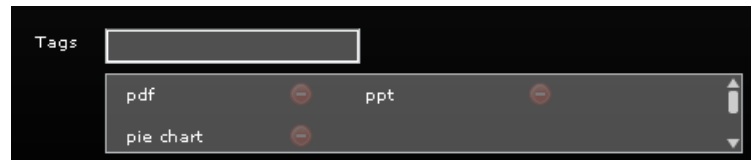

Figure 2. 16 Document keywords

Figure 2. 17 Image description box

The description text is included in the HTML source. For instances, keyword tags are included in the meta tag in head section of HTML, the description text of image is included in the "alt" attribute of the HTML Image element.

```
1  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
2      "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
3  <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
4  <head>
5      <title>Pointer - Slide Shows in XHTML</title>
6      <meta http-equiv="Content-Type" content="text/html;
7      <meta name="keywords" content="pdf,ppt,pie chart"/>
8      <meta name="copyright" content="Pointer" />
9      <meta name="robots" content="INDEX. FOLLOW"/>
```

Figure 2. 18 Meta keywords tag

```
5px  alt= image  /></div>
.eight:450px; background: #66ff; background-image:url
; height: 325px; left: 71px; top: 63px" alt="PDF" /><
.eight:450px; background: #66ff; background-image:url
.eight:450px; background: #66ff; background-image:url
```

Figure 2. 19 Image alt attribute

Search engines normally use text browser to grab the web contents. However, in Pointer, it includes a lot of multimedia components which are not visible to search engines. Therefore, some elements are represented in other format in different outputs listed in 2.3.2.2 Progressive Enhancement Framework (Figure 2. 20).

Browser Outputs / Slide Elements	Flash mode	HTML + CSS + JavaScript	HTML + CSS	Text Only
Text	√ With Style	√ With Style	√ With Style	√ Without Style
Image	√	√	√	× Display "alt" text instead
Flash	√	×	×	×
Background Color	√	√	√	×
Background Flash	√	×	×	×
Video	√	×	×	×
Chart	√	× Chart data displayed as a table	× Chart data displayed as a table	× Chart data displayed as a table

Figure 2. 20 Data representation in different situations

3. Results

This chapter shows the project results including the application features, evaluation and comparison.

3.1 Features and Screenshots

The main features and its screenshots of the system are described as follows:

3.1.1 PPT Mode

The following diagrams are the screenshot of PPT mode. In this mode, user can view the slides only. The layout is very simple
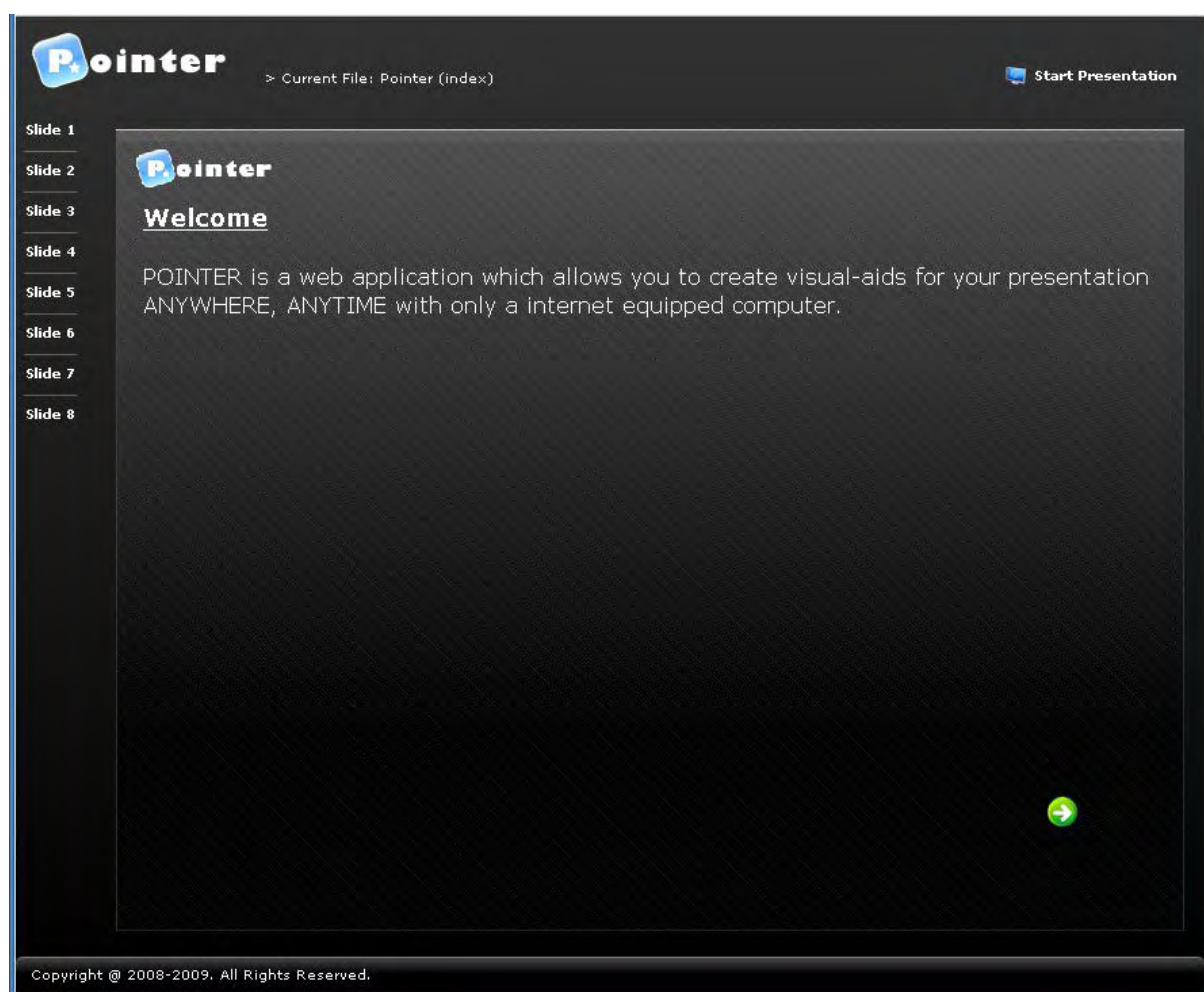

Figure 3. 1 Screenshots of PPT mode

3.1.1.1 Thumbnail Preview

When the mouse cursor is over the link bar, there is a thumbnail preview of that slide.

Figure 3. 2 Screenshot of link bar with thumbnail preview of slide

3.1.1.2 Full Screen

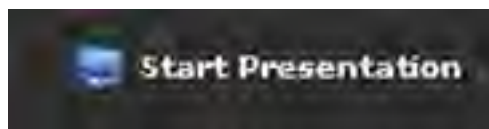There is a button for user to enter full screen mode.

Figure 3. 3 Screenshot of full screen button

3.1.2 Edit Mode

Edit mode provides full features. It allows user to edit and present their slides. Figure 3. 4 shows that the layout of edit mode is similar to PPT mode with adding a number of editing tools.

Figure 3. 4 Screenshot of edit mode

3.1.2.1 Password Authentication

In order to protect the assets, author can set a password to the document. Once the password protection is enabled, the system will require user to enter password every time they want to edit the document.
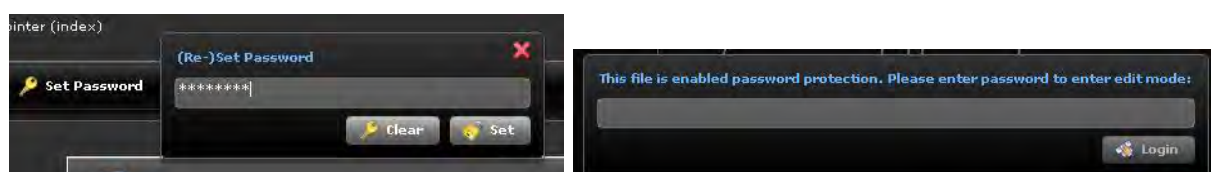

Figure 3. 5 Screenshot of setting password, and unlocking the document

3.1.2.3 Export to PDF

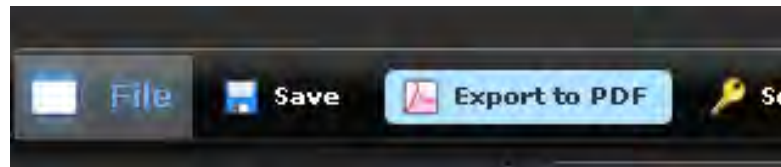User is able to export the document into PDF format for distribution. The output looks exactly the same as in Pointer.
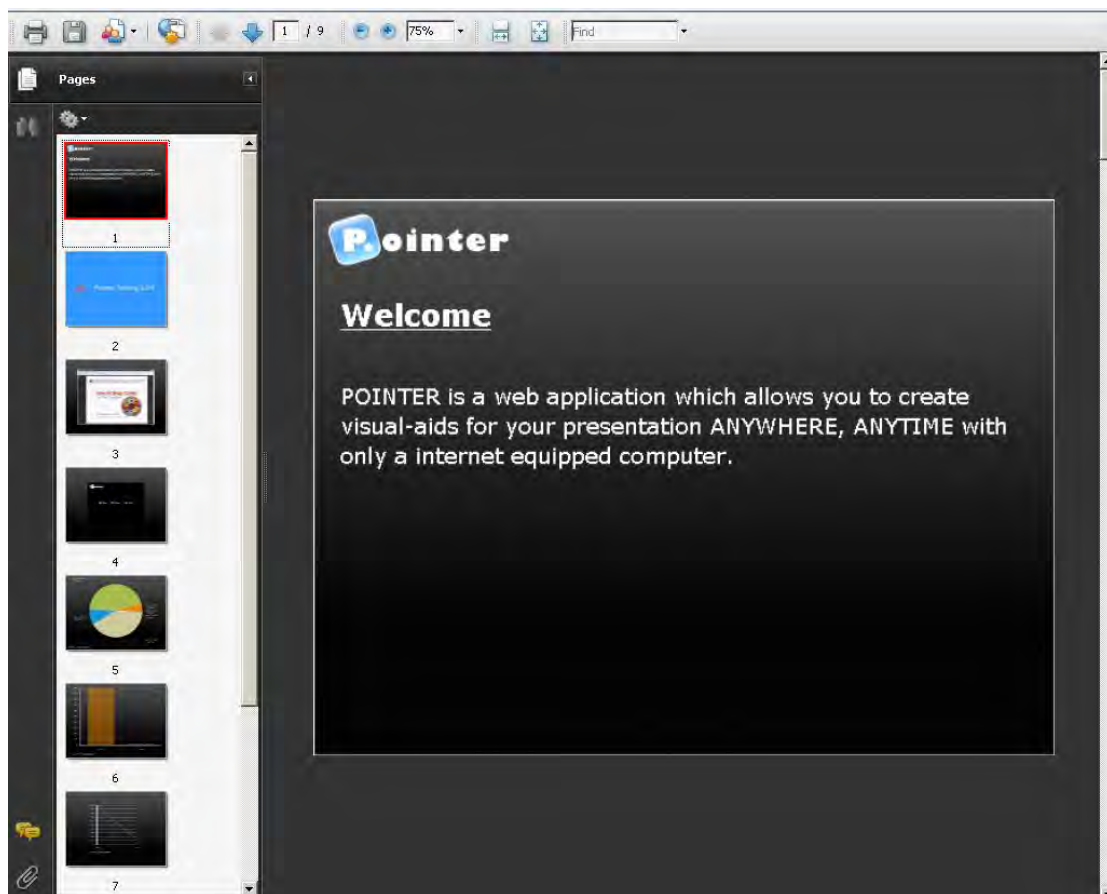

Figure 3. 6 Screenshot of export button

Figure 3. 7 Sample of exported PDF document

3.1.2.4 Animation Style

The system supports several animation effects between slide transitions. They are Cube Rotate, Flip, Push, Pop, Door and Gate.
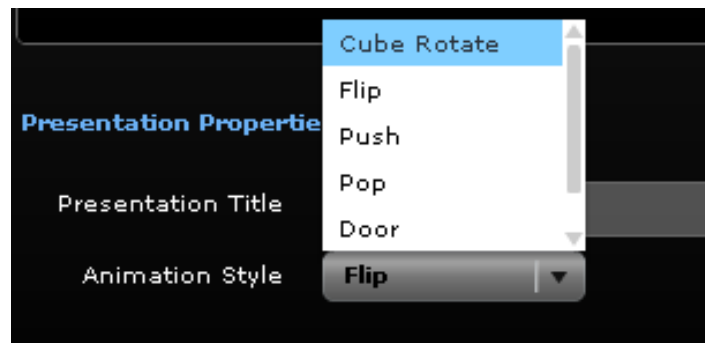

Figure 3. 8 User can set the animation style from the list

3.1.2.5 Document Properties (Title, Tags)

Users can set title and tags to describe the document.   The title and text will appear in the HTML code.

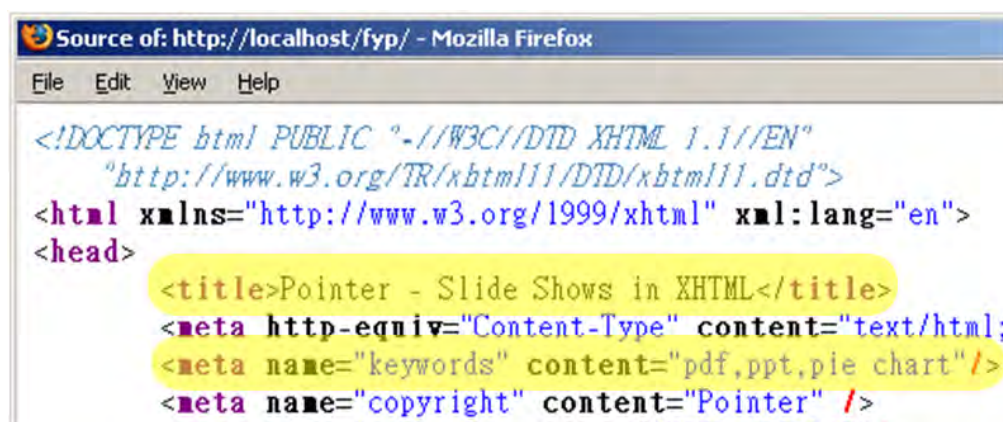**Figure 3. 9 User can use some keywords to describe their slides**

Figure 3. 10 Title and tags are shown in the HTML source

3.1.2.6 Thumbnail View

There is a list of thumbnail view of slides at the left hand side. The list is resizable and can be changed by mouse dragging. Besides, user can reorder or delete a slide by dragging its thumbnail.
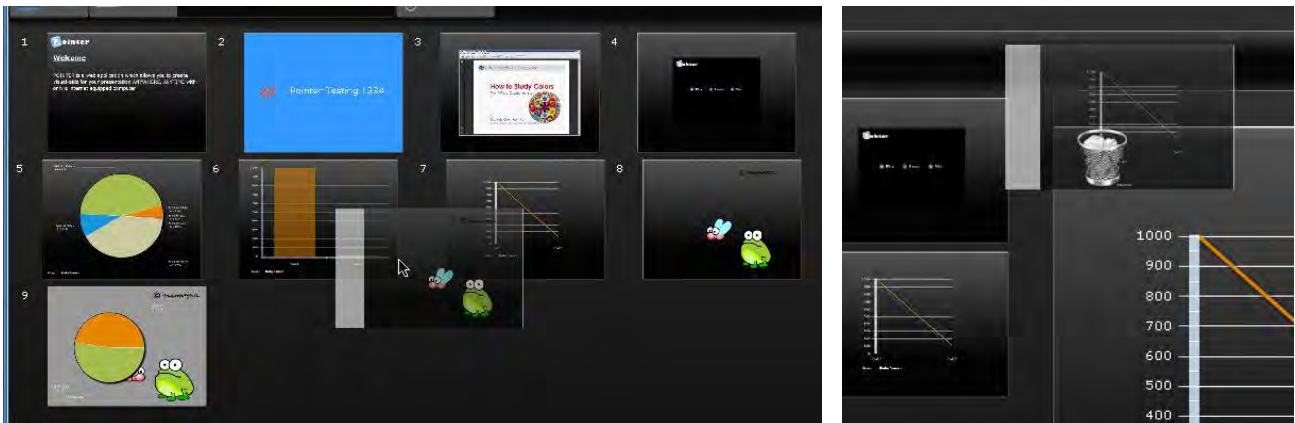

Figure 3. 11 User can drag and drop the thumbnail to reorder and delete slides.

3.1.2.7 Slides Properties (Title, Background Styling)

User can set the title, background color, background image to each slide separately. The application supports GIF, PNG, JPG and SWF for the background image.
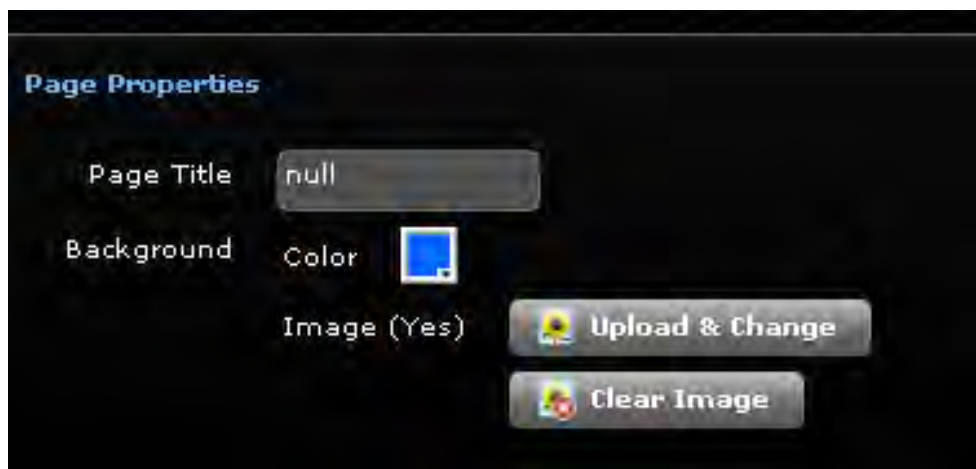

Figure 3. 12 Slides properties options.

3.1.2.8 Scaling Tool

The scaling tool enable user to scale the size of the current editing slide from 50% to 150%.
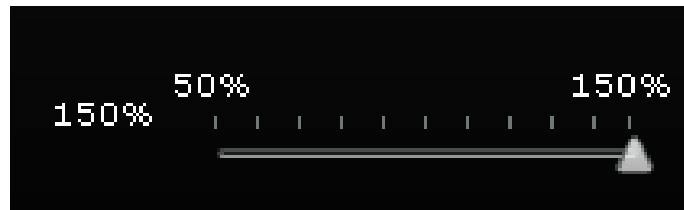

Figure 3. 13 User can scale the view to fit their screen

3.1.2.9 Slide Elements (Text, Image, SWF, Video, Graph)

User can insert multimedia elements in their presentation slides by just a simple click. The elements include text, image, Flash movie, video, and graph.
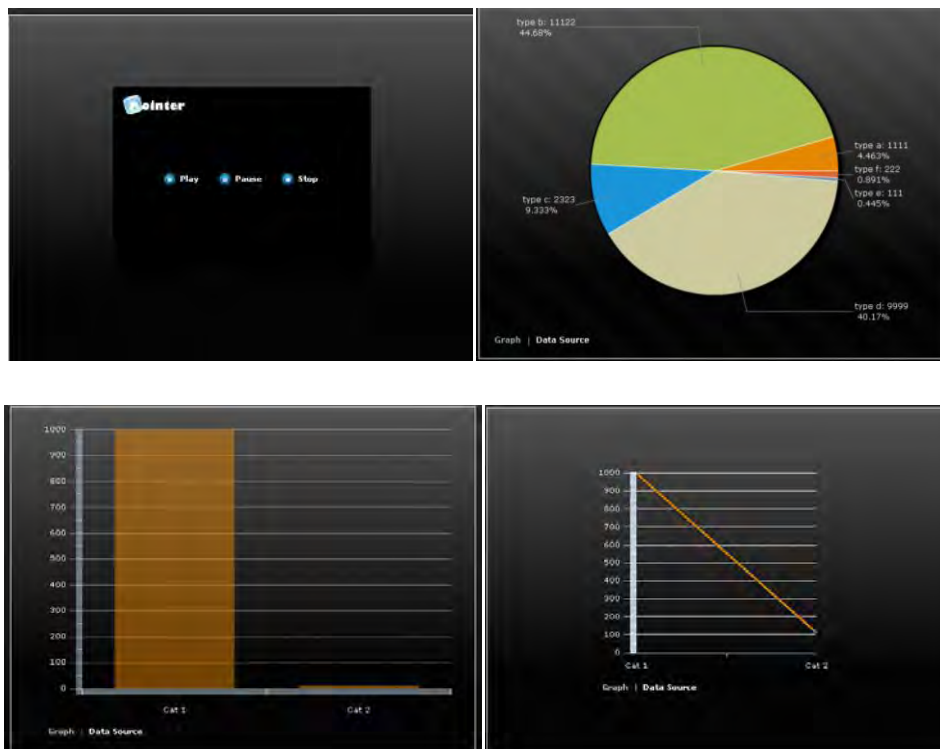

Figure 3. 14 Screenshots of elements video and charts
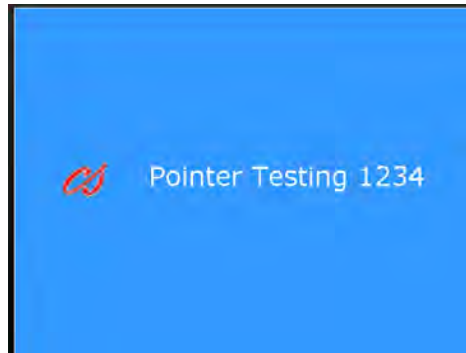
Figure 3. 15 Slide with blue background color and white text
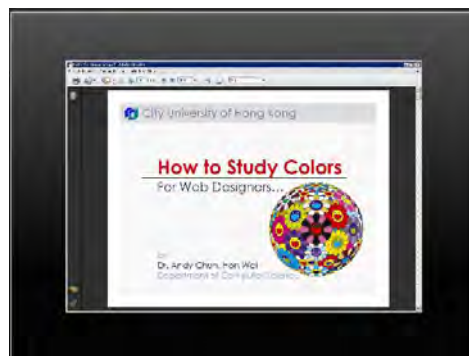
Figure 3. 16 Sample image elements

3.1.2.10 Text Styling

Users can change font type, size of the text. Some other basic styling tools include bold, italic, underline, alignment, and coloring are provided also.

Figure 3. 17 Text styling tool box

3.1.2.11 Resizing Panel

Resizing panel is provided when user clicks on any slide elements. Moving and resizing of the elements can be done by simple mouse dragging.

Figure 3. 18 Resizing panel

3.1.2.12 Full Screen

Edit mode provides full screen function as same as in PPT mode (details and screenshots are described in 3.1.1.2 Full Screen).

3.1.3 Progressive Enhancement

As mentioned in the previous section 2.3.2.2 Progressive Enhancement Framework, the website will behave differently based on the environment of the visitor. The following shows outcomes between different situations.

3.1.3.1 No Flash Player but JavaScript Enabled

If the system cannot detect an active Flash player, a special output format of the slide will be generated. It is a XHTML page. User can still change the slide by clicking "Previous" and "Next" link. The operations are done with using JavaScript.
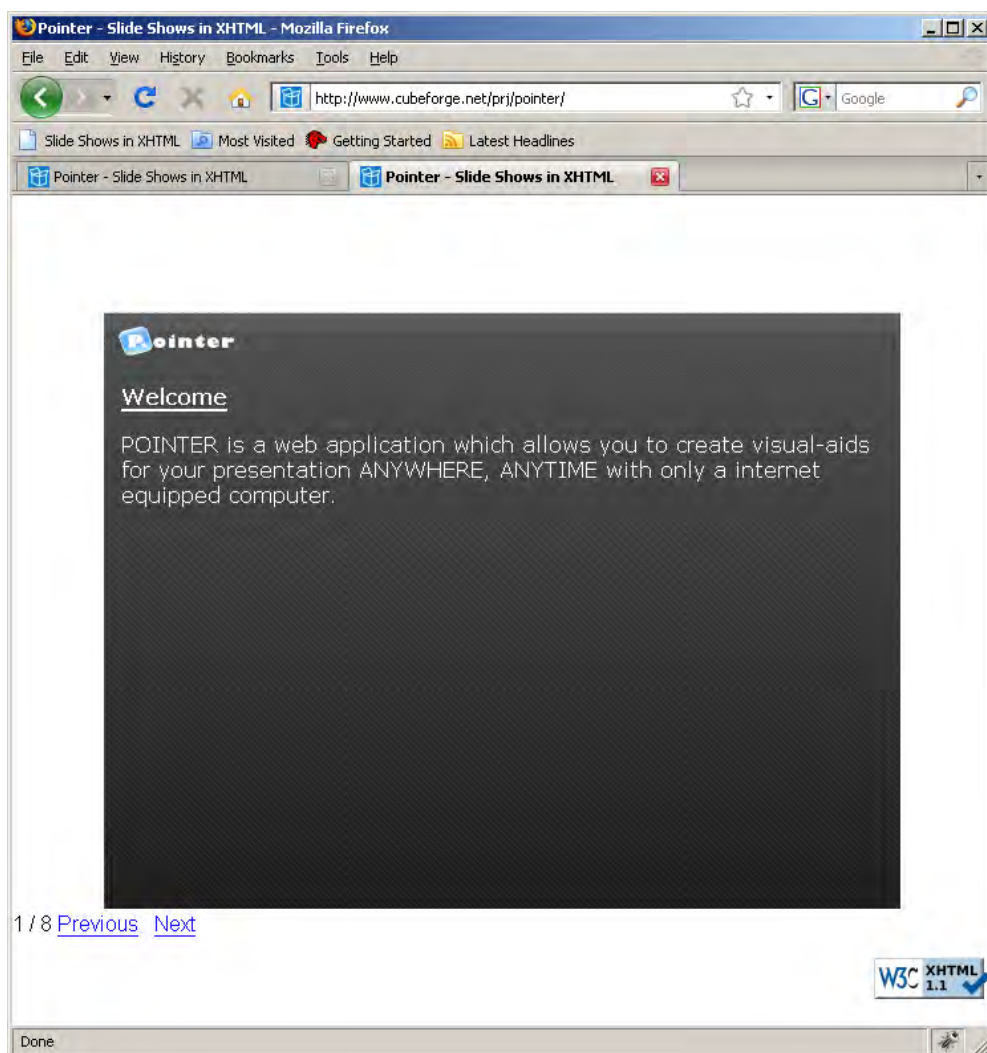

Figure 3. 19 When Flash player is not supported

3.1.3.2 No Flash Player and JavaScript

If it is found to be not supported both Flash player and JavaScript, the resulting page is a normal HTML page with showing all slides at once.
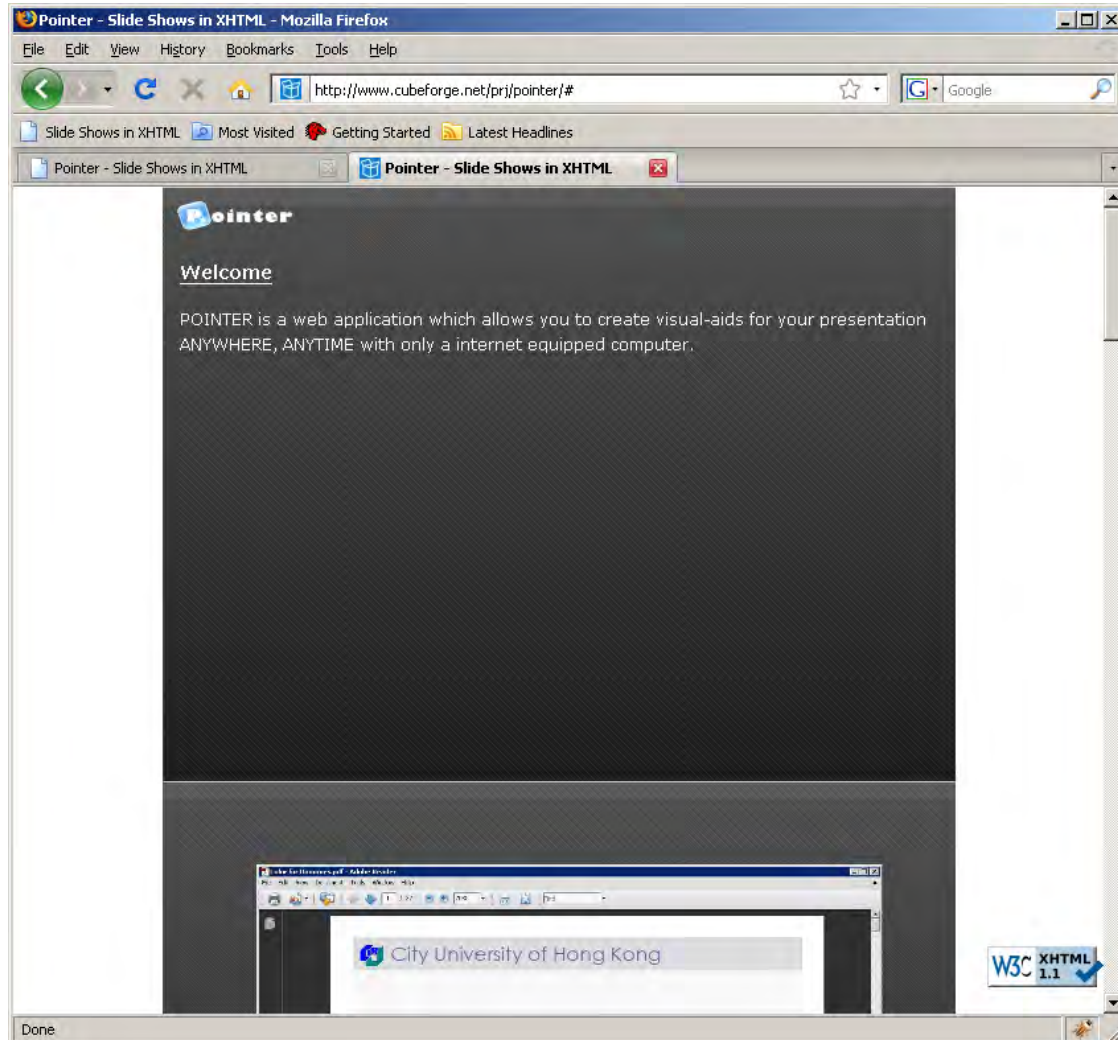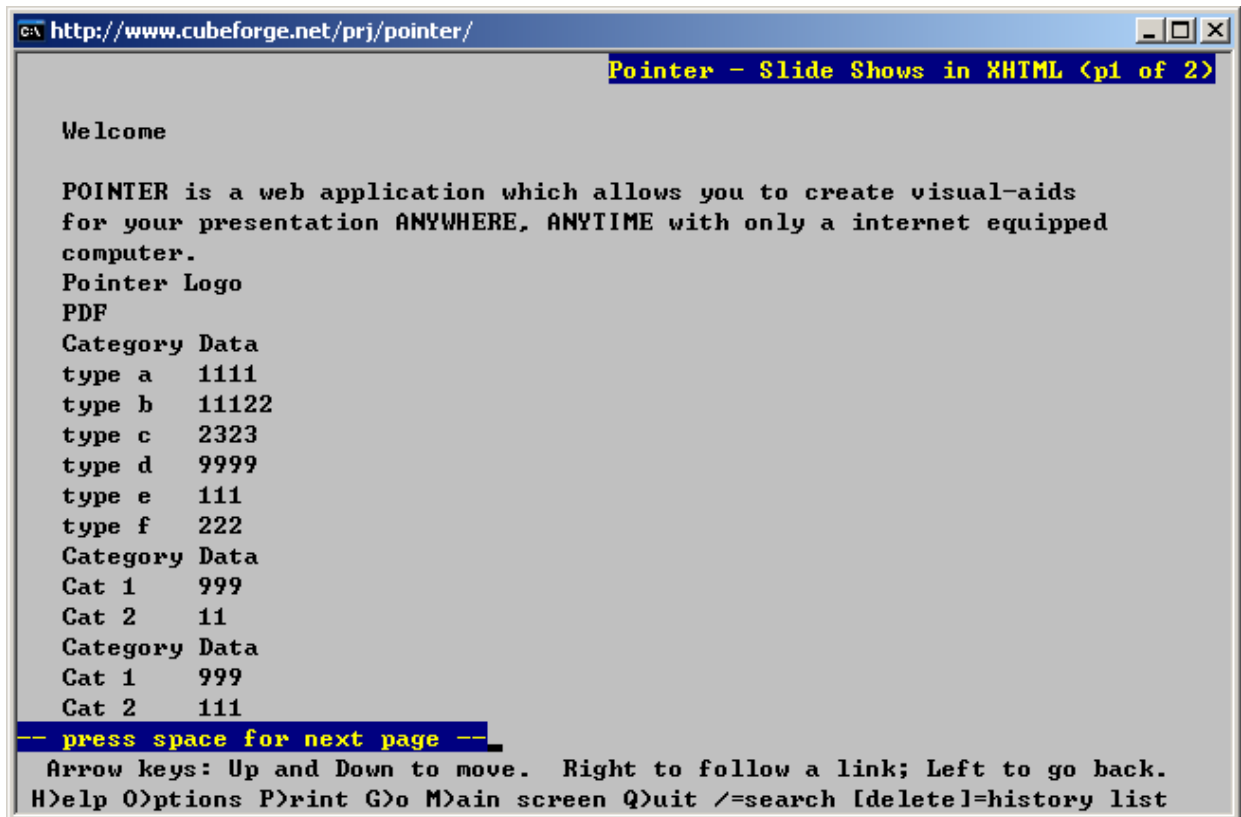

Figure 3. 20 No Flash player and JavaScript support

3.1.3.3 Text Browser

For low-tech browser like text browser and web crawler, they do not support Flash player plug-in, JavaScript and even do not support CSS layout and styling. The output will only have text.

```
C:\  http://www.cubeforge.net/prj/pointer/                           _ □ ×
                                  Pointer - Slide Shows in XHTML (p1 of 2)

   Welcome

   POINTER is a web application which allows you to create visual-aids
   for your presentation ANYWHERE, ANYTIME with only a internet equipped
   computer.
   Pointer Logo
   PDF
   Category Data
   type a    1111
   type b    11122
   type c    2323
   type d    9999
   type e    111
   type f    222
   Category Data
   Cat 1     999
   Cat 2     11
   Category Data
   Cat 1     999
   Cat 2     111
-- press space for next page --
  Arrow keys: Up and Down to move.  Right to follow a link; Left to go back.
 H)elp O)ptions P)rint G)o M)ain screen Q)uit /=search [delete]=history list
```

Figure 3. 21 Sreen of visiting Pointer using Lynx Browser (a famous text only browser)

3.2 System Evaluation

This section includes the evaluation of the system in different aspects: search engine optimization, file size, accessing time, application setup, XHTML validation and user testing.

3.2.1 Search Engine Optimization

In order to simulate the content obtained by search engines, one of the famous text browser – Lynx is used to test the output. 3.1.3.3 Text Browser and Figure 3. 1 show the output using Lynx. The result shows that only the Flash animation and video content cannot be displayed. Other contents are shown as text. It implies the document created by Pointer can be indexed by search engines theoretically.

However, it is difficult to do SEO as we do not know how search engines define the rank of a site. Alternatively, I have published and hosted Pointer in a public server to test whether it is able to be indexed. Figure 3. 22 shows the index page of Pointer, which is also built by the slide editor, is indexed by Google.
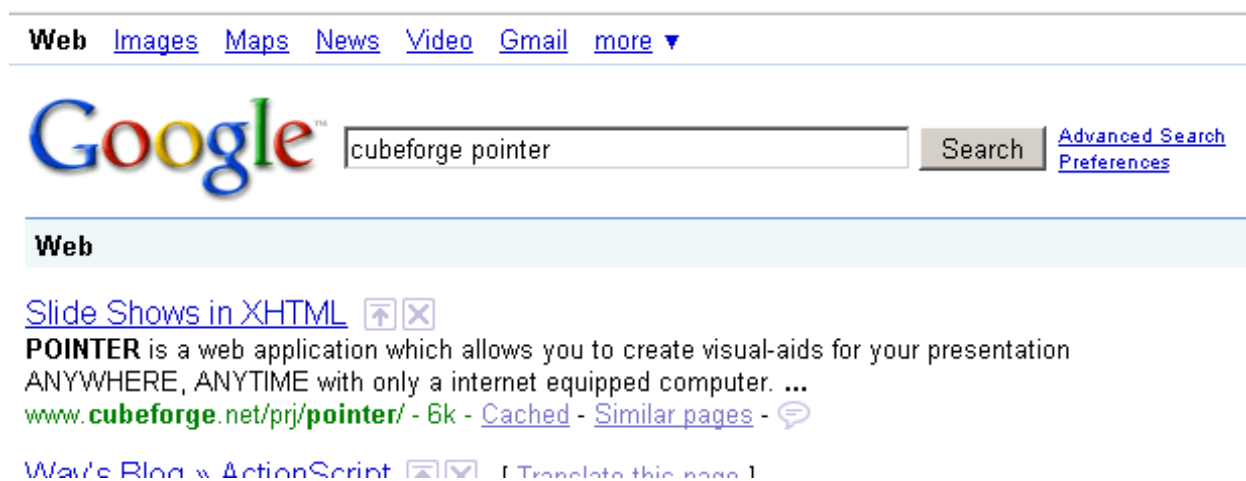
Figure 3. 22 Google search result

3.2.2 File Size

In order to evaluate the file size of Pointer, two similar slides are created in Pointer and Microsoft PowerPoint respectively. Both files use the same image and flash source.
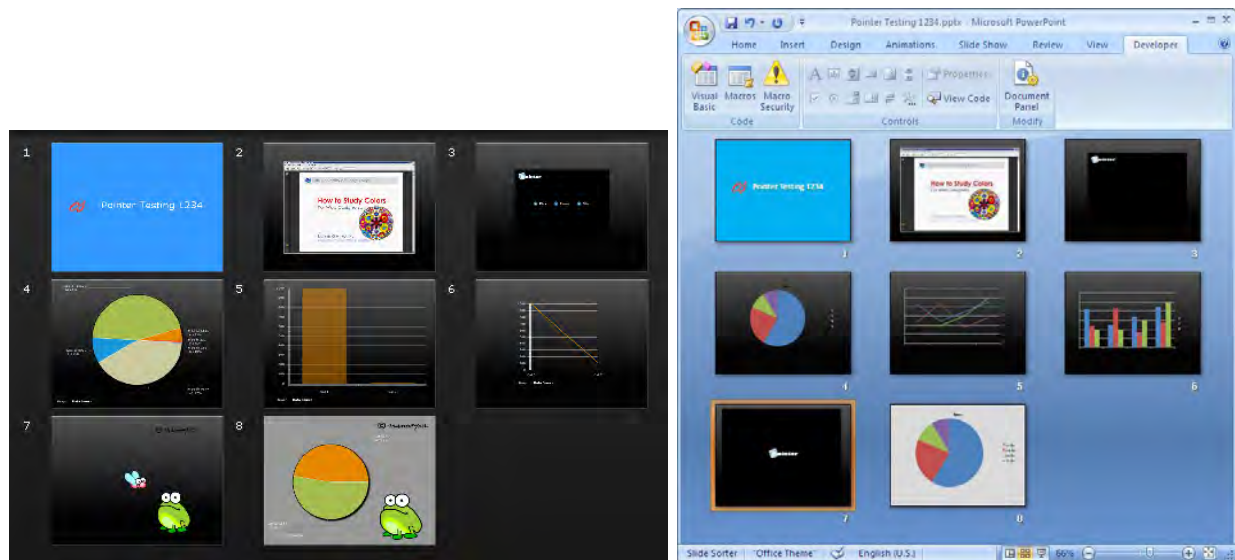
Figure 3. 23 Screen capture of testing file on Pointer and MS PowerPoint 2007

As a result, the PowerPoint 2007 format uses around 548 KB (unzipped size), PowerPoint 2003 format uses around 512KB and size of Pointer version is around 616 KB. The size difference is because PowerPoint does not embed external resources like Flash movie (swf) and other movie formats (such as avi, wmv, etc). It only includes the link inside its data file. Excluding the external resources, the size of Pointer version is around 476KB **only, which is a few smaller than PowerPoint's version.**

3.2.3 Accessing Time

Using the same test file above, it only requires about 2-3 seconds loading the page (including first visit). The performance is fast in terms of accessing time. Compared to other desktop application, the time required is about the same.

Another test is done with a larger file which contains 90 slides. The result remains the same as previous file that only cost 2 seconds to access to the page.

3.2.4 Application Setup & Space

Pointer is a flash-based web application. It is similar to traditional web pages and applications. No extra installation is required prior to use the application. Therefore, users do not need to reserve space for installation.

3.2.5 Digital Right Management

Currently, there is a very serious problem in protecting the presentation documents. People can use and edit the presentation slide once they get the PPT file. In order to protect the document, Pointer allows the author setting a password for restricting editing. The password is encrypted by MD5 and stored in the XML file. In behalf of sharing the document without sending out the source, Pointer provides a view only version - PPT Mode alternatively. In PPT Mode, the slides are generated dynamically inside the Flash application. Therefore, people can view the work done by others without obtaining the source at the same time.

3.2.6 XHTML Validation

To make sure the web page displays correctly on all major browser, the web is implementing using latest XHTML version 1.1. The output is validated and checked by W3C Markup Validation Service.

Figure 3. 24 W3c XHTML 1.1 validation results

3.2.7 Compatibility Testing

The major challenge of implementing a web page is that different browsers have different behavior. Therefore, the displayed page may not be the same in different environments. Keeping the page looks consistent is a very important task. It ensures different users having the same experience.

Enjoying the benefit from Flash, the application performs exactly the same in different browsers and operating systems. Testing environments are listed as follows:

	Operating System	**Browser**
1.	Microsoft Windows (Server 2003 / Vista SP / XP / 7 Beta)	Google Chrome 1.0
2.	Microsoft Windows (Server 2003 / Vista SP / XP / 7 Beta)	Apple Safari 4 Public Beta
3.	Microsoft Windows (Server 2003 / Vista SP / XP)	Microsoft Internet Explorer 7
4.	Microsoft Windows 7 Beta	Microsoft Internet Explorer 8
5.	Microsoft Windows (Server 2003 / Vista SP / XP / 7 Beta)	Mozilla Firefox 3
6.	Apple Mac OS X 10.5	Apple Safari 3
7.	Apple Mac OS X 10.5	Mozilla Firefox 3
8.	Ubuntu Linux 8.10	Mozilla Firefox 3
9.	Apple iPhone OS 2.2	Mobile Safari
10.	Windows Mobile 6.1	Opera 9.5

Figure 3. 25 Testing environments

iPhone and Windows Mobile currently does not support Flash content. Therefore, only HTML version is tested in these 2 operating systems.

Figure 3. 26 Pointer in iPhone

3.2.8 User Testing

User testing is an important process for creating an application. It can obtain useful opinions from target users. It aims at improving the user interface and functionality. In the project, two representatives are invited for doing the user testing: 1 potential user having rich computer experience and 1 without.

3.2.8.1 Lily Ng

Lily Ng is a Junior Audit. She has not much experience in using computer. Her job only requires using some office applications such as Excel and Word. She is invited to do the evaluation since she is a typical user who does not have computer knowledge.

She is requested to build a page following a current document built by Pointer (http://www.cubeforge.net/prj/pointer/). The document contains 10 slides which require using all functions in Pointer. The required documents, i.e. images, videos and Flash, are provided for her.

The test result is hosted on http://www.cubeforge.net/prj/pointer/lilyng.ppt and attached in Appendices section. She used around 30 minutes to finish the task and commented as follows:

> *For overall impression, it is acceptable. It enables me to make a powerpoint in a very short time and it is easy to use. The upload time is fast compared to other web applications. (Translated from Chinese)*

She has also given some opinions on using the application:

- Tool tips should be provided when mouse over.
- More style of bullet point should be provided for different use.
- System help should be included in the system menu.
- Background music is suggested.
- It is better if we can hide some slides instead of deleting the slides.

3.2.8.2 Matthew Ho

Apart from "new" user like Lily Ng, it is also important to know the opinions from computer experts. Therefore, Matthew Ho is invited for the test. Matthew is a Programmer and a computer degree graduate. He has a wealth of computer knowledge.

In the test, Matthew is requested to build a 10-page presentation slides with topic Flex. A sample video and Flash are provided for him for convenience.

The resulting slides are attached in Appendices section and can be accessed by http://www.cubeforge.net/prj/pointer/matthewho.ppt. He finishes the task in around 15 minutes. His comments are as follows:

> *The application is easy-to-use when creating simple slides. But it seems it is complicated if I want to do something in advanced.*

He has also given some suggestions on the application:

- Alignment tools should be provided.
- The style of charts cannot be changed. It would be confused if more than 1 chart in a slide.

- Tooltips should be provided for easy understanding.
- Copy and Paste functions should be provided.

3.2.8.3 Conclusion

To conclude, Pointer provides an easy way to create simple presentation slides. However, the features and functions are still not enough. It still needs improvements in the future (details are discussed in 4.3 Extensibility and Improvements).

3.3 System Comparison

This part provides a detailed comparison between Pointer and the current presentation tools in the world. Microsoft PowerPoint 2007 and Google Docs are chosen as they are the famous desktop presentation tool and web presentation tool from the industry repectively.

3.3.1 Elements

The following table shows the elements supported between Pointer, Microsoft PowerPoint 2007 and Google Docs.

Element Types	Pointer	Google Docs	Microsoft PowerPoint 2007
Text	√	√	√
Image	√	√	√
Video	√ Only support FLV format	√ Only support Youtube videos	√ Support multiple formats (WMV, AVI, MPG, etc)
Flash	√	×	√
Chart	√	√	√
Shape	×	√	√
Drawing (Lines, arrow and other special pattern)	×	√	√

Figure 3. 27 Comparisons of elements between Pointer, MS PowerPoint 2007 and Google Docs

3.3.2 Presentation Mode

Both 3 applications provide presentation mode for user. However, only Pointer and Microsoft PowerPoint 2007 provide full screen projection. Instead, Google Docs pops up a new browser window with screen size. However, the application bar of the browser and window taskbar remain in the screen. Therefore, it is not a real full screen projection.
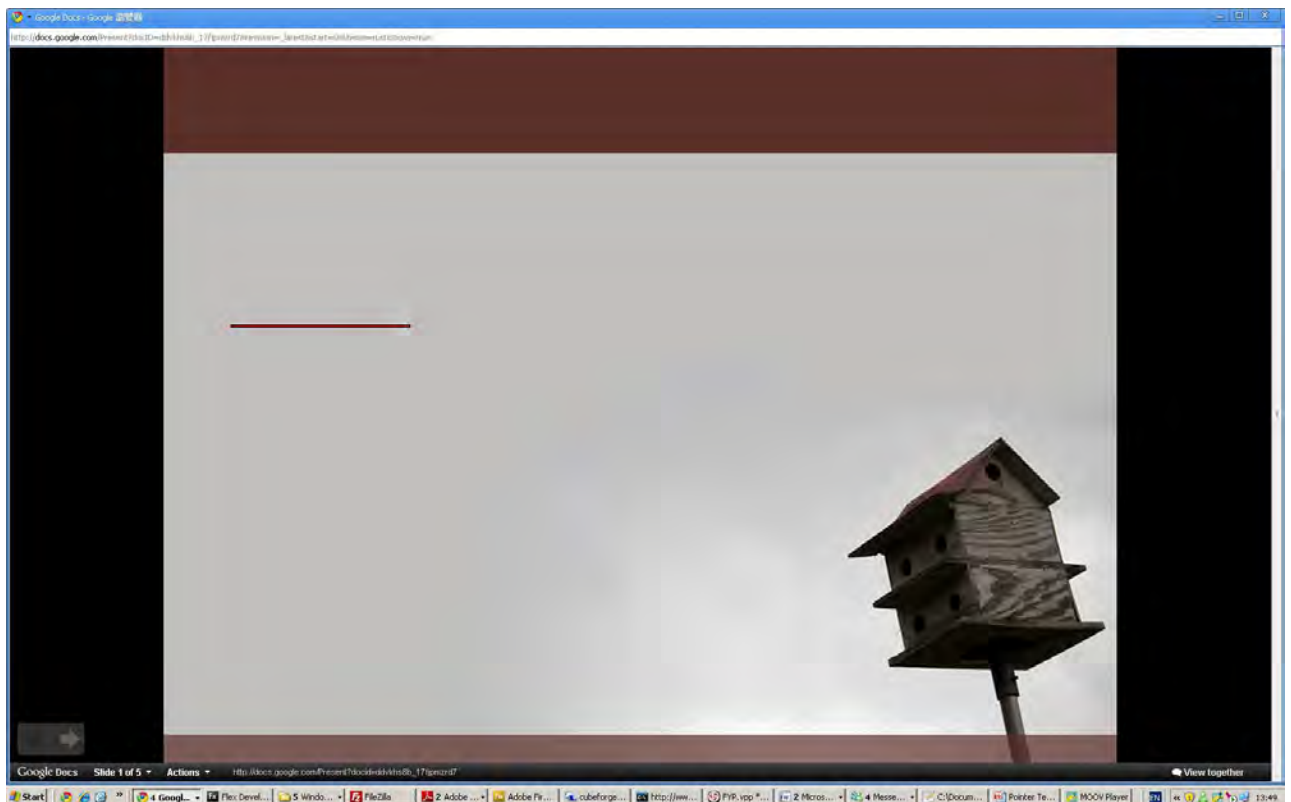
Figure 3. 28 Presentation mode in Google Docs

3.3.3 Styling

Styling options between 3 prescribed applications are analyzed as follows:

3.3.3.1 Text Styling

Both 3 applications provide basic styling for text elements. It includes bold, italic, underline, alignment, font type, font size, coloring and bullet list. In Google Docs, it also provides numbered list and text indentation. While there are more options in Microsoft PowerPoint 2007 such as text shadow, text space, strikethrough, etc.

3.3.3.2 Slide Background Styling

All applications support using solid color or image as slide background. However, only Pointer allows user to use Flash as background while other two do not. Furthermore, Microsoft PowerPoint 2007 has more options on background styling such as gradient fill.

3.3.3.4 Object Scaling and Positioning

Scaling and positioning tool is a must for slide editors. All applications provide standard tool for scaling and positioning by drag-and-drop.

3.3.4 Animation

Microsoft PowerPoint 2007 provides a wide range of options in selecting slide transition (Figure 3. 29). In Pointer, it provides 6 3D effect options, i.e. Cube Rotate, Flip, Push, Pop, Door and Gate. However, Google Docs does not have any slide transition effects.

Figure 3. 29 Transition effects provided in Microsoft PowerPoint 2007

3.3.5 File Size

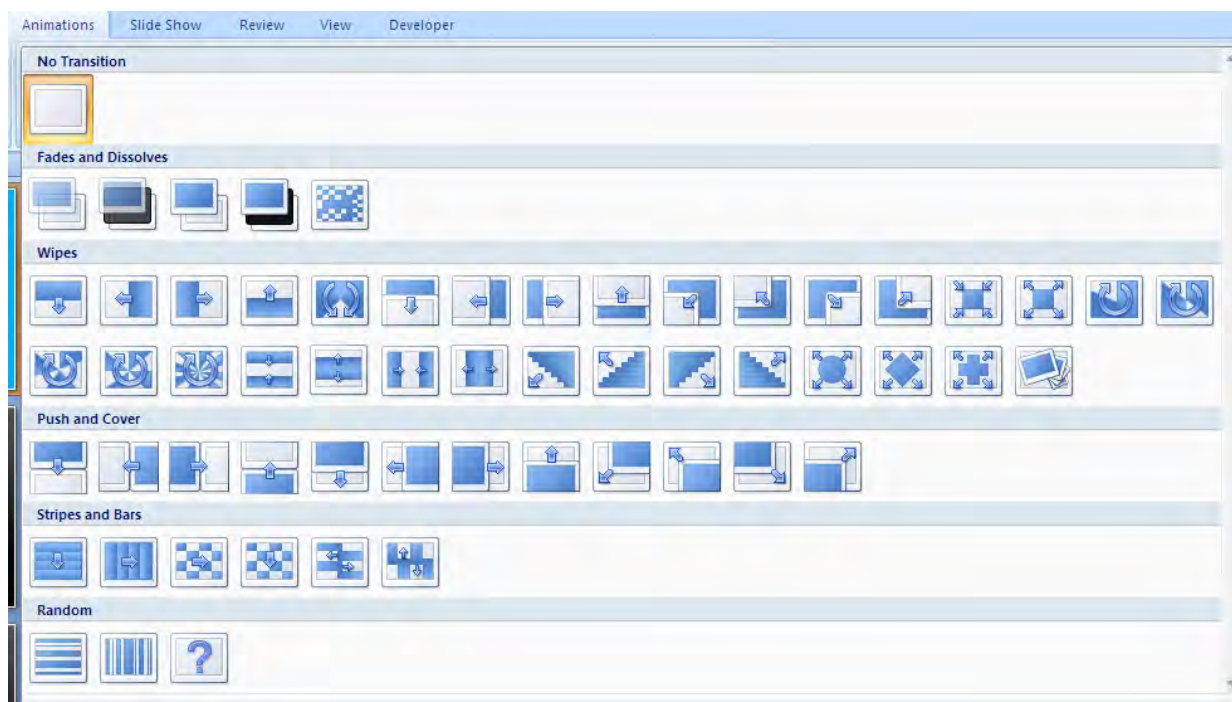The file sizes of data among 3 do not have much difference. The result is compared and shown in 3.2.2 File Size.

3.3.6 Accessing Time

As covered in 3.2.3 Accessing Time, the average access time to Pointer is around 2-3 seconds. The results of accessing Google Docs and Microsoft PowerPoint 2007 are almost the same.

3.3.7 Platform and Software Compatibility

A similar testing for Pointer is held and described in 3.2.7 Compatibility Testing. The comparison between 3 applications in platform compatibility is described as follows:

Platform	Pointer	Google Docs	Microsoft PowerPoint 2007
Microsoft Windows (XP / Server 2003 / Vista / 7)	√	√	√
Mac OS X 10.5	√	√	√ (using Microsoft PowerPoint for Mac 2008)
Ubuntu Linux 8.10	√	√	× (supported by 3rd party applications only)
Apple iPhone OS 2.2	√	×	× (view only by Mobile Safari)
Windows Mobile 6.1	√	×	√ (using Microsoft PowerPoint Mobile)

Figure 3. 30 Platform compatibility comparison

Web application is likely more compatible than desktop application across different operating systems as it only requires web browser to access which is provided in all major platforms. Even though PowerPoint file can be viewed in major platforms, it requires dedicated software on different platforms to open the document.

3.3.8 Software and Update Distribution

Google Docs and Pointer do not require any installation before use while user has to install before using Microsoft PowerPoint 2007. Therefore, 1GB disk space is saved if user chooses not to use Microsoft PowerPoint 2007 [26].

It is common to release update patches to an application dealing with bug fixing and updated features. However, as the developer of web application can simply update the system on the fly, therefore there is no need for user of Google Docs and Pointer to perform an update.

3.3.9 Data Publishing

There are two main methods to publish your presentation documents. Typically, user would like to send the soft copy to others. Google Docs and Microsoft PowerPoint 2007 allow user to save document as PPT or PDF. And Pointer can export the presentation slides to PDF format. However, as the format PPT does not embed the external resource, user is responsible to carry those files such as Flash movie and video by themselves.

Furthermore, Google Docs and Pointer can let user to save the content online and publish the content over the Internet. In this case, the author can share their document with friends just by a hyperlink.

3.3.10 Search Engine Optimization

The online document created by Google Docs cannot be indexed by search engine. It is because the contents are generated dynamically once you visit. If you view the HTML source of a Google Docs document, the source does not contain any content.

Unlike Google Docs, presentation slides hosted by Pointer are able to be searched as well as PPT created by Microsoft PowerPoint. The proof is shown in 3.2.1 Search Engine Optimization.

3.4 Summary

Compared to other famous presentation software, Pointer provides common functions in other presentation tools. It provides a user-friendly way to people to create presentation aids in any time, any places and any environments.

4. Critical Reviews

This chapter lists the review of the project and the future development plan.

4.1 Benefits

This project provides an alternative way to people to create a presentation slides easily. By using Flash/Flex technology, the presentation can include great 3D animation effects **and a "rich" user interface. The application has an interactive communication with system** user and it only needs 1-2 clicks to create an element normally. The major benefit is that Pointer provides the same experience to users every time, in every place and in every machine. It behaves consistently all the time.

On the other hand, Pointer, as a web Flash application, is a great example to show how to optimize search engine result and how to compatible with users using Progressive Enhancement Framework if they do not have Flash Player. Pointer escapes from these traditional problems from using Flash/Flex.

In the past, some people love Flash animation and they even create Flash to make presentation. But it is very complicated as they need to find a Flash developer and every changes made are required a compilation. For now, they can use Pointer to enjoy a Flash presentation without above concerns.

4.2 Limitations

The typical problem of a Flash application is that they need a Flash plug-in. But it should not be a big problem as there are more than 99% of internet-equipped computer installed with Flash Player 9 [12]. Another problem is that data are stored in the web server. Hence, users have to access to the Internet before use of the application.

Compared to Microsoft PowerPoint 2007, the features and elements supported in Pointer are very few. But this comparison is unfair as Microsoft PowerPoint has a very long history since 1984 [2].

4.3 Extensibility and Improvements

The architecture of Pointer is highly extensible. It is very easy to add support of an additional element. On the other hand, the slides created by Pointer actually are the web pages with adding presentation functions, e.g. full screen, slide transition effects, etc. Therefore, it can be treated as a web page builder also. A sample HTML Mode is added to test its feasibility.

> *http://domainname/<filename>.html*

If the user adds ".html" extension right after the original path, he/she can access to the document in Web Page mode (Figure 4. 1). It provides a standard navigation bar at the left hand side and the slides become pages of the web site. Accordingly, if the application provides more HTML elements, it becomes a Flash web builder.
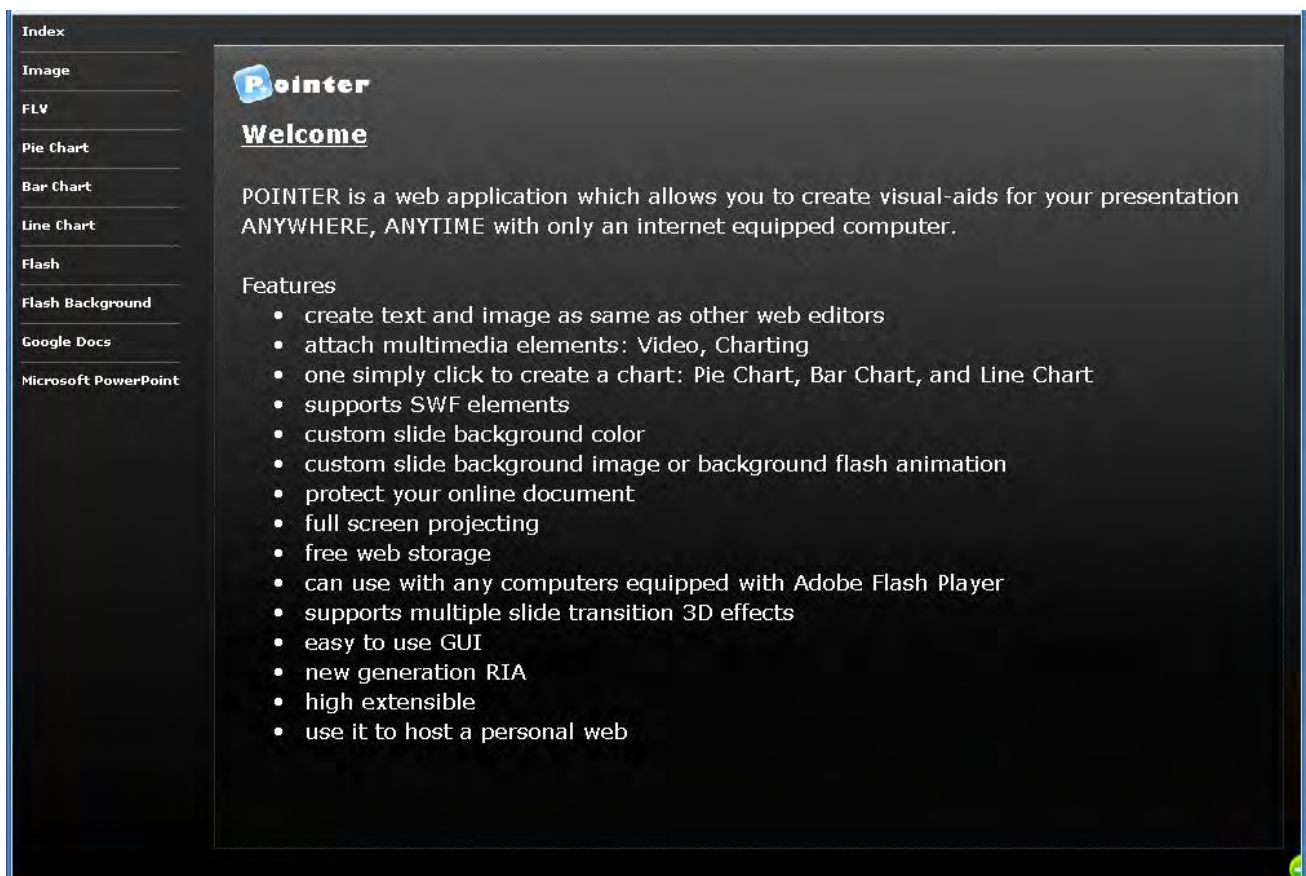

Figure 4. 1 Web Page Mode

There is a lot of room for improvements. Currently, the data are stored in a file server. People can get the content directly if they know the exact file path. The data could be stored in database server thereafter with user account control. Hence, it can be more secure since the file could not be obtained directly from the web server.

The current version of Pointer is a web application so that People have to use it online. It is possible to make a distributable version in the future by using Adobe AIR. AIR application can also be implemented using Flex SDK with additional window API. Similar to Flex application, it can also be run in multiple platforms.

4.4 Troubleshooting and Challenge

The major challenge of the project is the time management. The scope of the project can be very large as PowerPoint has many features. In the limited time, only key features are implemented eventually. But I think it is still great that the application can be published and it is work by only using several months. This is the first time for me to do such a huge project by myself. I have to learn independently and need to search and study a lot of document and information.

There is a big challenge when I am dealing with problem of existing presentation software. Currently, we cannot compare the other documents or web pages during presentation (1.3.3 Usability Problems). Initially, it was planned to have a component to embed or load those documents inside the slides. However, it is too complicated to support multiple data types within limited time period. Figure 4. 2 is the semi-products of loading a web page within a presentation slide. Unfortunately, it still needs improvements at the current phase as some errors may occur during testing.
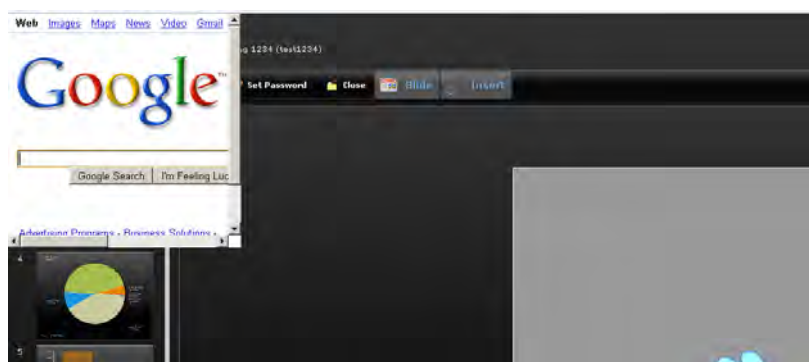

Figure 4. 2 Embed a web page within presentation slides.

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Appendices

This section provides the additional information and materials that are related to the project. It includes progress logs and project schedule.

I. Progress Logs

Progress Log of Oct 2008

Environment Setting

1. The server side is set up. (MS Server + Apache 2 + PHP 5 + MSSQL Server)

Functionalities

1. Created basic architecture of the application using Cairngorm.

2. Created temporary UI for testing the functionalities.

3. Implemented "full screen", scaling the slide to full screen size.

4. Implemented features of loading external xml file.

Progress Log of Nov 2008

Environment Setting

1. SVN Server

Report Writing

1. Interim Report

Progress Log of Dec 2008

Functionalities

1. Finalized the UI of the application.

2. Implementing Elements support including Text, and Image.

Progress Log of Jan 2009

Functionalities

1. Implementing Elements support including VideoDisplay, and SWF.

2. Bug Fixing.

Progress Log of Feb 2009

Functionalities

1. Implementing Support with Animation.

2. Server Side File Upload Management

3. Performance Tuning.

4. Bug Fixing.

Progress Log of Mar 2009

Functionalities

1. Implementing Support with Graph.

2. Progressive Enhancement: Flash Version + HTML Version + Text Version

3. Performance Tuning.

4. Bug Fixing.

5. SEO in both versions.

Progress Log of Apr 2009

Functionalities

1. Background Color & Image Support/.

2. XHTML Validation.

3. Added more animations type.

4. Performance Tuning.

5. Bug Fixing.

Report Writing

1. Final Report.

II. Project Schedule

#	Task Name	Duration	Start	Finish	Predecessors
1	**Milestone 1**	**68 days?**	**Mon 1/9/08**	**Sun 30/11/08**	
2	Project Plan (Objective Define, Background Analysis)	21 days?	Mon 1/9/08	Mon 29/9/08	
3	Class Diagram (System Structure)	6 days?	Wed 1/10/08	Wed 8/10/08	2
4	UI Design	8 days?	Wed 1/10/08	Fri 10/10/08	2
5	Implementation: UI Layout	6 days?	Sat 11/10/08	Fri 17/10/08	4
6	Implementation: backend server setup (apache, mssql)	3 days?	Wed 15/10/08	Sat 18/10/08	
7	Implementation: basic features (add, move, delete of text, graphics, image)	16 days	Sun 19/10/08	Sat 8/11/08	5
8	Implementation: delegate with backend (save, restore)	10 days?	Sun 9/11/08	Thu 20/11/08	6
9	Implementation: features (play presentation)	3 days?	Fri 21/11/08	Tue 25/11/08	7
10	Testing and Publish	3 days?	Wed 26/11/08	Sun 30/11/08	5,6,7,8,9
11	**Milestone 2**	**23 days?**	**Mon 1/12/08**	**Wed 31/12/08**	**1**
12	UAT	23 days?	Mon 1/12/08	Wed 31/12/08	1
13	Implementation: features (use of multimedia files)	10 days?	Mon 1/12/08	Fri 12/12/08	
14	Improvement (Bug fix, UAT)	8 days?	Mon 15/12/08	Wed 24/12/08	
15	Testing and Publish	5 days?	Thu 25/12/08	Wed 31/12/08	13,14
16	**Milestone 3**	**25 days?**	**Thu 1/1/09**	**Mon 2/2/09**	**11**
17	UAT	24 days?	Thu 1/1/09	Sat 31/1/09	11
18	Implementation: features (theme)	13 days?	Thu 1/1/09	Sat 17/1/09	
19	Improvement (Bug fix, UAT)	3 days?	Mon 19/1/09	Wed 21/1/09	
20	Testing and Publish	9 days?	Thu 22/1/09	Mon 2/2/09	18,19

III. Software Installation Guide

1. Environment

1.1 Operating System

Any operating systems compatible with Apache. For example, Windows Server, Linux, Mac OS X

1.2 Web Server

Apache 2.2 with PHP 5.2.6

2. Apache settings

2. 1 Rewrite Module

Uncomment or insert the following line into Apache configuration file:

```
LoadModule rewrite_module modules/mod_rewrite.so
```

2.2 Rewrite rules

Apply the following rewrite rules to corresponding <Directory> tag in Apache configuration file:

```
RewriteEngine On
RewriteRule
    ^<dir>/$ <dir>/ppt.php?system_name=index&system_mode=html
RewriteRule
    ^<dir>/([^/.]+)?.ppt$ <dir>/ppt.php?system_name=$1&system_mode=ppt
RewriteRule
    ^<dir>/([^/.]+)?.html$ <dir>/ppt.php?system_name=$1&system_mode=html
RewriteRule
    ^<dir>/([^/.]+)?$ <dir>/ppt.php?system_name=$1&system_mode=edit [L]
```

3. Files

Unzipped the system package to the document root of the Apache:
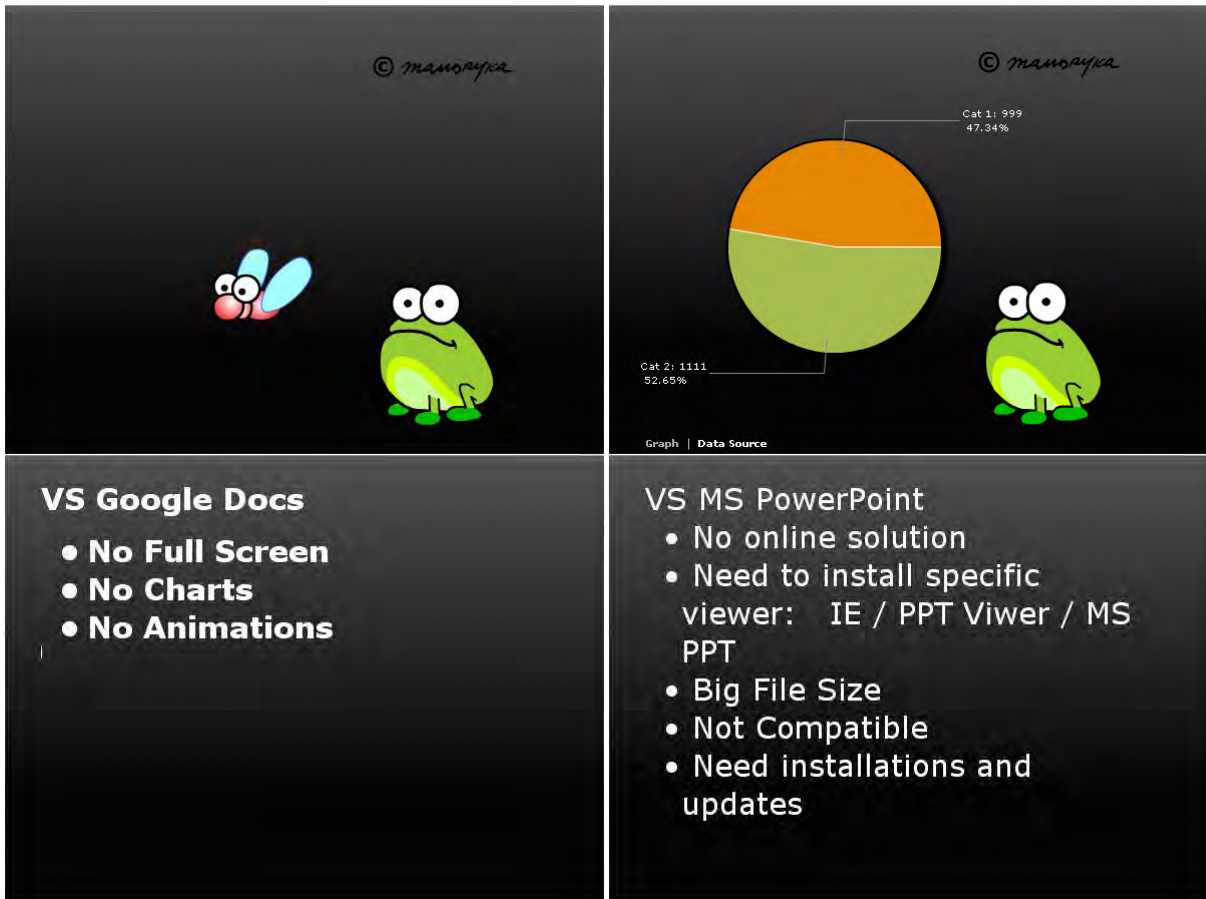
pointer.rar
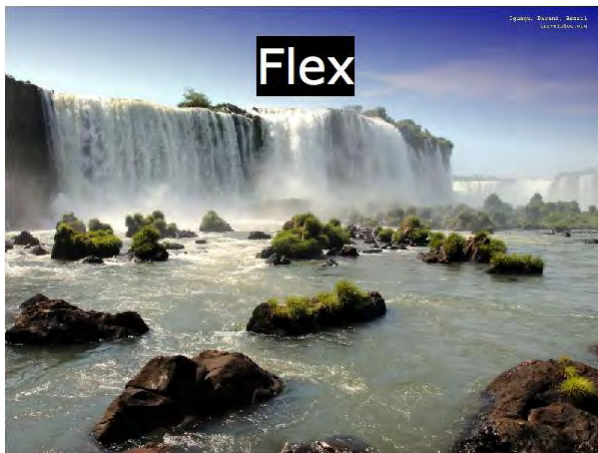WinRAR archive
1,513 KB

IV. User Testing Results

1. Lily Ng

Link: http://www.cubeforge.net/prj/pointer/lilyng.ppt

2. Matthew Ho

Link: http://www.cubeforge.net/prj/pointer/matthewho.ppt