Silver Light Technology For Rich Internet Applications

Vasavi.Bande[#1], Sangepu.Jayashree[#2]

[1]*Associate Professor,* [2]*Student of IV B.Tech*

[1,2] *Department of Computer Science and Engineering .*

[1,2] *Hyderabad Institute of Technology and Management, A.P,INDIA*

Abstract--**Microsoft Silverlight is a cross-browser, cross-platform implementation of the .NET Framework for building and delivering the next generation of media experiences and rich internet applications (RIA) for the Web. Silverlight uses the Extensible Application Markup Language (XAML) to ease UI development (e.g. controls, animations, graphics, layout, etc.) while using managed code or dynamic languages for application logic. In this paper we discussed Silverlight Architecture, its features and how to run Silverlight application, the Silverlight framework to create applications for the Windows Phone and how the Silver Light grasped the market over Flex.**
Keywords: RIA,WMV,WMA,XAML,AJAX.

I. INTRODUCTION

Silverlight has built in media support for wmv, wma, mp3, jpeg and png files on both windows and MAC with a few lines of code and WITHOUT media player. The 1.0 Version of Silverlight supports javascript client side scripting in a download a little over 1 mega byte. Silverlight is a browser plug-in that runs on IE, Firefox and Safari - Windows and Macs. Silverlight is a vector rending engine that supports an upward compatible 2D subset of WPF graphic description language XAML. Version 1.1 of Silverlight will contain a subset of the CLR allowing client programming with any .net language[1]. From a security standpoint, Silverlight runs in the context of the browser and does not have full access to the client machine. There will be a DLR (Dynamic Language Runtime) add on for Silverlight allowing creating of the client side dynamic language of your choice. WPF and Silverlight allows even a video to be used as a paint brush texture so you can "paint" items with video. Using VB.NET or C# instead of JavaScript on the client can be up to 1000 times faster. Silverlight allows you to progressively play media content from any server or you can point to a streaming server. Silverlight can work from any server, windows or linux, IIS or Apache. Silverlight allows you to blend html, ajax and vector graphics. Silverlight supports hi-def (720p) full screen video. Version 1.1 of Silverlight will support JSON allowing automatic marshalling of .NET data types to/from javascript.

Silverlight enables you to create a state-of-the-art application that has the following features:

- It is a cross-browser, cross-platform technology. It runs in all popular Web browsers, including Microsoft Internet Explorer, Mozilla Firefox, and Apple Safari, Google Chrome, and on Microsoft Windows and Apple Mac OS X.
- It enables you to create Windows Phone applications. To learn more about creating Windows Phone applications with Silverlight, see Windows Phone Development.
- It is supported by a small download that installs in seconds.
- It streams video and audio. It scales video quality to everything from mobile devices to desktop browsers to 720p HDTV video modes.
- It includes compelling graphics that users can manipulate—drag, turn, and zoom—directly in the browser.
- It reads data and updates the display, but it doesn't interrupt the user by refreshing the whole page.
- The application can run in the Web browser or you can +configure it so users can run it on their computer (out-of-browser). In addition, you can use your knowledge of the Silverlight framework to create Windows Phone applications.

1. *History*
A. *Silverlight1*: Silverlight 1, developed under the codename Windows Presentation Foundation/Everywhere (WPF/E) was released in 2007[2]. It consisted of the core presentation framework, which is responsible for the user interface (UI), interactivity and user input, basic UI controls, graphics and animation, media playback, Digital rights management (DRM), and DOM integration.

B. *Silverlight 2:* Included a version of the .NET Framework, implemented the same full Common Language Runtime (CLR) version as .NET Framework 3.0, so it can execute programs written in any .NET language.

C. Silverlight 3 : Silverlight 3 was announced on September 12, 2008, and unveiled at MIX09 in Las Vegas on March 18, 2009.[54] A beta version was made available for download the same day. The final version was released July 9, 2009. Silverlight 3 included more controls— including but not limited to Data Grid, Tree View, various layout panels, Data Form for forms-driven applications and Data Pager for viewing paginated data.

D. Silverlight 4: On November 18, 2009, at the Professional Developers Conference in Los Angeles, Microsoft Corporation unveiled a Beta version of Silverlight 4. The final version was released on April 15, 2010 (along with Silverlight 4 tools for developers). Silverlight 4 includes new features like Support for Google's Chrome browser, Web cam and microphone, Printing, More mouse support New notification, support to send messages to users and New and enhanced controls (e.g., RichTextBox, DataGrid); Theming of controls, rendering HTML, better localization, and others.

E. Silverlight 5: On December 2, 2010 Silverlight 5 beta was announced for release in the 1st half of 2011 at the Silverlight Fire starter event. The final release is planned for the 2nd half of 2011. GPU accelerated video decoding, 3D graphics, playback speed controls, remote control and 64-bit support are the newly added features in this version.

2.Silverlight Application With Rich Graphics and User Interaction
You can create Silverlight applications in a variety of ways. You can use Silverlight markup to create media and graphics, and manipulate them with dynamic languages and managed code. Silverlight also enables you to use professional-quality tools like Visual Studio for coding and Microsoft Expression Blend for layout and graphic

Fig 1.Silverlight application with rich graphics and user interaction

design as shown in the figure 1.

3.Features of Silverlight

Silverlight combines multiple technologies into a single development platform that enables you to select the right tools and the right programming language for your needs. Silverlight offers the following features

A. *WPF and XAML.:* Silverlight includes a subset of the Windows Presentation Foundation (WPF) technology, which greatly extends the elements in the browser for creating UI. Silverlight lets you create immersive graphics, animation, media, and other rich client features, extending browser-based UI beyond what is available with HTML alone. XAML provides a declarative markup syntax for creating elements.

B. *Extensions to JavaScript:* Silverlight provides extensions to the universal browser scripting language that provide control over the browser UI, including the ability to work with WPF elements.

C. *Cross-Browser, Cross-Platform Support.:* Silverlight runs the same on all popular browsers (and on popular platforms). You can design and develop your application without having to worry about which browser or platform your users have.

D. *Integration with Existing Applications:* Silverlight integrates seamlessly with your existing JavaScript and ASP.NET AJAX code to complement functionality you have already created. Access to the .NET Framework programming model. You can create Silverlight applications using dynamic languages such as IronPython as well as languages such as C# and Visual Basic.

E. *Tools Support*: You can use development tools, such as Visual Studio and Expression Blend, to quickly create Silverlight applications.

F. *Networking support:* Silverlight includes support for HTTP over TCP. You can connect to WCF, SOAP, or ASP.NET AJAX services and receive XML, JSON, or RSS data.

G. *LINQ.*

   Silverlight includes language-integrated query (LINQ), which enables you to program data access using intuitive native syntax and strongly typed objects in .NET Framework languages.

II. THE SILVERLIGHT PLATFORM

The Silverlight platform as a whole consists of two major parts, plus an installer and update component, described as follows.

Core presentation framework: Components and services oriented toward the UI and user interaction, including user input, lightweight UI controls for use in Web applications, media playback, digital rights management, data binding, and presentation features, including vector graphics, text, animation, and images. Also includes the Extensible Application Markup Language (XAML) for specifying layout.

NET Framework for Silverlight: A subset of the .NET Framework that contains components and libraries, including data integration, extensible Windows controls, networking, base class libraries, garbage collection, and the common language runtime (CLR). Some parts of the .NET Framework for Silverlight are deployed with your application. These "Silverlight Libraries" are assemblies not included in the Silverlight runtime and are instead shipped in the Silverlight SDK. When Silverlight Libraries are used in your application, they are packaged up with your application and downloaded to the browser. These include new UI controls, XLINQ, Syndication (RSS/Atom), XML serialization, and the dynamic language runtime (DLR).

Installer and updater: An installation and update control that simplifies the process of installing the application for first-time users, and subsequently provides low-impact, automatic updates.

1.Silverlight Architecture

There is a particular value in the combined set of tools, technologies, and services included in the Silverlight platform. They make it easier for developers to create rich, interactive, and networked applications. Although it is certainly possible to build such applications using today's Web tools and technologies, developers are hindered by many technical difficulties, including incompatible platforms, disparate file formats and protocols, and various Web browsers that render pages and handle scripts differently. A rich Web application that runs perfectly on one system and browser may work very differently on another system or browser, or may fail altogether. Using today's large array of tools, protocols, and technologies, it is a massive and often cost-prohibitive effort to build an application that can simultaneously provide the following advantages:

A. Ability to create the same user experience across browsers and platforms, so that the application looks and performs the same everywhere.

B. Integration of data and services from multiple networked locations into one application using familiar .NET Framework classes and functionality. A media-rich, compelling, and accessible user interface (UI).Silverlight makes it easier for developers to build such applications, because it overcomes many of the incompatibilities of current technologies, and provides within one platform the tools to create rich, cross-platform ,integrated applications.
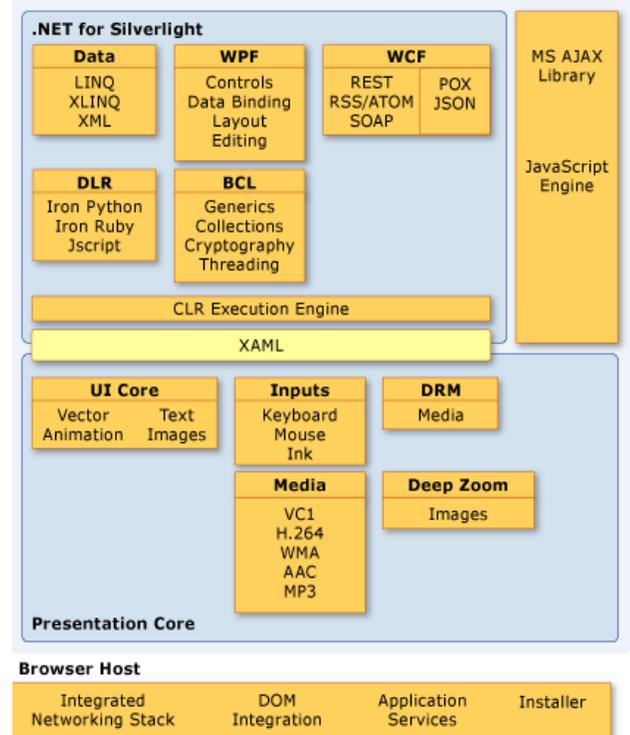

Fig 2.silverlight architecture

The above Figure2 describes the essential architecture and components of Microsoft Silverlight. Silverlight is not only an appealing canvas for displaying rich and interactive Web and media content to end users. It is also a powerful yet lightweight platform for developing portable, cross-platform, networked applications that integrate data and services from many sources. Furthermore, Silverlight enables you to build user interfaces that will significantly enhance the typical end user experience compared with traditional Web applications. While Silverlight as a client-side runtime environment seems simple and compact in size, the Silverlight development platform integrates a number of features and complex technologies, making them accessible for developers. To create effective Silverlight-based

applications, developers need a working knowledge of the platform architecture.

2. Core Presentation Components

The core presentation features of the Silverlight platform, shown in the previous section and illustration, are described as follows.

A. *Input:* Handles inputs from hardware devices such as the keyboard and mouse, drawing, or other input devices.
B. *UI rendering*: Renders vector and bitmap graphics, animations, and text.
C. *Media*: Features playback and management of various types of audio and video files, such as .WMP and .MP3 files.
D. *Deep Zoom*: Enables you to zoom in on and pan around high resolution images.
E. *Control*s: Supports extensible controls that are customizable through styling and templating.
F. *Layout*: Enables dynamic positioning of UI elements.
G. *Data binding:* Enables linking of data objects and UI elements.
H. *DRM*: Enables digital rights management of media assets.
I. XAML: Provides a parser for XAML markup.

Developers can interact with this presentation framework by using XAML to specify presentation details. XAML is the primary point of interaction between the .NET Framework and the presentation layer. Developers can programmatically manipulate the presentation layer using managed code.

3.The .NET Framework for Silverlight

The description of the partial list of the .NET Framework for Silverlight features shown in the previous illustration is as follows.

A. *Data*: Supports Language-Integrated Query (LINQ) and LINQ to XML features, which ease the process of integrating and working with data from disparate sources. Also supports the use of XML and serialization classes for handling data.
B. *Base class*: A set of .NET Framework libraries that provide essential programming functions, such as string handling, regular expressions, input and output, reflection, collections, and globalization.

Window Communication Foundation (WCF) : Provides features to simplify access to remote services and data. This includes a browser object, HTTP request and response object, support for cross-domain HTTP requests, support for RSS/Atom syndication feeds, and support for JSON, POX, and SOAP services.

C. *CLR (common language runtime):* Provides memory management, garbage collection, type safety checking, and exception handling
D. *WPF controls*: Provides a rich set of controls, including Button, Calendar, CheckBox, DataGrid, DatePicker, Hyperlink Button, List Box, Radio Button, and Scroll Viewer.

E. *DLR (dynamic language runtime):* Supports the dynamic compilation and execution of scripting languages such as JavaScript and IronPython to program Silverlight-based applications. Includes a pluggable model for adding support for other languages for use with Silverlight.

The .NET Framework for Silverlight is a subset of the full .NET Framework. It provides the essentials of robust, object-oriented application development for application types (such as Internet applications) for which this support has not traditionally been available. Developers can interact with the .NET Framework for Silverlight layer by writing managed code using C# and Visual Basic. .NET Framework developers can also access the presentation layer by authoring in Visual Studio or Microsoft Expression Blend.

4.Additional Silverlight Programming Features

Silverlight provides several additional features that help developers create rich and interactive applications, including those described in the following TableI .

TABLEI

Additional Features of Silverlight.

Feature	Description
Isolated storage	Provides safe access from the Silverlight client to the local computer's file system. Enables local storage and caching of data isolated to a particular user.
Asynchronous programming	A background worker thread carries out programming tasks while the application is freed up for user interaction.
File management	Provides a safe File Open dialog box, to ease the process of creating safe file uploads.
HTML– managed code interaction	Enables .NET Framework programmers to directly manipulate UI elements in the HTML DOM of a Web page. Web developers can also use JavaScript to call directly into managed code and access scriptable objects, properties, events, and methods.
Serialization	Provides support for serialization of CLR types to JSON and XML.
Packaging	Provides the Application class and build tools to create .xap packages. The .xap package contains the application and entry point for the Silverlight plug-in control to run.
XML libraries	XmlReader and XmlWriter classes simplify working with XML data from Web services. The XLinq feature enables developers to query XML data directly within .NET Framework programming languages.

The following Microsoft applications include special features for Silverl*ight development:*

A. *Microsoft Expression Blend*: This tool can be used to create and modify the presentation layer of an application by manipulating the XAML canvas and controls, working with graphics, and programming the presentation layer with a dynamic language such as JavaScript.
B. *Visual Studio*: Visual Studio 2010 provides visual design support for creating Silverlight applications. You can build user interfaces for your applications by dragging controls from the Toolbox and setting properties in the Properties window. You can also edit XAML directly in the XAML view. Because Silverlight-based applications are executed in a run-time environment on the client machine, no particular application is required to be installed on the server. However, developers may find that their ability to create rich applications that integrate services and data from multiple sources on the server is enhanced by integrating the following types of services and server-side applications into their Silverlight-based applications.
C. *ASP.NET AJAX*: This includes a set of controls, services, and libraries for creating rich and interactive Web-based applications.

III. RUNING SILVERLIGHT APPLICATIONS

To run a Silverlight web application, users require a small plug-in in their browser. The plug-in is free[4]. If users do not already have the plug-in, they are automatically prompted to install it. The download and installation take seconds and require no interaction from the user except permission to install.

Silverlight makes sure that you can run your applications in all modern browsers, without having to create browser-specific code. Silverlight applications can run in the browser or outside the browser.

1. Creating Silverlight Applications

You can create Silverlight applications using any .NET Framework-supported language (including Visual Basic, C#, and JavaScript). Visual Studio and Expression Blend provide support for developing Silverlight applications. You can create Web pages that use both HTML and WPF elements with Silverlight. Like HTML, XAML enables you to create UI for your Web-based application with declarative syntax, with the difference that XAML provides significantly more powerful elements.

In this section we described the step-by-step information for getting started developing Silverlight-based applications[4]. It includes information about the development tools, how to create a basic project in Visual Studio, and provides links to samples with the source code.

You can create Silverlight applications using skills that you already have and tools that you are already familiar with. This topic describes various tools that you can use when developing applications for Silverlight 4.

2. *Installing the Silverlight 4 Tools for Visual Studio 2010*

Silverlight 4 Tools for Visual Studio 2010 is an add-on for Visual Web Developer 2010 Express or Visual Studio 2010 that provides several features for creating applications in Silverlight[3]. As mentioned previously, when you install Visual Studio 2010 Service Pack 1, you get the Silverlight 4 Tools for Visual Studio 2010 automatically, or you can install them separately. When you install the Silverlight 4 Tools, the following components are installed.

- Silverlight 4 developer runtime
- Silverlight 4 SDK
- Updates to Visual Studio to support Silverlight 4 features
- WCF RIA Services

Unlike the Silverlight runtime installed by end users, the developer runtime installed with the Silverlight 4 Tools has error messages that can be helpful for debugging. The Silverlight 4 Software Development Kit (SDK) includes several components to help you create Silverlight applications. The Silverlight 4 SDK is included in the Silverlight 4 Tools installation or you can install it separately. By default, the Silverlight 4 SDK is installed in the %ProgramFiles%\Microsoft SDKs\Silverlight folder. The Silverlight 4 SDK contains the following items.

A. *User License:* The License document includes the terms for the Silverlight 4 SDK.
B. *Silverlight Libraries*. The Silverlight 4 SDK includes client and server libraries. The Silverlight libraries are not part of the Silverlight plug-in. The client libraries include Silverlight extensions and user controls. The server libraries include Silverlight server controls. For terms of use, review the Silverlight 4 SDK User License. For a list of the controls included in the Silverlight 4 SDK, see Controls by Function.
C. *Tools:* Includes reference assemblies, build components, and tools to build and package Silverlight applications[6].

The following Table II depicts the differences between Silverlight[8] and adobe flex[9].

TABLEII

Differences Between SilverLight and Adobe Flex

SILVERLIGHT	ADOBE FLEX
Silverlight has added multimedia support and has some enhanced animation effects.	Audio and video features are again richer for Adobe technologies
Silverlight 4 offering much tighter integration with HTML and advanced support for trusted applications.	Has nice built-in advanced features like integrated browser and support for local SQLLite database with automated client/server data synchronization
Silverlight wins in templating and styling.	Flex styling is based on inheritance and quite commonly regarded as inflexible.
has an ability of overriding existing template completely, which is a much powerful concept, but the price is excessive information in your XAML, not easily readable. If we consider pure computational performance, Silverlight is a clear winner.	Flex does not have any built-in support for multithreading, which complicates the situation further.
Microsoft Silverlight has recently entered the RIA world.	On the other hand, Adobe has been in the RIA market for quite longer
Silverlight, is progressing very fast and promises better integration with other Microsoft technologies	if needing rich out-of-browser functionality or a program to be run on Linux, go for Adobe Flex.

3.Other Silverlight Tools

As you do more Silverlight development, there are other tools that you might want to utilize which are as follows[5].

A. *Expression Blend* : It is a tool for designers (and developers) to create graphics, design animations and produce experiences. Expression Blend uses XAML and the same project system as Visual Studio. This allows designers and developers to share the same files and collaborate.

B. *Deep Zoom Composer* : It is a tool to prepare high-resolution images for use with the Deep Zoom feature. The new Deep Zoom technology in Silverlight allows users to perform smooth in-place zooming and panning. The Deep Zoom Composer allows the user to create Deep Zoom composition files that control the zooming experience and then export all the necessary files for deployment with Silverlight.

C. *Silverlight.js* : It is a JavaScript helper file that is provided in the Silverlight SDK. You can call functions defined in this file in order to initialize Silverlight plug-in instances on a Web page. It also contains utility functions for determining the client's installed version of the plug-in.

D. *Silverlight. supported UserAgent.js:* This optional JavaScript helper file includes the Silverlight.supported User Agent function, which determines if the user's browser supports Silverlight.

IV. CONCLUSION

Silverlight has overtaken Flex usage among ASP.NET developers who are building web applications on the DiscountASP.NET hosting platform within the last two years. While the gap between the percentage of web sites using Flex and Silverlight continued to decrease from 2005 to 2007, Silverlight usage was beyond the Flash in 2008 and continues to maintain its lead into 2009. Hence the Newer customers who have Silverlight as an option from the beginning of their site development efforts are choosing to use Silverlight over Flash as it supports RIA and other features discussed in the paper.

REFERENCES

[1] Perez, Sarah (22 March 2010). "Silverlight for Symbian Plugin Now Available". *Cool Stuff – A Channel 9 Blog*. Microsoft Corporation. Retrieved 4 November 2010.
[2] http://en.wikipedia.org/wiki/Microsoft_Silverlight
[3] "DevConnections - Visual Studio 2010 and Silverlight 4 Launch Event". Penton Media.
[4] Sterling, Charles. "Writing a Windows Sidebar Gadget in Silverlight dead simple". MSDN Blogs. Retrieved 2008-03-09.
[5] "Silverlight Mobile rumored for Windows Mobile 7". www.wmexperts.com. Retrieved 2009-05-05.
[6] "Mono developers to bring Silverlight to Linux". 7 May 2007.
[7] (Flash). StatOwl.com. Retrieved 2011-07-24.

[8] "Microsoft/Novell Collaboration on Silverlight". Retrieved 2007-09-05.
[9]http://en.wikipedia.org/wiki/Microsoft_Silverlight#Adoption.

Authors:

Vasavi Bande, is M.Tech in Computer Science from Jawaharlal Nehru Technological University,A.P., India. She has vast experience in Computer Science and Engineering areas pertaining to academics and industry related real time projects. She is presently working as Associate Professor in Department of Computer Science and Engineering, Hyderabad Institute of Technology and Management [HITAM], Hyderabad, A.P, India. She has presented many papers to her credit at conferences. She has presided over as judge to many Paper Presentations and Technical Quizzes. She has authored 7 research papers to date and are published in reputed and indexed International Computer Science Journals. She has guided 20 Students of Master degree in Computer Science and Engineering in their major projects. She is bestowed with the Editorial Member on three International Journals Boards and is nominated as Reviewer to four International Computer Science and Information Technology Journals. Her area of research include Cloud computing, Network Security, Image Processing, Data Mining, Web Technologies and Emerging Technologies. She can be reached at vasavi.bande@yahoo.co.in

Sangepu Jayashree is pursuing B.Tech 4th year in Computer Science and Engineering, Hyderabad Institute of Technology and Management, Hyderabad [HITAM], A.P, India. She has participated in number of paper presentations and technical workshops. She has organized number of events which include Cultural, Symposiums and blood donation camps. She can be reached at jsjayashree3@gmail.com