



➤ Presenting Cognizant's Microsoft Center of Excellence
Silverlight 4 RC
Point of View

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Executive Summary

This document provides an overview of the technology features that are available as a part of Microsoft's Silverlight 4 RC. It also provides our unique point of view that defines the new features that helps in creating engaging, interactive user experiences for Web, desktop, and mobile applications that can be adopted across the enterprise landscape cycle by architects, technical managers and Silverlight developers.

Features

Silverlight 4 provides features that are capable of providing a very richer user experience that is comparable with the typical WPF-based stand-alone applications. The Silverlight 4 has been bundled and rolled out with a lot of extensions to its predecessor and has had a significant impact on the development front. The key features that Silverlight 4 include:

- Modular development with MEF
- WCF RIA Services
- Printing Support
- HTML Support
- COM Automation
- Signing of XAP
- Support of Google Chrome browser
- Web Camera and Microphone Support
- Localization
- Silverlight DRM
- Multi-touch Support
- WCF net.tcp
- Local File Access
- Out of Browser feature

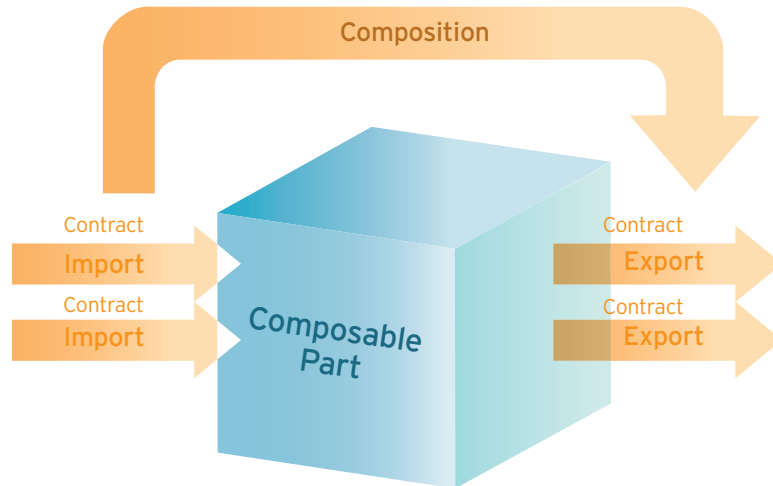
This document provides a point of view of the all the features that are mentioned above.



Modular Development with MEF

Managed Extensibility Framework (MEF) is an out-of-the-box feature to enable modular and decoupled component development in Silverlight 4. The MEF falls in line with the already existing component-based development frameworks such as PRISM and CAB. MEF

enables developer to code incrementally and simplifies the design of “composable” systems that can be extended by third parties, post deployment. The MEF is based on the following core concepts.



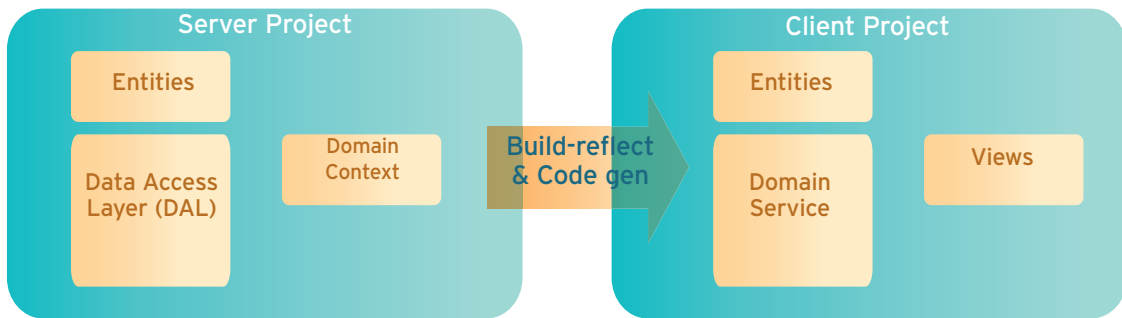
Favorability						
Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Testability	Usability Impact
★★★★★	★★★★	★★★★★	★★	★★★★★	★★★★★	★
<ul style="list-style-type: none"> MEF enables applications be built with multiple XAP files and downloaded based on the context associated at the runtime of the application. MEF adoptability results in a very secured and responsive system. Applications are more secured as the XAP are downloaded in runtime and only the components required at the runtime of the application are downloaded. MEF can be of help in “SaaS” enabling the enterprise application. The decoupled components and integrating at runtime makes it a prime pattern to adopt for application that need to be enabled as Software as a Service. Another feature is the ability to create a multitenant application using MEF. MEF can be used to develop applications on-the-go; client application functionality can be added as new XAP files which can be downloaded by the users associated with the client software. Adoptability of MEF enables extensibility and manageability. MEF also offers a dependency injection kind of patterns which can overall shorten development time since each component can be tested separately without having to be integrated with the complete application. On the downside, Migration of the existing Silverlight 3 application will be challenging and the effectiveness of migration will be based on the existing design. The migration of the application will be fairly easy when it is moved from a PRISM / CAB-based application. 						

WCF RIA Services

WCF RIA Services in Silverlight 4 enables n-tier development from traditional two-tier development by including enterprise-class networking and data access for building n-tier applications with transactional support and data paging. WCF RIA Services also provides the ability to network in the binary format and also in an open standard, such as the ATOM Extension called ODATA.

The WCF RIA Service is based on the attribute development model and introduces the client side rendering between the client and server. WCF RIA Services enables the facility of code generation of the middle tier component to the client component through "Domain Services" and "Domain Context."

Solution (Application)



Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
★★★★	★★★★★	★★★★★	★	★★★★★	★★★★	★★★★★
Impact						
<ul style="list-style-type: none"> ■ The WCF RIA Service can be the potential enabler of the new age Web portals. RIA Services, alongside MEF, provides a very modular approach for developing Web portals and also could be the new face of "SaaS" applications. ■ RIA services can be leveraged to achieve multi-tenancy as the code generated on the client side is tied to the associated server side and the introduction of client side components provides a very responsive system, as the most client side features (such as the validation and caching) are done at a high precision level, leveraging the resources available on the client side. ■ WCF RIA Service can also be a new age face of "SOA" Applications. Over time, enterprises have invested heavily in product silos, which now have a legacy tag. Enterprises are consolidating key services across these legacy environments to support a better business model. SOA has been binding factor for application integration and is among the key enablers for improving user experience. WCF RIA Service- based application with the Out-of-Browser and the elevated privileges feature can be a ideal way to front-end SOA applications. ■ Silverlight 4 is also equipped with Bing maps as a part of the new release. WCF RIA services, in conjunction with these tools, can provide an assortment of rich mash-ups (componentized applications) that potentially alter the visual representation of information. ■ The MEF along with the WCF RIA Services provide the better architecture pattern that can potentially can be adopted to any kind of Silverlight based application that is targeted for better manageability, performance and extensibility. ■ WCF RIA Services and MEF target applications might look similar to the WPF. However, the purposes of both are different, as WPF are is leveraged for a Windows-based application that is optimized for the environment such as one using the DirectX feature. Silverlight is used for rich internet application that targets the multiple environment or platform. 						

Printing

One of the key features in the Silverlight 4 is its printing support. Silverlight 4 provides a "PrintDocument" class which performs the necessary plumbing work and exposes events for the data to be printed. Silverlight uses the XAML Tree. The "PrintDocument" has primarily a property named "DocumentName" and couple of startup and end events, namely "StartPrint" and "EndPrint." These provide the required startup and end jobs handling functions. Printing happens through the

"print" method, which depends on the content source that is associated with "PrintDocument" to be printed and also a Boolean value "HasMorePages" to determine the continuation of printing more items. The content source for the printing is performed through the "Print Page" event that is initialized by the "print" event.

Printing support in the Silverlight 4 is still at the nascent stage and would not be suitable for the enterprise reporting.

Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
N/A	★	★★★★	N/A	N/A	★	★★★★
Impact						
<ul style="list-style-type: none"> ■ Printing in Silverlight is not character based and it is one big bitmap image that is sent to the printer. Usage of bitmap printing has its own disadvantages in terms of the cost efficiency (the printer resource is greater when the bitmap is printed) and also the duration for the print as it is not character based. ■ Contents beyond the printable area are clipped, hence potentially making the reports unusable. This results in spanned and cut images across multiple pages. ■ The print options can be sent to PDF. However search on the PDF cannot be made as it is a single Image and does not contain the necessary textual data. This makes even archiving of the reports not useful either. ■ "Printing snapshots for quick processing on the Line of Business, such as printing the ID card for a new employee on the organization. Silverlight 4's Web camera capabilities, coupled with the printing option, can potentially speed up the ID creation process." Has additional space. ■ The print option can be used to print non-screen contents in a business required way. This is more useful for mini reports such as quote creation verification, order approval status list, etc. ■ Though the report capabilities are kicked off on the printing support, it does not meet the business requirement. Silverlight 4 has alternate methods using COM Automation that can be leveraged as a better reporting tool. 						



COM Automation

COM Automation is by far one of the compelling enhancements in Silverlight 4. This new way of providing elevated privileges for "Out of Browser" applications in Silverlight 4 enables programming with "Internet Applications having access to Local box Contents." The COM Automation is essentially used for leveraging

already installed applications and accessing the local file share. It treats the client component as a part of the application's full resources. COM Automation provides a new path of development with core functionality residing in the server, but can also target application resources on the client machine.

Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
★★★★★	★★★	★★	★★★★★	★	★	★★★★★
Impact						
<ul style="list-style-type: none"> ■ COM Automation helps automate Microsoft Office tools. The option can be useful to collaborate with users, generate and create customized reports, integrate with instant messenger. As previously explained, customized reports can be generated by using Excel and Crystal Reports using COM Automation. ■ COM Automation enables access to local file shares. The option can be useful for the storing personalization of data; uploading of local data files to the server can be now avoided and can be accessed for processing from the local file share. ■ The COM Automation can be used with text to speech tools for helping people with reading disabilities. ■ Helps in maintaining offline databases. With the COM Automation, access to the local ODBC sources and database are enabled and the offline databases at the client can be maintained. ■ COM Automation can instantiate other applications and can subscribe to events, which helps to update application status. ■ Extended trust allows developers to changes registry contents and other important file information, to prevent security breaches. Extended trust may enable registry and local access through COM automation and can possibly result in security challenges. ■ So far, Silverlight is considered to be a Flash player-like add-in. Having providing the Out-of-Browser feature with elevated privilege makes it a not liked contender for a publically available Out-of-Browser application due to fear of security breach. ■ Another important limitation is that by using COM Automation in the Out-of-Browser application, the resulting application can run only in an Windows environment, thus nullifying platform portability. ■ Programming using dynamic instanced object is also a challenge because of the lack of support with intellisense. 						



HTML Support

Silverlight 4 now supports HTML embedding. Silverlight 4 has two ways of rendering HTML contents, namely Web Browser Control and HTML Brush. One of the key benefits of the HTML Support is that it not only supports static HTML Web pages but also pages with scripts. The availability of this option potentially enables a Silverlight 4 application to render any contents from Flash,

ASP.NET Pages, static Pages and even another Silverlight control. The difference between the Web Browser Control and the HTML Brush is the ability to play live content. Web Browser Control provides API not only for rendering the live content, but also to receive notifications from Java Script and invoke JavaScript functions placed alongside HTML Rendering.

Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
★★★★★	★★★	★★	★★★★★	★	★	★★★★★
Impact						
<ul style="list-style-type: none"> ■ The enterprise can decide on the overall direction of its Web facing applications and use only critical parts, such as Silverlight applications and HTML Support, which will help accelerate the migration/co-existence of the legacy ASP.NET / Web facing applications to Silverlight. ■ Some of the existing shortcomings of the Silverlight applications can also be addressed with HTML support. For example, in a heavy report generation system where customized reports are needed, power of reporting tools (such as Crystal Reports) can be leveraged by hosting an ASP.NET page containing the CRViewer inside Silverlight as a HTML Embedded Item. ■ The Web Browser Control provides a key API -- "Invoke Script" -- to trigger a JavaScript function. This API can be effectively leveraged as a pre-event capture on the destined application. ■ HTML Hosting is currently not supported as a part of the in-browser Silverlight Application. It also requires an elevated permission for displaying contents from other domains not related to the existing Silverlight applications. 						

Signing XAP for Trusted Application

Silverlight 4's Out-of-Browser feature provides elevated privileges to enable applications to access local resources. One of the bottlenecks of the accepting the application with the Out-of-Browser feature is the authenticity from the public domain. It will not be prudent for public Web applications to be installed unless it is from the trusted

provider. To mitigate this, Silverlight 4 allows provides for a signing of XAP files using any certificate provider, such as VeriSign, Thawte, GoDaddy and Comodo. The option enables the end user to trust the application and have it enabled in the Out-of-Browser mode.

Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
★	★★★★★	★★	N/A	N/A	N/A	★★★
Impact						
<ul style="list-style-type: none"> ■ One of the advantages with signing an of XAP file is the enablement of auto update of the application. The auto update feature ensures the download of the latest XAP files available from the provider. ■ From the enterprise perspective, a trusted application provides a sense of security for the Out-of-Browser-based application and will enable the adoption of the Out-of-Browser application widely. 						

Silverlight DRM

Digital Rights Management (DRM) has been enabled with the Windows Media Player and PlayReady for restricting Internet streaming videos and downloading of music files in Silverlight 4. The Silverlight DRM is a powerful feature

for future subscription-based live and secure Internet streaming. The compatibility with Windows Media Player DRM and the PlayReady DRM virtually provides streaming to any type of platform.

Extensibility	Security	Manageability	Ease of Migration	SOA Enabler	Performance	Usability Impact
★	★★★★★	★★	N/A	N/A	N/A	★★★
Impact						
<ul style="list-style-type: none"> Subscription-based streaming of the video content is possible with Silverlight applications with the use of Silverlight DRM. The contents can be highly encrypted and hence the enterprise can be relieved from piracy issues and rights violations of the streamed media as it will target only the respective end user. With the advent of the DRM, the license and the media are stored separately. Hence, it is possible to keep the subscription base separate from the actual media. "With the power and storage of a cloud-based application available in Azure, the CDN-based application coupled with the Silverlight 4 DRM features, enterprises can have their own private CDN (Content Delivery Network) without third-party support (i.e., Akamai)." Space is required between "of" & "a." The search engine optimization for the DRM is not currently available and hence would be a bottleneck for the enterprise to maintain the media list as searching is not available. 						

Key Developer Enhancements

Notification API

Silverlight 4 has a notification API to render information on the screen as and when an event occurs. This is an Out of Browser capability that is provided and is achieved by the Notification Window Class.

The "Notification Window" allows for definition of the height and width of the Notification area and provides the necessary details to be placed on the content area.

From the enterprise point of view, the Notification API can be leveraged wherever the user needs to be alerted. Typically, situations such as completion of an asynchronous event or critical status update information can be placed as a Notification Window.

Localization

One of the key features contained in Silverlight 4 is localization support for many languages including Arabic and Hebrew. Silverlight 4 applications now supports numerous Indian scripts, too.

Localization in Silverlight 4 is related to "FlowDirection" Property in use controls. The property defines the flow of text and supports bi-directionally. Silverlight 4 also provides various controls supporting Flow Direction, including the introduction of the very popular Richtextbox and the view control.

From the enterprise point of view, it would be a step forward in creating the next generation multi-language application. The original ASP.NET way of adding resource files and linking it to Silverlight server application enables the application to display an application with localized language.

WCF net.TCP

Microsoft Silverlight 4 enables Silverlight clients to communicate with a Windows Communication Foundation (WCF) service using the net.tcp protocol. The key benefits of the net.tcp protocol include support for

duplex communication with a simple to use programming model and better performing application. With the WCF net.tcp support added in Silverlight 4, client applications can continue to benefit from the programming model usability while gaining a major performance benefit over HTTP polling duplex protocol. Migration of client applications already utilizing HTTP polling duplex protocol to use net.tcp should require minimal changes in the application code.

Other Features

Silverlight 4 associates many new features such as support of Google Chrome Browser, drag and drop functionality, extended data binding features, Web camera and microphone enablement, improved Graphical Processing Unit Acceleration and multi-touch features. From the developer perspective, these features provide a much required optimal development environment that can be targeted at applications ranging from kiosks to multi-touch-enabled applications.

About Cognizant

Cognizant (NASDAQ: CTSH) is a leading provider of information technology, consulting, and business process outsourcing services. Cognizant's single-minded passion is to dedicate our global technology and innovation know-how, our industry expertise and worldwide resources to working together with clients to make their businesses stronger. With over 50 global delivery centers and more than 85,500 employees as of March 31, 2010, we combine a unique global delivery model infused with a distinct culture of customer satisfaction. A member of the NASDAQ-100 Index and S&P 500 Index, Cognizant is a Forbes Global 2000 company and a member of the Fortune 1000 and is ranked among the top information technology companies in BusinessWeek's Hot Growth and Top 50 Performers listings.



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