

Choosing the Right CRM Platform

Smart Client vs. Thin Client

Executive Summary

For the past few years, browser-based “thin client” applications have been dominating the enterprise application space due to their ease of deployment, updating, and administration, all leading to a respectable low cost of ownership. However, this model is no longer able to provide the levels of functionality, performance, flexibility, and integration required to meet today’s business demands.

This white paper compares and contrasts the two primary alternatives to thin clients—enhanced thin clients that use technologies such as ActiveX, AJAX, and ASP.NET and the new generation of “smart clients”—and examines the differentiating characteristics that could impact your CRM implementation.

Introduction

Today's IT organizations are under pressure to deliver strong, usable, and efficient business applications that meet the increasing expectations of business users and executives, who need access to data, functionality, and tools that help them stay competitive. These applications must also be flexible enough to enable the company to adapt to ever-changing market conditions and demands.

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this model is no longer able to provide the levels of functionality, performance, flexibility, and integration required to meet today's business demands. Users now expect faster and more responsive applications that enable them to perform their daily work in a flexible and efficient manner that is not always possible with thin client

applications due to a variety of limitations. Furthermore, increasingly mobile users taking advantage of a rapidly growing list of new devices pose additional challenges. Add all these factors together, and it becomes clear that a new category of client application is required to meet expanding business-user needs.

This white paper compares and contrasts the two primary alternatives to thin clients—enhanced thin clients that use technologies such as ActiveX, AJAX, and ASP.NET and the new generation of "smart clients"—and examines the differentiating characteristics that could impact your CRM implementation.

Finding a Better Alternative

A major challenge for technology professionals has been to figure out how to restore the benefits of older Windows-based applications that thin clients have lacked, without adding the complexities and the high management costs that were associated with these traditional "rich clients."

To address the shortcomings of both thin clients and the previous generation of Windows rich (client/server-based) clients, companies have been looking at two main alternatives:

- thin clients that have been enhanced with the use of technologies such as ActiveX, AJAX, and ASP.NET to mimic a richer user interface

- smart clients, which promise to take full advantage of the rich client model, providing a rich user experience, while at the same time reaping the benefits of thin clients

Since both of these clients are superior to pure thin clients, this white paper will focus not on thin clients but on the differences between these two main alternatives.

Enhanced thin clients typically use AJAX, ActiveX, or ASP.NET technologies to expand the capabilities of traditional thin clients. These technologies allow developers to create more dynamic, responsive applications for web delivery while retaining advantages such as the ability to leverage the Internet and provide easy remote access to data.

A smart client is a .NET technology for building rich Internet applications that provide users with a highly interactive user interface. Smart clients aim to provide "the best of both worlds" and bridge the gap between web and desktop applications by adding the intelligence to manage data and connectivity to produce a superior user experience. While smart clients provide the benefits of a rich client model with thin client manageability, they also provide more flexibility and capabilities than traditional rich client applications.

These two client technologies, smart clients and thin clients with AJAX, ActiveX, or ASP.NET, are both necessary technologies; they do not replace each other so much as provide companies with a greater range of options. When looking to choose the right enterprise applications, especially critical department-spanning applications such as customer relationship management (CRM) systems, a company must examine the characteristics of the underlying client technologies and determine which option best suits their requirements and target users' profile. Companies should evaluate clients comprehensively, examining the impact of an application's client on performance, usability, deployment and maintenance, ease of integration, security, total cost of ownership, and more. What follows is a comparison of the two core client alternatives to assist business decision-makers in evaluating their options.

Performance

Application performance is typically—and most practically—determined by measuring how quickly a user can complete an end-to-end business task. This measurement depends on two factors:

1. how quickly the user can retrieve data and access functionality over a local or wide area network (for example, how long it takes to open a form)
2. how quickly they can complete the business task once they are in the application and the information is retrieved.

Factors that affect the first point include bandwidth, latency, server round trips, compression, and performance optimization. Factors that affect the second point are screen design, navigation design in relation to the business context, number of clicks required to complete the task, ability to multi-task, availability and presentation of information, number of applications the user has to access to complete the task, and so on.

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Smart clients can take advantage of local resources (CPU, hard disk, peripherals, etc.) to do work at the local level—on the user's computer. Given the power of workstation and notebook hardware that

has been available for the past few years, users will therefore usually experience greater responsiveness and performance from a smart client application. In contrast, thin clients generally do not access local resources, and if they do, it is through an extra layer, such as COM, which requires information to be passed back and forth to the central server.

Smart clients can not only take advantage of the local CPU, but they also have the advantage of permitting multi-threading, which drastically increases performance by allowing different tasks to occur simultaneously. In addition, smart clients can perform well in low-bandwidth and high-latency environments because they take advantage of client-side caching, whereas thin clients are seriously compromised by bandwidth limitations and latency.

Smart clients minimize server round-trips by enforcing certain logic on the client side and maintaining user interface (UI) definitions locally. This results in substantially better performance than thin clients, which download every screen with each click or have to go back and forth to the server for each and every request.

Unlike AJAX-based clients, smart clients load the appropriate net data when they load a form. This means that users don't have to wait to retrieve data each time they navigate from one tab to another tab within the same form.

These factors combine to give smart clients the clear advantage when it comes to application performance. Smart client application users enjoy a faster, more responsive usage experience. In the context of CRM, where the application is being used to call up important customer data in time-sensitive contexts, such as during a service call, this responsiveness is critical to delivering a high-quality customer experience.

Usability and User Interface

The key success factor of any CRM project is rapid user adoption. Unlike a back-end application, where users are forced to use the system or they can't do their jobs, CRM is a front-office application that users must *want* to use because it makes their jobs easier. Likewise, the value of the system is directly correlated to the extent to which it is used and integrated into every front-office activity. To have full and rapid user adoption, companies must make sure that usability, flexibility, performance, and multiple access methods are among their top priorities in selecting a CRM application, in addition to ensuring the right functionality and manageability. They must also ensure that the system is flexible enough to mirror their processes, rather than forcing them to adapt their processes to the system.

Heavily weighted factors in usability include performance, ease of use, tight integration with Microsoft Office, quick access to data and functionality, access from anywhere (offline/online/home/mobile), integration with other applications, and minimized clicks. Evaluators should also look for the best use of screen design and navigation to optimize screen real estate for presenting data and functionality, as well to create an appealing, familiar, and comfortable interface for end users.

Unfortunately, for most business users, browsers are slow and cumbersome to navigate, and toggling between screens is painful, putting even enhanced thin clients at a disadvantage. In addition, the individual browser specifies the limits of what can be accomplished graphically in the user interface, which limits a company's ability to tailor and streamline the interface and make it more user-friendly.

When business users are expected to do the majority of their daily work in an application—as is the case with customer relationship management applications, where all customer interactions are expected to be recorded in the CRM system—usability and the user interface simply cannot be thought of as secondary considerations: they can have a significant impact on the utility of the system to its users and the speed with which they can complete business tasks, not to mention whether they embrace the system in the first place. A rich, highly interactive user interface such as those made possible by smart clients offer a more compelling experience and are more likely to encourage adoption than similar web-based applications.

If an application is CPU-intensive, such as corporate applications that do a lot of complex data-sorting, editing, and manipulation with the use of graphic-intensive charts and graphs (as is often the case with CRM systems), users are more likely have a better experience with a smart client-based application that can take advantage of local CPU power to offer a more responsive application. Typical web-based applications are very sequential and linear in nature. Smart clients, on the other hand, allow you to branch off at any point and to multi-task in a non-linear, decision-tree-like fashion.

Smart client applications combine standard Windows tools with the point-and-click functionality of web pages. This familiarity and ease of use means users can log on and start using them at once, reducing training requirements. Since smart clients still share many of the features of browsers (such as back and forth, history, and favorites), the learning curve for users is reduced. With

With Microsoft ClickOnce technology, smart clients match and even exceed thin clients in ease of deployment and maintenance

browser-based applications, however, some of the browser features that users expect to work may not work, such as managing "state." (Web browsing is inherently "stateless"—that is, the browser doesn't "remember" anything from moment to moment—but users expect

applications to "remember" what they've done.) For example, hitting a "back" or "refresh" button or closing a window in a thin client application could result in an unanticipated loss of data and work, whereas with a smart-client application, users can be easily prompted to save their work before exiting or leaving a page.

Smart client solutions can be composed of functionality from more than one client application, with each application collaborating with the others to provide just the right functionality to the user. Such "composite" applications can integrate client-side software resources into a coherent solution or extend the functionality of an existing application to provide smart client features.

Additional usability advantages of smart clients over thin clients include the ability to update data in certain sections of the application without having to refresh the entire display, as well as the ability to use keyboard-driven shortcuts. Furthermore, smart clients can gracefully switch between connected and disconnected states, rather than losing data and work when a connection drops.

As is evident from the discussion above, several key user interface and usability requirements are difficult for browser-based applications to handle. While individually they may seem minor, cumulatively, they can have a major impact on the user experience. A poor user experience often hinders CRM adoption, jeopardizing the attainment of an CRM implementation's business goals.

Deployment and Maintenance

Web applications have always had a clear deployment advantage: no need to install software on users' computers makes for an easy and rapid deployment. With the cost of deployment, maintenance, and administration playing a significant part in the overall cost of a CRM application, thin clients have for the last several years been favored by cost-conscious organizations.

The emergence of smart client alternatives that leverage Microsoft ClickOnce technology, however, have begun to seriously challenge one of the major AJAX and browser-based development advantages. With Microsoft ClickOnce technology, smart clients match and even exceed thin clients in ease of deployment and maintenance:

- Smart clients are centrally deployed and managed and require no administration on client workstations.
- The ClickOnce technology installs the application via a simple hyperlink, without the need for administrator oversight.
- Smart clients are downloaded over the web (HTTP), just like file copies.
- Smart clients update seamlessly in real time, without user action, by downloading net meta-changes from a centralized server.

In addition, unlike with thin client applications, powerful servers are not needed to support smart clients, since smart clients leverage the computing power of every desktop and laptop to process data and display information. Smart client applications can support hundreds of end users from a single, inexpensive server.

Development and Total Cost of Ownership (TCO)

Out-of-the-box applications seldom meet all the needs of complex organizations "as is," which makes the ease of development on an application's platform extremely important, as companies often need to modify or add on to the core system, or even develop entirely different applications to complement it. Thin client and smart client development offer very different scenarios to technology teams, which can dramatically impact an application's total cost of ownership.

Companies can very easily create other smart client-based solutions to meet the needs of different parts of the organization with a low total cost of ownership. Smart client solutions can become an integral part of an organization's information infrastructure, accessing corporate data and services and providing a powerful and familiar working environment. Web Services provide a natural way for companies to expose data and services, and smart client applications are the ultimate consumers of these Web Services. For these and other reasons, smart client development is on the whole less expensive and faster than thin client development.

Thin client developers face unique challenges and constraints due to the applications' reliance on browsers. Due to the pervasiveness of Internet Explorer (IE),

developers must commonly rely upon this browser as their main delivery method. ActiveX, MSXML, and XMLHTTP provide IE-supported options for enhancing a web application's features, but developers are then subject to the limitations of Internet Explorer. New IE releases, which are becoming increasingly automatic and unavoidable, often wreak havoc on web applications and cause

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procedures to break, resulting in unacceptable production downtime. Meanwhile, alternative browsers such as Firefox and Google Chrome are gaining popularity, introducing more complexity and cost into testing and programming if companies want to support more than just IE.

In contrast, smart clients are browser-independent and are tied only to the operating system, rather than the specific versions or updates of the browser. Smart

client-based applications are not subject to destructive browser issues such as timing-dependent bugs and memory leaks. Smart clients provide APIs that give administrators the flexibility to use the web programming approach that works best in each browser.

Thin clients using AJAX can handle some user interface logic programmed via JavaScript and make subsequent requests for more functionality/data from the application server. This poses a challenge, in that when using client-side JavaScript, applications don't have a powerful framework of class libraries to fall back on (such as the .NET base class libraries). Because of this, in some cases developers have to move logic back onto the server and create a cross-process call over the web to reach it, or write their own. In addition, JavaScript is an interpreted scripting language and quite inefficient compared with full compiled .NET-based dynamic link libraries (DLLs) used as client tasks by smart clients.

Smart clients, on the other hand, can validate input from the user before making calls to the application server. This user interface logic can be programmed with any .NET language. The UI logic renders data to the client via calls into WinForms namespaces. This reduces the development time required to write .NET Windows Forms-rich Internet applications compared with writing thin client applications.

With smart clients, developers can leverage the full capabilities of Visual Studio libraries to reduce coding times when creating client tasks for smart clients. Writing JavaScript, in contrast, is no different than coding in Notepad, as users do not have access to Visual Studio Intellisense. This increases the risk of issues due to the need to remember specific methods and go back

and forth to understand available API calls, as well as introducing an increased risk of typos and spelling errors. Debugging a client task in a smart client is also much simpler than debugging client scripts such as JavaScript, because smart client users have access to the full Visual Studio debugging environment.

The user interface for an AJAX application is rendered as a combination of HTML DOM objects and CSS styles, while the user interface for a smart client application is rendered via Win32 calls on the Windows operating system, providing greater flexibility. The smart client approach to "skinning" and branding requires only rudimentary knowledge of page styling, sufficient to set colors and fonts. Even when deeply customizing look and feel, you don't have to deal with browser layout inconsistencies. Many properties that require programming with other kinds of applications, such as color and the ability to make an item "read-only" or hidden, can be done without programming in smart client applications.

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Security

Customer data is one of a company's most vital assets, and data security is of equally high concern to a company and its customers, who need to trust that their data is safe. Unfortunately, because they rely on browsers for data access and transfer, thin client applications are prone to various security weaknesses that smart clients are able to avoid. For example, changes in browser security settings can result in issues for thin client applications (for example, disabling scripts and downloads).

Since smart clients are web applications that do not use browsers to access data, data is shielded from the security holes, bugs, and malicious codes that are associated with browser-access applications.

Integration

Integration is often one of the greatest sources of expense and complexity when implementing applications. Smart clients alleviate this challenge because they can interact with other applications much more easily than other kinds of clients. Because they utilize Web Services, smart clients are also less dependent on platforms and browsers than other available options.

A major integration advantage of smart clients is their support for the Composite UI Application Block (CAB). This architecture allows developers to plug in and combine disparate applications using web, WinForm, and Windows Presentation Foundation (WPF) technologies to

create a single coherent solution. Such solutions can be formed by coupling desktop applications or by providing a generic “shell” application that houses multiple lightweight applications that are combined to form the solution.

Smart clients extend far beyond mere UI widgets, providing a comprehensive data-binding architecture, a powerful cross-browser toolset, and metadata management that radically reduces duplication and complexity.

Smart client forms also support .NET controls. This means that .NET controls that you may have developed for another application or purpose can easily be dropped onto a smart client form and be used and re-used without re-programming. These .NET controls can provide integration of functionality or features from your other enterprise applications through the use of Web Services, providing a “one-stop shop” for end users, who save time by working within a single application.

Lastly, smart client forms can easily integrate and embed web pages by dynamically creating a parameter-based URL in the context of what the user is doing. For example, a smart client could integrate Google Map plug-ins to map the location of a contact right within the contact form, without leaving the existing page.

Pivotal CRM: Smart Client Innovation at Work

Ask any CRM expert what really makes or breaks a CRM implementation, and you'll get the same answer: user adoption. Many a company has invested time, money, and passion into deploying the perfect CRM system, only to find that it's worth very little if users aren't using it.

CDC Software understands this, and it's why we've built the next-generation Pivotal CRM 6.0, a smart client CRM solution your users will love.

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Built on the Microsoft .NET platform, Pivotal CRM 6.0 takes full advantage of all of the benefits of smart client architecture, combining the best of “thick” and “thin” clients to create a truly superior CRM solution. Its use of Microsoft's ClickOnce deployment technology makes it easy to implement and update. The Pivotal CRM smart client downloads

to the C:\Document and Settings folder of the user's computer. All users have full permission to their individual folders; therefore there are no security considerations for

installation. But most importantly, it offers features your users will love: an intuitive interface, deep integration with the Microsoft tools they use every day, and the ability to tailor and personalize the solution to match unique business processes and individual user needs—all made possible by a combination of the underlying smart client foundation and a next-generation application that takes full advantage of smart client innovations.

User productivity is at the heart of Pivotal CRM. Pivotal CRM makes navigation much easier for users with an application that is modeled around the business structure, rather than the database model. Task-based navigation allows users to move through the system more easily, with far fewer clicks to access information. Users are also provided with important information and functionality by task-driven portals that offer real-time reports, KPIs, alerts, queries, and more. Built for multi-tasking, Pivotal CRM enables users to have multiple forms open, pill forms off and save for later use, create short-cuts, easily access their personal history and recently used documents, and more. In addition, Pivotal CRM screen designs present data in a manner that makes sense for your business users and takes advantage of the screen real estate to make the data your users need most fast and easy to access, supporting better decision-making and helping them deliver better experiences to your customers.

Pivotal CRM embeds the tools your employees use every day: Microsoft® Outlook,® SharePoint,® and the Office suite. This allows users to move seamlessly between systems, eliminating cumbersome application switching and increasing productivity. Users enjoy the ability to use familiar embedded tools while leveraging the rich data in Pivotal CRM, which boosts user productivity, reduces the learning curve, and increases adoption. Administrators enjoy a system that saves them the need to attempt complex integrations with these high-value tools.

Beyond being a highly usable application for end users, Pivotal CRM offers a platform developers love. The Pivotal Toolkit integrates the Visual Studio Form designer, combined with Pivotal Controls. This makes it very easy for administrators to create smart client forms without requiring additional web styling skills. The flexibility of the Pivotal Platform and the power of the Pivotal Toolkit make it easy for administrators to tailor the system precisely to evolving business needs, integrate it with other enterprise applications, and even build out complex complementary applications at a fraction of normal development costs.

By taking full advantage of the benefits of smart client architecture, Pivotal CRM delivers a superior CRM solution that provides a better experience for administrators, end users, and customers alike.

Conclusion

Both smart client and thin client technologies have their place. Enhanced thin client technologies are typically well suited to consumer-targeted applications. On the other hand, businesses seeking enterprise applications such as CRM typically have a finite number of users and need an application that mimics their business processes and offers a rich and highly interactive user interface. For these businesses, a smart client application usually offers a more flexible, powerful, and usable solution.

Smart clients represent the future of corporate desktop applications. In contrast, the use of AJAX, ASP.NET, and ActiveX with thin clients is more of an attempt to dress up old technologies to cover up their flaws. While they allow developers to do new things with old technologies such as reducing full-page refreshes and working asynchronously, they oust control from the presentation tier and cannot effectively leverage the power of today's inexpensive yet powerful workstations. Thin clients simply cannot provide the performance and the rich and interactive experience that today's corporate users demand.

This is not to say that thin clients and Web 2.0 are things of the past; they just have a different purpose. Thin clients are better suited for consumer-based applications that

Smart clients do more than just address the shortcomings of other client options; they also offer many new capabilities

anyone and everyone can access. Smart clients are meant for corporate users who value multi-tasking, interactivity, a rich user interface, integration with Outlook and SharePoint, minimized clicks, and best use of screen design very highly—all features that lead to

user adoption, a critical success factor in the deployment of a customer relationship management system or any other enterprise application.

Microsoft has spent millions of dollars developing and embracing smart client technology, and this new technology has been welcomed enthusiastically by developer communities. With the smart client, Microsoft has addressed the shortcomings of traditional Windows clients, including:

- Difficulty deploying and updating
- "DLL hell" (heavy administration)
- Lack of access from the Internet
- Poor performance
- Lack of integration capabilities
- The limited capabilities of older desktops

In essence, smart clients take all the benefits of Windows clients and thin clients, remove the drawbacks of traditional Windows clients, and add new advantages and flexibility to reduce an application's total cost of ownership as well as increase user adoption.

Smart clients do more than just address the shortcomings of other client options; they also offer many new capabilities. Smart client technology has opened the doors to ongoing innovation. Developers now have access to technology and capabilities that allow them to create business applications that far exceed former possibilities. CDC Software has been a pioneer in leveraging these new capabilities, as evidenced by Pivotal CRM 6.0, its leading customer relationship management solution that takes full advantage of smart client capabilities. CDC Software has invested millions in revamping Pivotal CRM's user interface using Microsoft smart client technology, while preserving the proven Pivotal CRM architecture, and this has been welcomed wholeheartedly by the market and our loyal base of industry-leading customers. Looking ahead, CDC Software continues this path of innovation, migrating Pivotal CRM to the Windows Presentation Foundation, which allows for richer media content such as videos, further enhancing the user experience.

Without question, Pivotal CRM is today the most flexible enterprise application on the market, offering the lowest total cost of ownership. With Pivotal CRM's intelligent application of smart client technology, our customers enjoy unmatched CRM usability and flexibility today, and they will be able to realize more and more benefits as we unleash the added power and capabilities of this new technology.

Additional Suggested Reading

Hill, David. *What Is a Smart Client Anyway?*

URL: <http://blogs.msdn.com/dphil/articles/66300.aspx>

Hollis, Billy. Back to the Future with Smart Clients.

URL: <http://msdn.microsoft.com/en-us/library/ms953304.aspx>

Jupiter Research. Smart Client Applications: The Best of Both Worlds—The Desktop and the Web.

URL: <http://download.microsoft.com/download/9/5/e/95eafbc3-4d5d-4648-8aa6-589391068fb5/JupiterSmartClient.pdf>

Microsoft. Smart Client Application Development.

URL: <http://msdn.microsoft.com/en-us/isv/bb190536.aspx>

Microsoft. Smart Client Development Overview (Level 200) [Webcast].

URL: <http://msevents.microsoft.com/CUI/WebCastEventDetails.aspx?culture=en-US&EventID=1032278657&CountryCode=US>

Smart Client Software Factory. Composite Smart Client Applications.

URL: <http://msdn.microsoft.com/en-us/library/cc540675.aspx>

Smart Client Software Factory. Deploying Smart Client Applications with ClickOnce.

URL: <http://msdn.microsoft.com/en-us/library/cc558871.aspx>

Smart Client Software Factory. Introducing the Smart Client Software Factory.

URL: <http://msdn.microsoft.com/en-us/library/cc540671.aspx>

Thin Client vs Smart Client [Discussion thread].

URL: <http://forums.microsoft.com/MSDN/ShowPost.aspx?PostID=927032&SiteID=1>

Wikipedia.org. Smart Client.

URL: http://en.wikipedia.org/wiki/Smart_client

Experience CRM That's Built for You

To learn more about how Pivotal CRM can meet your organization's unique needs, call us at +1-877-PIVOTAL or visit us at www.PivotalCRM.com.