Web Integration Technologies

Application and Benefits

Introduction

In every corporation, the browser has become the most prominent and effective means to access applications systems and the data they provide. Most companies have a rapidly growing number of web-based systems in place enabling everyone - employees, customers and business partners – to access important functionality and access to the important information needed for their jobs. These new applications all have been designed with a browser interface, primarily for its universal access characteristics.

However, with the number of web systems growing exponentially both inside and outside the physical network gateways to an organization, it is often extremely difficult to get these systems to work together in any integrated way. In almost every case, they were built independently by different groups using various technologies. One universal, though, is that all web applications utilize HTTP as the transport protocol and HTML as program syntax. In fact, this universal use of both for almost all web applications represents a special type of Application Programming Interface (API) that can be leveraged for integration.

Red Oak's web integration products are a unique set of professional tools that enable this specific type of integration of any web-based systems or applications, whether inside the enterprise or across the world.

Typical solutions implemented using Red Oak products can include:

- Portlets created from existing web applications
- Composite applications
- Aggregation and integration of data and other content
- Web Services created from existing web applications

This document underscores the difficulties of traditional integration methods and introduces Web Integration as a potential solution to these challenges. In addition, it provides a technical introduction to Red Oak's web integration tools, and explains the benefits and advantages this provides over other integration methods.

Web Integration Challenges

Today's enterprises are challenged with increasingly important and difficult integration problems. Despite best efforts to standardize and coordinate across the company, most IT organizations are faced with numerous internally developed and packaged applications that were not designed to communicate with each other. With web applications, they are now faced with an even greater challenge - the need to access and integrate with applications outside of the enterprise in support of customers, partners and suppliers.

Traditionally, standard approaches to application integration have been used to solve these issues. Most recently, pundits and the media have suggested web services as an application integration panacea. Yet most organizations face a number of serious issues with this method:

- Time Consuming

Despite constrained budgets and limited resources, most user requirements today require their technology groups to deliver solutions faster than ever before. In the world of integration, determining which API to use for integration is a critical step. Industry approaches such as web services promote a uniform programmatic interface to all applications, yet all of the normal development issues remain. Web services or even hand-coded solutions have to be built and thoroughly tested before they are deployed. Normally this involves changing the application to expose its logic, a resource intensive and time consuming development effort. More pragmatically, this approach is only possible when your company has ownership of the entire application.

- Impractical

For web applications outside of the enterprise, the modifications required by traditional integration methods will often not be possible. Even when a partner or customer is willing to open up their systems, the ability to integrate may be impractical. As a result, most business-critical projects requiring integration to external applications are extremely difficult at best, impossible at worst. For most organizations, this can translate directly to missed business opportunities and increased operational costs.
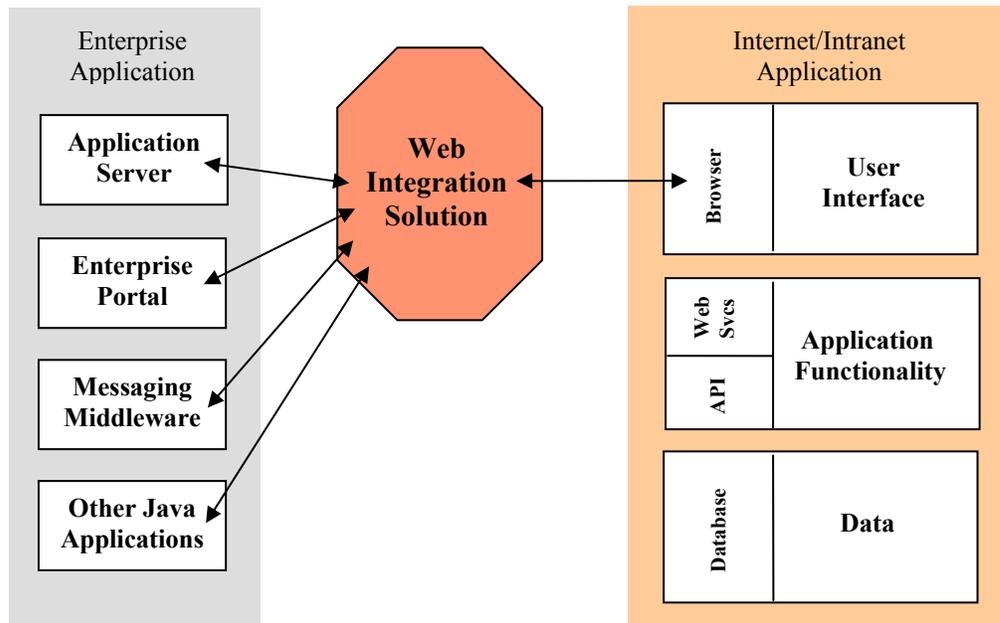
- Expensive

Traditional application integration relies upon having total control of the application, so it can be modified internally. This often results in significant costs, since most application integration projects represent very large development efforts using highly skilled staff. Inherent in these larger projects is a high risk of delay and a possible impact on overall infrastructure of the organization.

Web Integration Options

Below is a general illustration of potential integration points into a target web application. In concept, connectivity can take place at one of three different layers of an application:

- User Interface
- Application Functionality
- Data Access layer

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┌─────────────────────────┐              ┌─────────────────────────────────┐
│  Enterprise             │              │      Internet/Intranet          │
│  Application            │   ┌──────┐   │      Application                │
│  ┌──────────────┐       │   │ Web  │   │  ┌──────┬──────────────────┐   │
│  │ Application  │◄──────┼──►│Integr│◄──┼─►│Browser│  User           │   │
│  │ Server       │       │   │ation │   │  │       │  Interface      │   │
│  └──────────────┘       │   │Soluti│   │  └──────┴──────────────────┘   │
│  ┌──────────────┐       │   │ on   │   │  ┌──────┬──────────────────┐   │
│  │ Enterprise   │◄──────┼──►│      │   │  │Web Svcs│  Application    │   │
│  │ Portal       │       │   └──────┘   │  │ API    │  Functionality  │   │
│  └──────────────┘       │              │  └──────┴──────────────────┘   │
│  ┌──────────────┐       │              │  ┌──────┬──────────────────┐   │
│  │ Messaging    │       │              │  │Database│  Data           │   │
│  │ Middleware   │       │              │  └──────┴──────────────────┘   │
│  └──────────────┘       │              └─────────────────────────────────┘
│  ┌──────────────┐       │
│  │ Other Java   │       │
│  │ Applications │       │
│  └──────────────┘       │
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The Application Functionality layer is the traditional place for programmatic access to an application, and is done by integrating with an API or using web services. It provides direct access to the business logic of an application. In some instances, however, an API does not exist and integration must be done by modifying the application code itself.

Integration at the Data Access layer is typically done through connections directly to the underlying databases. This is the most efficient approach to obtain data available through the application, yet because it by-passes and circumvents the business logic of the application, it is used only for data inquiry and aggregation requirements. True application integration must take place using the logic of the target. By utilizing the applications transaction logic, for functions such as updates, the integrity of the new data being added or modified can be insured.

Since the User Interface layer, or presentation layer, was designed initially to allow an operator to interact with the application, it provides a standard and universal API providing access to both the application business logic and to all application data.

Web Integration Overview

Web Integration is a unique and innovative approach to the challenges of integrating and service-enabling existing browser-accessible applications. Web Integration can be done quickly, iteratively, at low cost and with relatively modest skill requirements. In addition, because it uses the presentation layer as its API, it is by nature non-intrusive.

The key factor with Web Integration is that most production applications already have an HTML-based interface that provides access to both functionality and data. Most newly developed web applications even expose logic that has been written into the presentation layer itself.

Although this web interface was intended for end users, Web Integration can turn the browser into a well-defined programmatic interface that exposes the full functionality and data of the application.

As the figure above shows, a Web Integration Server accesses the presentation layer of an application through the browser interface. This server can then make one or more of the following access points available: a web service, a modified browser interface, or an API into the application's logic and data.

Using Web Integration, other applications would have the capability to access the full functionality and data of the application, as if the application had been developed to provide an open interface. By accessing the application through the user interface, the power and functionality of these applications can be re-utilized in sophisticated integration solutions, such as:

- *Enterprise Portals* - content and functionality of existing web-enabled applications can be used in an enterprise portal.

- *Composite Applications* - functionality from any existing application can be combined to create a new application that automates business processes

- *Web Services* - any web-enabled application can be turned into a web service

- *Data Collection* - data available via any web-enabled application can be aggregated and moved to a new system, such as a content management system.

- *Market Intelligence* - information from competitors, media providers, government databases, etc., can be collected on a regular, scheduled basis for market intelligence purposes.

- *Automation* - in general, Web Integration is exceptional for programmatically automating normal operator tasks requiring the flow of information between web-enabled applications.

Web Integration Benefits

Web Integration has a number of important benefits compared to the other more traditional integration approaches:

- Lower cost

Using Web Integration, the effort required becomes much less expensive compared to traditional integration. There are numerous reasons, including lower skills for developers, no change to existing applications, and no infrastructure changes to network.

- Non-intrusive

Web Integration is done non-intrusively, thereby lowering the risk and impact of the entire integration project. Because there are no architectural changes required, it is often easier to justify cross-enterprise projects. This benefit extends even further to those external applications where the user interface is the only available option for integration.

- Faster development

Since the browser interface is well understood by both the end user and the programmer, application design becomes much easier and less prone to error.

- Faster overall integrations

Even complex Web Integration projects can be completed in weeks rather than months. Companies can gain competitive advantages by leveraging their existing enterprise applications more quickly than their competitors.

- Lower skill requirements

A traditional integration project requires highly skilled development staff. In depth knowledge of the applications and application integration techniques is required. With Web Integration technologies, development personnel with basic programming experience and web application knowledge can do a superior job. The need for high-skilled expensive programmers can be obviated.

- Potentially lower risk

Web Integration allows for shorter and more cost-effective implementation cycles. The initial integration can often be up and running quickly and further integration can be accomplished once results from the initial integrations have been proven. This allows companies to try out new business opportunities at lower risk than using traditional methods.

Red Oak Web Integration Solutions

Together, Red Oak's two integration products - Web Clipper and Web Integrator - represent the leading web integration tool suite available today. Together, they enable fast, efficient and powerful integration of web-based applications and their data into Portals, composite applications and other systems such as content or knowledge management.

These tools can access any browser-based application and automate those transactions that extract and reuse online data and application logic, regardless of how it was designed, built and delivered. Both Web Clipper and Web Integrator include a straight-forward visual design environment, as well as comprehensive Web Integration tools that simplify overall development and enable faster implementations. This provides results that exceed those that can be achieved with traditional integration approaches.

All solutions are developed with an easy-to-use visual SDK or Workbench that is non-invasive, meaning no code changes to the target web application are required. Once the integration solution is created, other applications can access the full functionality and data of the application, with no impact on the existing technology infrastructure. As server-based solutions, both tools can be used by any application without regard to platform, network or infrastructure.

These web integration tools can be used to implement various types of integration solutions, to include:

- *Web Clipping* - utilize existing portions of any web-enabled application in your portal

- *Application Integration* - integrating the functionality of any web-enabled application into your application while providing full updating capability to the application data

- *Data Aggregation* - aggregating data from any number of web-enabled applications through data inquiry functionality.

Web Clipping Overview

What is Web Clipping and why might you use it? Web Clipping is a technical methodology that enables selectable portions of an existing web application to be used in another web application. For those familiar with Legacy Integration technologies, it is similar in concept to Web-to-Host solutions. The underlying application does not change, but the user interface – or parts thereof – are utilized as a portion of a new presentation. Web Clipping is accomplished technically by choosing and isolating the HTML of the existing web application and then re-packaging it for viewing and use in a new web application, typically an enterprise portal application.

A Portal by definition is a composite web application, and technically it is made up of multiple smaller portions of web application functionality called portlets. Good examples of universal Portal applications are Yahoo and AOL. Both provide a single browser access window to multiple, sometimes disparate application functions presented to the user in a unified view. These separate application portlets provide access to significant functionality and real-time information from a myriad of underlying sources.

Developing a portal involves significant integration tasks, because the portal requires integration to the functionality and data of these other applications, and these may or may not reside inside the company. Web clipping is an effective, fast and easy means of increasing functionality to enterprise portals, yet most portal development environments do not have an automated means of handling web clipping.

With Red Oak's Web Clipper, the interfaces of existing web-enabled applications can easily be turned into portlets. Required segments of web applications are captured by the Web Clipper Workbench, and automatically packaged as a standard portlet, allowing the user to match the style of other portlets in the Portal. Since Web Clipper is a non-invasive solution, there are no changes to the underlying web applications, the steps to integrate are reduced and no new interfaces need to be developed for the applications.

Red Oak's Web Clipper creates portlets automatically by visually clipping the relevant functionality from the existing applications and packaging the resulting HTML in portlet format. This could be a summary report from an existing CRM application, selected input and output from a company's web-enabled ERP system or a product information table from a partner's website. In addition to portlet generation, it includes functionality for automated deployment to most major portals.

Web Clipping Benefits

A unique feature of Web Clipper is that it supports dynamic clipping. This means that clipping can continue after the user interacts with a clip in a portlet. For example, assume that a search form is clipped and shown in a portlet. With dynamic clipping, if the user fills in the form and submits it, the search result page can be clipped as well, and shown in the portlet. Without dynamic clipping, the search result page would open up in a new browser window forcing the user to leave the portal. With dynamic clipping, the user can stay inside the portal while interacting with clipped content.

Using Web Clipper has a number of advantages for creating and deploying web clipping portlets:
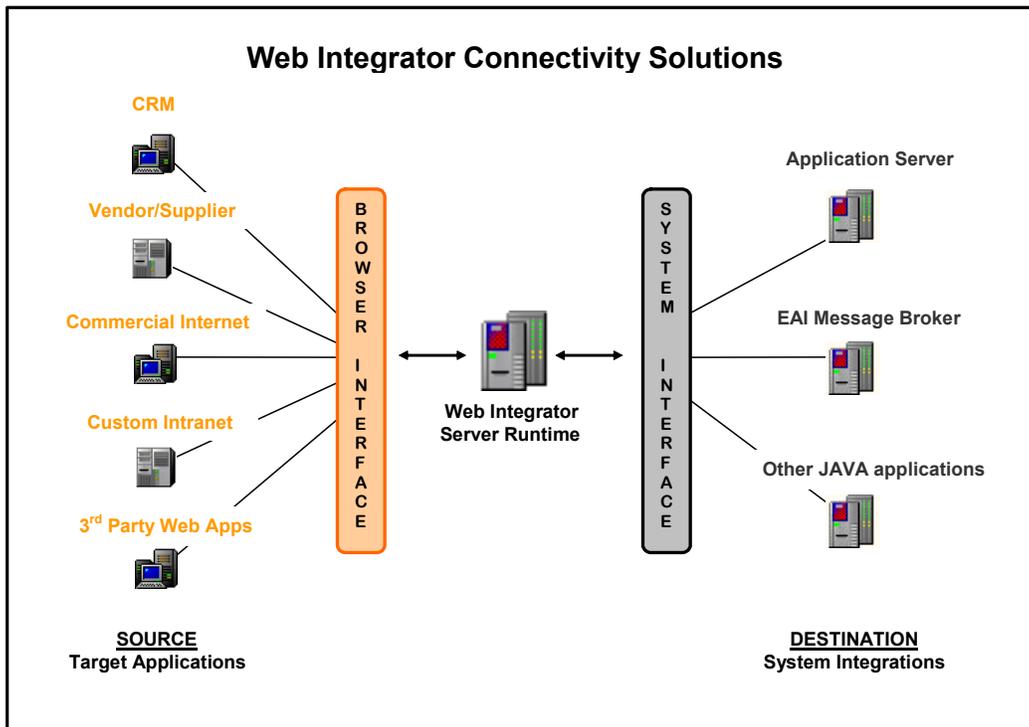
- No Programming - existing applications and content can be made available in the portal without any programming using Web Clipper's visual development environment.

- No Redesign - the portal developer does not need to design a new user interface. If the portal has a different visual style than the existing applications, the clipped segments can be easily modified to match.

- External Integration - clipping can be used to integrate all browser-based applications, including external web application functionality and data where your IT department has no control over the source.

- Lower Cost - it takes less effort and expense to create portlets with Web Clipper, making it feasible to integrate all external applications in the portal.

- Faster – in addition to automated creation, Web Clipper enables single step deployment as well. The faster a portal application is developed and deployed, the more quickly business value is delivered.

Web Application Integration Overview

What is Web Application Integration and why might you use it? Web Application Integration involves connecting a browser-based application – including its data and functionality - in a "programmatic" fashion to another application, which may also be a web application. Typically, applications connect with other applications via an adapter, a software component that translates the functions and data between the two applications. Adapters can be written to connect two specific applications, or they may translate one application's functions and data to a standard API, or possibly to an API used by middleware.

Web Application Integration is the most advanced form of Web Integration. It allows the user full programmatic access to the functionality and data of the web-enabled applications. In essence, any interaction with the web application can be turned into a "programmed operator". These resulting programmatic functions can then be called from (integrated with) any other application. In effect, a program calls another program, data is supplied and the specific program actions are performed.

Red Oak's solution for programmatic web application integration is Web Integrator. It acts as a bi-directional adapter between any web-enabled application and another system. It was specifically designed to enable production Internet or Intranet application functions to be programmatically automated.   These integration programs enable, as the figure below depicts, connectivity to and integration with any other Java application, such as an application server or middleware.

Web Integrator Connectivity Solutions

CRM

Vendor/Supplier

Commercial Internet

Custom Intranet

3rd Party Web Apps

BROWSER INTERFACE

Web Integrator Server Runtime

SYSTEM INTERFACE

Application Server

EAI Message Broker

Other JAVA applications

SOURCE
Target Applications

DESTINATION
System Integrations

Development is accomplished using the Web Integrator SDK. The SDK incorporates a straightforward "capture" and automatic code generation process. This visual design time

environment enables the user to quickly and easily convert any application functionality exposed in the browser into a program. These resulting Java programs are executed via the Web Integrator Runtime Server and enable any web application to connect and communicate with any other application in the enterprise. Most importantly, Web Integrator provides non-invasive access to all the logic and underlying data of the browser application, thereby requiring no changes to the target application.

With sophisticated development and runtime environments, Web Integrator enables any number of application functions to be integrated, from as many different Internet or Intranet systems as the user requires. In effect, the integrations can be point to multi-point or even multi-point to multi-point solutions, dramatically increasing the power of the integration.

Some examples of programmatic web application integration using Web Integrator are:

- Integration of web-enabled enterprise applications such as ERP, CRM with other legacy systems. If a new customer is created in your CRM system, this information can be automatically populated into all other systems via this programmatic integration.

- Integration between your internal applications and external web-enabled systems from your customers, suppliers or partners, such as order entry or shipment tracking systems.

- Data aggregation, such as gathering information from multiple external procurement web portals for presentation in an internal enterprise application.

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In summary, Red Oak's web integration solutions provide some substantial and tangible benefits:

- *Lower Overall Cost*s - existing internal and external web applications can be integrated without any programming through visual development. Non-invasive development tools alleviate the need to modify existing systems which results in reduced costs compared to traditional methods.

- *Faster to Build and Deploy Solutions* - the automated development environment also includes tools for deployment, significantly reducing the overall time required for any integration project.

- *Lower Overall Risk* - with short duration development and cost-effective implementation, initial integration projects can often be completed in days. Because further integration can be done quickly and efficiently, companies can undertake new opportunities at reduced risk.