Flash for Rich Internet Applications
(or, The End of Web "Pages")

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(presentation available at: **www.phillipkerman.com/ff2004sfo**)

Overview:_____

Websites using the page metaphor are becoming passé. Replacing them are web applications that provide real utility. Flash can create so-called "rich internet applications" (RIAs) by adding multimedia and extensive programming features. Flash also supports standard protocols (like XML and SOAP) so you can clearly present and interact with complex data from databases and web services with Flash as the interface. In addition, the Flash Communication Server lets multiple users connect to the same live data including streaming media. The benefits of rich internet applications created in Flash include an immersive branded interface, local storage of complex data (beyond what cookies can do), and no need to refresh the browser—which all lead to a better (and bandwidth friendly) user experience. This presentation will define "rich internet applications" and demonstrate several examples. You'll also get an overview of the technology's capabilities.

Tools and Technologies:_____

Products

Flash Remoting: More a "feature" than a "product" as it's built into ColdFusion MX (though you can buy it for .NET and Java servers). It lets Flash movies send and receive data to application servers (which can, in turn, link to databases). In addition to parsing common data types (so you don't have to), data travels over HTTP using a small and fast binary message format (called AMF—action message format) which is asynchronous (meaning Flash can proceed instead of waiting for data to arrive).

The two huge advantages remoting has over alternatives using GET and POST (below) are:
1) you don't need to convert all values to string (you can send and receive numbers, arrays, generic object etc.) and,
2) data travels over an optimized binary format called AMF (Action Message Format).

The downside is remoting is a proprietary format compared to the open standard SOAP.

Flash Communication Server MX: This server lets you build Flash Player files that let users share data in real-time with others. In addition, live or recorded streams of video and audio can be included in your applications. This is probably the most exciting product in Macromedia history.

products continued

Flex:
This server delivers customized .swfs on the fly. Requests are made when a user visits an mxml page—which, like html, declares the objects and controls that need to appear on the page… except here you declare Flash components and how they connect to data. There are other features like how previously created .swfs get cached as well as a complete layout manager. Flex is not only designed to work in parallel with existing application servers but the whole mxml language ("Macromedia XML") is standards based so that—for those familiar with tagged languages—it's easy to learn. Flex really shouldn't attract too many Flash developers but rather attract traditional developers who would, otherwise, never touch Flash. Flash developers can create custom components that Flex developers can include in their applications.

Macromedia Central:
The most simple definition for Central is a browser that only displays .swfs (including access to remote data) and has additional special features useful to desktop applications. Using a Central app is like browsing the web but just finding the data in which you're interested. You can configure an application to continually check data and bring notices to your attention (like instant messages) when the data hits a given high or low mark. In addition, you can design your Central app to accept data that the user passes from another Central application (or, make data in your application available to other apps). This way, you don't need to attempt to create an "everything app" but rather make a single app that's really good at *one* thing. For example, your graphing application could accept data points collected by another developer's stock checking tool. The user just says "blast these data points from the stock app to the graphing app".

Central offers a lot of promise even if the coolest features are yet to come. However, the fact that Central is the first environment where you can access AOL's instant messaging service (AIM) should be enough reason for people to see the potential. I expect to see Macromedia migrating more and more of their applications to work in or with Central or at least become "Central ready."

Standards

URL Encoded Data: Through Flash's LoadVars object, you can request data from a server via GET or POST (or simply by reading a static text file). The data arrives as name/value pairs but all values are strings. You can convert numbers to strings but you'll need to know which values are numbers. This is the primary limitation of LoadVars.

Web Services: A common way to structure data for sharing. For example, Amazon's web service lets you search and retrieve data from their catalog of products and then present that data in your own interface (even in Flash if you want). Some are free, some cost money. Through licensed accounts businesses have some control over how their data is presented—but, generally, that's up to the subscriber. However it does mean data has far greater reach than what's possible by storing it on one site and expecting visitors.

Data sent to and from web services is formatted in a specific form of XML called SOAP. In addition, any web service needs to include a WSDL file that serves as a schema for how the web service is used. The WSDL is almost like a users manual describing how to use the web service.

standards continued

XML: Basically, it's a way to format data so that not only the content but a description of that content is included (but free of any display formatting). Sort of like how the slashes in a date: 3/3/04 help put some meaning to the numbers. The slashes are the structure not the data. Anyway, XML is a hierarchical style of formatting data that either loads into Flash or gets sent out of Flash to an application server.

Flash Features and Concepts

TextField and TextFormat Objects are necessary for dynamically presenting formatted text. A TextField is an instance (of Dynamic or Input Text) onscreen. A format object is like a stylesheet, so it has no effect until you apply it to a specific TextField. Also, Flash supports simple HTML tags including a href. Such hyperlinks can additionally trigger scripts inside your movie.

Dynamic Graphics includes a variety of runtime drawing capabilities. These include drawing lines, curves, and filled shapes. In addition, you can load external JPGs or Flash movies, as well as display symbols contained in the movie--but positioned on the fly.

Arrays vs. Generic Objects are two ways to store groups of data in single variables. That is, where a regular variable has a name and a value, a variable whose value is an array can have multiple values. Arrays are good when the number of items is unknown or needs to grow or shrink as the number of records vary. Arrays also have lots of sorting abilities. Generic objects are nice when the contained values need context. For example, an array might be good to store a list of your kids. But, a generic object might be good for storing firstname, lastname, and phonenumber because each value is identified with a property name.

DataProvider Class is basically an array full of generic objects—in fact, in Flash MX 2004, that's really all it is. The cool part is you can associate (bind) a DataProvider to a component so that as the data changes so does the component's display.

Callbacks for Asynchronous Operations is a necessary way to structure certain operations. For example, making a request to a remote database won't give you an immediate reply. Instead you set up how you're going to handle the response first, then you make the request. Asynchronous is simply the idea that you can make a request (say load data from a database) and Flash will continue to operate (say, animate a graphic) instead of hanging while it waits.

Local Shared Objects: These are similar to browser cookies. They allow a movie to save data on the user's computer so that next time they visit your application it will remember and restore the display or automatically log in. Cookies aren't as useful as Shared Objects because they only hold string values. With Shared Objects you can store any data type (such as array or generic object). Then, when resuming, that data comes back into Flash in the same form.

LocalConnection Object is a way for multiple Flash movies to send messages and trigger events in other movies playing on the same computer. (Interestingly, the syntax is nearly identical for when using the remote NetConnection object with Flash Communication Server.) Anyway, if nothing else, LocalConnection is the primary way your application elements built for Macromedia Central can all work in concert. However, you'll want to learn how to use the LCService Class which makes it much easier to manage.

Flash features continued

onResize is an underutilized event that triggers whenever the user resizes their browser. This means, if you want to rearrange the screen based on their layout you can do it when the resize. To use this your publish settings must use Scale: no Scale (or just put this script in your file: `Stage.scaleMode="noScale";`).

Context Menu. The Flash 7 player lets you create a custom menu that the user can access by right clicking (or control click on Macintosh). Although you can't remove the default "about Flash" option—you can build really useful menus for your users.

Scroll Wheel. If you're used to using your mouse scroll wheel you definitely notice when an application fails to support it—it's like reaching for the steering wheel and it comes off in your hands (or something like that). It's a fair bit of work to add this to your Flash application but it really pays.

Technical Details:_____

The downloadable files for this presentation (and the live demonstration) include several starter scripts or skeletons onto which you can build more complex features.

Definitions and Buzzwords:_____

API (Application Programming Interface): The set of commands and functions that, through programming, give you access to an underlying system. For example, Flash has a Drawing API that lets you draw lines, curves, and fills—effectively giving you complete access to the drawing tools in Flash.

Application: Like a desktop application, any site that gives you a way to work—that is, provides utility.

Application Server: A web server that delivers customized pages based on a programming language. Instead of creating static pages by hand, an application server can dynamically create pages on the fly.

IDE (Integrated Development Environment): Basically the software interface used to author content. Flash is an IDE; the IDE for Flex is a text editor (though you can also use Brady or third party tools like Eclipse or PrimalScript).

Parse: To extract certain data and optionally translate one format to another.

Namespace: Simply a way to shield your variable names from conflicting with other identically named variables used by other developers. Sort of like how two families could have a "Dave" but one is "Dave Smith" and the other "Dave Jones". Each Dave is different because they have a different namespace (Smith or Jones).

Rich Media: The new word for "multimedia", perhaps.

Scalable: Two meanings. Flash vector graphics visually scale when you change the width and height. A scalable application is one that will continue to perform well even as you expand it to support more users.

Schema: A description for how data (mainly XML) is formatted. Consider how a schematic in a car manual might show how the engine is pieced together. Mainly the schema puts labels on each item so that terms that appear later are clearly associated with a specific part.

buzzwords continued

SDK (Software Development Kit): The documentation, samples, and needed tools that get you started using a system. For example, you can download, study, and use the SDK for Macromedia Central.

Thin Client: The Flash player (required on each client machine) and the fact it's less than 400K.

Ubiquitous: 98% of all web connected computers have a version of the Flash player (obviously, newer features require the latest revision—but that's an easy upgrade).

Other words to impress people when discussing RIAs (which, when pronounced "ree ah", may or may not impress people): collaboration, aggregate, user experience, usability, legacy, mission-critical, drill-down, populate.

Example Sites:

Macromedia: The Story:	**www.macromedia.com/macromedia/story/**
Year in Pictures:	**www.msnbc.com/modules/yip02/**
Bob Vila Paint Designer:	**www.bobvila.com/DesignTools/**
Sony room builder:	**www.sonystyle.ca/wegatheatre/**
Whizzball:	**http://kids.discovery.com/games/whizzball/**
Pet Market (sample):	**http://examples.macromedia.com/petmarket/flashstore.html**
Answering machine:	**www.phillipkerman.com/machine/**
The Big Picture:	**www.msnbc.com/modules/bigpicture/elex/** **www.msnbc.com/modules/bigpicture/iraq/** **www.msnbc.com/modules/bigpicture/oscars/**

Other Resources:

Various Macromedia visions of rich internet applications and related tools:
www.macromedia.com/desdev/mx/flash/whitepapers/richclient.pdf
www.macromedia.com/desdev/mx/flashcom/articles/comserver.pdf
www.macromedia.com/desdev/mx/studio/whitepapers/rich_internet_apps.pdf
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My books: **www.phillipkerman.com/books/**

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