

An Introduction to XPConnect

Writing Extensions in Pure JavaScript

Anant Narayanan
Malaviya National Institute of Technology

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Why is Firefox successful?

Apart from the fact that it is Open Source

EXTENSIONS

No other browser provides such a feature-rich extensible development environment



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Community

- There is a thriving community behind extension development
- There are extensions to help you do every imaginable task with web pages (Firefox) and email (Thunderbird)
- Powered by the Mozilla platform



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Contribution

- Writing extensions is one of the easiest and most useful ways of contributing to Mozilla
- You just have to *scratch your own itch*, or come up with an idea for your extension
- We'll look into the technical aspect of developing your extension in this presentation



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Overview

- XPCOM & why it is useful
- XPConnect & why it is useful
- How XPConnect packs punch into Javascript
- How you can develop your very own extension in pure Javascript in a matter of hours

(You need to know basic JavaScript)



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XPCOM

- Cross Platform Component Object Model
- Provides a framework for writing cross-platform, modular software
- Provides the abstraction required to write applications that will run on the Mozilla platform across the variety of operating systems that Mozilla supports



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Components

- Core: Type System, Data Structures, Streams
- UI: Clipboard, Drag-and-Drop, XUL
- Application: Preferences, Profiles, WM
- Network: Channels, Protocol Handlers
- DOM, Mail and several others
- You can even create you own!



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Interface Description

- Language neutral way to specify interfaces to the XPCOM components
- The Interface Definition Language used by Mozilla (IDL) is slightly different than the conventional ones
- XPCOM initially meant to be used in C++



XPCConnect

- Allows scriptability of XPCOM components
- Simple interoperability between XPCOM and languages like Javascript, Perl and Python
- Allows transparent access and manipulation of XPCOM objects via the XPIDL definitions



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Javascript & XPCConnect

- Javascript run in the Mozilla environment will have access to all XPCOM components
- Caveat: Only those components that have interfaces defined in XPIDL will be available
- Developing extensions is breeze, assuming you already know Javascript
 - JS is considerably easier than C++!



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Development Tools

- Best way to work with Javascript is Firefox
- Plugins that you will find helpful:
 - Console²
 - Extension Developer
 - Firebug
 - jsLib
 - XPCOMViewer



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Let's Get Started



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Skeleton of an Extension

- Every extension is made up of a set of base files and directory
- This hierarchy is zipped to create your .xpi re-distributable extension



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Visit the Wizard

- Don't waste time in creating these base files and directories
- Get your skeleton at
 - <http://ted.mielczarek.org/code/mozilla/extensionwiz/>
- Will generate a zip file containing the base extension code



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The Code

- All the JavaScript code goes into the *components/* directory
- Put all your other resources - HTML, Images et. al. in *content/*
 - This content will be available as *chrome://<name>/content/*



Power Javascript

- Think of Javascript as a language
- All XPCOM components are available as regular Javascript *OBJECTS*



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The Lifecycle of an XPCConnect Object

- Every component is uniquely identified by a *Contract ID*
- Usually something like:
 - @mozilla.org/network/simple-uri;1
 - @mozilla.org/soleservice;1



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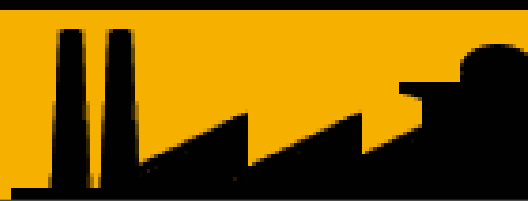
Instantiating a Component

- Usually, you will just call the *getService* method on the component class passing an interface along
- ```
Components.classes["@mozilla.org/moz/jssubscript-loader;1"].getService(Components.interfaces.mozIJSSubScriptLoader);
```





# Code Snippets



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# Logging

```
function jsLog(msg, error) {
 var consoleService = Components.classes
["@mozilla.org/consoleservice;1"].getService
(Components.interfaces.nsIConsoleService);
 if (error) {
 consoleService.logStringError(msg);
 } else {
 consoleService.logStringMessage(msg);
 }
}
```



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## Loading other JS files into a given Object

```
function jsImport(obj, fName) {
 var loader = Components.classes
["@mozilla.org/moz/jssubscript-loader;
1"].getService
(Components.interfaces.mozIJSSubScriptLoader);
 loader.loadSubScript
("file://" + __LOCATION__.parent.path + "/" + fName,
obj);
}
```



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# Some Theory

- Mozilla introduces the *Components* object into the Global JS Namespace
- *Components.classes*
- *Components.interfaces*
- *Components.results*
  - *etc...*





# Preventing Clashes

- Since everything Javascript is in the global namespace...
- ... you need to protect your code by wrapping them suitably into objects
- Remember, multiple extensions may run on a single Mozilla instance, and they all share the namespace



# Resources

- Use the XPCOMViewer for offline ready documentation on the various scriptable XPCOM components available to you
- eg: Ever felt the need for sockets in Javascript?

[@mozilla.org/network/socket-transport-service;1](https://developer.mozilla.org/en-US/docs/Network/Socket-transport-service;1)



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# Resources (Contd.)

- A lot of repetitive tasks and frequently used components in Javascript are available as friendly JS objects via jsLib
- Disadvantage: If your code uses jsLib, it becomes a pre-requisite for your extension
- Mozilla normally doesn't allow dependencies between extensions, but it's Ok in this case



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# Resources (Contd.)

- Run XPConnect powered code in Firebug to get instantaneous results (kind of like working in the python interpreter)
- Firebug also will give you helpful error messages when something goes wrong. Use the Logger to segregate different types of messages and view them in Console<sup>2</sup>





# Resources (Contd.)

- Visit XULPlanet for comprehensive online documentation on XPCOM scriptable components:
  - <http://www.xulplanet.com/references/xpcomref/>
- Every serious JS programmer must visit:
  - <http://javascript.crockford.com/>



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# Questions? Thank You!

Feel free to contact me:

[<anant@kix.in>](mailto:anant@kix.in)

<http://www.kix.in/>

The Web9 Project implements a new protocol handler  
entirely in Javascript:

<http://code.kix.in/projects/web9>



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