

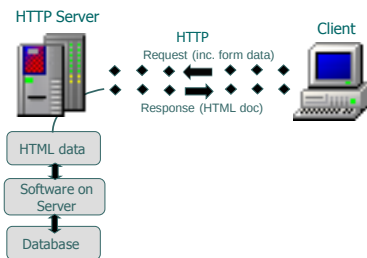
Lecture 11 Server Side Interaction

Boriana Koleva
Room: C54
Email: bnk@cs.nott.ac.uk

Overview

- Purpose of Server-Side Scripting
- Example Server-Side Technologies:
 - Server-Side Includes
 - CGI
 - Perl
 - Java Servlets and Java Server Pages
 - ASP.NET
 - Embedded Scripts
 - PHP
- Ajax

World Wide Web



Examples of Server Side Applications

- Search systems
- Document management systems
- User registration/administration/profiles
- Transactions
- E-commerce

SSI – Server Side Includes

- Instructions to the server embedded in HTML
- File extension of .shtml is usually used
- Server must be SSI enabled
- SSI instructions in HTML Comments
 - <!-- This is a comment -->
- SSI instructions preceded by hash (#)
 - <!--#include virtual=myfile.html-->
 - This includes the file "myfile.html" in the main XHTML file
- <http://scarlet.cs.nott.ac.uk/~bnk/WPS/demoSSI.shtml>

Demo SSI code

```
<h2> Server Side Includes </h2>
<p> This is the main file (demoSSI.shtml)
- everything between the two horizontal
  lines is held in an external file
  (table.html).
</p>
<hr>
<!--#include virtual="table.html"-->
<hr>
<p> This is the main file again </p>
```

Common Gateway Interface (CGI)

- CGI allows browsers to request the execution of server-resident software
- An HTTP request to run a CGI program specifies a program, rather than a document
 - Servers can recognize such requests in two ways:
 1. By the location of the requested file (special subdirectories for such files)
 2. A server can be configured to recognize executable files by their file name extensions



CGI

- A CGI program can produce a complete HTTP response, or just the URL of an existing document
- CGI programs often are stored in a directory named `cgi-bin`
- CGI programs may be written in *any* language
- <http://marian.cs.nott.ac.uk/~bnk/cgi-bin/demoCGI>
- Most major languages have CGI libraries
- PERL is the most commonly used language for CGI

demoCGI code

```
#!/bin/sh
echo Content-type: text/html
echo
echo "<html>"
echo "<head> <title> A simple CGI demonstration"
echo "</title> </head>"
echo "<body>"
echo "<h1> A simple CGI demo </h1>"
echo "<p> The time is now:"
date
echo "</p>"
echo "<pre>"
cal
echo "</pre>"
echo "</body>"
echo "</html>"
```

CGI

- Some CGI programs are in machine code, but Perl programs are usually kept in source form, so `perl` must be run on them
- A source file can be made to be “executable” by adding a line at their beginning that specifies that a language processing program must be run on them first
- For Perl programs, if the `perl` system is stored in `/usr/local/bin/perl`, (as it usually is in UNIX systems) then this is:

```
#!/usr/local/bin/perl
```

CGI

- An HTML document can specify a CGI program with the hypertext reference attribute, `href`, of the anchor tag, `<a>`, e.g.:
- ```

Click here to run the CGI program, reply.pl

```
- But more commonly a CGI program is called when the Submit button of a form is clicked
- ```
<form action = "reply.cgi" method = "post">
```

Perl

- PERL
 - Practical Extraction and Report Language
- Interpreted programming language
- Ported to most platforms
- Originally intended primarily for Unix administrative tasks
- Exceptionally powerful text processing

Perl

- Derived from C, AWK, Lisp and many other languages
- Extensive support for regular expressions
 - Standard set of text matching and manipulation expressions
- Only primitive data type is a “scalar”
 - Scalars can hold numbers, strings or typed data
- Arrays are indexed by scalars
 - Associative arrays
- Object Oriented “modules”
 - E.g. for CGI programming

<http://www.cs.nott.ac.uk/~bnk/WPS/popcorn.html>

<http://www.cs.nott.ac.uk/~bnk/WPS/popcorn.txt> (perl code)

Java Servlets

- A servlet is a compiled Java class
- Servlets are executed on the server system under the control of the Web server
- Servlets are managed by the *servlet container* (also called *servlet engine*)
- Servlets are called through HTML
- Servlets receive requests and return responses, both of which are supported by the HTTP protocol

Java Servlets

- When the Web server receives a request that is for a servlet, the request is passed to the servlet container
- The container makes sure the servlet is loaded and calls it
- The servlet call has two parameter objects, one with the request and one for the response
- When the servlet is finished, the container reinitializes itself and returns control to the Web server

Java Servlet Advantages

- Can be faster than CGI, because they can run in the server process
- Have direct access to Java APIs
- Because they continue to run (unlike CGI programs), they can save state information
- Have the usual benefits of being written in Java (platform independence, ease of programming)

JavaServer Pages (JSP)

- Released in 1999 as Sun's answer to ASP and PHP
- Architecturally, JSP may be viewed as a high-level abstraction of Java servlets
 - Instead of embedding HTML in Java code, code is embedded in HTML to provide the dynamic parts
- JSP syntax is a fluid mix of two basic content forms: *scriptlet elements* and *markup*
 - markup is typically standard HTML or XML
 - scriptlet elements are delimited blocks of Java code which may be intermixed with the markup

JavaServer Pages (JSP)

- Because Java is a compiled not a scripting language, JSP pages must be compiled to Java bytecode classes before they can be executed
- JSPs are compiled into servlets by a JSP compiler
 - So JSP is a simplified approach to writing servlets

.NET Framework

- .NET Framework is a collection of technologies for the development and deployment of .NET software systems
 - pre-coded solutions form the framework's class library and cover a large range of programming needs
 - Programs written for the .NET Framework execute in a software environment that manages the program's runtime requirements - Common Language Runtime (CLR)
- .NET languages from Microsoft: VB .NET, Managed C++, .NET, JScript .NET, J# .NET, C#

ASP.NET

- Set of web application development technologies part of Microsoft's .NET platform
- Code can be embedded in ASP.NET documents, or can be separate in a code-behind file
- Any .NET language can be used
- Every ASP.NET document is compiled into a class

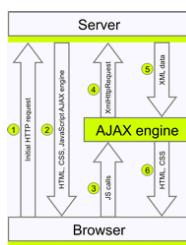
Server-Side Embedded Scripts

- Many proprietary scripting systems
 - Often included as connectivity kits for databases
 - Sometimes as part of a dedicated web management system - e.g. Cold Fusion
 - Scripts are embedded into HTML/XHTML
- HTML containing scripts is pre-processed, the scripts executed and the result served as standard HTML
- PHP (PHP Hypertext Pre-processor)
 - Embedded "C-like" scripting language
 - Platform independent
 - Open Source
 - Support for large number of databases (inc. MySQL)

Ajax (asynchronous JavaScript and XML)

- A group of technologies used on the client-side to create interactive web applications
- combination of HTML and CSS to mark up and style information
- The DOM is accessed with JavaScript to dynamically display, and to allow interactivity with, document elements
- JavaScript and the XMLHttpRequest object – method for exchanging data asynchronously between browser and server to avoid full page reloads

Ajax Diagram



Summary

- Purpose of Server-Side Scripting
- Major Server-Side Technologies
 - Server-Side Includes
 - CGI
 - Perl
 - Java Servlets and JavaServer Pages
 - ASP.NET
 - Embedded Scripts
 - PHP
- Ajax