

How to Build a Web Database: A Case Study

Introduction

This paper shows you how to build a simple Web application using ColdFusion. If you follow the sample case study of the multimedia resources database in this paper, you can create a small Web database application you want.

Significance of the topic

Most of commercial Web applications are developed using a server technology. The server technology is a technology such as ASP, ColdFusion that gives the Web server the ability to modify a Web page at run time. A Web application is a collection of static and dynamic pages that interact with each other and with various resources on a Web server, including databases. A dynamic page means a Web page modified at run time by the Web server before being sent to a browser.

About databases

A database is some sort of collection of organized facts and we can use it for any Web applications. The building block of a database is the record. A record is a collection of related data treated as a single entity. A collection of records that share the same fields is called a table because this kind of information can easily be presented in table format: each column represents a field and each row represents a record. In fact, the word column is synonymous with the word field, and the word row is synonymous with the word record. (Fig. 1)

ID	LastName	FirstName	Address	City	State	ZIP
2231	Adamson	Robert	1021 B Wheatley	Lawrence	NY	11559
2232	Anderson	John	1024 Santee St.	Owings Mill	MD	21117
2233	Atget	Eugene	103 N Market Dr.	Cleveland	OH	44135
2234	Bakus	Denis	1031-1 S Dolfield	Los Angeles	CA	90015
2235	Barry	David	1075 Socorro Rd	Miami	FL	33122
2236	Bradley	Matthew	255 David Ave.	Los Angeles	CA	90015

Figure 1: A schematic overview of a database

A database can contain more than one table, each with a unique name. These tables can be related or independent from one another. A subset of data extracted from one or more tables is called a recordset. A recordset is also a table because it's a collection of records that share the same fields.

Before you started

To establish a Web database system, you need a server (Windows NT) including ColdFusion Server software, and you may use any editors, either ColdFusion Studio or Dreamweaver UltraDev, on your desktop. This is the following case study of the paper, “Building a Multimedia Web Database Using Director and ColdFusion,” written by Jungwha Hong last summer semester, and you may refer to the system setup from it.

Building a Web database: A case study

To build a Web database, first of all, you need to define the problem or objective: how the database will be used and what information needs to be stored in it. In this case, we want to build a Web database for manipulating Internet multimedia resources.

Second, it is necessary to research the current databases, which are similar, good, or bad. It will be helpful for you to be able to imagine a good design for your database.

Third, design the data structures. You have to define each entity for making each table. In this case, we need only one table. In this case, I named by “tblmmdb2” as a multimedia database resource table.

Fourth, we have to construct relationships between tables (entities). We called data modeling. For the data modeling, we usually use E-R Diagram (ERD) for conceptual schema, which describes the relationships between each two entities such as one to one, or one to many. In this case, we do not have to worry about the data modeling because there is only one entity in our database. And then, for each entity, we need to define the logical schema. For example, in this case, we can define the logical schema like this.

mmdbtbl{mmID, mmURL, mmTitle, mmDescription, mmKeyword, mmMedia, mmPostName, mmPostDate}

Each table should have a primary key. In this case, mmID is a primary key.

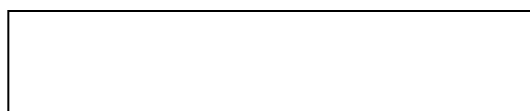
Sixth, now we can define the implementing rules and constraints for each table, we called data dictionary, using Microsoft Access tool, like below.

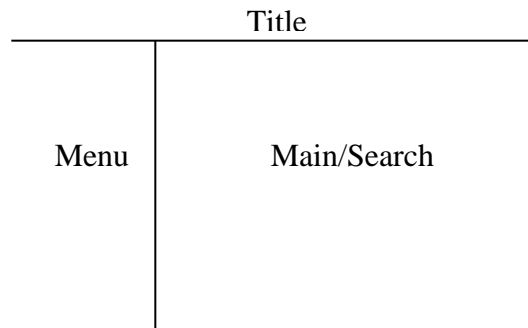
tblmmdb2:

Field Name	Data Type	Field Size	Caption
mmID	Autonumber	Long Integer	mm ID
mmURL	Text	200	mm URL
mmTitle	Text	200	mm Title
mmDescription	Text	200	mm Description
mmKeyword	Text	200	mm Keyword
MmMedia	Text	50	mm Media
mmPostName	Text	50	mm Post Name
mmDate	Date/Tiem	mm/dd/yy	mm Date

And then, save the file, named by mmdb.mdb under the directory, like
 ../mmdbproject/database/mmdb.mdb

Seventh, create views and reports for each search forms, output result forms, and add/delete/modify forms to display on the screen like below.

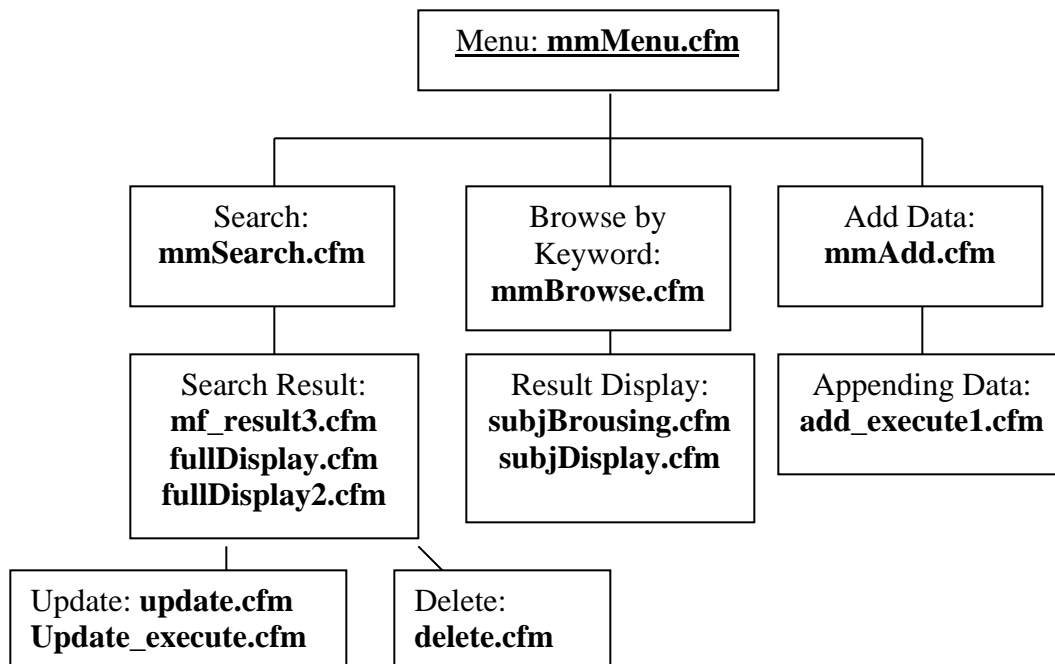




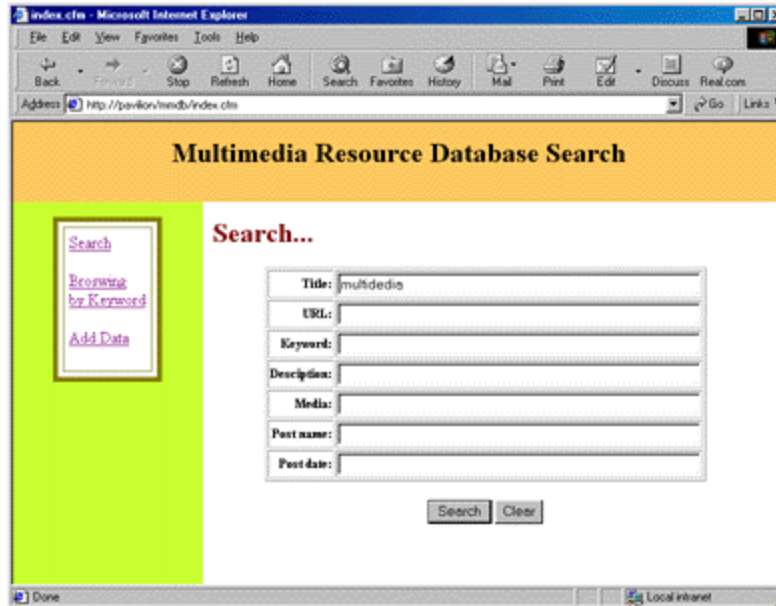
Finally, implement and integrate your design using an editor, and then, save all scripts under the directory: ../mmdbproject/scripts/

Front page: **index.cfm**

Title: **mmTitle.cfm**



FULL CODE:



index.cfm -----

```

<html>
<head>
<title>index.cfm</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
</head>
<frameset rows="80,*" frameborder="NO" border="0" framespacing="0">
  <frame name="topFrame" scrolling="NO" noresize src="mmtitle.cfm" >
  <frameset cols="190,632*" frameborder="NO" border="0" framespacing="0" rows="*">
    <frame name="leftFrame" scrolling="NO" noresize src="mmmenu.cfm">
    <frame name="mainFrame" src="mmsearch.cfm">
  </frameset>
</frameset>
</frameset>
<noframes><body bgcolor="#FFFFFF">
</body></noframes>
</html>

```

mmmenu.cfm -----

```

<html>
<head>
<title>mmmenu.cfm</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
</head>
<body bgcolor="#ccff33">
<FORM ACTION="mf_results3.cfm" METHOD="post">
<table border="5" cellspacing="5" cellpadding="5" align="center" bgcolor="white"
bordercolor="olive">
  <tr>
    <td><font face="Times New Roman" size=+1>
      <p></p>
      <a href="mmsearch.cfm" target="mainFrame">Search</a>
    </td>
  </tr>
</table>

```



```

<!-- Query --->
<CFQUERY DATASOURCE="mmdb" NAME="resource">
SELECT * FROM tblmmdb2
WHERE mmID=mmID
<!-- Is there any search text? --->
<CFIF mmURL IS NOT "">
    <!-- Loop through the words --->
    <CFLOOP INDEX="word" LIST="#mmURL#" DELIMITERS=" ">
        <!-- Add the AND clause --->
        AND mmURL LIKE '%#word#%'
    </CFLOOP>
</CFIF>
<CFIF mmtitle IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmtitle#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmTitle LIKE '%#word#%'
</CFLOOP>
</CFIF>
<CFIF mmkeyword IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmkeyword#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmKeyword LIKE '%#word#%'
</CFLOOP>
</CFIF>
<CFIF mmdescription IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmPostName#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmDescription LIKE '%#word#%'
</CFLOOP>
</CFIF>
<CFIF mmPostName IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmPostName#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmPostName LIKE '%#word#%'
</CFLOOP>
</CFIF>
<CFIF mmPostDate IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmPostDate#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmPostDate LIKE '%#word#%'
</CFLOOP>
</CFIF>
<CFIF mmMedia IS NOT "">
<!-- Loop through the words --->
<CFLOOP INDEX="word" LIST="#mmPostName#" DELIMITERS=" ">
    <!-- Add the AND clause --->
    AND mmMedia LIKE '%#word#%'
</CFLOOP>
</CFIF>
ORDER BY mmPostDate
</CFQUERY>

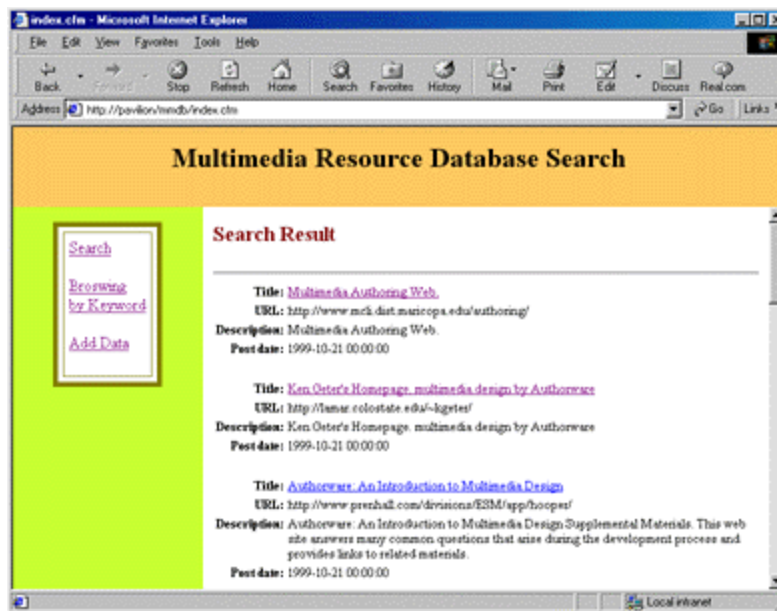
```

```

<HTML><HEAD><TITLE>mf_results3.cfm</TITLE></HEAD>
<BODY>
<font face="Times New Roman" color="Maroon"><H2>Search Result</H2></font>
<HR>
<cfoutput query="resource">
<table>
    <tr><th align =right>Title:</th><td>
<a href="fullDisplay.cfm?mmID=#mmID#">#TRIM(mmTitle)#</a></td></tr>
    <tr><th align =right>URL:</th><td>#TRIM(mmurl)#</td></tr>
    <tr><th align =right valign=top>Description:</th><td>#TRIM(mmDescription)#</td></tr>
    <tr><th align =right valign=top>Post date:</th><td>#TRIM(mmPostDate)#</td></tr>
</table>
<P>
</cfoutput>

</BODY></HTML>

```



fullDisplay.cfm -----

```

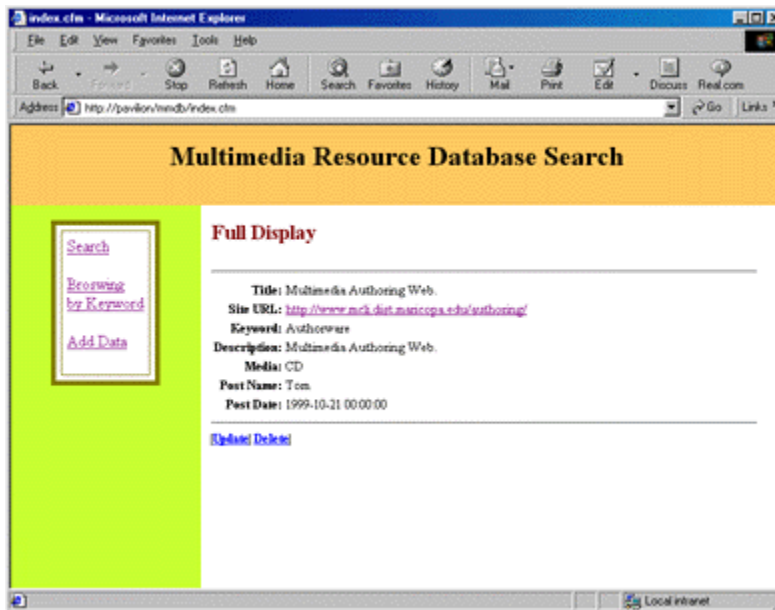
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="mmdb" name="res">
    SELECT * FROM tblmmdb2
    WHERE mmID = #mmID#
</cfquery>
<HTML><HEAD><TITLE>FullDisplay.cfm</TITLE></HEAD>
<BODY>
<font face="Times New Roman" color="Maroon"><H2>Full Display</H2></font>
<HR>
<cfoutput query="res">
<font face="Times New Roman">
<table>
    <tr><th align=right>Title:</th><td>#TRIM(mmTitle)#</td></tr>

```

```

<tr><th align=right>Site URL:</th><td><a href="#mmurl#">#TRIM(mmurl)#</a></td></tr>
<tr><th align=right>Keyword:</th><td>#TRIM(mmKeyword)#</td></tr>
<tr><th align=right>Description:</th><td>#TRIM(mmDescription)#</td></tr>
<tr><th align=right>Media:</th><td>#TRIM(mmmedia)#</td></tr>
<tr><th align=right>Post Name:</th><td>#TRIM(mmPostName)#</td></tr>
<tr><th align=right>Post Date:</th><td>#TRIM(mmPostDate)#</td></tr>
</table>
<HR>
|<a href="update.cfm?mmID=#mmID#"><b>Update</b></a>|
<a href="delete.cfm?mmID=#mmID#"><b>Delete</b></a>|
</cfoutput>
</font>
</BODY></HTML>

```



fullDisplay2.cfm -----

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="dc" name="res">
    SELECT R.*, Publisher FROM tblResource R, tblPublisher P
    WHERE ResourceID = #ResourceID# AND R.PublisherID = P.PublisherID
</cfquery>
<cfquery datasource="dc" name="sub">
    SELECT RS.*, S.* FROM tblResSubject RS, tblSubject S
    WHERE RS.SubjectID = S.SubjectID AND RS.ResourceID = #ResourceID#
</cfquery>
<HTML><HEAD><TITLE>fullDisplay2.cfm</TITLE></HEAD>
<BODY>
<H1>Full Display</H1>
<HR>
<table>
<cfoutput query="res">
    <tr><th align=right>Resource ID:</th><td>#TRIM(ResourceID)#</td></tr>

```

```
|<th align=right>Title:</th><td>#TRIM(Title)#</td></tr>
|<th align=right>Creator:</th>
<th align=right>Site URL:</th><td><a
href="#Identifier#">#TRIM(Identifier)#</a></td></tr>
|<th align=right>Copyright:</th><td><a
href="#RightsURL#">#TRIM(RightsURL)#</a></td></tr>
|<th align=right>Subject:</th>
<th align=right>Keyword:</th><td>#TRIM(Keyword)#</td></tr>
|<th align=right>Resource Type:</th><td>#TRIM(Type)#</td></tr>
|<th align=right>Publisher:</th><td>#TRIM(Publisher)#</tr>
|<th align=right>Description:</th><td>#TRIM(Description)#</td></tr>
</cfoutput>
</table>
<HR>
</BODY></HTML>

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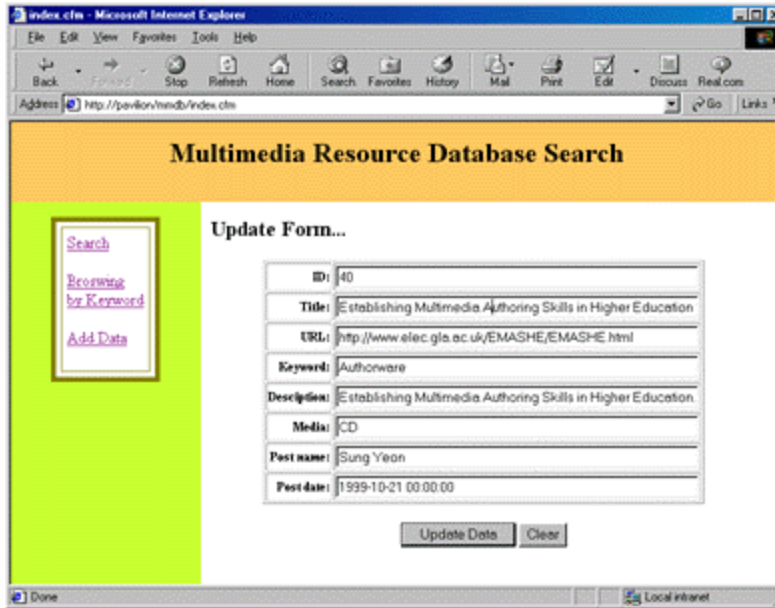
```

delete.cfm -----

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="mmdb">
DELETE FROM tblmmdb2
WHERE mmID = #mmID#
</cfquery>
<html><head><title>Delete.cfm</title></head>
<body>
<cfoutput>
<h3> Resource Deleted! </h3>
</cfoutput>
</body></html>

```



update.cfm -----

```

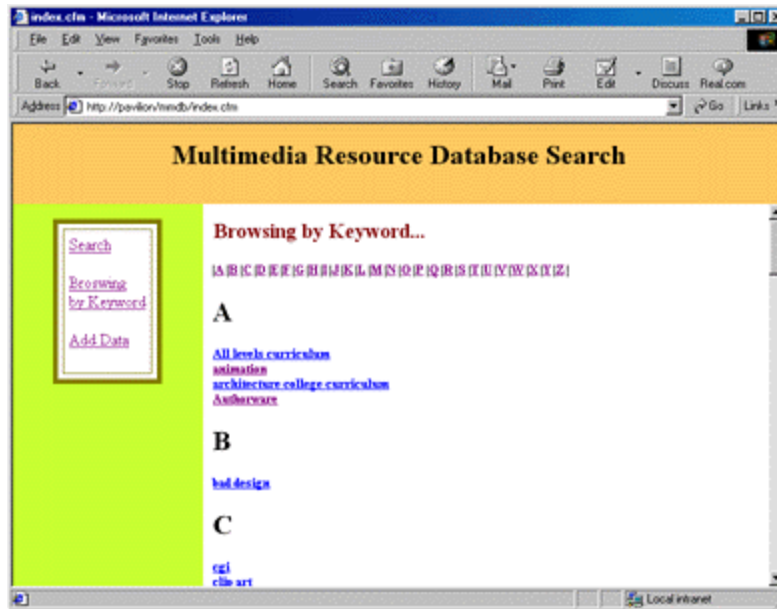
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="mmdb" name="res">
    SELECT * FROM tblmmdb2 WHERE mmID=#mmID#
</cfquery>
<HTML><HEAD><TITLE>Update.cfm</TITLE></HEAD>
<BODY>
<H2 align=left>Update Form...</H1>
<center>
<FORM ACTION="update_execute.cfm" METHOD="post">
<cfoutput query="res">
<table border align="center">
<tr><th align=right>ID:</th><td><INPUT NAME="mmID" VALUE="#TRIM(mmID)#" SIZE
="50"></td></tr>
<tr><th align=right>Title:</th><td><INPUT NAME="mmtitle" VALUE="#TRIM(mmtitle)#" SIZE
="50"></td></tr>
<tr><th align=right>URL:</th><td><INPUT NAME="mmurl" VALUE="#TRIM(mmurl)#" SIZE
="50"></td></tr>
<tr><th align=right>Keyword:</th><td><INPUT NAME="mmkeyword"
VALUE="#TRIM(mmkeyword)#" SIZE="50"></td></tr>
<tr><th align=right>Description:</th><td><INPUT NAME="mmDescription"
VALUE="#TRIM(mmdescription)#" SIZE="50"></td></tr>
<tr><th align=right>Media:</th><td><INPUT NAME="mmMedia" VALUE="#TRIM(mmMedia)#"
SIZE="50"></td></tr>
<tr><th align=right>Post name:</th><td><INPUT NAME="mmPostName"
VALUE="#TRIM(mmPostName)#" SIZE="50"></td></tr>
<tr><th align=right>Post date:</th><td><INPUT NAME="mmPostDate"
VALUE="#TRIM(mmPostDate)#" SIZE="50"></td></tr>
</table>
</cfoutput>
<P>
<INPUT TYPE="submit" VALUE="Update Data">
<INPUT TYPE="reset" value="Clear">

```

```
</FORM>
</BODY></HTML>
```

update_execute.cfm -----

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfupdate datasource="mmdb" tablename="tblmmdb2">
<html><head><title>Updating_Execute.cfm</title></head>
<body>
<cfoutput>
<h3> Resource: (#mmTitle#) Updated! </h3>
</cfoutput>
</body></html>
```



mmbrowse.cfm -----

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="mmdb" name="QrySubject">
    select distinct mmKeyword from tblmmdb2
</cfquery>
<html><head><title>mmbrowse.cfm</title>
</head>
<body><a name="top"></a>
<font face="Times New Roman" color="Maroon"><H2>Browsing by Keyword...</H2></font>
<cfloop index="LoopCount" from="0" to="25">
    <cfoutput>|<a
href="#chr(35)##chr(65+LoopCount)#"><b>#chr(65+LoopCount)#</b></a></cfoutput>
</cfloop>|<BR>
<cfloop index="LoopCount" from="0" to="25"> <cfoutput>
```

```
<h1><a name="#chr(65+LoopCount)#">#chr(65+LoopCount)#</a><a
href="#chr(35)#top"></h1></a>
</cfoutput> <cfloop query="QrySubject">
  <cfif #left(mmKeyword,1)# IS #chr(65+LoopCount)#>
    <cfoutput><a
href="subjDisplay.cfm?mmKeyword=#mmKeyword#"><b>#mmKeyword#</b></a></cfoutput><br
>
  </cfif>
</cfloop> </cfloop>
</body></html>
```

subjBrowsing.cfm -----

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="dc" name="QrySubject">
  select * from tblSubject order by subject
</cfquery>

<html><head><title>SubjBrowsing.cfm</title></head>
<body>
<a name="top"></a>
<h1><font face="Times New Roman" color="Maroon">Subject Browsing</font></h1>
|<a href="browse.htm"><font face="Times New Roman" color="Teal">Browsing Menu</font></a>
|<a href="search.htm"><font face="Times New Roman" color="Teal">Searching Menu</font></a>
|<a href="default.htm"><font face="Times New Roman" color="Teal">Main Menu</font></a>|
<HR>
<cfloop index="LoopCount" from="0" to="12">
  <cfoutput>|<a
href="chr(35)#chr(65+LoopCount)#"><b>#chr(65+LoopCount)#</b></a></cfoutput>
</cfloop>|<BR>
<cfloop index="LoopCount" from="13" to="25">
  <cfoutput>|<a
href="chr(35)#chr(65+LoopCount)#"><b>#chr(65+LoopCount)#</b></a></cfoutput>
</cfloop>|<HR>
<cfloop index="LoopCount" from="0" to="25">
  <cfoutput><h1><a name="#chr(65+LoopCount)#">#chr(65+LoopCount)#</a>
  <a href="#chr(35)#TOP"></h1></a></cfoutput>
  <cfloop query="QrySubject">
    <cfif #left(subject,1)# IS #chr(65+LoopCount)#>
      <cfoutput><a href="subjDisplay.cfm?SubjectID=#SubjectID#">
        <b>#subject#</b></a></cfoutput><br>
    </cfif>
  </cfloop>
</cfloop>
</body></html>
```

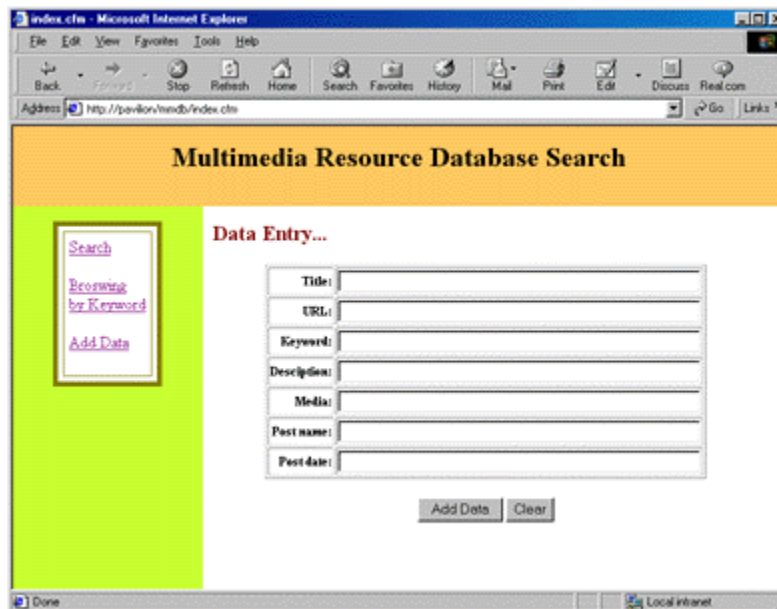
subjDisplay.cfm -----

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<!-- Query -->
<CFQUERY DATASOURCE="mmdb" NAME="resource">
SELECT * FROM tblmmdb2
WHERE mmKeyword='#mmKeyword#' and mmID=mmID
</CFQUERY>
```

```

<HTML><HEAD><TITLE>subjDisplay.cfm</TITLE></HEAD>
<BODY>
<font face="Times New Roman" color="Maroon"><H2>Search Result</H2></font>
<HR>
<cfoutput query="resource">
<cfquery datasource="mmdb" name="sub">
    SELECT * FROM tblmmdb2
    WHERE mmKeyword = mmKeyword and mmID='#mmID#'
</cfquery>
<table>
    <tr><th align=right>Title:</th><td>
<a href="fullDisplay2.cfm?mmID=#mmID#">#TRIM(mmTitle)#</a></td></tr>
    <tr><th align=right>URL:</th><td>#TRIM(mmURL)#</td></tr>
    <tr><th align=right>Keyword:</th>
    <td><cfloop query="sub">
        |<a
href="subjDisplay.cfm?mmKeyword=#mmKeyword#">#mmKeyword#</a>
        </cfloop>|</td></tr>
    <tr><th align=right>Media:</th><td>#TRIM(mmMedia)#</td></tr>
    <tr><th align=right>Description:</th><td>#TRIM(mmDescription)#</td></tr>
    <tr><th align=right>Post name:</th><td>#TRIM(mmPostName)#</td></tr>
    <tr><th align=right>Post date:</th><td>#TRIM(mmPostDate)#</td></tr>
</table>
<P>
</cfoutput>
</BODY></HTML>

```



mmadd.cfm -----

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<cfquery datasource="mmdb" name="publisher">

```

```

        select * from tblmddb2
    </cfquery>
    <HTML><HEAD><TITLE>mmadd.cfm</TITLE></HEAD>
    <BODY>
    <div align="left">
    <H2><font face="Times New Roman" color="maroon">Data Entry...</H2></font>
    </div>
    <FORM ACTION="add_execute1.cfm" METHOD="post">
    <table border align="center">
    <tr><th align="right">Title:</th><td><INPUT NAME="mmtitle" SIZE="50"></td></tr>
    <tr><th align="right">URL:</th><td><INPUT NAME="mmurl" SIZE="50"></td></tr>
    <tr><th align="right">Keyword:</th><td><INPUT NAME="mmkeyword" SIZE="50"></td></tr>
    <tr><th align="right">Description:</th><td><INPUT NAME="mmDescription" SIZE="50"></td></tr>
    <tr><th align="right">Media:</th><td><INPUT NAME="mmMedia" SIZE="50"></td></tr>
    <tr><th align="right">Post name:</th><td><INPUT NAME="mmPostName" SIZE="50"></td></tr>
    <tr><th align="right">Post date:</th><td><INPUT NAME="mmPostDate" SIZE="50"></td></tr>
    </table>
    <P><center>
    <INPUT TYPE="submit" VALUE="Add Data">
    <INPUT TYPE="reset" value="Clear">
    </center>
    </FORM>
    </BODY></HTML>

```

```

add_execute1.cfm -----
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<CFINSERT DATASOURCE="mddb" TABLENAME="tblmddb2">
<html><head>
    <title>add_execute1.cfm</title>
</head><body>
<H1>Resource Added</h1>
<cfoutput>
Multimedia Resource: <b>#mmTitle#</b> Added<br>
by #mmPostName#. #mmPostDate#
</cfoutput></body></html>

```

- End of Code -

This paper is written by Jungwha Hong for the course EDC 385G, Interactive Multimedia: Design and Production, Fall 2000, at The University of Texas at Austin.

Related links on the web for the Web Database

1. Databases and the World Wide Web, Marianne Winslett, University of Illinois

- <http://cdr.cs.uiuc.edu/pubs/de97tutorial/index.htm>
2. Choosing a Database for your Web site
<http://www.wiley.com/compbooks/ashenfelter/resources.html>
 3. Web Database ORG
<http://www.webdatabase.org/>
 4. Webreview.com, John PaulAshenfelter
[http://www.webreview.com/pace/print/au/Ashenfelter John Paul](http://www.webreview.com/pace/print/au/Ashenfelter_John_Paul)
 5. Choosing a Web database
<http://www.builder.com/Programming/ChoosingWebDB/>
 6. Web database solution
http://www.canright.com/web_database.htm
 7. Web Database Connectivity with Scripting by Z. Peter Lazar.
<http://www.oreilly.com/catalog/wj6/excerpt/>
 8. Web Resources Database
<http://199.217.32.75/resources/search.html>
 9. Web Database Tutorial (PHP & MySQL)
<http://www.blazonry.com/scripting/linkssdb/>
 10. Management Web Resources Database
<http://www.keele.ac.uk/depts/mn/teach/mgtlinks.htm>
 11. Database-Driven Web Sites
<http://www.smartbooks.com/t-progddatabases.htm>
 12. Database: Web Database
<http://www.geocities.com/SiliconValley/Bay/5388/webdb.html>
 13. Developing Web Database Applications Using Active Server Pages (ASP)
<http://cpcug.org/user/houser/asp/>
 14. Web Database Development for Windows Platforms
http://www.phptr.com/ptrbooks/ptr_0130139858.html

15. Useful Links For Database-Web Connectivity
<http://developer.netscape.com/docs/manuals/dbresour.html>
16. Tools for Web Database Access
<http://ashok.pair.com/webdata.htm>
17. Web Database Project
http://cs1.cs.nyu.edu/ms_students/chia7019/webdb.html
18. Web Database Connectivity with Scripting Languages
<http://www.w3j.com/6/s3.lazar.html>
19. Web Database Tools
<http://users.erols.com/foxdm/database.htm>
20. Web Database Development Step by Step
<http://www.interlacken.com/webdb/>