

Lecture

Forms and Common Gateway Interface Mechanism

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What are We Talking About Today?

- HTML Forms
 - Used to create interactive web pages where users can input and submit data.
 - Key for interactions like registration and data submission.
 - Represents documents as a tree structure
- Form Submission Methods
 - GET: Appends data to URL.
 - POST: Sends data as a payload to the server.
- CGI Mechanism
 - Server-side scripts process form data and generate dynamic content.
 - Popular scripting languages for CGI include Python, Perl, and PHP

Forms

- Used to create a set of pages that contain fields in which the viewer can select and supply information
 - Introduced very early in HTML 2.0
 - Allows WWW users to perform data entry
 - Permit direct interaction with customers for inquiries, registration, sales of products, and services
 - To create a capability requires two steps:
 - Use HTML form elements to create the pages that contain the form
 - Write a server-side script to process form data; this program must be placed so the WWW server can execute it

The Original Set of User Interface Elements

<INPUT>

Text

File

Checkbox

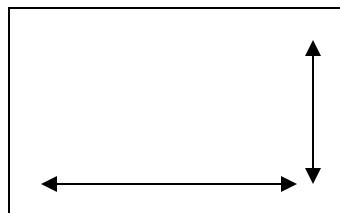
Radio button

Submit

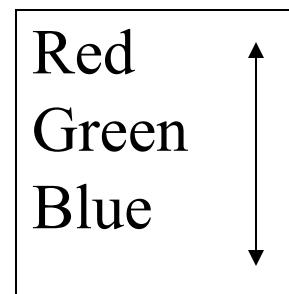
Reset

Password

<TEXTAREA>

A rectangular box representing a text area. Inside the box, there are two vertical arrows: one pointing up and one pointing down, indicating scrollable content.

<SELECT>

A rectangular box representing a select element. Inside the box, the word "Red" is followed by a small square input field.A rectangular box representing a select element. Inside the box, the words "Red", "Green", and "Blue" are listed vertically, each preceded by a small square input field. To the right of the list, there are two vertical arrows: one pointing up and one pointing down, indicating scrollable content.

FORM Element and Some Attributes

- **Syntax** `<FORM>...</FORM>`
 - **Attribute Specifications**
 - ACTION=*URI* (form handler)
 - METHOD=[*get* | *post*] (HTTP method for submitting form)
 - *GET* is the default; form contents are appended to the URL
 - *POST* form contents to be sent as payload
 - ENCTYPE=*ContentType* (content type to submit form as)
 - **Defaults** to application/x-www-urlencoded which returns name/value pairs, separated by &, spaces replaced by + and reserved characters (like #) replaced by %HH, H a hex digit
 - ACCEPT-CHARSET=*Charsets* (supported character encodings)
 - TARGET=*FrameTarget* (frame to render form result in, in HTML4)
(a browsing context name or keyword, in HTML5, such as `_self`, `_blank`, `_parent`, `_top`, `iframename`)
 - ONSUBMIT=*Script* (form was submitted)
 - ONRESET=*Script* (form was reset)
 - AUTOCOMPLETE (**HTML5 ONLY**) values completed by browser
- <https://developer.mozilla.org/en-US/docs/Web/HTML/Element/form>

<INPUT> Tag

- Used inside <FORM> tag to specify a data-entry object
- Has attributes, here are a few
 - TYPE: User input type (default is TEXT)
 - NAME: Name of data entry object whose value the user will supply
 - VALUE: Required for radio and checkboxes
 - CHECKED: For radio buttons and checkboxes
 - SIZE: Specific to each type of field
 - MAXLENGTH: Limit on accepted characters
 - SRC: Image file used as a graphical submit button when TYPE=IMAGE
 - DISABLED: unavailable in this context
 - READONLY: for text and passwords
- **HTML5 adds several new attributes for validation**
- See http://www.w3schools.com/tags/tag_input.asp

<INPUT> Tag Attributes

- *<input> tag also supports the **Global Attributes**, that can be used with all HTML elements*
 - CLASS: Specifies one or more class names for an element (refers to a class in a style sheet)
 - HIDDEN: Specifies that an element is not yet, or is no longer, relevant
 - And many more. See:
https://www.w3schools.com/tags/ref_standardattributes.asp
- The <input> tag also supports the **Event Attributes** in HTML.
 - Window event attributes: onload, onunload, etc.
 - Form event attributes: onchange, onfocus, etc.
 - Keyboard / mouse events: onkeydown, onclick, etc.
 - Drag, clipboard, media events: onpause, onplay, etc.
 - And many more. See:
https://www.w3schools.com/tags/ref_eventattributes.asp

<INPUT> Element, Type Options (cont'd)

[HTML5 adds 13 new input types. See later slides]

- **CHECKBOX:** A single value, on/off; each generates name/value pair

```
<INPUT TYPE=CHECKBOX CHECKED NAME="MARRIED" VALUE="yes">
```

- **FILE:** Users attach a file to the form contents; a text field holds the file name, and a button permits browsing

```
<INPUT TYPE=FILE NAME="fname">
```

- **HIDDEN**: The field is not rendered, so servers can maintain state information

```
<INPUT TYPE=HIDDEN NAME="BANKACCT" VALUE="A057-23-789">
```

<INPUT> Element, Type Options (cont'd)

- **RESET**: Defines a button that users click to reset fields to their initial state

```
<INPUT TYPE=RESET VALUE="CLEAR">
```

- **SUBMIT**: Defines a button that users click to submit the form's contents to the server

```
<INPUT TYPE=SUBMIT VALUE="submit data">
```

- **TEXT**: An input field of a single line where users can enter data

```
<INPUT TYPE=TEXT SIZE=20 NAME="lastname" VALUE="type your last name">
```

<INPUT> Element, Type Options (cont'd)

- **IMAGE**: Used for graphical submit buttons

```
<INPUT TYPE=IMAGE SRC="banner.gif" VALUE="gohome">
```

- **PASSWORD**: Just like TYPE=TEXT, but the input is echoed with *

```
<INPUT TYPE=PASSWORD SIZE=10 NAME="pw">
```

- **RADIO**: Used for attributes that take a single value from a set of alternatives; all buttons have same name and explicit value

```
<INPUT TYPE=RADIO NAME="AGE" VALUE="0-20">
<INPUT TYPE=RADIO NAME="AGE" VALUE="21-50">
<INPUT TYPE=RADIO NAME="AGE" VALUE="51-100" CHECKED>
```

<INPUT> Element, Type Options

- **TYPE**: [COLOR DATE DATETIME DATETIME-LOCAL EMAIL MONTH NUMBER RANGE SEARCH | TEL | TIME | URL | WEEK]
 - **COLOR**: Used for input fields that should contain a color
Select color: `<INPUT TYPE="COLOR" name="favcolor">`
 - **DATE**: Allows the user to select a date
Birthday: `<INPUT TYPE="DATE" NAME="bday">`
 - DATETIME**: Allows the user to select a date and time (with time zone)
Birthday: `<INPUT TYPE="DATETIME" NAME="BDAYTIME">`
 - **EMAIL**: Allows the user to enter an e-mail address
E-Mail: `<INPUT TYPE="EMAIL" NAME="email">`
 - **MONTH**: Allows the user to select month/year
Birthday (M/Y) : `<INPUT TYPE="MONTH" NAME="bdaymonth">`

<INPUT> Element, Type Options (cont'd)

- **NUMBER**: Used to enter a numeric value

Quantity (1-5) :

```
<INPUT TYPE="NUMBER" name="quantity" min="1" max="5">
```

- **RANGE**: Used to enter a value from a range of numbers

```
<INPUT TYPE="RANGE" NAME="points">
```

- **SEARCH**: Used for search fields (behaves like regular TEXT)

Search Google: <INPUT TYPE="SEARCH" NAME="GOOGLESEARCH">

- **TEL**: Allows the user to enter a telephone num.
- Telephone: <INPUT TYPE="TEL" NAME="ustel">

- **TIME**: Allows the user to select a time
- Time: <INPUT TYPE="TIME" NAME="ustime">

<INPUT> Element, Type Options (cont'd)

- **URL**: Used to enter a URL address

Add Homepage: <INPUT TYPE="URL" name="homepage">

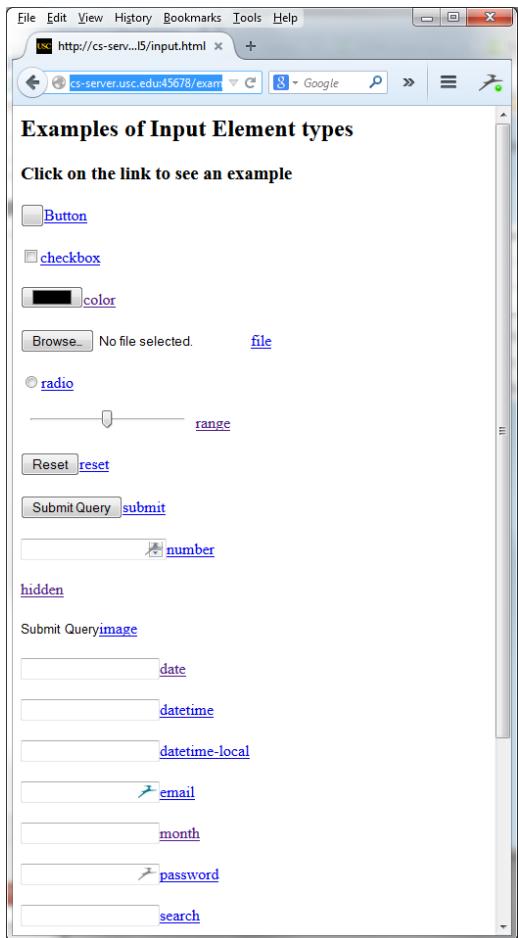
- **WEEK**: Used to select a week and year

Select a week: <INPUT TYPE="WEEK" NAME="week_YR">

- **DATETIME-LOCAL**: Used select date and time (no time zone)

Birthday: <INPUT TYPE="DATETIME-LOCAL" NAME="bday">

<INPUT> Element, Type Options (cont'd)



Examples of all of the <input> element types, including the most recent in HTML5 provided by w3schools

<http://csci571.com/examples/html5/input.html>

Example of <FORM> With Text Widgets

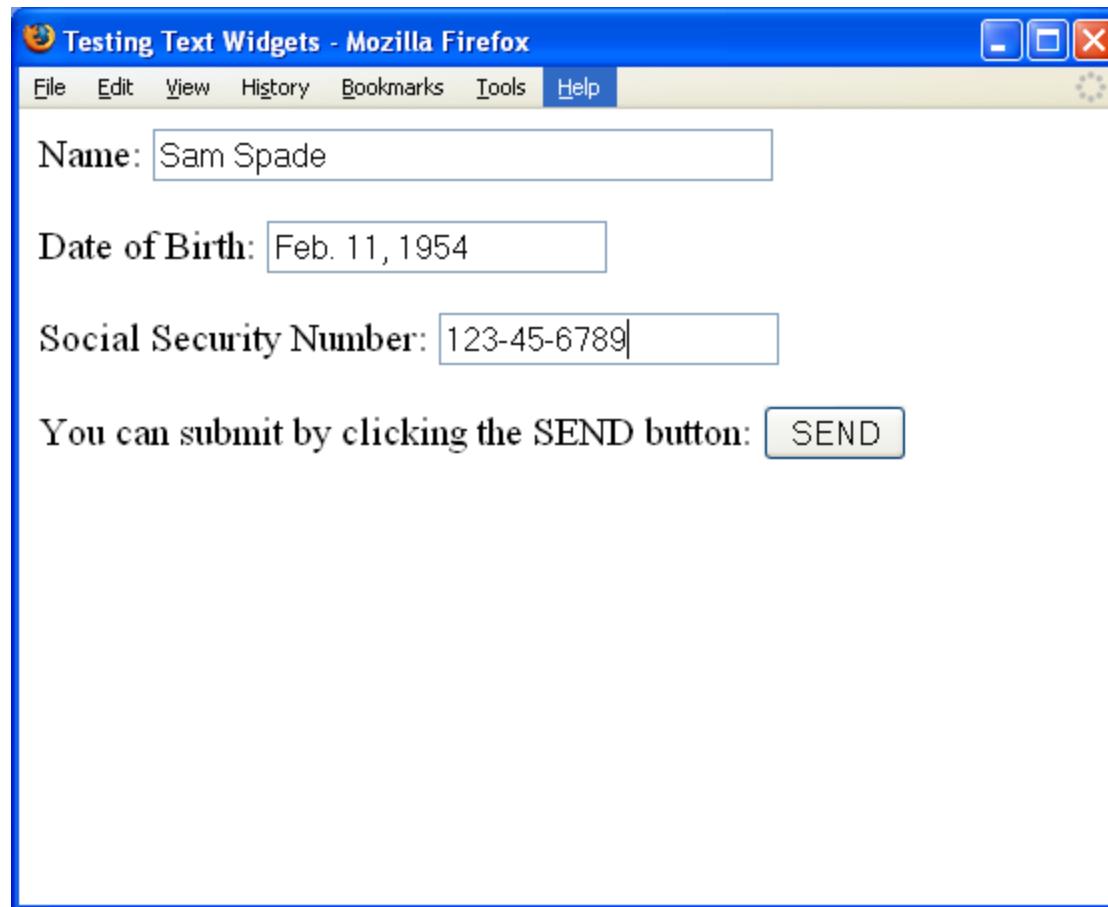
```
<html>
<head> <title>Testing Text Widgets</title> </head>

<body>
  <form method="POST" action="/cgi-bin/post-query">
    Name: <input name="in_name" type="text" size=40>
    <p> Date of Birth:
        <input type="text" name="in_dob"></p>
    <p> Social Security Number:
        <input type="text" name="in_ssn"></p>
    <p> You can submit by clicking the SEND button:
        <input type="submit" value="SEND"></p>
  </form>
</body>

</html>
```

Note:post-query is a standard Apache CGI program distributed by web servers and used to check that form elements are being properly sent to the server

Browser Output of Text Widgets Example



The image shows a screenshot of a Mozilla Firefox browser window. The title bar reads "Testing Text Widgets - Mozilla Firefox". The menu bar includes "File", "Edit", "View", "History", "Bookmarks", "Tools", and "Help". The main content area displays a form with four text input fields and a submit button. The first field is labeled "Name" with the value "Sam Spade". The second field is labeled "Date of Birth" with the value "Feb. 11, 1954". The third field is labeled "Social Security Number" with the value "123-45-6789". The fourth field is a message: "You can submit by clicking the SEND button:" followed by a blue "SEND" button.

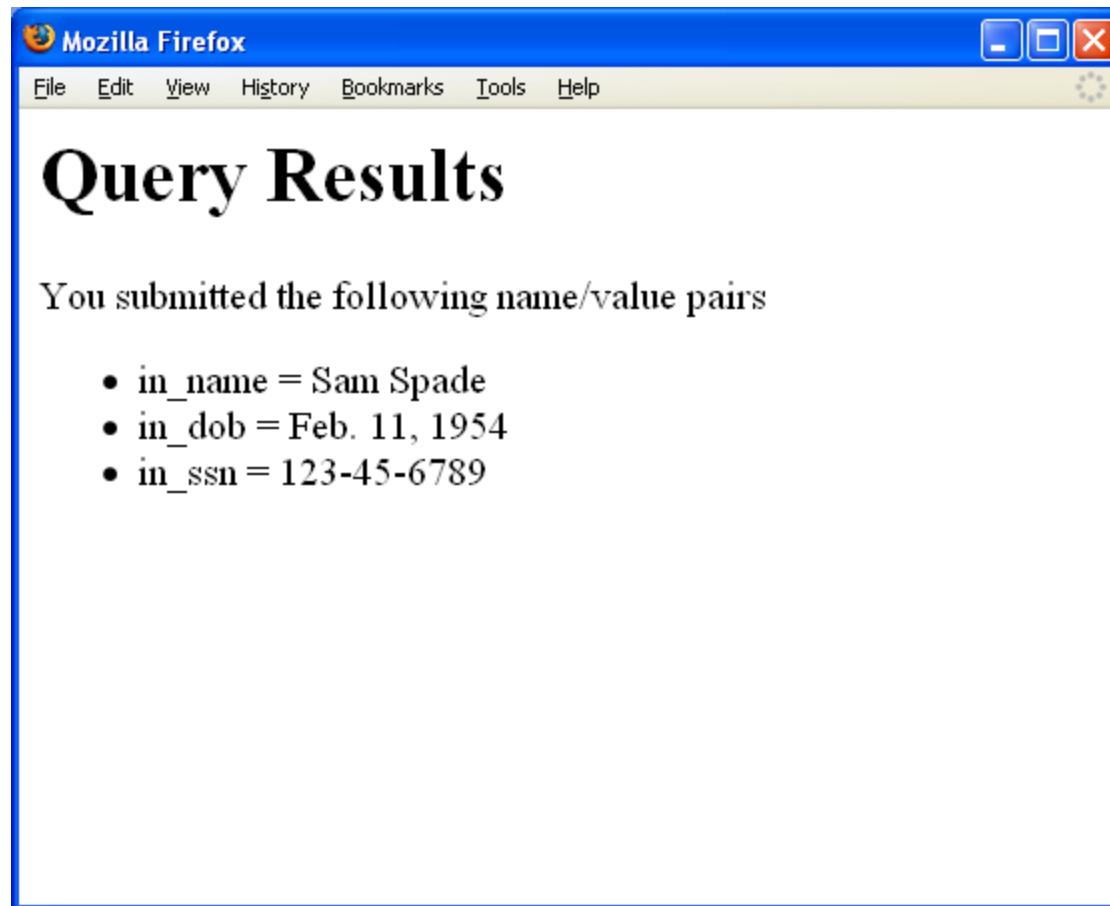
Name: Sam Spade

Date of Birth: Feb. 11, 1954

Social Security Number: 123-45-6789

You can submit by clicking the SEND button:

Query Results for Text Widget Example



Example of <FORM> With Checkboxes

```
<html>
<head> <title>Testing Checkboxes</title> </head>
<body>
  <form method="POST" action="/cgi-bin/post-query">
    Fill in facts about yourself:
    <p>
      <input type="checkbox" name="house" value="yes">own a house<BR>
      <input type="checkbox" name="car" value="yes">own a car<BR>
      <input type="checkbox" name="boat" value="yes">own a boat<BR>
      <input type="checkbox" name="degree" value="yes">
                                  have a college degree<BR>
    To reset the checkboxes, click here
    <input type="reset" value="RESET">
  </p>
  <p>
    You can submit by clicking on the SEND button:
    <input type="submit" value="SEND">
  </p>
</form>
</body>
</html>
```

Browser Output of Checkbox Example

Testing Checkboxes - Mozilla Firefox

File Edit View History Bookmarks Tools Help

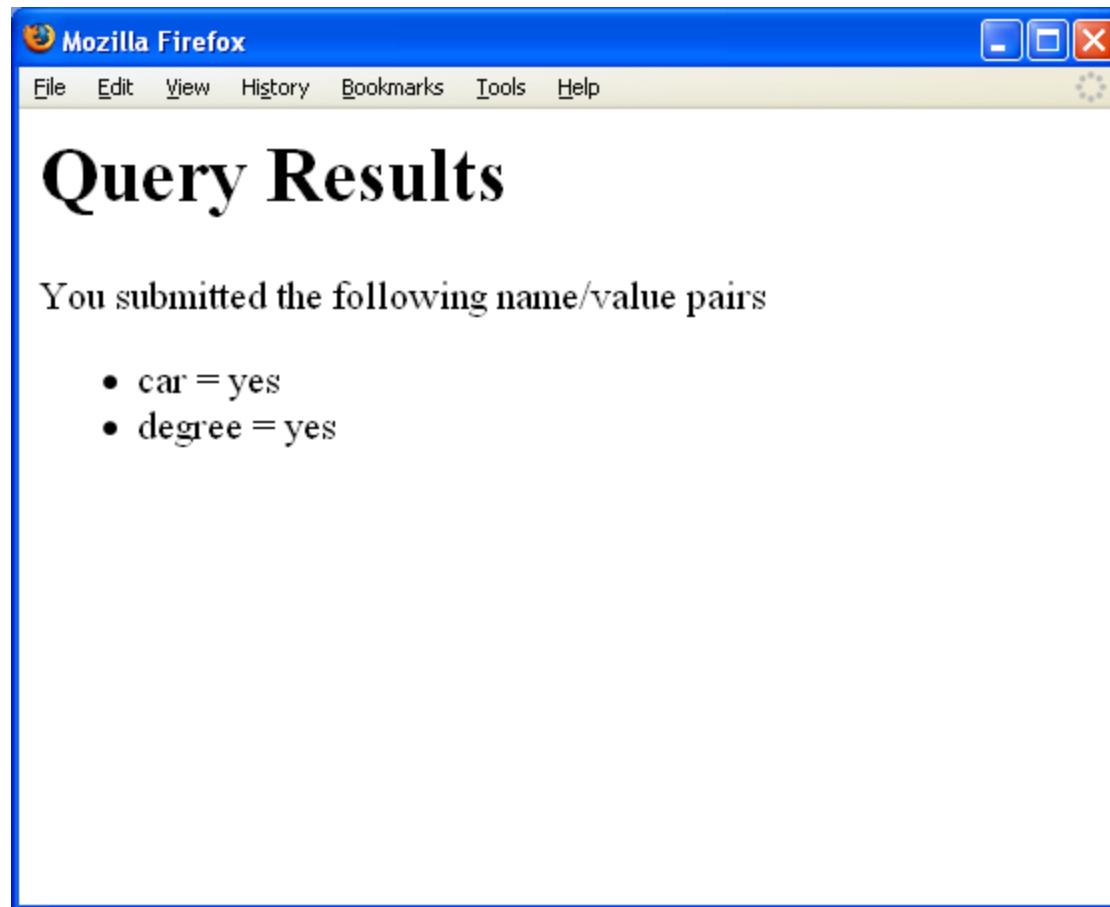
Fill in facts about yourself:

own a house
 own a car
 own a boat
 have a college degree

To reset the checkboxes, click here

You can submit by clicking on the SEND button:

Query Results of Checkbox Example

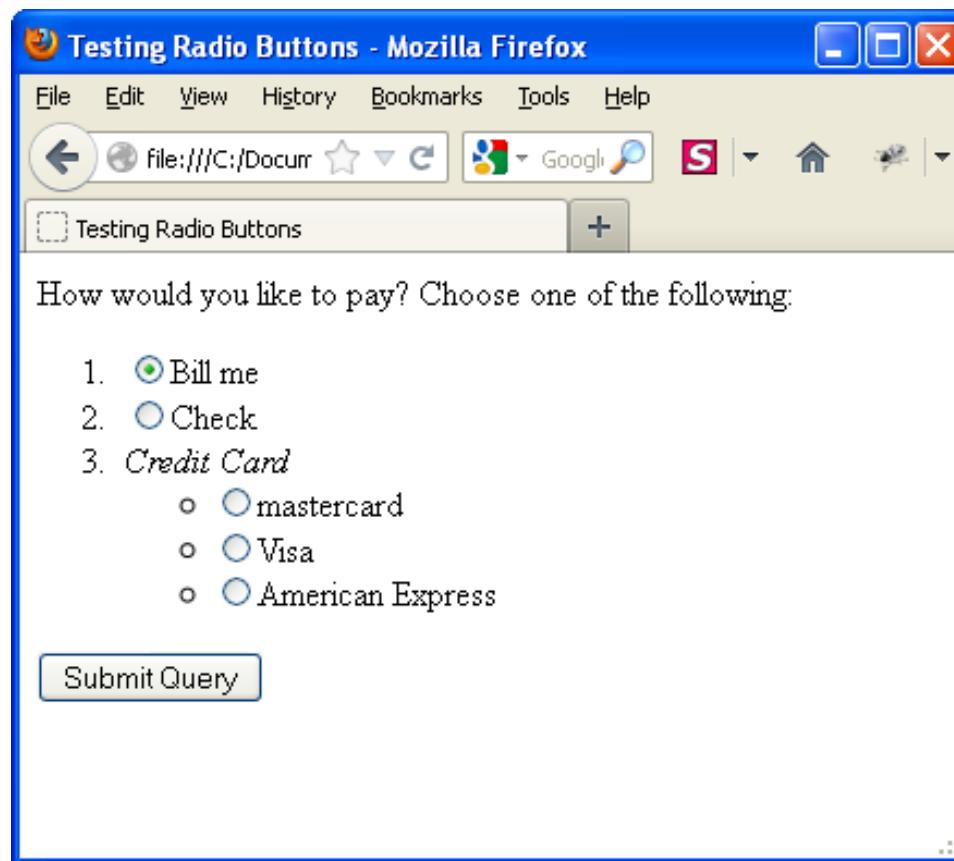


Example of <FORM> With Radio Buttons

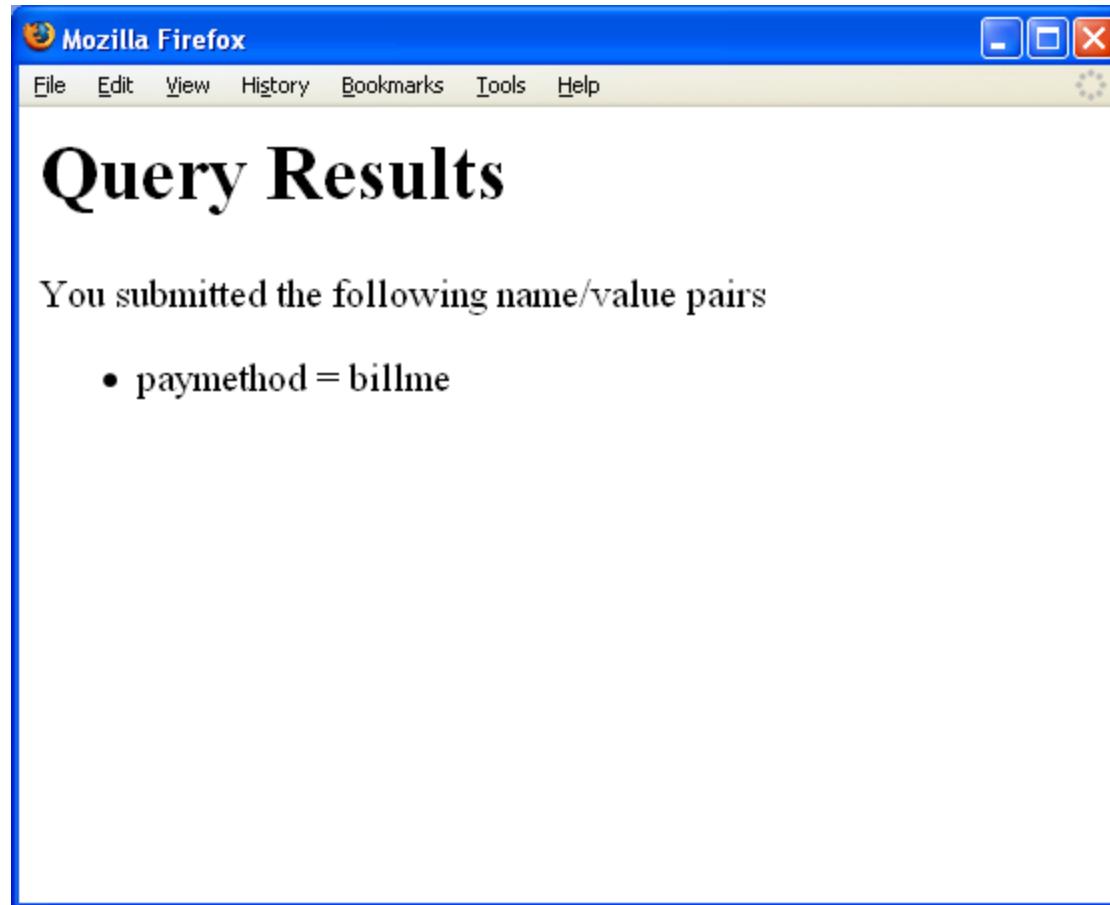
```
<HTML>
<HEAD><TITLE>Testing Radio Buttons</TITLE></HEAD>

<BODY>
<FORM METHOD="POST" ACTION="/cgi-bin/post-query">
  How would you like to pay? Choose one of the following:<P>
  <OL>
    <LI><INPUT TYPE="radio" Name="paymethod" VALUE="billme" CHECKED>
        Bill me<BR>
    <LI><INPUT TYPE="radio" Name="paymethod" VALUE="check">Check<BR>
    <LI><I> Credit Card </I>
        <UL>
          <LI><INPUT TYPE="radio" Name="paymethod" VALUE="mastercard">
              mastercard<BR>
          <LI><INPUT TYPE="radio" Name="paymethod" VALUE="visa">Visa<BR>
          <LI><INPUT TYPE="radio" Name="paymethod" VALUE="amex">
              American Express<BR>
        </UL>
    </OL>
    <INPUT TYPE="submit" VALUE="Submit Query">
</FORM></BODY></HTML>
```

Browser Output of Radio Buttons



Query Results for Radio Buttons Example



<TEXTAREA> Tag

- specifies a large rectangular text-entry object with multi-line input and scroll bars
- Attributes:

NAME=name specifies a name for the data entry object to be sent to the server-side script

COLS=num

- Width (in characters) of a text-entry region on the screen
- If user types more than COLS characters, field is scrolled

ROWS=num

- Height (in characters) of a text-entry region on the screen
- If user types more than ROWS lines, field is scrolled

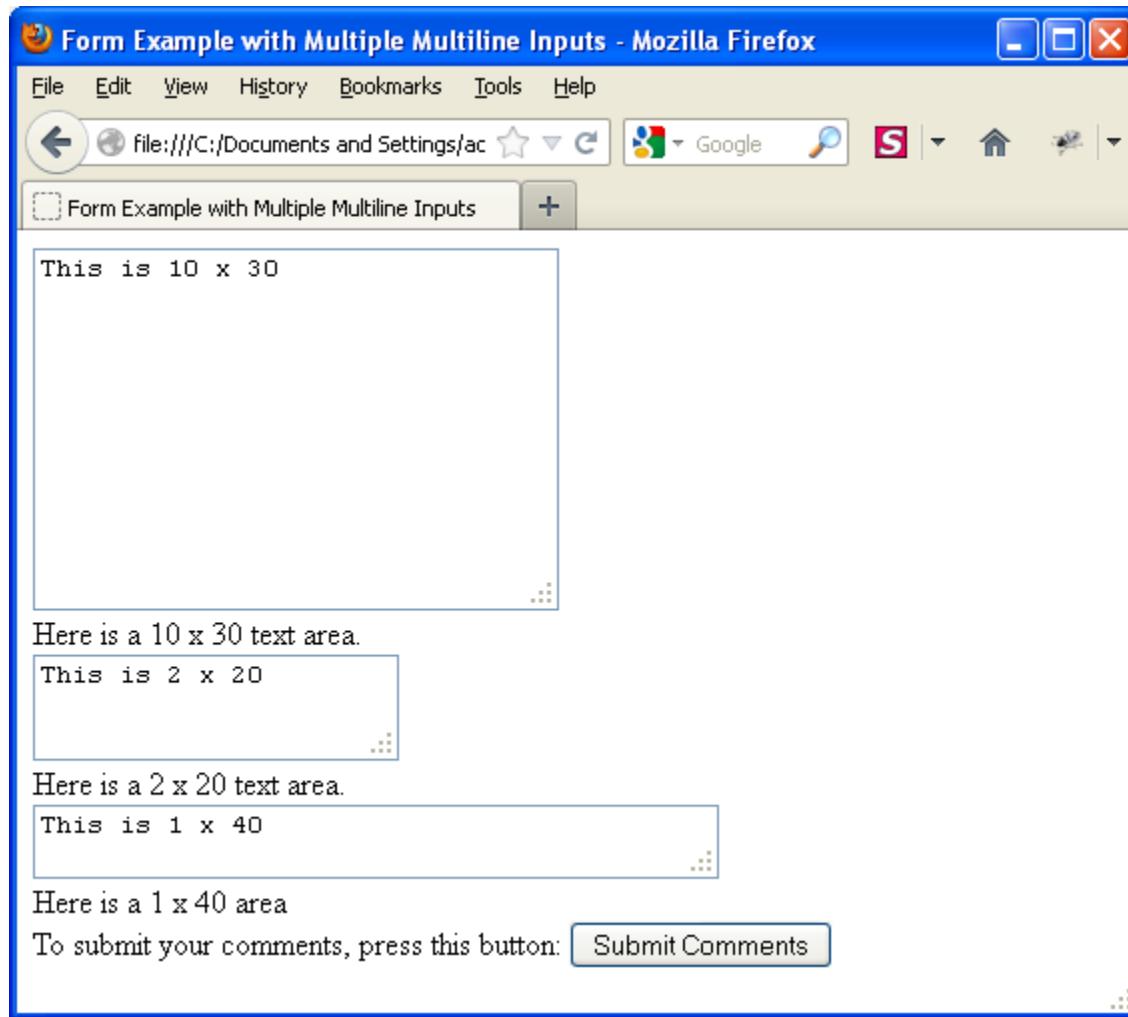
Example of Multiline Input Areas

```
<HTML><HEAD><TITLE>Form Example with Multiple Multiline  
Inputs</TITLE></HEAD>  
<body><form method="POST" action="/cgi-bin/postquery">  
  
<TEXTAREA NAME="largearea" ROWS=10 COLS=30>This is 10x30</TEXTAREA>  
<p>Here is a 10 x 30 text area.<p>  
  
<TEXTAREA NAME="smallarea" ROWS=2 COLS=20>This is 2x20</TEXTAREA>  
<p>Here is a 2 x 20 text area.<p>  
  
<TEXTAREA NAME="narrowarea" ROWS=1 COLS=40>This is 1x40</TEXTAREA>  
<p>Here is a 1 x 40 area <p>
```

To submit your comments, press this button:

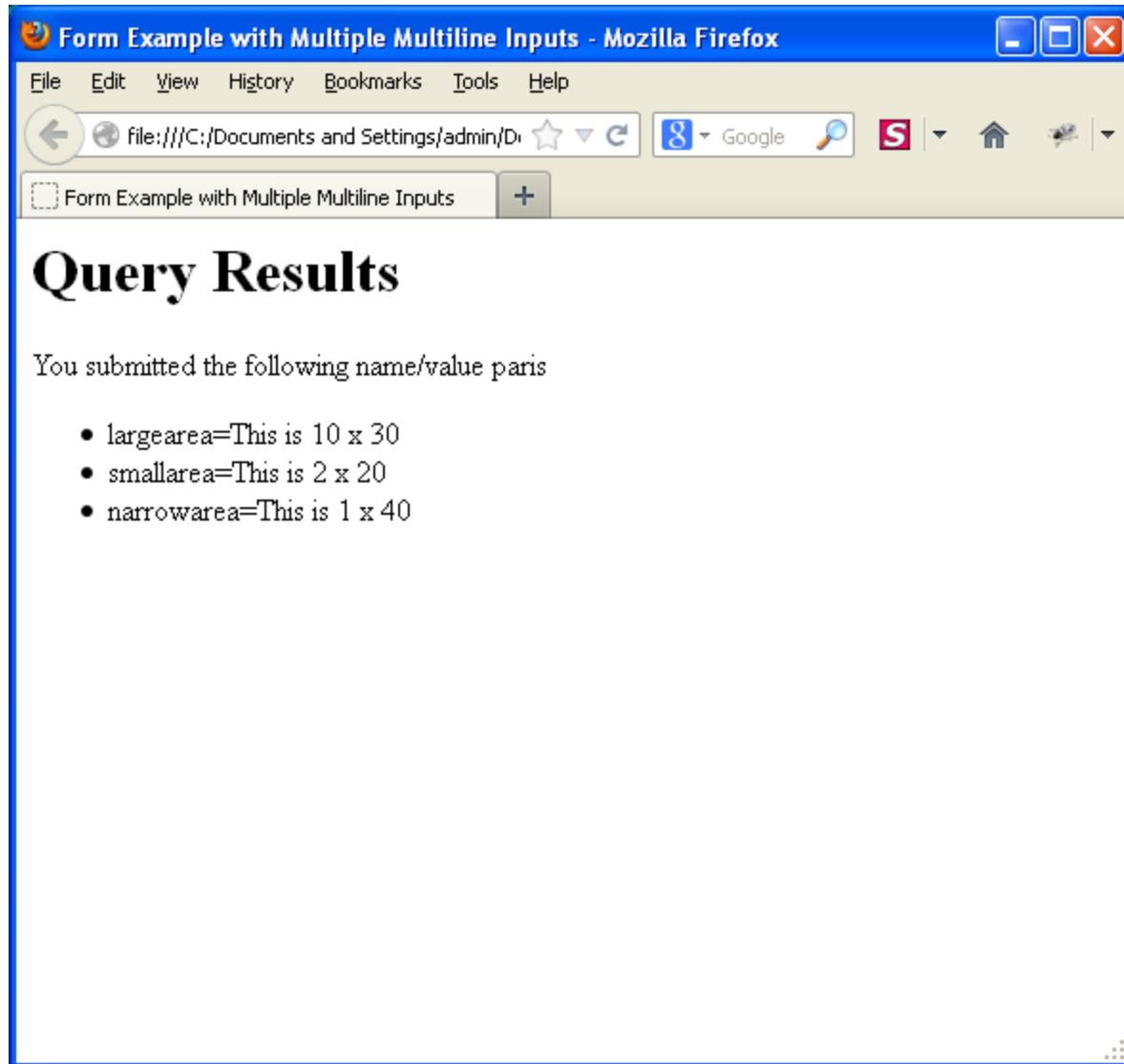
```
<INPUT TYPE="submit" VALUE="Submit Comments"><BR>  
</FORM></BODY></HTML>
```

Browser Output of Multiline Input Areas



Initial Screen

Query Results of Textarea Example



<SELECT> Tag

- Used inside the <FORM> element to specify a selection list object (a list of items or a pop-down menu that the user can select from)
- Attributes:
 - **NAME**=name
 - Specifies a name for the data entry object to be passed to the server-side script
 - **SIZE**=num
 - Number of lines of the list to display at a time
 - If SIZE is 1 or unspecified, browser will display as a drop-down list box
 - If SIZE is greater than 1, browser will display as a scrollable list with only SIZE options visible at a time

<SELECT> Tag Attributes

- MULTIPLE
 - Specifies that multiple list items may be selected (whereas normally only 1 item can be selected)
 - All selected values are sent to server-side script as separate name/value pairs
- HTML5 adds more attributes:
 - **AUTOFOCUS**: drop-down list should automatically get focus
 - **FORM**: defines one or more forms the select fields belongs to
 - **REQUIRED**: user is required to select a value before submitting the form

<OPTION> Tag

- Used inside the <SELECT> tag to specify the start of a new menu item in the selection list
- Syntax as follows:
`<OPTION attributes> Text`
- Attributes:
 - **SELECTED**
 - Menu item is pre-selected in the list
 - **VALUE="text"**
 - Text specifies the value to be sent to the script if the option is selected
 - By default, the text following the OPTION element is sent
 - **DISABLED**
 - Specifies a “grayed”, non-selectable item
 - **HTML5 adds the REQUIRED attribute**

Example of <SELECT>, <OPTION> Tags

```
<HTML><HEAD><TITLE>Forms Example with Options</TITLE></HEAD><BODY>
<FORM METHOD="POST" ACTION="/cgi-bin/post-query">
Which School would you like to apply to? <BR>
<SELECT NAME="school" SIZE=5>
  <OPTION> Letters&Science</OPTION>
  <OPTION SELECTED> Engineering</OPTION>
  <OPTION> Business</OPTION>
  <OPTION> Law</OPTION>
  <OPTION> Medicine</OPTION>
</SELECT><BR>
What semester do you wish to start? <BR>
<SELECT NAME="semester">
  <OPTION SELECTED> Fall</OPTION>
  <OPTION> Spring</OPTION>
  <OPTION> Summer</OPTION>
</SELECT><BR>
To submit your choices, press this button:
<INPUT TYPE="submit" VALUE="Submit Choices">. <BR >
To reset the form, press this button:
<INPUT TYPE="reset" VALUE="Reset">.
</FORM></BODY></HTML>
```

Browser Output of <SELECT>, <OPTION> Example

Forms Example with Options - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Which School would you like to apply to?

Letters&Science

Engineering

Business

Law

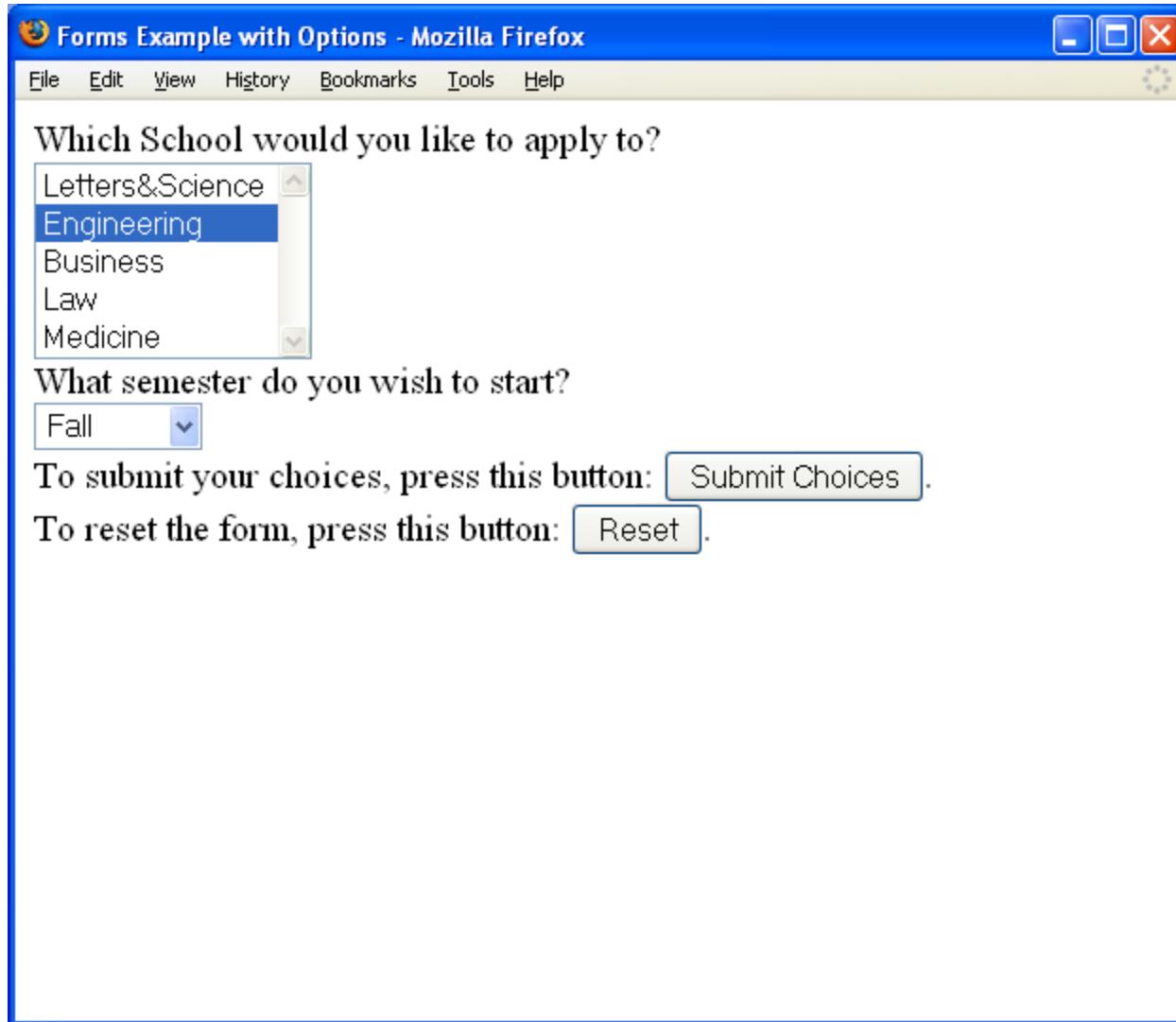
Medicine

What semester do you wish to start?

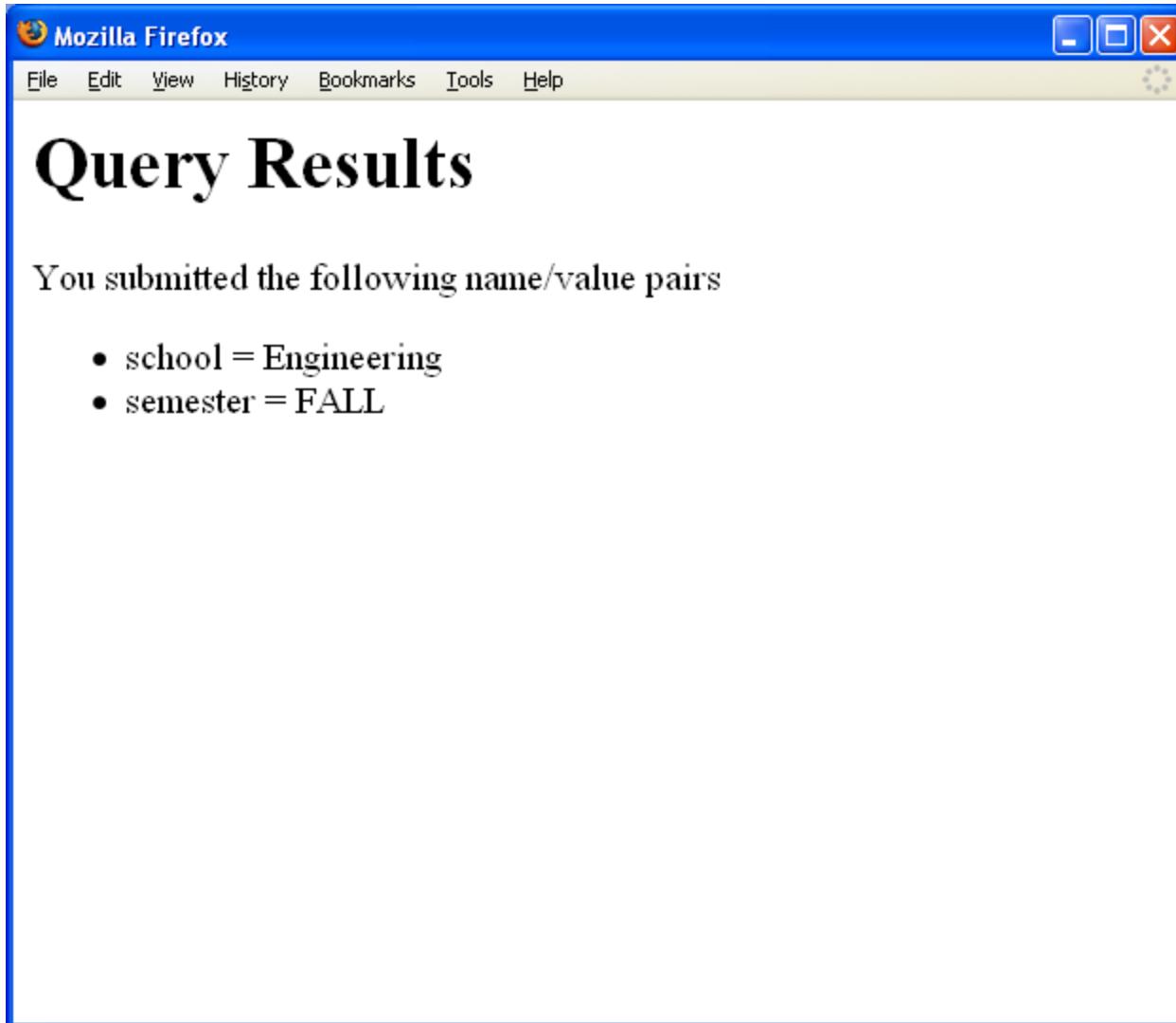
Fall

To submit your choices, press this button: .

To reset the form, press this button: .



Query Results for <SELECT> Example



FIELDSET – Form Control Group

- The **FIELDSET** element defines a *form control group*.
 - By grouping related form controls, authors can divide a form into smaller, more manageable parts, improving the usability problem that can strike when confronting users with too many form controls.
 - The grouping provided by **FIELDSET** also helps the accessibility of forms to those using aural browsers by allowing these users to more easily orient themselves when filling in a large form.
- The content of a **FIELDSET** element must begin with a **LEGEND** to provide a caption for the group of controls. Following the **LEGEND**, **FIELDSET** may contain any HTML element, including another **FIELDSET**.

Browser Output

3 Fieldsets Grouping form elements

FieldSet Example - Mozilla Firefox

File Edit View History Bookmarks Tools Help

file:///C:/Documents and Settings/admin/Desktop/test.html Google S

Bookmarks FieldSet Example

Contact Information

Name:

E-mail Address:

123 Main Street
Los Angeles, CA
90069

Mailing Address:

Ordering Information

Please select the product(s) that you wish to order:

[HTML 3.2 Reference](#)
 [HTML 4.0 Reference](#)
 [Cascading Style Sheets Guide](#)

Credit Card Information

Visa MasterCard

Number:

Expiry:

<http://csci571.com/examples/html5/fieldsettest.html>

Run through Tab order:

Name

E-mail

Mailing Address

HTML 3.2

HTML 4.0

.

.

Etc

To test ACCESSKEY in Chrome use

ALT + ACCESSKEY (I, O, C)

To test ACCESSKEY in Firefox use

ALT + SHIFT + ACCESSKEY

Fieldset Example

```
<FORM METHOD=post ACTION="/cgi-bin/order.cgi">

<FIELDSET> <LEGEND ACCESSKEY=I>Contact Information</LEGEND>
<TABLE> <TR> <TD> <LABEL FOR=name ACCESSKEY=N>Name:</LABEL> </TD>
          <TD> <INPUT TYPE=text NAME=name ID=name> </TD> </TR>
<TR> <TD> <LABEL FOR=email ACCESSKEY=E>E-mail Address:</LABEL> </TD>
<TD> <INPUT TYPE=text NAME=email ID=email> </TD> </TR>
<TR> <TD> <LABEL FOR=addr ACCESSKEY=A>Mailing Address:</LABEL> </TD>
<TD> <TEXTAREA NAME=address ID=addr ROWS=4 COLS=40></TEXTAREA> </TD> </TR> </TABLE> </FIELDSET>

<FIELDSET> <LEGEND ACCESSKEY=O>Ordering Information</LEGEND>
<P>Please select the product(s) that you wish to order:</P>
<P> <LABEL ACCESSKEY=3>
<INPUT TYPE=checkbox NAME=products VALUE="HTML 3.2 Reference">
<A HREF="/reference/wilbur/">HTML 3.2 Reference</A> </LABEL> <BR> <LABEL ACCESSKEY=4> <INPUT TYPE=checkbox
NAME=products VALUE="HTML 4.0 Reference">
<A HREF="/reference/html40/">HTML 4.0 Reference</A> </LABEL> <BR> <LABEL ACCESSKEY=S> <INPUT TYPE=checkbox
NAME=products VALUE="CSS Guide"> <A HREF="/reference/css/">Cascading Style Sheets Guide</A> </LABEL> </P>
</FIELDSET>

<FIELDSET> <LEGEND ACCESSKEY=C>Credit Card Information</LEGEND> <P> <LABEL ACCESSKEY=V> <INPUT TYPE=radio
NAME=card VALUE=visa> Visa </LABEL> <LABEL ACCESSKEY=M>
<INPUT TYPE=radio NAME=card VALUE=mc> MasterCard </LABEL> <BR>
<LABEL ACCESSKEY=u> Number: <INPUT TYPE=text NAME=number> </LABEL> <BR>
<LABEL ACCESSKEY=E> Expiry: <INPUT TYPE=text NAME=expiry> </LABEL> </P> </FIELDSET>

<P> <INPUT TYPE=submit VALUE="Submit order"> <INPUT TYPE=reset VALUE="Clear order form">
</P> </FORM>
```

3 *fieldsets* with legends
ACCESSKEY specifies a single character for giving focus

Ways to pass data to the backend over HTTP

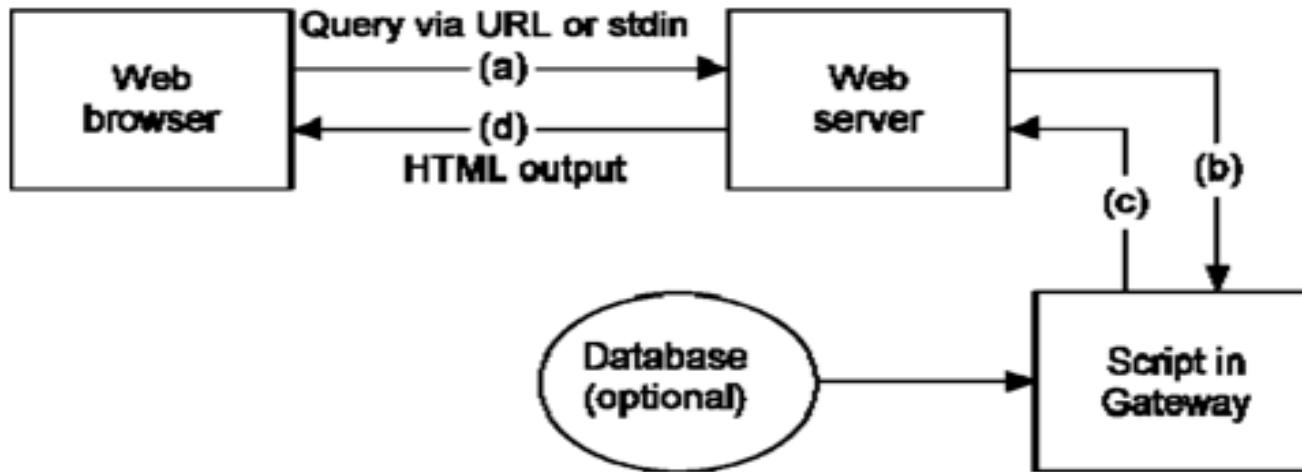
- URL
 - Path
 - QueryString
- Body
 - Supported by <form>
 - application/x-www-form-urlencoded (default)
 - multipart/form-data (support files)
 - text/plain
 - See: <https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods/POST>
 - Other:
 - JSON (applications/json)
 - See: <https://www.geeksforgeeks.org/how-to-post-json-data-to-server/>

Purpose of the CGI

- Common Gateway Interface (CGI) is a mechanism by which programs, called *scripts*, can be used to create dynamic Web documents
 - Scripts are placed in a server directory often named cgi-bin
 - Scripts can deliver information that is not directly readable by clients
 - Scripts dynamically convert data from a non-Web source (e.g., DBMS) into a Web-compatible document
- Current version of CGI is 1.1
- The reason for the term “common gateway” is these programs act as gateways between the WWW and any other type of data or service
- See <http://www.w3.org/CGI/>

Basic Operation

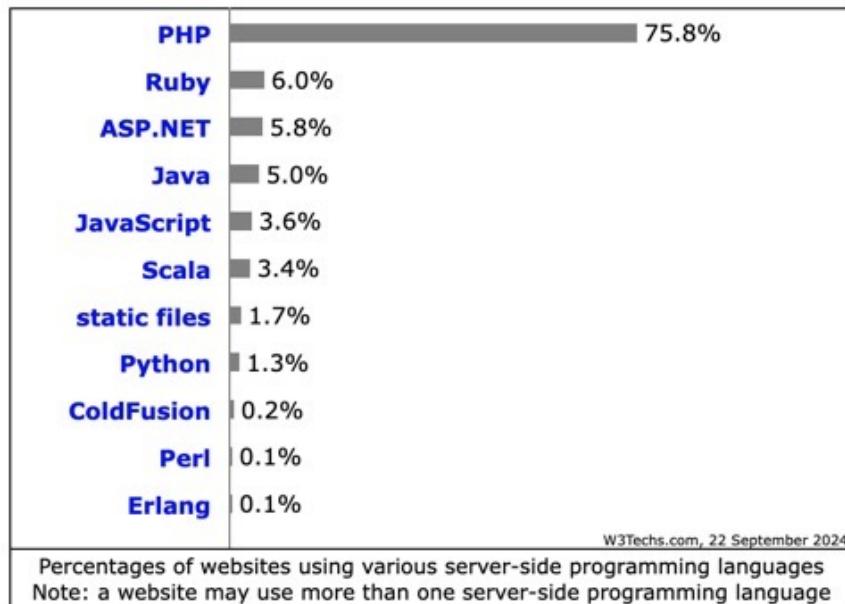
- An executable program that can be run without being directly invoked by users



The browser issues a query, (a), which is sent to the server; the server interprets it and invokes the proper CGI script, passing it the input data, (b); output from the script is returned, (c), via the server, to the browser, (d); output may be HTML, but it may instead be a URL, which is fetched by the server

Languages to Write Gateway Programs

- Any language that can produce an executable file
- Some typical ones are:
 - Traditional compiled languages such as C/C++
 - Or interpreted languages such as:
 - PHP, JavaScript, Python or Java
- Interpreted languages are often preferred as they are
 - Easy to write and portable, and speed is usually not a factor



http://w3techs.com/technologies/overview/programming_language/all

Anchors Are Used to Invoke CGI Scripts

- A hypertext reference can refer to:

- A remote file

```
<A HREF="http://domain_name/path/myfile.html">
```

- An executable script in the cgi-bin directory

```
<A HREF="http://domain_name/cgi-bin/scriptname">
```

- An executable script with arguments

```
<A HREF="http://domain_name/cgi-bin/scriptname?arg1+arg2">
```

- URLs produced by the query “bicycle tours”:

http://search.yahoo.com/bin/search?p=bicycle+tours

http://search.msn.com/results.asp?RS=CHECKED&FORM=M
SNH&v=1&q=bicycle+tours&zip=90211

CGI Script Environment Variables

- Environment variables
 - are a set of pre-defined dynamic values that can affect a running program
 - they are generally part of the operating environment in which a program runs;
 - UNIX (its variants) and Windows all use these as a means of passing information about the environment of a process
 - CGI environment variables are created by the web server and set immediately before the web server executes a gateway script
 - the CGI script can retrieve the values and use the data they send
 - CGI environment variables are defined in
<https://datatracker.ietf.org/doc/html/rfc3875>

CGI Environment Variables

- Can be classified into two major categories:
 - 1. Non-request specific
 - 2. Request specific
- **Non-request-specific** environment variables are the same for all requests:
 - SERVER_SOFTWARE, the name and version of the information server software answering the request
e.g., SERVER_SOFTWARE = Apache/1.3.15
 - SERVER_NAME, server's hostname, DNS alias, or IP address, e.g., SERVER_NAME = nunki.usc.edu
 - GATEWAY_INTERFACE, the revision of the CGI specification with which this server complies
 - SERVER_PROTOCOL, the name and revision of the information protocol with which this request came in
e.g., SERVER_PROTOCOL = HTTP/1.0
 - SERVER_PORT, the port number to which the request was sent
e.g., SERVER_PORT = 8088

CGI Environment Variables (cont'd)

- **Request-specific** environment variables
 - These variables are set depending on each request
 - REQUEST_METHOD, the method with which the request was made; e.g., (GET, POST)
 - PATH_INFO, the extra path information as given by the client; e.g.,
given `http://nunki.usc.edu:8080/cgi-bin/test.cgi/extra/path`
then `PATH_INFO = /extra/path`
 - PATH_TRANSLATED, the PATH_INFO path translated into an absolute document path on the local system
`PATH_TRANSLATED = /auto/home-scf-03/csci571/WebServer/apache_1.2.5/htdocs/extra/path`
 - SCRIPT_NAME, the path and name of the script being accessed as referenced in the URL
`SCRIPT_NAME = /cgi-bin/test.cgi`
 - QUERY_STRING, the information that follows the ? in the URL that referenced this script

CGI Environment Variables (cont'd)

- `REMOTE_HOST`, Internet domain name of the host making the request
- `REMOTE_ADDR`, the IP address of the remote host making the request
- `AUTH_TYPE`, the authentication method required to authenticate a user who wants access
- `REMOTE_USER`, username that server and script have authenticated
- `REMOTE_IDENT`, the remote username retrieved by the server using inetd identification (RFC 1413)
- `CONTENT_TYPE`, for queries that have attached information, such as POST method, this is the MIME content type of the data
- `CONTENT_LENGTH`, the length of the content as given by the client

CGI Environment Variables (cont'd)

- Also, every item of information in an HTTP request header is stored in an environment variable
 - Capitalize the name in the request header field
 - Convert dashes to underscores
 - Add the prefix HTTP_
- For example:
 - HTTP_USER_AGENT contains the request header User_Agent field data
e.g., HTTP_USER_AGENT = Mozilla/4.7 [en]C-DIAL (WinNT; U)
 - HTTP_ACCEPT contains the request header Accept field, of the form type/subtype
 - HTTP_REFERER contains the URL of the document that generated this request

CGI Script Output

- The script sends its output to `stdout`; the server adds appropriate headers and returns this output to the client
- Output from a script to the server could be:
 - A document generated by a script
 - The type of document could be HTML, plain text, image, video or audio clip, and many other types
 - Instructions to the server for retrieving the desired output elsewhere
 - an error indicator

Server Directives

- The output of scripts begins with a small header consisting of text lines containing server directives
 - This must be followed by a blank line
- Any headers that are not server directives are sent directly back to the client
- Server directives are used by CGI scripts to inform the server about the type of output
- The current CGI specification defines three (3) server directives:
 - Content-type
 - Location
 - Status

Server Directives (cont'd)

- 1. **Content-type: type/subtype**

- The MIME type of the document being returned
 - For example,

content-type: text/html (HTML document)

content-type: text/plain (plain-text document)

- 2. **Location**

- Alerts the server that the script is returning a reference to a document, not an actual document
 - If the argument is a URL, the server will issue a redirect to the client; for example,

location: http://www.ncsa.uiuc.edu/

- If the argument is a path, the document specified will be retrieved by the server, starting at the document root; for example,

location: /path/doc.txt

Server Directives (cont'd)

- 3. **Status**
 - This is used to give the server an HTTP/1.1 status line to send to the client
 - The format is nnn xxxx:
 - nnn is the three-digit status code
 - xxxx is the informative message
- E.g., 403 Forbidden

Things to Check Before Running CGI Scripts

- The following need to be readable and executable by the server
 - CGI scripts
 - Other programs that the scripts call
 - The directory in which the scripts reside
- In UNIX, check the read/write/execute permissions of the files and directories
- In Windows, check the web server settings of the script directories

show_vars.php

- PHP is a language with built-in ability to access environment variables
- show_vars.php is a program that prints environment variables
- The code is available at:
http://csci571.com/examples/php/show_vars.php
- Below is some sample output

```
Show $_SERVER, $_POST, $_GET Variables
www-scf.usc.edu/~csci571/Special/php_ex/show_vars.php
Show $_SERVER, $_POST, $_GET...
```

\$_SERVER	\$_POST	\$_GET
DOCUMENT_ROOT: /var/local/www/htdocs	empty	empty
HTTP_ACCEPT: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8		
HTTP_ACCEPT_ENCODING: gzip, deflate		
HTTP_ACCEPT_LANGUAGE: en-US,en;q=0.5		
HTTP_CACHE_CONTROL: max-stale=0		
HTTP_CONNECTION: Keep-Alive		
HTTP_COOKIE: soc_textsize=small		
HTTP_DNT: 1		
HTTP_HOST: www-scf.usc.edu		
HTTP_PRAGMA: no-cache		
HTTP_USER_AGENT: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8; rv:18.0) Gecko/20100101 Firefox/18.0		
HTTP_X_BLUECOAT_VIA: 88e360ea4520a546		
PATH: /sbin:/user/bin:/user/bin:/user/sbin		
REMOTE_ADDR: 159.83.168.252		
REMOTE_PORT: 19753		
SCRIPT_FILENAME: /home/scf-22/csci571/public_html/Special/php_ex/show_vars.php		
SCRIPT_URI: http://www-scf.usc.edu/~csci571/Special/php_ex/show_vars.php		
SCRIPT_URL: /csci571/Special/php_ex/show_vars.php		
SERVER_ADDR: 68.181.201.23		
SERVER_ADMIN: webadm@usc.edu		
SERVER_NAME: www-scf.usc.edu		
SERVER_PORT: 80		
SERVER_SIGNATURE:		
Apache/1.3.31 Server at www-scf.usc.edu		
Port 80		
SERVER_SOFTWARE: Apache/1.3.31 (Unix)		
PHP/4.3.9 mod_layout/3.0.3		
UNIQUE_ID: URPtRkslyRcAAdleA6c		
GATEWAY_INTERFACE: CGI/1.1		
SERVER_PROTOCOL: HTTP/1.1		
REQUEST_METHOD: GET		
QUERY_STRING:		
REQUEST_URI: /csci571/Special/php_ex/show_vars.php		

```
Show $_SERVER, $_POST, $_GET Variables
www-scf.usc.edu/~csci571/Special/php_ex/show_vars.php
Show $_SERVER, $_POST, $_GET...
```

\$_SERVER	\$_POST	\$_GET
DOCUMENT_ROOT: /var/local/www/htdocs	empty	empty
HTTP_ACCEPT: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8		
HTTP_ACCEPT_ENCODING: gzip, deflate		
HTTP_ACCEPT_LANGUAGE: en-US,en;q=0.5		
HTTP_CACHE_CONTROL: max-stale=0		
HTTP_CONNECTION: Keep-Alive		
HTTP_COOKIE: soc_textsize=small		
HTTP_DNT: 1		
HTTP_HOST: www-scf.usc.edu		
HTTP_PRAGMA: no-cache		
HTTP_USER_AGENT: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8; rv:18.0) Gecko/20100101 Firefox/18.0		
HTTP_X_BLUECOAT_VIA: 88e360ea4520a546		
PATH: /sbin:/user/bin:/user/bin:/user/sbin		
REMOTE_ADDR: 159.83.168.252		
REMOTE_PORT: 19753		
SCRIPT_FILENAME: /home/scf-22/csci571/public_html/Special/php_ex/show_vars.php		
SCRIPT_URI: http://www-scf.usc.edu/~csci571/Special/php_ex/show_vars.php		
SCRIPT_URL: /csci571/Special/php_ex/show_vars.php		
SERVER_ADDR: 68.181.201.23		
SERVER_ADMIN: webadm@usc.edu		
SERVER_NAME: www-scf.usc.edu		
SERVER_PORT: 80		
SERVER_SIGNATURE:		
Apache/1.3.31 Server at www-scf.usc.edu		
Port 80		
SERVER_SOFTWARE: Apache/1.3.31 (Unix)		
PHP/4.3.9 mod_layout/3.0.3		
UNIQUE_ID: URPtRkslyRcAAdleA6c		
GATEWAY_INTERFACE: CGI/1.1		
SERVER_PROTOCOL: HTTP/1.1		
REQUEST_METHOD: GET		
QUERY_STRING:		
REQUEST_URI: /csci571/Special/php_ex/show_vars.php		

show_vars.php – output tabs & arrays

```
<!doctype html><html>
<head><title>Show $_SERVER, $_POST, $_GET Variables</title></head>
<body>
<?php
    function print_tabs($tabs) {
        for ($i = 0; $i < $tabs * 4; $i++) { echo " "; }
    }
    function print_array($arr, $tabs = 0) {
        if (!empty($arr)) {
            foreach ($arr as $k => $v) {
                print_tabs($tabs);
                echo "<b>" . $k . "</b>:  " . $v . "<br/>";
                if (is_array($v)) {
                    print_array($v, $tabs + 1);
                }
            }
        } else { echo "empty<br/>"; }
    }
?>
```

show_vars.php - \$_SERVER, \$_POST, \$_GET

```
<table>
<tr>
  <th width="33%">$_SERVER</th>
  <th width="34%">$_POST</th>
  <th width="33%">$_GET</th>
</tr>
<tr>
  <td valign="top"><?php print_array($_SERVER); ?></td>
  <td valign="top"><?php print_array($_POST); ?></td>
  <td valign="top"><?php print_array($_GET); ?></td>
</tr>
</table>
```

show_vars.php – POST

```
<ul>
  <li>$_SERVER array is initialized by the server, and contains special
parameters such as headers, server version.</li>
  <li>The $_POST array is set when a form of method=POST has an action to
this page and is submitted.
<ul>
  <li>
    <a href="?fname=Hello&lname=World">A form with method = POST</a>
    <div>
      <form method="POST" action="">
        <p>
          <label for="fname">First Name</label>
          <input type="text" value="" name="fname">
        <p>
          <label for="lname">Last Name</label>
          <input type="text" value="" name="lname">
        <p>
          <input type="submit" value="Submit" name="submit">
      </form>
    </div>
  </li>
</ul>
```