Internet: the network of networks connected via the public backbone and communicating using TCP/IP communication protocol

Internet Protocols(IP): is the fundamental protocol defining the Internet
❖   32-bit number (in IPv4)
❖   Associated with at most one device at a time (although device may have more than one)
❖   Written as four dot-separated bytes, e.g. 192.0.34.166
IP function: transfer data from source device to destination device

Limitations of IP:
❖   No guarantee of packet delivery (packets can be dropped)
❖   Communication is one-way (source to destination)

TCP adds concept of a connection on top of IP
    ❖   Provides guarantee that packets delivered
    ❖   Provide two-way (full duplex) communication

List the advantages and disadvantages of using client caching:
    ❖   Cache advantages
            o   (Much) faster than HTTP request/response
            o   Less network traffic
            o   Less load on server
    ❖   Cache disadvantage
            o   Cached copy of resource may be invalid (inconsistent with remote version)

Validating cached resource:

❖   Send HTTP HEAD request and check Last-Modified or ETag header in response.
❖   Compare current date/time with Expires header sent in response containing resource.
❖   If no Expires header was sent, use heuristic algorithm to estimate value for Expires.

HTTP methods:

❖   **Get:** used to retrieve data from a specified webpage. For example, when users type URL and click enter.
❖   **Post:** used to insert or update data on a specific remote recourse. For example, when users fill in registration/ login form and click submit.
❖   **Head:** is almost similar to Get except it only retrieve the header fields of HTTP (no body).

HTML VS XHTML
❖   HTML allows some tag omissions (e.g., end tags)
❖   XHTML element and attribute names are lower case (HTML names are case-insensitive)
❖   XHTML requires that attribute values be quoted

XHTML: White Space: Four white space characters: carriage return, line feed, space, horizontal tab

Discuss the different ways to integrate a CSS into a Web page

    1.   **Inline:** HTML elements may have CSS applied to them via the STYLE attribute.
    2.   **Embedded:** By placing the code in a STYLE element within the HEAD element.
    3.   **Linked/ Imported:** Place the CSS in an external file and link it via a link element.

CSS Syntax: Selector Strings

- **Single** element type:

  ```
  p      { font-size:smaller; letter-spacing:1em }
  ```

- type selector **Multiple** element types:

  ```
  h1,h2,h3,h4,h5,h6 { background-color:purple }
  ```

- **All** element types:

  ```
  * { font-weight:bold }
  ```
  universal selector
- **Specific elements by id:**

  ```
  #p1, #p3 { background-color:aqua }
  ```
  ID selector

Source anchor elements:

```
a:link { color:black }
a:visited { color:yellow }
a:hover { color:green }
a:active { color:red }
```

What is the difference between class and id?

❖ **ids are unique**
   - o   Each element can have only one id
   - o   Each page can have only one element with that id

❖ **classes are NOT unique**
   - o   You can use the same class on multiple elements.
   - o   You can use multiple classes on the same element.

>>>>>
- • **Types of JavaScript objects**
     1. **Native:** provided by scripting engine
     2. **Host:** provided by host environment

JavaScript has six data types:

1. Number
2. String
3. Boolean (values true and false)
4. Object
5. Null (only value of this type is null)
6. Undefined (value of newly created variable)
7. Primitive data types: all but Object

Local vs. global variables:
   ❖ **Global variable:** declared outside any function
   ❖ **Local variable** declared within a function

There are no classes in JavaScript

alert()" VS "prompt()"

❖ **The prompt()** method displays a dialog box that prompts the visitor for input. A prompt box is often used if you want the user to input a value before entering a page.
The alert() method displays an alert box with a specified message and an OK button.
❖ An alert box is often used if you want to make sure information comes through to the user.

What is DOM?

- • The Document Object Model (DOM) is an API that allows programs to interact with HTML (or XML) documents

Event Handling:

❖ HTML DOM events allow JavaScript to register different event handlers on elements in an HTML document.
❖ Events are normally used in combination with functions, and the function will not be executed before the event occurs
❖ **Example:** onclick, onmouseover, onload, onunload, onmouseup

Server-side Programming The combination of

- • HTML
- • JavaScript
- • DOM
- • is sometimes referred to as Dynamic HTML

COOKIE: A cookie is commonly used to determine a user. A cookie could be a small file that the server embeds on the user's computer. Every time identical computer requests a page with a browser, it'll send the cookie too.

SESSION: Session values square measure store in server facet not in user's machine. A session is offered as long because the browser is opened. User couldn't be disabled the session. we might store not solely strings however also objects in session.

What is the difference between Session and Cookie?

- • The main difference between sessions and cookies is that sessions are stored on the server, and cookies are stored on the user's computers in the text file format.
- • Cookies cannot hold multiple variables; But Session can hold multiple variables.
- • We can set expiry for a cookie. The session only remains active as long as the browser is open.
- • Users do not have access to the data you stored in Session, since it is stored in the server.
- • Session is mainly used for login/logout purpose while cookies using for user activity tracking

Cookies- Privacy issues

- • Due to privacy concerns, many users block cookies
- • Blocking may be fine-tuned. Ex: Mozilla allows
- • Blocking of third-party cookies
- • Blocking based on on-line privacy policy
- • **Alternative** to cookies for maintaining session: URL rewriting

GET vs. POST:

❖ **GET:**
  o Query string is part of URL
  o Length of query string may be limited
  o Recommended when parameter data is not stored but used only to request information
❖ **POST:**
  o Query string is sent as body of HTTP request
  o Length of query string is unlimited
  o Recommended if parameter data is intended to cause the server to update stored data
  o Most browsers will warn you if they are about to resubmit POST data to avoid duplicate update

Environment Variables: are used to tell applications where to look for certain files. For example, the CLASSPATH environment variable can be used to tell the Java compiler and virtual machine where to look for user-defined Java class files.
 example: QUERY_STRING, REQUEST_METHOD, HTTP_USER_AGENT)

XML stands for EXtensible Markup Language, XML was designed to store and transport data

Ajax: is about updating parts of a web page, without reloading the whole page , Asynchronous JavaScript and XML
Combination of
❖ (X)HTML
❖ XML
❖ CSS
❖ JavaScript
❖ JavaScript DOM (HTML and XML)
❖ XMLHttpRequest in ansynchronous mode

JavaScript and XML:
- JavaScript DOM can be used to process XML documents
- JavaScript XML Dom processing is often used with XMLHttpRequest
  - Host object that is a constructor for other host objects
  - Sends an HTTP request to server, receives back an XML document


JavaBeans Classes:
- JSTL Core actions are designed to be used for simple, presentation-oriented programming tasks
- Therefore, if more complicated programming tasks are to be performed; java methods should be called
- JavaBeans technology allows a JSP document to call Java methods

Getter VS Setter:
❖ **getter:**
  - no arguments
  - returns a value
  - name begins with get (or is, if return type is boolean) followed by upper case letter
❖ **setter:**
  - one argument (same type as setter return value)
  - void
  - name begins with set followed by upper case lette

MVC: Model–view–controller (MVC) is a software architectural pattern for implementing user interfaces. Many web apps are based on the (MVC) architecture pattern
- **Typical JSP implementation of MVC**
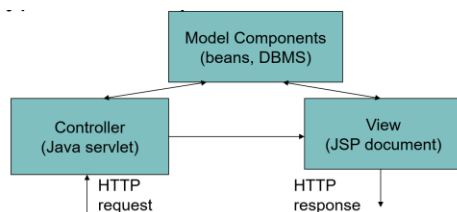
JDBC provides a standard library for accessing relational databases. By using the JDBC API, you can access a wide variety of SQL databases with exactly the same Java syntax.

Seven Steps for Database Access:
1. Load the JDBC driver
2. Define the connection URL
3. Establish the connection
4. Create a Statement object
5. Execute a query or update
6. Process the result set
7. Close the statement and connection

Super Global Variable:
☞ $_GET[]. An array that includes all the GET variables that PHP received from the client browser.
☞ $_POST[]. An array that includes all the POST variables that PHP received from the client browser.
☞ $_COOKIE[]. An array that includes all the cookies that PHP received from the client browser.
☞ $_ENV[]. An array with the environment variables.
☞ $_SERVER[]. An array with the values of the web-server variables.

>>>>>>>

Buffered VS Unbuffered Queries
❖ **Buffered queries:**
  o Retrieve the query results and store them in memory on the client side.
  o Subsequent calls to get rows will simply spool through local memory.
  o Advantage: You can move the "current row" pointer around in the result set freely; because it is all in the client.
  o Disadvantage: Extra memory is required to store the result set, which could be very large, and that the PHP function used to run the query does not return until all the results have been retrieved.
❖ **Unbuffered queries**
  o Limit you to a strict sequential access of the results but do not require any extra memory for storing the entire result set.
  o You can start fetching and processing or displaying rows as soon as the MySQL server starts returning them.
  o When using an unbuffered result set, you have to retrieve all rows with mysqli_fetch_row or close the result set with mysqli_free_result before sending any other command to the server.

PHP Runtime Errors:
❖ **E_ERROR:** This is a fatal, unrecoverable error. Examples are out-of-memory errors, uncaught exceptions, or class redeclarations
❖ **E_WARNING:** This is the most common type of error. It normally signals that something you tried doing went wrong. Typical examples are missing function parameters, a database you could not connect to, or division by zero.

design patterns: When designing software, certain programming patterns repeat themselves. Some of these have been addressed by the software design community and have been given accepted general solutions.

design patterns type:
• **Strategy Pattern:** is typically used when your programmer's algorithm should be interchangeable with different variations of the algorithm.
• **Singleton Pattern:** is probably one of the best-known design patterns. You have probably encountered many situations where you have an object that handles some centralized operation in your application, such as a logger object.
• **Factory Pattern:** Polymorphism and the use of base class is really the center of OOP. However, at some stage, a concrete instance of the base class's subclasses must be created.
• **Observer Pattern:** PHP applications, usually manipulate data. In many cases, changes to one piece of data can affect many different parts of your application's code. allows for objects to register on certain events and/or data, and when such an event or change in data occurs, it is automatically notified.

Input Filter: The filter_input() function gets an external variable (e.g. from form input) and optionally filters it. This function is used to validate variables from insecure sources, such as user input.

Advantage of Prepared Statements:

❖ **Performance:** A prepared statement does not always execute faster than an ordinary SQL statement. The performance improvement can depend on the particular SQL command you are executing.

❖ **Security:** We recommend that you always use a prepared statement or stored procedure to update database values when accepting input from a user through an HTML form to avoid SQL injection attack. This approach is strongly recommended over the approach of building an SQL statement by concatenating strings from the user input values.

Advantage Of Callable Statements

❖ A stored procedure has many advantages. For instance, syntax errors are caught at compile time instead of at runtime;

❖ the database procedure may run much faster than a regular SQL query; and the programmer only needs to know about the input and output parameters, not the table structure.

❖ coding of the stored procedure may be simpler in the database language than in the Java programming language because access to native database capabilities (sequences, triggers, multiple cursors) is possible.

disadvantage Of Callable Statements

One disadvantage of a stored procedure is that you may need to learn a new database-specific language (note, however, that Oracle8i Database and later support stored procedures written in the Java programming language).

A second disadvantage is that the business logic of the stored procedure executes on the database server instead of on the client machine or Web server.

transaction management approach: When a database is updated, by default the changes are permanently written (or committed) to the database. However, this default behavior can be programmatically turned off. If auto committing is turned off and a problem occurs with the updates, then each change to the database can be backed out (or rolled back to the original values). If the updates execute successfully, then the changes can later be permanently committed to the database.

MySQL Strengths and Weaknesses

– **Strength:** Great Market Penetration
– **Strength:** Easy to Get Started
– **Strength:** Open-Source License for Most Users
– **Strength:** Fast
– **Weakness:** Commercial License for Commercial Redistribution
– **Strength:** Reasonable Scalability

TECHNIQUES TO MAKE SCRIPTS "SAFE":

• Input Validation
• HMAC Verification
• Input Filter
• Working with Passwords

=========================

short questions and practical long questions:

Write a code: PHP/HTML: Example!!

❖ HTML FORM

❖ PHP Output the Form input (week 7- slide 9-13)

Find errors: XML/ CSS/JS/DOM/DB/PHP

Find output: Servlet/XML/JS/PHP