Programming for Digital Media EE 1707

Lecture 7
JavaScript

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JavaScript Security and Cookies

1. **About JavaScript and security issues (client-side)**

2. **Cookies**

3. **Short introduction to JavaScript server-side**

4. **Short introduction to JavaScript object notation (JSON)** (source: http://json.org/)

Security issues

Amongst a few issues:

1. **Spoofing password authentication**
   - Normally using pop-up windows to collect data
   - Change the status of the browser
   - **Modern Browser restrict and control access to such information**

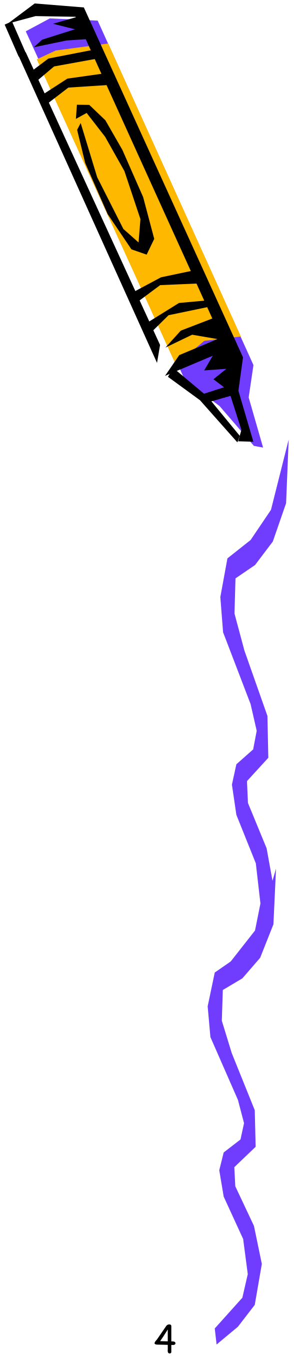
2. **Denial-of-Service attacks**
   - Creating zombie applications that overwhelm the server
   - Modal pop-up windows that can not be closed

3. **Stealing email addresses and browser history**

Client-Side JavaScript Security

- **Origin of the code is usually unknown**
  - Is the code trustworthy?
  - Does your browser provide any protection?

- **JavaScript containment**
  - JavaScript is not designed to directly invoke OS commands
  - Does not interfere and create local input/output files
  - Limitations in networking capabilities

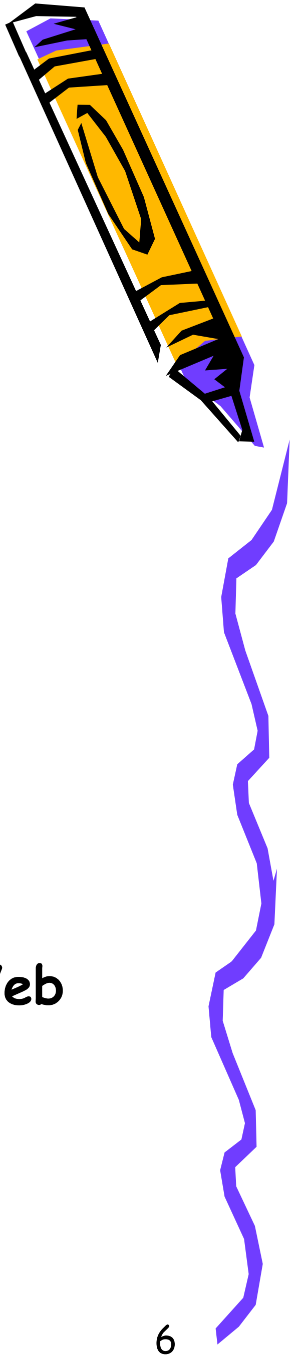


Good Practice digitally signed applications

- **Digital Signature: A digitally encrypted entity that secures the original code**
  - Stops unauthorised tampering of the original application
  - May be allowed more privileges and access to local resources subject to user's permission

Cookies

- Cookies are a series of data stored by the user's browser (normally 4-5KB)
- There is a limit to the number of cookies that can be stored by the browser
- It is stored as a .txt file
- Web server receive and transmit cookies via http
- Cookies provide client-side state information to the Web application i.e. (shopping basket, remember user preferences, …)



Cookies attributes

- **It is optionally specified**
- **Used to specify**
  - Domain (e.g. www.mydomain.com)
  - Path (…/…/…)
  - Expires
  - Secure (attribute that sets if the app uses https)

Creating Cookies *setCookie and getCookie function*

- **The concept of creating cookies is to store and remember a specific information *(e.g. user's name)***
- **The first step therefore is to create a function that stores the information of a user (e.g. first name)**
  - *setCookie(Cookie_name, value, expiredate)*

```
function setCookie(Cookie_name, expiredate)
  {
     Write the code that would hold the value and expiry date of a cookie
}
```

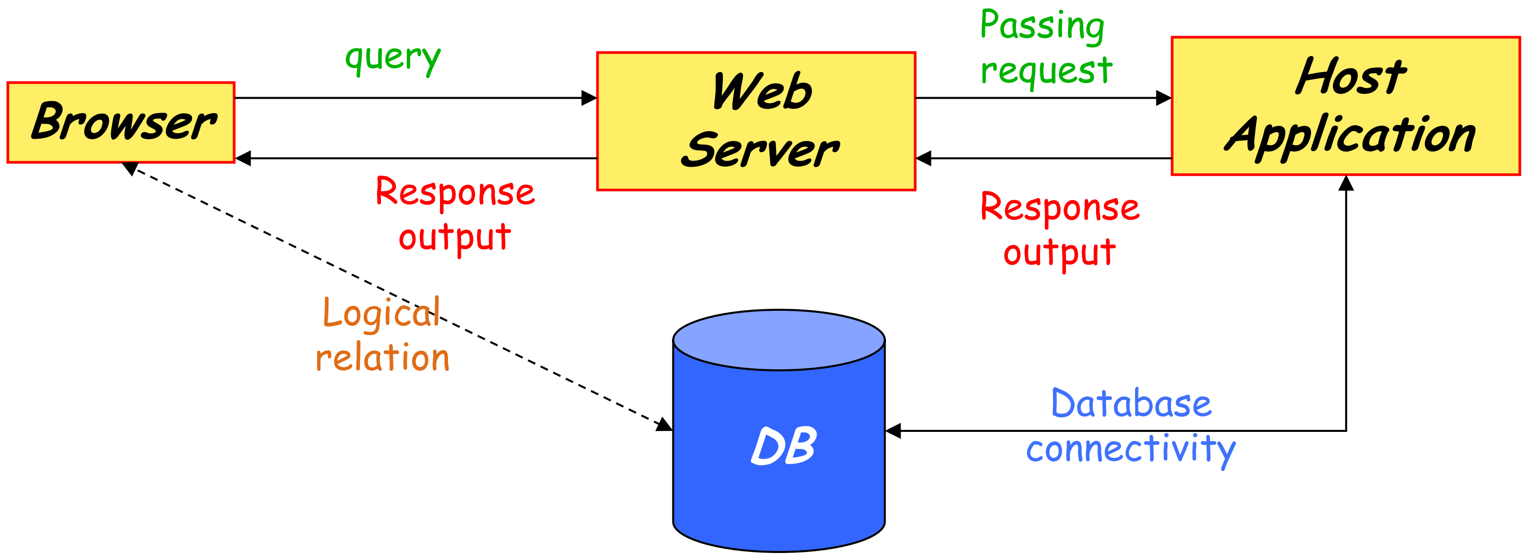
  - *getCookie (cookie_name)*

```
  function getCookie(Cookie_name) {
    Check if a cookie is stored at all in the document.cookie object and if
    the cookie is stored return the value
}
```

Example: *http://www.w3schools.com/js/js_cookies.asp*

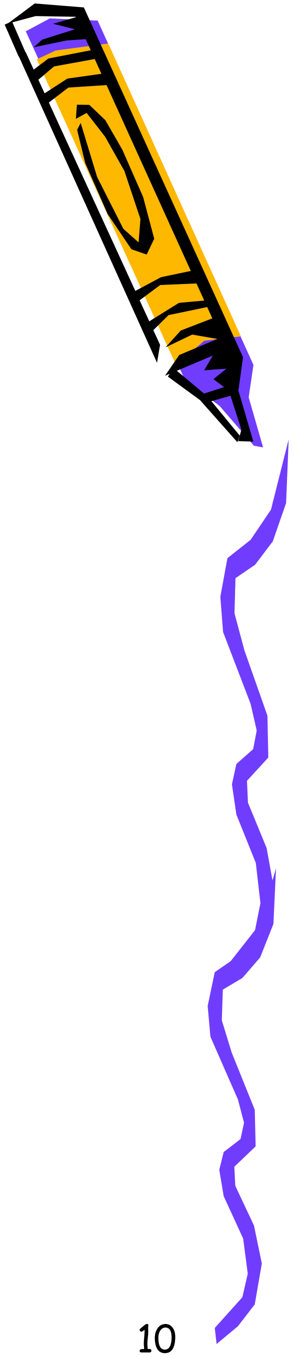
Server-side JavaScript

- Can invoke other programmes on the server
- Output from the program can create dynamic web pages



Server-side programming

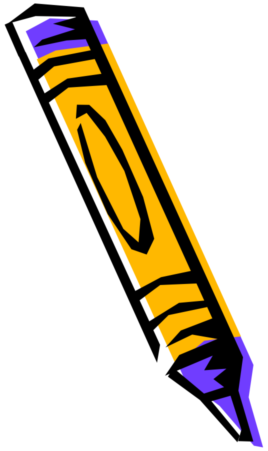
- **Java server pages (JSP)**
- **Java servlet APIs**
- **Active server pages (ASP)**
- **Interface with databases**



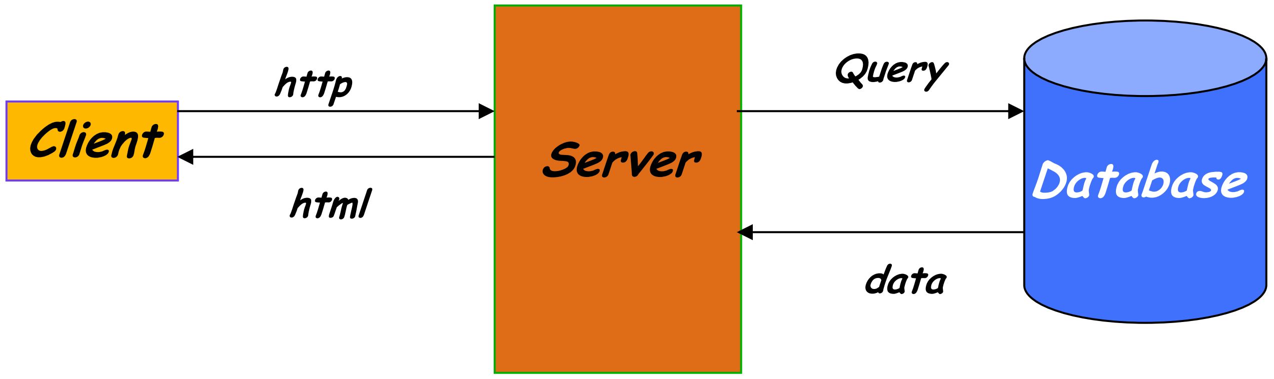
Databases and web applications

The process:

- **Browser submits the data on a form**
- **Server-side application JavaScript queries the database (SQL)**
- **Database returns the queried data to the application**
- **JavaScript application returns the data with the proper html format to the browser**



Schematic view

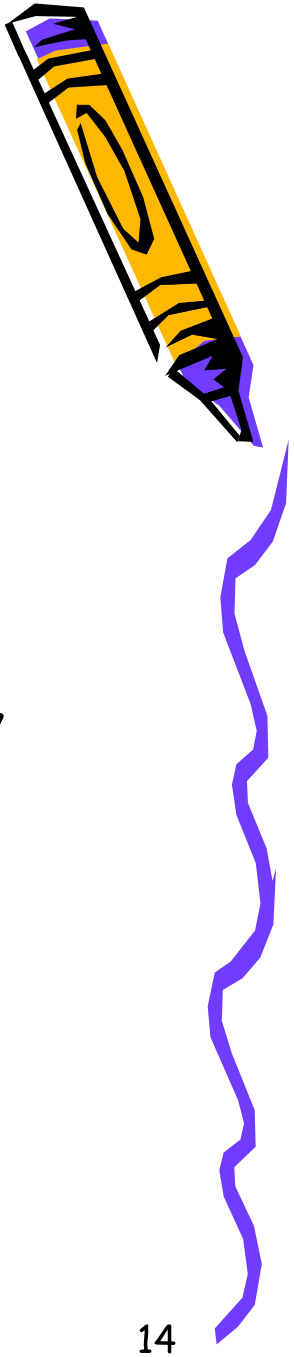


Database design for Web applications

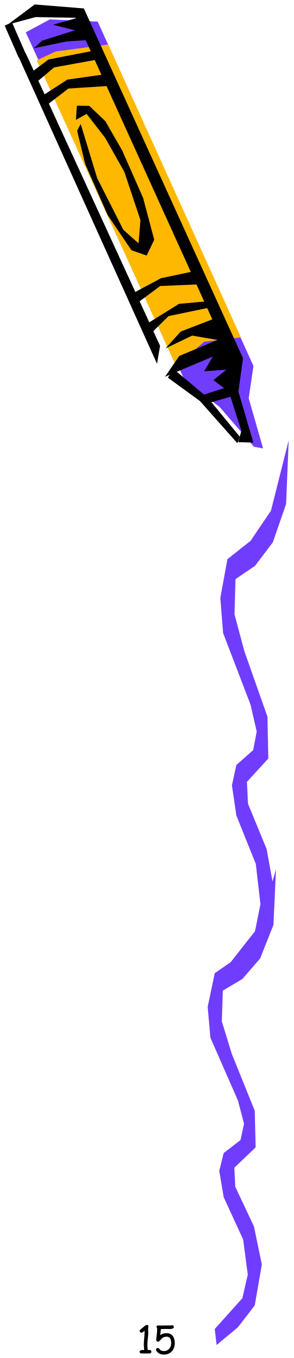
1. **Define and database system (e.g. Access, SQL server, etc.)**
   - Design the tables, relationships, access controls, data format, content,…
   - Configure connections (JDBC, ODBC, native interface)
2. **Design the HTML forms that mirror the data structure in the DB**
   - The forms should be able to query, submit, update, and in general handle the data
   - Have validation capabilities
3. **Develop the JavaScript application to conduct the require operations**
   - Check for errors (validate data)
   - Parse information (get and post methods)
   - Build the SQL commands (embed in functionalities)

JavaScript Object Notation (JSON)

- Is an ideal data interchange language
- JSON is a text format that is completely language independent
- It works with for example C, C++, C#, Java, JavaScript, Perl, Python, and many others.



JSON Structure



- **JSON is built on two structures:**
  - A collection of name/value pairs (*Objects*).
  - Ordered list of values i.e. *array*, vector, or list

JSON implementation

1. Setup an object access *rule* using a name/value pair

2. The rule is normally an expression for accessing an object member

3. The rule is normally a function or a string with a single argument which is evaluated at transformation time

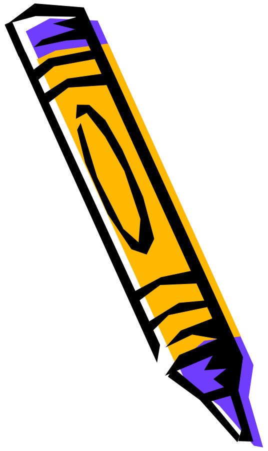
JSON Syntax

- **JSON is designed to pass objects containing name, values, arrays, …**

```
{"Exam": {
        "Maths":[
        {"name": "Calculus", "percentage": "30" }, // object access rule
        {"name": "Algebra", "percentage": "30" }
        {"name": "Geometry", "percentage": "40" } ]
        }

}
```

- *{ }   are containers*
- *[ ]   contain arrays*
- *Names and values are separated by " : "*
- *Array elements are separated by " , "*

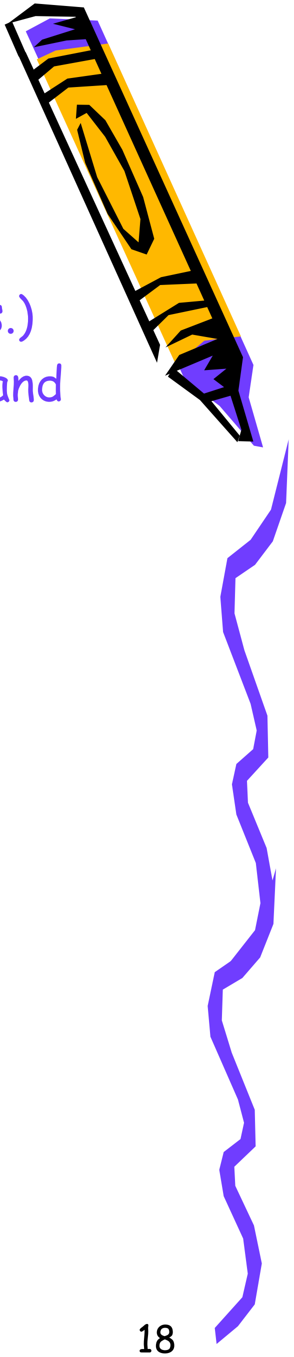


JSON and XML

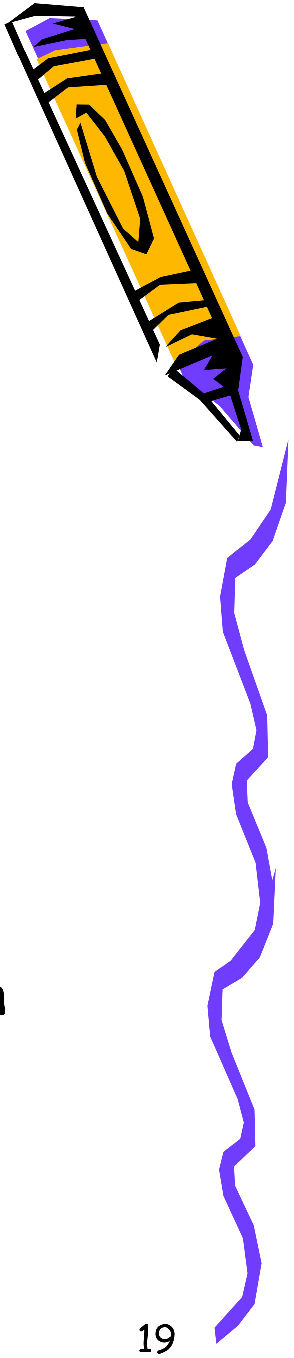
- **Similarities:**
  - Both are hierarchical. (i.e. you can have values within values.)
  - Both can be parsed and used (most programmes can use it and pass variables)

- **Differences:**
  - In syntax
  - JSON can be parsed by simply using the eval( ) method in JavaScript
  - JSON elements in the array object do not have names of their own (no namespaces) – collision avoided by nesting objects

- **If you are using Ajax JSON is quicker to develop.**



Asynchronous JavaScript and XML (AJAX)



- **Next week discussion**
- **Not new probably around since 1997**
- **A combination of technologies and techniques**
  - XML data interchange only
  - Passing JavaScript methods to client
  - DHTML widgets
  - XML & XSLT
- **The main philosophy is the asynchronous communication with the server without a page refresh**
- *Also see www.adaptivepath.com*

What does AJAX bring

- Advent of broadband allows for more sophisticated applications with complex interfaces
- Recent developments in areas of browser development, search applications, locations based services (e.g. Google Maps)
- People are now designing web applications and not merely web sites and pages
- Next week more on AJAX