# UNIT 5: INTERACTIONS IN HYPERTEXT, MULTIMEDIA AND THE WORLD WIDE WEB

## Table of contents



### HUMAN COMPUTER INTERACTION IN HYPERTEXT, MULTIMEDIA AND THE WORLD-WIDE WEB

### 1.0 INTRODUCTION

**Understanding hypertext**

It enables you to find information by navigating the hyperspace using the web technology Hypermedia is not just text but hypertext systems containing additional media such as illustrations, photographs, video and sound.

The web contains protocols, browsers, web servers, clients and a lot of networking. The challenges remain a loss in hyperspace and information overload.

The advantage of this option is an interactive Data Base access. The availability of bandwidth and the security of data are problem issues to be resolved.

### 2.0 OBJECTIVES

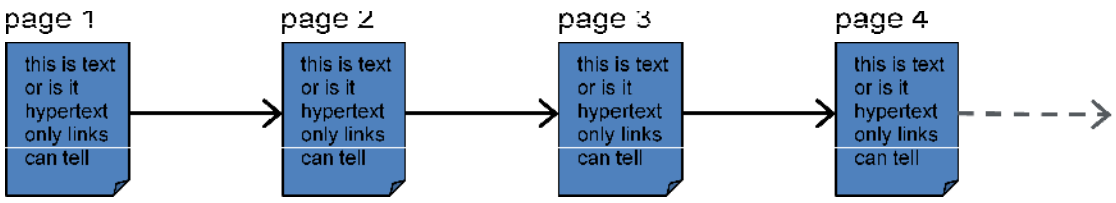
Understanding hypertext Multimedia or Hypermedia Animation
Video and Audio effects. Web technology issues:
Network issues
The web content could be made static by unchanging pictures and text or made dynamic with interaction and applications on the web.

## 3.0 MAIN CONTENT

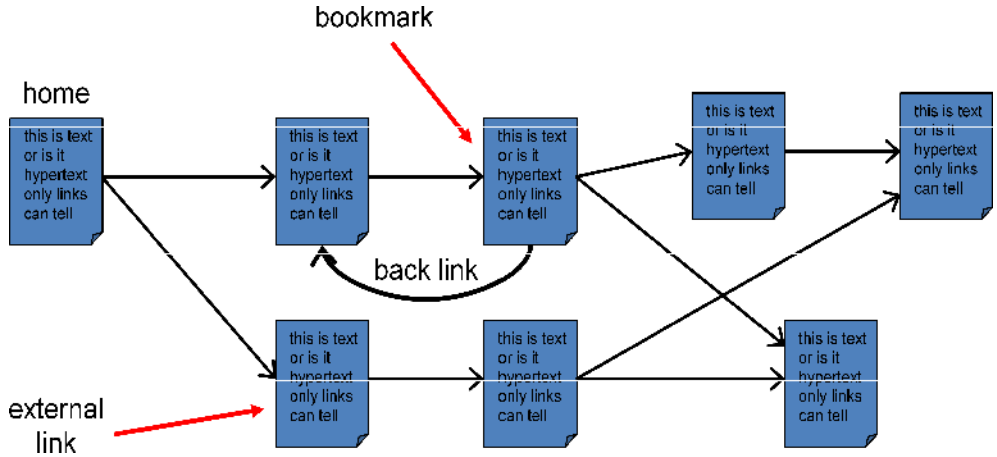
### 3.1 Understanding hypertext

Hypertext enables you to find information by navigating the hyperspace using the web technology Hypertext is made up of rich content of graphics, audio, video, computation and interaction.

Text




In some cases hypertext imposes strict linear progression on the reader but in most cases it is not linear as shown in the diagram below: Hypertext - not just linear




From the above, we can see that the non-linear structure contains blocks of text (pages) with links between pages that create a mesh or network. The users follow their own path for the information desired.

### 3.2 Multimedia or Hypermedia Multimedia is sometimes also called effects.

Hypermedia. The term can also be used for impple audio and video
Hypermedia is not just text but hypertext systems containing additional media such as illustrations photographs,video and sound
Links and hotspots may be in media

Animation

Animation is adding motion to images particularly images on things that change in tiime

Examples are digital faces that take seconds to tick around the clock face.

Animation comprises live displays for showng status and progress, flasing caratat text entry location, busy cursors (in form of hour-glass, clock, and spinning disc) and progress bars
Animations are used for education and training making students see things happen through introduction of interesting and entertaining images.
Used for data visualisation by creatin visualisation is done using animated In science, complex molecules and th and viewed on the screen.
Animated characters are useful in wi

Video and Audio effects.
The current technology on improved Tools are now available to edit sound They are easy to embed in web page The memory occupied could be man It can however affect the download t and sometimes frustrating.
It may be hard to add 'links' in hyper

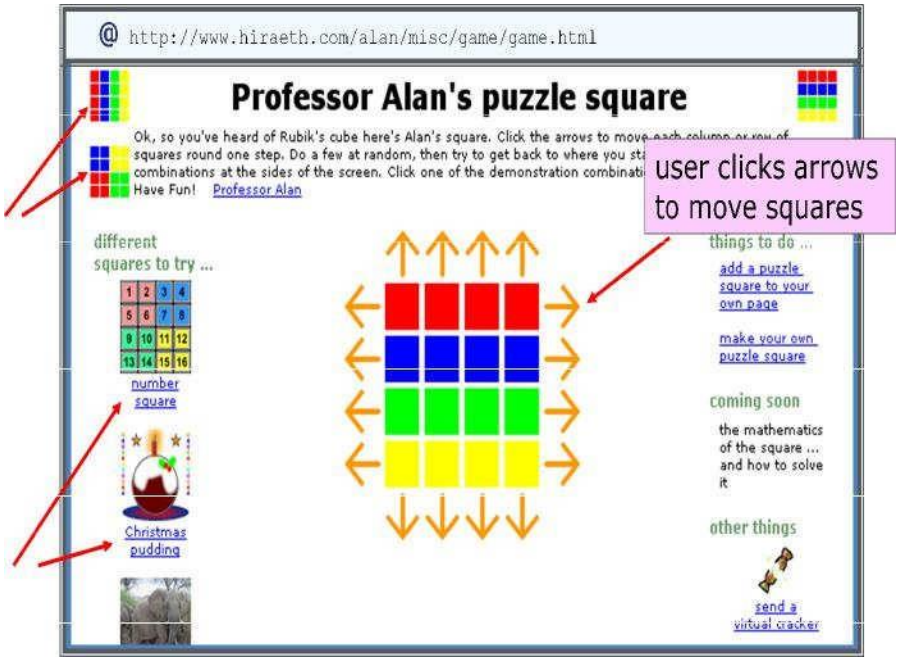
Using animation and video Animations and videos are potentiall arcade games.
But how do we harness the full possi In order to gain more experience fro theorists, cartoonists, artists, and wr

3. **3 Interacting in hypertext.**

Using the computer for processes, h Illustrative interactions:

i. We search for a particula books, look for the books' puzzle square). The e-com

ii. Professor Alan's puzzle sq




iii. Delivery technology

On the computer, the help systems a hypermedia

re installed on hard disk with applications in

CD-ROM or DVD based

The same information can be obtained from the web since many applications ha e web-based documentation. These applications can as well be delivered on the move as long as you are connected to the internet using mobile platforms such as mobile phones, PDAs (Personal Digit computers.

WiFi access points or mobile phone networks containing tiny web-like pages can where l Assistants), or laptop be used for whom and

iv. Tourist guides and directe d advertising.

v. Rapid prototyping, creati n of live storyboards and mock-up interacti ns are done using links.

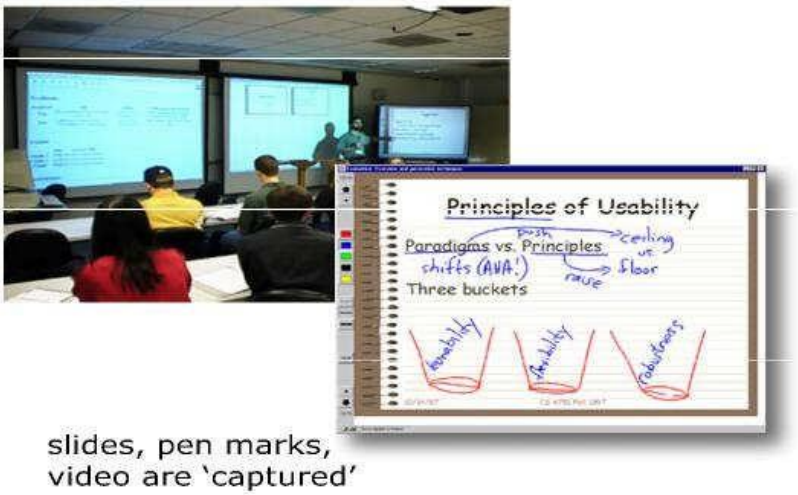
vi. The help and documentat ion allow hierarchical contents and keyword

vii. 'Just in time learning' (wh at you want when you want it) such as for a photocopier with te obtai hnical words linked to their definition search or browsing. ning a technical manual ossary are done on the web. You can as well obtain a g in links between similar photocopiers!

viii. In education, animation a nd graphics allow students to see things happen .Sound effects add atmosphere, and diagrams can be looked at while listening to explana tion. The non-linear

ix. E-learning provides educa tion out of the classroom!!

An e-Class is shown in the picture below allows students to explore at their own pace.




Lost ness in hyperspace

To avoid getting lost in hyperspace while finding information, use structure and n history, bookmarks, indices, directories and searching algorithms.

The non-linear structure of the web is very powerful but potentially confusing. There are two aspects of lost ness: Cognition and Content that create fragmenta also a lack of information integration thereby creating confusion.

Good design helps navigation and structure where hyperlinks move across struct

avigation with the aids of

y information. There is

### 3.4 Designing structure:

Designing good structure entails task analysis for activities and processes in existing organizational structures. In making navigation easier, create maps to give an overview of the structure and to show linear path through a current location.
Also provide recommended routes a s guided tour or bus tour metaphor and as a non-linear structure.
To support printing your navigated information, you need a linearised content th

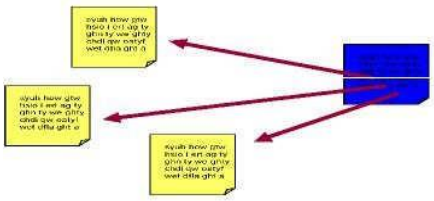
History and bookmarks also ease navigation because they allow 'hub and spoke' access with lots of revisiting of pages. Bookmarks and favourites are good for longer term revisiting. Frames are difficult to bookmark, search and link to, except there are good reasons for its use, it is not recommended.

Using indices, directories and search
Indexes are often found on help, documentation and books. Selective but non-exhaustive list of words are used in index. Directories on web index would be very huge; so, manually choose site of navigation e.g. an open directory project or Yahoo. Using web search engines make you 'crawl' the web by following links from page to page. Search engines build full word index but ignore common 'sto ' words to carry out its search. It looks up your request in index when you enter keywords to find the pages.

### 3.5 Conducting complex search:

Conducting a complex search involvetoo many pages for a single word search, th selective. You can use a Boolean seach method that combines words with logic e facts about engine only, write 'enginAND NOT car' . 'AND NOT 'is the Boolean
In creating a link structure, Goggle, atere is a need to be more
.g. if you want to find xpression.
To be search engine friendly, add 'M
eta' tags, relevant title, keywords and description. Note that it is hard search engine, uses richness of in and out links to rank pages.

to index generated pages for a hidden web.
Finding research literature involves special portals and search sites such as citese er<citeseer.nj.nec.com>.
Searches for literature papers require scanning the papers for bibliography to build up citation index, such as in the diagrams below.



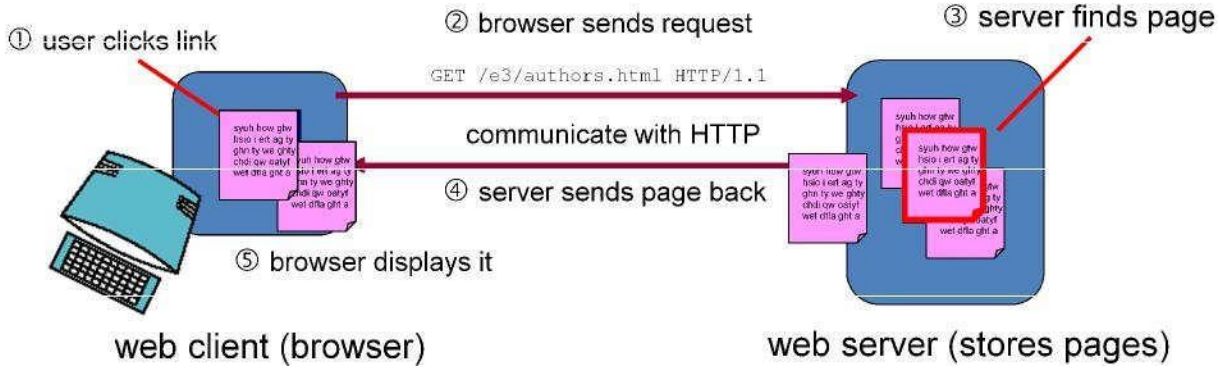
bibliography backwards in time

### 3.6 Web technology and web issues:

The web contains protocols, browsers web servers, clients and a lot of networki s g.
Web activities involve using protocol and standards. Protocols such as HTTP( Hypertext Transmission protocol)that carry information ov the internet, HTML (Hyper-Text Mark-up anguage) , XML view (Extended Mark-up Language) and graphics formats for content browsers to view the results, and a lot of plug-ins.

Changing use of the Internet:
Initially, the internet was created for research by CERN for their high energy physics research. But all over it is now used by corporate , government, commerce, entertainment, and community.
The challenges remain a loss in hyperspace and information overload.

Web servers and clients:
The web is distributed with different machines far across the world. Pages are st red on servers, the browsers (the clients) ask for pages that are sent to and from across the internet as illustrated in the picture below:

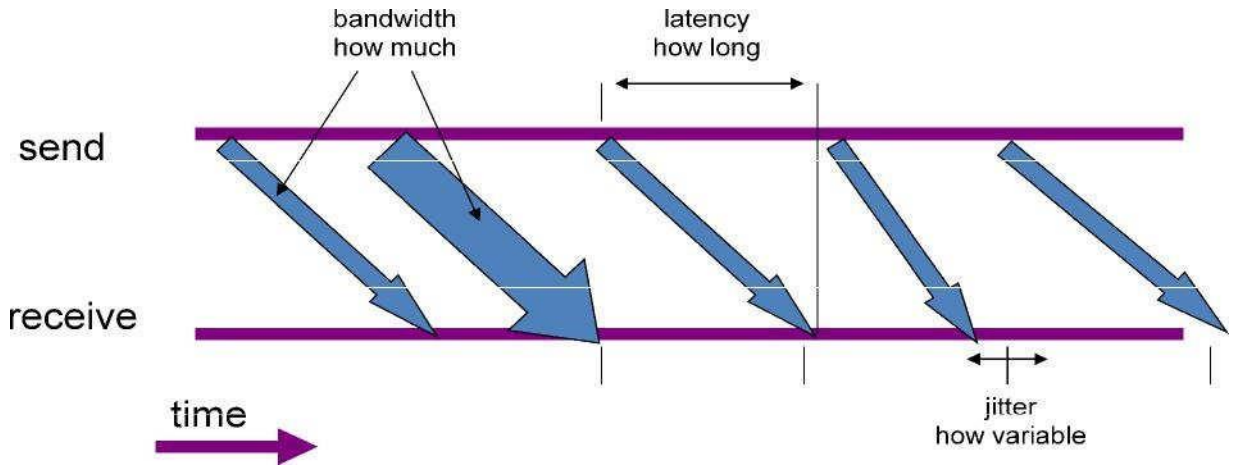



.7 Network issues — Timing and volume of data transmission

QOS (quality of service): This term describes the quality of service provided by th The following comprise the quality oservice:-

Bandwidth: This is how much of infomation transmitted per second Latency: This is how long the transmission takes (otherwise called delay) Jitter: This is how consistent the delay is Reliability: Here some messages may be lost and needed to be resent. This increae ses jitter and the connection set-up, hence a need to handshake to start.

The illustration of bandwidth, latenc and jitter is given in the accompanying diag ram below.




### 3.8 Design implications of the W b:

While designing, you should consider the bandwidth and hence about the download time, e.g. an image 100K bytes may be transmitted in 1 s ec (also called broadband), and a 56K bytes of modem may transmit in 18 seconds. Hence the need to save graphics in appropriate format and size at the same graphics could be reused in the browser cach so th e after first load.

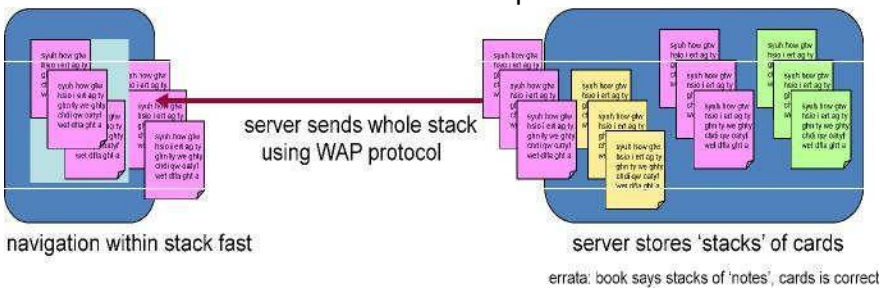
To reduce the connection time, use ne big file at a time in a data transfer than u sing several small ones.

Beware of 'fit on one screen' rule be cause scrolling is fast! Think before breaking big graphic into bits.

In latency, think aboutfeedback.

#### 3.8.1 WAP (Wireless Advance Protocol):

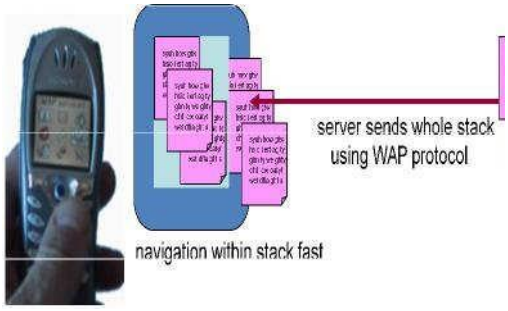
This describes the web activities on th e phone as illustrated in the diagram below:




The phone is made up of very small screen and the scrolling of data could be very painful because the screen displays small 'pages' at a time. A GSM connection is considerably slow wi is th big chunks. Operation carried out using a WML (wirelessmark-up language) whose content is deliver The d in 'stacks' of 'cards'. Operation cards are the 'pages' the user views but navigation within the stack is fast.

N.B. With larger screens and faster connections, WML (Wireless Mark-up Language) is giving way to small

HTML pages. See illustration below.




### 3.8.2 Static web content:

This is a medium and a message com prising text, graphics, movies and sound.
The message and the medium "cont nt is king" because it is the catch phrase of he dot.com era but widely ignored.
The message content should be appropriate to the audience, should be timely, reliable, and generally worth reading!
The medium page and site design should be a good design that is essential to att act readers A bad design may mean good material that is never seen.
The content should be printable!

### 3.8. 3 Text:

The text style should be universal generic styles such as serif, sans, fixed, bold an d italic. You can use specific fonts too, but these should vary between platforms.
Use cascading style sheets (CSS) for fine control but beware of older browsers an compatibility.
Because colours are often abused, b careful about your choice of colour.
Text positioning should be easy; it co uld be left, right justified or centred. You sh DHTML (Dynamic Hypertext Mark-up Language) requires precise positioning so b You should also take note of the screen size.
Remember that mathematical orient ed texts require special fonts and layout.

### 8.4 Graphics:

Graphics should be used with care considering for example, the file size and download time. For example, the image above is made up of 1000 words of text and is affected by size, numbe r of colours, and file format.
Add little backgrounds because too any backgrounds often make text hard to read.
Speeding up transmission of graphic require caching and to be able to reuse the same graphics.


Using progressive formats make the image to appear in low resolution and the im age also gets clearer as shown above.

### 8.5 Formats:


Use JPEG for photographs as shown
above, for higher but 'lossy' compression.
Use GIF (Graphics Image Format) for sharp edges and lossless compression.
PNG formats are supported by current web browsers. For action, use animated gifs for simple animations and image maps for images you can click on.

### 3.8.6 Icons:

Sample icons are displayed below

They are just small images on the web used for bullets and decoration or to link t o other pages. There are lots available!
The design of icons is just like any other interface that needs to be understood. S o icons should be designed as collection to fit the web. A web site under construction is a sign of the inherent incompleteness of the web.

### 3.8.7 Web colour:

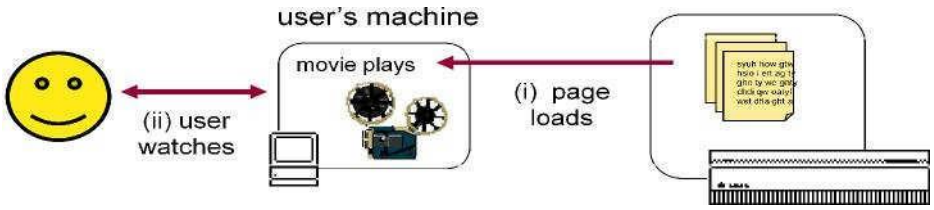
Decide from the beginning how many colours your web site is to contain. The PCmonitor is made to display millions of colours each comrising 24 bits per pixel but the 'same' colour may look very different.
Web colours are usually expressed a dips per inch —dpi. Between 72 to 96 dpi a e common.

Older computers, PDAs and phones c even in greyscale.
an tolerate perhaps only 16 bits or 8 bits per pixel in 256 colours or
From the colour palettes, you can ch oose up to 256 different useful colours, alth ugh Netscape 'web safe' 216 colours are common. Each GIF (Graphics Image Format) used for fast download has its own palette.

### 3.8.8 Movies and sound

The problems of size and download a re worse in movies and sound compared wi th graphics. So
they require special plug-ins. The some compact formats such as MIDI. With streaming video, you can play illustration below).

problems are not prominent with audio however, because some have hile downloading hence can be used for 'br oadcast' radio or TV (see




Dynamic web content
This content shows what happens were, with its technology and security, it enables a local interaction, and effective search through remote access and batch generation of pages of dat a. It is of dynamic content.

The active web
In the early days of the web, pages that contained text were static pages.some gateways such FTP GOPHER enabled usability thereby making interaction easy on one simple model.

A dynamic content has a model or metaphor with passive pages but active interface.Each leads different user understanding.

The architectural design of the web is about what happens where. The design has

(i) A feedbackin which a user can see results of his own actions,

(ii) a feed through effect in which effects of other people's actions are seen. Note that the effect of the design is reflected on the complexity of implementation and its maintenance.

The concerns of the designer from the user's point of view are the changes to be made in the design during use in terms of the media stream, the presentation, and the content. He should be guided by the following
questions:

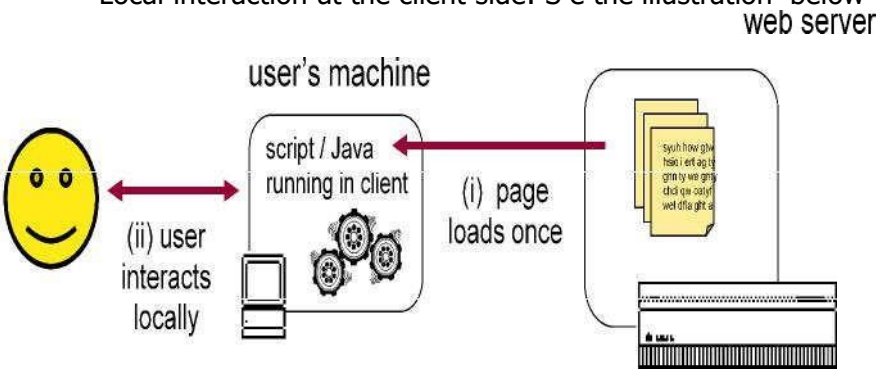
i. 'Are these done automatically?',
ii. ' By whom would the changes be made?' -The site author, the user, or other users through a feed through? and
iii. How often is the pace of change: in days, in months, or in seconds?

The technology of design changes:
Where does the change happen? Is i through the client using toolkits such as the applets , Flash, JavaScript and DHTML ,or through the server using server toolkits such as the CGI scripts, J va servlets , JSP, ASP, PHP, etc,? Or through another machine such as the author's machine, the

database server, the proxy server, or through people adopting socio-technical solutions?

Security of the web:
For computational functions, the codes and data should not be at the same place! The problems that need to be addressed on security include the security of data, the safety of the web-server and the client
machine that is the most vulnerable, and of course the entire networks.

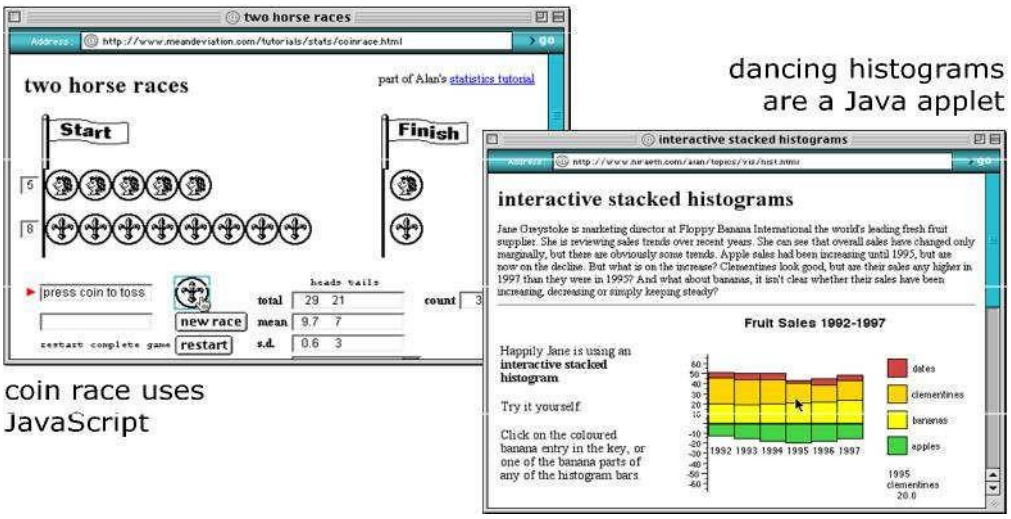
Local interaction at the client side: S e the illustration below




For a fixed content interaction, the user interacts locally through his machine by he use of Java applets,Flash, JavaScript plus DHTML (Dynam ic Hyper-Text Mark-up Language).

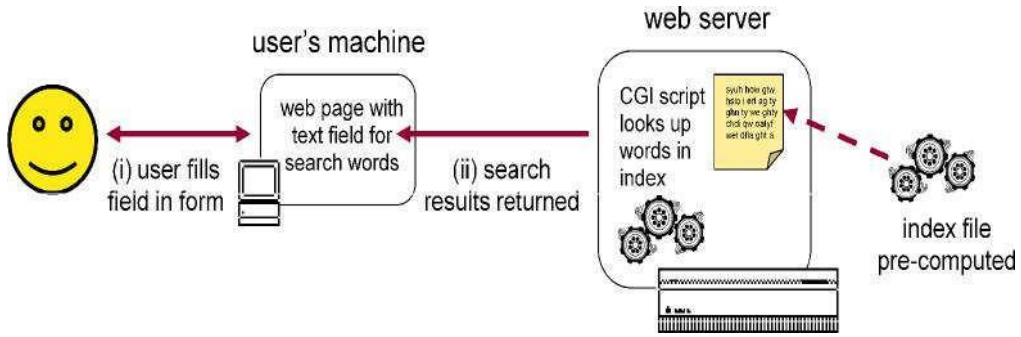
In fixed content interaction, a rapid feedback occurs but interaction is local and there is no feed through.

examples




The picture above shows that the 'coin race' uses Java Script while the 'dancing' histograms (set of interactive stacked histograms) that depict the sales trends for each fruit type, are Java applets.

The picture below demonstrates the processes of the user conducting a web search.

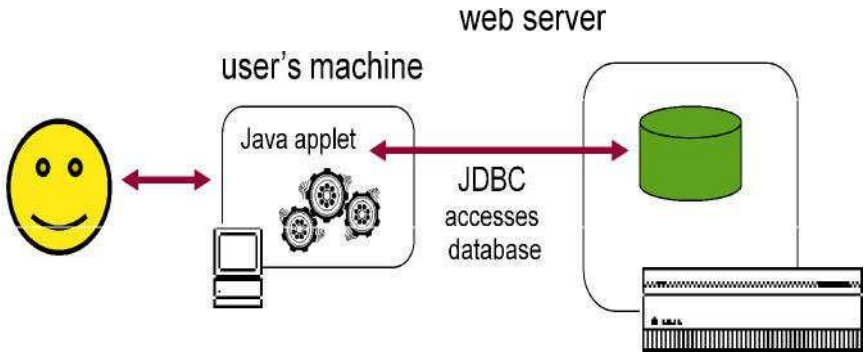



Indices are created off-line before commencement of search.

u need database driven sites. The available ptions of tools that can
For automatic generation of data, yo Flash access remote DB using the server-end be used are the client-end applet or
forms with limited user interface.
CGI that is driven by web

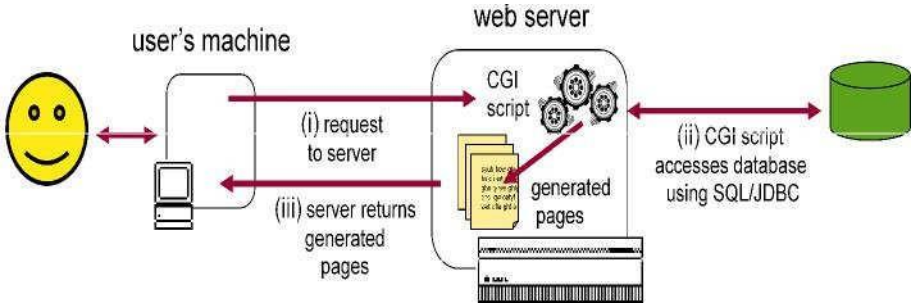
However, hybrid solutions that could be optionally utilised are the CGI generated pages that can contain JavaScript etc. The JavaScript can 'wr ite' web pages dynamically.

Look at the following picture: A situation of the Java applet and JDBC accessing t e database. Java applet & JDBC



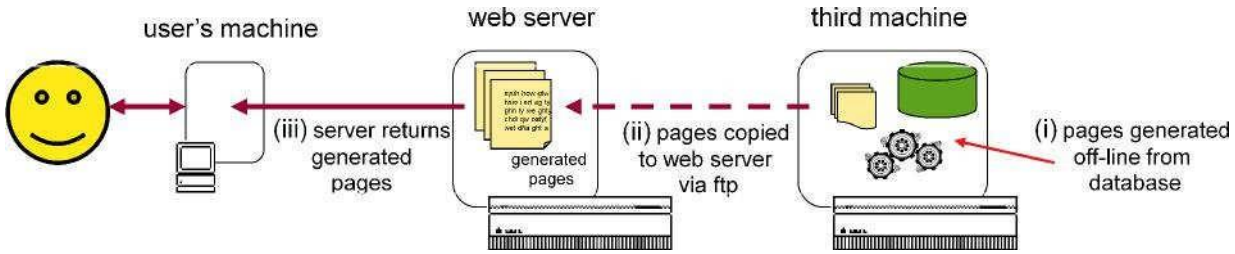

The advantage of this option is an interactive Data Base access. However, the availability of bandwidth and the security of data are problem issues to be resolved.

The picture below depicts the situation in which the CGI script accesses the database.



The advantage here is that the database is always current with up to date information.
Its disadvantage is the non proximity of the web server and that access is not index friendly.

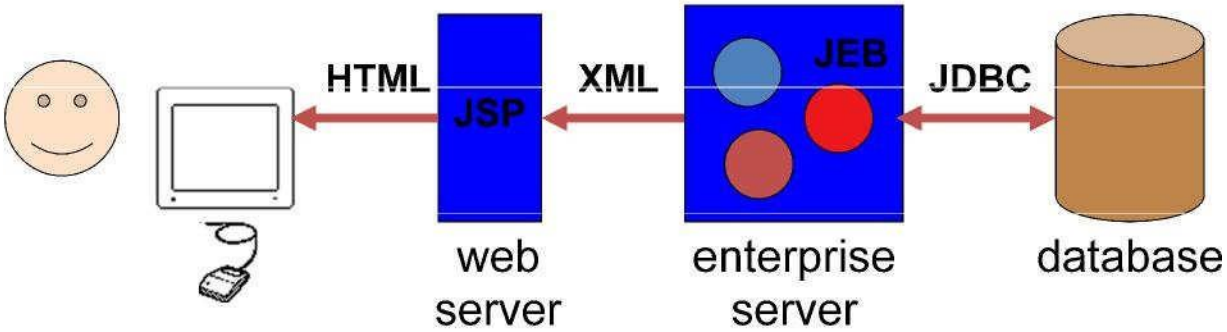
Batch generation of web pages of data.
Batch generation of data is for slow and varying data that is updated through a local database.
Here, pages are periodically generated before up load.
Many technologies are involved in batch generation; and they include the use of object oriented languages such as C, Java, HyperCard and Visua l Basic. Illustration of batch generation of web pages




Advantages of this option are that the generated batches are index able and secure. The disadvantage is its slower turnaround.
Dynamic content:

Dynamic contents are really 'active'web pages in which data is updated as well a
s presented on the web.
The data presentation could be mad etc.in any of the means discussed previously using the CGI, applet-JDBC

The update is done through the webform interface using the server script that updates the data base, as in the example of that carried out in th e updating of book theatre seats.
The issues of concern in the design of this type of interaction are the authentication and security problems due to multiple transactions of data. Using the n-tier architecture




As illustrated, the picture contains oe or more intermediate layers with theiness logic' in layers. The web is made up of standard com 'bus ponents and protocols.

## 4.0 CONCLUSION

The challenges of human computer interaction in hypertext, multimedia and the world-wide web remain a loss in hyperspace and information overload.

Also, the availability of bandwidth an d the security of data are problem issues to be resolved

## 5 .0 SUMMARY

Hypertext enables you to find information by navigating the hyperspace using the web technology

Multimedia is sometimes called Hyprmedia and can be used for simple audio and video effects. ch Hypermedia is not just text but hypertext systems containing additional media such as illustrations, photographs, video and sound.

Animation is adding motion to image s, particularly images on things that change in time.

History and bookmarks ease navigation because they allow 'hub and spoke' acces with lots of revisiting of pages. Bookmarks and favourites are good for longer term revisiting

The web contains protocols, browsers, web servers, clients and a lot of networking.

Web activities involve using protocols and standards. Protocols such as HTTP (Hypertext Transmission Protocol) that carry information over the internet, HTML (Hyper-Text Mark-up Language) , XML (Extended Mark-up Language) and graphics formats for content browsers to view the results; and a lot of plug-ins.

Wireless Advance Protocol (WAP) describes the web activities on the phone

Web icons are small images on the web used for bullets and decoration or to link to other pages.

Dynamic content are 'active' webges in which data is updated as well as presented on the web. Batch generation of web pages ofta is for slow and varying data that is update d through a local da database

## 6.0 Tutor Marked Assignment

1 Distinguish between:

(i) Hypertext and Hyper media,

(ii) Hypermedia and Animation effects

2 What do you understand by "Video and Audio" effects in human computer in advantages and challenges arising from their application in web browsing and interaction? What are their hypertext?

3 Give 5 examples of typical Human Computer interactions in the web.

4 What is the function of the Boolean search used in conducting a web search? Give 2 examples of Boolean expressions that can be used for a web search.

5 Describe the major components of the web technology

6 The quality of Service (QOS) of a network is reflected in the bandwidth, latency, the jitter, and reliability of the network. What do you understand of the underlined terms?

7 Mention 2 design implications of the web. Describe how these affect the web activities using the GSM phone

8 What are the design implications to be considered in the following:

(i) Static web content, (ii)Text, (iii) Graphics, (iv)Picture formats, (v)Icons, (vi)Web colour, (vii) Movies and sound,(vii) the active web.

9. Distinguish between a fixed content interaction in the web and a dynamic interaction. What are the resource software applications utilized to carry out these interactions?

10. Using a pictorial illustration how is the batch generation of web pages carried out? What are the technologies utilized to carry out this function? What are the advantage(s) and disadvantage(s) of this option of generating data?

## 7.0 Further Readings / References


- Catledge, Lara D. and James E. Pitkow. "Characterizing Browsing Strategies in the World-Wide Web." Unpublished (?), 1994. [give URL?]
- Nielsen, Jakob. "Using link titles to help users predict where they are going." *Alertbox* column of January 11, 1998.
- Nielsen, Jakob. "The difference between Web design and GUI design." *Alertbox* column of May 1, 1997.
- Nielsen, Jakob. "The Tyranny of the Page: continued lack of decent navigation support in Version 4 browsers." *Alertbox* column of November 1, 1997.
- Nielsen, J., *Multimedia and Hypertext: the Internet and Beyond.* 1995, Boston: Academic Press Professional.
- van Dam, A., *et al.* "A Hypertext Editing System for the 360," in *Proceedings Conference in Computer Graphics.* 1969. University of Illinois.