

# Mensch-Maschine-Interaktion 2

## HCI and the Web

Prof. Dr. Andreas Butz, Prof. Dr. Michael Rohs

# HCI and the Web

## 1.1 HCI – A Quick Reminder

## 1.2 Web Technology – A Brief Overview

## 1.3 Web Usability: How Do We Use the Web?

## 1.4 Designing Web Sites for Usability

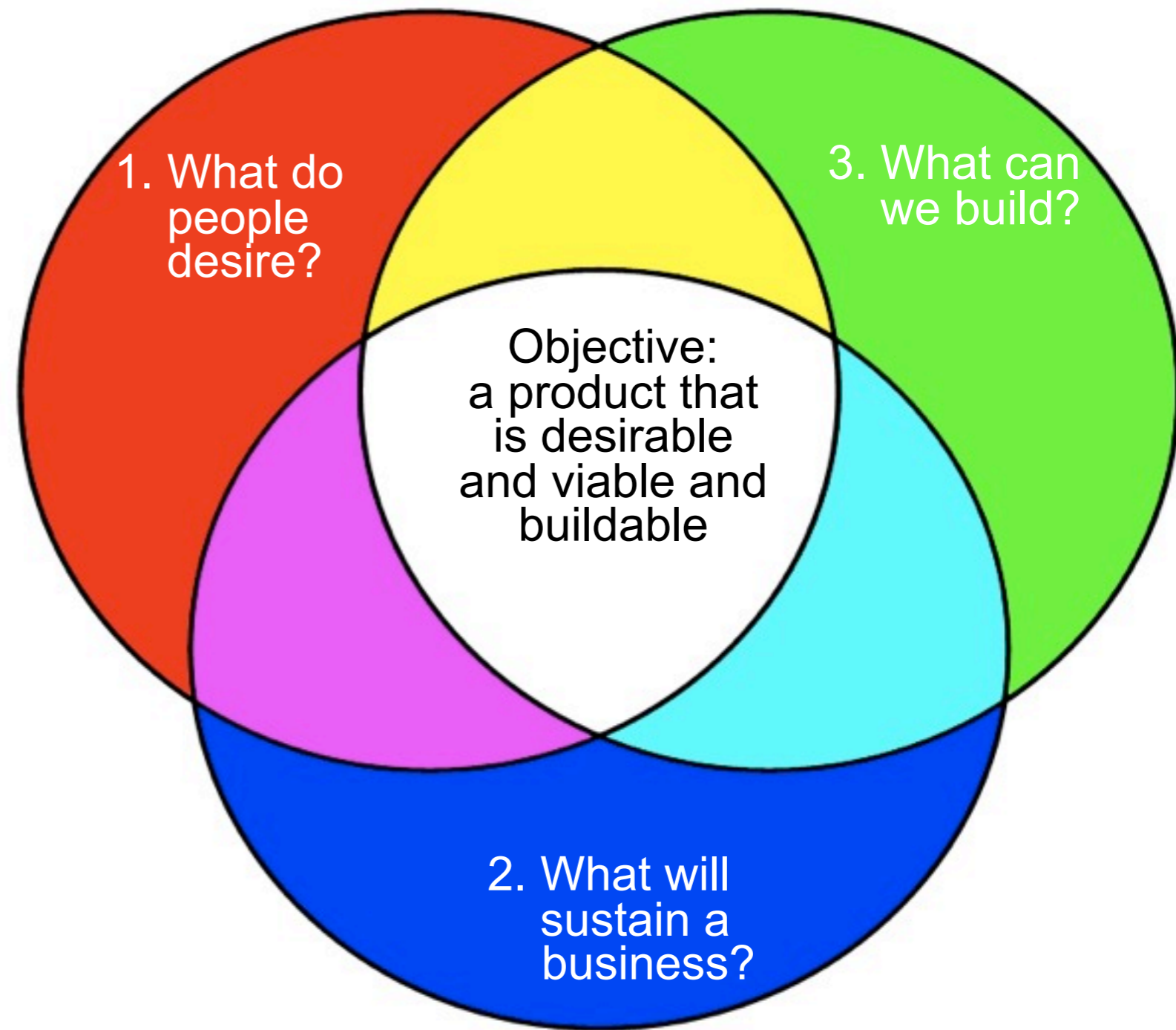
## 1.5 Web Accessibility

### Literature:

- Jakob Nielsen: Designing Web Usability, New Riders 2000
- Steve Krug: Don't Make Me Think, New Riders 2006 (2nd ed.)

# Building Successful Digital Products

- **Tension**
  - different objectives
  - different design goals
- **Step by step 1-2-3**
- **Solution**
  - Products in the overlapping space



*From A. Cooper, About Face 2.0*

# What is Usability?

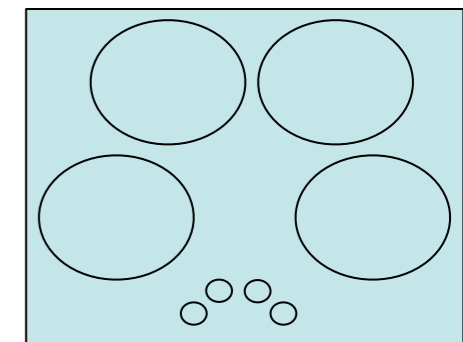
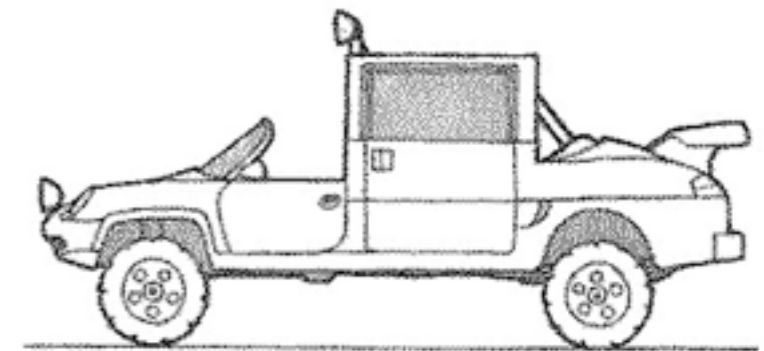
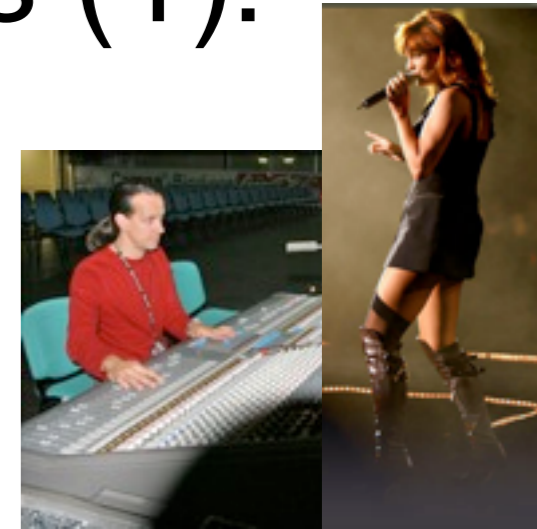
- “Usability is a quality attribute that assesses how easy user interfaces are to use. The word ‘usability’ also refers to methods for improving ease-of-use during the design process.” (Jakob Nielsen)
- “Scientific discipline using observation, measurement and design principles to enhance a site visitor’s ability to perform specific tasks” (Kathy Gill)
- “... the effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks ...” (ISO)

# Why is Usability Important?

- Improving usability can
  - increase productivity of users
  - reduce costs (support, efficiency)
  - increase sales/revenue (web-shop)
  - enhance customer loyalty
  - win new customers
- Several case studies that show the benefit of usability
- Usability is often considered as sign of quality
- Working with users can create ideas for new products, e.g. "similarities" feature (people who bought this also bought that) at amazon.com  
(Source: Interview Maryam Mohit)

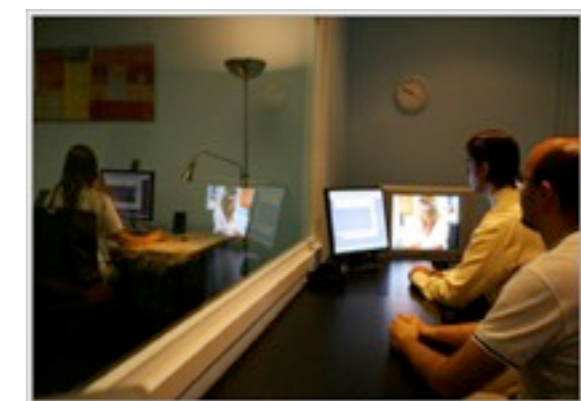
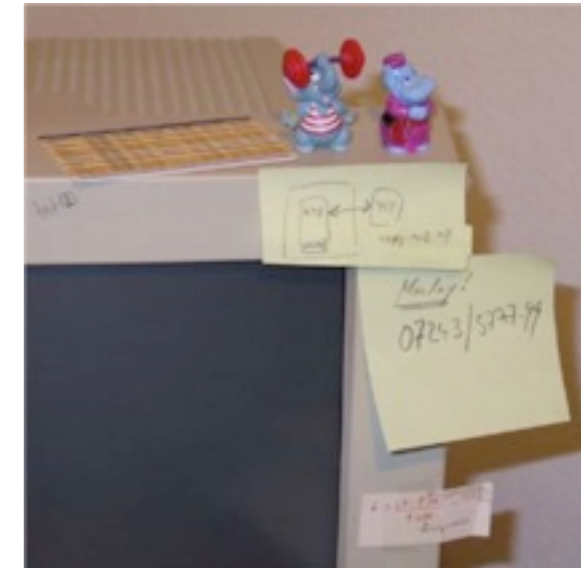
# Human-Computer Interaction Basics (1): Views and Models

- Facade & machinery and their integration
  - What the user sees and what happens in the background
  - What humans can perceive
    - Physiological and psychological limitations
  - What users want
  - What humans make of what they see
    - Mental models
- Create adequate conceptual models
  - Make the application domain visible/tangible
  - Know Thy User
  - Map internal functions to externally visible affordances
  - Create an experience



# Human-Computer Interaction Basics (2): Process

- Investigate requirements seriously
  - Observations, studies, focus groups
- Usability is a central element of all development activities
  - Part of quality assurance
- Iterative development
  - Early prototypes: Paper prototypes, mock-ups
  - High-fidelity prototypes & user studies
- Guidelines and principles
  - E.g. learnability, efficiency, memorability, errors, satisfaction (Nielsen)
- Evaluation
  - Usability engineering as an empirical discipline



# Web Usability

- Usability of Web sites and applications delivered over the WWW
- Dependent on several issues related to
  - Web technology
  - Web design
  - Project Management
  - Usability evaluation
- Web usability is not about “adding some fancy graphics, color, and cool styles at the end of the project”
- Web usability can be measured!



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# What do we need for a distributed system to share documents?

- How are documents encoded?
  - Content
  - Semantics
  - Presentation
- How are documents identified?
  - Where is data held?
  - How can data be accessed?
- How are documents transmitted/transported to the user?

# Distributed File Servers

- Document format
  - Any document
- Mechanism for identification
  - File name (Alias for server name and path)
- Transfer protocol
  - E.g. SMB/CIFS, NFS, AFP

# The WWW Approach

- Document format
  - Hypertext Markup Language, HTML
    - Document Type of Standardized General Markup Language (SGML)
  - Alternative (simpler): XHTML, based on XML
- Mechanism for identification
  - Uniform Resource Identifier, URI
    - used as Uniform Resource Locator, URL
- Transfer protocol
  - Hypertext Transfer Protocol, HTTP
    - ASCII-coded Request-Reply protocol using TCP/IP

# Mixture of Content, Semantics, Presentation

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//
  EN" "http://www.w3.org/TR/REC-html41/loose.dtd">
```

```
<HTML>
```

```
<HEAD>
```

```
<TITLE>Simple Example Document in HTML</TITLE>
```

```
<META name="author" content="Heinrich Hussmann">
```

```
<META name="description" content="Just for demo">
```

```
</HEAD>
```

```
<BODY>
```

```
A simple text. <BR>
```

```
<FONT FACE="Helvetica">Font Helvetica</FONT> <BR>
```

```
<FONT FACE="Times">Font Times</FONT> <BR>
```

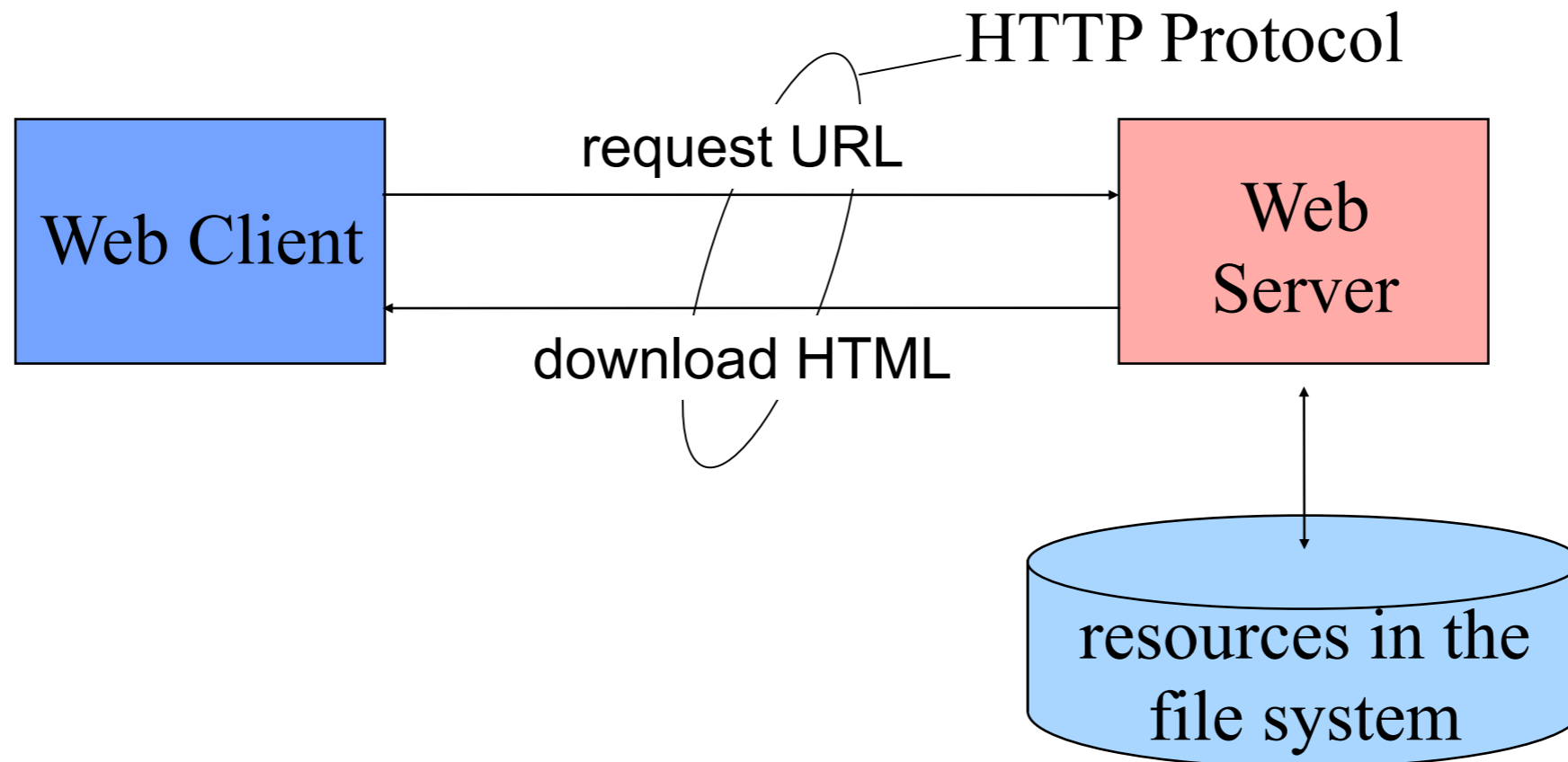
```
<B>Bold</B> <I>Italic</I>
```

```
</BODY>
```

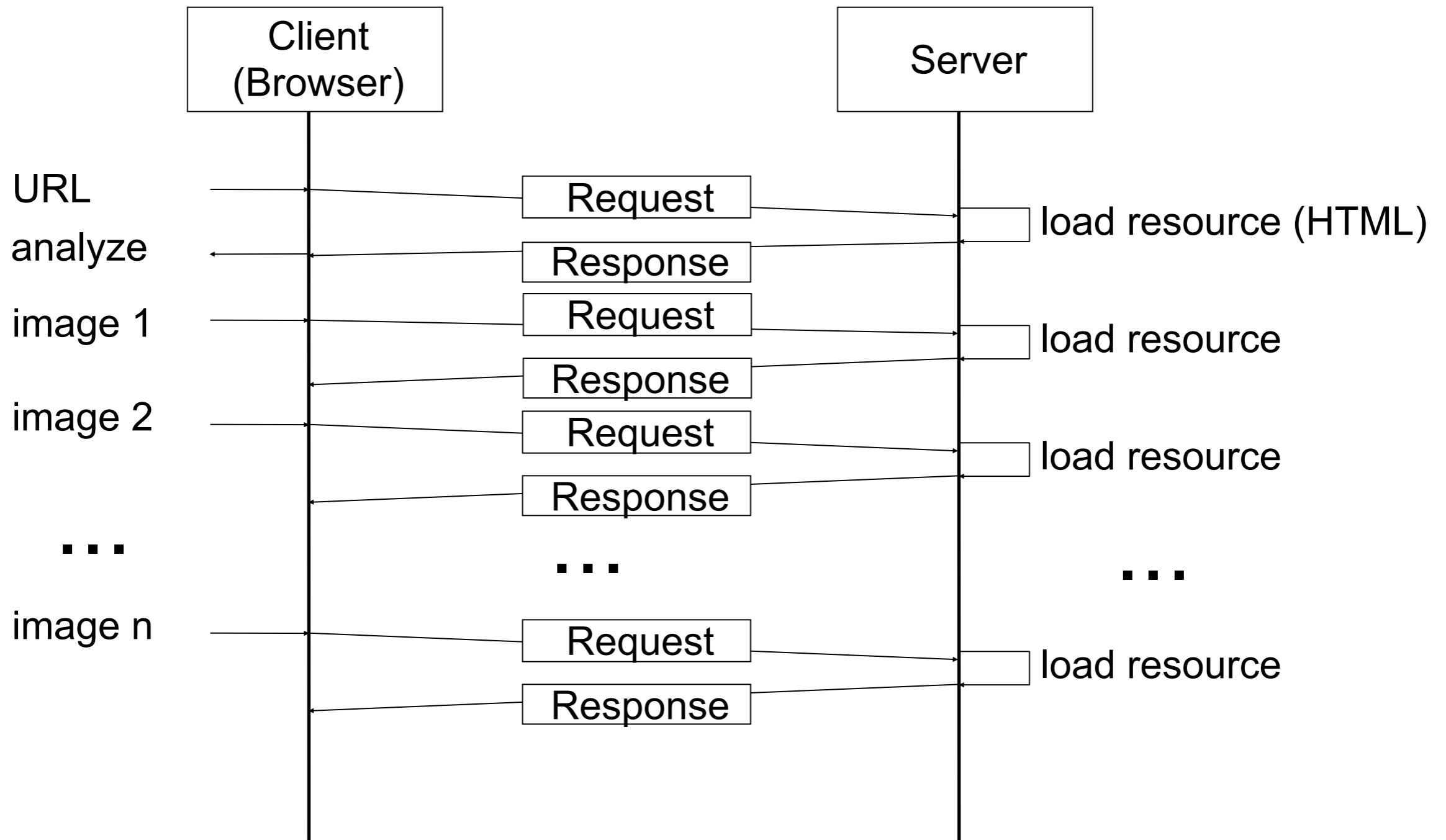
```
</HTML>
```

# Architecture and Protocol (simplified)

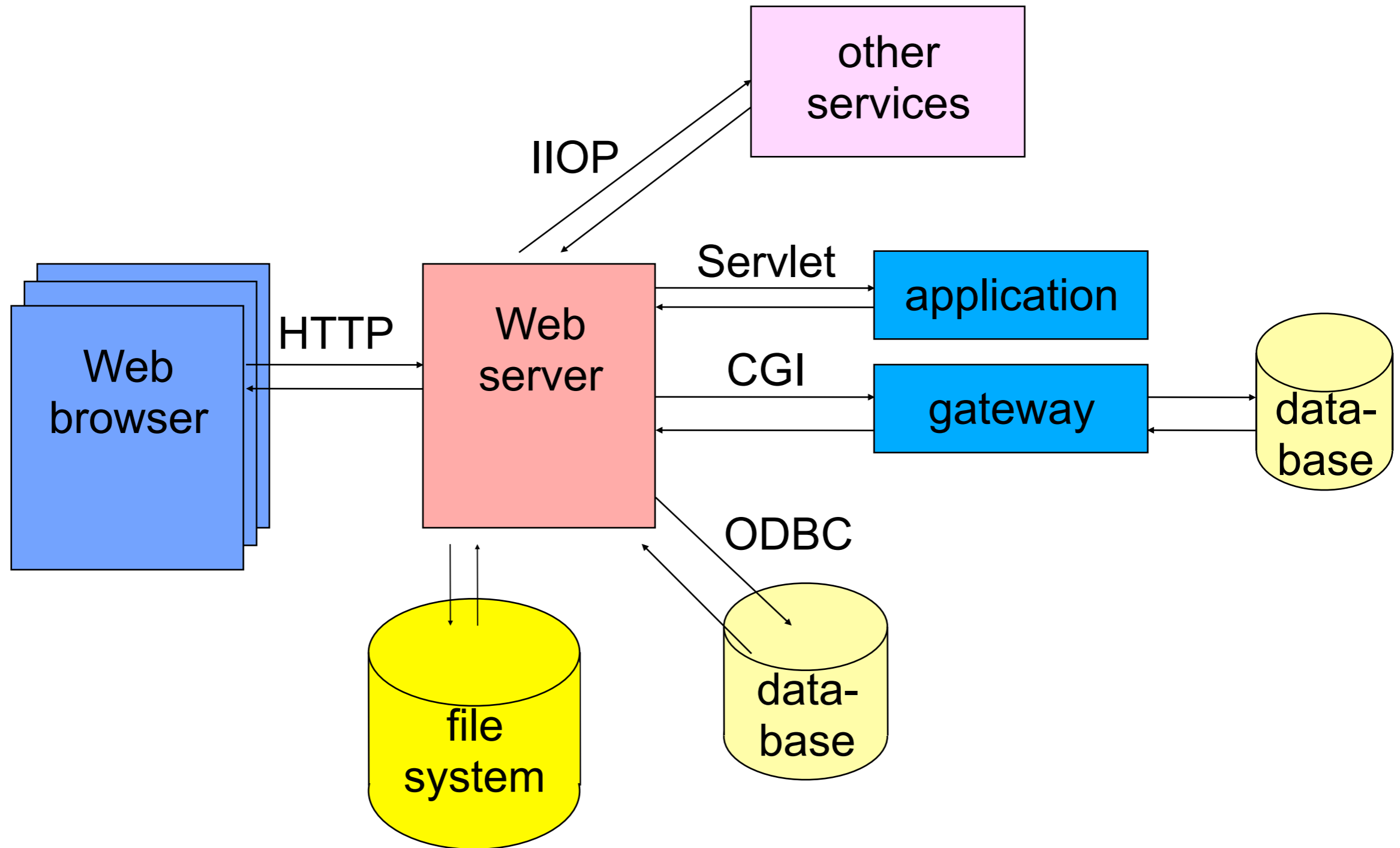
- Client-server architecture
- Synchronous communication model (request/response)
- Resources
  - Unit that is communicated between Client and Server
  - Static or dynamic



# Documents and Resources



# Example Architecture





# The WWW is a Distributed System

- What is a distributed System?
  - Tanenbaum, A.,S. (from Computer Networks)  
"... in a distributed system, the existence of multiple autonomous computers is transparent (i.e., not visible) to the user."
  - Leslie Lamport:

```
Received: by jumbo.dec.com (5.54.3/4.7.34)
        id AA09105; Thu, 28 May 87 12:23:29 PDT
Date: Thu, 28 May 87 12:23:29 PDT
From: lamport (Leslie Lamport)
Message-Id: <8705281923.AA09105@jumbo.dec.com>
To: src-t
Subject: distribution
```

There has been considerable debate over the years about what constitutes a distributed system. It would appear that the following definition has been adopted at SRC:

*A distributed system is one in which the failure of a computer you didn't even know existed can render your own computer unusable.*

# Information Exchange Between Browser and Server

- Obviously the document
- Further information available (e.g. header fields)
  - Browser type and version
  - Operating system (version)
  - Referer
  - Cookies
  - Screen size, window size
  - If Java/JavaScript/VBScript are enabled
  - List of plug-ins installed
  - Network parameter and route
  - ...
- Rich source of information
  - Can make applications more usable
  - Information may not be complete or may be wrong

Try it out at:

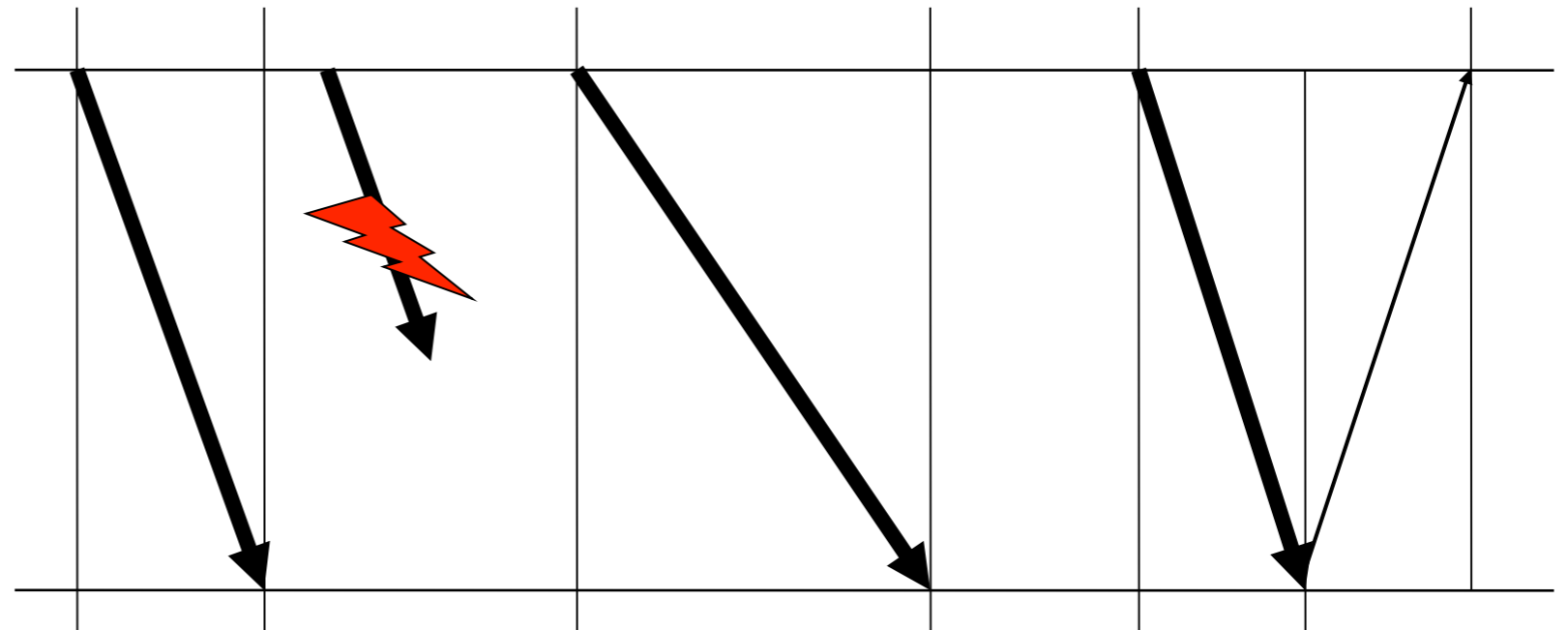
<http://network-tools.com/analyze/>

# The WWW is a Distributed System

## Usability Issues

- Network

- Delay
- Failure
- Jitter
- Latency
- Bandwidth



- Multi-user System

- Work load, system performance
- Concurrency problems

# Designing Distributed Applications

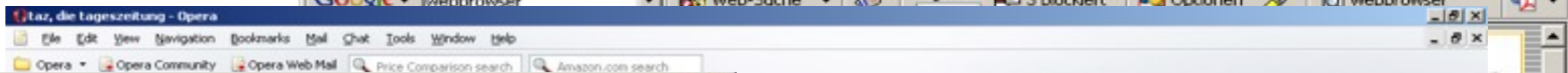
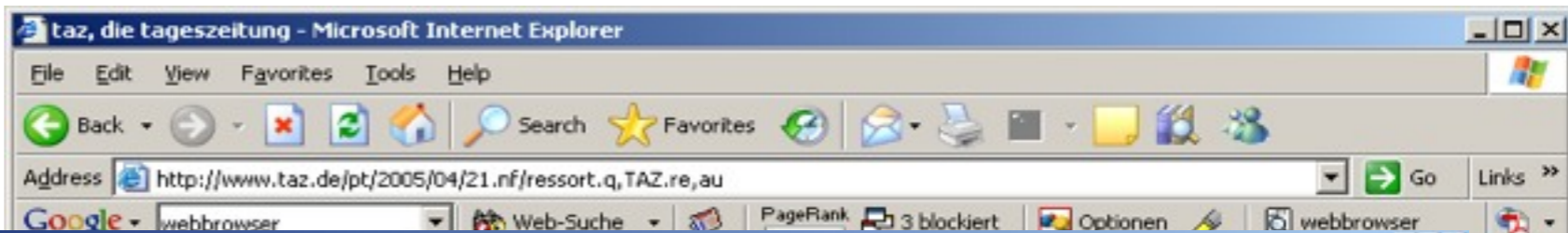
- Basics
  - applications consist of several parts (e.g. different processes)
  - in general these parts are executed on different machines
  - these parts of the application are executed concurrently or one after another
  - there is communication between these parts
- Software/Application Design Aspects
  - data
    - analyzing data transfer (optimize for minimum)
    - investigate how caching can be supported
    - keep data safe (minimize data that is given away)
  - functional
    - execute functions where it is most reasonable
    - regard the infrastructure on that the applications will be executed
  - response time (optimize for minimum)

# The Web Means Heterogeneity of Platforms

- Processing power
  - Processor, co-processors, cache
  - RAM
- I/O-performance
  - Hard drive speed
  - Network
- Input and Output
  - Displays
  - Keyboard layout
- Additional Hardware and Periphery
  - Video and audio (in/out)
  - Card reader, printer, scanner
- Software,
  - Browser
  - Operating System

# Statistics on Platform Usage

- Never trust the statistics!
  - Also small groups of users are important!
  - Statistics may be very unreliable



**die tageszeitung** 21.4.2005

Archiv [Recherchedienst](#) [Impressum](#) [Abo](#) [Anzeigen](#) [tazshop](#) [taz-Genoss](#)

**Ausland**

Rücktritt und Neustart Berlusconi  
Der italienische Ministerpräsident wirft aus taktischen Gründen das Handtuch, denn er will mit seinen alten Partnern eine neue Koalitionsregierung bilden. Doch die Parteien sind völlig zerstritten. Daher sind kurzfristige Neuwahlen nicht auszuschließen  
115 Zeilen, MICHAEL BRAUN (TAZ-Bericht)

Neue Vorwürfe gegen Bolton

**Weltmusik 30.4.**  
12 Seiten

**taz-Veranstaltungen**  
nrw|taz retten | abonnieren  
1.000 Abos bis zum 30. Juni

**Sind Sie eine Heldin?**

**extrablatt**

Falls Sie sich

Done

Google search 100%

**taz-Abo digital** --> PDF --> HTML --> TXT

**FASTAFRICA**

anzeigen tazshop taz-Genossenschaft über uns Kontakt

21.4.2005

Magazin | Le Monde diplomatique | TomTunnel |

n das Handtuch, denn er will mit seinen alten Partnern eine neue ritten. Daher sind kurzfristige Neuwahlen nicht auszuschließen

die Abstimmung über den umstrittenen John Bolton als US-Botschafter

im umkämpften Nord-Darfur mit Schweizer Beteiligung

**nrw|taz** retten | abonnieren  
1.000 Abos bis zum 30. Juni

**Sind Sie eine Heldin?**

**extrablatt**

Falls Sie sich tatsächlich fragen sollten, warum Sie eine Zeitung wie die taz brauchen, legen wir Ihrem Probeabo noch ein Buch mit den Antworten obendrauf.  
**5 Wochen taz plus Buch: 15 Euro**

# Other Graphical Browsers





# Plain Text Browser, e.g. Lynx

```
Terminal — lynx.command — 80x24
University of Munich - Media Informatics (p1 of 5)

To main content [1]
LMU München
Media Informatics Group [0]

Search [s]_____ Search
Deutsch · English Studying Media Informatics | Institut für Informatik
| Sitemap

* Home
* About
* Lectures
* Research
* People
* Contact
* Internal

Smaller font Default font size Larger font

Media Informatics Group
(NORMAL LINK) Use right-arrow or <return> to activate.
Arrow keys: Up and Down to move. Right to follow a link; Left to go back.
H)elp O)ptions P)rint G)o M)ain screen Q)uit /=search [delete]=history list
```

# Audio Browsing

- There are users who listen to Web sites!
- Example:
  - Web browser Safari
  - Screen reader Voice Over (built into Mac OS)
- Who among the Web designers will think of these users?



**VoiceOver**

Your Mac speaks for itself.

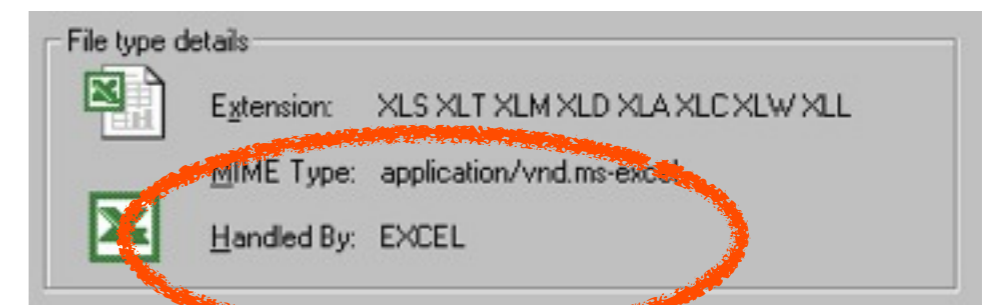
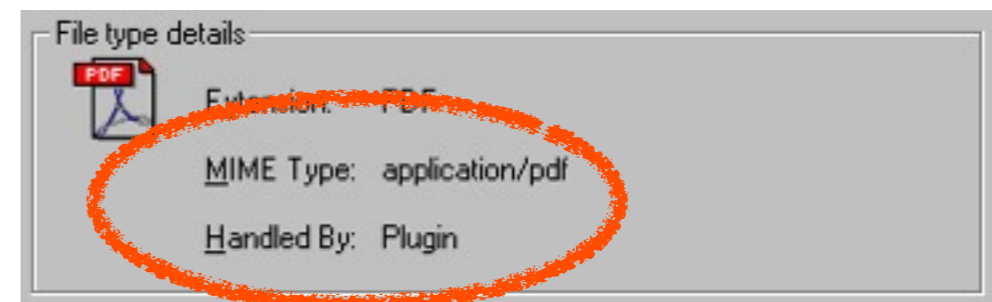
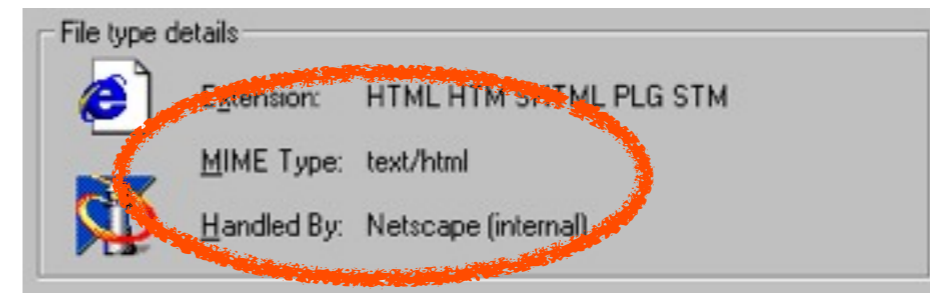


# Media Types in the Web

- text / hypertext
- Inline graphics in Hypertext
- icons / graphics (bitmap, vector) / drawings / photos
- interactive graphics: active maps
- animations
- programs (e.g. JavaScript)
- audio clips / video clips (e.g. MP3, MPG)
- audio / video streams
- 3D-scenes (e.g. VRML)
- objects, like Applets, Flash, ---
- any type of media ...

# Media Types in the Web - Concept

- open concept to integrate arbitrary media
  - transmitted in the MIME format
- interpretation of different Media types in the WWW
  - browser build-in for most basic types
    - text, HTML hypertext, GIF and JPEG images
  - using browser Plug-Ins
    - e.g. for Acrobat PDF, Real-Audio, RealVideo, Shockwave, Flash
  - using external applications (helper applications)
    - e.g. ghostscript for PostScript, other proprietary formats/applications
  - save files
    - Download of arbitrary formats



# MIME Extension

- mapping of file types (e.g. extensions in the file system, UNIX) onto MIME types (on the server)
- foo.ps => application/postscript => ghostview
- mapping of MIME types to applications (in the browser)
- ... it is open – but this may be a serious usability problem
  - Do the users have the right connection?
  - Does the external program, plug-in work?

# Technology Overview Client

- content that can be displayed/provided
  - text, HTML, images, videos, audio, ...
- content and programs that can be interpreted by the browser
  - HTML
  - browser script: JavaScript, VBScript, SMIL, MathML, ...
- programs that are executed in the context of the browser
  - Java Applets (Byte Code, Virtual Machine)
  - Flash
  - ActiveX (Native Code, executed directly by the operating system)
- programs that are plugged into the browser and executed in the context of the browser for specific data types
  - Plug-Ins
- external programs that are started by the browser to handle data that can not be handled by the browser
  - helper applications

# Technology Overview Server

- content (e.g. HTML-pages) that contains statements that can be replaced or executed:
  - SSI, XSSI
  - server side scripting (ASP, PHP, JSP, ...)
- programs that create content
  - additional process: CGI
  - In the context of the servers: Servlets, ...
- extensions of web servers
  - NSAPI, IISAPI, Apache-Modules, ...
- gateways and front-ends for databases
- application server
- dedicated/specific server

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# The Web Means Heterogeneity of Users

- In principle, anybody can use the Web!
- Huge span of user variety:
  - Kids
  - Beginners
  - Elderly
  - Experienced technically educated professionals
  - Technically ill-educated professionals
  - Hackers
- “Know Thy User” - Is it possible on the Web?
- Why do people use the Web?
  - Assumedly easy and simple way of achieving things
  - Because it is fun
  - Because there are no other options
- (As always:) Simplicity is most important

# Steve Krug: Design and Reality

## WHAT WE DESIGN FOR...

## THE REALITY...



# Steve Krug: We Don't Read Pages, We Scan Them

- We are in a hurry.
- We know that we do not have to read everything.
- We are educated in scanning things.



# Steve Krug: We **Satisfice** (satisfying & sufficing)

- We do not make optimal choices
  - We are in a hurry.
  - There is not much penalty for guessing wrong.
  - Weighing options does not guarantee success.
  - Guessing is more fun.
- Gary Klein: Sources of Power - How People Make Decisions
  - Example: Fire commanders do rarely compare options!
    - Find a reasonable plan
    - Check it for obvious problems
    - Try it!

# Steve Krug: We Muddle Through

- Users in general do not care how and why things work
  - Any working solution is accepted
  - We do not have the time to analyze the details
  - There is no incentive for having it understood better
- Example:
  - Use a search box for navigating to a site



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