Multimedia im Netz

Wintersemester 2009/2010

Part I

Web Technologies for Interactive Multimedia

2 Media on the Web

Embedding a YouTube Video

```
<object width="500" height="315">
<param name="movie"
value="http://www.youtube.com/v/_oBuE66majc&hl=de&fs=1&rel=0&border=1"></param>
<param name="allowFullScreen" value="true"></param>
<param name="allowscriptaccess" value="always"></param>
<embed src="http://www.youtube.com/v/_oBuE66majc&hl=de&fs=1&rel=0&border=1"
type="application/x-shockwave-flash" allowscriptaccess="always" allowfullscreen="true"
width="500" height="315"></embed></object>
```

- Redundant information
    - Nested "object" and "embed" tags
- Adobe Flash runtime code referenced
    - MIME type "application/x-shockwave-flash"
    - Movie player program, parameterized

Embedding Media

- Media embedding requires:
  - Media data (a file)
  - Player software
- Typical media data:
  - Sound files (e.g. .wav, .midi)
  - Movie files (e.g. .avi, .mov)
  - Programs to be executed on a virtual machine
    - » Java applets
    - » Flash runtime code (Shockwave Flash, .swf)

`<embed>` Tag in HTML

- **`<embed>`** tag refers to browser *plugin*
  - Introduced by Netscape with browser version 2.0
  - Outdated, **not** part of the HTML standard
- Example:

  `<embed src="yippee.wav" width="140" height="60">`

- Plugin:
  - Separate program to handle special file types
    - » E.g. Flash player plugin handles .swf files
  - Located on client
- Important attributes:
  - **`src`**: Data to be embedded (URI or local file)
  - **`width, height`** etc.: Control of appearance
  - **`autostart`**: Determines whether playback starts immediately
  - **`pluginspage`**: Where to find information on the plugin software
  - **`pluginurl`**: Where to find the plugin software

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`<object>` Tag in HTML

- `<object>` : Generic solution to embed arbitrary data files
  - Part of HTML 4.0 and XHTML 1.0 standards, supported by Microsoft
  - Supports media files, files to be opened with separate application software, files to be opened with plugin software, executable programs (e.g. Java applets or ActiveX controls)
  - Not well supported in all browsers

- Example (modern standard-conform style):
```
<object data="nibbles.swf"
    type="application/x-shockwave-flash"
    width="600" height="400">
        <param name="movie" value="nibbles.swf">
        <param name="quality" value="high">
</object>
```

- Important attributes:
  - `data:` Data to be embedded (URI or local file)
  - `width, height` etc.: Control of appearance
  - `type`: MIME type of data

- Nested tag `<param>` to convey arbitrary name/value pairs

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More on the `<object>` Tag in HTML

- Further attributes:
  - **`classid:`** May be used to specify the location of an object's implementation via a URI. It may be used together with, or as an alternative to the `data` attribute, depending on the type of object involved.
    - » Specifies the version of the player software to be used
    - » In practice often platform specific, e.g. ActiveX registry values
  - **`codebase:`** Specifies the base path used to resolve relative URIs specified by the `classid`, `data`, and `archive` attributes. When absent, its default value is the base URI of the current document.
    - » In practice, misused to specify the location of the player software (like **`pluginurl`**)
  - **`codetype:`** Specifies the content type of data expected when downloading the object specified by `classid`.
    - » MIME type for code of player (not data)
- **`<object>`** tag with child tags in its body:
  - Uses the inner HTML code as display alternative

http://www.alistapart.com/articles/flashsatay/

Combining <embed> and <object>

- Problems:
  - Older browsers:
    - » Microsoft IE ignores `<embed>`
    - » Netscape/Mozille ignores `<object>`
  - Current browsers:
    - » `<object>` as shown above works on all platforms
    - » However, Microsoft IE does not allow streaming of the data (but loads all data first)
- Pragmatic solution:
  - Enclosing an `<embed>` tag in an `<object>` tag (see above)
  - Recommended for Flash, stable
  - Not (X)HTML standard conform!
- Complex solution for Flash, standard conform:
  - Use portable `<object>` code from abovr
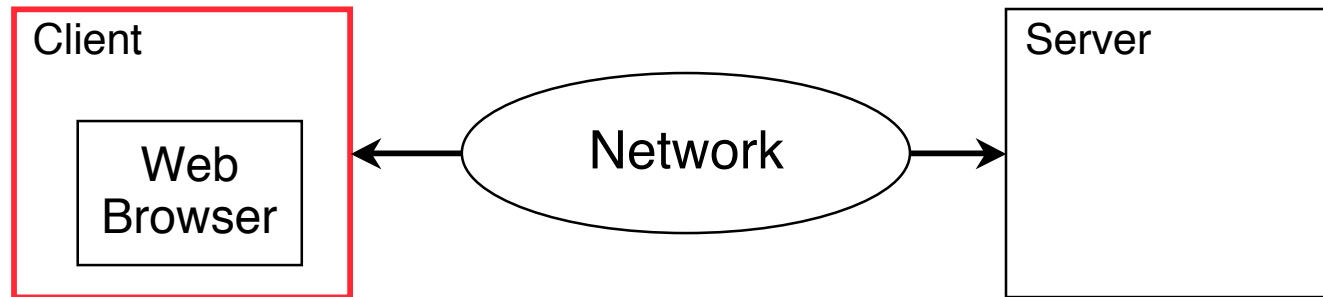 - Load a container movie which then loads the target movie

http://www.alistapart.com/articles/flashsatay/

2 Media on the Web

Functionalities Supported by Client Only

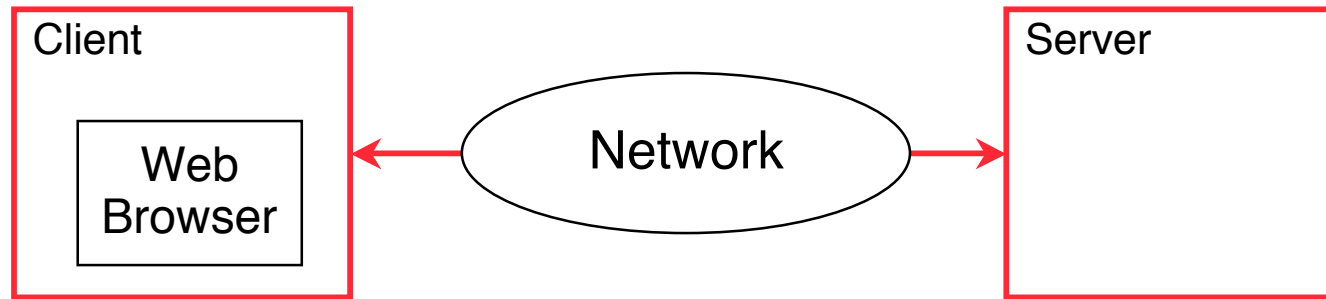Client | Network | Server

Web Browser

- Media rendering:
  - Recognition of media file types
    - » MIME registry of browser
  - Local media playing software
    - » Plugins or separate programs
- Interactivity:
  - Local interactions
    - » Highlighting, dynamic menus etc.

Functionalities Supported by Server Only
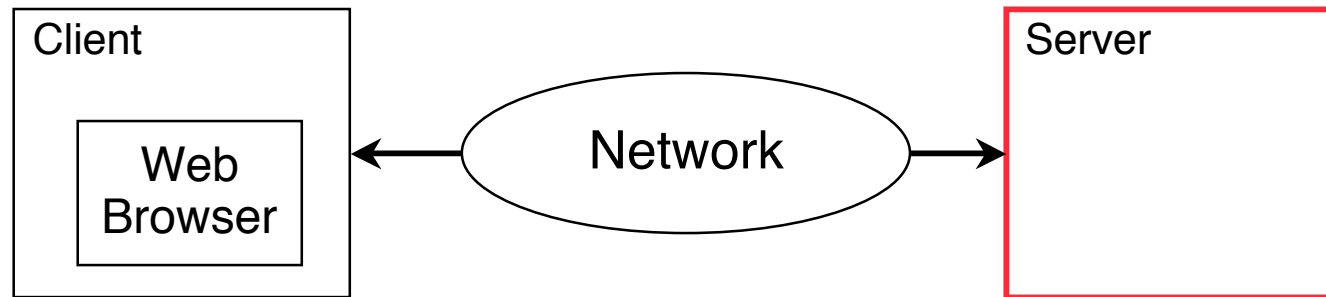
- Media rendering:
  - Storage of media files and meta-information
  - Indexing and querying
- Interactivity:
  - Interactions with server-side effect
    - » E.g. database updates (registration, buying, ...)
  - Interactions with global effect for all users
    - » E.g. adding a comment, uploading a video

Functionalities Supported by Client & Server

```
┌─────────────────────┐              ┌─────────────────────┐
│ Client              │              │ Server              │
│   ┌───────────┐     │   ⟵  Network  ⟶   │                     │
│   │   Web     │     │              │                     │
│   │  Browser  │     │              │                     │
│   └───────────┘     │              │                     │
└─────────────────────┘              └─────────────────────┘
```

- Media streaming:
  - Playback of incomplete content in client
  - Playout in defined order from server
  - Synchronization, rate control, buffering
  - Flow control (stop, start, pause)
  - Adaptation to network conditions
- Interactivity:
  - Near real-time interactions
    - » E.g. status notifications, data ticker

2 Media on the Web

Audiovisual Players

- Player software for rendering a single audiovisual presentation
  - Audio or video file formats (e.g. .mpg, .mp3, .m4a, .mov, .avi, .wma, .wmv)
- Either browser plugin or separate application
  - Sometimes both co-exist (e.g. QuickTime, Flash)
- Examples:
  - Microsoft Media Player
  - Apple QuickTime Player
  - RealPlayer

Universal Multimedia Players

- Provide a platform for arbitrary interactive multimedia applications
  - Including media playback, but also highly interactive applications like games
- Provide an authoring platform independent of execution platform
  - Usually using a virtual machine for execution
- May include components for playback of a single audiovisual presentation
  - Eg. Player component in Flash playing Flash Video (.flv)
- Examples:
  - Adobe Shockwave, playing Adobe Director (.dcr) files
  - Adobe Shockwave for Flash, playing .swf files
  - Microsoft Silverlight, playing .scr files
  - Java applets, playing .class/.jar files
- Video on the Web is increasingly dominated by universal multimedia formats
  - Better platform independence, better versatility