Session: 16

Building a Mobile Web Application

Objectives

- Describe the features of different mobile devices
- List the different types of platforms available for mobile devices
- Explain the design and architectural aspects of a mobile Web site
- Explain the requirements for developing and testing of a mobile Web site
- Explain HTML5 support for a mobile Web site
- List the best practices for optimizing a mobile Web site

Mobile Application Environment

- Today, access to the Web is not limited to only desktop systems, but is also available on portable and wireless devices, such as mobile devices.
- A mobile device, also known as a handheld device, is a small portable computing device with a small display screen and keyboard.
- A mobile device has an operating system on which various types of application software are executed, also known as apps
- The most commonly used apps are mobile browsers that display the Web pages.

Types of Mobile Devices

Low-end Mobile Devices

Mid-end Mobile Devices

High-end Mobile Devices

Smartphones

Tablets and Notebooks

Mobile Platforms 1-2

- A mobile device platform is similar to a software platform.
- It is responsible to interact with the device hardware and run software/services on the mobile device.
- The mobile platforms are categorized as proprietary & open source.

Palm OS

- It is a proprietary mobile OS developed by Palm Inc. and was used for Personal Digital Assistants (PDAs).
- Currently, Palm Inc. has developed webOS, which is based on the Linux kernel.

Blackberry OS

- It is a proprietary mobile OS developed by Research in Motion (RIM) and is based on Java platform.
- It is primarily used by Blackberry smartphone devices.

Mobile Platforms 2-2

Windows Mobile

- runs on top of the Windows Mobile platform.

Linux

- **open source OS,** supported by Motorola smartphones.

Android

- **open source OS** developed by Google, currently used by smartphones and tablet computers.

iOS

- developed by Apple Inc. and was initially referred to as iPhone OS.
- derived from Mac OS X, which is based on the UNIX platform.

Symbian

- **open source mobile OS** developed for mobile phones.
- includes a user interface framework, libraries, and component tools.

Design Aspects of Mobile Web Site 1-3

Basic considerations for designing a mobile web sites :

- Resolution and Physical Dimension
- Page Orientation
- Input methods

➢ Resolution and Physical Dimension

The resolution means the number of pixels (width and height) on the screen: Pixels per Inch (PPI) or Dots per Inch (DPI)

Category	Resolutions (in pixels)
Low-end mobile devices	128 x 160 or 128 x 128
Mid-end mobile devices	176 x 220 or 176 x 208
High-end devices	240 x 320
Smartphones	240 x 480, 480 × 320, 640 × 480, or 960 × 640

Design Aspects of Mobile Web Site 2-3

- Following table lists the resolution and display sizes of different mobile devices.

Manufacturer	Model	Screen Size	Resolution (in pixels)	Type
Apple	iPad3	9.7"	2048×1536	Tablet
Apple	iPhone 3GS	3.5"	480×320	Smartphone
Apple	iPhone 4S	3.5"	960×640	Smartphone
Blackberry	Torch 9810	3.2"	640×480	Smartphone
HP	Touchpad	9.7"	768×1024	Tablet
Samsung	Galaxy S 4G	4"	480×800	Smartphone
Samsung	Galaxy S II	4.52"	800×480	Smartphone
Nokia	Lumia 800	3.7"	480x800	Smartphone

Design Aspects of Mobile Web Site 3-3

- Smartphones and tablets can switch between landscape and portrait views to present the better viewing of a Web page.
- This rotation capability is due to the hardware accelerators available in the phones.
- A mobile Web site must be aware of these rotations and should provide a good user experience in both the orientations.

➢ Input Methods

- Numeric keypad
- Alphanumeric keypad (Simple or QWERTY)
- Virtual keypad on screen
- Multi-touch
- External keypad
- Voice and handwriting recognition

Architectural Aspects 1-2

Navigation

- Is the path followed by a user to travel in a Web site.
- As compared to the navigation tree of a desktop site, almost 80% of the information of a desktop site will not be useful to a mobile Web site.

Perspective

- The perspective of a mobile user is different from a desktop user in terms of needs and accessibility.
- Hence, a user-centric design approach should be followed. This ensures that a user completes the task easily and successfully.

Enhancement

- Enhancement is a simple and powerful technique that can be adopted while designing a mobile Web site.
- This technique defines compatibility of Web site and allows access to basic content, services, and functionality on all type of mobile devices.
- Also, it provides a better Web experience on devices with higher standards.

Architectural Aspects 2-2

- The Web standards: HTML, CSS, and JS …must be correctly used. This increases the possibility of displaying pages on large number of devices.
- The well-formedness of the markup tags used on a page can be achieved by validating them.

Use of HTML tables

- As the screen size of mobile devices is small, so the use of tables in layouts should be avoided.
- It makes the scrolling difficult and also slows down the page loading in the browser.

Pop-up windows

- The Web sites with pop-up windows makes the site impractical to work with.
- Also, all mobile browsers do not provide support for them.

Use of graphics

- The use of graphics increases download time of the pages.
- Also, they can obstruct the layout of the old mobile browsers, resulting in incorrect display of the page.

Use of frames

- Many mobile devices do not provide the support for frames due to usability problems.
- Also, the HTML5 new specification does not provide the support for frames.

Setting Up the Environment

IDE

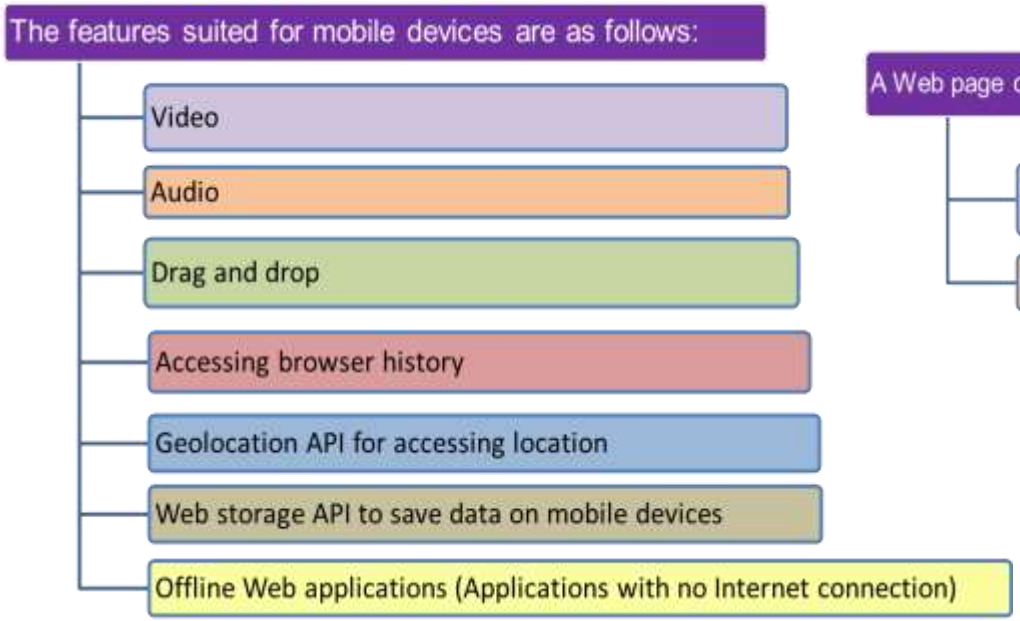
- An IDE is a tool used for coding the markup, JS and CSS.
- Some of these tools are as follows:
  - Adobe Dreamweaver
  - Microsoft Expression Web
  - Aptana Studio
  - Eclipse
  - Editplus (text editor)

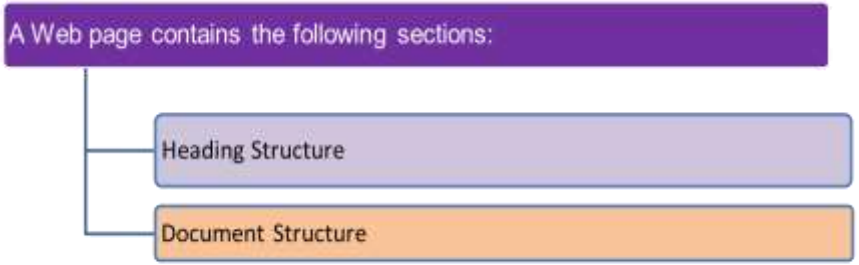
Emulators

- Android
- iOS
- webOS
- Blackberry
- Windows Phone
- Opera Mobile

HTML Support on Mobiles

- Majority of smartphones and tablets are providing good support for HTML5.
- Most Android and iOS mobile devices as well as tablets use browsers that are based on Webkit.
- The Webkit is a layout engine supported by browsers, such as Google Chrome and Apple Safari to render Web pages.
- The Web pages developed for a mobile Web app have the same structure as traditional Web pages.





Heading Structure 1-3

Meta Tag

- A <meta> tag indicate that the document is optimized for mobile devices and are used to control the display scale while displaying HTML content on the device.
- It is specific to mobile browsers.

Meta Tag	
<meta name="HandheldFriendly" content="true"/>	<meta name="Apple-mobile-web-app-capable" content="yes"/>
<meta name="MobileOptimized" content="width" />	<meta name="Format-detection" content="telephone=no"/>

Attribute
width
height
initial-scale

Heading Structure 2-3

➢ Viewport Meta Tag

- This is a new technique used to inform the browser that the Web page is optimized for a mobile device.
- A viewport is the rectangular display area on the screen where the content of a Web page are displayed by the browser.
- It contains attributes, such as width and height that can be set to larger or smaller values depending on the total visible area on the screen.
- Following table lists the attributes of viewport meta tag.

Attribute
`width`
`height`
`initial-scale`
`minimum-scale`
`maximum-scale`
`user-scalable`

Heading Structure 3-3

➢ Title Tag

- The text selected for <title> tag should be meaningful, short, and precise.
- It should be between four and eight words, as some old mobile devices truncate the long titles after 10 or 12 words.

➢ Icons

- To add icons to a mobile Web page, images could be used.
- These formats are compatible with mobile devices, as they are easy to export and are optimized in size.
  For example, <link rel=”icon” type=”image/png” href=”mobile.png” />
- From HTML5 onwards, Android supports the apple-touch-icon-precomposed meta tag in order to display high-resolution icons.

Document Structure 1-3

- The document structure is represented by a **body** element
- Some of the elements used in the body element:

Layouts

- **article** - An independent portion of the document or site
- **aside** - Content that is tangential to the main part of the page or site
- **figcaption** - Caption for a figure
- **figure** - A figure or quotation pulled out of the flow of text
- **footer** - The footer of a document or section
- **header** - The header of a document or section
- **hgroup** - A group of headings
- **nav** - A navigation section
- **section** - Identifies a block of content

Document Structure 2-3

Images

- Almost all mobile browsers understand formats: GIF, JPEG, and PNG.
- The <img> tag is used to display image on a Web page.
- The attributes such as width, height, and alt should be specified, as it reduces the rendering time of the image.

Lists

- **Ordered lists :**
  - Used for navigational menus and are defined using **<ol>** tag.
- **Unordered lists :**
  - Used for presenting objects of same type and are defined using **<ul>** tag
- **Definition lists :**
  - Used for presenting information as key/value pairs and are defined using **<dl>** tag on a Web page.

Document Structure 3-3

Links

- Hyperlinks are used to link pages in a Web application.
- A hyperlink is defined using **<a>** tag with href attribute.
- The **href** attribute is set to the URL of a resource.
- The **<a>** tag should also have accesskey attribute specified with it.
- The accesskey attribute is a keyboard shortcut and is useful for mobile devices that have support for access keys.
- As mobile devices are basically phones, hence, links can be created to perform phone call action by **tel:<phone number>**

CSS for Mobile 1-3

- CSS3 provides properties for adding colors, selectors, borders, backgrounds, and so on for effective appearance of a Web page.

Most modern mobile browsers support following features of CSS3:

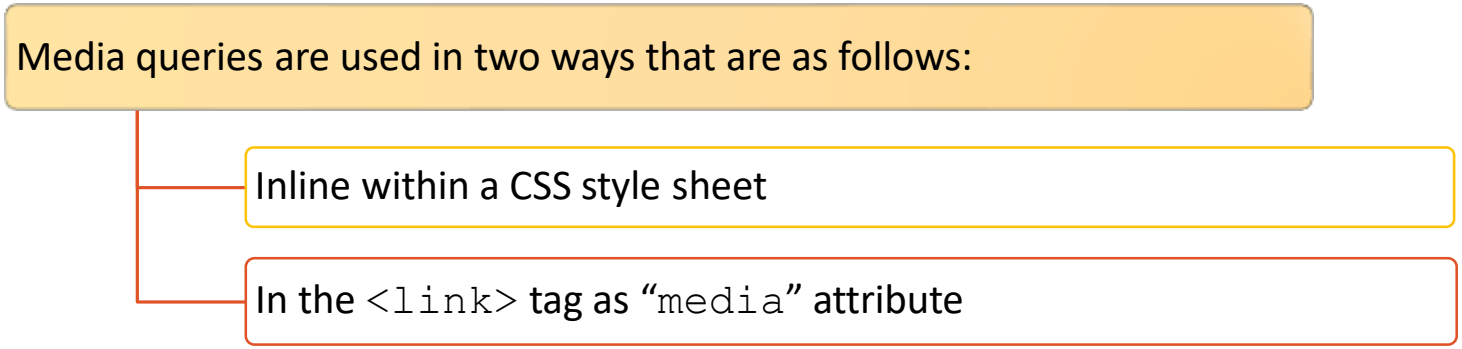
- Rounded corners
- Images with borders
- Adding shadow effect on text and boxes
- Animations
- Transitions
- Multi-column layout

Keyword	Browser
-moz	Firefox
-ms	Internet Explorer
-o	Opera
-webkit	Google Chrome and Safari

CSS for Mobile 2-3

➢ Media Queries for Browser Detection

- Media queries are used to target specific features, such as screen width, orientation, and resolution of the devices.
- It is used to display HTML pages on various devices, such as computers and mobile with different styles based on their media types.
- In media queries, expressions are added for specific media type, then checking for condition is done, and finally, respective style sheet is applied to a Web page.



CSS for Mobile 3-3

- Code snippet shows to apply a style sheet to a device with screen and set the viewing-width of the area to 480.

```
<link rel=”stylesheet” media=”only screen and  (max-device-width: 480px)”
href=”screen.css” />
```

- Code snippet to change the background color depending on the device width.

```
@media only screen and (max-device-width: 480px) {
      body {   background-color: #666; }
}
```

- Code snippet to serve style sheets based on the orientation of the device.

```
<link rel=”stylesheet” media=”all and (orientation: portrait)”  href=”portrait.css” />
<link rel=”stylesheet” media=”all and (orientation: landscape)” href=”landscape.css” />
```

Optimizing a Site for a Mobile 1-2

- Mobile Web sites should be optimized for better performance.
- Some of the best practices that can be followed for mobile apps :
  - Design should be simple to fit on small screens.
  - Avoid horizontal scrolling as some phones do not support horizontal scrolling and hide the content on the screen.
  - Use buttons, instead of providing many tiny links.
  - Create cookies to store the user's choice for viewing the full version of the site.
  - Avoid creating complex forms with many input fields, as data entry can be difficult on mobile devices compared to the desktops.
  - Limit the use of images due to bandwidth restrictions on mobile devices.

Optimizing a Site for a Mobile 2-2

- Add mobile specific functionalities, such as built-in GPS facility or call-in action links.
- Use of good foreground and background colors is important as they makes the sites readable on small screens.
- Select the technologies that are compatible with old mobile devices.
- Also, provide alternatives for functionalities, such as cookies, tables, style sheets, fonts, colors, and so on.
- Avoid use of pop-up windows, tables for layout, frames, and image maps in the mobile Web site design.

Summary

- A mobile device is a small portable computing device with a small display screen and keyboard.
- The different categories of mobile devices are: basic model, low-end mobile devices, mid-end mobile devices, high-end mobile devices, smartphones, and tablets.
- A mobile platform is basically responsible to interact with the device hardware and run software/services on the mobile device.
- Different platforms for mobile devices include: Palm OS, Blackberry, iOS, Symbian, Windows Mobile, and Android.
- An ideal mobile Web site is supported and rendered properly by maximum possible browsers and OS.
- Two factors that need to be considered, while designing mobile Web application are its initial display (zoom) scale and orientation.
- The use of media query is to display HTML pages on different devices with different styles based on their media types.