



MONASH  
University

程序代写代做 CS编程辅导

FIT1050 Web Fundamentals



# Mobile Web Design and Development

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Week 10

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# Learning objectives

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## Evolution of mobile browsing

- Changes in communication technology
- Changes in browsing devices



## Mobile content delivery approaches

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- Compare strategies for delivering mobile content

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## Mobile web design

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- Device display considerations
- User input considerations

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# Evolution of Mobile Browsing

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# Early mobile web browsing

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Due to limited bandwidth and technical capabilities of early mobile devices, information access was not a typical web browsing experience.



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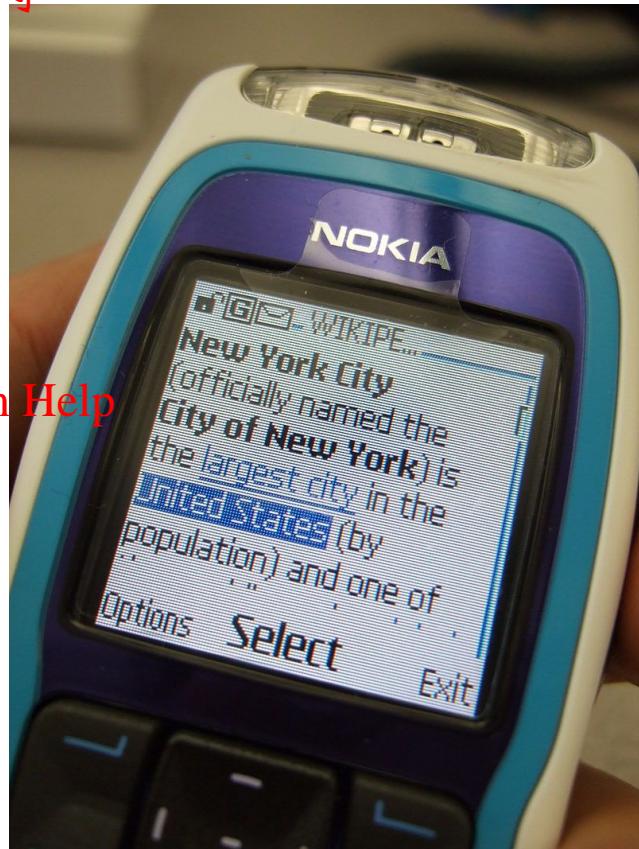
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- **WAP (Wireless Application Protocol)** provided a standard protocol stack for mobile phones.
- **WAP browsers** were limited in features.
- **WML (Wireless Markup Language)** was very simple compared to HTML.
- **WAP Gateways** translate HTML to WML.



# Evolving mobile connectivity

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1990

## 2G GSM

- Slower than dial-up Internet: **~9.5Kb/s**
- Mobile data cannot be used during phone calls

## 2.5G GPRS

- Faster than dial-up Internet: **~100Kb/s**

## 2.75G EDGE

- Equivalent to early broadband internet speeds: **~350Kb/s**

2000

## 3G UMTS

- Expect rates vary on situation.
- Stationary or walking: **~2Mb/s**
- Typical moving vehicle: **~348Kb/s**



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2010

## 4G LTE

- **Long-Term Evolution**
- Theoretical speeds reaching **300Mb/s**
- Typical speeds **<10-100Mb/s**

## 4G LTE Advanced

- Up to **1Gb/s**

2020

## 5G NR

- **New Radio**
- Different frequency bands for different levels coverage and bandwidth.
- Low-band: **50Mb/s**
- Mid-band: **100-900Mb/s**
- High-band: **2Gb/s**

Listed speeds are theoretical maximums

- Shown in kilobits, megabits and gigabits.
- Typical speeds are dependent on many factors, usually 10% of theoretical speed

# How different types of 5G are utilised

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Low frequency  
cells **700 MHz**



High frequency  
cells **3.4-3.8 GHz**



Millimetre wave  
cells **26 GHz**



Large scale events  
Thousands of users

Vehicle communications  
Transport infrastructure

Environmental  
monitoring &  
Smart cities  
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Transport &  
infrastructure

Improved residential  
connections,  
Smart energy

# Evolving web browsing devices

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From feature phones and PDAs, to smartphones and tablets.



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# Google's mobile ranking update

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In November 2016, many news sources reported...



**"Mobile internet usage surpasses desktop usage for the first time..."**

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- [Assignment Project Exam Help](https://tutorcs.com/2016/11/12/internet-usage-desktop-vs-mobile/)

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2015-2016 also saw mobile-friendly updates to Google's ranking algorithms.

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Affectionately termed by popular media as: "**Mobilegeddon**"

# StatCounter global trend leading to Mobilegeddon

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Some predicted that this trend would continue to the demise of desktop browsing...

# The aftermath of Mobilegeddon

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Desktop vs Mobile vs Tablet Market Share Worldwide  
Jan 2016 - Nov 2021



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# Global trends are not the whole story

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Basing predictions on global trends without considering the localised demographics and events is an unreliable approach.



Web development site **W3Schools** has said the following on the subject of its web browser statistics:

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**"You cannot - as a web developer - rely ONLY on statistics. Statistics can be misleading. Global averages may not always be relevant to your website."**

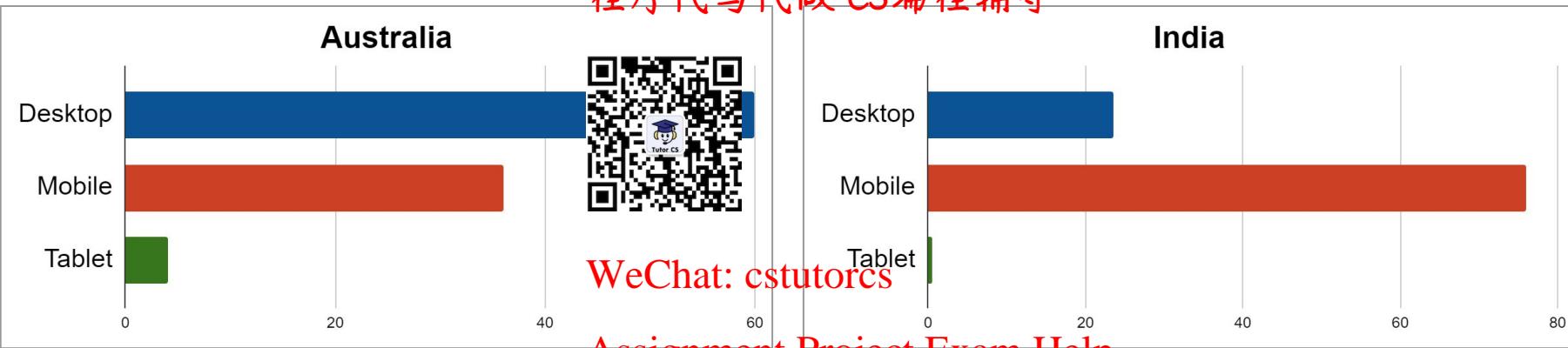
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**Different sites attract different audiences."**

[http://web.archive.org/web/2015/http://www.w3schools.com/browsers/browser\\_stats.asp](http://web.archive.org/web/2015/http://www.w3schools.com/browsers/browser_stats.asp)

# Consider the following localised statistics

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# Use analytics for real user behaviour

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Mobile Device Info	Acquisition	Behavior						Conversions	
	WeChat: cstutorcs	New Users	Sessions	Bounce Rate	Pages / Session	Avg. Session Duration	Goal Conversion Rate	Goal Completions	
Users									
1. Apple iPhone	32 (52.46%)	27 (49.06%)	24 (40.15%)	67.65%	1.65	00:00:51	0.00%	0 (0.00%)	
2. Apple iPad	7 (11.48%)	7 (12.73%)	7 (10.77%)	71.43%	2.14	00:00:45	0.00%	0 (0.00%)	
3. Motorola Moto G (4) Moto G4	7 (11.48%)	7 (12.73%)	7 (10.77%)	100.00%	1.00	00:00:00	0.00%	0 (0.00%)	
4. Samsung SM-G930F Galaxy S7	4 (6.56%)	3 (5.45%)	4 (6.15%)	100.00%	1.00	00:00:00	0.00%	0 (0.00%)	
5. (not set)	2 (3.28%)	2 (3.64%)	2 (3.08%)	50.00%	1.50	00:00:44	0.00%	0 (0.00%)	
6. Apple iPhone 6	1 (1.64%)	1 (1.82%)	1 (1.54%)	0.00%	8.00	00:02:45	0.00%	0 (0.00%)	

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# Mobile Content Delivery Approaches

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# How websites are accessed

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Excluding search, entering a web site address is more difficult on mobile devices.

- Software keyboards are more difficult to use accurately
- Characters required for URLs are sometimes hidden
- Long URLs might not be fully visible while typing



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There are a few commonly used solutions:

- **Shorter URLs** Email: tutorcs@163.com
  - URL shortening tools: <https://tinyurl.com/749389476>, <http://bit.ly/>
- **QR codes and NFC tags** <https://tutorcs.com>
  - User may need to install an app and be in close proximity
- **Voice input** (mostly executing web searches)

# What do you think? Are these safe?

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For the safety and security of the PayPal network, we are writing to remind you that you need to reset your PayPal password to continue using your PayPal account. This will prevent your PayPal account from being limited.

We need you to please update this by 5 February 2022 (plus 15 days), otherwise the **functionality of your PayPal account will be impacted.**

To keep using your account and all its features, please:

1. Open PayPal: <https://bitly.com/98K8eH>
2. Enter your current username and password
3. Set a new password for your account

Should you have any questions please visit the [Help Centre](#).

Thank you for shopping with PayPal.

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TO CLAIM YOUR DISCORD NITRO!  
(THIS GIFT EXPIRES IN 40 HOURS)



# Mobile content serving approaches

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Generally, one of 4 methods used to serve web content for mobile devices



- Desktop website + native app
- Desktop site + mobile site
- User-agent sniffing
- Responsive web design

Each method has its own strengths and weaknesses.

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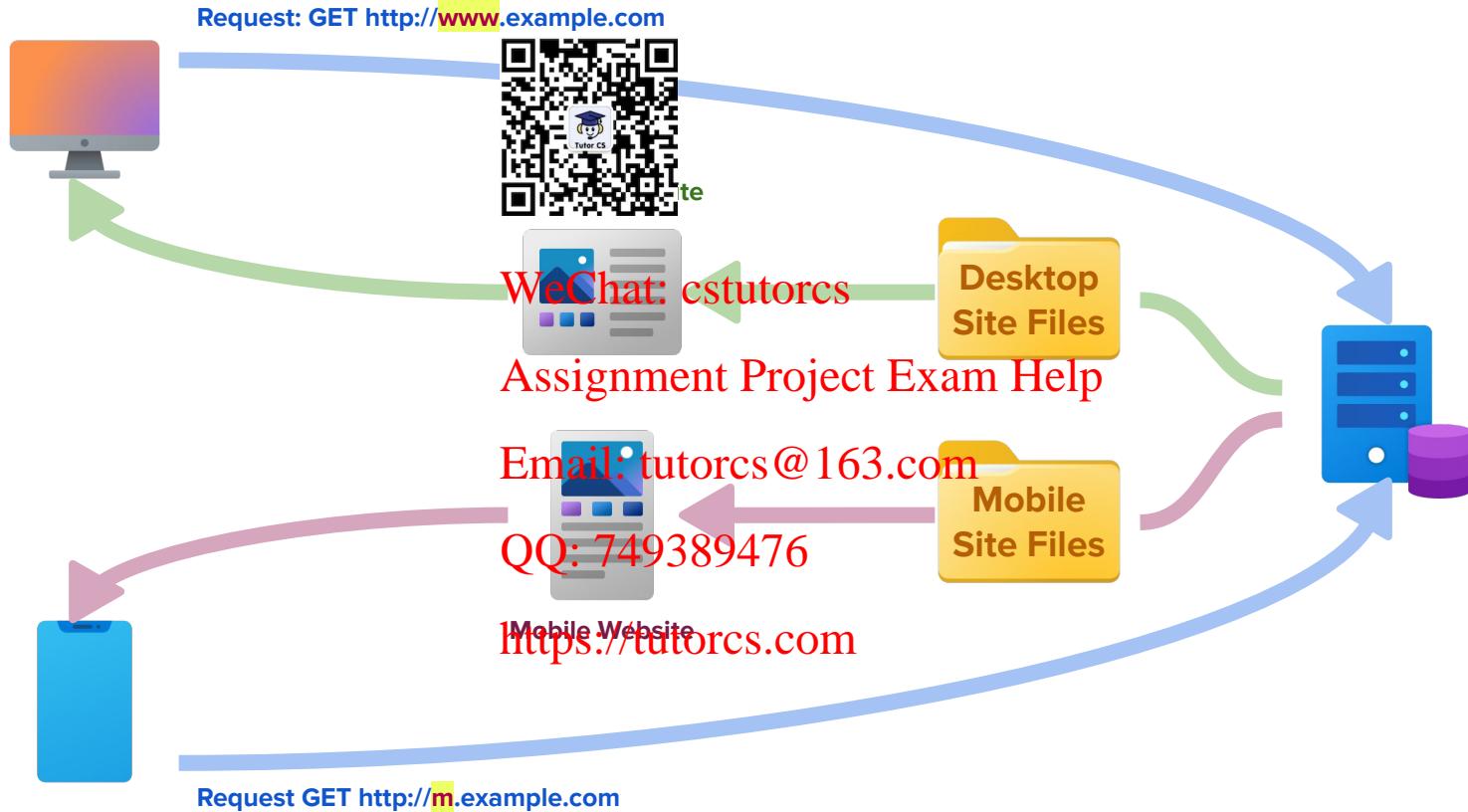
# Desktop website + native app

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# Desktop site + separate mobile site

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# Common mobile URL formats

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- Mobile site in a sub-folder: <http://example.com/mobile>

- Implies that mobile content is less important.



- Mobile site on a subdomain: [m.example.com](http://m.example.com)

- Implies that mobile content is somewhat equivalent to desktop.

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- Mobile site on dedicated TLD: <http://example.mobi>

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- Requires registration of an extra domain, can't combine with country TLDs.

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Tim Berners-Lee has argued against the use of a dedicated mobile TLD.

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"The Web is designed as a universal <https://tutorcs.com>. Dividing the Web into information

destined for different devices, user, or classes of information, breaks the Web in a fundamental way."

# Separate sites + user-agent sniffing

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# Single responsive site

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# Designing for Mobile Devices

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# Design considerations

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Differences between mobile and desktop - both features and limitations influence how we plan and execute design



- Variety of screen sizes, resolutions and aspect ratios  
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- Varying CPU power and RAM limitations of devices  
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- Unpredictable bandwidth and data limits  
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- Touch is the most common user input method  
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This considerations are not exclusive to mobile devices, but impact users with mobile devices more frequently.

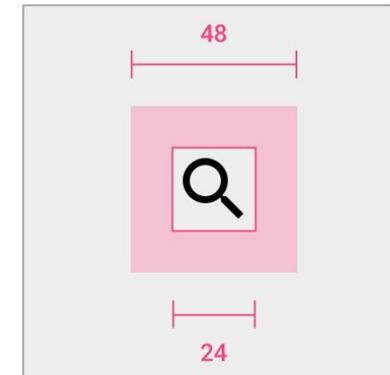
# Review: Touch target sizes

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As discussed in Lecture 8 (Accessibility), touch input is less accurate than mouse pointer input. Major platforms recommend similar **finger-friendly target sizes**.



- **Physical** ~7-10mm
- **Apple** 44px
- **Google** 48px
- **Microsoft** 40px

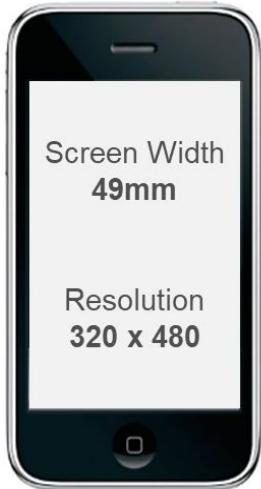


These **px** measurements are in **device-independent CSS pixels** that already take into account any scaling from the device **pixel ratio**.

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# Physical dimension vs. screen resolution

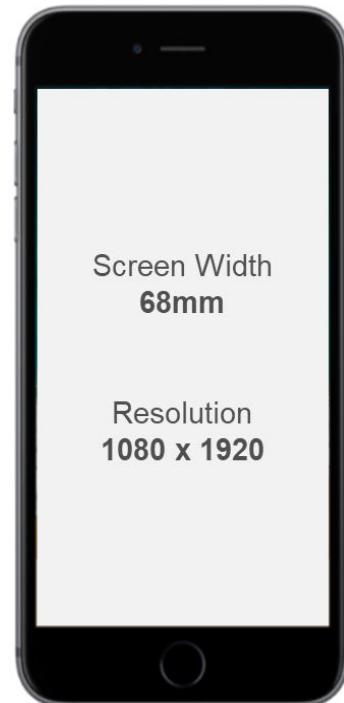
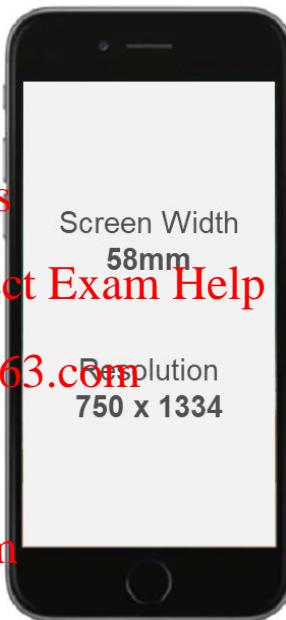
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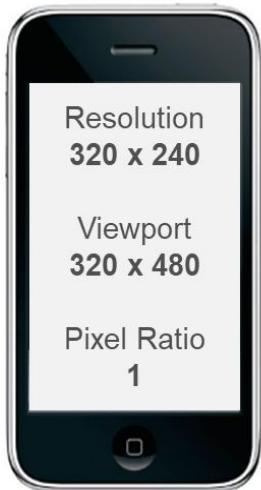
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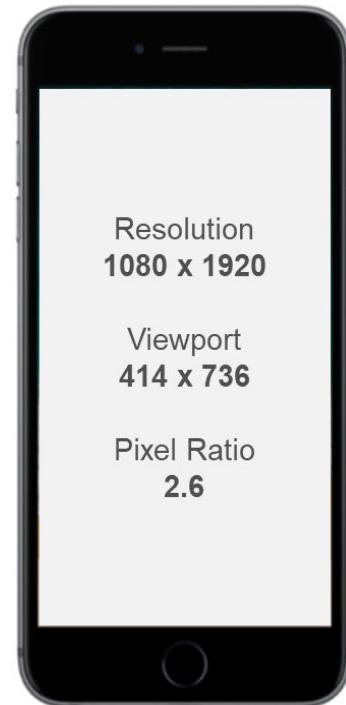
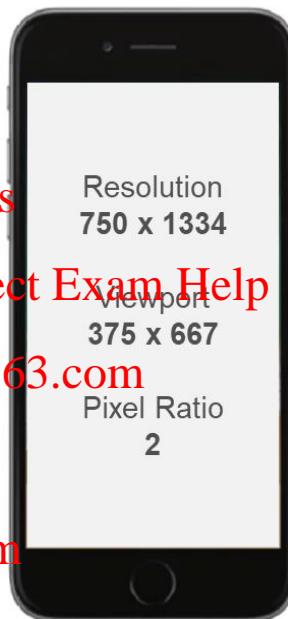


# Screen resolution vs. viewport resolution

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# Screen reachability

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For single-handed use, thumb-zone affordance may need to be considered.



# Changing mobile navigation conventions

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Consider placement of core app features, and fixed position menu bars.



What compromises are being made here?

# Mobile-friendly keyboard input

An advantage of mobile input is the ability to programmatically select different keyboard layouts.

**Input types are easy to set.**

```
<input type="text" />  
<input type="email" />  
<input type="url" />  
<input type="tel"/>
```



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URL



Phone



# Responsive design with viewport breakpoints

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CSS breakpoints allow different styles to be applied based on viewport width.

Desktop & Tablet Landscape

The Boston Globe website layout includes a top navigation bar with links like SUBSCRIBE TODAY, Talk is cheap. News-gathering is not., The Boston Globe, Metro, Sports, Business & Tech, Opinion, Politics, Lifestyle, Arts, Cars, Real Estate, and a menu icon. Below the header is a large article about 'Finding Lisa' with a photo of a man and a child. To the right is a sidebar with a QR code labeled 'Tutor CS' and sections for Politics, Opinion & Ideas, and Metro news. A call-to-action at the bottom encourages supporting real journalism and subscribing.



Large Tablet

The layout remains largely the same as the desktop version, but the overall width is reduced. The main article about 'Finding Lisa' is more prominent, and the sidebar on the right is slightly compressed. The QR code and 'Tutor CS' link are still present.

Mobile & Small Tablet

The site is fully responsive, showing a simplified layout designed for smaller screens. The main article and sidebar are scaled down, and the overall design is more compact. The QR code and 'Tutor CS' link are still visible.

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media=screen

media=(max-width:960px)

media=(max-width:768px)

# Testing mobile websites

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## Actual hardware (real physical devices)

- Most accurate, but expensive



convenient for comprehensive testing

## Simulators and emulators

- Simulators (such as Chrome's ~~WeChat~~ ~~emulator~~) are somewhat accurate
- Emulators provide more accurate rendering, but inaccurate performance

## Screenshot services (e.g. [Email: tutorcs@163.com](https://www.browserstack.com/screenshots))

- Not interactive, still useful for quick layout checks

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## Interactive remote devices (e.g. <https://www.browserstack.com/live>)

- More expensive than screenshot services, may exhibit some lag.

# Next week

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- Web-servers and server-side scripting.
- Create a simple database-driven content management backend.



## Self-study

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- Continue working on your assignment using your chosen template.
- Remember to use Chrome's DevTools to inspect and modify the page.

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## Reminders

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- Participation Milestone 4 takes place in this week's lab class.
- You must attend your **allocated lab class** for this participation assessment.