A pixel is not a pixel

Peter-Paul Koch http://quirksmode.org http://twitter.com/ppk SF HTML5, 6 April 2012

Example site

- http://mobilism.nl/2012/
- A proper responsive site that you can use on any device
- For most of the presentation I'm going to pretend it's not mobile-optimised

A pixel is not a pixel

- Three kinds of pixels
- Two viewports
- Zooming
- How to access all this with JavaScript
- Media queries width and device-width
- Meta viewport

Pixels

A pixel is not a pixel

- CSS pixels
- Density-independent pixels
- Device pixels

CSS pixels

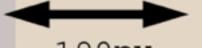
- CSS pixels are the ones we use in declarations such as width: I 90px or padding-left: 20px
- They are what we want
- Their size may be increased or decreased, though



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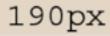
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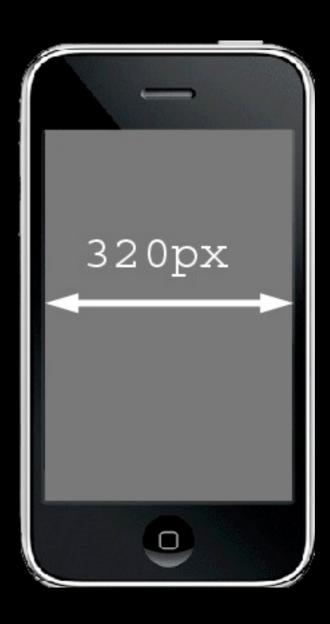
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- Device pixels are the physical pixels on the device
- They have a fixed size that depends on the device

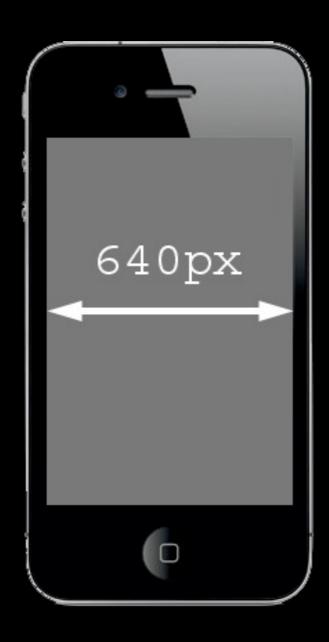


```
<meta name="viewport"

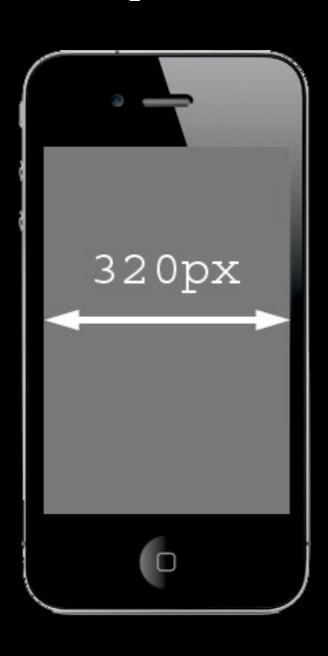
content="width = device-width">
```

- What is the device width?
- The number of device pixels
- So on the iPhone, your site is restricted to 320px

- But ...
- Devices get higher and higher pixel densities
- In theory this would mean that the meta viewport width also goes up
- But that would break sites



Density-independent pixels



Density-independent pixels

- Thus device vendors created densityindependent pixels (dips)
- They are another abstraction layer
- The number of dips is equal to the number of CSS pixels that is optimal for viewing a website on the device at 100% zoom
- For the iPhone that's 320px

Density-independent pixels

```
<meta name="viewport"
content="width = device-width">
```

- What is the device width?
- The number of dips
- So on the iPhone, your site is still restricted to 320px
- even on a Retina display

What do we need?

- CSS pixels
- Density-independent pixels
- Device pixels

What do we need?

- CSS pixels
- Density-independent pixels
- Device pixels

What kind of pixels?

If a certain JavaScript property is expressed in pixels

always ask yourself what kind of pixels.

Usually it's CSS pixels, especially for anything related to CSS

Sometimes it's device pixels or dips, for anything related to screen size

Viewports

Viewports

- The viewport is the total amount of space available for CSS layouts
- On the desktop it's equal to the browser window
- The https://html element has an implicit width:
 100% and spans the entire viewport



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Viewports

- On mobile it's quite a bit more complicated
- If the (narrow) browser window were to be the viewport, many sites would be squeezed to death
- And mobile browsers must render all sites correctly, even if they haven't been mobileoptimized



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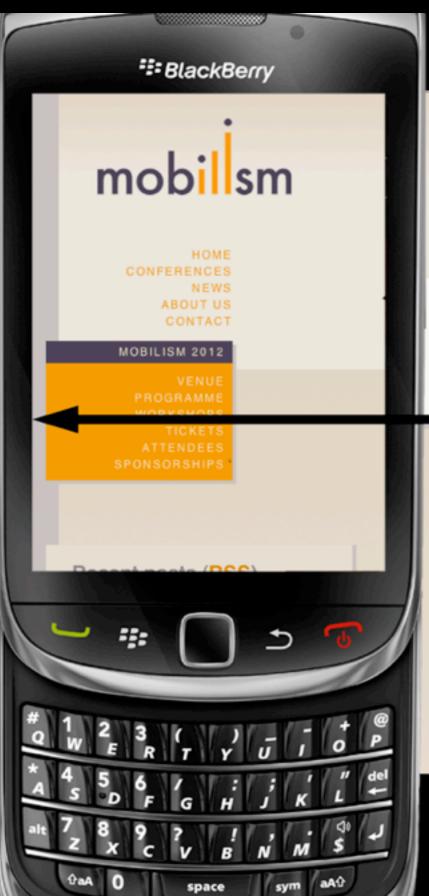
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Viewports

- That's why the mobile browser vendors have split the viewport into two:
- The layout viewport, the viewport that CSS declarations such as padding-left: 34% use,





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Viewports

- That's why the mobile browser vendors have split the viewport into two:
- The layout viewport, the viewport that CSS declarations such as padding-left: 34% use,
- and the visual viewport, which is the part of the page the user is currently seeing
- Both are measured in CSS pixels





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Viewports

- Initially most browsers make the visual viewport equal to the layout viewport
- by zooming the page out as much as possible

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Viewports

- Initially most browsers make the visual viewport equal to the layout viewport
- by zooming the page out as much as possible
- Although the page is unreadable, the user can at least decide which part he'd like to concentrate on and zoom in on that part

Zooming

Zooming

- Zooming on desktop and mobile are totally different
- On desktop the viewport is narrowed, which causes elements with padding-left: 34% to be recalculated (though they should still take up the same ratio)
- and elements with a width: I 90px to become relatively wider



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Zooming

 On mobile the visual viewport is decreased, so that the user sees less of the complete site





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Zooming

- On the desktop the viewport becomes less wide and the CSS pixels become larger.
- The same amount of device pixels now contain less CSS pixels, after all.

Zooming

- On mobile the visual viewport becomes less wide, but the layout viewport remains static. Thus CSS declarations are not recomputed.
- The visual viewport now contains less CSS pixels.

screen.width and screen.height

- The width and height of the screen
- In device pixels (or dips)
- Totally useless. Don't bother reading it out

document.documentElement.clientWidth and document.documentElement.clientHeight

- The width and height of the layout viewport
- In CSS pixels
- Useful, though mostly because of media queries

window.innerWidth and window.innerHeight

- The width and height of the visual viewport
- In CSS pixels
- Extremely important. It tells you how much the user is currently seeing

document.documentElement.offsetWidth and document.documentElement.offsetHeight

- The width and height of the <html> element
- In CSS pixels
- Very occasionally useful

window.pageXOffset and window.pageYOffset

- The current scrolling offset
- In CSS pixels
- Useful. Works just as on desktop

- System pioneered by Nokia and BlackBerry
- Picked up by Apple
- Android supports it only from 3 on
- IE9 on Windows Phone does not support it
- But otherwise browser compatibility is quite decent

document.documentElement.clientWidth /
window.innerWidth

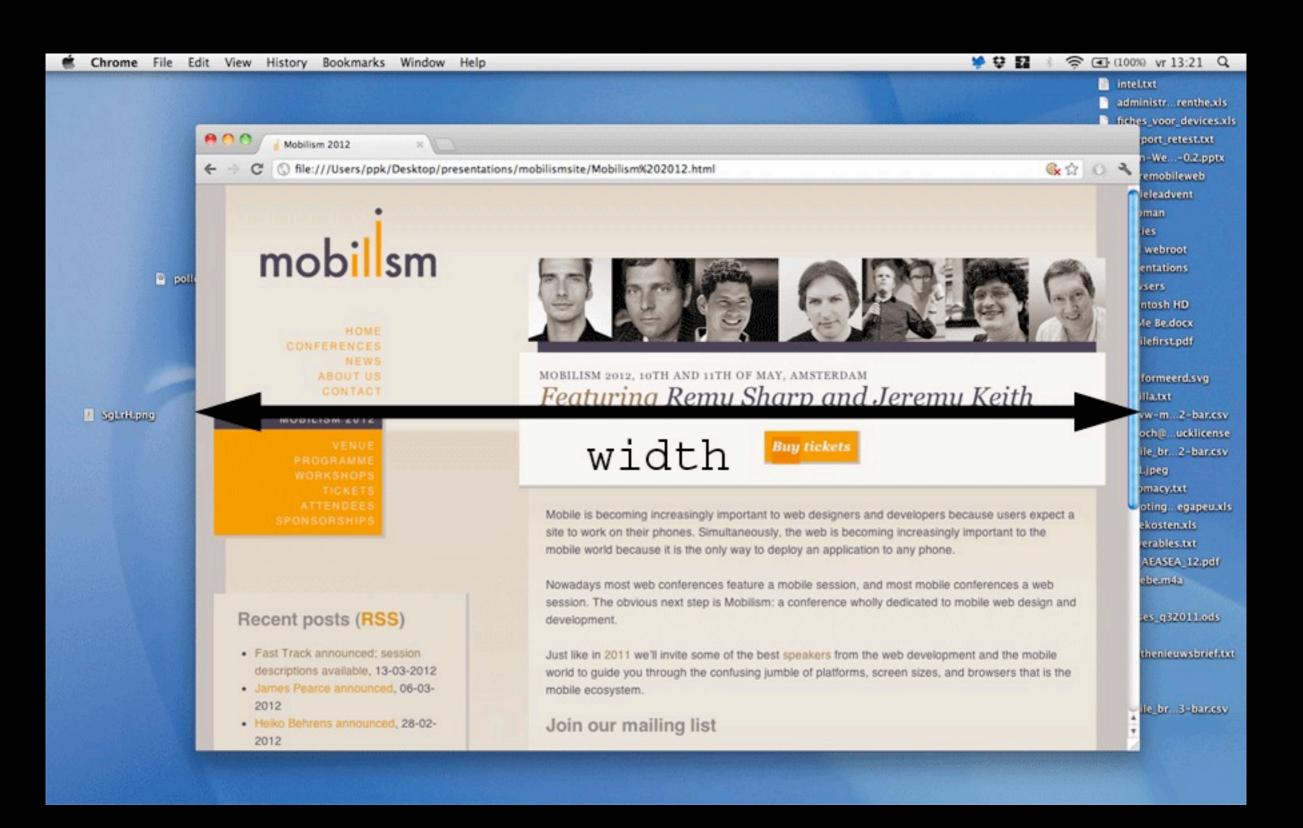
- This gives the current zoom level
- You're not interested in the zoom level, though
- You want to know how much the user is currently seeing
- The visual viewport, in other words

- There are two important media queries:
- width
- device-width
- width is the one you want

- device-width gives the width of the device screen
- in device pixels
- Equal to screen.width



- width gives the width of the viewport
- in CSS pixels
- (There are a few zooming problems on desktop, though)
- Equal to document.documentElement.clientWidth



- device-width gives the width of the device screen
- in device pixels or dips
- Equal to screen.width
- On mobile the screen is far smaller than on desktop, but that doesn't matter





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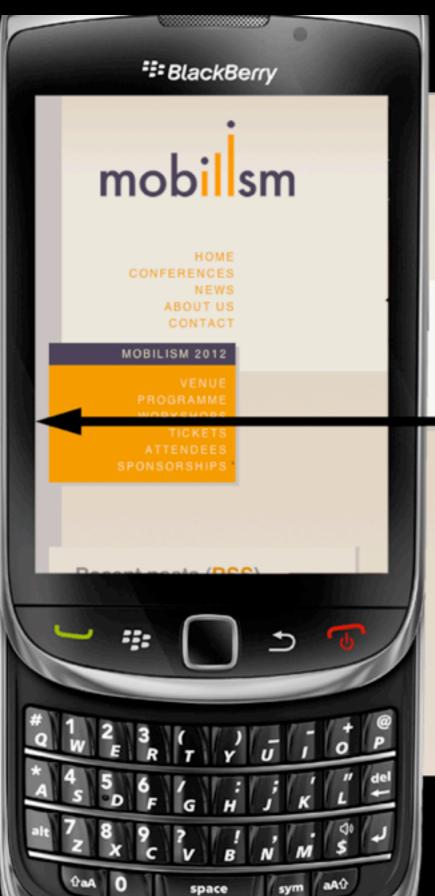
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- width gives the width of the viewport
- in CSS pixels
- Equal to document.documentElement.clientWidth
- On mobile this means the layout viewport





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width

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- width is the media query you want
- but at first sight it seems to be totally useless on mobile
- Usually we don't care about the width of the layout viewport
- We need to treat one more element, though.

```
<meta name="viewport"
content="width=device-width">
```

```
@viewport {
    width: device-width;
}
Only Opera for now
```

```
<meta name="viewport"

content="width = device-width">
```

- The meta viewport tag tells the browser to set the size of the layout viewport
- You can give a pixel value
- or device-width, which means the screen size in dips





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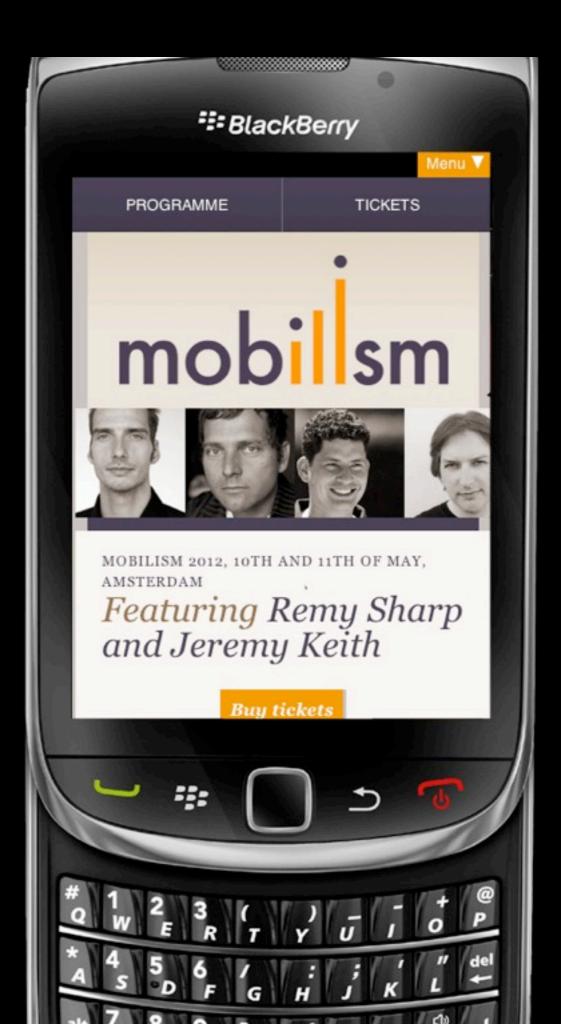
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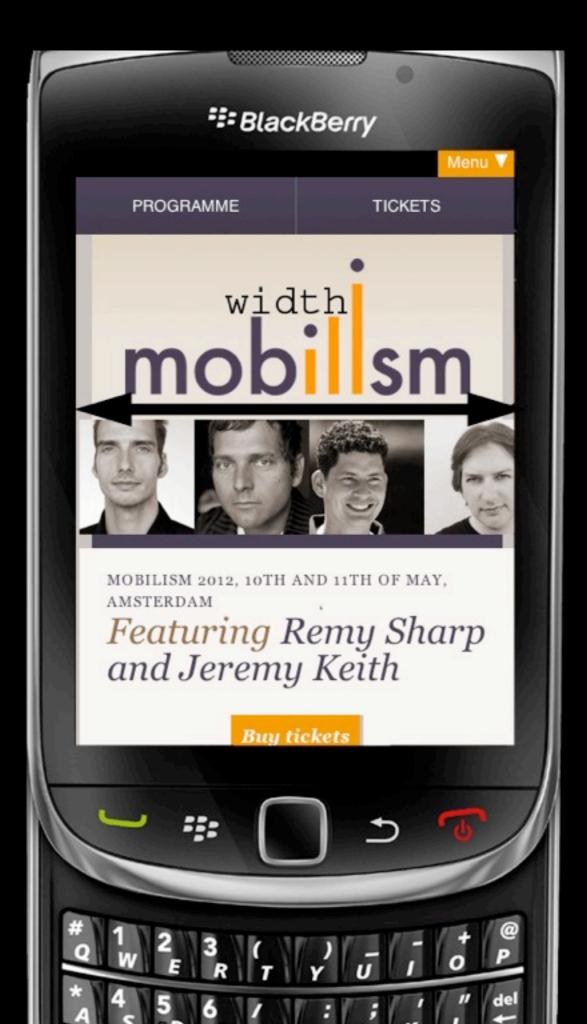
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```
<meta name="viewport"
content="width = device-width">
```

- There is little reason to use other values than device-width
- And because you tell the layout viewport to become as wide as the device
- the width media query now contains useful data



- In theory the device-width and width media queries would now return the same values
- but only when the zoom level is 100%
- This is a frighteningly complicated area
- Don't go there
- Use width

Mobile versions

- So the trick for creating a mobile version of a site
- is using <meta name="viewport" content="width=device-width" />
- in combination with width media queries
- You probably already knew that
- but now you also understand why

Thank you

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Questions?

Peter-Paul Koch http://quirksmode.org http://twitter.com/ppk SF HTML5, 6 April 2012