Responsive image overview

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```
<img
src="balloons.jpg"
alt="Hot air
balloons.">
```

Photo by Snapwire from Pexels

Responsive images

- Content choices – "art direction"

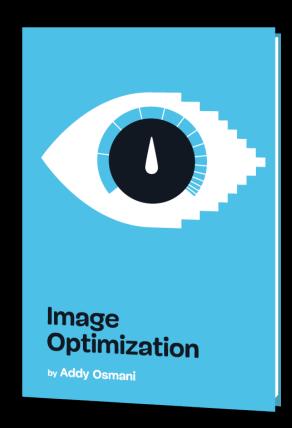- Format – GIF, JPG, PNG, SVG, AVIF, WebP, others

- Pixel density

- Image display dimensions

- Who chooses which image to use – you or the browser?

A brief history

- May 2010: Responsive images defined
- 2010-2014: Disaster
- 2014-2015: Standards defined
- 2016: `<picture>` supported
- 2017: `srcset` and `sizes` supported

Prime Directive

Only one image should load, even if many are specified.

BAD CODE

```
<div class="fake-responsive">
    <img src="tiny.jpg" class="tiny">
    <img src="big.jpg" class="big">
</div>
```

```
@media (max-width: 500px) {
    .big { display: none; }
}

@media (min-width: 501px) {
    .tiny { display: none; }
}
```

Use cautiously

```
<img src="big.jpg" alt="Big img">


img {
    max-width: 800px;
}
```

`<picture>`:

You decide
which image displays

```
<picture>
    <source
      src="balloons-lg.jpg"
      media="(min-width: 850px)">

    <img
      src="balloons-cropped.jpg"
      alt="Hot air balloons rise
            over the desert.">
</picture>
```

```
<picture>

    <source

      src="landscape.jpg"

      media="(orientation:
landscape)">


    <img

      src="portrait.jpg"
      alt="Hot air balloons rise
            over the desert.">

</picture>
```

(may work better with aspect ratio media queries)

```
<picture>

    <source

      src="landscape.webp"
      type="image/webp">


    <source

      src="landscape.png"
      type="image/png">


    <img

      src="fallback.jpg"
      alt="Hot air balloons rise
           over the desert.">

</picture>
```

However, `<picture>` forgets things...

How big is the image location (the hole) in the page layout?

How big are the images (the peg) that might be displayed?

What is the pixel density of the screen?

```
<picture>

    <source src="large.jpg"
      media="((min-device-pixel-ratio: 1.5) and (min-width: 20.001em) and (max-width: 35.999em))
              or ( (max-device-pixel-ratio: 1.5) and (min-width: 120.001em) )
              or ( (min-device-pixel-ratio: 1.5) and (min-width: 60.001em) )" />

    <source src="medium.jpg"
      media="((max-device-pixel-ratio: 1.5) and (min-width: 20.001em) and (max-width: 35.999em))
              or ( (max-device-pixel-ratio: 1.5) and (min-width: 60.001em) )
              or ( (min-device-pixel-ratio: 1.5) and (min-width: 10.001em) )" />

    <source src="small.jpg" />

    <!-- fallback -->

    <img src="small.jpg" alt="A rad wolf" />

</picture>
```

srcset and sizes:
The browser decides which image displays

Known unknowns...

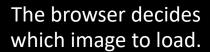| Variable	Known by author when she's writing the code?	Known by browser when it's loading the page?
viewport dimensions	no	yes
image size relative to the viewport	yes	no
screen density	no	yes
source files' dimensions	yes	no

https://ericportis.com/posts/2014/srcset-sizes/

Known unknowns...

Variable	Known by author when she's writing the code?	Known by browser when it's loading the page?
viewport dimensions	no	yes
image size relative to the viewport	yes	~~no~~ yes! via `sizes`!
screen density	no	yes
source files' dimensions	yes	~~no~~ yes! via `srcset`!

https://ericportis.com/posts/2014/srcset-sizes/

There's a catch

The browser decides which image to load.

The browser may not decide to load the image you expect.

Different browsers may make different choices.

```
<img src="small.jpg"

       srcset="large.jpg 1024w,
               medium.jpg 640w,
               small.jpg 320w"

       sizes="(min-width: 36em) 33.3vw, 100vw"

       alt="A rad wolf" />
```

```
<img src="small.jpg"
```

```
srcset="large.jpg 1024w,
        medium.jpg 640w,
        small.jpg 320w"
```

```
sizes="(min-width: 36em) 33.3vw,
100vw"
```

```
alt="A rad wolf" />
```

Fallback – if browser can't understand `srcset/sizes`, it displays this image.

`alt` attribute is the same for all images

```
<img src="small.jpg"

       srcset="large.jpg 1024w,
               medium.jpg 640w,
               small.jpg 320w"

       sizes="(min-width: 36em) 33.3vw,
100vw"

       alt="A rad wolf" />
```

File names and width of images in pixels.

Other units not accepted.

Same as
```
<img
src="large.jpg"
width="1024">
```

```
<img src="small.jpg"

    srcset="large.jpg 1024w,
            medium.jpg 640w,
            small.jpg 320w"

    sizes="(min-width: 36em) 33.3vw, 100vw"

    alt="A rad wolf" />
```

Size of the hole on the web page.

If the min-width is at least 36em, display the image at 33.3vw.

Otherwise, display the image at 100vw.

```
<img src="standard.jpg"
    srcset="retina.jpg 2x,
            super-retina.jpg 3x" />
```

That's a nice, compact way to supply hi-DPI imagery.
But!
It only works for fixed-width images.

```
<picture>

    <!-- 16:9 crop -->
    <source media="(min-width: 36em)"
            srcset="quilt_2/detail/large.jpg 1920w,
                    quilt_2/detail/medium.jpg 960w,
                    quilt_2/detail/small.jpg 480w" />

    <!-- square crop -->
    <source srcset="quilt_2/square/large.jpg 822w,
                    quilt_2/square/medium.jpg 640w,
                    quilt_2/square/small.jpg 320w" />

    <img src="quilt_2/detail/medium.jpg"
        alt="Detail of the above quilt, highlighting
             the embroidery and exotic stitchwork." />

</picture>
```

https://alistapart.com/article/responsive-images-in-practice/

```html
<picture>

    <!-- 16:9 crop -->
    <source media="(aspect-ratio: 16/9)"
            srcset="quilt_2/detail/large.jpg 1920w,
                    quilt_2/detail/medium.jpg 960w,
                    quilt_2/detail/small.jpg 480w" />


    <!-- square crop -->
    <source media="(aspect-ratio: 1/1)"
            srcset="quilt_2/square/large.jpg 822w,
                    quilt_2/square/medium.jpg 640w,
                    quilt_2/square/small.jpg 320w" />

    <img src="quilt_2/detail/medium.jpg"
         alt="Detail of the above quilt, highlighting
              the embroidery and exotic stitchwork." />

</picture>
```

https://developer.mozilla.org/en-US/docs/Web/CSS/@media/aspect-ratio

Which should you use?

`<picture>`

Image optimized for **content reasons** matters more than technical reasons.

Author chooses the best image.

Images may be very different in composition and dimension.

`src, srcset`

Image optimized for **technical reasons** matters more than content reasons.

Browser chooses the best image.

Images vary in dimension but not composition.

FINALLY: Responsive background images

Contain your background images in a media query

This should mean only one image downloads.

Constrain ALL background images in specific media queries or multiple images may download.

```
@media (max-width: 700px) {
    body {
        background-image: url(small.jpg);
    }
}

@media (min-width: 701px) {
    body {
        background-image: url(large.jpg);
    }
}
```

https://responsivebreakpoints.com/

Good for generating a series of responsive images
plus `srcset, sizes, <picture>` **HTML to go with them.**