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# Welcome to the issue

## THE WEB DESIGNER MISSION

To be the most accessible and inspiring voice for the industry, offering cutting-edge features and techniques vital to building future-proof online content



Steve Jenkins

## Highlight



We try to hire people from diverse backgrounds

They are Huge. Web Designer talks to the agency that are changing people's lives. Page 34

## What's up with web animation?



You can't help but be impressed by a brilliant piece of web animation. So what if it doesn't serve any other purpose than to show off a developer's skills? It's always good to see the boundaries being pushed in web design. But, animation on the web is so much more than just headline-grabbing acts. Subtle UI animations have just as much importance, if not more. Get these wrong and users may never come back. Our latest lead feature (page 40) looks at the current state of web animation, the technologies, how it affects the user and offers expert tips and tutorials.

The importance of the user should never ever be forgotten. Without them a site or app is doomed to fail. Designing the right UX is what our feature on page 66 is all about. It looks at user-centred design, why you should use an iterative design approach and the latest trends that will help future-proof the user experience.

What needs to be done before a user gets to play with a site or application? It needs to go through a strict set of tests. The right tests will weed out any problems and stop any serious issues being exposed to the public. Our feature on testing (page 72) reveals the tests you need to consider and the best tools for the job.

Plus, as always we have our staple selection of CSS, HTML and JS tutorials to keep you busy. Enjoy the issue.

We're just missing a standardised timeline animation IDE like we had in Flash that will output clean, lightweight code

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# 50

## Designer resources

**Video Tuition** - jQuery: 62 Minutes of expert video guides from CartoonSmart

**Assets** - 30 Dessert and candy icons from SparkleStock  
- 15 Abstract effects from SparkleStock

**Fonts** - Pretender and Rakesly font from Typodermic fonts



www.filesilo.co.uk/webdesigner

# This issue's panel of experts

Welcome to that bit of the mag where we learn more about the featured writers and contributors...



**Richard Wentk**

Richard is the director of Skydancer Media, a full-service media company creating apps and building websites. He is also the author of numerous web development books. This issue he delves into the world of web animation and reveals what you need to know to get creative. **Page 40**

It's more useful to think of animation as a tool you can use to enhance your site's production values

### Stephanie Ellis



Stephanie has been working in user experience since 2009. She has worked on major brands including Exxon, Unilever and Vodafone. This issue she reveals the crucial role of UX in design and takes a look at the latest trends. **Page 66**



### Tam Hanna



Tam is a veteran in the world of coding and has worked with a host of coding languages. This issue he provides an insight into the very important role of testing. From accessibility to unit testing and the best tools, they're all here. **Page 72**



### Mark Shufflebottom



Mark Shufflebottom is professor of Interaction Design at Sheridan College, Canada. The animation library Snap.svg is his forte this issue. He reveals how to create an interactive exploded-view infographic. **Page 48**



### Matt Gifford



Matt Gifford is a web development consultant and industry author from Cambridge. He has over a decade of industry experience and in his latest tutorial he reveals how to develop a feature-rich API with Hapi.js. **Page 84**

### Sean Tracey



Sean is a creative technologist living and working on the south coast. He loves playing with the latest JavaScript APIs. And, this issue he reveals how to build a Chrome OS app with the popular programming language. **Page 54**

### Mark Billen



Mark is a freelance technology journalist with a background in web design and development. This issue he tackles the Lightbox pages and reveals how to create a host of quick-fire techniques you need to know. **Page 16**

### Tim Stone



Tim is a lead front-end developer at Redweb and has a first-class degree in Interactive Media Production. In this issue he shows how to use Angular 1.4 to make user feedback forms easier for developers and users. **Page 78**

### Ralph Saunders



Ralph is a front-end developer living in Bournemouth. He likes to push the traditional boundaries of web design and this issue he explores building aspect ratio-based layouts with HTML and CSS. **Page 60**

**Got web skills?**  
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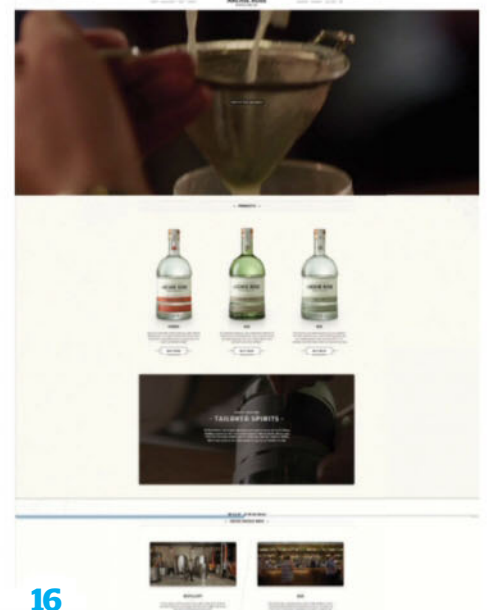
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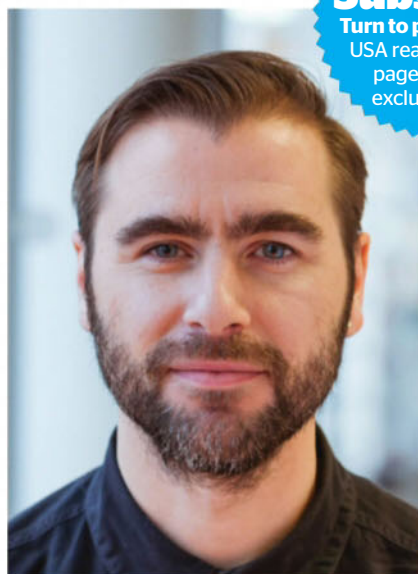
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Contextual design is a natural progression from Web 2.0

James Deeley

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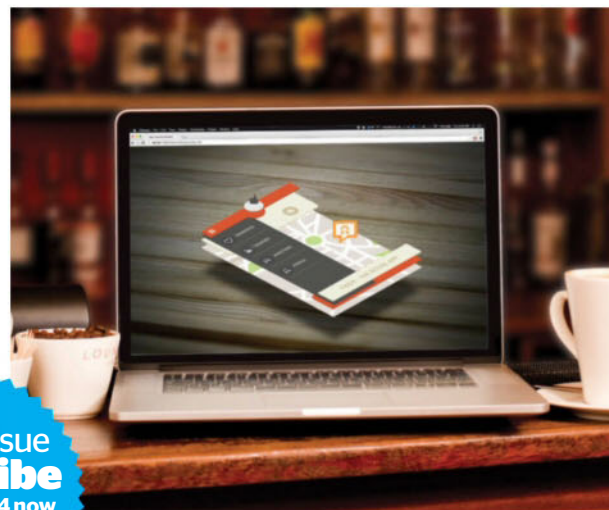
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## The tools and trends to inspire your web projects

If you have a creative project, new web product or great designer story, contact the editorial desk

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# WebAssembly: a faster, better JS

Google, Mozilla and Microsoft have teamed up to create a faster, leaner programming language. Web Designer takes a closer look

JavaScript has been a mainstay of web development for as long as browsers have been around. The .js extension is seen everywhere, you only need to take a look through an issue of **Web Designer**

to see how popular it is. And, like all web technologies, creators, users and developers are always looking for ways to make JS faster and more efficient. As the web grows and matures, JavaScript has looked to follow suit. New data types have been introduced to try and get the language somewhere near native code, but JavaScript still has its limitations. It was almost inevitable that a new format would make an appearance and that time has come.

The web's big boys Google, Mozilla, Microsoft and others, announced that they had teamed up to launch WebAssembly ([github.com/WebAssembly](https://github.com/WebAssembly)). But what is

WebAssembly? In a nutshell WebAssembly is a new language in binary format that will improve performance. The next question is why do we need WebAssembly? You might find this hard to believe but JavaScript is not perfect. To run in the browser there are effectively two stages. First JavaScript has to be compiled into machine code or bytecode. Once this has been done the code is optimised so that it will run faster. What can be done to improve this scenario? The obvious is to reduce the stages involved in the process. So how does WebAssembly work? WebAssembly gives users access to a set of low-level building blocks that we can use to construct just about anything you can imagine. Sounds good. To find out more about what is happening it's worth starting with Brendan Eich's blog, the man who invented JavaScript ([brendaneich.com/2015/06/from-asm-js-to-webassembly](https://brendaneich.com/2015/06/from-asm-js-to-webassembly)). Other sources worth checking out include the FAQ on GitHub.

These resources answer a lot of questions like why create a new standard?, What compilers can be used to build WebAssembly programs? Is WebAssembly trying to replace JavaScript?

Also make sure that you check out the W3C WebAssembly Community Group ([w3.org/community/webassembly](https://w3.org/community/webassembly)).

Does this mean that the end is nigh for JavaScript in its current state? Yes and no. WebAssembly is only at the beginning of its path to completion. And, even when WebAssembly is fully implemented in all commonly used browsers there will still be the old-age problem of legacy issues. Remember that IE6 is still in existence, and so will JavaScript be for years to come, supporting the millions of sites that have been coded with HTML, CSS and JavaScript. But, with Google and its ilk behind the drive to adopt WebAssembly, it won't be long before it becomes part of the everyday development process.

 WebAssembly gives users access to a set of low-level building blocks... to construct just about anything 

## Five to follow

Find out what's happening with JavaScript by following these accounts

### Eric Elliott

[@\\_ericelliott](https://twitter.com/_ericelliott)  
A compassionate entrepreneur and keen advocate of JavaScript. Author of *Programming JavaScript Applications*.

### Brendan Eich

[@BrendanEich](https://twitter.com/BrendanEich)  
This is the man who invented JavaScript, cofounded **mozilla.org** and has served as CTO, SVP Eng and later as CEO at Mozilla as well.

### Alex Rauschmayer

[@rauschma](https://twitter.com/rauschma)  
Alex describes himself as a JavaScript person. He blogs, writes, is a trainer and organiser of the MunichJS User Group.

### Badass JavaScript

[@badass\\_js](https://twitter.com/badass_js)  
A showcase of awesome JavaScript that pushes the boundaries of what is possible for designers on the web today.

### JavaScript Live

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# <design notes>

A collection of inspirational visuals

## Finishing touches: A men's style guide

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**1** Everything about this infographic ties in with the content. The colour scheme is muted and hipster.

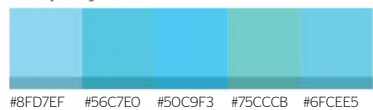
**2** The layout of the infographic is relative simple, but angles and typography add interest. What really stands out are the illustrations.



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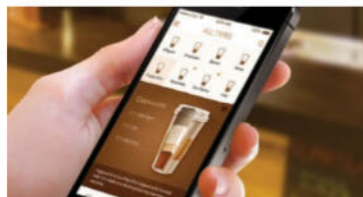
### Arx

bit.ly/1SN8zbT

A font with style, perfect for big headline with a difference.

## Graphics

Great visuals to inspire



### Coffee Time app

on.be.net/1BD11q5

A gorgeous and lush-looking interface all about our favourite drink. This is currently a concept created by London-based studio Inkration.

## Themematic

Style up your WordPress



### Barbershop

barber.axiomthemes.com

A classy dark theme that hipsters will absolutely adore. Subtle animation and black-and-white photography add to the overall ambience.

## Sites of the month



### Catch the dragon catchthedragon.nl

An interactive VR experience that engages and engulfs the user



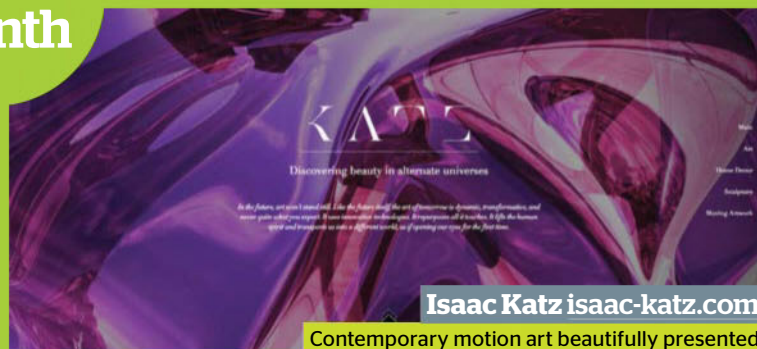
### Miki Mottes mikimottes.com

Full-scale illustration with smart subtle animations



### Time4: Good yourtime4.com

Crisp side-scrolling storytelling animations



### Isaac Katz isaac-katz.com

Contemporary motion art beautifully presented

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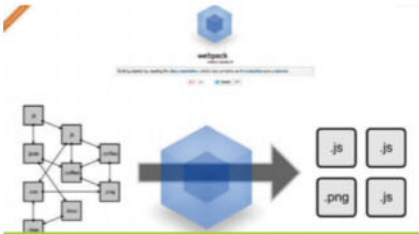
Discover the must-try resources that will make your site a better place



## Ring generator

[joeyvandijk.github.io/rimg](http://joeyvandijk.github.io/rimg)

A responsive image solution for browsers that support media queries. This is a pure JavaScript solution. No server-side code here.



## webpack

[webpack.github.io](http://webpack.github.io)

Webpack is a module bundler. It takes modules with dependencies such as JavaScript, Less, CSS and then generates static assets representing those modules.



## Back& backand.com

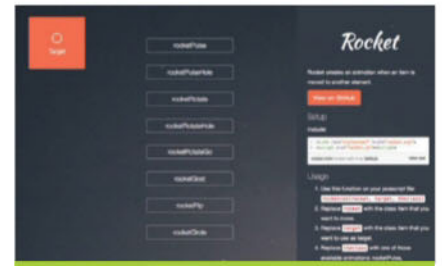
We all like the easier life and Back& is here to help. In a nutshell it's a 'Feature-rich backend-as-a-service for Angular that takes care of all the yucky server-side stuff'. It's easy to get up and running and offers a host of services that enables users to concentrate on their applications rather than the backend. Forget about hosting, setting up and maintaining servers and backups - these are all included in the price. The service is currently in beta with prices expected to start at around \$19 (£12) a month. However, if you sign up before it comes out of beta you can get a 'free-forever account'.



## Glyph

[glyph.smarticons.co](http://glyph.smarticons.co)

Who needs icon fonts? Check out this semantic and very comprehensive SVG icon set designed for customisation.



## Rocket

[minimamente.com/example/rocket](http://minimamente.com/example/rocket)

A quick, simple JavaScript solution for animating an item moving from an element. Try all the different animations before using.

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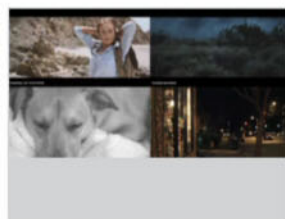


## Coverr

[coverr.co](http://coverr.co)

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# 02



## Mazwai

[mazwai.com](http://mazwai.com)

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# 03



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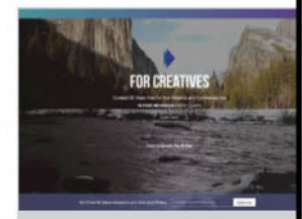


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# 05



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# CONTEXT IS KING

Say goodbye to responsive technologies and say hello to a UI with customer experience and consumer context at its heart

**I**f content is king, then it's about to be usurped. As far as smart devices go, it's now all about the context and the brands that succeed will be those that realise this early on.

It is fairly well accepted now (and indeed expected) that smart devices, such as phones and smartwatches, are clever enough to deliver relevant content for a user. For example they may know where you are based and then alert you with the appropriate weather updates or traffic news - nothing surprising there, right?

The next big leap however is for these smart devices to provide the appropriate content in the right context. For instance, when travelling by car, for various smart technologies to work most effectively the smartwatch and the smartphone need to communicate together and with the in-car system to ensure that all three are not performing the same functions. In an ideal world, one technology would navigate, one would alert to the best parking spots available and one would send a message to the restaurant to notify that you're five minutes late. This is what we mean by 'context' and why it needs to dictate your content and user experience strategy.

As an outcome to the need for technology working smarter in this new consumer context, there is now a lot of hype around contextual design. So, what is it and why is it a brave new world?

Contextual design is a natural progression from Web 2.0, responsive design, and mobile-first and content-first approaches. It's a clear indicator that we've reached a 'new level' in design development and it's one that essentially marries together the rapid development and adoption of a wide range of devices, within the ever-changing consumer landscape.

The end result should be the development of a network of smart devices all around the individual, all collecting and analysing our data as a fully intelligent



## JAMES DEELEY

Director of creative strategy, Amaze  
amaze.com

James Deeley is director of creative strategy at Amaze. He

has over 15 years' experience, working with some of the world's biggest brands including American Express and the BBC. He also cofounded the Pottermore digital experience.

shift too. A quick look into the wearables market for instance shows how 45 per cent of current smartphone users either own or plan to buy a wearable device within the next 12 months, perfectly demonstrating the beginning of a big shift in technologies.

The idea of a single consistent and 'one-size-fits-all' experience across all channels is therefore no longer relevant or appropriate. Instead, each will have to have a more natural and distinctive role to play in our ecosystem. We've moved beyond the idea that we need purely responsive design, we now need contextual design.

So what does the future hold for the humble website? Websites could become digital galleries or online libraries, allowing consumers the opportunity to pause, savour and get the full story. While if you're paying bills, shopping or checking the weather, then it's likely that these tasks will be fulfilled by your smart device. These quick-fix interactions just don't need websites anymore and digital design needs to reflect this change too.

Just how far can we go? In all honesty as far as your imagination can stretch. We could see a development in two distinct directions. The first is an increasingly personal and intimate relationship with devices that learn, adapt and anticipate from our moods, patterns of behaviour and daily routines. The alternative is less obvious, but instead more of an 'invisible infrastructure' that connects the physical world and made up of a world of sensors, beacons and hidden servers.

In either direction however, it is clear that technology and devices will be immensely sophisticated and fully responsive to our needs - consequently their design will need

to reflect this. The result? A myriad of devices and worldly touchpoints, operating systems and digital services that will develop a personality using data about our needs, and the context of our wider lives.

Sound far-fetched? Yes, maybe, but then so did the iPhone in 2006.



# THE FUTURE OF STORAGE

Tobias Brinkmann of OCZ reveals how bigger and better storage mediums will affect the way we work

**Q. Everything web designers and developers create is saved to storage. What tips would you give to ensure minimal data loss?**

In order to minimise data loss the best way to do so is to move to make the transition from a Hard Disk Drive (HDD) to a Solid State Drive (SSD). Unlike HDDs, SSDs do not have any moving parts, making them far more shock resistant and ideal for mobile solutions.

Keeping the system stable also plays a vital role in minimising the risk of data loss. Many users tend to run OS updates but forget to update their hardware. Updating reduces the risk of data corruption due to old firmware or software bugs.

In order to be better protected from power-related issues, a drive that features Power Loss Protection (PLP) or Power Failure Management Plus (PFM+) can also be a good choice as both types ensure that data that resides on the drive is secure. Finally yet importantly, the best way to minimise the risk of data loss is to back up your data frequently, eg with the use of cloud storage for mobile users or RAID 1+ configurations for desktop users.

**Q. What does SSD offer and how long before it's superseded by the 'next big thing'?**

SSD adoption continues to increase rapidly in various segments and is not going to be replaced by the 'next big thing' anytime soon but continues to make its way into more PCs, handheld devices and servers.

The advantages SSDs offer compared to hard disk drives are many. SSDs are more durable – they feature a nonmechanical design of NAND flash mounted on circuit boards, and are shock resistant up to 1,500g/0.5ms. Whereas HDDs consist of various moving parts making them susceptible to shock and damage.



**TOBIAS BRINKMANN**  
Vice president, EMEA sales & global marketing  
OCZ.COM

SSDs are faster – they offer 100 times greater performance, almost instant data access, quicker bootups, faster file transfers and an overall snappier computing experience. HDDs can only

Tobias started working in IT in 2001 at Komplet and joined OCZ five years later. After a stint in the consumer electronics industry, he returned to OCZ in 2011.

access the data faster the closer it is from the read/write heads, while all parts of the SSD can be accessed at once.

SSDs use less power – they use less power at peak load than hard drives, less

than 2W or even 6W in DEVSLP mode vs. 6W for an HDD. Their energy efficiency delivers longer battery life in notebooks, less power strain on system and a cooler computing environment.

SSDs are lighter – they weigh less than 50g compared to over 700g for HDDs.

They're also cost efficient, though still at a higher price/gigabyte than hard drives, SSDs offer cost savings in the long run for businesses with lower energy usage and greater productivity with higher Input/Outputs Operations per Second (IOPS). One SSD delivers the performance of 100 hard drives.

Finally, SSDs are cooler and require very little power to operate meaning significantly less heat output.

**Q. You can now buy a 32GB flash drive for £10. Two years ago, this would have easily been ten times the price. Why is this?**

Because of the technological advances in NAND flash research and development, we are able to offer more storage capacity on a smaller surface. As a result, this decreases the required resources, with SSDs and other flash-based solutions like USB thumb drives becoming more popular.

**Q. What storage sizes and transfer speeds do you think will be the norm in five years time?**

When it comes to performance, the current limitations are the interfaces. We recently introduced our Z-Drive 6000, the most advanced addition to its family of enterprise drives. We are talking about a 2.5-inch drive with up to 8TB in terms of capacity, 700,000 IOPS and 2,900MB/s sequential. These performance and capacity numbers could not have been imagined years ago which shows you how quickly the SSD/flash storage market is evolving – it makes it very hard to make a prediction for the next five years.

# Fast & flexible Cloud Servers

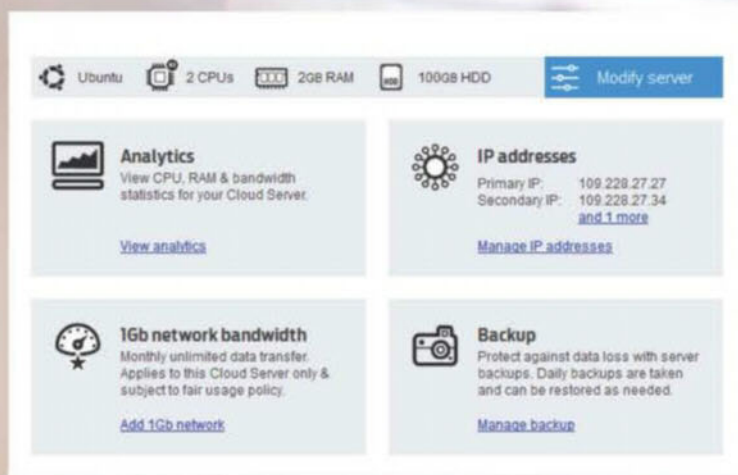
Richard Cullen, Managing Director at bluebox  
Fasthosts customer since 2002

## Cloud Servers – ultimate speed and resilience

**Fasthosts' UK-based Cloud Servers are fast – really fast – and with 3-way mirroring, they give you the resilience you need to stay in control.**

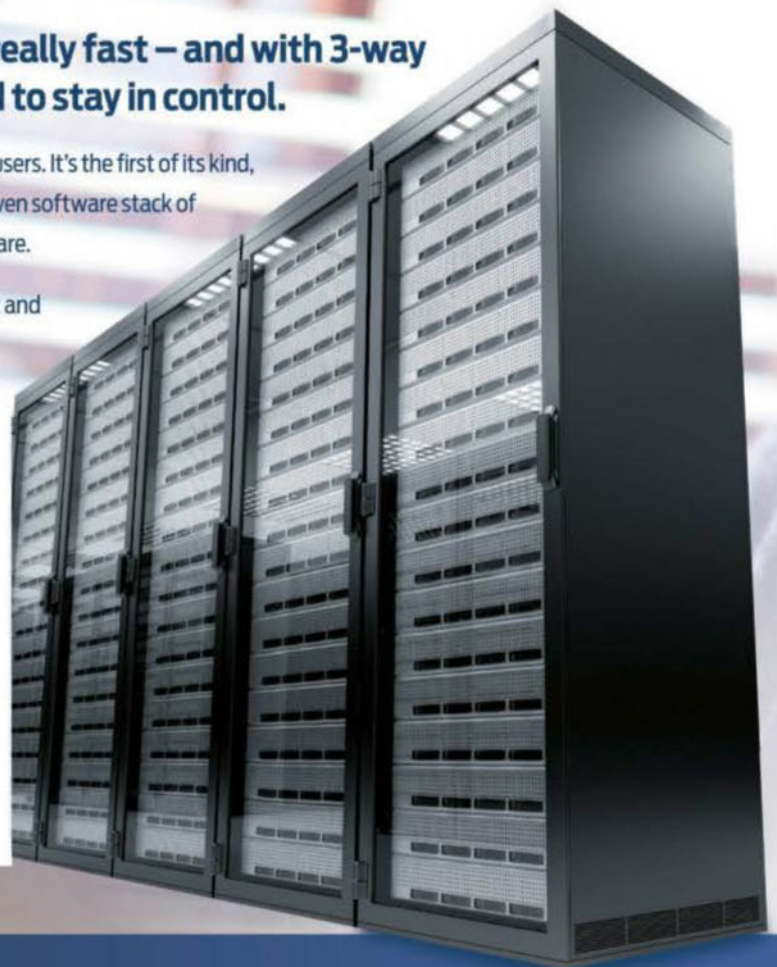
The platform we've created with Dell and Microsoft already has around 1,500 users. It's the first of its kind, using the latest Microsoft Cloud Platform System (CPS) which combines a proven software stack of Windows Server 2012 R2, System Center 2012 R2, Storage Spaces & Dell hardware.

Whatever application you're building, and however big it gets, 24/7 UK support and competitive pay-per-month pricing make Fasthosts your provider of choice.



The screenshot shows a control panel for a cloud server. At the top, it displays the operating system (Ubuntu), CPU count (2 CPUs), RAM (2GB), and HDD (100GB). Below this are four main sections: Analytics (with a 'View analytics' link), IP addresses (listing primary and secondary IP addresses and a 'Manage IP addresses' link), 1Gb network bandwidth (with an 'Add 1Gb network' link), and Backup (with a 'Manage backup' link). A 'Modify server' button is visible in the top right corner of the panel.

*The Fasthosts control panel completes the picture, with easy analytics and server management.*



Call **0333 0142 709**  
or visit **fasthosts.co.uk/cloud-servers**

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Cloud Servers

## Custom-build an advantage for your business:

### Ultimate speed

Microsoft Storage Spaces and enterprise grade SSDs give you the highest throughput and lowest possible latency – for the ultimate user experience.

### 99.99% uptime guarantee

3-way mirroring gives extreme resilience. Create your own disaster recovery, with server backups automated for you.

### Latest OS

Change configuration whenever you need: 1-24GB RAM (+ 33% bursts), up to 16vCPUs...and optional installed MS SQL Server on Windows 2012 R2.

### Expert UK support

Phone, text, email and chat support from technical specialists – all the help you need to resolve issues and implement better projects.

Cloud Servers from:

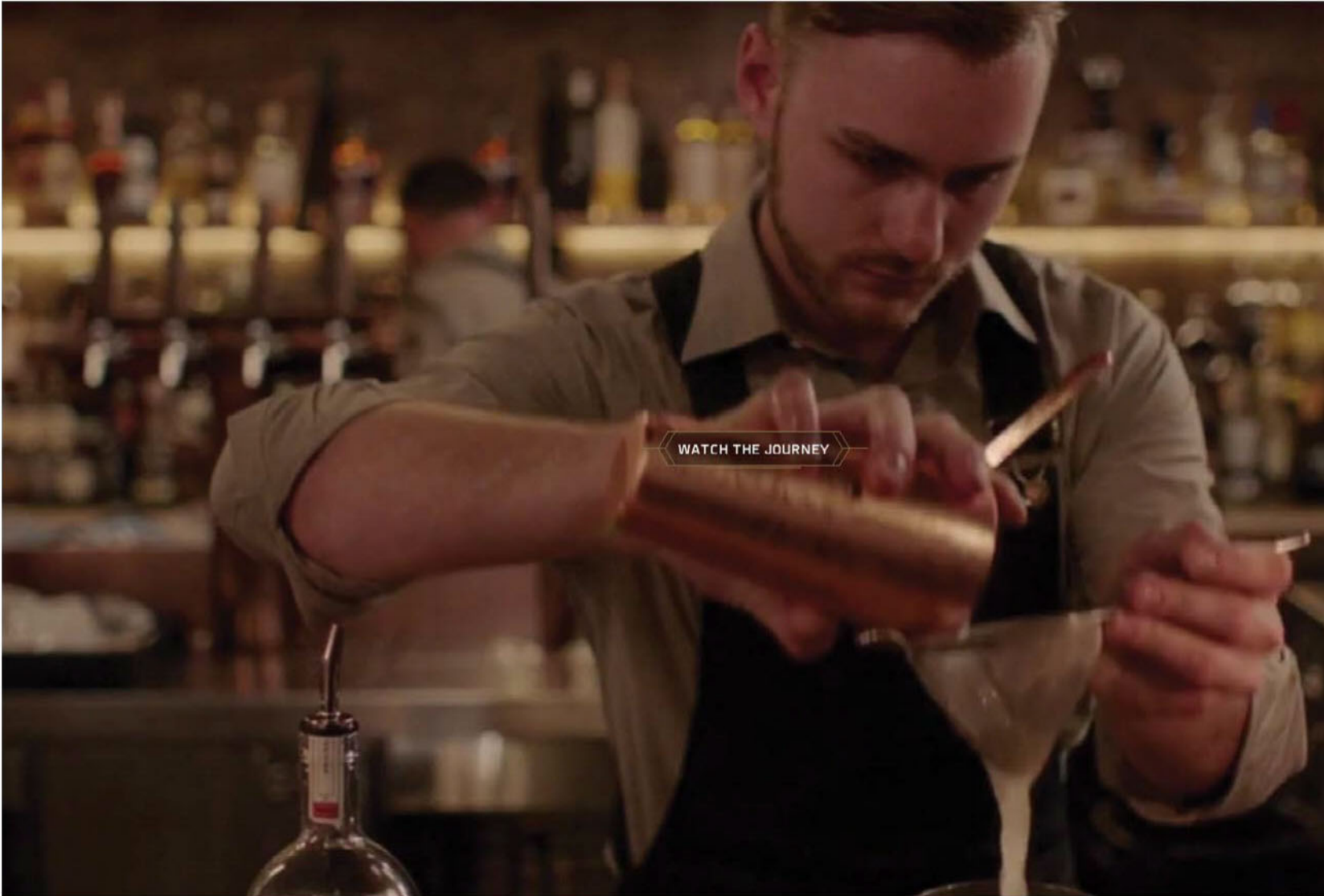
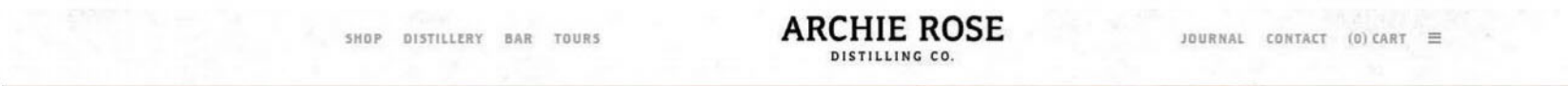
**£11.99**  
per month

ex VAT charged at 20%.  
12 month minimum term contract.



**Microsoft Partner**  
Gold Hosting





**<Above>**  
 • The opening shop section of the site sets up an elegant, classic template style with image and video accenting a restrained colour scheme



**<Above>**  
 • Click the Watch the Journey link on the main header movie clip and the video goes fullscreen to describe the origin of Archie Rose

**<Above>**  
 • Each of the three products can be viewed in greater detail, using a zig-zag layout to describe the unique story of distillation

**<Above>**  
 • Toggling into Gallery view entices drinkers with glossy professional product shots, presented with minimal fuss

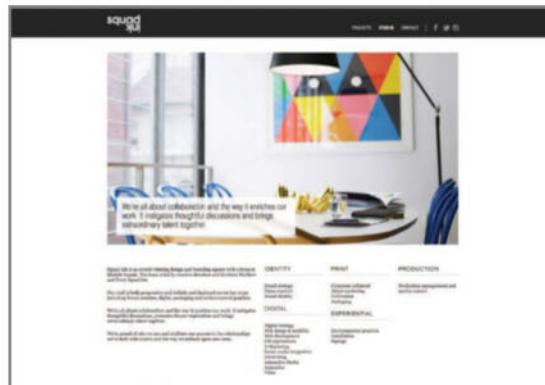
**<Above>**  
 • On first visit the site asks about your appropriate drinking age while another stylish canvas clip loops in the background



# Archie Rose Distilling Co.

archierose.com.au

**Development technologies** HTML5, CSS3, Node.js, Django, Modernizr



Designer **Squad Ink (Design), Weekends**  
squadink.com, weekends.ws

A collaborative design serves a tasteful brochure site illustrating a rich product story



**in the face of things, a website selling the virtues of an Australian distillery bottling vodka, gin and white rye may not sound so remarkable.** But this distinctly refreshing example for Sydney's Archie Rose charmingly blends rich assets with a personal journey. Designed by New

South Wales' agency Squad Ink as part of a wider branding and launch strategy, the build duties were then handled by Dominic Whittle's Hobart studio Weekends. The resulting eCommerce experience focuses then as much on Archie Rose founder Will Edwards as it does on the product. High-quality video clips and evocative photography takes the visitor on a

highly personal journey pieced together by clean, uncluttered templates and economical typography. "It's a pretty interesting build actually," explains principle designer and developer at Weekends, Dominic Whittle. "A custom admin running on Django sends data to a Node frontend and template layer." This combination of progressive web technologies and business storytelling is a potent mix, alongside a sense of consistency. The various page templates all adhere to smooth design restraint that not only looks sharp but also ensures the URL looks equally at home on smartphone or tablet. The A.R. Journal adopts a blog-like structure delivering news, community updates, education on distillation and indeed a mixology of serving ideas. Presentation here remains unfussy and tasteful in its timelessness - pretty apt all things considered.

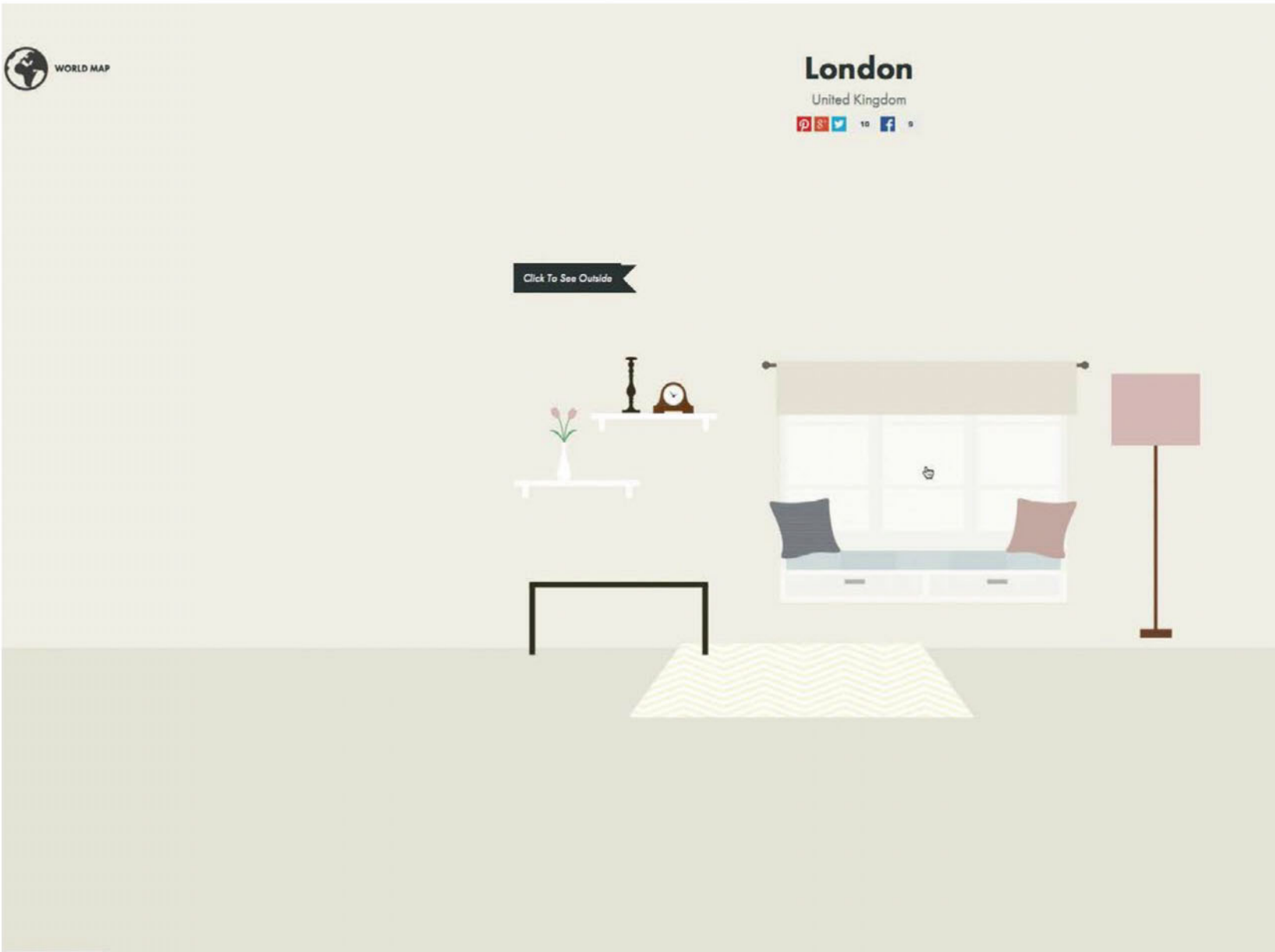
**High-quality video clips and evocative photography takes the visitor on a highly personal journey**

ABCABC  
1234567890

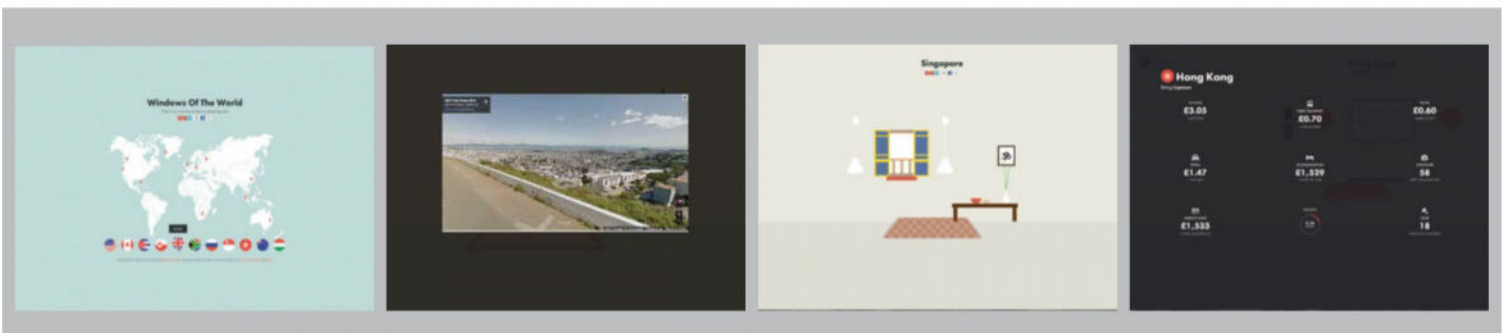
<Above>  
• A font known as Brooklyn features within the page styles, providing a blocky typeface

abcABC  
1234567890

<Above>  
• The Brothers font by Emigre provides the very distinctive blunt-cornered text used to style the page links and headers



**<Above>**  
 • Various key cities from various international countries have their living room windows represented in flat vector-style



**<Above>**  
 • The site opens on a flat world map, which features pins and button icons for navigating more directly

**<Above>**  
 • Click the window and the site makes use of Google Maps API to 'see outside' and visit the selected location virtually

**<Above>**  
 • Users can simply swipe left and right between windows or use the pop-down rollover button menu on the right

**<Above>**  
 • Fancy moving there? The site opens the window to relocation by offering some enlightening living cost stats





# Windows Of The World

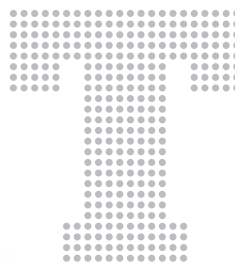
[woodyattcurtains.com/windows-of-the-world](http://woodyattcurtains.com/windows-of-the-world)

**Development technologies** HTML5, Sass, jQuery, Featherlight lightbox, TypeKit, Modernizr, Font Awesome, SVG, Numbeo.com



Designer **Impression, Woodyatt Curtains**  
[impression.co.uk](http://impression.co.uk), [woodyattcurtains.com](http://woodyattcurtains.com)

This beautifully illustrated microsite opens the curtains to usher cosmopolitan air into your browser



**These days eCommerce is evolving in new engaging ways to showcase diverse product types and this effort from UK trader Woodyatt Curtains typifies that.** Intended as a compact stand-alone microsite, Windows Of The World contrasts starkly with the company's main dotcom. A

series of sharp, sugary coloured vector illustrations depict distinctive living space windows for eleven international cities. Visitors pick locales from a main rollover map or merely shuffle the carousel-like navigation through London, San Francisco, Vancouver, Havana and beyond. Each clean, unfussy SVG illustration can be clicked to see the 'outside' - a pop-up

vista from Google Maps. Click an arrow tab on the right and a full-page overlay describes numerous stats on the featured location's living costs. A collaborative project between Nottingham agency Impression and Woodyatt, designer Rebecca Lee and developer Sam Goddard ran with the idea of demonstrating cultural differences across global interior design. "The minimal, flat design style fits in well with today's genre of interior design," explains Sam Wilson, developer at Impression. "The layout boasts a contemporary feel with interactive and educational features, pulling statistics from [numbeo.com](http://numbeo.com) and internal research. The project was perfect to utilise modern front-end development techniques, using HTML5, mobile-first Sass, jQuery and SVG images to build the site, it retained the high quality that Impression prides itself on."

**abcABC**  
**1234567890**

abcABC  
 1234567890

<Above>  
 • Futura PT in Book and Heavy weights open the site and style sparse page text confined only to country headings

**The minimal, flat design style fits in well with today's genre of interior design**

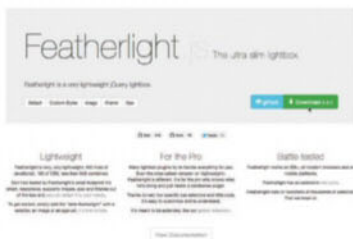


## Add a Google Maps custom lightbox with Featherlight

Impression's Sam Goddard explains how the many Windows Of The World were given a view using Google Maps and a lightweight jQuery plugin

### 01 Introducing Featherlight

Windows Of The World utilises Noël Bossart's Featherlight lightbox ([noelboss.github.io/featherlight](https://noelboss.github.io/featherlight)) to show the Google Maps content on click. The entire plugin weighs less than 6KB so it was ideal for this mobile-first responsive site. It also came with IFrame support built in, which was perfect for working with Google Maps and showing the 'view' outside each world window. Over the next few steps we'll explain how you can achieve a similar technique!



### 02 Prepare the assets

The first step in using Featherlight.js is to include all the necessary plugin assets which are helpfully hosted on a Content Delivery Network (CDN), ready for you to make use of. Just simply include the CSS in the <head> and JavaScript before your page's closing </body> tag as we have shown below in this code, or download the ZIP and check out the full plugin documentation over at [github.com/noelboss/featherlight/#installation](https://github.com/noelboss/featherlight/#installation). Make sure that you add the latest jQuery library also:

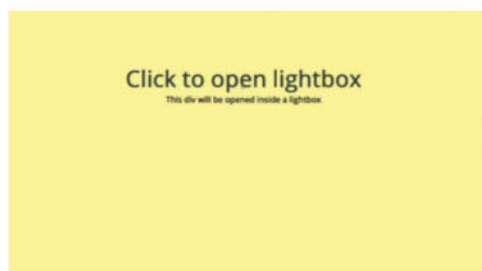
```
001 <link href="http://cdn.rawgit.com/noelboss/featherlight/1.3.1/release/featherlight.min.css"/>
002 ...
003 <script src="http://code.jquery.com/jquery-migrate-1.2.1.min.js"></script>
004
005 <script src="http://cdn.rawgit.com/noelboss/featherlight/1.3.1/release/featherlight.min.js" type="text/javascript"></script>
006 </body>
007
```

### 03 Putting it into practice

Once attached to your page, the plugin fires on all elements that are using the 'data-featherlight' attribute. So it's a simple case of assigning this to your

chosen <a> anchor tags and creating a separate container with a matching id for the lightbox content. So here we've got a simple text link opening another <div> to illustrate what we've done:

```
001 <div class="container">
002
003 <a href="#" data-featherlight="#theLightbox">Click to open lightbox</a>
004 <div id="theLightbox">This div will be opened inside a lightbox</div>
005
006 </div>
007
```



### 04 Keeping elements hidden

One of the things that you may have noticed at this point in our Google Maps workshop is that currently our target <div> is visible on our main page. The site works around this precisely by placing link and target element within a container <div>, and you can see that we have done this already in the previous step. By setting display to 'none' in a CSS selector class referencing container and element, the element only shows within the lightbox - and this will work exactly as we've desired it!

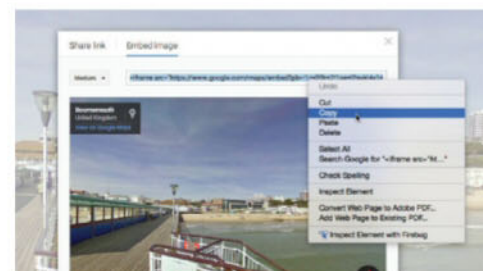
```
001 .container #theLightbox{
002 display: none !important;
003 }
004
```

### 05 Google Maps link

The next step was to find unique places for each country that we want to use in our project by searching for them and looking on Google Maps. This process was done very simply by going into Google Street View; just explore all the different areas until you find a good-looking location that suits the site you want to build. With your desired spot found, simply click the settings cog at the bottom right and then select the 'embed

image' tab at the top. Grab this iframe embed code, before copying and pasting it right into your div. You can then set the width and height as desired (we're using 900 x 500px) inline or via CSS:

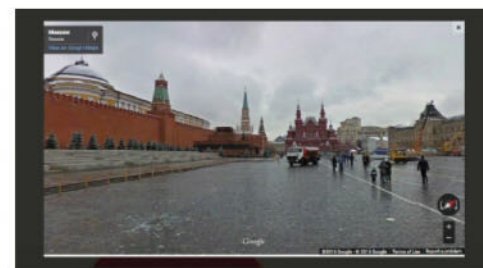
```
001 <div id="theLightbox">
002
003 <iframe src="https://www.google.com/maps/embed?pb=!1m0!3m2!1sen!2suk!4v1434110416454!6m8!1m7!1sDznZta_zvbaUqSrygOgLA!2m2!1d50.714728!2d-1.87489!3f0!4f0!5f0.7820865974627469" width="900" height="500" frameborder="0" style="border:0"></iframe>
004
005 </div>
```



### 06 Override the overlay

Lastly you may wish to begin customising Featherlight's default styles. A very simple yet effective amendment would be to change the background colour of the default overlay to match that of your company branding or to contrast perhaps with your site's colour scheme. This would be achieved very simply by amending the RGB values below, with a hex code as a fallback for older browsers:

```
001 .featherlight {
002 background: #000;
003 background: rgba(0,0,0,0.5);
004 }
005
```





Receive £25k  
tax-free to retrain as  
a computing teacher

and help develop  
the great minds  
of tomorrow.



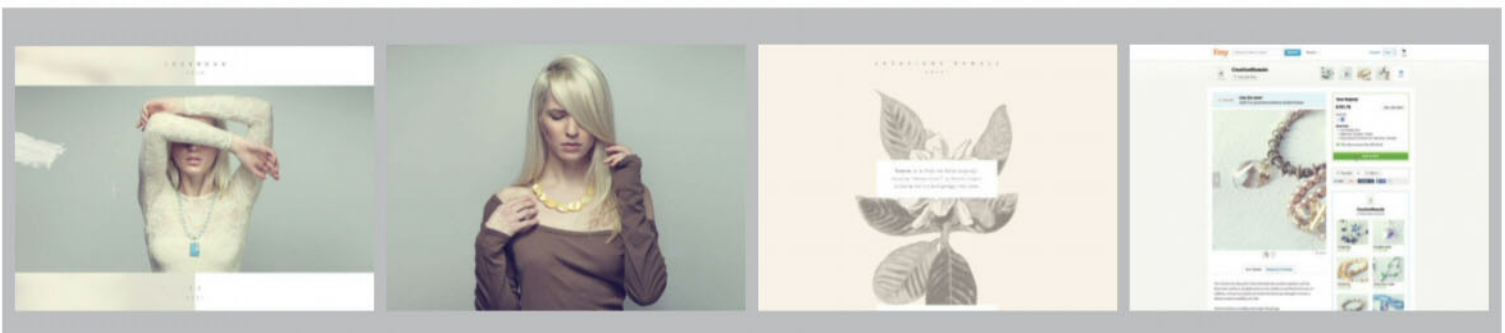
Switching to a great career as a computing teacher is more achievable than you think. You could receive a £25k\* tax-free bursary or a £25k\* scholarship provided by BCS, The Chartered Institute for IT. Alternatively, you could earn a salary of up to £25k\* while you train. Then you can inspire young people to fulfil their potential.

Apply now.

Visit [education.gov.uk/teachcomputing](https://education.gov.uk/teachcomputing)



**<Above>**  
 • Créations Namale is built around scrolling effects, that navigates through a cascade of fashion photography



**<Above>**  
 • Hover over the main image viewer panel and a custom plus sign cursor suggests the ability to click and zoom in

**<Above>**  
 • Sure enough the zoom blows the current image up to fill the browser window, pulling back upon a click of the now negatively signed pointer

**<Above>**  
 • The about section remains consistent to the scrolling effects and subtle typographic work employed throughout the site

**<Above>**  
 • Links to products on marketplace site [etsy.com](https://www.etsy.com) enables visitors to swiftly add jewellery to their bag and buy



# Namale - Joyaux Uniques

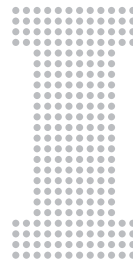
creationsnamale.com

**Development technologies** HTML5, CSS3, jQuery, jqueryEasing.js, Modernizr, Google Fonts



Designer **PHOENIX**  
phoenix.cool

Those plucky Canadians return with a stunningly beautiful and distinctive brochure site



**f there's one UI trend that has come to characterise the desktop web over the past couple years, it is scrolling effects.** Content animated and given a sense of depth on scroll, often provides an illusion of long pages when in fact only browser height is occupied.

This new design for jewellery brand Créations Namale pulls a similar jQuery-driven trick that leaves you confused and scratching your head.

The main page feeds a succession of fashion photography through a bordered area, almost like a viewing pane for focusing the eye. Gorgeously shot imagery then performs 50/50 splits to cleverly reassemble and invite full-width

zooms on click. It's purposefully puzzling but achieved with such elegance from Montreal studio PHOENIX, thanks to a painstakingly coordinated colour palette and an almost complete dispense of superfluous text. Ideas here on [creationsnamale.com](http://creationsnamale.com) have centred on the very heart of the site and the product showcased itself - the jewellery.

"What inspired us for this project was the name of the company 'Namale' which means 'unique jewel' in Fijian," explains creative director Louis Paquet. "So we really wanted to create something unique to showcase the jewellery as best as possible. To do so, we opted for a very clean and minimalist look, some smooth animations and a pastel palette of colours. The website really focuses on the pictures associated within the lookbook and products in an original yet functional way."

**We really wanted to create something unique to showcase the jewellery as best as possible**

abcABC  
1234567890

**<Above>**  
• Merriweather font by Eben Sorkin and available via Google Fonts styles the elegant main <h2> text

abcABC  
123456789

**<Above>**  
• CP Company by Fabrizio Schiavi and FSD styles <h3> and subsequent vertically aligned page links

U  
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## Time your CSS animations just right

The PHOENIX developers talk CSS animations and how to use custom speed curves to create spotlights

### 01 Timing is key

Adding motion to certain key elements in your design can make the difference between an ordinary website and a really interesting one. The interface doesn't need to be loaded with images and graphics to catch the eye, the elements present only need to be properly highlighted and that's where CSS animations come in play. But take note, as with a project like Créations Namale, timing is key.



### 02 The basic CSS transition

Animating an element in CSS is pretty simple. For example, if we want to animate the width of our targetElement when we put the mouse over it, we give it a basic width and modify it when it is in hover state. If there is no transition, the element's width changes instantaneously, but with CSS3 we know you can control how the transition happens so that it fits your design better and adds a slick touch to the experience:

```
001 targetElement {
002 /* Sets the parameters of the
003 transition */
004 transition-delay: 0s;
005 transition-duration: 0.25s;
006 transition-property: width;
007 transition-timing-function: ease-
008 in-out;
009 /* Sets the default width of the
010 element */
011 width: 200px;
012 }
013 targetElement:hover {
014 /* Sets the width of the element
015 when in hover state */
016 width: 450px;
017 }
```

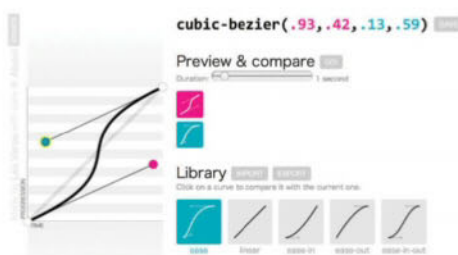
### 03 The timing-function parameter

The timing-function parameter already has a couple of premade speed curves that you can use, as listed below. Those are good in most cases and come in exceptionally handy if you don't want to break your head creating custom effects that may even not be worth the bother. But for Créations Namale, we had to go further and create our own custom speed curves to really put specific features under the spotlight.

```
001 /* Use one of the following to
002 revert to more basic transition effect
003 */
004 transition-timing-function: linear;
005 transition-timing-function: ease;
006 transition-timing-function: ease-
007 in;
008 transition-timing-function: ease-
009 out;
010 transition-timing-function: ease-
011 in-out;
012 /* Use this one for a more
013 customized effect */
014 transition-timing-function: cubic-
015 bezier(0.770, 0.000, 0.175, 1.000);
```

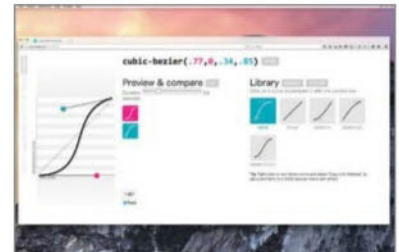
### 04 Work on your curves

It may look alien and complicated at first sight, but don't worry, you don't need to have a degree in maths to be able to tweak Bézier curves. A lot of sites are there to help you create your own timing function by playing with a visual representation of the animation. You can test your new curve directly on the site and compare it to the basic timing functions we saw in the previous step. A prime example of this would be Lea Verou's [cubic-bezier.com](http://cubic-bezier.com).



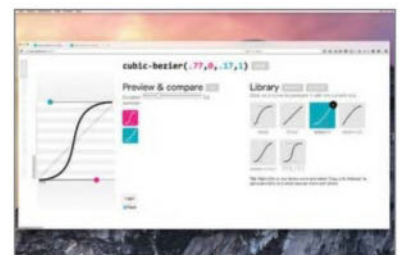
## Testing your timings

So with good timing so crucial to CSS Animation, we take a closer look at how [cubic-bezier.com](http://cubic-bezier.com) can help here



### 01 Set a cubic curve

This useful online tool is built for testing and comparing timing-function curves. For starters you'll find a cubic-bezier() that has its time and progression parameters set using the curve to the left. Simply drag the blue and red handles into position to try it out.



### 02 Use the library

Clicking the Save button and naming adds your custom curve to the Library on the right-hand side of the screen. Here you'll also find some standard, default ease, linear, ease-in and other curves to select for comparison. These curves can then be imported or exported as desired.



### 03 Preview and compare

A slider selects an overall duration in milliseconds, before the GO! button previews. The two curve blocks below animate using the cubic-bezier() in pink and the library curve in blue. You can even then send your favourite as a link to friends!





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**DIFFERENT  
THINKING**



Finder File Edit View Go Window Help

**JURASSIC WORLD** 26°

f t g+ i t

**PARK CAPACITY**  
89%  
PARK HOURS: 9:00 - 22:00

**WHAT'S HAPPENING**  
FREE MIKE AND IKE'S® AT 11:00

**WAIT TIMES**  
EGG SPINNER  
20 MINUTES

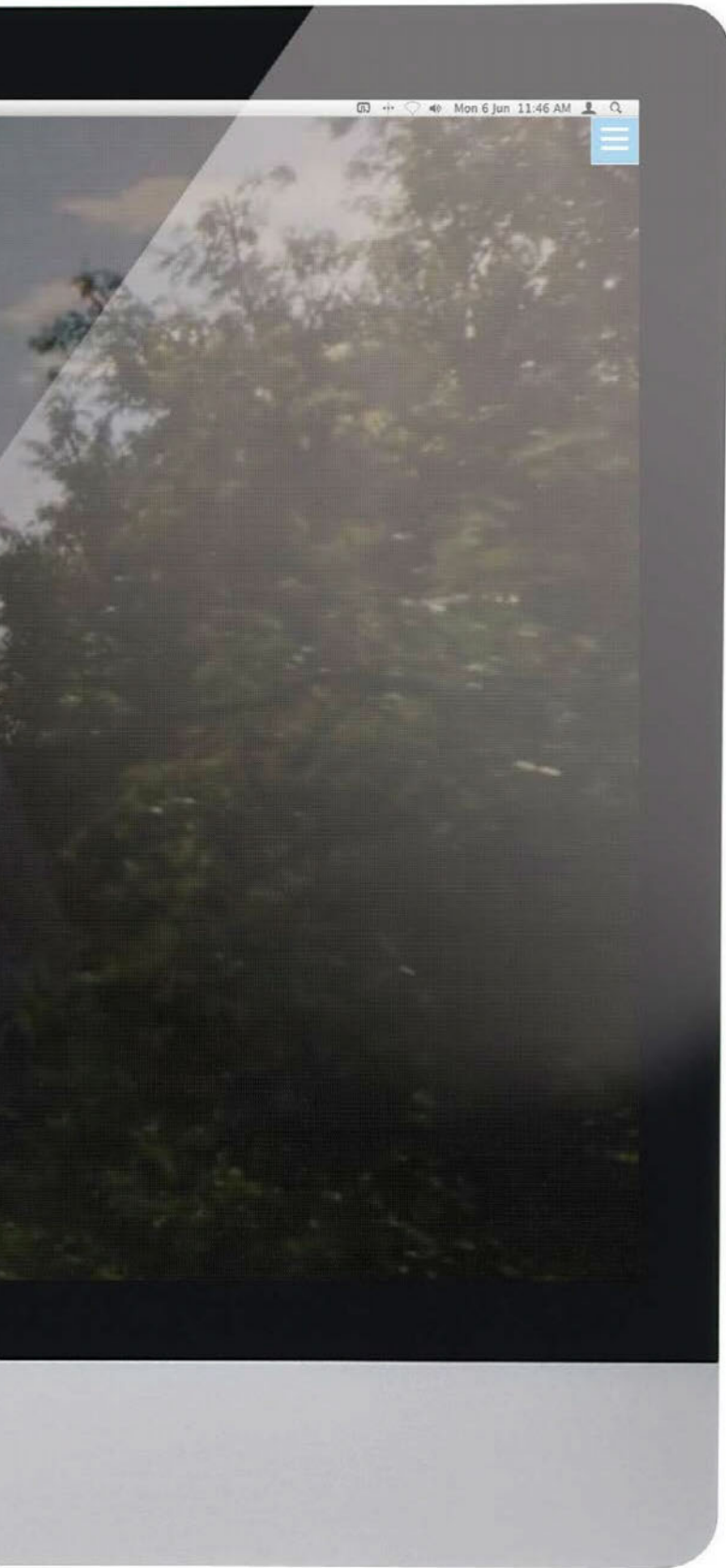
**GET TICKETS**

**DID YOU KNOW?**  
IF YOU LINED UP EACH PIECE OF MIKE AND IKE® CANDY MADE EACH YEAR, THEY WOULD REACH AROUND THE EARTH 3 TIMES.

VISIT JURASSICWORLD.MOVIE.CO.UK

0 DAYS 00 HRS 00 MIN 00 SEC  
ADD TO CALENDAR





# WELCOME TO JURASSIC WORLD

Take a peek inside how the almost real world of the greatest dinosaur experience was built

Project **Jurassic World**  
Web [jurassicworld.com](http://jurassicworld.com)

Agency **Trailer Park**  
Web [trailerpark.com](http://trailerpark.com)

People **Core team - 12**  
involved **Total team members throughout  
the life of the project - 30**

Total **6,500 hours**  
hours



It's been 22 years since the fateful opening of the original *Jurassic Park* on Isla Nublar. Back in 1993 a cluster of cloned dinosaurs went on the rampage and left a trail of destruction in their path. What could possibly go wrong in the new and improved *Jurassic World*?

The film may tread a familiar and well-worn path, but its web presence is no simple copycat. Inspired by the franchise's themes of innovation and epic storytelling, leading content marketers Trailer Park partnered with Universal Pictures to create a digital campaign to bring the theme park to life.

Real-world is the key word here, the *Jurassic World* site doesn't deal in flimsy promotions. The site looks to provide an immersive and realistic experience that convinces every visitor that *Jurassic World* really does exist.

As we all know a dinosaur theme park is no reality (yet), but the site builds anticipation and slowly takes over a visitor's psyche by showcasing every detail that a real *Jurassic World* would offer.

What would you expect to see at a modern-day website for a theme park? You'd probably expect hotels, attractions, travel packages, restaurants, time-reactive announcements and video feeds to name a few. This is exactly what *Jurassic World* has to offer and why it works so well with its on-screen cousin. If a dinosaur theme park did exist in 2015, this is what it would look like.

As you might expect, the collaboration to bring *Jurassic World* to the masses across many mediums is not easy to imagine as a short-term project. We leave it to Glenn Sanders, group creative director, digital at Trailer Park to reveal the intricacies and processes needed to get the project off the grounds. "We began working on *Jurassic World* in January 2014. After reading the script, we realised it had the potential to be a modern classic, and as fans of the original film, we jumped at the opportunity. We also had the advantage of working with our internal content,

print, theatrical AV (trailer) and social media groups to better understand the film's initial marketing as well as its on-set content plans.

"The first round of creative we shared was roughly 70 pages of raw ideas across a variety of mediums. This proved our excitement for and understanding of the film. It also formed the basis for a story-based campaign that spanned over a year with multiple phases.

"We built the campaign around the idea that the park is a real destination, with the knowledge that this is the culmination of two decades of fan-wish fulfillment: to visit the theme park John Hammond promised us in 1993. Every detail of the campaign supported this core idea, which was in perfect alignment with the studio's vision for the overall marketing campaign.

"Once it was clear the site would be the centrepiece of the digital campaign, we moved into a design phase that

distribution plan, including the RaptorPass programme for superfans to get exclusive first-look access to a variety of film and behind the scenes content.

"As we developed the site design, we began to see images and footage from our content team who were on set with the film-makers every day of the shoot. This influenced many of the choices we made for the site. Having such extraordinary access to the film in progress meant that the digital experience would match up seamlessly with the look and feel of the film.

"As just one of many dozens of examples, we discovered the film-makers had shot literally hours of B-roll video intended for use in the control room scenes, showing 'mundane' operations at the theme park (everything from tourists waiting in lines to park workers shovelling dinosaur droppings). As a result, we added the park cams section which played seemingly live feeds of what is happening

right now at *Jurassic World*. This one section became a huge social media and press hit as fans watched the clips obsessively, and would not have been possible without close interaction with our internal Trailer Park teams and the studio."

A project of the magnitude of *Jurassic World* was always going to need some serious collaboration and communication between the parties involved. Bryan Dávila producer, digital at Trailer Park gives their side of the story: "To create the experience we had in mind, we knew we would need to work in very close partnership with Universal Pictures. Throughout the project we were in constant communication with them as we developed content and updated the site for each stage of the digital campaign.

As Glenn mentioned earlier, the fact that multiple departments within Trailer Park were all working together was a real asset to the project and helped to make it unique, as Bryan explains: "With those teams all working

## “HAVING SUCH EXTRAORDINARY ACCESS TO THE FILM MEANT THAT THE DIGITAL EXPERIENCE WOULD MATCH UP SEAMLESSLY”

encompassed a deep dive into UX. We also researched existing theme park sites - many of which are years behind the responsive user-centered design we developed for [jurassicworld.com](http://jurassicworld.com). [We then] began developing a comprehensive social media content creation and



## THE TECHNOLOGY BEHIND THE BUILD

The bigger the build, the bigger the decisions and once these had been made there would be no going back. Rob Stemm, group director of technology at Trailer Park, breathes an insight into how the *Jurassic World* website was to be transformed into a living reality: "After reviewing the high-design/animation [quality] expected for the website, the client development requirements and the time constraints to create the first version of the site, we decided it wasn't practical to build out a CMS solution.

"The next big decision was to determine the need for any server side code. Based on the animation and transitional effects desired by the creative team, we decided it was best to develop the website as a single-page application following an MV\* front-end only design pattern.

"Avoiding the need for server-side code would allow us to deliver the site to end users much faster as everything is static and could be delivered from the edge. This MV\* architecture ([backbonejs.org/](http://backbonejs.org/) and [marionettejs.com](http://marionettejs.com)) also allowed us to seamlessly trigger animations and transition between sections of

the site. Each section was data-driven, so we could easily update a JSON data file to add or remove content from sections.

"Building the site as an SPA posed additional challenges around providing specific social content for each route within the application.

"Most social bots don't execute JavaScript when pulling metadata from webpages, which is problematic when your website is one HTML page relying on JavaScript to change out the content. To solve this problem we ran snapshots of the site using PhantomJS ([phantomjs.org](http://phantomjs.org)) and created an .htaccess file on the server directing all bot traffic to the corresponding snapshot pages. Once this was in place we could provide different social copy and meta information for every route within the site.

"The creative team really pushed the development team to their limits with the complex features and animations of the site including the park map and monorail widget ([jurassicworld.com/park-map](http://jurassicworld.com/park-map)); consumption widget ([jurassicworld.com/plan-your-visit/eat/food](http://jurassicworld.com/plan-your-visit/eat/food)); dino size chart

([jurassicworld.com/dinosaurs/apatosaurus](http://jurassicworld.com/dinosaurs/apatosaurus)); park dashboard, custom menu navigation and park cams ([jurassicworld.com/park-cam](http://jurassicworld.com/park-cam)). Not only was it difficult to create these features for desktop users, but building them responsively all while providing the same user experience across all devices added an additional layer of complexity.

"The data supporting the various widgets on the site changes throughout the day as well as throughout the month. This includes the park capacity, wait times for attractions, weather, upcoming events and the monorail schedule.

"Generating the data to make this feel like a real theme park wasn't an easy task and required rounds of review to make sure everything throughout the site was in alignment from a timing perspective.

"We even went as far as handling the data conversions of weights and measurement to the metric system for our friends around the world. Overall, the attention to detail for the functionality and animation of each widget was incredible and just an amazing experience to work on."



**JURASSIC WORLD** 26°

f t g+ i t

PARK CAPACITY  
**22%**

WHAT'S HAPPENING  
FERRY DEPARTS AT 16:30

PARK HOURS: 9:00 - 22:00

WAIT-TIMED  
GENTLE GIANTS PETTING ZOO  
0 MINUTES

DO YOU KNOW?  
DO NOT TAP ON THE GLASS, CROSS BARRIERS OR CALL OUT TO THE DINOS. YOUR SAFETY IS OUR FIRST PRIORITY.

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- TICKETS
- OUR FOUNDER
- PLAN YOUR VISIT
- DINOSAURS
- THE MOVIE
- SAFETY FIRST
- KIDS
- PARK CAM
- PRESERVE YOUR MEMORIES with Google Photos
- CREATION LAB
- RAPTORPASS
- NEWS FEED
- MASRANI



**EXCUSE OUR MESS**

We have experienced a security breach involving several of our attractions. If you are currently at Jurassic World, please get indoors immediately and follow all safety instructions. Our trained professionals will have the dinosaurs contained shortly.



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**JURASSIC WORLD IN THEATRES**

The world's biggest animals deserve to be seen in person. But if you can't make it to Isla Nublar, Jurassic World can be seen in theatres this summer across the globe. It's the most thrilling dinosaur experience you can get outside of the park itself.



Bigger. Louder. More Teeth.  
**INDOMINUS REX**

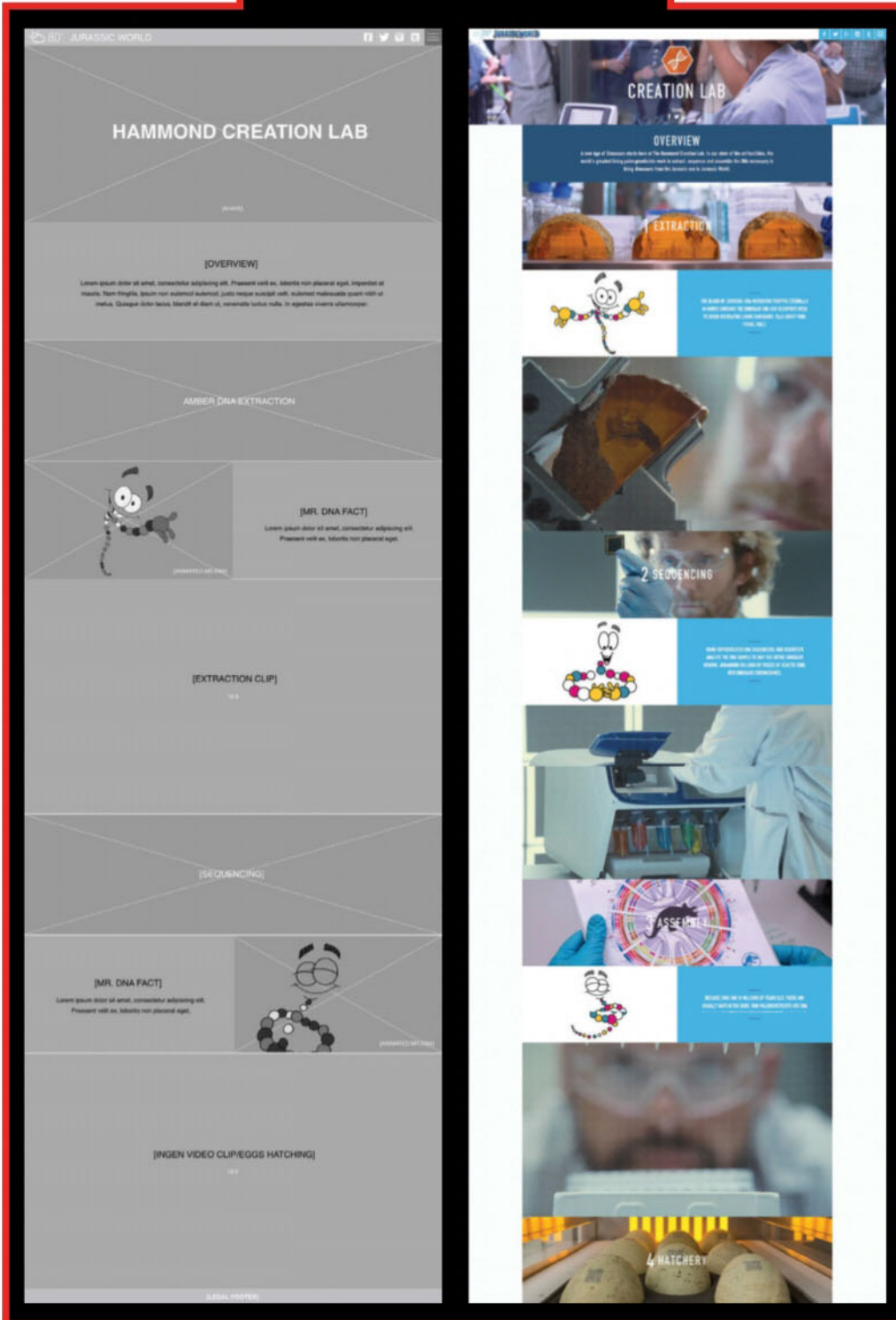
Arrives This Summer

**READ MORE**



## WIREFRAMES

The wireframes were key to ensuring that the right design decisions were made. Extensive and comprehensive wireframing ensured that the final build went as smooth as possible.

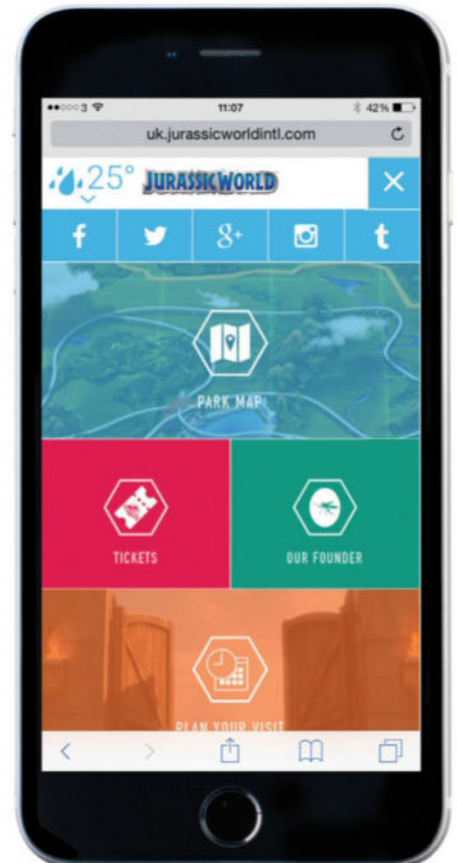


in-house we had a great opportunity to leverage one another's work for *Jurassic World* to create a quality experience. This gave us faster access to assets and information, and ultimately allowed us to maximise our creative thinking and work more efficiently."

From the other side it's Cameron Curtis, director of digital marketing at Universal Pictures, who subsequently reveals that this is not the first time that the two companies had worked together. "We've built a collaborative relationship with Trailer Park, having worked with them on several Universal film projects. In learning that other groups within their agency were also working on *Jurassic World*, I completely encouraged the digital team's internal communication and collaboration. Not only did it help disseminate information quickly, it also ultimately aided in building the best immersive online experience for the film."

With the initial excitement, and a little bit of history coursing through their veins the next question was how to bring the new *Jurassic World* to life but of course retaining the crucial visual aura that pervades over the series. "Our design direction for the website was inspired by John Hammond's quest for innovation and desire to capture the imagination of the entire planet," Brad Burris, creative director of digital at Trailer Park enthused, revealing the size of the task ahead. "We wanted fans old and new to believe that this place really exists. Creating such a site for a truly beloved film franchise and the world's greatest theme park is a tall order, especially with eager superfans watching you every move.

"Our UX/UI solutions had to be forward-thinking to demonstrate this idea of innovation, that a theme park built



The site has a lot of subtle references to the original films

“WE WANTED FANS OLD AND NEW TO BELIEVE THAT THIS PLACE REALLY EXISTS. CREATING SUCH A SITE FOR A TRULY BELOVED FILM FRANCHISE... IS A TALL ORDER”



on genetic modification, for which no expense was spared, would be leagues ahead of anything else that is currently in the market. From the very start, we created **jurassicworld.com** to have a cross-platform responsive design that puts the user at the center of the experience.

“Our goal was to create an immersive experience so engaging that people were compelled to explore every corner of the site, discover great content with every click, tap or swipe, and ultimately ‘book their trip’ by purchasing tickets to see the film.

“Building on the film’s set design and art direction, we established a theme park iconography system and colour palette to brand each portion of the site. This graphic style was carried throughout our widget interfaces for park data such as weather, capacity, wait times, food consumption and other interesting facts that build on the park’s veracity. We wanted the main navigation to be simultaneously unconventional and intuitive, so we created a cascading tile grid that feels modern and is particularly ground-breaking for a theme park site. The nav is such an iconic statement, that it was even leveraged for the *LEGO Jurassic World* videogame trailer.

“Our Park Map quickly became the centrepiece of the website, serving up an incredible interactive view of Isla Nublar that’s explorable across all devices. Evolved from the printed version visitors use on the island, our map was re-created from scratch as a digital illustration for Retina devices with four levels of zoom detail. Each location was then highlighted on the map features a detail view to explore tourist POV-style images and unique facts to help you plan your visit.

“By pairing the immersive in-world photography and video footage with our detailed interface design, dev and copywriting, we were able to provide an ultrarealistic view into the theme park, encouraging legions of young fans to beg their parents for a trip there. Heck, we even fooled some grown-ups too.

“Throughout this campaign, we’ve been fortunate enough to leverage and create a ton of original content to promote this experience and showcase the amazing wonders of *Jurassic World*. We partnered with paleo-journalist Brian Switek to fact-check our work and provide copy, paleontologists from the Natural History Museum of Los Angeles County to photograph dinosaur fossils, and paleo-illustrator Julius Csotonyi for his incredible dinosaur renders. Even Google joined our *Jurassic* adventure in a branded content partnership to launch their new Google Photos app inside of our site’s interface.

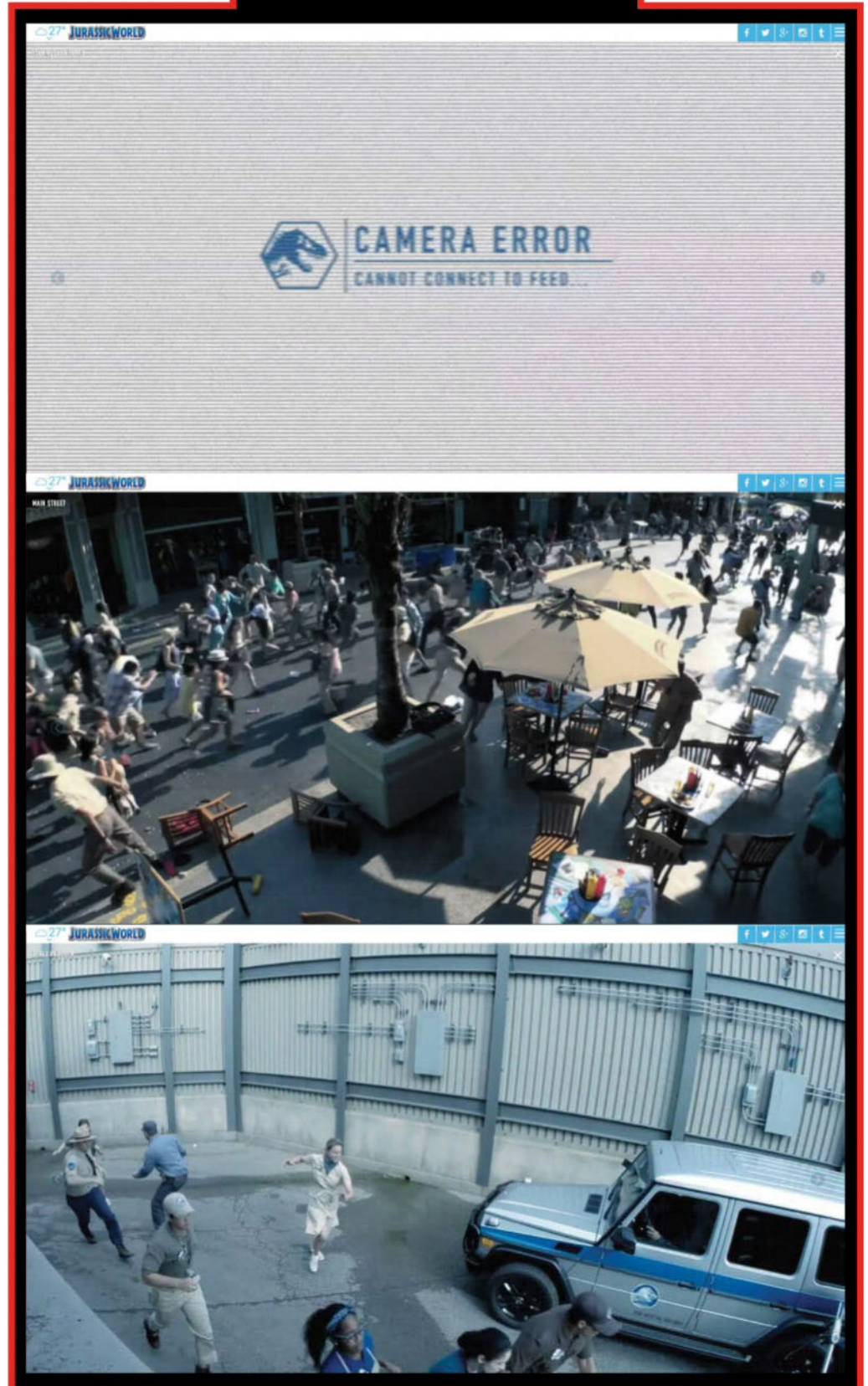
“Our team’s passion and dedication to this project has been unmatched and has really made this a special experience for fans of *Jurassic World* everywhere. We are thrilled to be a part of it all.”

The mammoth task of bringing the reality of *Jurassic World* together had to be matched by its marketing and promotion. With all that had gone on before, expectations were certainly high and originality needed to be key as Sanders explains, “We encountered several challenges in creating the digital campaign. With *Jurassic World* the fourth film in the franchise, we wanted the campaign to feel unique and special to the new generation and also appeal to the legacy fans.

“We also wanted to differentiate the experience from the summer action-adventure films. And finally, legacy

## MAYHEM

What’s going on here? To add further realism to the *Jurassic World* experience the park cams shifted into Mayhem mode on the film’s release date. Watch as visitors flee in terror and workers spring into action.







fans had been clamouring for a real-life *Jurassic Park* experience and we wanted to exceed their expectations.

"Our partnership with Universal Pictures, collaboration with internal departments and creative thinking helped us face the challenges to create a ground-breaking experience for fans. The site was so realistic that many people thought *Jurassic World* was an actual destination.

"As for the fans, they literally hung on every detail. We found that any tiny change to the website, even pages that we had intentionally hid, would be posted on social media and dissected by fans within minutes of being updated on the site.

"And in our minds, that means that the website inspired an emotional connection in fans, which is the ultimate goal of any marketing campaign."

The good folks at Universal Pictures had a slightly different tilt on the launch. "Traffic to the site far exceeded our expectations," revealed Curtis. "We launched the site timed to the film's first trailer reveal last Thanksgiving during a major NFL game and received major buzz amongst fans. Ahead of the launch, we built fan

anticipation for the new site by launching a countdown clock that coincided with the trailer reveal. In fact, many fans worldwide posted videos of themselves counting down to the last few seconds of the countdown clock and exploring the site for the first time.

"It was also important to schedule content releases at strategic times. We had four major content releases since last November's official launch. One key moment was the Super Bowl where we timed new content to our spot during the game."

How big is *Jurassic World* going to be as time goes by? It's certain to be huge, with box office sales already exceeding expectations and the site is here to stay as we give the final word to Glenn Sanders and Trailer Park: "We are excited to continue working on [jurassicworld.com](http://jurassicworld.com) through its home entertainment campaign. This is unusual because most digital campaigns, for even the biggest tentpole movies like *Jurassic World*, end after the film's box office opening. But due to the great response to the site, Universal Pictures has asked to continue with the campaign postrelease." Is there more to come?

**“IN OUR MINDS...THE WEBSITE INSPIRED AN EMOTIONAL CONNECTION IN FANS, WHICH IS THE ULTIMATE GOAL OF ANY MARKETING CAMPAIGN”**

## THE BIG QUESTION...

**T. rex is considered the dinosaur king, but who's your favourite and why?**



My personal favorite dinosaur is the Velociraptor. It's clever, fast, fearless and looks badass.

**GLENN SANDERS,**  
GROUP CREATIVE DIRECTOR



My personal favorite dinosaur is the mighty Stegosaurus for his elaborately designed body armor. He's a low-aggression herbivore badass with 17 boney plates from neck to spiked tail to take on any enemy.

**BRAD BURRIS,**  
CREATIVE DIRECTOR, DIGITAL



My favorite is the Suchomimus for its relationship to the modern crocodile and it's former life on the water in the swampy prehistoric Sahara.

**BRYAN DÁVILA,**  
PRODUCER, DIGITAL



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Jasmine-Visual Design, User Experience, Cop  
Nicole-Content, Program Management  
Alma-Analytics, BA, Research, BS, Product  
seo, Planners, Social Marketing, Me  
Janet-Studio  
Ashley-QA, Frontend Eng, Back end Eng. S  
TD, TA

# TRANSFORMING THE DIGITAL ENVIRONMENT

Technologists, designers and strategists come together at Huge to change lives with new experiences that not only shape brands, but the very culture they inhabit





At such a large company, you can expect social events to be aplenty at Huge

Creating new experiences is at the heart of everything that Huge touches. The agency's skillset is wide, diverse and dynamic, which is why many of the world's biggest companies and best-known brands come to Huge to not only develop next-generation marketing campaigns, but to help them redefine what their company does and what their brand means in a digital environment that knows no boundaries.

Huge's VP of communications Sam Weston discussed how the company was founded: "Huge was started as a web design studio in a DUMBO apartment in Brooklyn. In 1999, the internet and websites were decidedly uncool. User experience was not something people talked about. Brands didn't really care about the internet, and websites served little purpose beyond being brochures and curiosities.

"Huge was founded on the belief that the internet could do much more for what a brand could be than was conventional wisdom at that time - and that the ability to help people do things, using the internet, was going to be transformative."

Sam continued: "In its first five years, Huge established a reputation for best-in-class web design under the leadership of David Skokna, the company's first creative director. Word started to get around that if you were a company that cared about design, you went to Huge for your website.. Then, in 2005, when Aaron Shapiro joined the company, we became the first agency to pair digital design with management consulting and business strategy.

"Aaron's background was as an entrepreneur and a management consultant, having been the youngest person accepted to Columbia Business School and working at Booz Allen. He joined Huge

after having hired the agency to design a logo for Silverpop - a company he founded that would eventually grow into one of the world's largest email technology businesses before being acquired by IBM. It was this combination of user-centric design and business consulting that made Huge uniquely able to harmonise what users wanted with what businesses needed."

As every new business owner knows, naming your company is an important thing to get right. "It was more important for us to choose a great name than base it off of whatever domain was available at the time. Even back then we could only get **hugeinc.com**," commented Sam. "Since then, we've had to watch **huge.com** play host to a series of terrible business ideas, but with an asking price in the millions it's just not worth enough to us to care. Our reputation is based on our work, not our domain name!"





## industry insight

Aaron Shapiro,  
CEO

“We try our best to hire people from diverse backgrounds in order to get more creative solutions. The way we work requires people who aren't precious about their ideas and who embrace feedback even when it's painful. And perhaps most importantly, those who can listen to what clients and users need”

Being founded on website design, Huge's own presence on the web clearly serves as a vital component of the company's own marketing. Sam outlined how important Huge's website is: "For us, the site is incredibly important. It's a point of pride that we make something that others quickly copy. If you're being hired to do this stuff and you're known for this type of work, then what you do for your own company must be as great as what you're working so hard to do for your clients."

What makes Huge stand out from the crowd is clearly the cutting-edge work that the agency has been producing since the company was founded: "We were the first agency to be founded on the idea that the principles of user experience should drive not just design, but business and marketing as well," Sam continued. "It's incredibly difficult to sync up what clients need with what users really want, but that's what it takes to create things that change industries - and that's what we're best at."

Who an agency partners with is often an important decision that not only influences the

resulting work, but can also impact the very ethos of the agency itself. Sam continued: "It's really important for us to be thoughtful about who we work with. We try to partner with clients who are as ambitious about digital as we are, who want to do big things that make life better for users, and who want to set the standard for digital in their industry."

"The projects we're best known for and most proud of are usually the ones that realise our vision of how to go about making things. People like to point to projects like **TED.com**, where we worked collaboratively with the client as a single team, or HBO GO, where we created a product that changed how people thought about TV. In everything we do, we're trying to help companies enable that one thing they can uniquely help people do better than anyone else and to drive business transformation around that behaviour."

Huge operates twelve offices around the world. As such, the work completed is highly diverse. Is there a typical workflow that Huge has adopted over the years? Sam explains their approach: "It depends on the scale of the initiative. About half of our work are now retained, ongoing, continual evolutions of brand platforms and experiences, so while projects may have start dates and deliverable deadlines, there are no end dates for the work. Digital is never done: as soon as you stop iterating and pushing, someone else will beat you."

"For each account, we bring together senior representatives from design, user experience, technology and strategy as a core team. Then, depending on the type of work, others are added to help accomplish the work. We try to keep the teams lean to give people as much responsibility as we can and to eliminate bureaucracy. Project managers help keep everyone coordinated and on schedule, but the most important part of any team is the client. We like to have clients work as part of our teams as much as their schedules will allow. Their input is invaluable and helps us to make decisions quickly. Instead of saving their feedback for presentations, we try to get it every day, in real-time, to make the work as strong as possible."

Clearly Huge has had to adapt to the rapidly evolving digital world we all live in, and mobile devices are an example of how technology can fundamentally change what an agency has to do to remain relevant. Sam outlined their methodology: "Pretty much every design project we take on these days includes responsive work. We've been vocal about the benefits of embracing mobile web for most companies. As browser functionality and mobile bandwidth continues to improve, most brands will benefit from getting their mobile web experience right first."

"Many brands forget that without an explicit value proposition for their users, most applications are failures. When brands are truly committed to becoming digitally led, they can pull off these



## Nike FuelBox

[hugeinc.com/case-study/nike-fuelbox](http://hugeinc.com/case-study/nike-fuelbox)

To encourage people to get active, Nike sought an intimate and personalised initiative that would take the Nike FuelBand experience beyond the app and into the real world.

Huge and Nike created the Nike FuelBox, a mobile vending machine activated with Nike FuelPoints that dispensed Nike products at locations throughout NYC over the summer of 2014. The initiative redefined loyalty programming as a truly integrated digital/physical experience. The FuelBox was designed to reward users for the sweat equity they



built each day: sweat a little, get a little; sweat a lot, get much more. Working with Nike, Huge designed and built the machine, led technical development and integration, and created the custom packaging and labelling for the rewards.



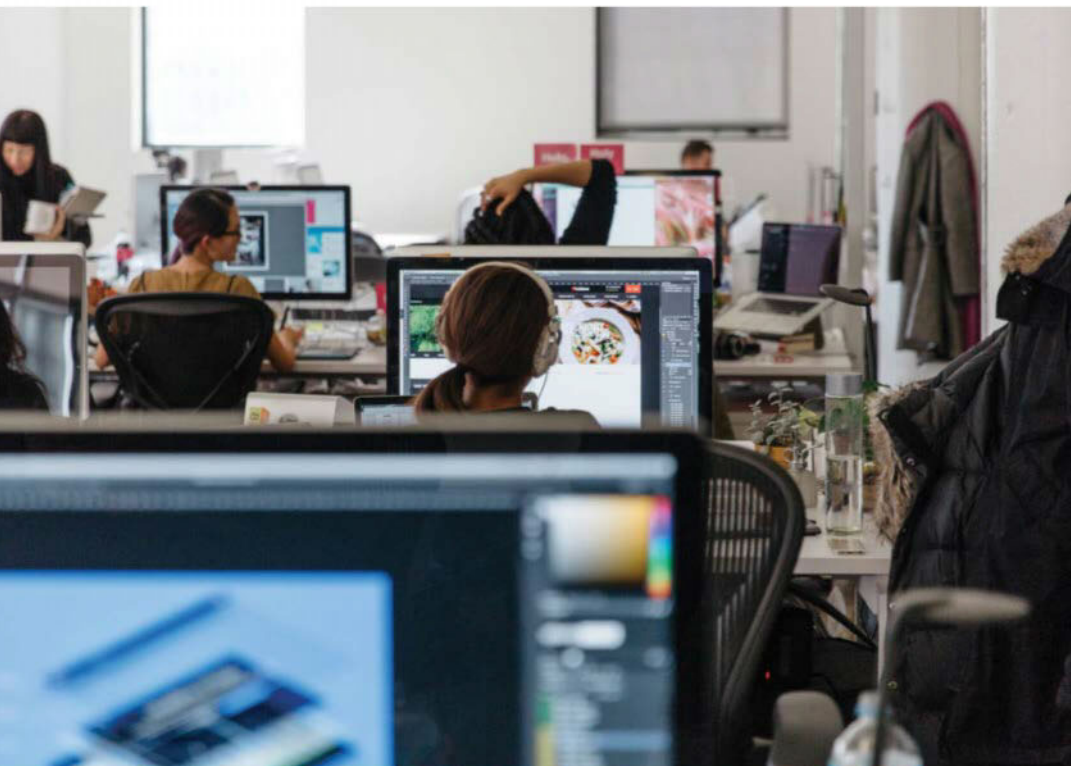
To make it even more exciting, the FuelBox was deployed to locations around NYC. To locate the FuelBox, fans had to follow the @NikeNYC Twitter handle and use clues shared to determine that day's location. Once found, fans could connect their FuelBand and select a product based on their score: the more you move, the more products you unlock.



HUGE



Hello.



development practices (continuous integration, MV\* patterns and so on) have only increased the pace of advancement. Web standards that work everywhere will continue to replace technologies that only work on certain devices, going far beyond 'websites' and impacting every aspect of our lives."

With Karl Stanton, director of engineering also commenting: "HTML5, CSS3 and jQuery has already evolved dramatically. HTML5/CSS3 is a widely adopted standard for making things. JQuery as a 'framework' is actually on the decline. Whatever happens in the future, at the moment the internet is app-based, which means we have to think about our work as being application based. Applications are built out of small components, not pages. Designers design systems, not layouts. Engineers are using whatever toolset necessary to get their job done, and in six months after that, they'll use a better and more focused toolset. Web technology and our industry are forever-evolving."

And Jason Tiernen, product design lead at Huge said: "I've been a big supporter of Sketch as an interface design tool. The speed of iteration it provides as well as the ease of transitioning to code is great. We still are using Illustrator and Photoshop for specific tasks, but it's great to have an option specifically for UI.

"I've also been playing more with Quartz Composer and Avocado. It's a noncode-based interaction design tool made by IDEO. It's great for designing interactions and prototypes that feel native. Marvel is also a great mobile and web prototyping tool I've been using on a regular basis. I'm really impressed with the speed of product iteration they've adopted as well as the UX testing tools they're rolling out soon. It's great for quickly validating flows and look and feel."

And of course social media has transformed societies and how people communicate with each other. How have these channels influenced Huge? "Social media is obviously important, but the truth is that social channels are now essentially paid media channels. As long as shareholders keep turning the screws on companies like Facebook and Twitter to drive up ad revenue - if you're trying to do any sort of mass marketing on those

## Web standards that work everywhere will continue to replace technologies that only work on certain devices

investments because they're committed to delivering utility to users in this way. But for most companies - as they go through their transformation into digital-first, user-centric businesses - responsive solutions that can be updated centrally across all platforms are often the best place to start. However, every situation is unique so decisions must be based on business goals and the best way to deliver what users need."

Sam continued: "We work with companies that are as committed to shaping culture and defining the future as we are - and we're fortunate to have

built a reputation that attracts the clientele we want to work with."

The tools available to creative professionals are now vast and diverse. Greg Whitescarver, technology director outlined how Huge has developed its toolset: "Web standards like HTML, CSS and JavaScript are so important because they are ubiquitous and free. And every day, standards-based web technologies match more of the capabilities of proprietary technologies like desktop apps, Flash and native mobile apps. Tools like jQuery and increased sophistication in



channels you're only going to get what you pay," said Sam. "Social is great, but remember that brands don't own any of the connections they have on those channels. We think the future lies in really knowing and owning your own user base, and developing smart interactions with users based on their behaviour and individual needs."

An agency is effectively only as good as the people it employs. So what qualities do they look for in a prospective employee and what advice would they give to anyone looking to take a step into the industry? Huge CEO Aaron Shapiro explained Huge's approach: "This is the most important challenge for any company in our space. When it comes to people, 'you are what you eat', so it's essential to get it right.

"When it comes to hiring talent, we look for people who truly care about what they do and who are uncompromising when it comes to doing something that will change expectations in the industry, make life easier for people, and drive our clients' businesses.

"We try our best to hire people from diverse backgrounds in order to get more creative solutions. The way we work requires people who aren't precious about their ideas and who embrace feedback even when it's painful. And perhaps most importantly, those who can listen to what clients and users need. This line of work requires people who are selfless and tireless about getting to something great and who aren't willing to accept 'okay'. People starting out should know that two things matter: what you've made in the past and whether people want to work with you. One of the best ways to get started is to take the initiative to make something that solves a problem you personally care about."

Finally, what does the future hold for Huge? Is the agency looking to expand or diversify and what exciting projects do they have on the horizon? Aaron explains what they have in store: "The future is so exciting for us... For years, we were kind of outsiders. Now everyone is trying to fix their business before someone comes along and makes them irrelevant, so there is no shortage of partners who want to do the kind of big things we care



Spanning 12 offices globally, Huge employs diverse employees so that they can always provide the most creative client solutions

about. [These challenges] keeps us on our toes as well. We're trying to build an agency that will be able to do everything a client will need in 2020. This is an enormous challenge, because we expect the pace of change to get even faster.

"Right now, we're focused on tying data and AI in with technology and design to create smart products and services. We're thinking about what it means for the way we design solutions when voice, gesture and automated systems challenge screens as the dominant interfaces. And we're excited about the responsibility we have now that companies are relying on agencies like ours, which are built on user experience and technology, to create the digital brand experiences that define them."

Defining the digital space that brands inhabit has been the core driver behind Huge since inception. The collaborative nature of their work practices and a belief in the power of listening to their clients has resulted in an agency that not only wealds the latest digital tools, but use them to shape the future we are all going to experience.

# HUGE

**WEB** .....hugeinc.com  
**FOUNDERS** Aaron Shapiro, David Skokna, Gene Liebel, Sasha Kirovski  
**YEAR FOUNDED** .....1999  
**LOCATION** Brooklyn, Atlanta, Washington, D.C., Oakland, Los Angeles, Portland, Singapore, London, Rio de Janeiro and more

## SERVICES

- > Digital business transformation
- > Product and service design
- > Brand experience and marketing communications
- > Technology
- > Data science





*Presenting*

# HTML & CSS ANIMATION

EXPERTS REVEAL THE PATH TO BUILDING  
BEAUTIFUL DYNAMIC DESIGNS





## What's up with web animation?

**A**sk any two designers what they think of animation, and you'll get

**six opinions.** The web still hasn't quite recovered from the Flash years, when loading and splash pages stressed prebroadband modems and made users wait for extravagant doodles.

For designers, Flash was a brilliant way to rack up the billable hours. It wasn't so popular with visitors, who either learned to click on the 'Skip animation' button as soon as it appeared, or were left wondering why they'd just spent two minutes watching a cartoon rocket land in a giant vector graphic cheesecake.

Of course Flash is still around, but it doesn't seem to be winning new fans. Today, most clients and creative directors are going to look strangely at anyone who suggests a splash screen, whether it uses Flash or a more recent technology.

That could be because modern animation has calmed down and tried to make itself more of a team player. Instead of being all about the technology or the designer, animations have become more about the design.

So what is animation for? It's easy to make a site where everything moves all the time, but visitors will hate it. It's more useful to think of animation as a power tool you can use to enhance your site's production values, help users find their way to the content they're looking for,

and emphasise the stories you want the site to tell.

If the animation isn't helping out, don't use it. You can make exceptions for showcase and demo sites where you're exploring a new technology. But for general public access, animation should always be able to justify its existence.

As the technology has improved, the limiting factor for motion design isn't the technology. You can use animation frameworks and plain CSS3 to do almost anything you want in 2D. 3D isn't quite as developed, but it doesn't have as many clear use cases, and most sites work fine with 2D animation, perhaps with a few understated 3D accents.

The challenges have more to do with clever design, creativity and - most of all - effective communication. Animation isn't so much about moving divs as about moving visitors. If it isn't doing that, you may need to rethink it.

To make life easy, we'll pull out some of the recent UI and UX design trends so you can look at them in more detail. There's no need to start with a blank editor and an equally blank expression. Modern animation design doesn't mean starting from scratch on every project. A few hints and suggestions go a long way, as does some knowledge of what the rest of the industry is doing.

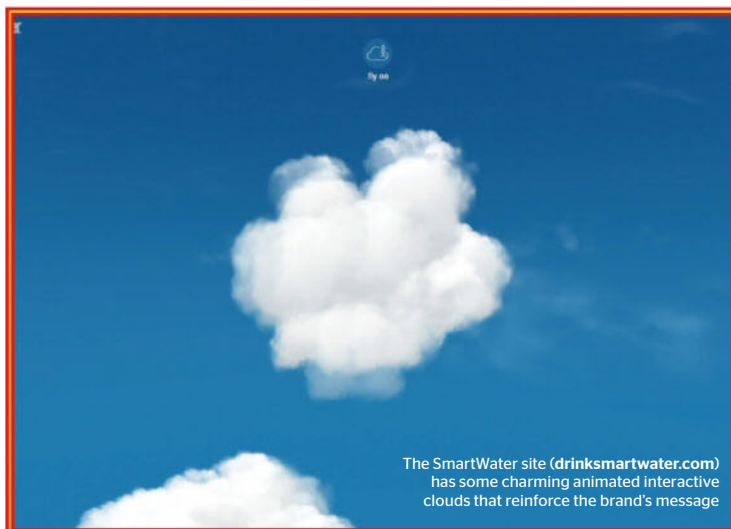
If you're ready to be moved, read on...



### SHANE MIELKE

Creative director at shanemielke.com

“CSS and GreenSock animations are amazing ways to spice up your front-end builds. Pixi.js and three.js give us 2D and 3D WebGL/Canvas animation playgrounds. In the right hands all of these tools can work magic. We're just missing a standardised timeline animation IDE like we had in Flash that will output clean, lightweight code.”



## The state of browser support

	e	g	o	s	i	9	android
<b>CSS3 keyframes</b>	10	4	16	4	15	7.1	4.1
<b>CSS3 animation</b>	10	4	16	4	15	7.1	4.1
<b>jQuery 1.X animation</b>	6	Current	Current	5.1	12.1	6.1	4
<b>jQuery 2.X animation</b>	9	Current	Current	5.1	12.1	6.1	4
<b>Other JavaScript frameworks</b>	9	Current	Current	5.1	12.1	6.1	4
<b>WebGL [1]</b>	11	31	31[2]	8	29[2]	8.3	40[2]

[1] Requires compatible graphics hardware [2] Partial

## ANIMATION IN ACTION

### Dreamteam dreamteam.pl

The use of web animation needs to be considered and have value. Alternatively, it can be something to adore and be admired. DreamTeam by Polish creatives BrightMedia sits very much in adore and admire. The homepage animation reveals itself with a simple straight line before blossoming into a fully fledged animation. The fun doesn't stop at the homescreen, scroll down and watch more smart design unveil itself.

#### KEEPING UP

The creatives behind DreamTeam are Polish agency BrightMedia. Keep up with their latest work via [brightmedia.pl](http://brightmedia.pl).

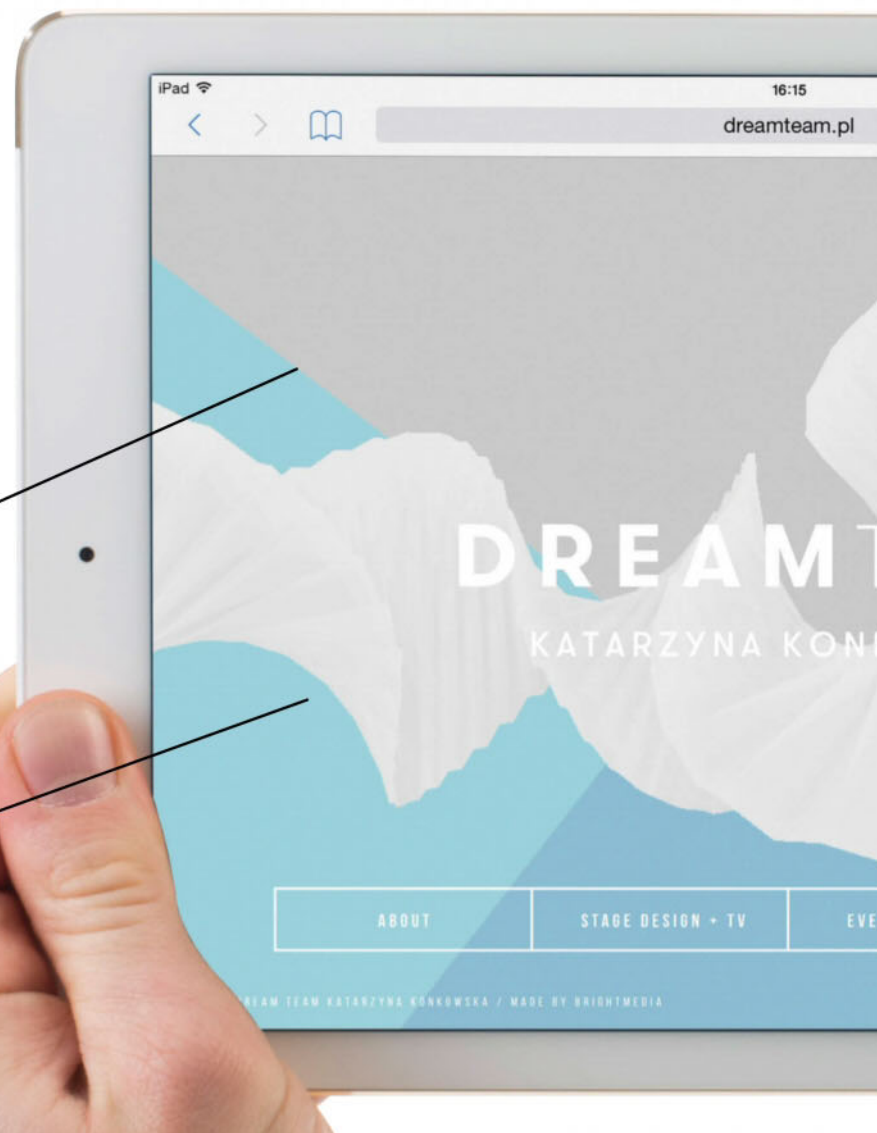
Alternatively, check their Twitter [@brightmediapl](https://twitter.com/brightmediapl) for latest updates.

#### All for show

The opening animation has no real purpose other than to engage and excite the user. The moment the animation starts, the user is hooked. An attention-grabbing design is guaranteed to give the creators attention right across the web design community.

#### UI animation

Simple navigation animation is used to enhance the overall site. To reinforce the common purpose of the site each menu item has a rollover effect. A solid white background eases in with a subtle animation and immediately draws the user's attention.



## The technologies & tools

### Keep it simple with CSS3

Knowing how to work with CSS3 animations is a core skill now. CSS3 animations are split into two related tag groups. The transform tags move things around the screen, with simple support for 3D. The animation and keyframe tags control the movement.

But there are downsides, and these will include some of the usual CSS gotchas. It's easy to make animations that almost work but it's possible that they may just start or stop in the wrong place, or don't quite loop as you want them to. And CSS3 simply isn't very smart. You can link animations to events in a basic way, and you can chain and link animations to create complex effects as well. But it's difficult to make animations respond to surrounding content.

### JS & jQuery: the missing link

JavaScript and jQuery can fill in the features that are missing from CSS3. Do you need to make sure an element won't fall off the bottom of the screen, or cover something important when the user reveals it? JavaScript is the solution.

There's one catch. CSS3 runs efficiently inside the browser with superfast precompiled code. JavaScript animation is compiled on the fly, and it's not nearly as efficient. So if you do anything complicated you'll kill the battery life on mobile, and heat up the processor on desktops and laptops until the fans kick in.

Raw JS is a powerful option with a lot of creative potential. But you will need to handle it with a lot of care.

### Working with frameworks

JavaScript wouldn't be JavaScript without more libraries than a human brain can remember. Luckily only a handful are popular at a time. A few years ago MooTools' FX Morph, Transition and Tween classes were widely used. (See [mootools.net](http://mootools.net) for details.) Yahoo's YUI library ([yuilib.com](http://yuilib.com)) also found favour, inside and outside

Yahoo - especially in the form of AlloyUI ([alloyui.com](http://alloyui.com)) which merged it into Bootstrap.

Now jQuery has taken over most of the load, with its .animate function, which includes easings, durations, and the ability to animate any numerical CSS property.

But that's not enough for some projects. For more control, you can work with more advanced frameworks such as paper.js ([paperjs.org](http://paperjs.org)), Raphael.js ([raphaeljs.com](http://dmitrybaranovskiy.github.io/raphael/)) and Processing (there are two web versions - [processingjs.org](http://processingjs.org) and [p5js.org](http://p5js.org)). For those who want a Flash-like interface, there's also the paid-for GreenSock framework ([greensock.com](http://greensock.com)).

The big advantage over basic CSS3/HTML is support for vector graphics and simplified animation loop that saves you from dealing directly with timers.

Which should you choose? Processing is the most sophisticated, and supports pixel-level manipulations - although they're buggy in processing.js - videos, webcams and sound. It works with HTML5 Canvas tags,

**“Raw JS is a powerful option with a lot of creative potential. But you will need to handle it with a lot of care”**





### HTML5 technology

Taking a peek at the source code reveals a surprisingly slim page. It is the HTML5 Canvas element where all the hard work is done. The animation sits quietly in the background claiming all the glory while the standard HTML creates the crucial elements needed to navigate and guide users around the site.

### And there's more

The homescreen is undoubtedly the centrepiece of the DreamTeam site, but complimentary and more constructive animation is incorporated into the site. Simply scroll down the page to see how subtle user interface animations are introduced into the site design.

## Motion emotion

Don't forget that many CSS tags – including older pre-CSS3 tags – can be animated. So animation can mean creating opacity fades, animated borders and text decoration.

so it's good for big animated backgrounds and digital art.

However it's not so ideal for making UI elements and moving them around. Raphael and paper are simpler, and concentrate more on vector graphic design with a hint of animation. GreenSock is much used by corporates and adds useful functions that simplify CSS animation. They're all worth looking at, because knowing what's out there can spark new ideas for existing designs.

## Visualising data

If you're working with data visualisation, the go-to framework is d3.js. ([d3js.org](http://d3js.org)) d3 is a monster that chews on data and spits it out in almost any shapes you can imagine and a few you probably can't. It's immensely powerful, but also has a steep learning curve. If you can hack it though, it's ideal for making and animating UI elements, especially if you're using them to display quantitative data.

To help you get started, the d3 site has a huge selection of demos and examples. Don't expect instant results, but if you can spare a week or two to get familiar

with it it will definitely take your data vis skills up a couple of levels.

## WebGL and 3D animation

Waiting in the wings is 3D animation and rendering. This has a lot of potential, but it's not quite there yet. The WebGL standard is a simplified version of the OpenGL 3D graphics programming API used in high-poly commercial games.

This sounds like a good thing. But not all platforms support all features, and some older hardware barely supports WebGL at all. So you can't rely on it. And it's hard to make it look awesome. Gamers are used to high-poly rendering with advanced lighting effects, and WebGL can't match that.

Finally, it's hard to use. The three.js framework ([threejs.org](http://threejs.org)) makes it more accessible, and there are plenty of demos to learn from (look out for the work of [mrdoob](http://mrdoob.com) – you can follow him on Twitter @mrdoob). But it's still a couple of levels up from plain CSS.

Is it worth it? For plain vanilla UI design, no. For more experimental projects, it's certainly worth exploring to see what's possible.

## Web animation API: a new solution?

If you've looked at native apps, you'll know the web doesn't have anything quite like the slick and streamline native animation frameworks built into iOS and Android. The W3C's web animation API is an attempt to fix this. It's not a drop-in replacement for mobile animation, so don't expect to make elements glide or fade more easily than in the past. For better or worse, the W3C committee have gone in a different direction.

The current proposal bundles the existing CSS3 animation features, extends them to allow simpler DOM element animation and adds some welcome extras, including support for a timeline and for play state management. Keyframes also get an upgrade, so you can do more with them. It's also going to be possible to start, stop, restart, and pause animations using JavaScript code, which will fix some of the limitations of CSS3 animation.

If you're thinking this sounds a little like Flash – it does. Or at least, the timeline and keyframe features do. When web animation becomes widely supported it's going to become easier to chain animations, to create animated effects by flip-booking SVG files, and to make animations respond to external events.

So it's better to think of it as an animation management system, and not so much as a new set of canned effects you can drop into your pages with almost no code.

The current API proposal has issues. One big problem is lack of synchronisation. You can make events play together on the same timeline, but it's hard to guarantee that animations on separate timelines will remain synchronised across a page.

Another problem is complexity. The API proposal tries to do so much it's not a model of elegance and clarity. It's possible to create complex animations with it, but it's not going to win awards for being easy to use. This is good news for designers with good code skills, who will continue to be in demand. But perhaps it's not so good for the state of web animation in general – although it's likely that as soon as the spec is finalised, it's going to be wrapped into a friendlier and simpler framework so more people can use it without reaching for the paracetamol.

Whatever the limitations, the API is the most exciting thing to happen to animation since CSS3. It should be ready for commercial use within a year or two. Currently it's 'being considered' by Microsoft. Chrome's developer builds include it, and Firefox has a not-quite-there implementation. Older and more obscure browsers will play catch-up, as usual. If you want to know more, check out [w3c.github.io/web-animations](http://w3c.github.io/web-animations).

## Make animation work for the user

In a world after Flash, the point of animation is to enhance the user experience without distracting or annoying your users. It's not quite true that animation should be unnoticeable - sometimes you want something that stands out. But it should never clash with the rest of the site design, it should never draw attention to itself without a good reason, and it should always provide a clear user benefit.

Modern motion design has split into three main areas. UI sweeteners add a hint of eye candy to plain vanilla UI elements to raise production values without beating visitors over the eyeballs with designer awesome.

### Staying focused

The aim is to make your site look slicker, smoother and glossier, and generally more sophisticated and authoritative. A little CSS3 or JavaScript can do a lot of good, but if the user is more likely to remember the motion than the content you may want to rethink your design strategy - especially if you start veering towards the sketchy end of town with insane animate-everything excess, and overly bouncy, distracting image carousels and sliders. These are the modern

equivalent of the animated GIFs that haunt the ancient underworld of amateur web design.

The next UX group are the attention-getters. When you want a user to focus on one point in the web sales pitch, add some content-related animation to make that element stand out. These elements are the descendants of the old splash pages, but they've been toned down for modern sites so they don't overwhelm visitors. They're very popular on Bootstrap sites, where one item out of two or three has added movement and maybe tells a short story. Typically they're spread over a third or a quarter of the page, and they're more cute than cinematic. The animation works a bit like a tiny video that dramatises the point of the element it decorates, like the

visual equivalent of an <important> tag. It highlights something you want visitors to remember.

At the top of the animation tree are full-blown infographics. The genius of motion design means you can make infographics interactive (see page 48 for our tutorial). This often works better than leaving users passively looking at the screen as an animation plays through. It's a huge win for all kinds of education and training sites, where you can build a simulation and help users learn about a topic by interacting with it.

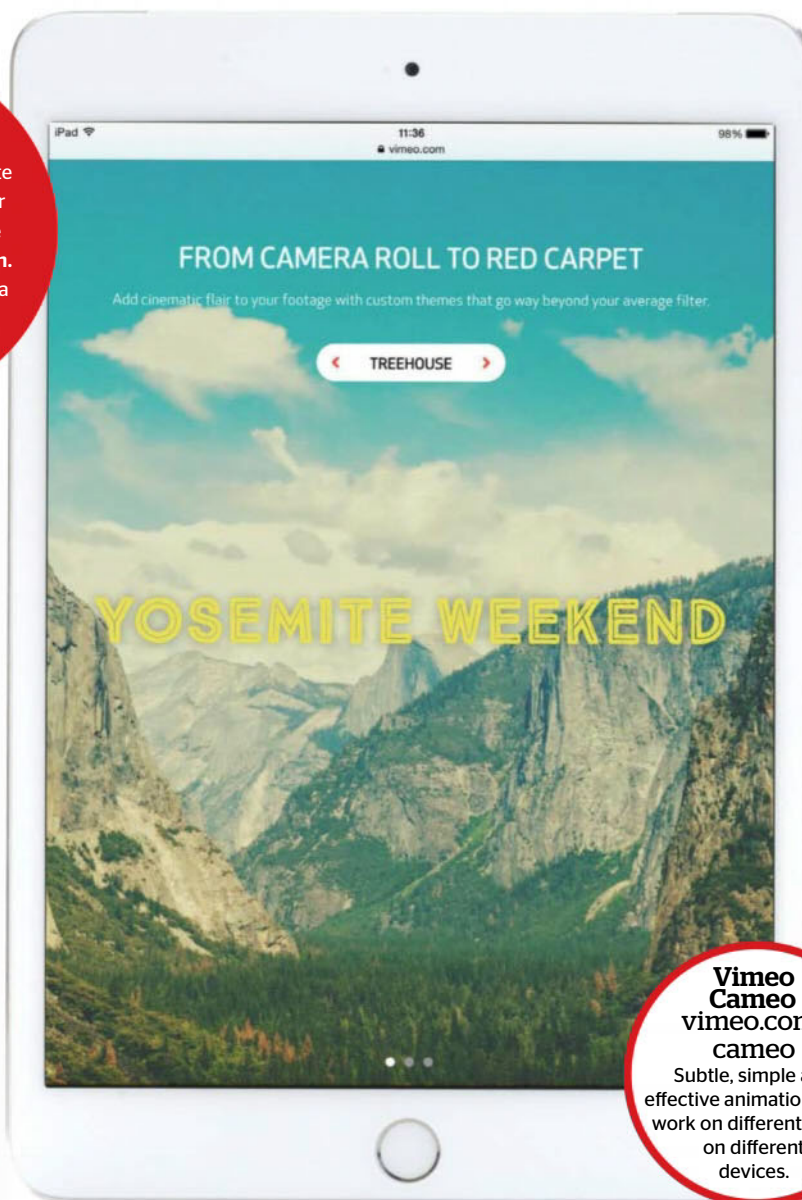
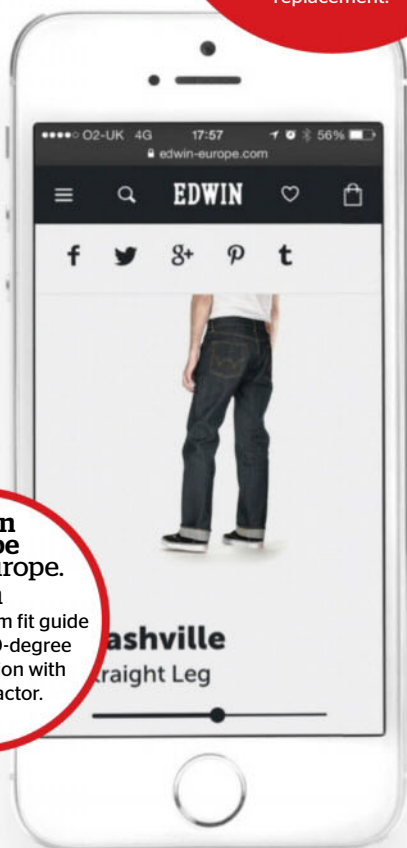
But animation isn't an obligatory part. Adding a simple splash or bounce tells the user they're in a new part of the site, and you're telling them a new chapter in your site's story. With careful tuning you can make the motion

### Speed up jQuery

jQuery isn't fast, and .animate is even slower. To make your animations faster and more efficient, try Velocity.js ([julian.com/research/velocity](http://julian.com/research/velocity)) for a drop-in .animate replacement.

### Edwin Europe

[edwin-europe.com](http://edwin-europe.com)  
Check the Denim fit guide to see the 360-degree view: animation with the wow factor.



### Vimeo Cameo

[vimeo.com/cameo](http://vimeo.com/cameo)  
Subtle, simple and effective animations that work on different levels on different devices.



a thing of beauty that stands on its own. Make sure that you keep it short though...

## Make UI engaging

Why spice up a UI with animation? Too much twitching and blinking can give users a migraine. But just the right amount of animation can make the difference between a boring site and one that users will keep coming back to.

In outline, there are three kinds of UI animations. Highlighters decorate existing content to suggest an affordance. The most obvious examples are link

decorations and pop-ups. Getting links right is always a challenge. A subtle mouseover underline animation can help draw attention to a link without making the rest of the page look busy and link-heavy. Another example are form error notifications. Have you ever pressed Submit on a site and then wondered why nothing happened? Site designers realised it was helpful to highlight mistakes in red, so users can see problems immediately.

But sometimes this is too subtle. You can use animation to draw attention to problems by making incorrect elements move a little, as well as changing

colour. Apple's 'You got that wrong, so this text box looks like it's shaking its head' is the classic example here.

Skeuomorphisms help make the site feel more physical. The aim here is to use visual metaphors to suggest physical objects. Often, just a hint of physicality is enough for more weight and presence.

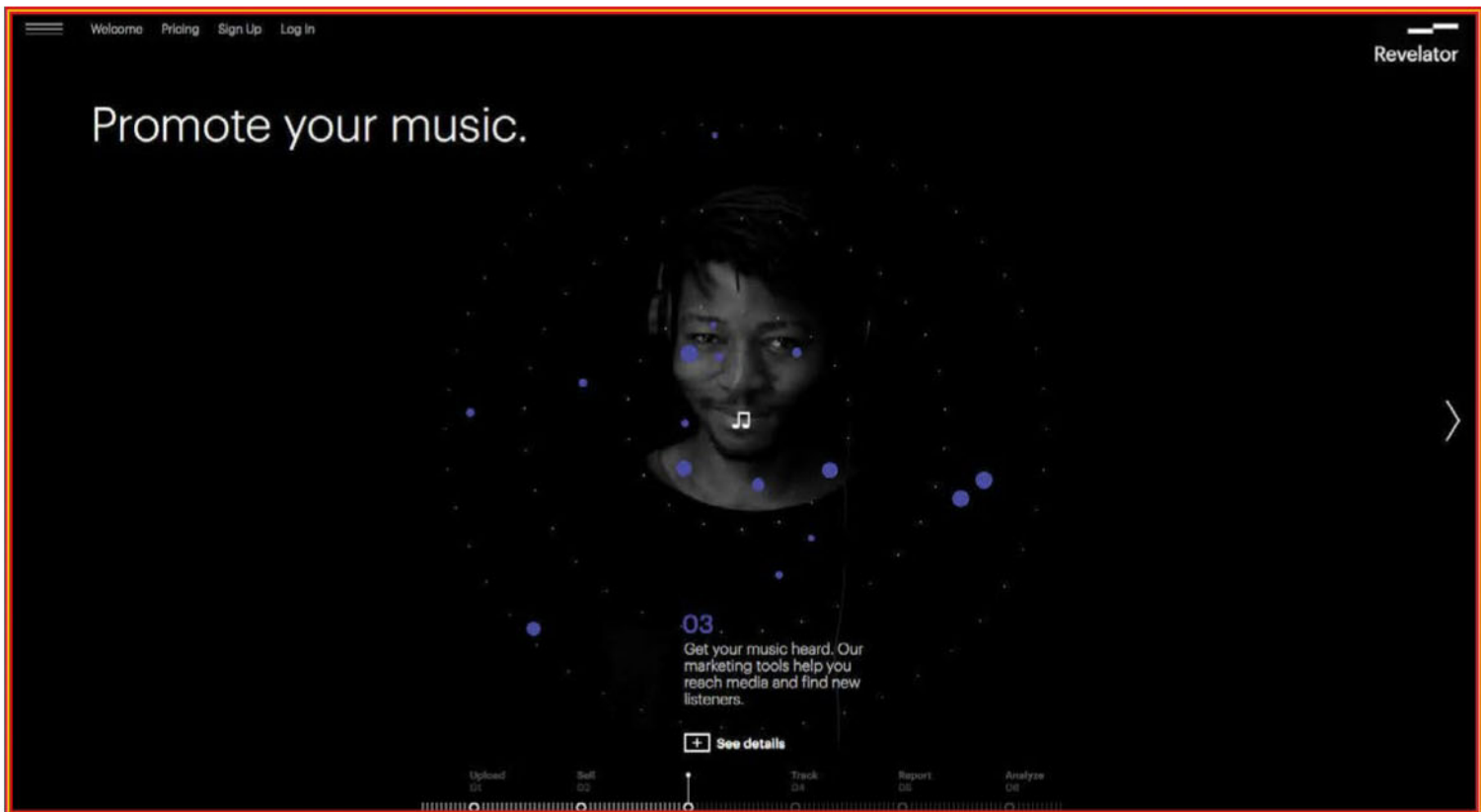
Attention seekers are the final UI group. They provide important stand-out features that can't be ignored, so they're hard to get right. Examples include 'FILL IN OUR FEEDBACK FORM' pop-ups, but you can also find them scrolling up from the bottom of the page on news sites to offer breaking news.

Attention seekers tend to annoy users, so consider using animation to make them less distracting. Make pop-ups appear at the side instead of the middle of the viewport, and put breaking news in a window. The animation should always help the user, not distract them.

**“The right amount of animation can make the difference between a boring site and one that users will keep coming back to”**



**Catch the dragon catchthe dragon.nl**  
Car manufacturer Peugeot combine video, VR and animation to create a breath-taking experience.



## TUTORIAL Create a pulsating circle

Hello Monday technical lead Torben Dalgaard Jensen reveals how they created the effects on Revelator.com. The Revelator website is built on the idea that you only need to use one platform if you want to run a music business. We wanted to showcase this idea by leading the user through an animated story that breaks the features into simple steps. Below we'll explain how you can create the type of animation we used for the Promote feature.

We'll use trigonometry to create the pulsating effect and write it entirely in JavaScript. GreenSock TweenMax is used for the tweening, and we will be writing a JavaScript object instance for the circle so that we can preserve modularity and readability.

### 1. Initial setup

First what we will do is create a container and an array to hold the circles. Then we are centring the container within the window. Also we are writing some stub code that we will revisit later.

### 2. Create DotCircle.js

We will go through the methods for the stub code for the DotCircle in the next steps. We calculate the distance in

degrees between each dot and create a radius object that we will use to tween the position of each individual dot. We are using 7px as the value for distance - you can play around with this value to create a circle with less or more dots in it.

### 3. The init method

Here we are creating each individual dot. We need to convert the degrees to radians and then calculate the initial position using trigonometry. We find it easier to work with degrees than radians, but this step can be skipped and do all calculations with radians.

### 4. Implode and pulse

These methods tween the radius value and update the position of the dots (see next step). In this example they will keep running each other when the tween completes to create the pulsating effect.

### 5. Update

Now what we'll do is we will update the position of the dots based on the new radius value we are tweening. Then we will be delaying them incrementally to create the staggered effect.

### 6. Ready to rock!

Going back to the main script - we will now create three instances of the DotCircle with incrementing radius. Then we will start the animation, again using delay to stagger them. For the full code in this tutorial, make sure that you check out FileSilo ([filesilo.co.uk/webdesigner](http://filesilo.co.uk/webdesigner)).



**TORBEN DALGAARD JENSEN**  
Technical lead at hellomonday.com

“We wanted to create a visual representation and give a sense of the excitement and relief musicians feel when they release their music and see the mood of their fans rise.”



## Q&A

# Animations: keep it simple



**HAKIM EL HATTAB**

Designer and developer  
hakim.se

**Q. The use of web animation in any project needs to be carefully considered. What advice would you give to designers and developers?**

When working on a web app keep in mind that excessive and lengthy interface animations can reflect negatively on the app as a whole. If animations are too slow the app itself is perceived as sluggish. If there are too many things animating too frequently it won't feel reliable and robust. Keep animations brief and remember that not everything needs to animate.

Animations have varying levels of expressiveness and personality. The most colorful kind - like 3D flips, bounces or elastic easing - can be a great way to make an interface more fun but since they're so distinct it's easy for them to be visually fatiguing. It's generally better to stick with simpler animations for things that people interact with frequently and save the more playful ones for areas that are used more seldomly.

Another rule of thumb I use is to show slow and hide fast. For example, I might run a half-second intro animation for a modal dialog but hide it without any animation at all. The rationale here is that you're more willing to watch something you requested animate in than you are waiting for something you dismissed to animate out.

**Q. Which web animation technologies currently excite you and why?**

CSS transitions and animations are the technologies that I care most about. Combined they are flexible enough to achieve the effects I want and it's been great seeing them gain broad support so quickly.

**Q. Web animation has vast potential. How do you see it evolving over the next couple of years?**

I expect tooling to get a lot better and I know that browser vendors are making good progress towards this. Working with animation is a visual process often requiring many iterations of number tweaking and previewing. If friction can be removed in that workflow we'll see higher quality animations.

The Web Animations API is looking promising too. There's certainly a need for animations that can be controlled more explicitly via a script than what's currently possible with CSS transitions and animations.

# What next for animation?

In the past, web design was split into epic splash animations and relatively small and trivial UI tweaks, with a few sliders in the middle. What happens when the web animation API becomes more widely used and designers can work with more complex animations?

Some designers will stampede back towards epic splash pages. Even though loading times and browser speeds make splash pages more feasible than they were in their heyday, it's likely they'll remain a sideline.

The trends in current design are clear: they're all about integrating animation with content - or rather, about enhancing content with tasteful and relevant animation. Parallax scrollers, minivideos, and animated icons do this already, with varying degrees of success.

For examples of possible future trends, run a search for the animation tag on Dribbble. Most examples use the

same contemporary flat, minimal, cartoon-style design language common on the web, but add an animated twist to highlight a feature or make it more memorable.

Eventually some icons will be animated as a matter of course. Balance is key. Too much movement is confusing for users. Animated GIFs were the bane of the early web, and animated icons could easily become the modern equivalent. But they probably won't, because designers are more experienced now, and there's more of a trend towards minimal design, where designers keep removing elements until they're left with the bare essentials.

If those essentials happen to include some movement that can justify its existence by telling a story about some content or highlighting the affordances of an icon or other UI element, that could potentially make the web much more creative for everyone.

# Resources

**Interviewing Julian Shapiro**  
[bit.ly/1Jz15tX](http://bit.ly/1Jz15tX)

Find out what velocity.js author Julian Shapiro thinks is going to happen next on the animated web. Read his comments about the difference between good and bad animation design, learn about the imminent speed and efficiency bump, discover how too much creativity can be a bad thing, and why education matters more than ever in motion design.

**Rachel Nabors' UX Guide**  
[bit.ly/1R6UdWj](http://bit.ly/1R6UdWj)

This excellent slide deck introduces the latest trends in animated UX design from the perspective of a trainer and designer. You may not necessarily agree with all the points - especially the one about the return of splashy flash screens. But the rest is definitely well worth reading for a creative and inspiring overview.

**Val Head's Videos**  
[vimeo.com/valhead/videos](http://vimeo.com/valhead/videos)

Not so much of the future, but you may as well get a good guide to the state of the art in the present before you go ahead and any higher - this collection of tutorial videos covers all the CSS3 animation bases, and includes an impressive collection of design examples. There's only about half an hour here in total though, but it's certainly time well spent, especially if you're just starting out.

**Narayan Prusty's Web Animation Tutorial**  
[qnimate.com/web-animation-api-tutorial](http://qnimate.com/web-animation-api-tutorial)

If API specs make you dizzy you can find some simple code examples of the Web Animation API here. There's a handy comparison with traditional CSS3 animation, so that you can see how to move from the old API to the new one. It's not going to win any design awards, but it's a good place to start if you're feeling lost and confused about where animation will go in the future.



# Create animated infographics with Snap.svg

Take a static graphic and add interactivity and animation to create an exploded-view infographic





**I**n the new responsive web world that designers have to inhabit, sizing graphics is of the utmost importance to us as web designers. Getting crisp graphics on both a phone and on a huge cinema display monitor is not just desirable, but essential. To that end most of us have switched to using SVG images for our icons and line art drawings, which are always crisp on every display. Not only that but the file size is often much smaller than a PNG image. When it comes to creating animated images or interaction with graphically rich content we will need a solution that can help us do this too. Thankfully Snap.svg comes to the rescue because it lets us use crisp SVG graphics but also adds the polish that clients have come to love for their shiny web apps.

In this tutorial we are going to use Snap.svg to create one of those exploded-view images that you would find in Haynes' car manuals but we're going to dissect a mobile app. We'll take a regular SVG created in Illustrator and add animations to this, then make some of the buttons on the interface work. These will drop pins onto a map and slide an off-canvas menu onto the screen. This provides a great introduction into how you can make your own graphically rich applications using Snap.svg.

## 1. Start the project

To start off the project, take the tutorial files from FileSilo and open the Start folder in a code editor such as Brackets. In the head section of the index.html page add a link as shown to the Snap.svg library. You can also download the library from [snapsvg.io](http://snapsvg.io) for reference.

```
<script src="js/snap.svg-min.js"></script>
```

## 2. Style the SVG element

Just after the Snap code library has been imported, the CSS styling for the SVG element is set. This is displayed,

centred on the page and a background image is placed in there so that all the vector lines and shapes have a background to stand out against.

```
<style>
svg{
display: block;
margin: 0 auto;
background-image: url(bg.jpg);
}
</style>
```

## 3. Start up Snap.svg

After the CSS styling in the head section, script tags are added with an onload function that detects if the page has finished loading. Once the page has been loaded up, two variables will be declared. One of these variables will hold a timer that waits a fraction of a second before starting the animation and another variable holds the Snap SVG file.

```
<script>
window.onload = function () {
var timer;
var s = Snap(1280, 800);
};
</script>
```

## 4. Load an SVG file

Before the closing bracket of the onload function in the previous step, add the code shown here. This tells snap to load the scene.svg file. Notice the comment that states the "tutorial code goes here" - this is where the rest of the tutorial code will go. Because once the SVG is loaded, the code between the curly brackets is called.

```
Snap.load("scene.svg", function(f) {
//TUTORIAL CODE GOES HERE
});
```

## 5. Reference individual graphics

Once the scene has finished loading up, we will need to do an important part of the tutorial - we need to reference individual graphic elements so that they can be animated or interacted with on the page. Here the variables will reference unique IDs, and these IDs are the ones that you'd find on any regular HTML tag. They will be stored in a variable to be used later on.

```
var menu = f.select("#menu"),

pin = f.select("#pin"),
chatPin = f.select("#chatPin"),
thumb = f.select("#thumb"),
disc = f.select("#disc"),
```

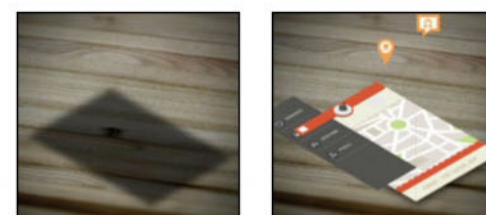
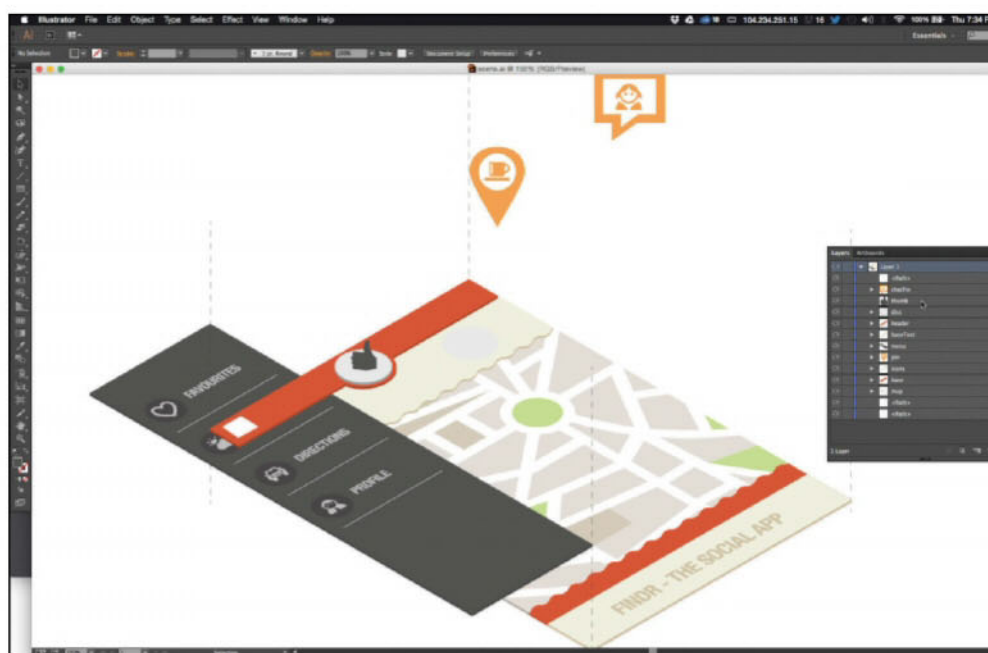
## 6. More references

Notice that each line of the code shown below has the variable that is then followed by the letter f. If you take a look at Step 4's code, you will notice that the f included there appears inside the brackets of the function, and all of this code is in that function. The letter f simply stands for file and it is a reference to the SVG file that we had set to load from before.

```
header = f.select("#header"),
icons = f.select("#icons"),
base = f.select("#base"),
baseText = f.select("#baseText"),
```

## Coding Snap.svg

Snap.svg uses JavaScript to manipulate the still SVG images that you import into it. The code adds animation and interactivity to the graphics for a rich user experience.



### Left

In Illustrator you can see all of the graphics named in the layers panel, so make sure that you open up the layer to see the names in the background of the SVG element, a background image has been added through CSS

### Top left

In the background of the SVG element, a background image has been added through CSS

### Top right

After loading the graphic it is displayed over the top of the background image, but still needs a little work

## Tutorials

# Create animated infographics with Snap.svg

### 7. Last graphic references

Here the last references are stored in variables and you may be wondering where exactly these names came from or how they got in the SVG file. When graphics are grouped together in Illustrator, they can be named in the layer panel, these names are applied as IDs when exported into SVG.

```
map = f.select("#map"),
people = f.select("#peopleBtn"),
chat = f.select("#chatBtn"),
burger = f.select("#burgerBtn");
```

### 8. Display the SVG on the page

The next line of code is quite an important line because this line displays the graphic on the screen. If you remember that `s` is the Snap reference, then `append` means to add to that, so we use the reference of `f` which is the SVG file. Save the page now and hit the 'live preview' in Brackets or view the page from a server to see the graphic.

```
s.append(f);
```

### 9. Clean up the graphic

At present there are some pins floating in space and a menu that is obstructing the way of the main graphic. These will be important to us later but for now let's make them invisible. Place the code here, just before the line

we added in Step 8 as this effect should be applied before the image is displayed.

```
menu.attr({ opacity:0 });
pin.attr({ opacity:0 });
chatPin.attr({ opacity:0 });
```

### 10. Hide 'hit areas' of buttons

You can refresh the browser now and see the updates to the graphic from the previous step. There are some hit areas for buttons to hide the button icons, so those will need to be made invisible as well. Add this code that we've provided below immediately after the code from the last step.

```
people.attr({ opacity:0 });
chat.attr({ opacity:0 });
burger.attr({ opacity:0 });
```

### 11. Leave a pause

Once the graphic is on the screen, the animation is ready to be applied but it should wait a little before starting - this is so that the user can see the graphic, then see it as it moves into position. Add the code here after the `s.append(f)`; from Step 8. This code will set a timer to wait for 300 milliseconds.

```
timer = setTimeout(designIn, 300);
function designIn() {
clearTimeout(timer);
```

### 12. Animate the graphics

Add the code to finish the function from the previous step. These graphics are animated with a slight bounce to get them into the position we want. The `t` inside the `transform` means that they are transformed relatively from their current position. The timing of each is placed after this. Then just hit Save and view it in the browser to see the animation.

```
thumb.animate( {transform: "t0,-160"},1500,
mina.backout );
disc.animate({transform: "t0,-150"},1100,
mina.backout);
header.animate({transform: "t0,-130"},850,
mina.backout);
icons.animate({transform: "t0,-100"},550,
mina.backout);
}
```

### 13. More animation

The graphics that are at the bottom of the app will also need to be animated, and so does the map in the background. Add the following lines of code before the closing bracket that we showed you in the previous step. Now just save the file and view it in your browser to see all the elements animate into position on the screen.

```
baseText.animate({transform: "t0,-130"},850,
mina.backout);
base.animate({transform: "t0,-100"},550,
mina.backout);
map.animate({transform: "t0,-70"},450, mina.
backout);
```

### 14. Move the thumb icon

As it stands, the animation stops moving but it would be good if we could make the thumb continuously bob about in the graphic. Go back to the code added in Step 12 and amend the 'thumb' code as shown. This will call another function `thumbUp` when it has finished.

```
thumb.animate( {transform: "t0,-160"},1600,
mina.backout, function(){thumbUp()} );
```

### 15. Move the thumb up

The `thumbUp` function is added here and it needs to go just below the closing bracket of the `designIn` function.

## Animating scale

If you want to animate the scale of an image, then SVG is the perfect graphic to scale as it is a vector and it can be blown up in size without any loss of quality.



#### Top left

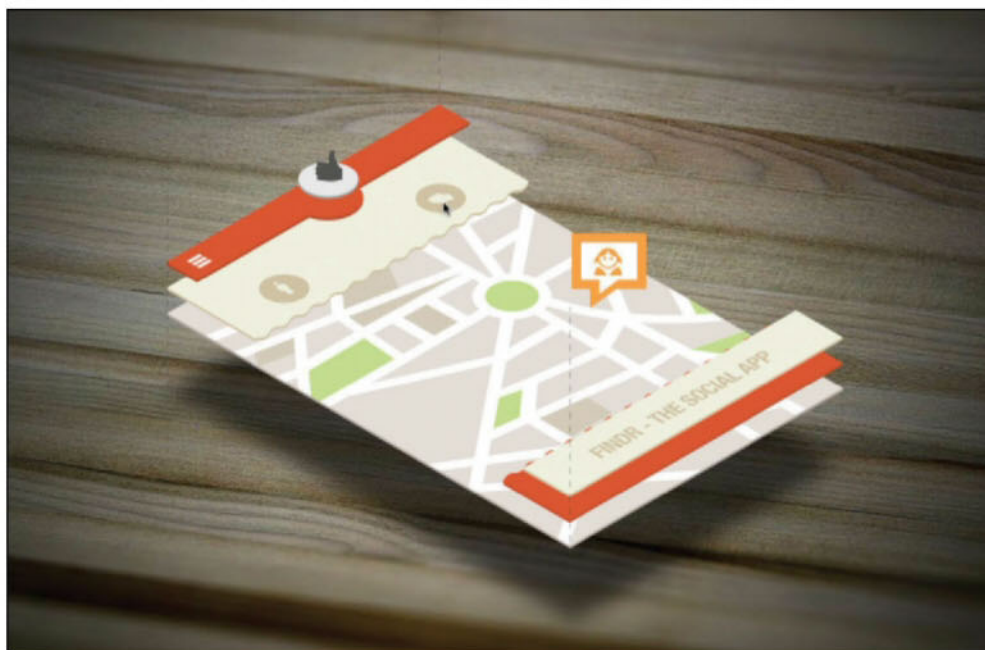
A little tidy up is required as some graphics aren't needed until animation is applied to other elements

#### Top right

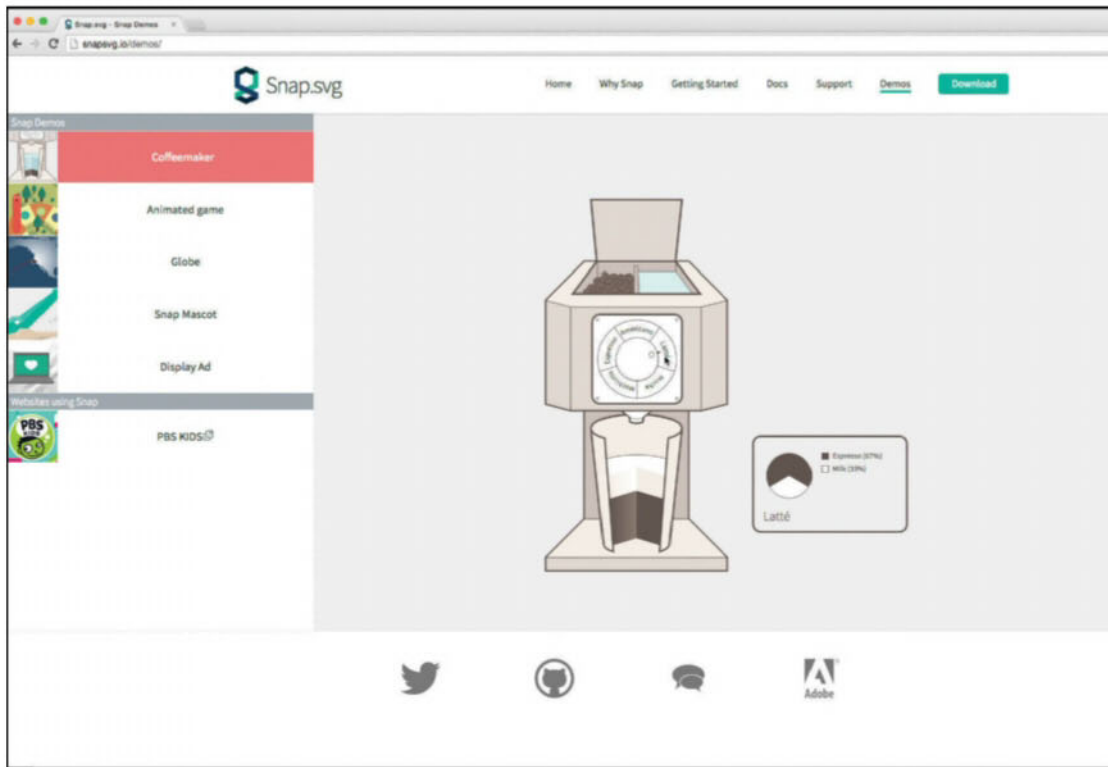
The first graphic elements are animated into position, showing an exploded view of an app

#### Right

Interactivity is added to the other icon but there needs to be a way to reset this so the icon goes away again







### Other ways to use Snap.svg

Snap.svg is great at manipulating premade SVG images but it is also great at creating content from scratch, perfect for making basic geometric shapes like circles or rectangles. There is a great tutorial on this at the Snap.svg site [snapsvg.io](http://snapsvg.io), but there are also some other great examples at websites like [svg.dabbles.info](http://svg.dabbles.info) that help to fill in some blanks in working with Snap.svg. Of course the perfect match for graphics is to create some graphics in your favourite vector illustration program, then add to it by creating dynamic masks with shapes in Snap.svg. An excellent example of this is the Coffee Maker demo that comes when you download the source code of Snap.svg, but bare in mind that this is a very advanced application!

This 'thumbUp' function is called after the thumb has moved into position and it moves it up a little higher with easing so that it slowly builds up speed and then subsequently slows down again.

```
function thumbUp()
{
    thumb.animate( {transform: "t0,-210"},800,
    mina.easeinout, function() {thumbDown()} );
}
```

### 16. Move back again

Once the thumb has moved up, it calls the function thumbDown so now we will add that function below. Again this moves the thumb down and calls the thumbUp function that keeps the thumb bobbing up and down in a loop. Now just save this and view it in the browser, as we have done previously, to see the animation in action.

```
function thumbDown()
{
    thumb.animate( {transform: "t0,-160"},800,
    mina.easeinout, function(){thumbUp()} );
}
```

### 17. Add interactivity

It's time to make the graphic interactive now. Adding the next set of code will make the icon of the person a button. Clicking on this button will make the pin animate

into the graphic and bounce onto the map. The pin was made invisible in Step 9. Save your code and view it in a browser to test the click.

```
popcorn.cue( 17.2, people.click(function ()
{
    pin.animate({opacity:1, transform:
    "t0,280"},900, mina.backout);
});
```

### 18. Click the chat icon

Similar to the previous step, if the user clicks on the chat icon, the chat pin should drop onto the map and show the location of the chat. The code adds this on-click animation, and once this is done you can save the page and view it in a browser to test that the click is working.

```
chat.click(function () {
    chatPin.animate({opacity:1, transform:
    "t0,280"},900, mina.backout);
});
```

### 19. Reset the pins

When the user clicks either of the icons and the pins drop into position, they will stay there. It's possible to only show one at a time by making the first pin animate back off when the other icon is pressed. Just add this line of code to the click function of Step 17 to do exactly that.

```
chatPin.animate({opacity:0, transform:
    "t0,0"},900, mina.backin);
```

### 20. Adjust the second pin

As in the previous step, the code here needs adding to the click function in Step 19. This will make the first pin

disappear when the other icon has been clicked. This is a simple solution for what we wanted to achieve so save this, then just test this in the browser and only one pin will display at a time.

```
pin.animate({opacity:0, transform:
    "t0,0"},900, mina.backin);
```

### 21. Bring in the menu

Right back at the start there was a menu that was made invisible. Now let's make the burger icon a button that can be clicked and this will bring the off-canvas menu into the app. Add this code below, which will animate this onto the screen. Then save this and try clicking the icon in the browser.

```
burger.click(function () {
    menu.animate({opacity:1, transform:
    "t150,-70"},900, mina.backout);
});
```

### 22. Remove the menu

To get rid of the menu, it is as easy as letting the user click on the actual menu itself. Adding the following code will animate it back to the original position, while also taking the opacity down and making the menu invisible. Save this and view again in the browser to see and test all the functionality.

```
menu.click(function () {
    menu.animate({opacity:0, transform:
    "t0,0"},900, mina.backin);
});
```

# web workshop

# Code on-scroll image animations with CSS

As seen on [bloomberg.com/graphics/2015-sepp-blatter-fifa](http://bloomberg.com/graphics/2015-sepp-blatter-fifa)

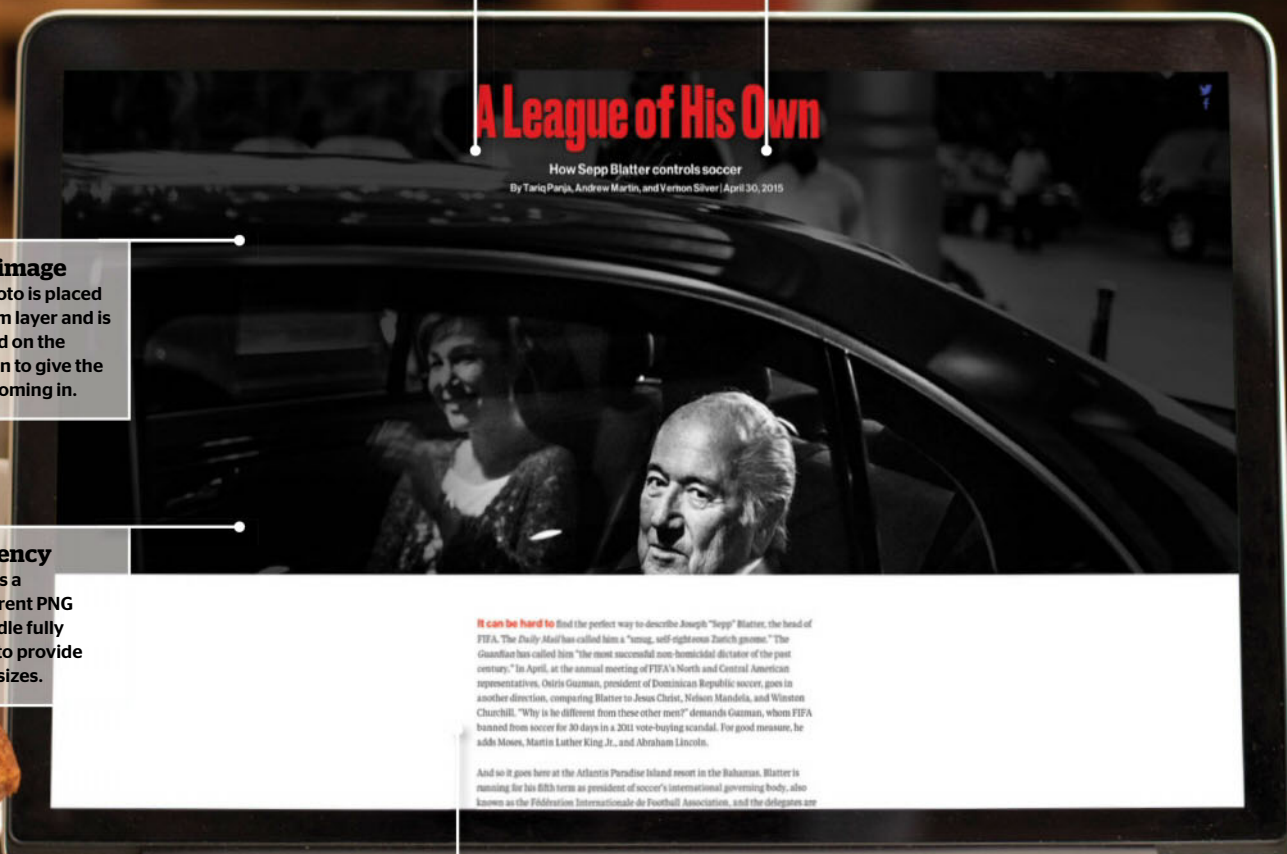
**Content overlay**  
Content can be placed in the content element in the header. This will be placed above the background image.

**Changes on scroll**  
The main content is placed under the header image and will become visible as the user scrolls down the page.

**Zooming image**  
The main photo is placed on the bottom layer and is resized based on the scroll position to give the illusion of zooming in.

**Transparency**  
The overlay is a semitransparent PNG with the middle fully transparent to provide focus as it resizes.

**Styled text**  
The main body of the page is set to have its own colour and styling. The header is set to the full body width.







Whether it's for fun or to emphasise something serious, this sinister on-scroll effect can be used to capture the attention of your

website viewers and to set the tone. With this in mind, there can be justified use of this effect for user experience design as well as using it from a graphic design perspective.

This animation effect makes use of HTML, CSS and JavaScript. This is important because CSS alone can't be used to detect page-scrolling events, hence these interactions are managed with JavaScript while the

default styling settings are defined in regular CSS. Note that for this Web Workshop we have placed both CSS and JavaScript in separate files so that the effect can be reused across multiple pages without any code duplication taking place.

The CSS filter property is fairly versatile and allows for many other options in addition to or instead of the greyscale property used in this tutorial.

It would be great to see how this concept is adapted to produce different types of sinister effects - so feel free to tweet us some links and pictures of your examples on Twitter @WebDesignerMag.

## EXPERT ADVICE

### Adapting the sinister effect Sinister features

Additional features can be added to the effect by adding new JavaScript code within the scroll listener. This tutorial uses the greyscale filter property as an example of changing the image colour, but other options are also available for experimenting.

### Calculations

The calculations for the transition are made using percentages so that it works the same in different resolutions. This is important to ensure that the effect doesn't break with high-res screens. You can test this using the zoom-out features of your web browser to simulate a higher resolution.

### Limitations

Step 8 shows a condition that stops the overlay resizing once its horizontal position exceeds -10 pixels. This prevents the illusion from being broken by larger resolutions that stops the overlay covering full width, keeping the webpage adaptable and future-proof.



## Making something look serious

"The sinister effect can be used to emphasise something serious and is ideal for use on webpages promoting a serious topic. In the case of the Bloomberg Business website, it is used to set the tone of a Fifties gangster movie, which have been the stage for of many stories about corruption."

**Leon Brown, freelance web developer**

**<comment>**  
What our experts think of the site

## Technique

### 1. Main page setup

The main page requires the standard HTML, head and body containers to be defined. This also enables us to insert the page components in the following steps in a way that keeps the JavaScript and CSS separate from the page body content.

### 2. CSS file linking

This HTML markup will link the files that the CSS and JavaScript code are contained in to the page so that the styling and functionality can be shared across multiple pages. It also enables us to keep the code clean by separating content, styling and functionality.

### 3. Content containers

Insert the sinister header and the main page content inside the page <body> tag. The sinister <header> contains the background photo image, an overlay image used for the zoom and a content container for the additional text content - in this case it's a title.

### 4. Initiate page styling

Now that the HTML elements are in place, we can move to the styles.css file to start styling the page. We start this file with the default styling of the main page - mainly the page background and the <main> content container, which we want to use to ensure that the content is centred and has readable text.

### 5. Sinister styling

The header's styling need to stretch across the page and have a visible height. It will also need to hide any overflow from the zooming images we are using. Images and the content container will be posited at the top left of the <head>, which is made possible with the header using relative positioning.

```
$(window).on('scroll', header{
display: block;
position: relative;
height: 100%;
text-align: center;
overflow: hidden;
margin-top: 25%;
})
header h1{
font-size: 6em;
color: #c00;
text-shadow: 2px 2px #000
}
header img,
header .content{
position: absolute;
top: 0;
left: 0;
margin: 0 auto 0 auto;
width: 100%;}
```

### 6. Style individual images

There are two images used in our layout - the first being the main photo image and the other being the sinister zoom overlay. We've avoided overcomplicating the HTML with class name and instead are using their position in the <header> container to define positioning styles.

```
$( "#header" ).click(function() {
if (menuOn == false){
$('#menu').animate({"bottom": -100, 500 });
menuOn = true;
} else {
$('#menu').animate({"bottom": "-100%", 500 });
menuOn = false;
}
});
});
</script>
```

### 7. Initiate listening code

With the styling now complete, we are ready to add the code to trigger changes as the page scrolls. This is achieved by adding JavaScript code that waits for a page-scroll event. We put this inside another listener for the completion of the page loading to avoid an error.

### 8. Activate image zooming

The sinister effect is primarily made from two animations - the main picture made bigger and the overlay made smaller to focus its inverted transparent circle around the image. We use a query selector to target the images to apply sizing and positioning calculations based on the scroll position.

```
//-- PUT THIS INSIDE THE SCROLL LISTENER
document.querySelector("header img").style.
width = (100+(window.scrollY/20))+"%";
document.querySelector("header img").style.
left = (0-(window.scrollY/50))+"%";
if(-200+(window.scrollY/3) < -10){
document.querySelector("header img:nth-
child(2)").style.width = (500-(window.
scrollY/1.5))+"%";
document.querySelector("header img:nth-
child(2)").style.left = (-200+(window.
scrollY/3))+"%";
}
if(-180+(window.scrollY/3.5) < -20)document.
querySelector("header img:nth-child(2)").
style.top = (-180+(window.scrollY/3.5))+"%";
```

### 9. More sinister colouring

The effect can be made to look more sinister by making the main photo change from full colour to black and white as the sinister effect takes place. This can be done by using the scroll position to affect the greyscale property. For the full code on this tutorial, make sure that you check our FileSilo site.

# Build a Chrome OS app with JavaScript

Use JavaScript to access nonstandard APIs and benefit from greater control in comparison to a typical web app







Chrome is only six years old, and yet, in such a short space of time (although a year is like an eon in technology) it's come to dominate browsing across our devices.

On big screens and little ones, Google has worked hard to make their browser the top dog in almost every conceivable space, and the low-cost PC market is not immune to this relentless march to dominance.

Chrome OS is an operating system based on the popular Chrome browser; JavaScript is a first-class citizen and the beauty of writing apps for Chrome operating system is that they will also work on almost any version of the Chrome browser.

It's said that the web is the platform, but as far as Google is concerned, Chrome is *this* platform and in this issue we're going to take that platform for a test-drive. Chrome OS has new, more powerful and further reaching JavaScript APIs than any other modern browser, and these APIs will also let us do a great deal more than a browser would normally be able to do.

We're going to create a minimalist stats board to teach us how to make Chrome OS apps and to demonstrate how far into the OS these APIs reach.

## 1. Get started

First we will need to download the project files from FileSilo. We're not going to write our own CSS or create our own icon files as this tutorial is about Chrome, not Photoshop! Unzip the project.zip folder and this will create a project that meets the minimum requirements for running a Chrome OS app.

## 2. The manifest.json

The manifest is where we define the prerequisites for the app. Here, we give our app a title, paths to any icon files we may have, version number and any permissions our

app may need. If we submit this app to the Chrome Web Store, the details used to describe and install the app will be taken from the manifest file.

```
{
  "name": "WDM Demo",
  "description": "A demo Chrome OS app for
  Web Designer Magazine.",
  "version": "0.1",
  "manifest_version": 2,
  "app": {
    "background": {
      "scripts": ["background.js"]
    }
  },
  "icons": { "16": "stats-16.png", "128":
  "stats-128.png" },
  "permissions": ["notifications", "system.
  cpu"]
}
```

## 3. Permissions

In our manifest, we define any permissions our app may need. Unlike a webpage, our users will not be asked for permission when we want to use a Web API (such as geolocation), instead, the act of installing the app is the act of consent that is required for us to act on the users behalf. For this app, we only want permission to use the Notifications API and the system.cpu API.

```
"permissions" : [
  "notifications",
  "system.cpu"
]
```

## 4. Background.js

In our manifest, we defined a background script, aptly named background.js. This file is where our app starts its

life. Chrome OS will run this file before any other. In this file we've added a listener that will be triggered when the app has been started. Here, we tell Chrome OS that index.html is the one that will define our window and we will then pass bounds to set the size of that window once it's been opened.

```
chrome.app.runtime.onLaunched.
addListener(function() {
  chrome.app.window.create('index.html', {
    'bounds': {
      'width': 1024,
      'height': 300
    }
  });
});
```

## 5. Let's experiment

None of the APIs that we're using in this tutorial are considered 'experimental' but if want to get creative with Chrome OS apps, then enable the experimental APIs. Just enter 'chrome://flags' in Chrome's URL bar, search for 'Experimental Extension APIs' and click enable.

## 6. Install our app


Before we can run our app, we need to install it. Don't worry, this isn't as daunting as it sounds. Open Chrome and click on the hamburger menu to the right of the URL

## Experimental APIs and you

Google likes to use Chrome OS as its testing ground for experimental APIs. Long before anything gets submitted to the W3C (if ever) Google will have written and redeployed an API a thousand times.

**Extensions**

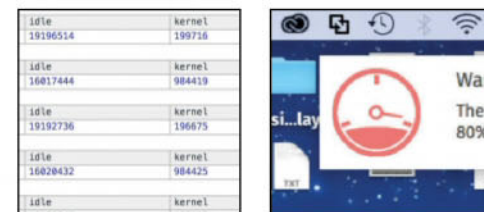
Load unpacked extension... Pack extension...

 **WDM Demo** 0.1  
A demo Chrome OS app for Web Designer Magazine.

Permissions Launch Reload (⌘R) Errors

ID: cjokfenjjinbdhnbdfpcfidcobpihe  
Loaded from: ~/Documents/Articles/Chrome App/public  
Inspect views: background page (Inactive)

Allow in incognito  Collect errors



### Left

You can load your app into Chrome without having to go through a packaging process. Just click 'Load Unpackaged Extension' and navigate to your project folder with the manifest.json in it

### Top left

To the untrained eye, these numbers will mean very little, but they represent the time the systems processors are taking to complete certain system or user ran processes

### Top right

Chrome's notifications API is separate from the Web Notifications API which ties into the OS notifications protocol. Still, they do the job rather well

## Tutorials

# Build a Chrome OS app with JavaScript

bar, find more tools and then click 'Extensions' (this may vary across different versions of Chrome). Tick 'developer mode' at the top of the page and then click 'load unpacked extension' and select the folder with our project in it.

### 7. Run our app

Our app will pop up in the list of extensions, but we can't run it from here. If we want to run our newly loaded app (from Chrome OS) we will need to head to the apps icon in your taskbar and select it from there or (from Chrome) open a new tab, click the Apps button in the top left of the window and run it from there.

### 8. First run

On our first run, our app is pretty empty looking, because, well, it's empty, but it won't be empty for too long. Just open up index.html for editing and add the following code:

```
<html>
<head>
<meta content="text/html; charset=utf-8"
http-equiv="Content-Type">
<title>WDM || Notes</title>
<link rel="stylesheet" href="styles.css"
type="text/css" />
<meta name="viewport" content="initial-
```

```
scale=1.0, user-scalable=no" />
</head>
<body>
<div id="meters"></div>
<script src="scripts/core.js"></script>
</body>
</html>
```

If you restart the app, you'll see that not much has changed, this is because we're going to use JS to create our DOM for us.

### 9. A functioning app

Open scripts/core.js for editing, all of the code is already there to be run, but we're not initialising it yet. Go to the bottom of the file and uncomment the line '/\*\_\_chrome\_cpu\_watcher.init()'; and then restart the app. Restart the app, voila! we have a fully functioning CPU meter with Chrome's CPU API. Let's walk through how this all works.

```
(function(){
  /*__chrome_cpu_watcher.init();
})();
```

### 10. The chrome window object

Whenever we want to interact with an API that is nonstandard, that is, Chrome OS/Chrome app specific, we do so with the global 'chrome' object. The APIs that are available are determined by the permissions argument set in our manifest file, but we can manipulate the window of our app. On line 111 of core.js, we do just that by setting the width of our window to be large enough that it can accommodate the number of processors our Chromebook or PC has.

### 11. System.CPU

One of those nonstandard APIs is the system.cpu API and this API enables us to get real-time information

about the state of our Chromebook's processor (or processors). This API has only one method, getInfo(), and we use its callback to set of our app on line 105. We need to know about the system we're analysing before we analyse it.

### 12. Create the CPU meters

Each different system has a different number of processing cores and the system uses the CPU differently. So, we need one meter per core and we need one extra one for the total. We create these meters with the createMeters() function between line 8 and 47 in core.js and we call that on line 109 inside of our first call to chrome.system.cpu.getInfo() on line 105. We're creating the HTML with a document fragment, but the HTML is equivalent to:

```
<div class="meter">
<h1>1</h1>

<p class="percentage">20%</p>
</div>
```

### 13. Get Chrome CPU data

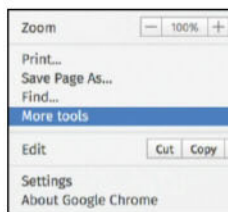
So, now that we have meters, we need to get them moving! Unless you have a superpowerful Chrome OS device, those meters should never be stationary for long. In order to work out the percentage of our system usage, we need to do a little math over time, so we'll call 'chrome.system.cpu.getInfo(updateMeters);' on an interval of 500ms on line 114.

### 14. The CPU data

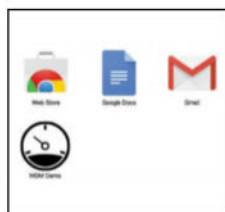
Getting our CPU data is really easy, but making sense of it is a little tough if you're not a sys dev. These are the 'times' that are taken up on the processors by different processes. We can't do much with it as it is, in order to

## Other platforms

If writing an app for one platform isn't your cup of tea, you can deploy Chrome apps to iOS and Android too. But be aware that some APIs might not be supported straight out of the box.

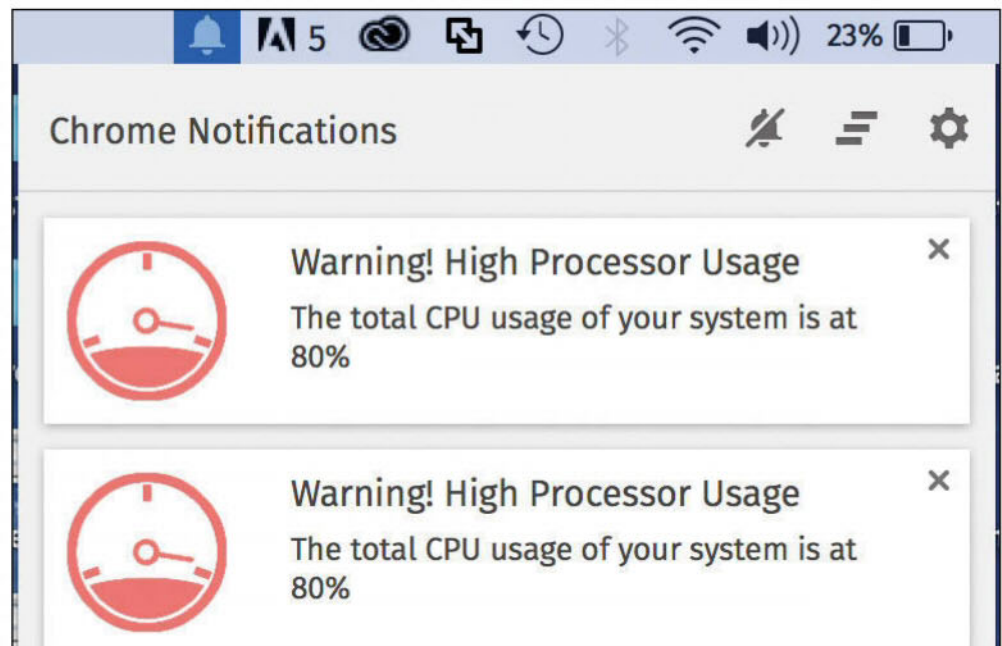


**Top left**  
The Extensions menu is buried quite deep in Chrome's hamburger menu, but you can find it under 'More tools'

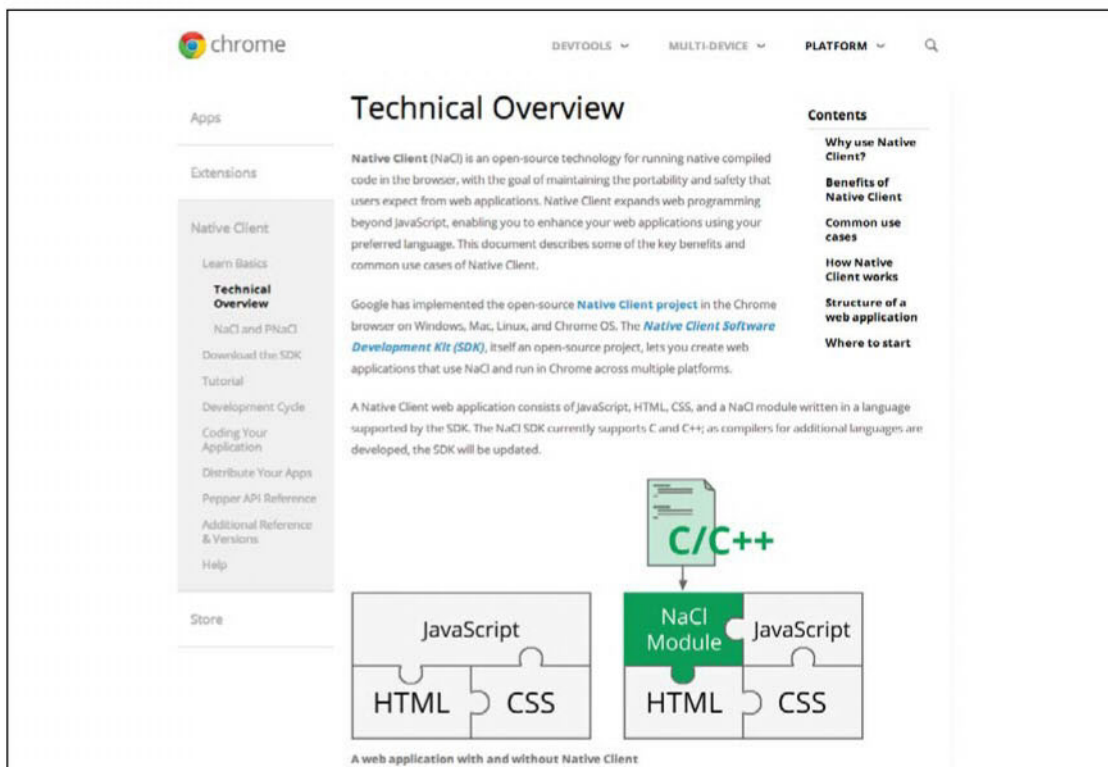


**Top right**  
You can run the app from the Extensions window, but once it's installed you can run it from your apps window

**Right**  
Chrome has its own notifications centre. On OS X you can find it in the menu bar, it's a little bell icon







### The native client

Google wants you to write apps in JavaScript, that's why we have all of these fantastic, low-level APIs that let us do almost anything we can conceive of these days. That doesn't mean, however, that JavaScript is the only way of getting things to run in Chrome - there's also the native client. If you really want to create something that is mind-blowingly fast, you can run compiled C/C++ code in Chrome using a technology called PNaCl (Pinnacle). These extensions run much the same as their JavaScript equivalents, but they are platform dependant, so you still need a version for Windows/Mac/Linux which is a bit of a downside - but you have full control of the extensions capabilities. The question you have to ask is "Do I really need all of this power and control?". It's up to you!

calculate a percentage, we need to compare two bits of data sampled over time.

```

"processors": [
  {
    "usage": {
      "idle": 17674141,
      "kernel": 1859709,
      "total": 23680054,
      "user": 4146204
    }
  },
  {
    "usage": {
      "idle": 23251012,
      "kernel": 245406,
      "total": 23679093,
      "user": 182675
    }
  }
]

```

## 15. The first instance

The first time we get our CPU data into `updateMeters`, we can't do anything with it, so we will skip over the calculations that are on lines 56 - 96 and put it straight into our `previousData` variable at the top of our function.

## 16. Compare the data

The second, and every subsequent time we get processor data, we can compare it with the data from the previous time `updateMeters()` was called. On line 62, we turn those big looking numbers from Step 12 into a

friendly percentage out of 100. On line 63, we turn our percentage into an angle that we want the needle on our meters to move by, which we do will do so with `transform: rotate()`:

```

var used = Math.floor((processors[b].usage.kernel + processors[b].usage.user - previousData.processors[b].usage.kernel - previousData.processors[b].usage.user) / (processors[b].usage.total - previousData.processors[b].usage.total) * 100),
    indicatorRotation = (220 / 100) * used;

```

## 17. UsageTotal

For each core we will now add the percentage that is being used to `usageTotal`. When we've added up all of the processor usage, we can then divide it by the number of processors to get the total CPU usage of our system out of 100 per cent. We will do this on lines 72-75 and this is why we added 1 to the `numberOfProcessors` on line 109, it's so that we had an extra meter for our overall usage.

```

var totalUsage = ((usageTotal / (numberOfProcessors * 100)) * 100) | 0;
meters[meters.length - 1].getElementsByClassName('percentage')[0].textContent = totalUsage + "%/100";
meters[meters.length - 1].getElementsByName('img')[0].style.transform = "rotate(" + (220 / 100) * totalUsage + "deg)";

```

## 18. Exceeding usage

Now, we have all of the code in place to visualise our CPU, if we were to run the app at this point, we'd see our CPU meters happily bobbing up and down as we used our Chromebooks, but we can't sit here watching these meters all day, we need something that will tell us if we're in danger, like say, if our total CPU usage exceeds 80 per cent. That's where the Notifications API comes in.

## 19. Red alert

Triggering a notification with Chrome OS is really quite simple, there are multiple types, but all we're going to use is the 'basic' type. This type includes an icon, a title and a message - all we need. On lines 77-94, we monitor the total CPU usage, if it goes above 80 per cent, we trigger a notification and we won't trigger another warning until it's dropped beneath 80.

```

chrome.notifications.create({
  type : "basic",
  title : "Warning! High Processor Usage",
  message : "The total CPU usage of your system is at " + totalUsage + "%",
  imageUrl : "stats-notification.png"
}, function(e){});

```

## 20. Round up

That's it. We've put together a really simple Chrome OS app that monitors and warns us of excessive CPU usage, but we've only scratched the surface here of what Chrome OS APIs can do - with APIs like Serial or Bluetooth, you could transfer files wirelessly or even use them to drive a 3D printer!

# web workshop

## Create a slide-down on-scroll menu

As seen on [lellabaldi.com](http://lellabaldi.com)

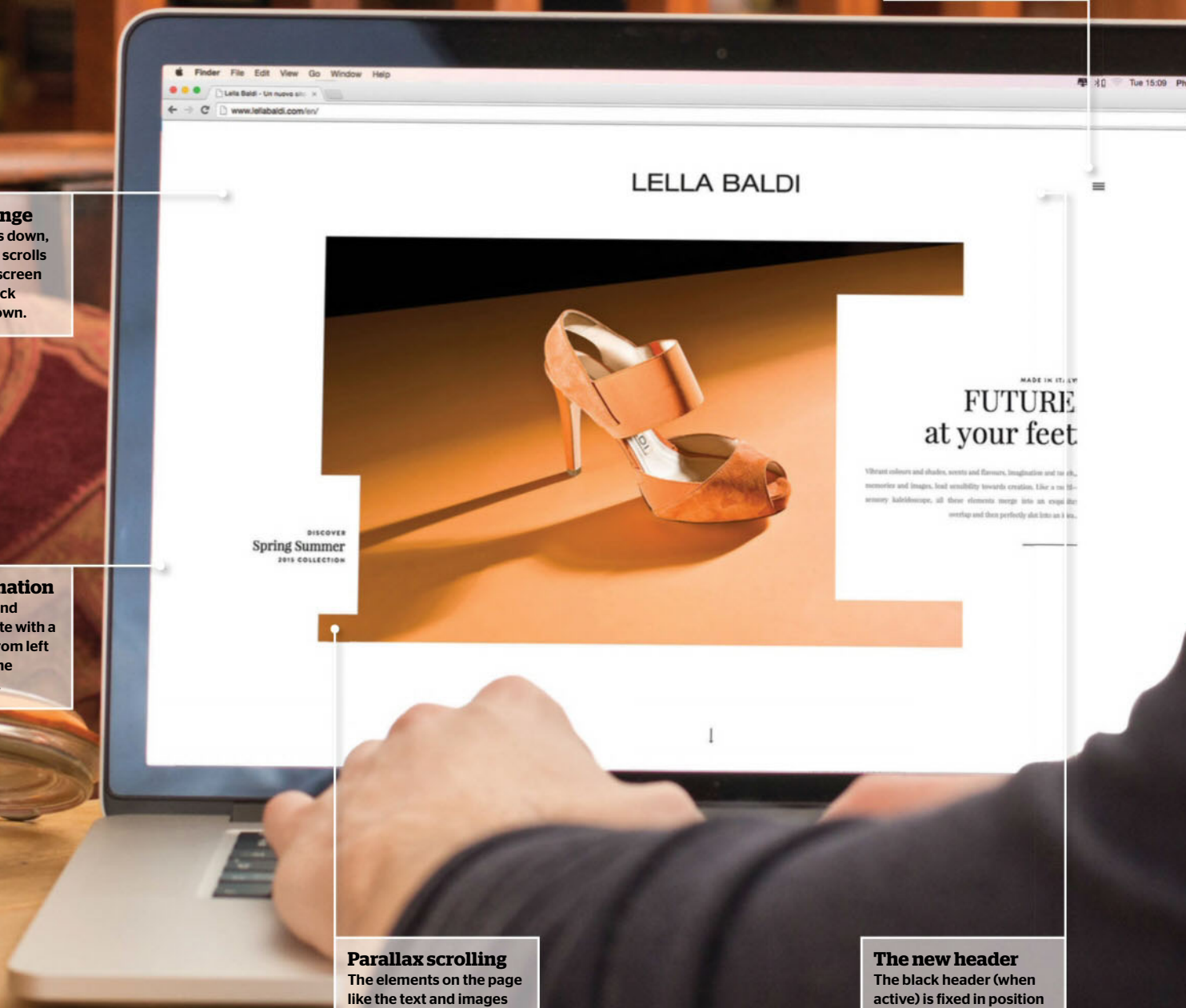
**The regular menu**  
When the site first loads, the burger menu is at the top right-hand corner of the screen and works as a normal menu.

**Scrolling change**  
As the user scrolls down, the regular menu scrolls off the top of the screen and triggers a black header to slide down.

**Loading animation**  
A black background transitions to white with a wipe animation from left to right to show the loading progress.

**Parallax scrolling**  
The elements on the page like the text and images scroll at different speeds but always form the main content in the middle.

**The new header**  
The black header (when active) is fixed in position with a semitransparent background so that content can still be seen.





## Create a slide-down on-scroll menu

↓ **DOWNLOAD TUTORIAL FILES** [www.filesilo.co.uk/webdesigner](http://www.filesilo.co.uk/webdesigner)



Menus are one of the most important aspects of any site, they provide the way that your visitors are going to actually navigate and interact with your content. This provides a tremendous opportunity to do something unique, at the very least the designer needs to take something that's quite familiar and do something a little unexpected.

The creators of [lellabaldi.com](http://lellabaldi.com) have done just that with their transformation of the familiar burger menu. As the page loads the burger icon is present at the top of the page in the right-hand corner of the screen, so no big

change there. But as the user scrolls down the page this icon will then scroll off the top as any normal content scrolls with the page. Just as the icon is scrolling off the page another header bar slides down with a different coloured background, containing another burger menu. It's a simple but effective change and certainly grabs the user's attention. When the icon is clicked, the off-screen menu slides up from the bottom of the screen and overlays with the new header, covering the entire screen. The way the menu slides up until it touches the header is actually very pleasing and shows how a simple animation can be effective.



### Make the wait interesting

"[Lellabaldi.com](http://Lellabaldi.com) is the branding site of Lella Baldi company, an Italian company famous for women's shoes completely made in Italy. The site style is like that of the brand: minimal chic, elegant, fresh and fluid, the site is fully responsive and mobile friendly. It's a refined style and unique, as are their creations."

**Lattanzi Eros, project manager**

**<comment>**  
What our experts think of the site

## Technique

### 1. Creating the menu reveal

The Lella Baldi site has a unique menu system, to get the same effect start by adding the jQuery library and the CSS styling to the head section of your document. The body is set to have no padding and the header is made into a fixed element. Make sure that you download all the code for this Web Workshop on our FileSilo.

### 2. Finish the styling

The content of the page is given an arbitrary 1,600 pixel height so that it is larger than the browser window, and just so that there is some scrolling on the page to reveal the header. The menu is placed as a fixed element off the bottom of the page.

```
#content{
width: 100%;
height: 1600px;
}
#menu {
width: 100%; height: 100%;
background: #222; color: #fff;
padding-left: 20px;
z-index: 201;
position: fixed;
bottom: -100%;
}
</style>
```

### 3. Add the HTML tags

Now move to the body section of the page and add div tags. These correspond to the CSS added in the previous two steps. If this was a real page then you would put your own content in the div with the id of 'content'.

```
<div id="header">Header</div>
<div id="content">Page Content goes here</div>
<div id="menu">Menu</div>
```

### 4. Add the functionality

Below the HTML tags, JavaScript content can be added. The document is checked to make sure it has loaded, then two variables are set to track whether the header has slid down onto the page or if the menu is on.

### 5. Scroll detection

When the scrolling has gone more than 100 pixels the header is animated onto the page to sit at the top. If the user scrolls up it slides back off again.

```
$(window).on('scroll', function() {
var scrollTop = $(this).scrollTop();
if ( scrollTop > 100 && down == false) {
$('#header').animate({"top": 0}, 300 );
down = true;
}
if ( scrollTop < 100 && down == true) {
$('#header').animate({"top": -100}, 300 );
down = false;
}
});
```

### 6. Click the header

Rather than just click a burger icon, the whole header is set to be a button to move the menu onto the page. The menu slides up from the bottom and stops below the header. The menu slides off if clicked a second time.

```
$( "#header" ).click(function() {
if (menuOn == false){
$('#menu').animate({"bottom": -100}, 500 );
menuOn = true;
} else {
$('#menu').animate({"bottom": "-100%"}, 500 );
menuOn = false;
}
});
});
</script>
```

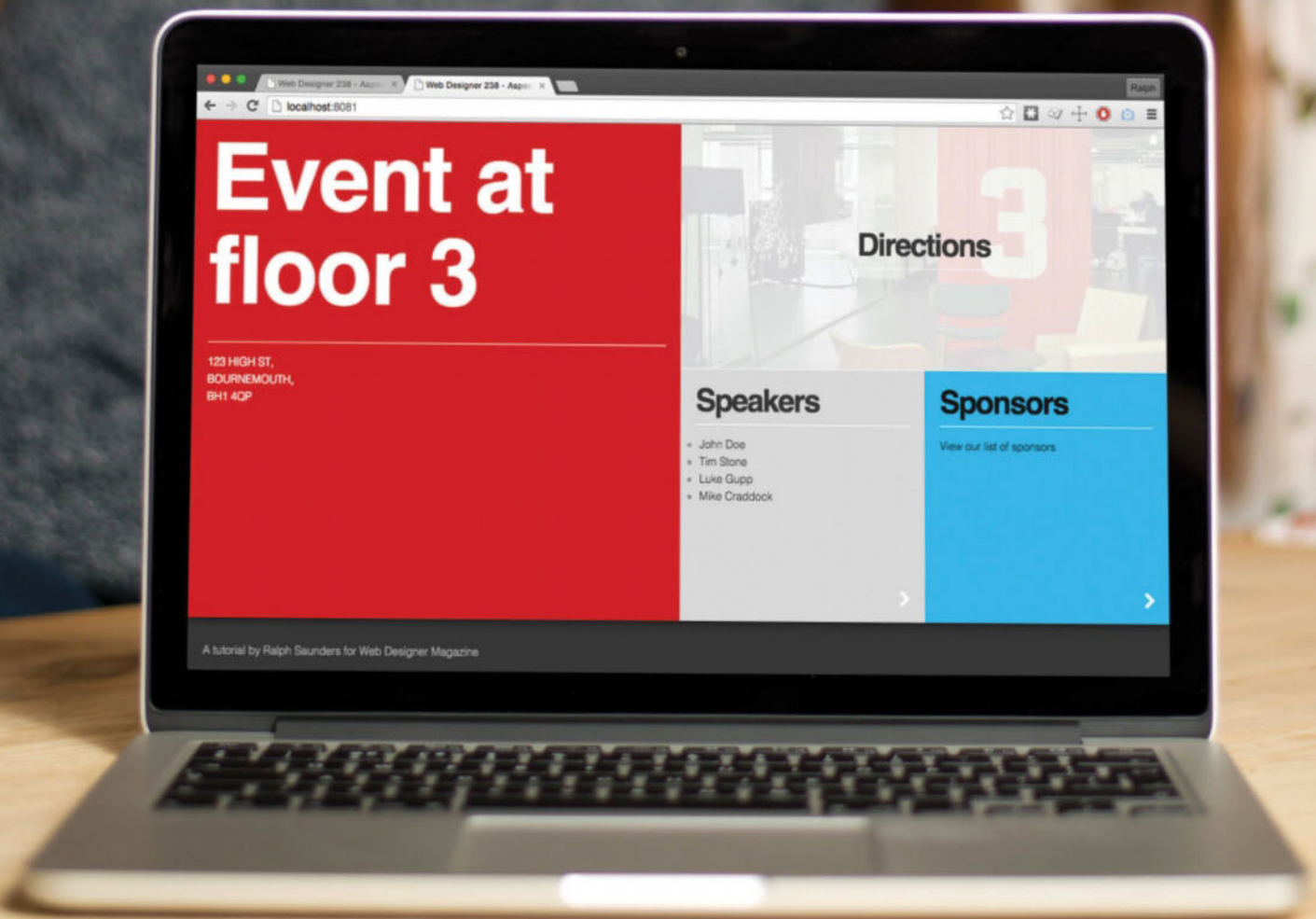
#### EXPERT ADVICE

##### Pushing the menu

In your quest to make your menu more amazing than other sites, always make sure your menu is as obvious as possible regardless of what new twist you are trying to give to your interaction. Every user has to understand how to navigate your site, otherwise what you've created is a complete failure.

# Design aspect ratio based layouts with HTML and CSS

Building tile-based UIs can be complex. Discover how to make this process easy and create responsive aspect ratio layouts







Traditional web builds assume content is flexible and likely content managed.

Boxes change in height as the page resizes because they're defined by a percentage width and their content. But this flexibility isn't always a requirement. We can craft more interesting layouts when content is well defined.

Aspect ratio-based layouts prioritise proportion over content. In this sense the process is much more like editorial - with all of its pros and cons. The aspect ratio approach gives us more design control but it's much more labour intensive to produce a good experience. If your client does not want to engage in editorial processes or requires flexible systems then steer clear!

This approach is fantastic for scenarios where data is well defined or can be truncated without issue or where iconography is more important than text. Dashboard pages, widget collections and even some web applications are all digital experiences that could benefit from this approach.

In this tutorial we're going to cover how to semantically build aspect ratio-based layouts, approaches for dealing with overflowing content, and overcoming the issues with making aspect ratios work responsively.

## 1. Download files

The ZIP file provided on FileSilo for this tutorial contains all the assets that we will be using along with a basic boilerplate setup. We're going to use an npm package called http-server to serve our files.

## 2. Mark up aspect ratios

The aspect ratio boxes don't have any semantic value in this tutorial, so we've used `<div>` tags. They could be `<section>` tags if appropriate. We're also using data attributes to semantically describe our 'aspect' element.

## 3. Style aspect ratios

We're using the ratio data attribute we created as a selector (supported by IE9 and up). Set the height to 0 and control the size of the box with padding only. As we're creating a square, the padding is equal to the width. We also hide any child content if it were to overflow.

```
.aspect[data-ratio="1:1"] {
  max-width: 100%;
  height: 0;
  padding-bottom: 100%;
  overflow: hidden;
  background: rgb(211, 22, 22);
  color: #fff;
}
```

## 4. Harder ratios

Using 4:3 is a little more complicated because we have to do some maths to figure out this ratio. The way to calculate how much padding you need to give an element is by dividing the height by the width and multiplying by 100. So for example we would use in this case:  $3 / 4 = 0.75 * 100 = 75$ .

```
.aspect[data-ratio="4:3"] {
  max-width: 100%;
  height: 0;
  padding-bottom: 75%;
  background: rgb(223, 28, 66);
  overflow: hidden;
  color: #fff;
}
```

## 5. Style aspect content

The content inside any given aspect box will look bad if it sits flush against the edges of the box. We can get around this by giving a margin to the `.aspect-content` div, which should wrap all written content in a given box.

```
.aspect-content {
  margin: 20px;
}
```

## 6. Add imagery

Working with images in aspect ratios is tricky. We want the image to scale, but we don't want to distort it. With this in mind, we will need to write markup that enables us to crop it if necessary.

```
<div class="aspect" data-ratio="2:1">
  
  <div class="aspect-content">
    <h4 class="headline">Directions</h4>
  </div>
</div>
```

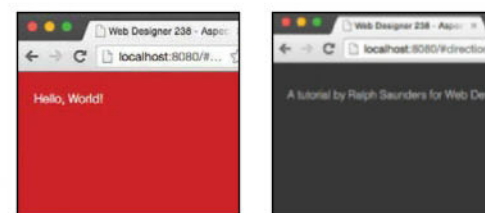
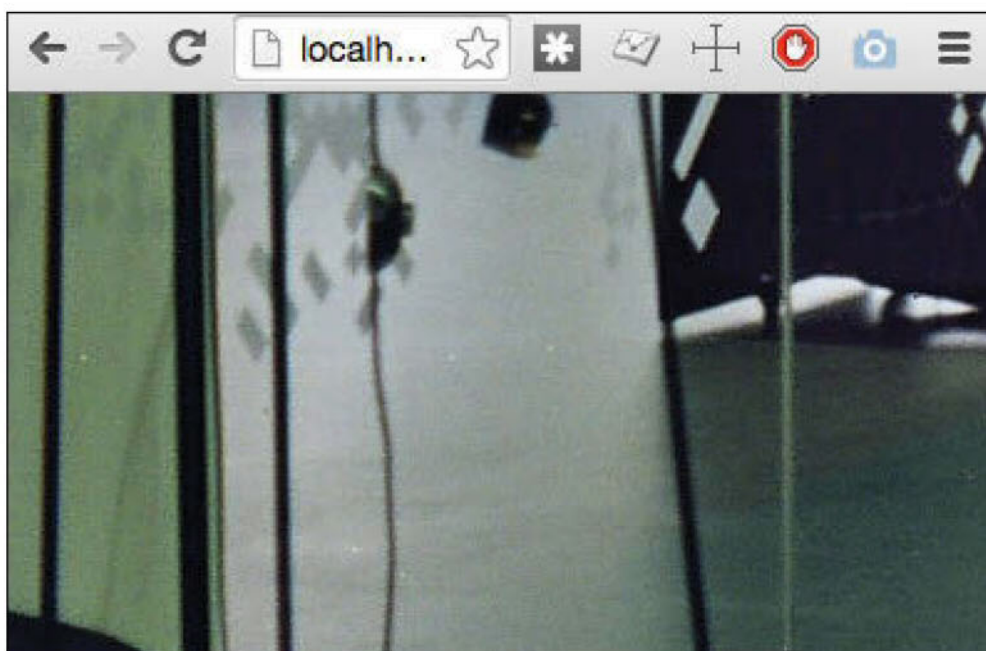
## 7. Style the image

Here we position the image absolutely, relative to its parent container. We also tell it to fit its parent container with the `max-width` property and have it crop from the bottom right. We also want this image to sit behind everything, so give it a z-index of 0.

```
.aspect {
  position: relative;
}
.aspect img {
  max-width: 100%;
```

## Compress images

The images provided in this tutorial are uncompressed - they weigh 4MBs each. Images can be compressed in Photoshop with the 'save for web' dialog or an npm module like imagemin.



### Left

The image we've put in is far too large. Let's make it fit our page better

### Top left

This is the aspect-ratio technique. The rest of the tutorial focuses on working with other ratios and content

### Top right

This is what you should see when serving the files from the start-here folder

## Tutorials

# Design aspect ratio-based layouts with HTML and CSS

```
position: absolute;
right: 0;
bottom: 0;
z-index: 0;
}
```

### 8. Content to the front

We need to bring the content to the front so we're giving it a higher z-index than the absolutely positioned image and we give it the lowest possible z-index for this effect.

```
.aspect-content {
z-index: 1;
position: relative;
}
```

### 9. Link the boxes to other pages

Here we take the 2:1 box and wrap it in an anchor element. In HTML5 this is valid so long as there isn't an anchor within an anchor. We also give this anchor a class, which we will use to change styles specifically to this box.

### 10. Style directions

We're overriding the normal .aspect-content styles so the content area fills the box and resets margins. Flexbox brings the content to a vertical and horizontal centre.

```
.directions .aspect-content {
width: 100%;
```

```
height: 100%;
margin: 0;
position: absolute;
display: flex;
align-items: center;
justify-content: center;
}
```

### 11. Animate hover on directions

We want the hover state to change the entire tile as the area is clicked. We've created a cubic-bezier transition for a nicer animation and all attributes that change between normal and :hover states will animate using this.

```
.directions .aspect-content {
color: rgb(55, 55, 55);
background-color: rgba(255, 255, 255, 0.83);
transition: all .5s cubic-bezier(0, 1.14, 1, 1);
}
.directions:hover .aspect-content {
background-color: rgba(47, 47, 47, 0.8);
color: #fff;
}
```

### 12. Animate the image hover

Fading the image out on hover will pull focus to the text and therefore the action of the box. We use the same animation and timing as the other hover effects on this element. The short duration is important because we're used to state changing instantly on hover. Animations over .5s feel sluggish.

```
.directions img {
transition: opacity .5s cubic-bezier(0, 1.14, 1, 1);
}
.directions:hover img {
```

```
opacity: .5;
}
```

### 13. Bring it together

Now we've got the different aspect ratios and some styles together we need to pull it together. Because the aspect boxes are fully responsive we can simply wrap them inside a div that limits their width.

```
<div class="one-half">
<a href="#directions" title="Directions to event" class="directions">
<div class="aspect" data-ratio="2:1">
<!-- ... -->
</div>
</a>
</div>
```

### 14. One half and one quarter

The one-half class limits the width of its child elements to 50% and will try and float itself along side other content. It works for siblings like other grid systems, but you also nest them to get quarters.

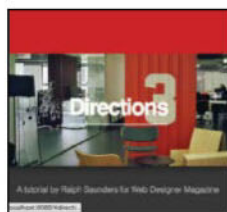
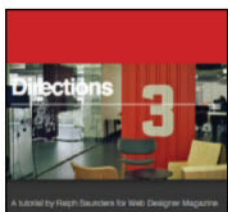
```
.one-half {
width: 50%;
float: left;
}
<!-- Nesting to get quarters! -->
<div class="one-half">
<div class="one-half">
</div>
</div>
```

### 15. Going responsive

Where we go responsive will depend entirely on the content you wish to place in the boxes and how you structured the one-half markup. You will have to resize

## Avoid styling

Large images with CSS styles on (like opacity) can take longer to render which makes animations slow. Try avoid applying styles to images and instead animate simpler elements.



#### Top left

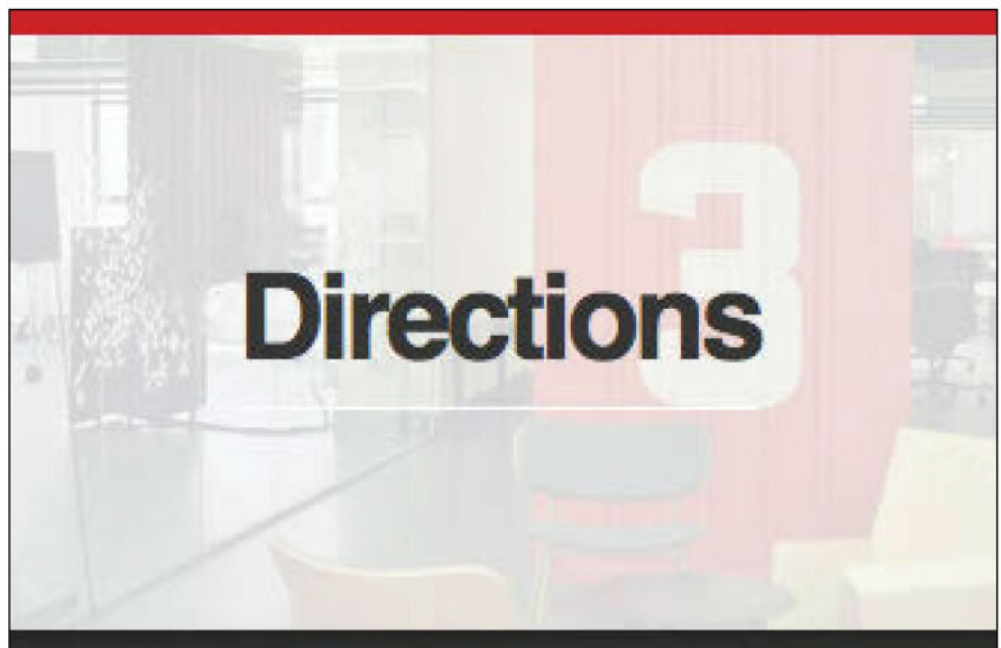
Positioning the content over the image required both z-index and position-relative properties

#### Top right

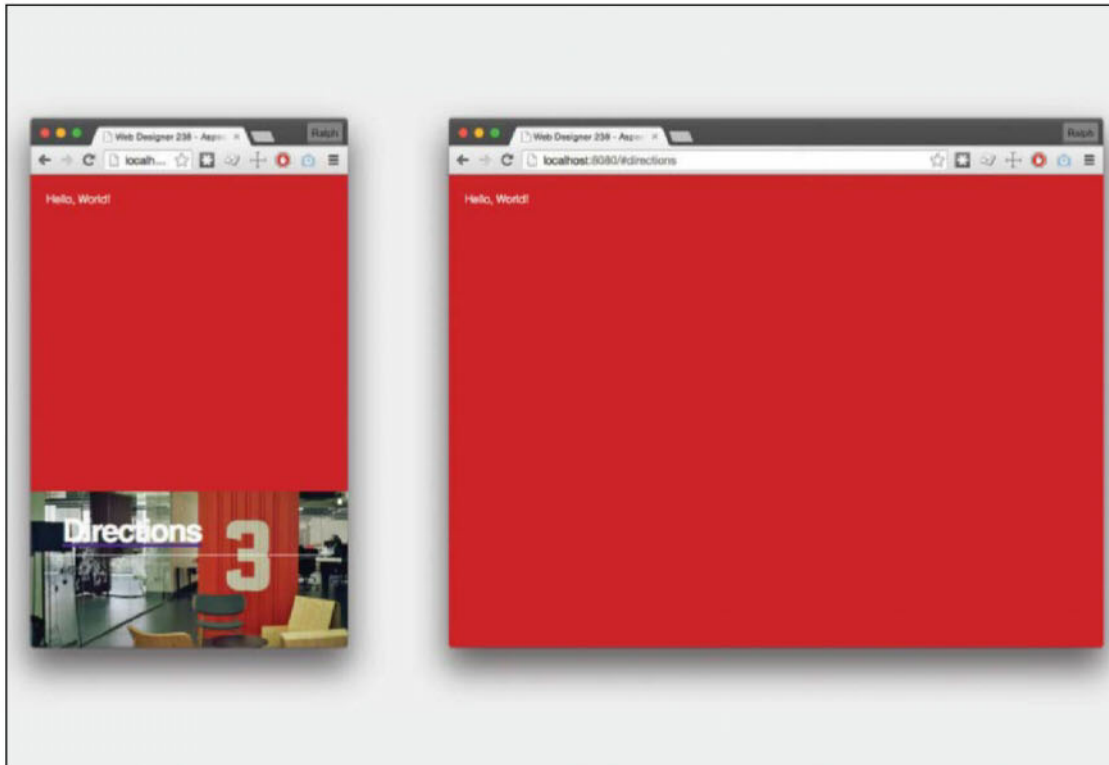
Flexbox works across evergreen browsers. For older browsers the text will just be aligned top left

#### Right

Instead of modifying the image we simply use transparent backgrounds and animate the content that sits on top of it







### Changing aspect ratio sizes

Unfortunately, aspect ratios don't work across all screen resolutions so when we go responsive we may actually end up with a bad looking UI. There are a few options available to us to fix this problem: write JavaScript to group the elements differently under different .one-half boxes, write JavaScript to modify the data-ratio attribute as required or write CSS to change up the aspect ratios themselves.

These different approaches all have pros and cons. The upside of using this pure CSS solution is that it performs really well across all devices, but it also means that you have elements which say that they are 1:1 but in reality they will have many different aspect ratios as and when the page resizes.

your window and see where things break. In the build example provided there were adjustments needed to the one-half class at 1000px.

```
@media screen and (max-width:1000px) {
  .one-half {width:100%;}
  .one-half .one-half {width:50%;}
}
```

### 16. 420px and below

We also had to bring the nested halves back to 100% at 420px and below so all the content remained visible. In the build example there are 1:1 boxes inside the nested halves, so we're still able to see two boxes in a portrait view on a mobile device.

```
@media screen and (max-width:420px) {
  .one-half .one-half {width: 100%;}
}
```

### 17. Changing aspect ratio

There was also a need in the example to modify the aspect ratios as the browser got smaller. This was because they became too large when the halves stacked. It feels counterintuitive to have a ratio of 1:1 look like 2:1, but this is the best performing solution.

```
@media screen and (max-width:1000px) {
  /* Make 1:1 become 2:1 */
  .aspect[data-ratio="1:1"] {
    padding-bottom:50%;}
  /* Make 2:1 become 4:1 */
  .aspect[data-ratio="2:1"] {
    padding-bottom:25%;}
}
```

### 18. Aspect at tablet

The square aspect ratio had a lot of issues in the tablet/large phone area of screen sizes. Similar to the above we've had to take it down to 3:2 at 850px and below and then bring it back to 1:1 at 600px and below.

```
@media screen and (max-width:850px) {
  .aspect[data-ratio="1:1"] { /* Make 1:1
    become 3:2 */
    padding-bottom:66.6%}
}
@media screen and (max-width:600px) {
  .aspect[data-ratio="1:1"] { /* Make 1:1
    become 1:1 again */
    padding-bottom:100%}
}
```

### 19. Aspect at mobile

At 420px and below, the 2:1 box (which was 4:1 at tablet) was looking a bit thin, even though all the content fit fine with the ratio. After some trial and error, we found that the 2:1 ratio worked better and it being the original ratio was an added bonus!

### 20. Finishing touches - markup

Add another call-to-action tile to see how it works with your other tiles in the layout. In the example it sits within a nested one-half container. This is a fairly straightforward CTA as there isn't much content here, it should just work with the responsive styles that have already been written.

```
<div class="one-half">
  <a href="#sponsors" title="Sponsors"
    class="sponsors">
```

```
<div class="aspect" data-ratio="1:1">
  <div class="aspect-content">
    <h4 class="headline">Sponsors</h4>
    <p>View our list of sponsors</p>
  </div>
</div>
</a>
</div>
```

### 21. Finishing touches - styles

Here we're using the .after pseudo element to place an image after our tile. Then we absolutely position it over the top. We need to make it clear that these tiles are CTAs on a web platform where users aren't used to seeing them in action.

```
.sponsors .aspect:after {
  content: '';
  width:13px;
  height:20px;
  background-image:url('./img/arrow.png');
  position:absolute;
  right:20px;
  bottom:20px;
  transition: right .5s cubic-bezier(0, 1.14,
    1, 1); }
```

### 22. Finishing touches - animation

To make the hover state a bit more obvious we can change the 'right' property which we set up a transition for in the previous step. It's fairly subtle but reinforces the notion that the user is interacting with an element that will take them somewhere.



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AND THE LATEST TRENDS**



# Why put the user first?

**WHAT IS USER EXPERIENCE, AND WHY ARE MORE AND MORE COMPANIES TAKING SPECIAL CARE TO PROVIDING THE BEST UX POSSIBLE?**

**In your job as a designer, do you frequently meet with users in the form of interviews, user testing, card sorts and desirability testing?** Do you know who your target users are? Do you test your early concepts and designs with users? Finally, do you periodically test your designs once they are deployed?

If you don't do any of these tasks - that is, you are designing without user input - you are not doing user experience. You are what is referred to as a 'wireframe monkey'. A wireframe monkey is a designer who churns out wireframes, based on nothing more than their own or their client's assumptions. A good UX designer will look at a client's requirements and then ask what research their requirements are based on. If the client responds that they do not have any research, a good UX designer will try and persuade the client of the benefits of primary research and user-centred design (UCD) methods. A good UX designer should ask lots of questions before they start to sketch/design. They will also understand that they need to observe user behaviour (user testing) rather than listen to what users say (focus groups).

If you look at some definitions of user experience, they all incorporate multiple uses of the word "user" (as you would expect) eg:

- User experience (UX) focuses on having a deep understanding of users, what they need, what they value, their abilities, and also their limitations.
- Every aspect of the user's interaction with a product, service, or company that make up the user's

perceptions of the whole. User experience design as a discipline is concerned with all the elements that together make up that interface, including layout, visual design, text, brand, sound and interaction. UX works to coordinate these elements to allow for the best possible interaction by users.

- As Jakob Nielsen explains: "User experience encompasses all aspects of the end-user's interaction with the company, its services, and its products" ([nngroup.com/articles/definition-user-experience](http://nngroup.com/articles/definition-user-experience)).

As well as focusing on acquiring a deep understanding of user motivation and behaviour, UX involves taking into account and supporting the business objectives, ie the key performance indicators - increasing the likelihood of increased user performance, satisfaction and return on investment.

UX also needs to be distinguished from usability which is a subset of UX. Usability focuses on how well a user can complete their task, rather than the entire end-to-end user interaction with a product.

To design a successful human-centred product, the following disciplines can be involved: user research, information architecture, interaction design, visual design, content strategy and accessibility.

Lots of well-known organisations make use of user experience, like Facebook, Apple, Google, the UK Government and Philips all understand that to make great products with the best user experience possible, they need to first have a deep understanding of people's needs and desires.

**“A good UX designer will look at a client's requirements and then ask what research their requirements are based on”**



**“If you are planning on designing a product with an exemplary user experience, you [will first] need to understand the user. Too often, technology or 'cool' features come first, with user needs second.”**

**Stephanie Ellis**  
User experience consultant

## The theory behind UX

**HOW THE TERM CAME TO BE ALL THANKS TO AN APPLE JOB ROLE**

**In 1993 Don Norman (who was vice president of the Advanced Technology Group at Apple) decided to change a job title from 'user interface architect' to 'user experience architect'. He believed this term better reflected the user's interaction with a system. Anyone who has studied product design will have heard of Don Norman. He is a cognitive psychologist who is considered one of the founding fathers of user-centred design. In the field of human-computer interaction (HCI), Norman was responsible for various HCI concepts such as the action model (incorporating the gulfs of execution and evaluation), perceptible affordances, rationality in human behaviour, the designer's conceptual model and the Activation-Trigger-Schema model. Other HCI concepts include:**

- **Banner blindness, a type of web behaviour where users consciously or subconsciously ignore any content that looks like an advert/banner.**
- **The theory of 'flow', which refers to the positive set of experiences that people experience - often when gaming - when they are so involved in an activity that nothing else seems to matter.**
- **The concept of copy and paste, developed by Larry Tesler and Tim Mott, while they were working for Xerox PARC. Tesler (who spent 17 years at Apple) advocates that usability testing should always be done before a designer finalises unproven or controversial interface elements.**

We can see that Tesler and Mott were using a user-centered design approach when they worked on their text-editing system back in the Seventies.

# The UCD lifecycle

## USER-CENTRED DESIGN (UCD) IS AN APPROACH THAT PUTS THE USER AT THE MIDDLE OF THE DESIGN PROCESS

UCD is an iterative design process, involving multiple methods that ensures that your product will be easy to use and (delivers a positive experience for the user as well. This design process generally consists of four stages:

### 1. Planning

Defining a project plan will usually be undertaken by a project manager and involves defining the project scope, assembling a project team and allocating project resources ie team members, tasks and timings. Project scope is important as this will outline what activities the project will include and in particular, what UCD activities are planned (depending upon time, budget and personnel resources).

### 2. Analyse

This is the discovery stage where you learn about your users, their tasks and environments. Tasks in this phase can include user testing the existing site (to find out what works and what doesn't), contextual interviews (usually conducted if designing an enterprise or business-to-business product), surveys (a series of questions designed to elicit feedback from site users) and card sorting (a method where users group and categorise a site's information).

One aspect to consider is the recruitment of participants. Unless you can be sure your client can

recruit representative users to serve as research participants, outsourcing the recruitment to a specialist recruitment company will save you time and money in the long run. This is because the time spent by staff on recruiting participants ranges from one and a half to two hours of staff time for each participant recruited.

Also worth mentioning is doing a content audit (on the existing site). This is useful in identifying duplicate and obsolete content, and ascertaining whether content needs to be rewritten or moved to a different section.

Outputs from this stage will include a list of usability issues of the current site, existing pain points and future requirements, qualitative persona user data, and label categories and navigation information for structuring the information architecture of the site.

Using the data collected in this stage will enable you to develop personas, determine requirements (both user and technical), develop user journeys and define the information architecture.

### 3. Design

Using the data collected in the analysis phase, you can now start designing your site. Typically design outputs include user journeys (the user flow through the site for the main tasks), sketching the site's templates and converting your sketches into wireframes, paper prototypes or an interactive prototype.

Do you need to do wireframes, paper prototypes and an interactive prototype? No, do as much as your budget and/or client needs. Wireframes are a good tool for communicating the actual design without any visual design. Paper prototypes (sketches of the design) can be good for collecting feedback on an initial concept while an interactive prototype will be able to show just how the design works digitally (though this will take you some more time to prepare).

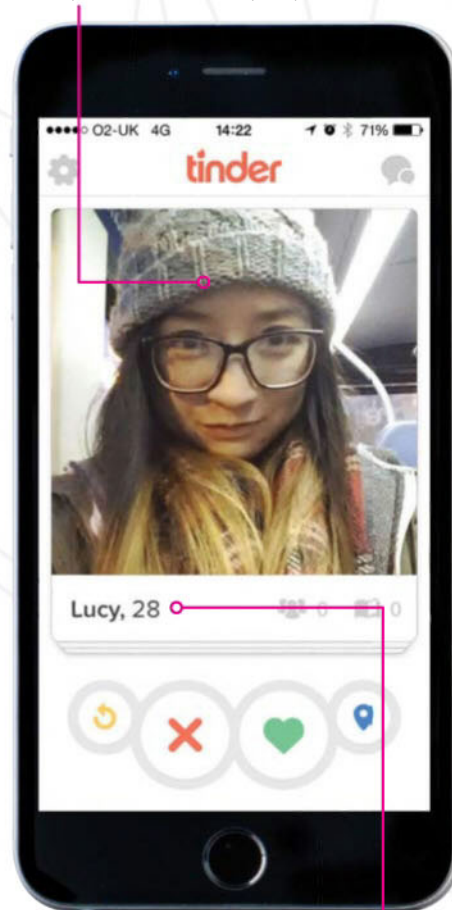
This stage typically depends upon the client and what they are comfortable with. Some clients are fine with static wireframes whereas others can only really understand and make sense of the design if it is delivered as an interactive, clickable prototype.

### 4. Test and refine

In addition to involving the user at all stages, UCD emphasises an iterative approach to design. In theory, this means frequent evaluation of design solutions with typical users (we'll discuss what invariably happens in practice later on). Types of evaluation can include chalkmark/first-click testing (to test the site's navigation), evaluating paper prototypes to ascertain the degree to which the design solution meets user needs and lab-based usability testing - if an interactive prototype has been developed - to measure task effectiveness, and efficiency and user satisfaction with the design.

## MOBILE gotinder.com

Tinder has useful and novel content for users who all have the same goal. Viewing faces activates the fusiform facial area, a part of the brain that makes human pay attention to human faces. The swipe method is easy to learn and is highly useable ie users can swipe and filter content quickly.



'You only swipe once (YOSO)' is a simple and engaging concept. The whole concept taps into users' emotions (in a totally superficial way but reflects human behaviour). By linking to a user's Facebook account, users are not disclosing any personal content that is not already within the public domain.



**Jesse James Garrett**  
@JJG

JJG is one of the world's most widely recognised technology product designers. He is also the author of *The Elements of User Experience*

“User-centered design means working with your users all throughout the project.”



**Don Norman**  
Norman is the cofounder and principal of the User Experience/Usability consulting firm, the Nielsen Norman group  
[jnd.org](http://jnd.org)



# The ROI of UX

WHAT'S THE POINT OF UCD AND WHY SHOULD YOU USE AN ITERATIVE DESIGN METHOD?



## DESKTOP lush.co.uk

The concept of the total user experience encompasses more than just the user interface. It involves having a digital strategy that covers the user experience across multiple channels, above and below the line. Lush has successfully managed to create an ecosystem where print, digital and social media connect and scale internationally.

The entire product page is exemplary but what stands out is the innovative use of video (the video plays as soon as the user lands on the page), showing the user how a product can be used. The full ingredients list also helps users in deciding to make a purchase.

The site is fully responsive and works just as well on mobile as it does on the desktop. The mobile site has the same content and feature parity as the desktop site. Desktop usability hasn't suffered as Lush has retained global navigation on their desktop site, rather than using the hamburger menu.

One of eCommerce's biggest challenges is to create trust and credibility. Even in 2015, it is surprising how many eCommerce sites make it difficult for users to find delivery and refund information. Lush prominently displays this information in their footer, creating trust with the user and aiding their decision-making.

### Doing is everything

Watch what users do in the testing stage, not what they say in focus groups. Jakob Nielsen said focus groups can give "inaccurate data because users may think they want one thing when they need another."

**Is there any evidence to show that iterative design works?** Clearly, using a 'design-test-change-test' process is going to be more expensive than a design method where the requirements are determined by the client and a designer churns out some wireframes.

This is because the principle of early and continual focus on users will therefore result in a useable product and it will deliver user satisfaction. But also, using a 'design-test-change-test' iterative cycle during a project improves task success, performance time and overall user satisfaction. UCD can additionally reduce the risk of an unuseable product ie one that is based on badly defined system requirements.

As technology is becoming increasingly ubiquitous, understanding user needs and contexts is essential when designing for multiple contexts of use and avoiding badly defined system requirements. When designing we now need to think about constraints such as designing

for small screens, interruptions when using devices, and using gestures rather than a mouse and variable connectivity. Conversely, designing for smaller screens provides us with features - GPS, camera and microphone - that can be used to reduce the user's workload.

But of course, design decisions are based on evidence, not opinions. In theory, this decision process should prevent stakeholders proposing unrealistic project goals (both user and technical) and helps focus decision-making on solving user problems and meeting their expectations. Avoiding costly features (that are more often than not proposed by senior stakeholders) that users do not require and/or cannot use can save considerable development time.

With user research methods such as contextual interviews and user testing, a designer can identify valuable insights and uncover opportunities. That is, user research can drive new product innovation by

uncovering problems and creating novel design solutions or by simply adding value for the user.

Often, when conducting user testing sessions, a facilitator will ask a participant how they would improve a product to which the response is invariably, 'make it more user-friendly'. On its own, this statement is pretty meaningless but having done some user testing, we are able to recognise latent user issues and articulate the phrase 'user-friendly'.

Amending a prototype design is also cheaper than modifying a fully-coded design and if we let our design teams regularly observe users interacting with their design or a competitor's design, we can gain empathy and learn the culture of use. Empathy is important for designers as it enables us to understand a user's frustrations while appreciating how a user approaches a task, ie their user journey, we can understand how a product may fit into a user's life.

## 'Sell' UX

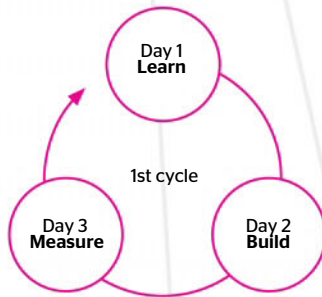
If you work for an organisation that has not embraced UCD, or your clients say they have done research (usually this is a survey) or that you don't need to do any research as they know their customers, then how do you persuade stakeholders of the benefit of the 'design-test-change-test' method? First include UCD tasks in your original quote so that you don't have to try and 'sell' UX to the client when the project has already kicked off.

Then run an informal user testing session, inviting the stakeholders to observe - you can use paper prototypes. Observing users struggling with a product is an extremely powerful way of teaching the benefits of UCD methods.

You can also use proprietary screen-recording software and test three to five users from within your office to start gathering data, using the thinking-aloud method. Using screenshots and quotes from a session can be a good way in attempting to convince stakeholders that user testing need not be a big production.

Josh Seiden (coauthor of *Lean UX*) advises you to talk to customers. If you have a sales team, ask them if you can accompany them on sales visits/calls and/or listen in to some customer calls if you have access to a call centre.

Day 1  
AM: User/stakeholder interviews  
PM: Personas/Scenarios



Day 3  
AM: Get stake holder feedback  
PM: Refactor

Day 2  
AM: Flow design  
PM: Refine



**Jeff Gothelf**  
@JBOOGIE

Jeff Gothelf is the author of *Lean UX: applying lean principles to improve user experience*, published by O'Reilly in 2013

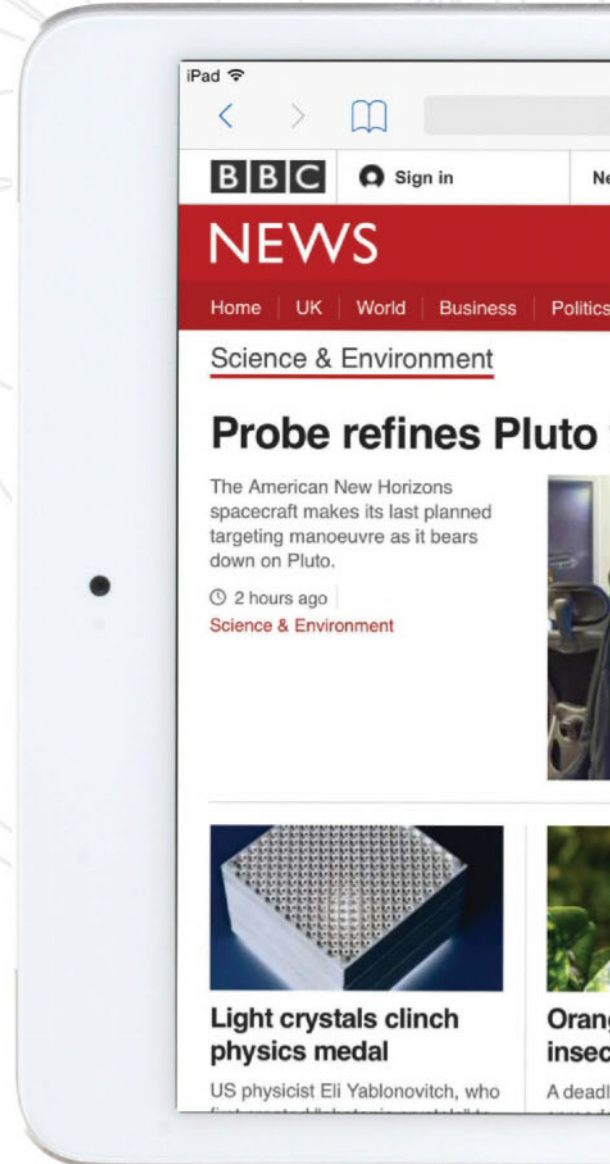
## UCD-less designs

### WHAT ARE THE CONSEQUENCES OF NOT USING A USER-CENTRED DESIGN APPROACH?

**So what happens when a product is designed without UCD?** Let's take a look at Apple's iOS 6 Maps app - created so that Apple would not have to pay Google's fee structure and stay under their control. It turned out to be a big UX failure due to the underlying content quality that directed users to the wrong location and placed important landmarks in the middle of lakes. While the Maps app functionality was great (the turn-by-turn direction was excellent and it was fully accessible for visually impaired users), the content quality was missing and users are fully aware of how a maps app should work and what a great user experience Google Maps provides.

Other UX failures include the US government's rollout of its **Healthcare.gov** site in October 2013. Multiple usability guidelines were breached such as forcing users to register before they can view their options, positioning key calls-to-actions below the fold, using nonstandard dots as a progress metre in place of the standard numbered steps or completion metre and requiring users to create a complex username rather than allowing them to use their email address. What have the Apple Maps app and **Healthcare.gov** taught the design community? That user expectations have changed from the days when people spent hours learning how to program their video recorder. We now expect products to be easy to use (without having to read through a 20-page instruction manual) and know now that a badly designed product is the designer's fault, not ours. These substantial failures could have been avoided if **Healthcare.gov** included UCD activities to evaluate the design (prior to it going to the build stage). Or maybe these organisations did do user research and stakeholders ignored the evidence - this does happen. Adopting a Lean UX method (discussed below) or discount usability techniques could have avoided some of the problems Apple and **Healthcare.gov** experienced with their designs.

Lean UX emphasises a focus on short, iterative design cycles rather than the waterfall-style production of lots of documentation (requirements, site maps, wireframes, technical specification and so on). Lean UX also encourages the designer to focus on the design phase and keep deliverables light and editable, for example by using whiteboards for your initial concepts and inviting the feedback from the project team. This method prevents you from working in a silo, with the benefit of other team members having a stake in the design and a sense of ownership. The result is that everyone in the team is working towards a common purpose. Using a lean UX method prevents the designer from wasting time on a design that is not technically feasible as the developers are able to review the designs earlier on in the design stage.



## Work with Agile

Agile software development is characterised by releasing fast iterations of products, in sprints of usually one or two weeks. This sprint will keep the team's focus on user needs and makes sure that users find the design intuitive and desirable.

As the Agile methodology does not explicitly mention how to integrate UCD activities so as to develop useable software, using a lean UX approach is probably the best way of introducing UCD techniques into an Agile project.

To be a successful designer when working with Agile you must understand your user and be flexible in adapting UCD techniques so as to fit in with reduced timescales.





As one of the top sites for attracting worldwide traffic, BBC News only implemented a fully responsive site this year

## 2015's top 5 UX trends

THE BIGGEST TRENDS TO FOLLOW TO OPTIMISE DESIGN

### Responsive web design

It's been around since 2010 and responsive web design (RWD) has more and more sites moving towards this mobile-first approach to deliver an optimal user experience.

### Mobile use

Mobile is now a big player in the UX market, because for the first time ever (April 2015), the time spent on mobile devices surpassed desktops and laptops in time spent online.

### The hamburger menu

2015 will see the continuation of the hamburger menu debate - a mobile design pattern where global navigational categories are hidden from view in a drop-down menu.

### Superfast development

The Agile software development process accelerates transparency and ensures development issues are identified earlier (in each sprint), and not at the end of the development stage.

### Digital ecosystem

The user experience community will need to consider future UX as housed within an ecosystem of products rather than its own virtual product.

### The IOT

The Internet of Things (IoT) refers to the range of connected physical devices, embedded with sensing abilities - that are able to gather and analyse data.

## Future-proof the user experience

It's been around since 2010 and responsive web design (RWD) has improved considerably, providing users with a positive mobile user experience. Sites that are not mobile optimised are penalised by Google and achieve a lower rank than sites that provide a good mobile experience. Clearly, Google is hoping this move will force more companies to adopt mobile sites and responsive design.

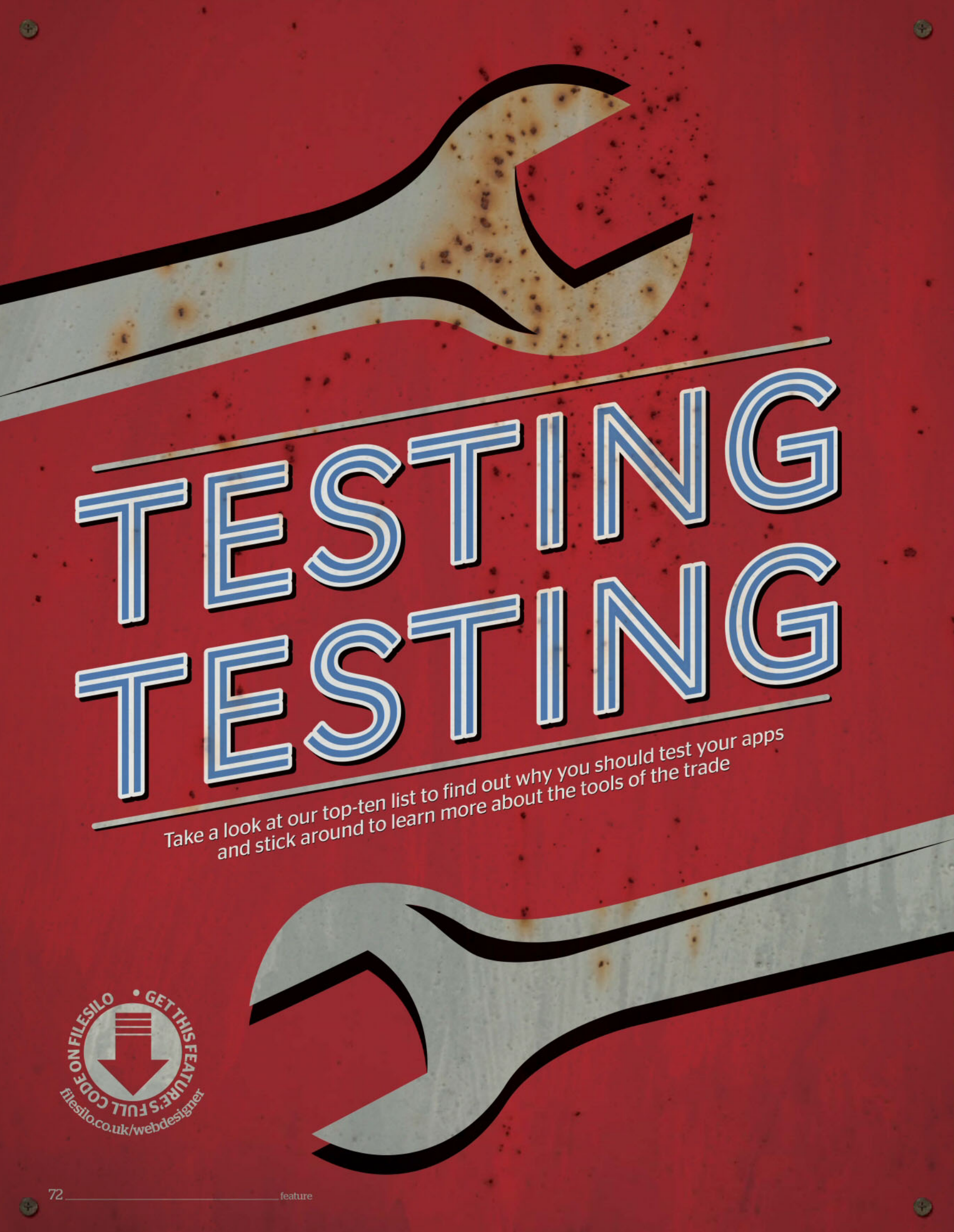
Google's move to penalise nonresponsive sites certainly makes sense given that for the first time ever (April 2015), the time spent on mobile devices surpassed that spent online via desktop and laptop (2 hours, 26 minutes each day to be precise). Some users will use mobile as their only form of internet access ([about.datamonitor.com/media/archives/5346](http://about.datamonitor.com/media/archives/5346)).

As RWD has become the norm, web design has become somewhat generic and lacking in creativity ie most homepages consist of a large hero image or carousel at the top of the page and boxes and grids elsewhere. A predicted trend is for the UX community to go beyond design patterns and think of UX as virtual product design, housed within an ecosystem of products or omnichannels. UX is now at the stage that we don't need to be re-creating design patterns for a checkout process or logging in. We should be thinking about how our designs fit in with bigger picture or a user's digital ecosystem that comprise multiple devices.

Which brings us to the next trend: the Internet of Things (IoT). As discussed above, the way we interact with computers has changed considerably within the last 15 years. Less of us are using desktop computers and more of us interact with a plethora of digital devices IoT refers to the range of connected physical devices, embedded with sensing abilities - that are able to gather

and analyse data. IoT devices can include wearables (fitness trackers and smart watches), home technology (heat and light regulation), medical devices (weighing scales, blood pressure monitors) and much more. What does this mean for UX? There will be a wide variety of environments where interactions will occur. Many devices will be concealed and without a screen. Some devices may not have the facility for input with interactions done on one device, and another delivering the output or input will be managed by an app.

Debate over the hamburger menu will continue. Although it seems to be ubiquitous, this menu minimises and hides the global navigation making it more difficult for users to find what they're looking for. Using a hamburger menu makes sense for sites that have a small number of navigation categories that can easily fit in a horizontal bar, but for sites that have multiple categories eg eCommerce, using the hamburger menu can increase the user's workload in navigating the site.



# TESTING TESTING

Take a look at our top-ten list to find out why you should test your apps  
and stick around to learn more about the tools of the trade





Unit testing started to become fashionable more than ten years ago. Its core idea is simple: since testing is a repetitive manual activity, it could also be handled by computers. Frameworks permitted the creation of small routines called unit tests, which were run automatically on request. Results could then be compared against predefined good and bad constants - the concept caught on like wildfire.

Unit tests are but one of the many automatic testing tools. As computational resources and research into artificial intelligence proceeded, static analysis became possible. It is based on a set of commonly encountered mistakes. Incoming product code is then compared against these known errors.

Since then, even more advanced systems saw the light of day. User interface tests manipulate the GUI stack of the platform, thereby simulating clicks and other user input. When set up correctly, most manual acceptance testing can be eliminated.

Fuzzers and Gremlins use random number generators and permutation logic to create pseudo-random input. They excel at sniffing out problems in input validation and/or parsing. Finally, load tests determine how your system behaves when bombarded with hundreds and/or thousands of requests at the same time.

You don't necessarily need to use all of the concepts that we've outlined - try using just one or two to give you significant boost in productivity.



**Kacper Nowicki**  
CTO at GoEuro

“Testing code rigorously is an essential part of our production cycle. Because GoEuro has needed to scale so quickly, it's tempting to skip complete testing to release faster - but we've learned the hard way that there are no shortcuts.”

## 10 REASONS WHY YOU NEED TO TEST

### 1. Reduction of legal liability

In many jurisdictions, vendors are required to ensure their products are of marketable quality. Having a documented testing process can help you if sued due to software bugs. Worst comes to worst, you can prove that there wasn't any malpractice, thereby reducing punitive damages or personal responsibility.

### 2. It's good practice

Professionals enjoy working with other professionals. Any vendor which does not have a dedicated testing process reeks of unprofessionalism. Not having a test system complicates the hiring of experienced staff. Software developers can just quit their job due to lack of testing and documentation processes.

### 3. It increases motivation

Performing repetitive tasks demotivates people. Eastern European outsourcing vendors punish their customers for turning in unsorted piles of bills due to the detrimental effect on staff morale. Automating your tests frees up developer and tester time for more important tasks.

### 4. It anticipates errors

The theory of falsification won a Nobel Prize. It states that a scientist should try to prove that his idea is wrong. It can be considered valid only if this process fails. Testing motivates developers to think about ways to break their code, thereby leading to more resilient applications.

### 5. It wins contracts

Some software-certification systems require the presence of a testing cycle. Not having one in place leads to your company failing inspections. When working for clients like the governmental or military, not having ISO certification is a deal-breaker and makes winning lucrative contracts difficult.

### 6. It reduces release anxiety

Some products suffer from slow release cycles: pushing out a product requires mental energy. Having a test cycle removes the QA step. This reduction in total effort tends to help anxiety situations as the total amount of effort is lowered by the reduction in the number of steps.

### 7. It simplifies fulfilling customer expectations

Ever had to turn down a feature request due to not being sure about how its integration will affect the rest of the product? If your code contains an ample amount of unit tests, adding a feature is as easy as coding it. Your computer will then take care of integration tests.

### 8. Tests are documentation

Ever suffered from not knowing how a newly acquired and quite complex system works? Well-written unit tests show how the individual classes work together to achieve one or more business tasks. Analysing that code permits new developers figure out the internal workings of the system quickly.

### 9. Unit tests help you get zoned

Programmers and HR managers dream of the concept of the zone - a mental state where effectiveness reaches the highest possible level. Getting into it tends to require some introductory work, which is subject related but not particularly complex. Coding unit tests is an ideal example for such 'menial tasks'.

### 10. It prevents catastrophic errors

If you release an application where a crucial feature doesn't work it can result in huge monetal losses. A reliable set of tests mitigates this by ensuring that no products get shipped with significant defects.

## 6 TYPES OF TESTING

### 1. A/B testing

Design meetings get bogged down by never-ending squabbles. A/B testing remobilises teams which have come to a deadlock. It can also optimise conversion. An A/B test involves the creation of two variations of your product. Customers are served one of two versions at random, with metrics being captured on the fly.

### 2. Beta testing

If a developer can't find willing testers, the product's concept usually is deeply flawed. The value of a beta test lies in setting customers loose on the product. While they are not able to replace the work done by 'normal testers', a well-run beta test tends to unveil all kinds of issues related to functionality, usability and discoverability.

### 3. Acceptance test

An acceptance test is a group of tests which are to be run before the product is released to customers. Since the usefulness of the test tends to be directly related to the time needed for its execution, the daily run should be compact. Since acceptance tests are run rarely, they can test uncommon cases.

### 4. Integration test

Integration tests look at the large picture. They analyse the cooperation between individual modules: in the case of a database and transaction system, it could model a transfer of money or precious metals from one account to another. Due to their increased complexity, integration tests are not run after each commit.

### 5. Fuzzing

Fuzzing uses mathematical models to create valid input invalidated by adding or removing elements at random. Fuzzing has some security problems but can be effective when dealing with an API or a service: user-facing applications tend not to benefit much if they don't read files.

### 6. Unit testing

A unit test is a test framework which runs one or more simple tasks and compares results to the provided values. If your test case spans multiple pages, it is too complex. Code coverage is associated with unit tests: it specifies the amount of code touched during test suite execution.

# BROWSER TESTING



# CODE VALIDATION

JavaScript's amazing evolution permits developers to create ever-more complex web apps. Unit tests have established themselves as a classic pattern: not implementing them leads to increased fragility and makes maintenance difficult. A large selection of unit testing tools for JavaScript has cropped up in the last few years. Their concept is simple: developers create small routines commonly known as test cases. Each case tests one or more workflows and compares the computed

results with good values provided in advance. Since most frameworks provide dedicated test runners, verifying the correctness of your application is as easy as invoking a single website. Some products even go as far as to integrate itself into node.js and similar test runners.

### A SMALL TEST

Since the concept of unit testing is not commonly taught in web design courses, we will take a small look at an

## 4 ESSENTIAL VALIDATION TOOLS

#### JSLint

[jshint.com](http://jshint.com)

Crockford's JSLint checks JavaScript for all kinds of common programming problems. However, the product uses a very rigid approach, so be prepared for a steep learning curve.

#### JSHint

[jshint.com](http://jshint.com)

JSLint's pedantism gave rise to JSHint, which has many options for tailoring its validation process to your personal coding style or your company's own coding conventions.

#### Scan.js

[bit.ly/1SP1pFI](http://bit.ly/1SP1pFI)

Scan.js transforms its input into a syntax tree, which is then compared against a database of known bugs and inconsistencies. This lets Scan.JS find common and obscure bugs.

#### Jasmine

[jasmine.github.io](http://jasmine.github.io)

Jasmine recently managed to gain a cult following due to its English-like domain specific language used for specifying the individual test cases:



Thousands of browsers compete for attention in today's world. While websites might not always have to support each and every superobscure HTML rendering engine, covering all major browsers is helpful when it comes to maximising reach.

In an ideal world, every browser would behave the same: rendering a piece of content would lead to the same bitmap on each engine. Sadly, browser vendors tend to take significant liberties when interpreting the specifications declared by the W3C.

Ensuring that a website runs on all browsers is best accomplished by using a well-known strategy to J2ME developers. If you ever heard them ranting about 'write once debug anywhere', you know just too well what's in store for you.

In the past, developers solved this problem by installing a large variety of browsers on their workstation. Since this bogged down their operating system, hardware-accelerated virtual machines were used to keep the browser installations at bay.

Since browser testing has become a very common problem, vendors started offering virtual machines containing various browsers. The features offered by the individual vendors differ. While some limit themselves to screenshots displaying your website in action on various

browsers, other companies permit you to access the individual virtual machines which usually come preloaded with a variety of helper tools.

### PAY MORE, GET MORE

While most vendors provide some kind of basic service at no cost, paying customers tend to be treated to extra features. The most important one is the automatic execution of unit tests. This means that the virtual machines will be spun up in order to be set loose upon a predefined set of Selenium, QUnit or other similar tests. Their results are then collated by the vendor, providing you with an accurate report of the health and sanity of your web application across various browser implementations.

**Watch your audience!**  
 Even though browser market share stats tend to provide a reliable 'first glance overview' of usage, keep in mind that some customer demographics may have varying usage behaviours.

### A QUESTION OF PRIVACY

When deploying vendor-provided testing solutions, you must always keep data security in mind. Executing unit tests requires you to give your source code to the vendor: this might not be acceptable in proprietary or highly classified applications. In this case, setting up a stack of virtual machines remains the best approach: products such as VirtualBox and VMware can simplify the process for you.

*“When deploying vendor-provided testing solutions, always keep data security in mind”*

example. QUnit, being developed as part of the jQuery product family, makes for a good starting point. First of all, a test fixture must be created. The official documentation recommends the use of the following structure - but make sure that you adjust the file paths before deployment:

```
<!DOCTYPE html>
<html>
<head>
<meta charset="utf-8">
<title>QUnit Example</title>
<link rel="stylesheet" href="//code.jquery.com/qunit/qunit-1.18.0.css">
</head>
<body>
<div id="qunit"></div>
<div id="qunit-fixture"></div>
<script src="//code.jquery.com/qunit/qunit-1.18.0.js"></script>
<script src="tests.js"></script>
</body>
</html>
```

Test cases are stored in one or more JavaScript files. The test function takes a name and a function pointer to a method containing the actual code to be run:

```
QUnit.test( "hello test", function( assert ) {
  assert.ok( 1 == "1", "Passed!" );
});
The actual comparison between returned and ideal results is then performed via assert commands. 'Ok' is the most basic of the batch, ensuring that the parameter passed in evaluates to true:
QUnit.test( "ok test", function( assert ) {
  assert.ok( true, "true succeeds" );
```

### EMULATED BLICKS

Unit tests reach their limit of usability when testing very complex workflows. In this case, it is more sensible to use a product like Selenium WebDriver. Its test cases are created by interacting with your web app and how it does this is by tracking the buttons and characters that are entered. The generated results are then compared against known-good results using bitmap and text content analysis.

Well-done WebDriver tests will analyse user interface and logic at the same time, thereby leading to a higher quality of test coverage as a result. Sadly, such tests also tend to be more brittle. They can break both due to changes in the user-interface, in the HTML rendering engine and in the actual code.

## 4 ESSENTIAL TOOLS

### SauceLabs

[saucelabs.com/home](http://saucelabs.com/home)

This company is one of the oldest vendors in the browser testing market. You can pick from a manual free version and a variety of paid automatisations options which run sets of unit tests for you automagically. Sadly, the latter service starts out at \$16 (£8) a month for two hours worth of automatic testing.

### Spoon

[spoon.net/browsers](http://spoon.net/browsers)

Spoon provides a set of virtual machines which can be run from their website. Their offering is ideally suited to quick explorative testing: if you are not sure about how a web app looks in an obscure browser, simply visit them from a Windows box and find out more.

### Microsoft DevEdge

[dev.modern.ie/tools/vms](http://dev.modern.ie/tools/vms)

Being the source of the most problematic browser, Microsoft is well aware of its obligation to web designers. Modern.ie provides a variety of fully configured virtual machines with various versions of IE - just pick the one best suited to your testing situation!

### VirtualBox

[virtualbox.org](http://virtualbox.org)

VirtualBox is a highly reliable open source VM host which can be considered the standard on Unix workstations. A VM setup requires specifying hardware resources and installing the OS and any required tools.

## LET'S SCAN ONLINE

### Google Webmaster Tools

[google.com/webmasters/tools](http://google.com/webmasters/tools)

The search giant's Webmaster Tools alerts you to a variety of problems encountered by the crawler. Fixing them will increase search visibility significantly.

### Nibbler

[nibbler.silktide.com](http://nibbler.silktide.com)

SilkTights Nibbler service performs a complete analysis of your website and grades it in five disciplines. Various improvement and remedy suggestions are shown.

### PageSpeed

[developers.google.com/speed/pagespeed](http://developers.google.com/speed/pagespeed)

Google's PageSpeed tool analyses your website and provides an array of impressive fix suggestions: from caching optimisations to the bundling of requests.

### SEO Centro

[seocentro.com](http://seocentro.com)

If there is a possibility of an SEO problem, SEO Centro is likely to have a diagnosis tool for you. Spending a few minutes with their various utilities is recommended.

# BETTER PERFORMANCE

Keeping an eye on website performance has never been more important. Back when broadband was introduced, sites seemed fast, but designs soon caught up and added a whole host of bandwidth-hogging features. Google's decision to penalise slow sites was the straw that broke the camel's back and performance frenzy has taken hold of web masters and their managers ever since.

Tests performed by various research bodies have determined that slow websites actively lose customers: making your websites load faster is a sure-fire way to improve conversion rates.

Ookla Speedtest is just one nifty tool which is worth its weight in gold when it comes to ensuring the reliability of your internet connection.

When it comes to figuring out a website's speed, a large variety of factors must be kept in mind. The actual loading time of a website is made up of three components:

First of all, the server must generate the content that is needed to be displayed. Second, this content must be deployed to the user. Finally, rendering must take place on the

customer's workstation. Optimising the content generation process can be accomplished in a variety of fashions. First of all, increasing the amount of performance available to your server directly reduces the amount of time needed to handle requests. Many web application frameworks provide a large variety of utilities to optimise performance: in the case of WordPress for example, caching plugins store generated content in order to accelerate its redeployment.

Cutting down actual transfer times can be accomplished by reducing the size of images, minifying CSS and JavaScript and performing a variety of similar tricks. Setting cache headers instructs clients browsers to keep images and similar files on the local disk: this cuts back loading time and also frees up bandwidth.

Finally, some markup tweaks can be done in order to help accelerate rendering. Setting image widths, for example, permits browsers to start laying out the page even if the actual picture files have not been transferred to the client's computer.

Testing the speed of a website is an art of its own. The sheer size of the earth means that the time to transfer data significantly effects performance: an American downloading from a server in Europe is likely to see significantly slower transfer rates. Fortunately, this problem can be addressed by the deployment of content delivery networks.

Performance testing tools come in two groups. Utilities such as PageSpeed or YSlow perform a static analysis of the delivered content, providing you hints and advices on how to increase the performance of your page.

Load testing tools such as LoadImpact have a large array of worker-drone workstations, which can be used to determine the impact of heavy loads. The level of performance needed, of course, differs from site to site: if you are unlikely to attract large amounts of customers and/or DDOS attacks, being able to survive seventy thousand customers per second might not be as important a step.

## Down and out

Sometimes it happens that a webmaster may call a vendor to complain about downtime. They then investigate the issue, only to find out that the problem was actually located at their ISP.

## 3 ESSENTIAL TOOLS

### Microsoft Azure

[visualstudio.com/en-us/get-started/test/load-test-your-app-vs](http://visualstudio.com/en-us/get-started/test/load-test-your-app-vs)

Microsofts offers you 20,000 free users every month. Just log into Visual Studio Online to configure load tests; owners of the Ultimate Edition of Microsoft's IDE can kick the test off from their workstation.

### Pingdom

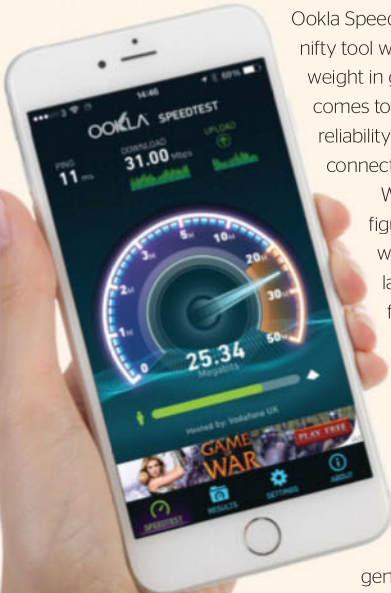
[tools.pingdom.com/fpt](http://tools.pingdom.com/fpt)

Provide Pingdom with a URL to be rewarded with a detailed breakdown of loading times and optimisation hints. The DNS and Ping tests let you check your server's response times from a variety of locations.

### LoadImpact

[loadimpact.com](http://loadimpact.com)

If you need a lot of users, Load Impact are your go-to place. Hit them up to get access to hordes of drone systems. The free plan provides up to five minutes of usage - enough for a quick check.



## ACCESSIBILITY

When working on government contracts, accessibility for disabled and/or visually impaired users is of significant importance. Both American and European governments have passed a variety of standards specifying parameters which are to be met by 'conforming websites'.

Fortunately, a selection of testing utilities are available. They compare your markup to a list of problems known to bring screenreaders out of sync. Another classic involves loading a website with the Lynx browser found in a command line of choice: its rendering engine is said to be very similar to the one used by screenreaders.

## USABILITY

An old adage states that some children are so ugly that only their mother can love them. This is often the case when it comes to dealing with user interfaces. The history of IT is full of cases where great GUI ideas simply did not work out when implemented in real life.

Usability problems are best snuffed out by beta testing: get some customers to try your product before it goes live, and observe their behaviour to find out areas which may trip them up. Keep in mind, though that beta testers get accustomed to your GUI as time goes by - so frequently adding new testers and fresh eyes can be helpful.

## SECURITY

Getting hacked is probably one of the worst experiences in the life of a webmaster. Keeping a web app safe is an art of its own: security professionals must be brought in if a product is intended to handle high-value data.

For smaller web apps though, following the guidelines in the OWASP web application security testing cheat sheet is a good first ([bit.ly/1T5eyJJ](http://bit.ly/1T5eyJJ)). Secondly, try to keep all components of your web server up to date. Vulnerability scanners analyse your web server for known weaknesses, while port scanners inform you about places where attackers can connect to your system.



# FOR THE GNU GENERATION

[www.linuxuser.co.uk](http://www.linuxuser.co.uk)

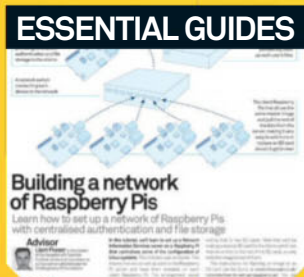


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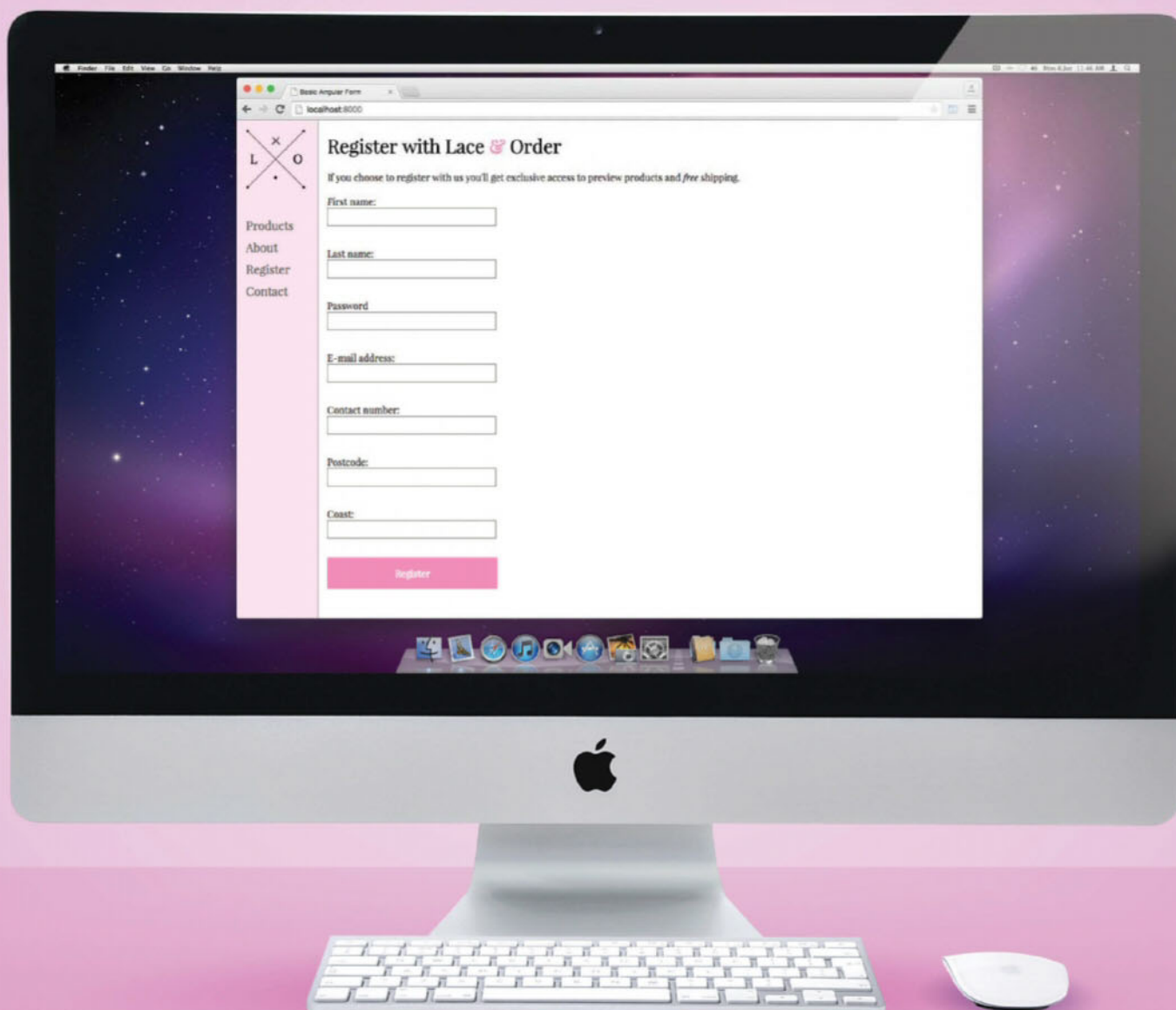
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# Code validation into forms with ngMessages

Learn how to create a form with reactive user feedback using Angular and the ngMessages directive





**F**orms are the gateway between your website and the user's life. Often forms capture sensitive data like your address, telephone number, card details and so on.

Filling in forms is annoying so as web developers we want to try and make this process as pain-free as possible. One way we can do this is to show helpful, timely messages to the user to let them know if they've made a mistake. These are essential to reducing friction in forms and aiding understanding. We also want to try and make them as accessible as possible so we will include ngAria, too.

Angular's ngMessages module provides developers with an easy way to present messages to a user. It's described by Angular as being "designed to handle the complexity, inheritance and priority sequencing based on the order of how the messages are defined in the template". You could use ngIf to toggle the visibility of messages but this can be complicated when there are many conditions. NgMessages was introduced in Angular 1.3 so it doesn't work with Internet Explorer 8 or below.

In this tutorial you'll learn how to create a form and use Angular to validate it. Our example will be a registration form for the fictitious 'Lace & Order' shop. It'll feature custom validation directives, default messages and utilising ngModel to its full ability.

## 1. Install Angular and modules

First off we're going to add ngMessages to our project and our preferred method of adding this in is to use Bower (go ahead and visit [bower.io/#install-bower](http://bower.io/#install-bower) if you haven't got it installed already). As well as the Messages module we're also going to make use of the Animate and ARIA modules.

```
$ bower install angular-animate angular-aria angular-messages
```

## 2. Include script files

Create a file called 'index.html' and then write the markup required for a skeleton HTML page (with the <head>, <body> and so on). Next we'll import the JavaScript files that Bower had fetched for us just before the closing body tag. Even though we're using the minified versions here, the browser will map to the full source files.

```
<script src="bower_components/angular/angular.min.js"></script>

<script src="bower_components/angular-animate/angular-animate.min.js"></script>

<script src="bower_components/angular-aria/angular-aria.min.js"></script>

<script src="bower_components/angular-messages/angular-messages.min.js"></script>

<script src="scripts/app/app.js"></script>

<script src="scripts/app/modules/registerModule.js"></script>

<script src="scripts/app/controllers/registerController.js"></script>
```

## 3. The formApp module

The module that will contain all the application-wide dependencies is called formApp. As well as the Angular modules that we included in the previous step register.module is also included. This will include the dependencies specific to the registration form.

```
angular.module('formApp', ['register.module', 'ngAria', 'ngMessages', 'ngAnimate']);
```

## 4. The register module

When we write custom directives you'll also have to add them as a dependency to this module. It's easy to forget to do this and find yourself spending minutes figuring out why your directive isn't working!

```
angular.module('register.module', ['register.controller']);
```

## 5. Register controller

The controller for our registration form is very bare bones. So what we'll do is we'll add some specific uses to it later (namely to add dynamic text). Behind the scenes it will do the internal wiring to ensure our form works as we expect it to.

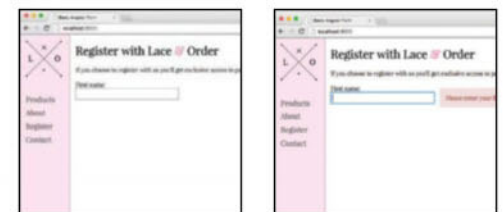
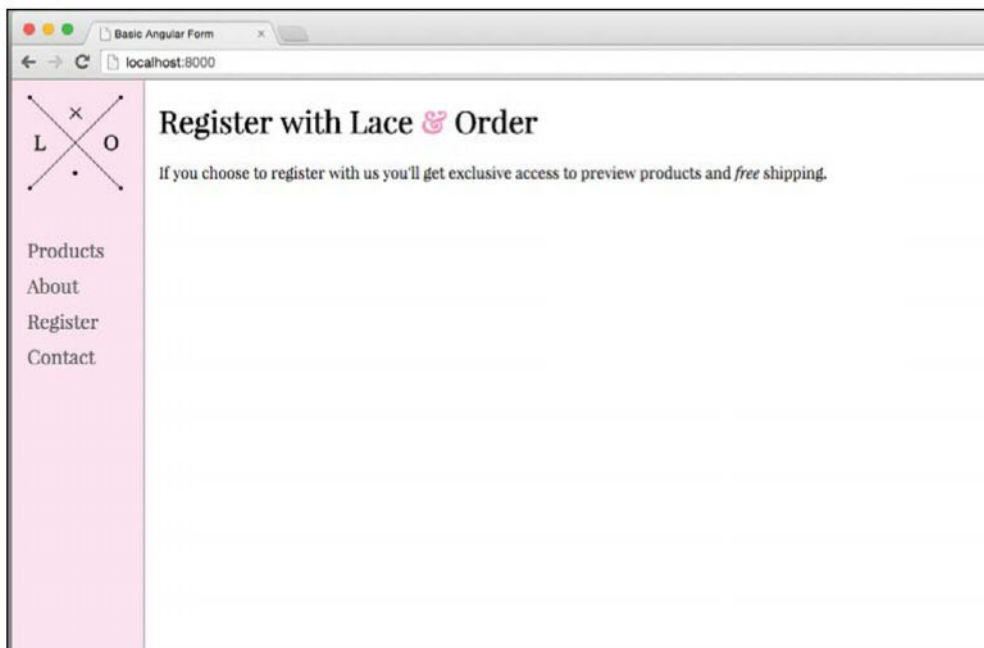
```
(function() {
  'use strict';
  angular.module('register.controller', [])
    .controller('registerController', ['$scope',
    function ($scope) {}]);
})();
```

## 6. Create the form tag

The form tag is going to do a lot of work for us. It's going to be the root of our application and also the controller. NgSubmit is evaluated each time the form is submitted (either by the user clicking the submit button or by pressing the Enter key).

## Directive names

In real-world applications you should always prefix your directive names with a couple of letters. This differentiates them from standard HTML elements.



### Left

This is the page that will contain our form, there's not much to it yet but the Angular's ready to go

### Top left

The initial bit of information we'll want is their name so we can address future communication

### Top right

With just a bit of markup and Angular's inner wirings we've got a dynamic message box reacting to the input

# Developer tutorials

## Code validation into forms with ngMessages

```
<form name="register" data-ng-app="formApp" data-ng-controller="registerController" data-ng-submit="submitForm(register)">
```

```
<h1>Register</h1></form>
```

### 7. The ng-attr directive

A couple of other attributes need to be added to the form tag. Ng-attr-novalue is an Angular directive which will only apply the novalue attribute if the expression evaluates to true. We want to disable the native HTML5 validation if the Angular app has successfully loaded.

```
<form data-ng-attr-novalue="{{true}}" data-ng-cloak></form>
```

### 8. First name input

The first piece of data that we'll capture from the user is their first name. NgModel is used to bind data to the input field. This means that when the data changes, the model is immediately updated. The rest of the markup is your regular HTML5.

```
<div class="row"><label for="firstName">First name:</label><input id="firstName" name="firstName">
```

```
data-ng-model="fields.firstName" required /></div>
```

### 9. ngMessages first name

Here's our first example of ngMessages in action. Ng-messages takes an Angular expression which evaluates to a key/value object. This behaviour is just like a switch statement. In the example that we have here, the object evaluated is the \$error property from ngModel in the firstName field.

```
<div class="errors" data-ng-messages="register.firstName.$error"><!-- next step --></div>
```

### 10. ngMessages directive

NgMessages does a great job of toggling specific messages but we also need to determine when to show them. Otherwise they'll appear before the user has touched the form! The messages should only appear if the field is dirty (if it has been filled in) or the user submits the form.

```
<div class="errors" data-ng-messages="register.firstName.$error" data-ng-if="register.firstName.$dirty || register.$submitted"><!-- next step --></div>
```

### 11. The required property

Within the ngMessages directive, we can now go ahead and list specific error conditions to show. This example

here has a simple paragraph tag, but you can use any element as well as place any markup that you want inside of it. 'Ng-message="required"' looks for the 'required' property on the object that we passed above. If true, then it'll show:

```
<p class="error" data-ng-message="required">Please enter your first name.</p>
```

### 12. Style error messages

Our error messages deserve a bit of love so let's apply some CSS to them. The most important parts to note are the opacity and transition properties. NgAnimate will use them in conjunction with other classes to ease them in rather than abruptly appearing.

```
.error { color: #a94442; padding: 0.875em; background-color: #f2dede; width: 16em; border: 0.125em solid #ebcccd; transition: 0.5s linear opacity; opacity: 0; margin: 0; }
```

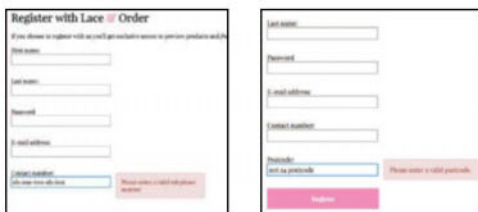
### 13. Submit the form

To allow the user to submit the form we're going to need a submit button! This calls the submit handler that was hooked up at the top of the form. However the user submits the form - be it by click, programmatically or pressing Enter - it calls the same function.

```
<div class="row"><input type="submit" value="Register" /></div>
```

## Debugging \$errors

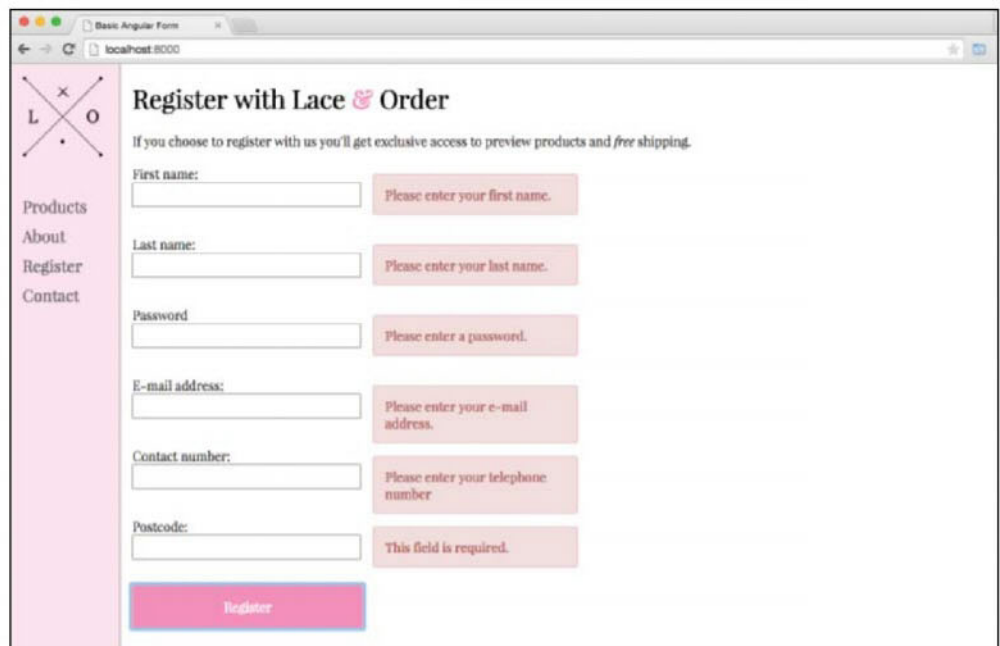
A useful way to get a quick understanding of an object in real-time is to output it onto the page: `<pre>{{form.postcode.$error | json}}</pre>`. This will show the object and format it as JSON.



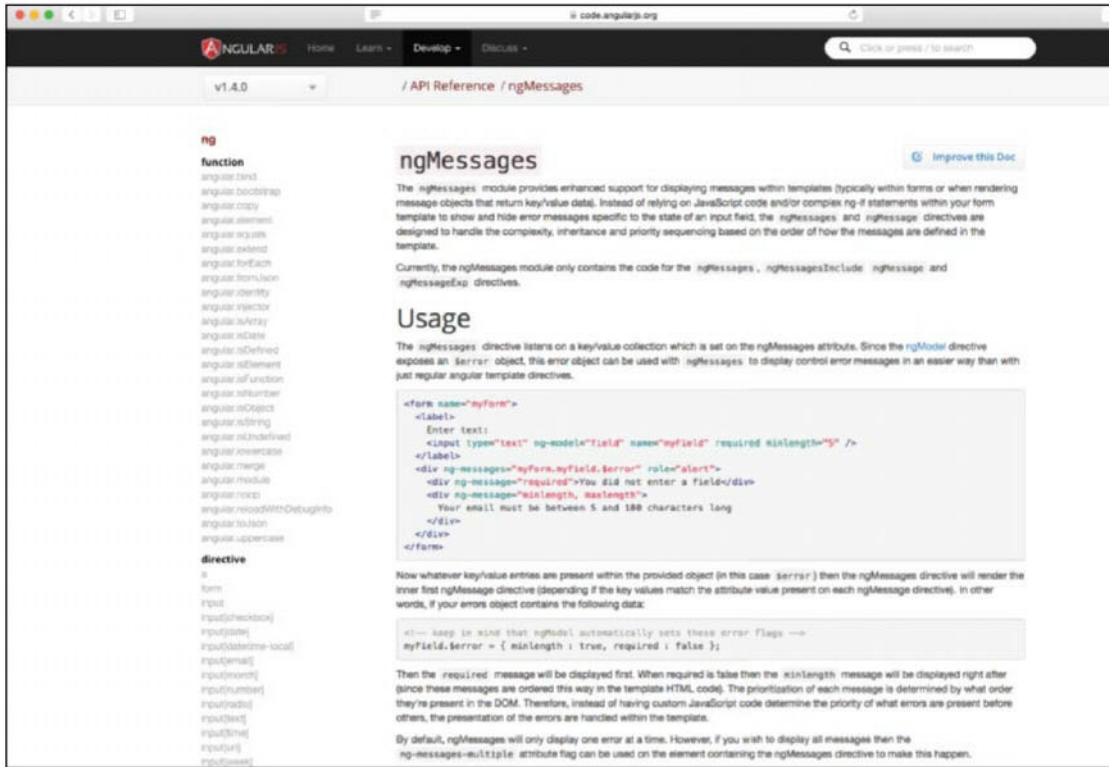
**Top left**  
The telephone error message is shown when the input doesn't match a REG\_EXP pattern using ngPattern

**Top right**  
The postcode validation error message appears when we input an incorrect postcode meaning our custom directive is working

**Right**  
The default messages are now included in the template unless they're overridden by one further up in the markup







**Utilise ngMessage expressions**

NgMessages also supports dynamic messages, that is, if you don't know the name of the message that might be fired you can check it with a message expression. In this example we've got an array in the controller called `errorMessagees` which contains a list of objects. These objects represent different error states and their corresponding text.

```
<div data-ng-messages="register.test.$error" role="alert">
<div data-ng-repeat="errorMessage in errorMessagees">
<div data-ng-message-exp="errorMessage.type">
<p
The ngMessages documentation has pages on each directive: docs.angularjs.org/api/ngMessages.

```

**14. Telephone input**

Let's take the concepts we've looked at and apply them to a new field, a contact number. This time `ngPattern` allows us to match what the user types to a regular expression. This regular expression checks that only numbers are typed.

```
<div class="row">
<label for="tel">Contact number:</label>
<input id="tel" name="tel" data-ng-model="fields.tel" type="tel" data-ng-pattern="/^[0-9]+$/" required />
<!-- next step -->
</div>
```

**15. Telephone error messages**

This time we're going to use the same technique as before to show a message. As well as 'required' there will also be a 'pattern' property as `ngPattern` has been used. You can chain properties together on the same error message to prevent repeating yourself.

```
<div class="errors" data-ng-messages="register.tel.$error" data-ng-if="register.tel.$dirty || register.$submitted" role="alert">
<p class="error" data-ng-message="required">Please enter your telephone number.
</p>
```

```
<p class="error" data-ng-message="tel, pattern">Please enter a valid telephone number.
</p>
</div>
```

**16. Postcode input markup**

You wouldn't think it but postcodes are actually quite hard to get right because there are so many variations. Nonetheless, we're going to create a custom directive to try and validate one.

```
<div class="row">
<label for="postcode">Postcode:</label>
<input id="postcode" name="postcode" data-ng-model="fields.postcode" postcode required />
</div>
```

**17. Postcode directive**

Create a new file under `directives` called 'postcode.js'. By requiring `ngModel` it's passed as the fourth argument to the link function so that we can extend it. Remember to add it as a dependency of the registration module.

```
angular.module('postcode.directive', [])
.directive('postcode', function() {
return {
require: 'ngModel',
scope: {
postcode: '='
},
link: function (scope, elm, attrs, ctrl) {}
```

```
};
};
};
```

**18. Regular expression test**

Within the link function we'll write the postcode validator logic. The long, nasty looking regular expression validates most UK postcodes. To register a new validator to the model that this directive is on we add to `$validators`. Now close spaces and see if the string passes `REG_EXP`.

```
var REG_EXP = new RegExp(/^[g][i][r][0][a][a]$|^((([a-pr-uwyz]{1}([0]|[1-9]\d?))|([a-pr-uwyz]{1}[a-hk-y]{1}([0]|[1-9]\d?))|([a-pr-uwyz]{1}[1-9][a-hjkps-uw]{1})|([a-pr-uwyz]{1}[a-hk-y]{1}[1-9][a-z]{1}))\d[abd-hjlnp-uw-z]{2})?$/i);
ctrl.$validators.postcode = function (value) {
if (typeof value === 'string') {
value = value.replace(' ', '');
return REG_EXP.test(value);
}
};
```

**19. Include message template**

The custom validator is then added as another property to the `$error` object if it returns false. This means that it can be used within `ng-message`. We're also going to use a template to fill in common error messages. This is included with `ng-messages-include`.

## Developer tutorials

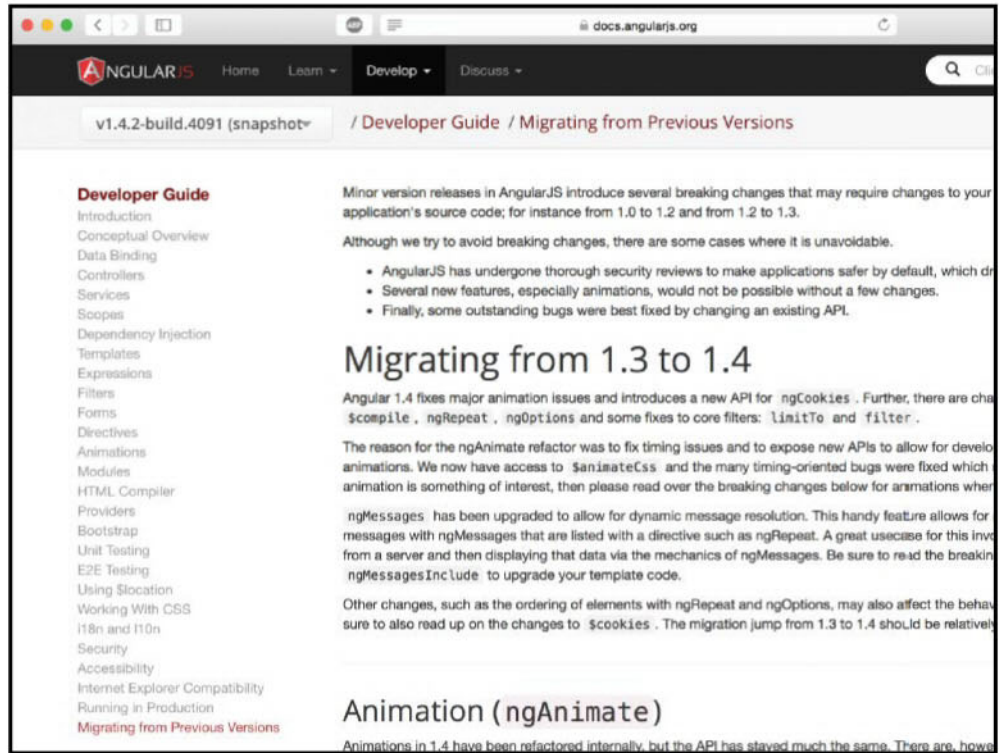
# Code validation into forms with ngMessages

```
<div class="errors" data-ng-
messages="register.postcode.$error"
data-ng-if="register.postcode.$dirty ||
register.$submitted" role="alert">
<p class="error" data-ng-
message="postcode">Please enter a valid
postcode.
</p>
<div data-ng-messages-include="default-
error-messages">
</div>
</div>
```

## 20. Custom message template

Ng-messages-include looks for an element's ID on the page. Angular recommends including templates as a script tag with a custom type so that it doesn't end up being parsed by the browser. The downside of this approach is the generic wording although this could be paired with dynamic text.

```
<script type="text/ng-template" id="default-
error-messages">
<p class="error" data-ng-
message="required">This field is required.
</p>
<p class="error" data-ng-
message="minlength">This field is too short.
</p>
<p class="error" data-ng-
message="maxlength">This field is too long.
</p>
</script>
```



## What's new in Angular 1.4?

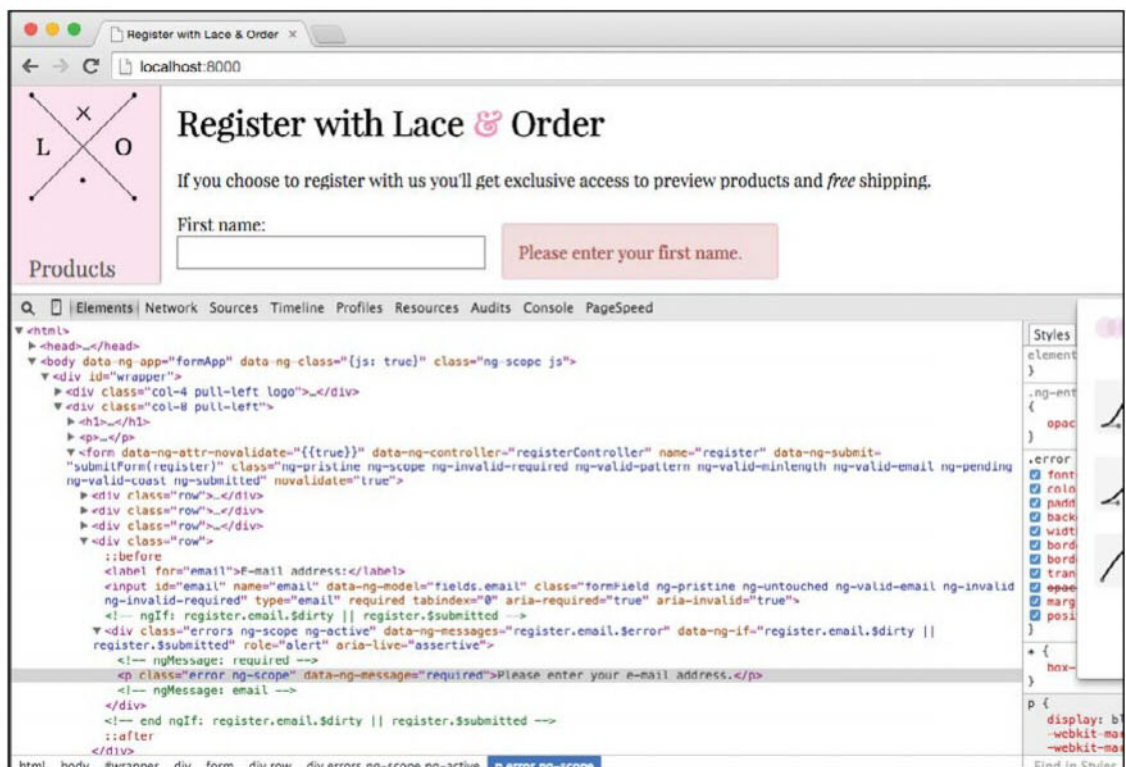
Angular 1.3 introduced ngMessages as an experimental module. This meant that developers were free to use it but breaking changes could be made to the API. The main change in 1.4 is that ngMessagesInclude was removed as an attribute on ngMessages. Instead it's used

on a ngMessage directive, like we've used in this tutorial. Angular 1.4 also introduced ng-message-exp and when-exp to evaluate expressions dynamically. Upgrading from 1.3 to 1.4 should be straightforward for most projects and you can find detailed migration information at [docs.angularjs.org/guide/migration](https://docs.angularjs.org/guide/migration).

## Breathe life into ngMessages

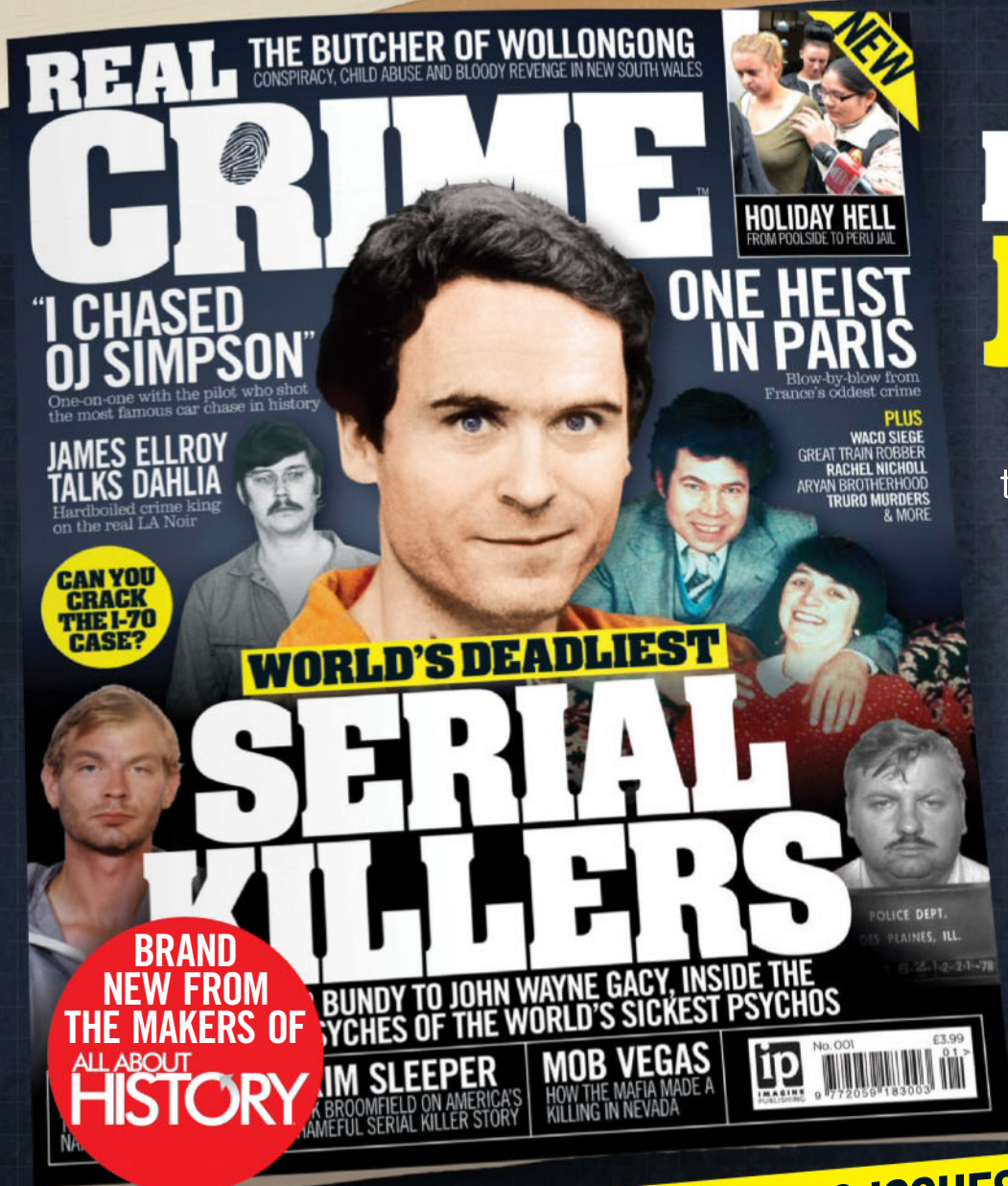
You can add a sense of momentum to your messages with ngAnimate. We've already installed and included this module. When ng-messages is shown, a class of ng-enter and ng-active is added - the former when it's being inserted and the latter when it's active. Our message boxes all have a class of 'error' so we'll target this and change the opacity. The CSS transition property will then smoothly animate the box in and then out when it's removed. You can use any sort of animation to be more creative here.

```
.error {
  transition:
    0.25s linear;
  opacity: 0;
}
.ng-enter .error,
.ng-active .error {
  opacity: 1;
}
```





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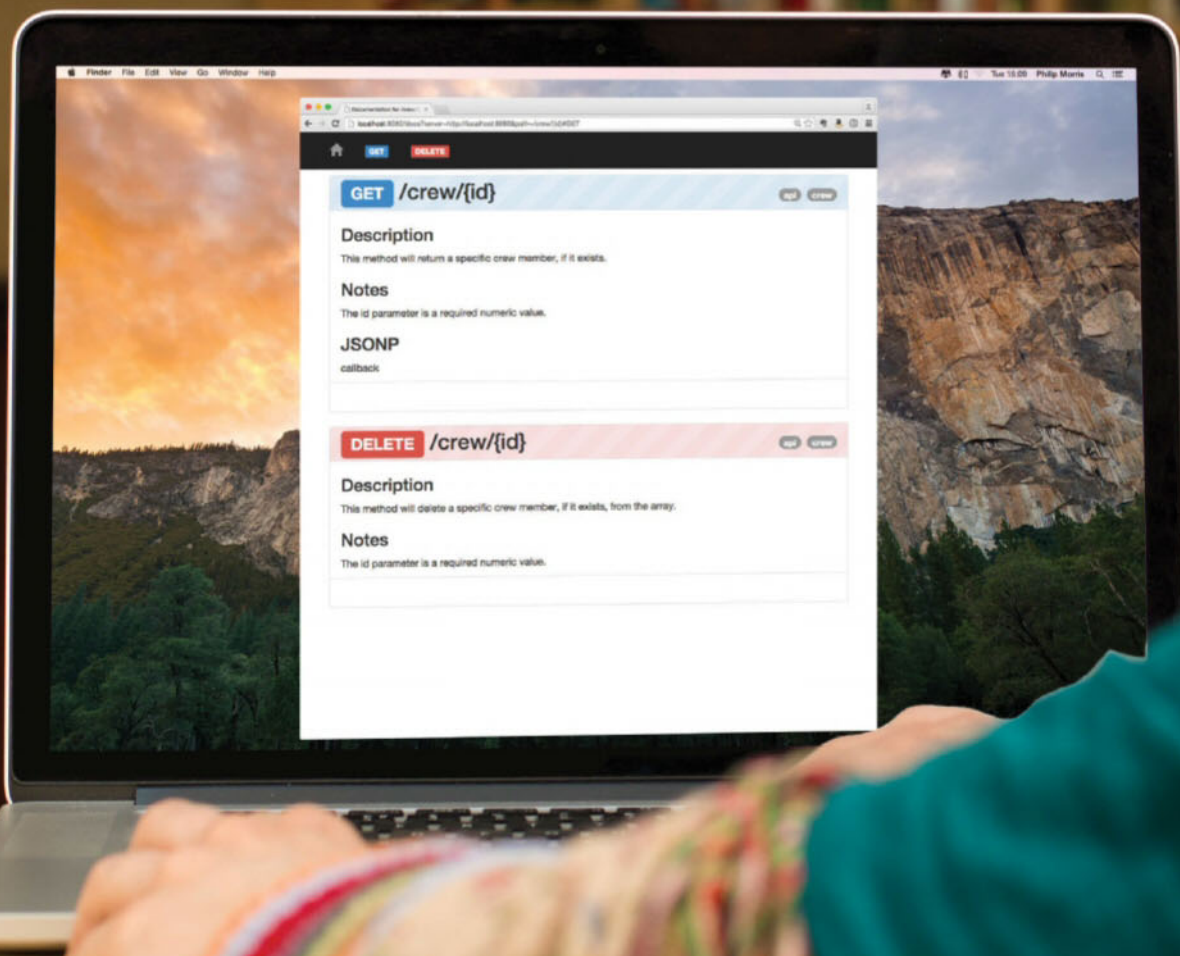
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# Build your own API with the Hapi.js framework

Develop a feature-rich API using Hapi with reusable application logic and minimal code







APIs are everywhere, just look around the web. Most services have an API that you can consume or interact with in some way. They offer extensibility, allowing developers and consumers to build enriched detailed applications, and they also combine multiple API sources if needed to develop something that is truly unique or specific to requirements.

They also offer developers the structural work for building applications for multiple devices, just create your underlying API and consume it in the browser or on mobile devices. They benefit from being lightweight, portable and easily maintainable.

There are a vast number of open source API solutions available for a large number of languages. In this tutorial we will look at Hapi.js, a JavaScript solution offered by the team at Walmart Labs that helps you build powerful APIs and applications with minimal code.

As we use Node underneath we will begin by installing the relevant required packages to generate our library before we create specific API routes to manage fetching, updating and deleting records from our data structure. We'll also look into the importance and ease of creating documentation using the framework.

If you have not explored creating an API for your web services yet, Hapi.js may be the very thing you've been waiting for to help you get started.

## 1. Install required packages

First we need to generate a new Node package file for our project and install the required Hapi module. Using the command line, navigate to your desired project location and initialise a new package.json file and accept as many default values as you need to. Once complete, install the API module and save it as a dependency into the package.json file.

```
npm init
npm install hapi --save
```

## 2. Create the server

Create a new file called 'server.js'. This will hold the core code for instantiating the server and dealing with routes. Require the API library and assign it to a variable of 'hapi'. Finally, create a new server instance and assign that to a new variable called 'server'.

```
var hapi = require('hapi');
var server = new hapi.Server();
```

## 3. Define the connection

With the server created we can now define the connection details. Using the underlying API we can implement the server.connection() method to define the connection details. Set the host and TCP port details as optional arguments. The port can be passed as a command-line argument or will default to 8080.

```
server.connection({
  host: 'localhost',
  port: Number(process.argv[2] || 8080)
});
server.start(function () {
  console.log('Server running at:', server.info.uri);
});
```

## 4. Run the server

You can simply run 'node server.js' which will fire up the server, but this will restrict your workflow if you make any changes. Install the supervisor package as a global module and then just run Node from there. It will reload the process whenever you update the file and you will then see the console output and an error JSON response in your browser.

```
node server.js
npm install supervisor -g
supervisor server.js
```

## 5. Define routes

The server needs to have routes defined to handle the request and output accordingly. Create a new route, providing the URL path and the HTTP method associated with the route. The handler option will call a function which will manage the response to the browser and output a simple string message.

```
server.route({path: '/', method: 'GET',
  handler: rootHandler});
function rootHandler(request, reply){
  reply('API Hapi-ness');
};
```

## 6. Additional route definition

Create another route for the server with the path /crew, which will call a function called getCrew when accessed using the HTTP GET method. Here we have sent the handler through as a parameter in the route options config object, which can be used to set a number of options to fine-tune each route.

```
server.route({
  method: 'GET',
  path: '/crew',
```

## Multiple methods

You can declare multiple methods in your route definition as an array like so: ['PUT', 'POST']. Hitting this endpoint with either of these methods will return the same response.

```
hapi — npm init — npm — node
Press ^C at any time to quit.
name: (hapi)
version: (1.0.0)
description:
entry point: (index.js)
test command:
git repository:
keywords:
license: (ISC)
About to write to /Users/monkehworks/Desktop/hapi/package.json:

{
  "name": "hapi",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "author": "Matt Gifford <matt@monkehworks.com> (http://monkehworks.com/)",
  "license": "ISC"
}

Is this ok? (yes) |
```



**Left**  
Simplify your tasks and let npm create the package.json file for you using sensible default values

**Top left**  
The initial server start returns an error JSON response as we have no routes defined for the application

**Top right**  
The GET request to the /crew route returns the JSON structure of data as expected

## Developer tutorials

# Build your own API with the Hapi.js framework

```
config: {  
  handler: getCrew  
}  
});
```

## 7. Build the response

The `getCrew` method has access to both the request and reply objects. We'll use `reply` to send the response back to the browser. The generated response will provide a JSON object containing a status and the returned data, which is obtained from an array of objects in the code.

```
function getCrew(request, reply) {  
  reply({  
    status: 200,  
    request: {  
      made: request.info.received  
    },  
    response: {  
      crew: crewDetails  
    }  
  });  
}
```

## 8. Sample data structure

Our app needs data to manage and return, so we'll use a manually created array of objects, contained within the JavaScript file. Whilst this suits our purpose for a sample

API, you can connect your API to use any available data source with an associated Node module for connectivity.

```
var crewDetails = [  
  {  
    id: 1,  
    name: 'misterdai'  
  },  
  {  
    id: 2,  
    name: 'fymd'  
  }  
];
```

## 9. Access URL parameters

We can use URL parameter values in our routes to filter data. Adjust the `getCrew` handler method to respond with a new method (`findCrewMember`) if the `name` key is found within the request query object, passing it through as an argument to the function.

```
var crewResponse = crewDetails;  
if (request.query.name) crewResponse =  
  findCrewMember(request.query.name);  
reply({  
  status: 200,  
  request: {  
    made: request.info.received,  
    params: request.query  
  },  
  response: {  
    count: crewResponse.length,  
    crew: crewResponse }  
});
```

## 10. Filter data

The new `findCrewMember` function accepts the provided name value as the method argument and uses

it to filter the array, which is then returned directly to the browser in the expected JSON response format and structure. This has additional values to also show the request URL parameters.

```
function findCrewMember(name) {  
  return crewDetails.filter(function(member) {  
    return member.name.toLowerCase() === name.  
      toLowerCase();  
  });  
}
```

## 11. Validation and logging

As we're now dealing with extra parameters, now would be a good time to employ some additional tools. Run the `npm` command to install three packages: `Joi`, `good` and `good-console`, saving them to the `package.json` file for future use. Once done, add the two `require` statements to the JavaScript file.

```
// CLI  
npm install joi good good-console --save  
// JS file  
var joi = require('joi');  
var good = require('good');
```

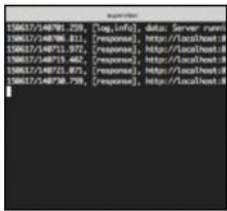
## 12. Register the plugin

The server needs to be made aware of some plugins such as the `good` reporter we will use. The API has a `server.register` method available for this purpose which can take an array or plugin objects, each of which handles its own option management to send values to the plugin for use.

```
server.register([  
  register: good,  
  options: {  
    reporters: [{  
      reporter: require('good-console'),
```

## The documentation

The Hapi library helps to make creating powerful but lightweight APIs a simple task, and it has an extensive API itself which you can tap into. Check it out here: [hapijs.com/api](http://hapijs.com/api).



### Top left

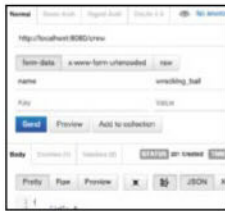
Using the `good-console` plugin really helps to structure request logs and to see what parameters are being passed through

### Top right

Use an app like Postman to interact with your local API. Here we send the POST request to add a new member

### Right

Self-documenting applications and plugins such as `Lout` can really improve your development workflow and automation processes



Routes for *http://localhost:8080*

- GET /
- GET /crew
- POST /crew
- GET /crew/{id}
- DELETE /crew/{id}



### Built-in handlers

Building up a server.route definition means associating it with a handler of some kind, typically a function to manage data manipulation and output as we have seen in the full tutorial code. Hapi.js includes a number of built-in handlers to offer some alternate but important options as standard.

Your application may require some static files for display as well as any API JSON responses from certain endpoints, for example the default '/' route may display an index.html page. Hapi.js enables you to use the file handler to cater for this, as well as for any directory and proxy handlers. The detailed documentation has all of the configuration options that you need, head over to [hapijs.com/api#route-handler](https://hapijs.com/api#route-handler) to find more information.

```
events: { response: '*', log: '*' }
}]
}
}], function (err) {
  ...
});
```

### 13. Plugin error handling

It's always wise to be prudent when registering any plugins to the server and catch any errors that may arise. Use the register method's callback option to detect any errors and throw an exception if needed. Move the server.start method into the callback following complete successful registrations.

```
if (err) throw err;
server.start(function () {
  server.log('info', 'Server running at: ' +
  server.info.uri);
});
```

### 14. Route input validation

Here we have passed a validate.query object to the route config object to tell Hapi that we want the query parameter values specified to be validated. The name has been restricted to meet particular minimum and maximum length requirements.

```
config: {
  handler: getCrew,
  validate: {
    query: {
      name: joi.string().min(4).max(25),
```

```
callback: joi.string()
}
},
jsonp: 'callback'
}
```

### 15. Route with parameters

Create a new route in the file that enables us to find a specific crew member using a parameter as part of the route, denoted here using the parenthesis. The config block will call the handler function and we also include optional meta information with descriptive details.

```
server.route({
  method: 'GET',
  path: '/crew/{id}',
  config: {
    handler: getMember,
    jsonp: 'callback',
    description: 'This method will return a
    specific crew member, if it exists.',
    notes: 'The id parameter is a required
    numeric value.',
    tags: ['api', 'crew']
  }
});
```

### 16. Find a member

The getMember handler function will be able to filter the static data array using the numeric value sent through the request parameters as the id that is taken from the route. Once again, the JSON response is generated and

sent back to the client. If no member exists, an empty object is returned in the block.

```
function getMember(request, reply) {
  var member = crewDetails.
  filter(function(member) {
    return member.id === parseInt(request.
    params.id);
  }).pop();
  if (typeof(member) !== 'object') member =
  {};
  reply({
    status: 200,
    request: {
      made: request.info.received,
      params: request.params
    },
    response: {
      crew_member: member
    }
  });
}
```

### 17. Create a post route

Create a new route with a POST method that will accept a payload containing a name key value pair. Use Joi to set validation requirements on the data input. The handler method will then take the payload and update the static array.

```
server.route({
  method: 'POST',
  path: '/crew',
```

## Developer tutorials

# Build your own API with the Hapi.js framework

```
config: {
  handler: addMember,
  validate: {
    payload: {
      name: joi.string().required().min(3)
    }
  }
}
```

### 18. Add data to array

Following a POST request to the new route the addMember function will be called. This will generate a new member object with an incremented id value, taken from the current array length plus 1. The correct 201 status code is returned to the user following the new record creation.

```
function addMember(request, reply) {
  {
    var member = {
      id: crewDetails[crewDetails.length - 1].id + 1,
```

```
name: request.payload.name
};
crewDetails.push(member);
reply(member).code(201).header('Location',
  '/crew/' + member.id);
}
```

### 19. Delete member handler

Create a new route definition similar to the getMember route which accepts a DELETE HTTP method request. This will call the deleteMember method to remove the specific object from the array using the id value sent as the request parameter.

```
function deleteMember(request, reply) {
  var member;
  for ( var i = 0; i < crewDetails.length; i++ ) {
    if ( crewDetails[i].id === parseInt(request.params.id) )
    {
      member = crewDetails[i];
      crewDetails.splice(i, 1);
      reply(member).code(200).header('Location',
        '/crew/' + member.id);
      break;
    }
  }
}
```

### 20. Self-document your app

Documentation is crucially important for any application, and this is certainly true for an API that could be opened

and available for consumption by developers and organisations needing to understand how it all works. We will install a new Node module called Lout to help us out with this process, and we will be saving it to the package.json file in the process.

```
npm install lout --save
<p class="error" data-ng-
message="maxlength">
This field is too long.
</p>
</script>
```

### 21. Register Lout

As it is an additional plugin we need to register Lout with the server, as we have already done with the good-console module. Revise the array of plugin objects and add a new one that registers the Lout module.

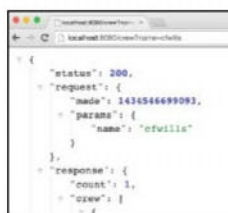
```
server.register
([
  { register: require('lout') },
  {
    register: good,
    ...
```

### 22. Documentation generated

With the plugin registered and any meta information (description, tags and notes) defined for each of our routes, simply navigating in the browser to /docs will display the Lout documentation. The styles can be overridden to suit your requirements. Selecting a specific method will display all associated meta information.

## Hapi plugins

Whether you need authentication, security or localisation features in your app, Hapi.js can be extended with a number of plugins at [hapijs.com/plugins#Authentication](http://hapijs.com/plugins#Authentication).



#### Top left

Filtering out records using URL query parameters is easily achieved. Here we also return the param values in the response

#### Top right

The 400 bad request error will occur if our name value is below the minimum of 4 characters

#### Right

Authentication plugins can be downloaded from the Hapi site. Bell is a third-party plugin that ships with support for Facebook, Twitter, GitHub and so on



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PACKAGE	PHONE NUMBER	COST PER YEAR	WEB SPACE	MONTHLY BANDWIDTH	POP3 ACCOUNTS	DATABASE SUPPORT	SHOPPING CART	VIRUS FILTER	FIREWALL	PHONE SUPPORT	EMAIL SUPPORT	WEB CONTROL PANEL	SERVICE LEVEL AGREEMENT
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Budget Web Hosting Pack	N/A	£10	1GB	1GB	5	✓	✗	Add-on	N/A	✗	✓	✓	✗
WordPress Web Hosting Pack	N/A	£20	5GB	2GB	100	✓	✓	Add-on	N/A	✗	✓	✓	✗
Startup Web Hosting Pack	N/A	£25	5GB	Unlimited	100	✓	✓	Add-on	N/A	✗	✓	✓	✗
Unlimited Web Hosting Pack	N/A	£50	Unlimited	Unlimited	Unlimited	✓	✓	Add-on	N/A	✗	✓	✓	✗
Unlimited Multi-site Web Hosting Pack	N/A	£300	Unlimited	Unlimited	Unlimited	✓	✓	Add-on	N/A	✗	✓	✓	✗

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123-reg (www.123-reg.co.uk)	Plus	0845 859 0018	£59.88	5GB	50GB	500	✓	✗	✗	✓	✓	✓	✗
123-reg (www.123-reg.co.uk)	Pro	0845 859 0018	£107.88	10GB	100GB	750	✓	✗	✗	✓	✓	✓	✗
123-reg (www.123-reg.co.uk)	Bus Pro	0845 859 0018	£179.88	20GB	Unlimited	1,000	✓	✗	✗	✓	✓	✓	✗
123-reg (www.123-reg.co.uk)	Plus (MS)	0845 859 0018	£59.88	2GB	25GB	100	✓	✗	✗	✓	✓	✓	✗
123-reg (www.123-reg.co.uk)	Pro (MS)	0845 859 0018	£107.88	5GB	50GB	500	✓	✗	✗	✓	✓	✓	✗
123-reg (www.123-reg.co.uk)	Bus Pro (MS)	0845 859 0018	£179.88	10GB	150GB	1,000	✓	✗	✗	✓	✓	✓	✗
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2020Media (www.2020media.com)	Everyday	0870 321 2020	£100	200MB	10GB	15	✓	✓	✓	✓	✓	✓	✗
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Blackfoot Hosting Ltd (www.blackfoot.co.uk)	Business	N/A	£50	1GB	20GB	100	✓	✓	✓	✗	✓	✓	✗
Blackfoot Hosting Ltd (www.blackfoot.co.uk)	eCommerce	N/A	£100	2GB	40GB	200	✓	✓	✓	✗	✓	✓	✗
Blackfoot Hosting Ltd (www.blackfoot.co.uk)	Professional	N/A	£150	3GB	60GB	300	✓	✓	✓	✗	✓	✓	✗
Blacknight (www.blacknight.com)	Minimus	35359 918 3072	£45	10GB	200GB	Unlimited	✓	✓	✓	✓	✓	✓	✗
Blacknight (www.blacknight.com)	Medius	35359 918 3072	£79	20GB	400GB	Unlimited	✓	✓	✓	✓	✓	✓	✗
Blacknight (www.blacknight.com)	Maximus	35359 918 3072	£45	30GB	600GB	Unlimited	✓	✓	✓	✓	✓	✓	✗
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Bravo14 (http://bravo14.co.uk)	Starter Windows	N/A	£20	2,000MB	2,000MB	10	✓	✓	✓	✗	✓	✓	✗
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Bravo14 (http://bravo14.co.uk)	Ultimate Linux	N/A	£60	Unlimited	Unlimited	Unlimited	✓	✓	✓	✗	✓	✓	✗
Bravo14 (http://bravo14.co.uk)	Ultimate Windows	N/A	£60	Unlimited	Unlimited	Unlimited	✓	✓	✓	✗	✓	✓	✗
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Designwasp (http://designwasp.com)	Windows Unlimited	0844 372 9848	£60	Unlimited	Unlimited	Unlimited	✓	✓	✗	✓	✓	✓	✗
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eHosting (www.ehosting.com)	Personal	0844 999 4100	£59.88	2.5GB	Unlimited	50	✓	✗	✗	✗	✓	✓	✗
eHosting (www.ehosting.com)	Expert	0844 999 4100	£95.88	5GB	Unlimited	250	✓	✗	✗	✗	✓	✓	✗
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Evohosting (www.evohosting.co.uk)	Starter	N/A	£29.99	500MB	1GB	3	✓	✓	✓	✗	✓	✓	✗
Evohosting (www.evohosting.co.uk)	Home	N/A	£54.99	2.5GB	30GB	50	✓	✓	✓	✗	✓	✓	✗
Evohosting (www.evohosting.co.uk)	Business	N/A	£79.99	6.5GB	Unlimited	Unlimited	✓	✓	✓	✗	✓	✓	✗
Evohosting (www.evohosting.co.uk)	eCommerce	N/A	£159.99	30GB	Unlimited	Unlimited	✓	✓	✓	✗	✓	✓	✗
Fasthosts (www.fasthosts.co.uk)	Personal	0808 168 6777	£32.87	5GB	Unlimited	50	✓	✗	✓	✓	✓	✓	✗



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### NAME AND URL

NAME AND URL	PACKAGE	PHONE NUMBER	COST PER YEAR	WEB SPACE	MONTHLY BANDWIDTH	POP3 ACCOUNTS	DATABASE SUPPORT	SHOPPING CART	VIRUS FILTER	FIREWALL	PHONE SUPPORT	EMAIL SUPPORT	WEB CONTROL PANEL	SERVICE LEVEL AGREEMENT
Fasthosts (www.fasthosts.co.uk)	Business Bronze	0808 168 6777	£58.38	50GB	Unlimited	500	✓	Option	✓	✓	✓	✓	✓	✓
Fasthosts (www.fasthosts.co.uk)	Business Silver	0808 168 6777	£76.39	Unlimited	Unlimited	Unlimited	✓	Option	✓	✓	✓	✓	✓	✓
Fasthosts (www.fasthosts.co.uk)	Business Gold	0808 168 6777	£101.89	Unlimited	Unlimited	Unlimited	✓	Option	✓	✓	✓	✓	✓	✓
Fasthosts (www.fasthosts.co.uk)	WD Starter	0808 168 6777	£149.99	20GB	Unlimited	Unlimited	✓	Option	Option	✓	✓	✓	✓	✓
Fasthosts (www.fasthosts.co.uk)	WD Advanced	0808 168 6777	£199.99	Unlimited	Unlimited	Unlimited	✓	Option	Option	✓	✓	✓	✓	✓
Heart Internet (www.heartinternet.co.uk)	Starter Professional	0845 644 7750	£29.80	2.5GB	10GB	1,000	✓	✓	✓	✓	✓	✓	✓	✓
Heart Internet (www.heartinternet.co.uk)	Home Professional	0845 644 7750	£89.99	Unlimited	Unlimited	10,000	✓	✓	✓	✓	✓	✓	✓	✓
Heart Internet (www.heartinternet.co.uk)	Business Professional	0845 644 7750	£129.99	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
Heart Internet (www.heartinternet.co.uk)	Reseller Professional	0845 644 7750	£349.99	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
ICUK www.icukhosting.co.uk	Professional	0845 009 9175	£30	250MB	1GB	50	✓	✓	option	✓	✓	✓	✓	✓
ICUK www.icukhosting.co.uk	Advanced	0845 009 9175	£50	2GB	2.5GB	150	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Enterprise	0845 009 9175	£80	2GB	500MB	Unlimited	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Professional Plus	0845 009 9175	£90	500MB	5GB	100	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Premium Plus	0845 009 9175	£150	1GB	12.5GB	500	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Enterprise Plus	0845 009 9175	£300	2GB	20GB	Unlimited	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Reseller Windows	0845 009 9175	£200	Unlimited	Unlimited	Unlimited	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Reseller Linux	0845 009 9175	£200	Unlimited	Unlimited	Unlimited	✓	✓	option	✓	✓	✓	✓	✓
ICUK (www.icukhosting.co.uk)	Reseller Enterprise	0845 009 9175	£500	Unlimited	Unlimited	Unlimited	✓	✓	option	✓	✓	✓	✓	✓
JAB Web Hosting (www.jabwebhosting.com)	Mail - M105	0800 043 0153	£15.17	256MB	3GB	50	✓	✓	✓	✓	✓	✓	✓	✓
JAB Web Hosting (www.jabwebhosting.com)	Home - H25	0800 043 0153	£24.47	1GB	8GB	50	✓	✓	✓	✓	✓	✓	✓	✓
JAB Web Hosting (www.jabwebhosting.com)	Professional - P55	0800 043 0153	£45	2GB	15GB	75	✓	✓	✓	✓	✓	✓	✓	✓
JAB Web Hosting (www.jabwebhosting.com)	Reseller - R25	0800 043 0153	£97.88	2GB	30GB	250	✓	✓	✓	✓	✓	✓	✓	✓
JAB Web Hosting (www.jabwebhosting.com)	Reseller - R105	0800 043 0153	£271.60	4GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Blog	01438 342 490	£20	100MB	1GB	5	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Starter	01438 342 490	£30	1GB	1GB	10	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Starter	01438 342 490	£30	1GB	1GB	10	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Dynamic	01438 342 490	£50	2GB	2GB	20	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Premium	01438 342 490	£80	5GB	5GB	50	✓	✓	✓	✓	✓	✓	✓	✓
LCN (www.lcn.com)	Unlimited	01438 342 490	£120	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	LD Budget (Linux)	07891 235858	£11.88	1GB	1GB	500	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	LD Home (Linux)	07891 235858	£23.88	10GB	10GB	5,000	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	LD Pro (Linux)	07891 235858	£41.88	50GB	50GB	20,000	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	LD Unlimited (Linux)	07891 235858	£60	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	Windows Home	07891 235858	£17.88	2GB	2GB	1,000	✓	✓	✓	✓	✓	✓	✓	✓
LD Hosts (http://ldhosts.co.uk)	Windows Unlimited	07891 235858	£60	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
Media Temple (http://mediatemple.net)	Shared-Server Pro	+1 310 841 5500	£64	2GB	1TB	1,000	✓	✓	✓	✓	✓	✓	✓	✓
Media Temple (http://mediatemple.net)	Shared-Server Advanced	+1 310 841 5500	£109	5GB	1.5TB	5,000	✓	✓	✓	✓	✓	✓	✓	✓
NameHog (www.namehog.net)	Email Only	01604 212 904	£11.99	2.5GB	15GB	10	✓	✓	✓	✓	✓	✓	✓	✓
NameHog (www.namehog.net)	Starter	01604 212 904	£36.99	10GB	150GB	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
NameHog (www.namehog.net)	Home Pro	01604 212 904	£59.99	25GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
NameHog (www.namehog.net)	Business	01604 212 904	£109.99	Unlimited	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
Namesco (www.names.co.uk)	StartUp Plus	0845 363 3632	£89.99	500MB	5GB	10	✓	✓	✓	✓	✓	✓	✓	✓
Namesco (www.names.co.uk)	Business	0845 363 3632	£149.99	2,000MB	20GB	100	✓	✓	✓	✓	✓	✓	✓	✓
Namesco (www.names.co.uk)	Business Plus	0845 363 3632	£89.99	3,000MB	30GB	200	✓	✓	✓	✓	✓	✓	✓	✓
Namesco (www.names.co.uk)	Designer	0845 363 3632	£239.88	1GB	20GB	200	✓	✓	✓	✓	✓	✓	✓	✓
Namesco (www.names.co.uk)	Designer Plus	0845 363 3632	£479.88	Unlimited	30GB	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
 <b>Netcetera</b> www.netcetera.co.uk	DEVELOPER	0800 808 5450	£32.89	1GB	Unlimited	500	✓	✓	✓	✓	✓	✓	✓	✓
	ONE	0800 808 5450	£109.99	5GB	Unlimited	1000	✓	✓	✓	✓	✓	✓	✓	✓
	RESELLER	0800 808 5450	£274.89	Unlimited	Unlimited	1000	✓	✓	✓	✓	✓	✓	✓	✓
	VM500 Server	0800 808 5450	£300	20GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
	2200DC Server	0800 808 5450	£720	160GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
	3000DC Server	0800 808 5450	£1,200	2x500GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
	2600QC Server	0800 808 5450	£1,800	2x500GB	Unlimited	Unlimited	✓	✓	✓	✓	✓	✓	✓	✓
Netplan (www.netplan.co.uk)	Shared 100	0207 1000 424	£60	100MB	1GB	5	✓	✓	✓	✓	✓	✓	✓	✓
Netplan (www.netplan.co.uk)	VS100	0207 1000 424	£600	5GB	5GB	5	✓	✓	✓	✓	✓	✓	✓	✓
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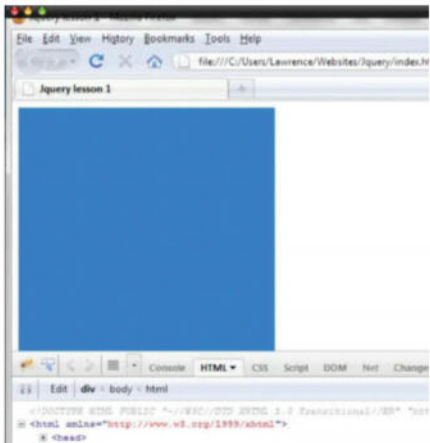
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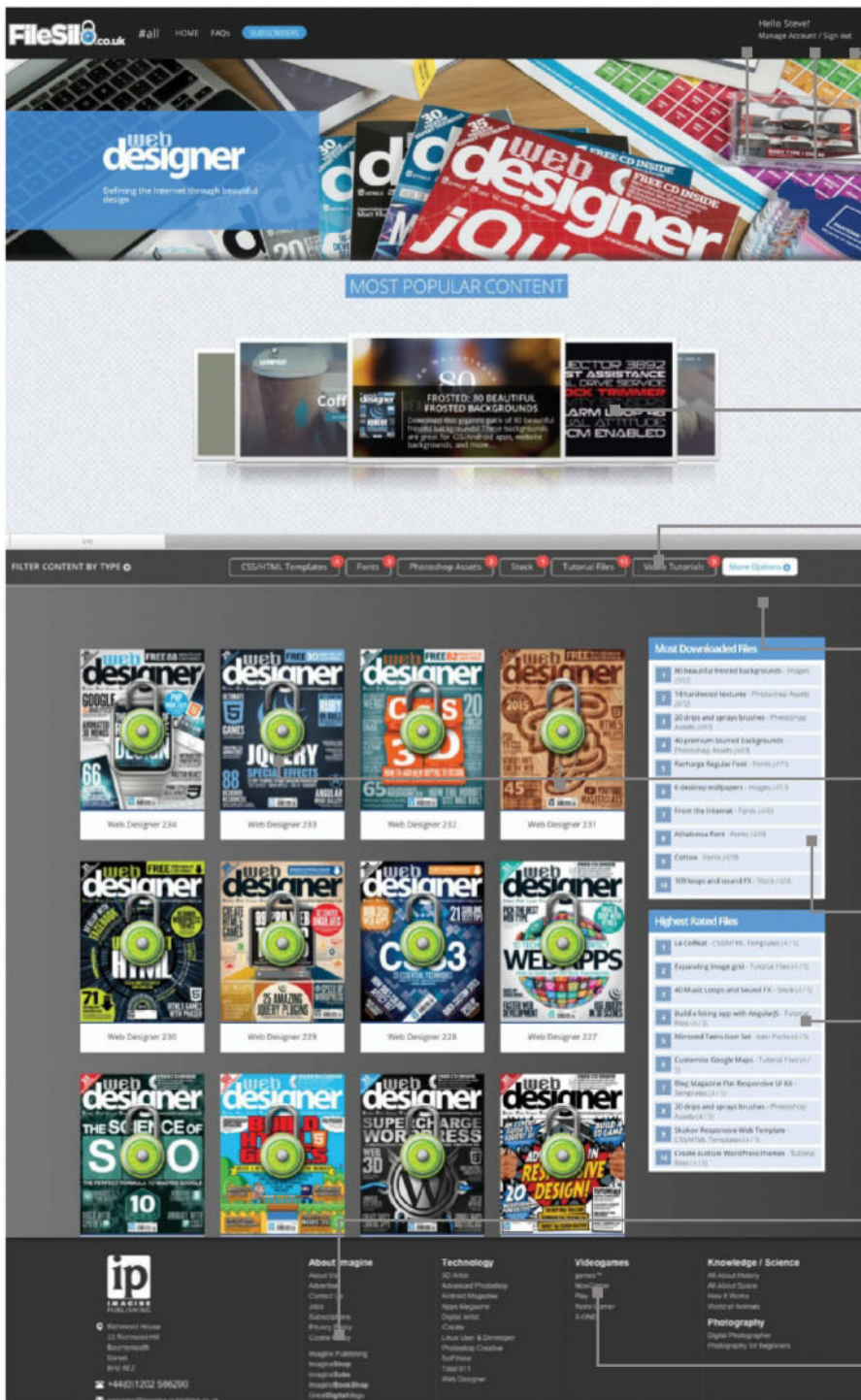
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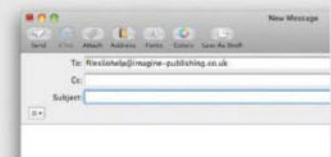


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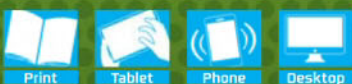


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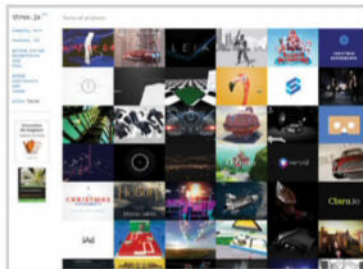
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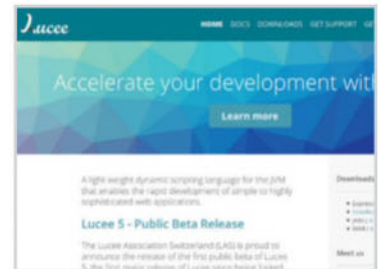
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