Head First JavaScript Programming

Wouldn't it be dreamy if there was a JavaScript book that was more fun than going to the dentist and more revealing than an IRS form? It's probably just a fantasy...

Eric T. Freeman
Elisabeth Robson

O'REILLY®

Beijing • Cambridge • Köln • Sebastopol • Tokyo

Table of Contents (summary)

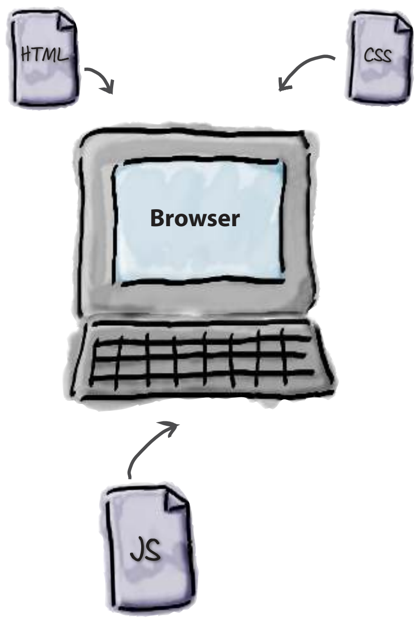
Table of Contents (the real thing)

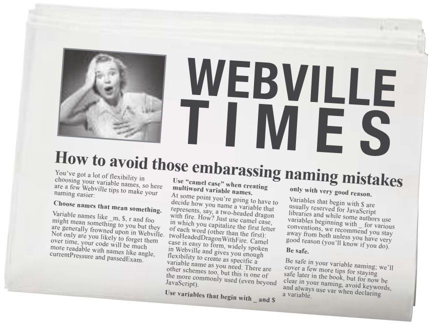
1

a quick dip into javascript

Getting your feet wet

JavaScript gives you superpowers. The **true programming language** of the web, JavaScript lets you **add behavior** to your web pages. No more dry, boring, static pages that just sit there looking at you—with JavaScript you're going to be able to reach out and touch your users, react to interesting events, grab data from the web to use in your pages, draw graphics right in your web pages and a lot more. And once you know JavaScript you'll also be in a position to create **totally new** behaviors for your users.





WEBVILLE TIMES

How to avoid those embarassing naming mistakes

You've got a lot of flexibility in choosing your variable names, so here are a few Webville tips to make your naming easier:

Choose names that mean something.

Variable names like _m, $, r and foo might mean something to you but they are generally frowned upon in Webville. Not only are you likely to forget them over time, your code will be much more readable with names like angle, currentPressure and passedExam.

Use "camel case" when creating multiword variable names.

At some point you're going to have to decide how you name a variable that represents, say, a two-headed dragon with fire. How? Just use camel case, in which you capitalize the first letter of each word (other than the first): twoHeadedDragonWithFire. Camel case is easy to form, widely spoken in Webville and gives you enough flexibility to create as specific a variable name as you need. There are other schemes too, but this is one of the more commonly used (even beyond JavaScript).

Use variables that begin with _ and $ only with very good reason.

Variables that begin with $ are usually reserved for JavaScript libraries and while some authors use variables beginning with _ for various conventions, we recommend you stay away from both unless you have very good reason (you'll know if you do).

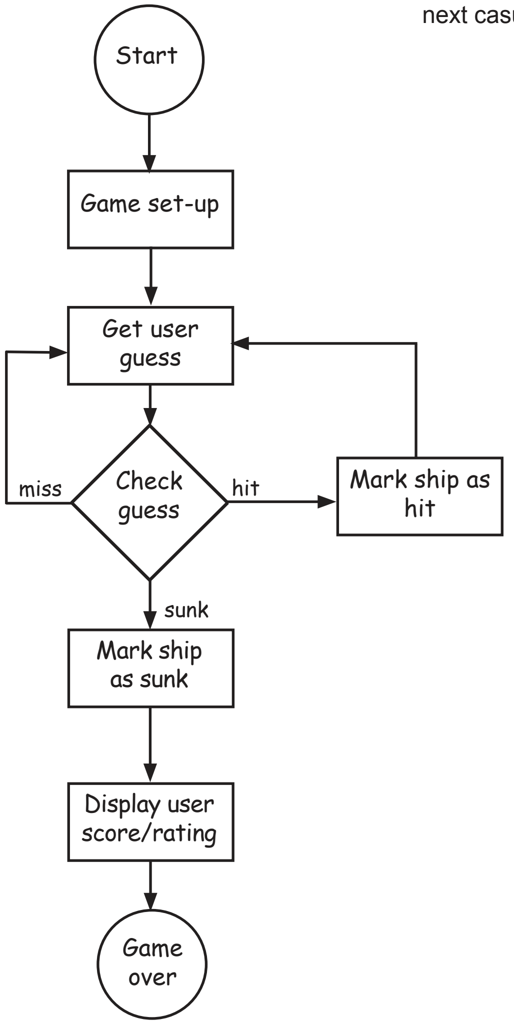
Be safe.

Be safe in your variable naming; we'll cover a few more tips for staying safe later in the book, but for now be clear in your naming, avoid keywords, and always use var when declaring a variable.

writing real code

2 Going further

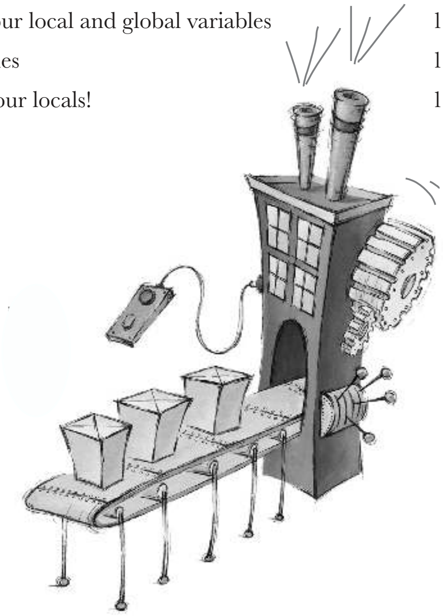
You already know about variables, types, expressions... we could go on. The point is, you already know a few things about JavaScript. In fact, you know enough to write some **real code**. Some code that does something interesting, some code that someone would want to use. What you're lacking is the **real experience** of writing code, and we're going to remedy that right here and now. How? By jumping in head first and coding up a casual game, all written in JavaScript. Our goal is ambitious but we're going to take it one step at a time. Come on, let's get this started, and if you want to launch the next casual startup, we won't stand in your way; the code is yours.



3 introducing functions

Getting functional

Get ready for your first superpower. You've got some programming under your belt; now it's time to really move things along with **functions**. Functions give you the power to write code that can be applied to all sorts of different circumstances, code that can be **reused** over and over, code that is much more **manageable,** code that can be **abstracted** away and given a simple name so you can forget all the complexity and get on with the important stuff. You're going to find not only that functions are your gateway from scripter to programmer, they're the key to the JavaScript programming style. In this chapter we're going to start with the basics: the mechanics, the ins and outs of how functions really work, and then you'll keep honing your function skills throughout the rest of the book. So, let's get a good foundation started, *now*.



putting some order in your data

4 Arrays

There's more to JavaScript than numbers, strings and booleans. So far you've been writing JavaScript code with **primitives**—simple strings, numbers and booleans, like "Fido", 23, and true. And you can do a lot with primitive types, but at some point you've got to deal with **more data**. Say, all the items in a shopping cart, or all the songs in a playlist, or a set of stars and their apparent magnitude, or an entire product catalog. For that we need a little more *ummph*. The type of choice for this kind of ordered data is a JavaScript **array**, and in this chapter we're going to walk through how to put your data into an array, how to pass it around and how to operate on it. We'll be looking at a few other ways to **structure your data** in later chapters but let's get started with arrays.

undestanding objects

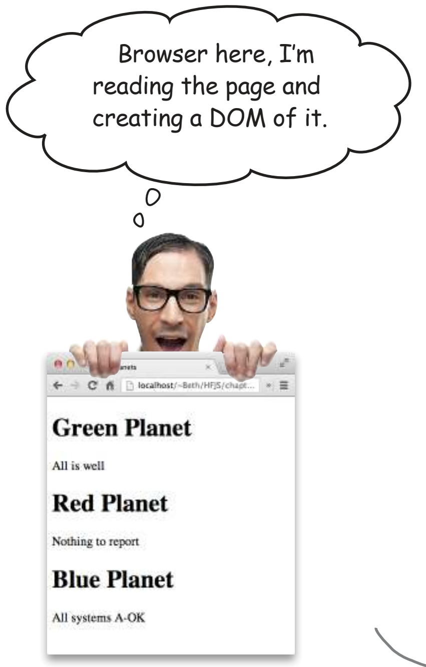
5 A trip to Objectville

So far you've been using primitives and arrays in your code. And, you've approached coding in quite a **procedural manner** using simple statements, conditionals and for/while loops with functions—that's not exactly **object-oriented**. In fact, it's not object-oriented *at all!* We did use a few objects here and there without really knowing it, but you haven't written any of your own objects yet. Well, the time has come to leave this boring procedural town behind to create some **objects** of your own. In this chapter, you're going to find out why using objects is going to make your life so much better—well, better in a **programming sense** (we can't really help you with your fashion sense *and* your JavaScript skills all in one book). Just a warning: once you've discovered objects you'll never want to come back. Send us a postcard when you get there.

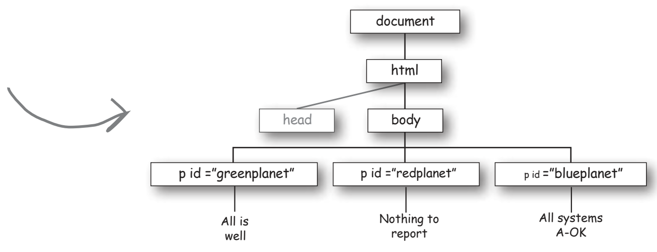
6 interacting with your web page

Getting to know the DOM

You've come a long way with JavaScript. In fact you've evolved from a newbie to a scripter to, well, a **programmer**. But, there's something missing. To really begin leveraging your JavaScript skills you need to know how to interact with the web page your code lives in. Only by doing that are you going to be able to write pages that are **dynamic**, pages that react, that respond, that update themselves after they've been loaded. So how do you interact with the page? By using the **DOM**, otherwise known as the **document object model**. In this chapter we're going to break down the DOM and see just how we can use it, along with JavaScript, to teach your page a few new tricks.



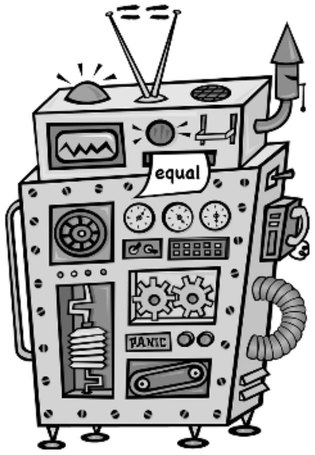
Browser here, I'm reading the page and creating a DOM of it.
localhost/~Beth/HFJS/chapt...
Green Planet
All is well
Red Planet
Nothing to report
Blue Planet
All systems A-OK



types, equality, conversion, and all that jazz

7 Serious types

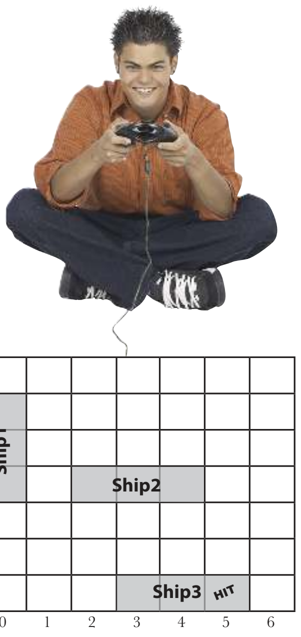
It's time to get serious about our types. One of the great things about JavaScript is you can get a long way without knowing a lot of details of the language. But to truly **master the language**, get that promotion and get on to the things you really want to do in life, you have to rock at **types**. Remember what we said way back about JavaScript? That it didn't have the luxury of a silver-spoon, academic, peer-reviewed language definition? Well that's true, but the academic life didn't stop Steve Jobs and Bill Gates, and it didn't stop JavaScript either. It does mean that JavaScript doesn't have the... well, the most thought-out type system, and we'll find a few **idiosyncrasies** along the way. But, don't worry, in this chapter we're going to nail all that down, and soon you'll be able to avoid all those embarrassing moments with types.



bringing it all together

8 Building an app

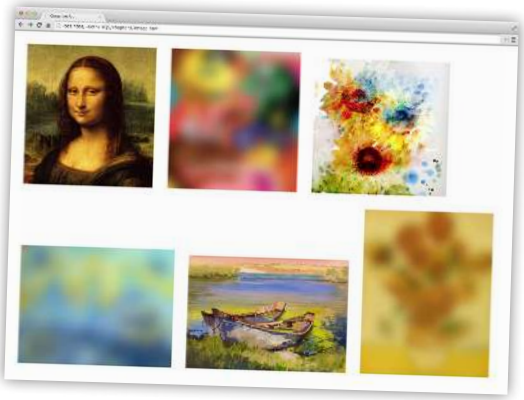
Put on your toolbelt. That is, the toolbelt with all your new coding skills, your knowledge of the DOM, and even some HTML & CSS. We're going to bring everything together in this chapter to create our first true **web application**. No more **silly toy games** with one battleship and a single row of hiding places. In this chapter we're building the **entire experience**: a nice big game board, multiple ships and user input right in the web page. We're going to create the page structure for the game with HTML, visually style the game with CSS, and write JavaScript to code the game's behavior. Get ready: this is an all out, pedal to the metal development chapter where we're going to lay down some serious code.



9 asynchronous coding

Handling events

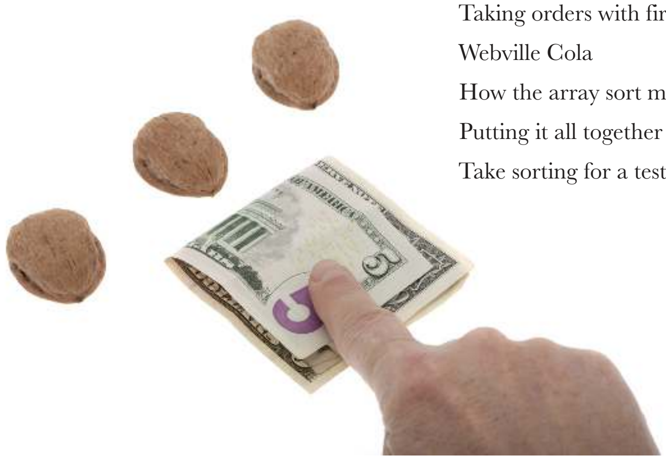
After this chapter you're going to realize you aren't in Kansas anymore. Up until now, you've been writing code that typically executes from top to bottom—sure, your code might be a little more complex than that, and make use of a few functions, objects and methods, but at some point the code just runs its course. Now, we're awfully sorry to break this to you this late in the book, but that's **not how you typically write JavaScript code**. Rather, most JavaScript is written to **react to events**. What kind of events? Well, how about a user clicking on your page, data arriving from the network, timers expiring in the browser, changes happening in the DOM and that's just a few examples. In fact, all kinds of events are happening **all the time**, behind the scenes, in your browser. In this chapter we're going rethink our approach to JavaScript coding, and learn how and why we should write code that reacts to events.



10 first class functions

Liberated functions

Know functions, then rock. Every art, craft, and discipline has a key principle that separates the intermediate players from the rock star virtuosos—when it comes to JavaScript, it's truly understanding **functions** that makes the difference. Functions are fundamental to JavaScript, and many of the techniques we use to **design and organize** code depend on advanced knowledge and use of functions. The path to learning functions at this level is an interesting and often mind-bending one, so get ready... This chapter is going to be a bit like Willy Wonka giving a tour of the chocolate factory—you're going to encounter some wild, wacky and wonderful things as you learn more about JavaScript functions.



11 anonymous functions, scopes, and closures

Serious functions

You've put functions through their paces, but there's more to learn. In this chapter we take it further; we get hard-core. We're going to show you how to **really handle** functions. This won't be a super long chapter, but it will be intense, and at the end you're going to be more expressive with your JavaScript than you thought possible. You're also going to be ready to take on a coworker's code, or jump into an open source JavasScript library, because we're going to cover some common coding idioms and conventions around functions. And if you've never heard of an **anonymous function** or a **closure**, boy are you in the right place.

Darn it! Judy was right again.
Wait a sec... what is this closure thing? It looks related to what we're doing. Maybe we can get a leg up on her yet.

advanced object construction

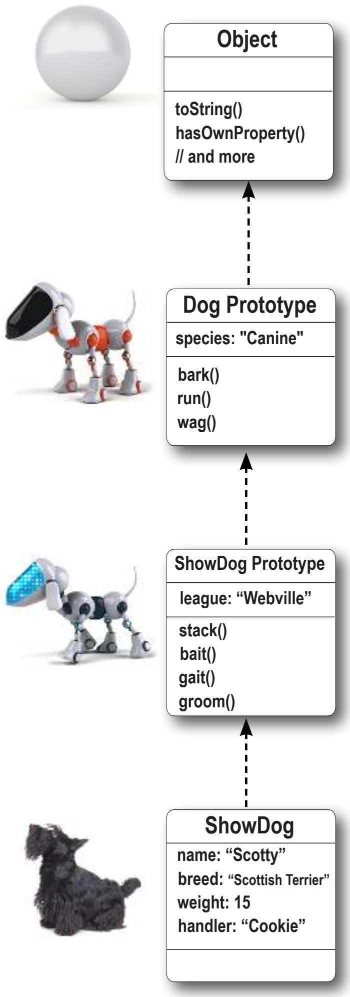
12 Creating objects

So far we've been crafting objects by hand. For each object, we've used an **object literal** to specify each and every property. That's okay on a small scale, but for serious code we need something better. That's where **object constructors** come in. With constructors we can create objects much more easily, and we can create objects that all adhere to the same **design blueprint**—meaning we can use constructors to ensure each object has the same properties and includes the same methods. And with constructors we can write object code that is much more **concise** and a lot less error prone when we're creating lots of objects. So, let's get started and after this chapter you'll be talking constructors just like you grew up in Objectville.

13 using prototypes

Extra strength objects

Learning how to create objects was just the beginning. It's time to put some muscle on our objects. We need more ways to create **relationships** between objects and to **share code** among them. And, we need ways to extend and enhance existing objects. In other words, we need more tools. In this chapter, you're going to see that JavaScript has a very powerful **object model**, but one that is a bit different than the status quo object-oriented language. Rather than the typical class-based object-oriented system, JavaScript instead opts for a more powerful **prototype** model, where objects can inherit and extend the behavior of other objects. What is that good for? You'll see soon enough. Let's get started...



14 Appendix: Leftovers

The top ten topics (we didn't cover)

We've covered a lot of ground, and you're almost finished with this book. We'll miss you, but before we let you go, we wouldn't feel right about sending you out into the world without a little more preparation. We can't possibly fit everything you'll need to know into this relatively small chapter. Actually, we *did* originally include everything you need to know about JavaScript Programming (not already covered by the other chapters), by reducing the type point size to .00004. It all fit, but nobody could read it. So we threw most of it away, and kept the best bits for this Top Ten appendix.This really *is* the end of the book. Except for the index, of course (a must-read!).