

Begin to Code: Building Apps and Games in the Cloud

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Introduction

The fundamentals of what a program does have not changed since the invention of the first computer over eighty years ago. Programs still takes data in, do something with it, and then send data out. However, the way that programs are created, deployed, and consumed has changed massively over the years, from central mainframe to personal computer to the cloud.

The cloud takes your programs and give them wings. The cloud enables you to turn your ideas into solutions that anyone in the world can use. This book gives you a handle on cloud development. It explains the evolution of the cloud, identifies challenges that it poses, and sets you on the road to becoming an accomplished cloud developer. You will learn how to code for the cloud, how to use cloud technology on your local machine, where code and data can be hosted and how applications are built from co-operating software components.

It won't always be an easy journey. Things worth doing tend to involve effort and learning how to code for the cloud is one of them. Not everything will make sense when you first see it. Cloud solutions may contain multiple moving parts which must all fit together to work correctly. In addition, there are people out there who will make it their business to try and undermine, overload, break or steal your work so you need to be prepared for this. You will have to learn how the cloud enables bad behavior as well as good. However, if you stay the course, you'll be rewarded with skills which you can use to use to take your ideas and bring them to life across the world.

How this book fits together

I've organized this book in three parts. Each part builds on the previous one with the aim of turning you into a successful cloud developer.

Part 1: The Cloud

In the first part we start by considering where the cloud came from and the drivers behind its development. Then we move on to get you started developing cloud applications. The final two chapters focus on safety and security, starting with a look at how to stay safe in the cloud and finishing with an examination of the TypeScript extension to JavaScript as a way of enforcing greater code security.

Part 2: Make a Cloud based application

In part 2 we discover how applications can be built and deployed using the cloud; starting with a simple (but useful) browser-based application and then moving on to discover how to use JavaScript to host web pages in the cloud. We'll also take a detailed look at hosting options that put your code into the cloud for anyone to access and how to connect browser and server based using JSON messages.

Part 3: Building with Cloud Technologies

In the final part we explore detailed examples of cloud applications, starting with a database powered customer facing application, moving into a cloud connected "Internet of Things" application and finishing with a connected multi-player game.

How to use this text

A good way to use the text is to read through a section away from the computer, perhaps on the bus (unless you are driving it), and then go back and work through the examples and exercises when you are sat next to a machine. This way you can pick up on the theory and context without feeling forced to do anything with it, and then you can reinforce your understanding by applying it later. Each chapter starts by setting out what you will learn and finishes with a set of questions that help you validate your understanding and give you thoughts to ponder on.

Everything will be described in a strong context. You might not initially understand how something works, but you should understand the problem it is being used to solve. Eventually you will start to see other contexts in which the tool or technique is used, at which point you can call yourself a proper developer.

You learn programming techniques and technologies best when you see them applied in a strong problem-solving context. The text is sprinkled with code examples that you can try along with suggestions of how the examples can be applied and extended.

Like learning to ride a bicycle, you'll learn by *doing*. You must put in the time and practice to learn how to do it. But this book will give you the knowledge and confidence to try your hand at programming, and it will also be around to help you if your programming doesn't turn out as you expected. Here are some elements in the book that will help you learn by doing:

Make Something Happen

Yes, the best way to learn things is by doing, so you'll find "Make Something Happen" elements throughout the text. These elements offer ways for you to practice your programming skills. Each starts with an example and then introduces some steps you can try on your own.

Everything you create will run on Windows, macOS, or Linux.

Code Analysis

A great way to learn how to program is by looking at code written by others and working out what it does (and sometimes why it doesn't do what it should). The book contains over 150 sample programs for you to look at. In this book's "Code Analysis" challenges, you'll use your deductive skills to figure out the behavior of a program, fix bugs, and suggest improvements.

What Could Go Wrong?

If you don't already know that programs can fail, you'll learn this hard lesson soon after you begin writing your first program. To help you deal with this in advance there are "What Could Go Wrong?" elements, which anticipate problems you might have and provide solutions to those problems. When we encounter something new, we might spend some time considering how it can fail and what we need to worry about when we use it.

JavaScript Heroes

There are some features of the JavaScript language that work especially well in particular situations, just like some superheroes are fast, other strong and other able to see through walls. When we hit these situations, we'll take a time out and explore in detail how the language feature works and give plenty of examples of where it can be used.

JavaScript Zeroes

JavaScript is a programming language created by fallible human beings. And like everything human-built it has inherent flaws. This does not make JavaScript a bad language, but it does mean that there are things about the language that you really should know when you start building large applications. There are not many "JavaScript Zeroes" in the book, but when you come across one it is worth taking a good look, knowing about it might save you your job one day.

Programmer's Points

I've spent a lot of time teaching programming. But I've also written many programs and sold a few to paying customers. I've learned some things the hard way that I really wish I'd known at the start. The aim of "Programmer's Points" is to give you this information up front so that you can start taking a professional view of software development as you learn how to do it.

"Programmer's Points" cover a wide range of issues, from programming to people to philosophy. I strongly advise you to read and absorb these points carefully—they can save you a lot of time in the future!

What you will need

You'll need a computer and some software to work with the programs in this book. I'm afraid I can't provide you with a computer, but in the first chapter you'll find out how you can get started with nothing more than a computer and a web browser. Later you'll discover how to use the Visual Studio Code editor to create JavaScript programs.

As you work through the book you will be creating and using cloud services which will be hosted on systems in the cloud. You might think that this would be expensive, but all the example applications are all based on technologies that are free to access on a personal level. You will have to register for some of them, but they are not going to cost you any money to use for this book.

Using a PC or laptop

You can use Windows, macOS, or Linux to create and run the programs in the text. Your PC doesn't have to be particularly powerful, but these are the minimum specifications I'd recommend:

- A 1 GHz or faster processor, preferably an Intel i5 or better.
- At least 4 gigabytes (GB) of memory (RAM), but preferably 8 GB or more.
- 256 GB hard drive space. (The JavaScript frameworks and Visual Studio Code installations take about 1 GB of hard drive space.)

There are no specific requirements for the graphics display on your machine, although a higher-resolution screen will enable you to see more when writing your programs.

Programming experience

This book will not tell you what programs do nor the fundamentals of program creation. You need to know a bit about programming, ideally with the JavaScript language. What the book will do is put lots of programming techniques into a cloud context. There are lots of examples you can use as jumping-off points for your own ideas, and we will use the cloud in lots of different scenarios, from useful applications, to turning lights on and off in your house to with "Internet of Things" devices to creating compelling multi-player gameplay.

You can write cloud applications in any programming language. But the JavaScript language has been associated with the cloud ever since the language was first built into early web browsers. JavaScript lends itself very well to cloud development, not least because of the huge number of libraries that have been built around it and the ease with which these can be used to develop solutions.

If you have a lots of JavaScript experience that is wonderful, you'll be able to get the most from

the content straight away. However, if you've programmed in any language, you should be able to get the hang of what the sample code is doing. Programming is a universal skill; the programming language is just how you present your program instructions to the computer. So don't be afraid to have a go just because your background is C, C++, Java or Python (to name a few).

Book resources

In every chapter in this book, I'll demonstrate and explain programs that teach you how create cloud applications. You can download this book's sample code from GitHub by following the link here:

<https://github.com/Building-Apps-and-Games-in-the-Cloud/resources>

The resources pages also include how-to videos and instructions to help you get started, along with

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Thanks to everyone for giving me another chance to do this kind of thing.

We know you're busy, so we've kept it short with just a few questions. Your answers go directly to the editors at Microsoft Press. (No personal information will be requested.) Thanks in advance for your input!