Preface

It's a magical time to be a technologist.

We have Docker to build containers, and Kubernetes to orchestrate them. Prometheus lets us monitor them. Consul lets us discover them. Jaeger lets us trace the relationships between them. These are just a few examples, but there are many, many more, all representative of a new generation of technologies: all of them are "cloud native," and all of them are written in *Go*.

The term "cloud native" feels ambiguous and buzzwordy, but it actually has a pretty specific definition. According to the Cloud Native Computing Foundation, a subfoundation of the renowned Linux Foundation, a cloud native application is one that's designed to be scalable in the face of a wildly changing load, resilient in the face of environmental uncertainty, and manageable in the face of ever-changing requirements. In other words, a cloud native application is built for life in a cruel, uncertain universe.

Incorporating lessons learned from years of building cloud-based software, Go was created about a decade ago as the first major language designed specifically for the development of cloud native software. This was largely because the common server languages in use at the time simply weren't a great fit for writing the kinds of distributed, process-intensive applications that Google produces a lot of.

Since that time, Go has emerged as the *lingua franca* of cloud native development, being used in everything from Docker to Harbor, Kubernetes to Consul, InfluxDB to CockroachDB. Ten out of fifteen of the Cloud Native Computing Foundation's graduated projects, and forty-two of sixty-two[1] of its projects overall, are written mostly or entirely in Go. And more arrive every day.

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1 Including CNCF Sandbox, Incubating, and Graduated code-based (non-specification) projects, as of February 2021.

Who Should Read This Book

This book is directed at intermediate-to-advanced developers, particularly web application engineers and DevOps specialists/site reliability engineers. Many will have been using Go to build web services, but may be unfamiliar with the subtleties of cloud native development—or even have a clear idea of what "cloud native" is—and have subsequently found their services to be difficult to manage, deploy, or observe. For these readers, this work will provide a solid foundation in not just how to build a cloud native service, but it will show why these techniques matter at all, as well as offer concrete examples to understand this sometimes abstract topic.

It's expected that many readers may be more familiar with other languages, but lured by Go's reputation as the language of cloud native development. For these readers, this book will present best practices for adopting Go as their cloud native development language, and help them solve their own cloud native management and deployment issues.

Why I Wrote This Book

The way that applications are designed, built, and deployed is changing. Demands of scale are forcing developers to spread their services' efforts across legions of servers: the industry is going "cloud native." But this introduces a host of new problems: how do you develop or deploy or manage a service running on ten servers? A hundred? A thousand? Unfortunately, the existing books in the "cloud native" space focus on abstract design principles, and contain only rudimentary examples of how to do any of this, or none at all. This book seeks to fill a need in the marketplace for a practical demonstration of complex cloud native design principles.

Conventions Used in This Book

The following typographical conventions are used in this book:

Italic
> Indicates new terms, URLs, email addresses, filenames, and file extensions.

`Constant width`
> Used for program listings, as well as within paragraphs to refer to program elements such as variable or function names, databases, data types, environment variables, statements, and keywords.

Constant width bold

    Shows commands or other text that should be typed literally by the user.

Constant width italic

    Shows text that should be replaced with user-supplied values or by values determined by context.

> This element signifies a tip or suggestion.

> This element signifies a general note.

> This element indicates a warning or caution.

Using Code Examples

Supplemental material (code examples, exercises, etc.) is available for download at *https://github.com/cloud-native-go/examples*.

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