

MICROSERVICES AND CONTAINERS



Microservices and Containers

Microservices and Containers

Table of Contents

Cover

Half Title

Title Page

Copyright Page

Dedication

Contents

Preface

Acknowledgments

About the Author

Part I: Microservices

Chapter 1: An Introduction to Microservices

What Are Microservices?

Modular Architecture

Other Advantages of Microservices

Disadvantages of Microservices

Chapter 2: Switching to Microservices

Fatigues and Attributes

Learning Curve for the Organization

Business Case for Microservices

Cost Components

Chapter 3: Interprocess Communication

Types of Interactions

Preparing to Write Web Services



Microservice Maintenance

Discovery Service

API Gateway

Service Registry

Putting It All Together

Chapter 4: Migrating and Implementing Microservices

The Need for Transition

Creating a New Application with Microservices

Organization Readiness

Services-Based Approach

Interprocess (Service-to-Service) Communication

Technology Selection

Implementation

Deployment

Operations

Migrating a Monolithic Application to Microservices

Microservices Criteria

Rearchitecting the Services

A Hybrid Approach

Part II: Containers

Chapter 5: Docker Containers

Virtual Machines

Containers

Docker Architecture and Components

The Power of Docker: A Simple Example

Chapter 6: Docker Installation

Installing Docker on Mac OS X

Installing Docker on Windows

Installing Docker on Ubuntu Linux

Chapter 7: Docker Interface



Key Docker Commands Docker Search Docker Pull **Docker Images** Docker RMI Docker Run Docker ps Docker Logs Docker Restart Docker Attach Docker Remove Docker Inspect Docker Exec Docker Rename Docker Copy Docker Pause/Unpause **Docker Create Docker Commit** Docker Diff Dockerfile MySQL Dockerfile **Docker Compose** Chapter 8: Containers Networking **Key Linux Concepts** Linking **Default Options** None Host Bridge

Custom Networks

Custom Bridge Network Driver

Overlay Network Driver

Underlay Network Driver or Macvlan



Chapter 9: Container Orchestration

Kubernetes

Kubectl

Master Node Worker Nodes

Example: Kubernetes Cluster

Apache Mesos and Marathon

Mesos Master

Agents

Frameworks

Example: Marathon Framework

Docker Swarm

Nodes

Services

Task

Example: Swarm Cluster

Service Discovery

Service Registry

Chapter 10: Containers Management

Monitoring

Logging

Metrics Collection

docker stats

APIs

cAdvisor

Cluster-wide Monitoring Tools

Heapster

Prometheus

Step 1: Running Prometheus

Step 2: Adding Node Exporter and cAdvisor

Step 3: Adding Targets

Step 4: Bringing Up the User Interface: Grafana



Step 5: Viewing the Stats

Step 6: Integrating the Alertmanager

Part III: Hands-On ProjectPutting Learning into Practice

Chapter 11: Case Study: Monolithic Helpdesk Application

Helpdesk Application Overview

Application Architecture

Authentication, Interceptor, and Authorization

Account Management

Ticketing

Product Catalog

Appointments

Message Board

Search

Building the Application

Setting Up Eclipse

Building the Application

Deploying and Configuring

New Requirements and Bug Fixes

Chapter 12: Case Study: Migration to Microservices

Planning for Migration

Applying Microservices Criteria

Conversion Summary

Impact on Architecture

Converting to Microservices

Product Catalog

Ticketing

Search

Application Build and Deployment

Code Setup

Building the Microservices

Deploying and Configuring

New Requirements and Bug Fixes



Chapter 13: Case Study: Containerizing a Helpdesk Application

Containerizing Microservices

Listing Dependencies

Build Binaries and WAR files

Creating a Docker Image

Building the Docker Image

DC/OS Cluster Setup on AWS

Deploying the Catalog Microservice

Submitting a Task to Marathon

Inspecting and Scaling the Service

Accessing the Service

Updating the Monolithic Application

Conclusion

What Is DevOps?

Only the Beginning

Appendix A: Helpdesk Application Flow

Administrator Flows

Login

Administration and Supported Products

Customer Flows

My Products

Create an Incident

View Incident

Message Board

Make Appointment

Search

My Profile

Support Desk Engineer Flows

View All Tickets



View Tickets

Appendix B: Installing the Solr Search Engine
Prerequisites
Installation Steps
Configuring Solr for Simple Data Import

Index