Deploying ArcGIS® Enterprise on Kubernetes

STUDENT EDITION

Copyright © 2023 Esri
All rights reserved.

Course version 1.0. Version release date August 2023.

Printed in the United States of America.

The information contained in this document is the exclusive property of Esri. This work is protected under United States copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by Esri. All requests should be sent to Attention: Director, Contracts and Legal, Esri, 380 New York Street, Redlands, CA 92373-8100, USA.

Export Notice: Use of these Materials is subject to U.S. export control laws and regulations including the U.S. Department of Commerce Export Administration Regulations (EAR). Diversion of these Materials contrary to U.S. law is prohibited.

The information contained in this document is subject to change without notice.

Commercial Training Course Agreement Terms: The Training Course and any software, documentation, course materials or data delivered with the Training Course is subject to the terms of the Master Agreement for Products and Services, which is available at https://www.esri.com/~/media/Files/Pdfs/legal/pdfs/ma-full/ma-full.pdf. The license rights in the Master Agreement strictly govern Licensee's use, reproduction, or disclosure of the software, documentation, course materials and data. Training Course students may use the course materials for their personal use and may not copy or redistribute for any purpose. Contractor/Manufacturer is Esri, 380 New York Street, Redlands, CA 92373-8100, USA.

Esri Marks: Esri marks and product names mentioned herein are subject to the terms of use found at the following website: https://www.esri.com/content/dam/esrisites/en-us/media/legal/copyrights-and-trademarks/esri-product-naming-guide.pdf.

Other companies and products or services mentioned herein may be trademarks, service marks, or registered marks of their respective mark owners.

Table of Contents

Esri resources for your organization

Course introduction

Course introduction
Course goals
Installing the course data
Icons used in this workbook

1 Examining ArcGIS as a cloud-native solution

Lesson introduction
ArcGIS and cloud computing
Cloud-native operational goals
Creating cloud-native solutions
Esri's complete cloud-native solution
Adoption considerations
Choosing the right approach to ArcGIS Enterprise
Lesson review
Answers to Lesson 1 questions

2 Exploring cloud-native implementation details

Lesson introduction
Containerization concepts
Working with containerization
Exercise 2A: Use a Docker app to explore containerization
- Explore the Docker container registry
- Download and execute a container application
- Test and modify a container app

Kubernetes cluster architecture
Exploring the world of Kubernetes objects
Working with Kubernetes UIs
Exercise 2B: Implement a Docker solution in Kubernetes
- Explore the Kubernetes infrastructure
- Examine a Kubernetes YAML file
- Create a container application from a YAML file
- Work with the OpenLens Kubernetes GUI dashboard
- Test a Kubernetes app

Lesson review

Answers to Lesson 2 questions

3 Configuring a prerequisite infrastructure

Lesson introduction
ArcGIS Enterprise on Kubernetes prerequisites
Examine an architectural view of the prerequisites
Exploring Kubernetes environment options
Exploring ArcGIS Enterprise microservices
Configuring web server access
Exercise 3A: Set up the reverse proxy web server
    Review domain certificate files
    Install and configure reverse proxy using a script
Exploring the role of persistent storage
Exercise 3B: Configure Kubernetes persistent volumes
    Verify access to the NFS server
    Enable persistent volumes using a script
Lesson review
Answers to Lesson 3 questions

4 Deploying ArcGIS on Kubernetes

Lesson introduction
Setting up ArcGIS Enterprise in Windows and Linux
Key setup workflow
Exploring deployment account roles
Relating deployment accounts to their functions
Exercise 4A: Run the deployment script
    Run the deployment script
    Explore a deployment properties file
Exploring ArcGIS Enterprise on Kubernetes architecture
Licensing ArcGIS Enterprise on Kubernetes
Troubleshooting the deployment process
Exercise 4B: Create the Enterprise organization
    Use the web app setup wizard
    Monitor the deployment process
Comparing deployment processes
Exercise 4C: Automate deployment
    Run the deployment script in silent mode
    Use the configuration script to create an organization silently
    Explore automated configuration with Helm
Lesson review

Answers to Lesson 4 questions

5 Admin apps for ArcGIS Enterprise on Kubernetes

Lesson introduction
Familiar admin workflows in the Enterprise portal
Exploring the Enterprise portal
ArcGIS Enterprise on Kubernetes admin tools
Comparing Enterprise admin tools
Exercise 5: Work with Enterprise Manager
- Validate the completed deployment
- Configure the system logging level
- Explore the ingress controller configuration
- Import TLS certificates
- Enable Active Directory user authentication
- Explore logs
- Explore other Enterprise Manager tabs

Lesson review
Answers to Lesson 5 questions

6 Admin workflows for ArcGIS Enterprise on Kubernetes

Lesson introduction
Enterprise Admin API exposing system framework
Exploring GIS services and Deployment objects
Exercise 6: Perform admin workflows using the Admin API
- Explore the Enterprise Admin API
- Review system-managed data stores
- Execute GIS service basics
- Explore the shared map service
- Examine a geoprocessing service implementation

GIS services and Kubernetes pods
Federation in ArcGIS Enterprise on Kubernetes
Compare federation workflows
Update strategies for ArcGIS Enterprise on Kubernetes
Troubleshooting ArcGIS Enterprise on Kubernetes
Applying troubleshooting strategies
Lesson review
Answers to Lesson 6 questions

7 Scaling system infrastructure and services

Lesson introduction
ArcGIS Enterprise scaling strategies

Shared and dedicated GIS service instances
Scaling in ArcGIS Enterprise on Kubernetes
Kubernetes resource quotas
Exercise 7A: Scale ArcGIS Enterprise on Kubernetes
    Add a node to the Kubernetes cluster
    Update resource quota
    Work with shared instance feature services
    Scale a dedicated instance map service
Advantages of automatically scaling services
Exercise 7B: Configure horizontal pod autoscaling
    Set pod resource limits
    Run service test plan
    Monitor service metrics
Lesson review
Answers to Lesson 7 questions

Appendices

Appendix A: Esri data license agreement
Appendix B: Cloud native glossary
Appendix C: Kubernetes objects glossary
Appendix D: Answers to lesson review questions
Appendix E: Additional resources