Containerization (Docker) for Reproducible Research Environments Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In the digital age, researchers working on sensitive topics—such as human rights, public health, or political instability—face unique challenges in ensuring data privacy, reproducibility, and computational integrity. Leveraging Docker containerization offers a powerful solution by creating isolated, secure, and reproducible environments that enhance research credibility while protecting sensitive data. Containerization (Docker) for Reproducible Research Environments Training Course bridges the gap between social science research and modern DevOps tools, enabling participants to confidently manage complex workflows in controlled environments.

The training emphasizes ethical research practices, data security, and collaborative reproducibility using containerization tools such as Docker, Docker Compose, and GitHub Actions. By combining theoretical insights with hands-on labs and real-world case studies, participants will acquire practical skills to deploy, document, and scale sensitive research projects using containerized systems that ensure long-term integrity and auditability.

Programme Curriculum

Containerization (Docker) for Reproducible Research Environments Training Course

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Course Objectives

1. Understand the significance of reproducibility in sensitive research.
2. Learn how to use Docker for secure and scalable environments.
3. Deploy containerized applications for data-driven investigations.
4. Enhance cross-disciplinary collaboration using version-controlled environments.
5. Protect sensitive data with container-level security strategies.
6. Integrate open science and ethical research practices using Docker.
7. Simplify dependency management through Dockerfiles and images.
8. Use Docker Compose for multi-container orchestration.
9. Employ GitHub Actions for automated and reproducible workflows.
10. Apply privacy-preserving computation strategies within containers.
11. Troubleshoot common Docker errors in sensitive research workflows.
12. Document and share reproducible research using public repositories.
13. Build scalable and reproducible models for impact-focused research.

Target Audiences

1. Academic Researchers
2. Policy Analysts
3. Human Rights Investigators
4. Journalists and Media Analysts
5. Public Health Professionals
6. Data Scientists and Statisticians
7. Research Ethics Committees
8. IT and DevOps Teams supporting research

Course Duration: 5 days

Course Modules

Module 1: Introduction to Reproducible Research with Docker

- Importance of reproducibility in sensitive contexts
- Overview of containerization and Docker
- Ethical challenges in research and technical responses
- Setting up Docker on Linux/Windows/Mac
- Intro to Docker Hub and image repositories
- **Case Study:** Reproducing a public health analysis on HIV data using Docker

Module 2: Docker Architecture and Core Concepts

- Containers vs Virtual Machines: Key differences
- Understanding Docker Images and Layers
- Writing effective Dockerfiles
- Using Docker CLI commands efficiently
- Managing versions of containers and images
- **Case Study:** Sensitive media data analysis in conflict zones

Module 3: Managing Sensitive Data in Containers

- Best practices for handling confidential datasets
- Encryption strategies in container storage
- Isolated vs shared volumes for data access
- Limiting container permissions (user roles and rootless containers)
- GDPR and data compliance strategies
- **Case Study:** Working with anonymized migration datasets

Module 4: Building Reproducible Pipelines with Docker Compose

- Introduction to Docker Compose YAML files
- Structuring multi-container projects
- Orchestrating databases, applications, and APIs
- Debugging interconnected services
- Deploying local and remote Compose apps
- **Case Study:** Collaborative research in a multi-language survey study

Module 5: Integrating Git and GitHub Actions for CI/CD

- Version control fundamentals for research environments
- Linking Docker projects with GitHub repositories
- Writing and triggering GitHub Actions for builds and tests
- Automating container image builds
- Audit trails for research reproducibility
- **Case Study:** Automating builds for a corruption study using GitHub Actions

Module 6: Securing and Auditing Docker Research Environments

- Docker security best practices (signing, scanning)
- Using Docker Bench for security audits
- Enabling image provenance and verification
- Log monitoring for container activity
- Incident response and recovery in containerized environments
- **Case Study:** Monitoring container logs in election integrity research

Module 7: Collaborative Research and Sharing with Docker

- Creating shareable Docker images for academic partners
- Publishing Docker projects with documentation
- Community standards in open research containers
- Using Binder, Code Ocean, or JupyterHub with Docker
- Peer reviewing Dockerized research workflows
- **Case Study:** Open-source sharing of reproducible environmental studies

Module 8: Final Project and Ethical Review

- Designing a complete reproducible research project
- Applying ethical frameworks to sensitive research tools
- Peer feedback and collaborative refinement
- Presenting findings in interactive sessions
- Preparing for journal/data repository submission
- **Case Study:** Containerizing a human rights data collection workflow

Training Methodology

- Interactive lectures with live demonstrations
- Hands-on labs with real Docker projects

- Case-based learning tied to real-world challenges
- Group discussions and peer reviews
- Continuous assessments and final project presentation

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.com or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to FINESKILL TRAINING CENTER account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
07 Sep 2026	11 Sep 2026	Physical	$1,500
14 Sep 2026	18 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$1,500
28 Sep 2026	02 Oct 2026	Physical	$1,500
05 Oct 2026	09 Oct 2026	Physical	$1,500
12 Oct 2026	16 Oct 2026	Physical	$1,500
19 Oct 2026	23 Oct 2026	Physical	$1,500

Start Date	End Date	Location	Price
26 Oct 2026	30 Oct 2026	Physical	$1,500

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