



# SEI Training

## Design Guidelines and Patterns for Microservices

**IN MODERN SERVICE-BASED SOLUTIONS,** services are developed and deployed as microservices. It is not an easy job to create a sound design for systems in this space, which often need to be elastic to thousands of machines, automatically deployable, resilient to simian armies, and accessible via a comprehensive API. There are countless technology and design choices to consider, including industry standards, frameworks, design patterns, integration approaches, middleware products, and tools. And it is a moving landscape—new ideas and products for services and microservices show up every week in your favorite newsletter or blog digest email. Given all this, how can you make informed design decisions?

This two-day course will give you the essential knowledge to see the microservices landscape with clarity. We will cover seven guidelines for service-oriented designs. More important, we'll look at the strategies available today to realize each design guideline. These strategies include design patterns, architecture tactics, and middleware elements and are complemented by good practices and governance precepts. As an example, the module covering the service autonomy design guideline includes event-driven architecture, use of Domain-Driven Design to remodel services to avoid distributed transactions, the Database per Microservice pattern, the Service Data Replication pattern, Command Query Responsibility Segregation, and Event Sourcing.

For this class, we developed a simple, clear, and consistent design notation for the more than 60 design diagrams used to convey and exemplify the design guidelines and strategies. But you don't just get to listen and read. Participants will share their experience throughout the

course. The course also includes a hands-on design lab, in which attendees evaluate existing designs based on the design guidelines, and create new designs using different patterns and other design strategies.

### Objectives

After attending this course, learners will understand

- what is a microservice and what is the microservice architecture style (beyond the hype)
- design guidelines for successful service-based solutions
- strategies, including several design patterns, that can be used to realize the service-orientation guidelines

Completion of this course fulfills a training requirement for the SEI's Service-Based Architecture Professional Certificate.

### Who should attend?

This course is valuable for

- software and application architects
- developers who use service and microservice technologies in their solutions

### Topics

The course covers the following topics:

- the microservice architecture style and service-orientation
- strategies and patterns for realizing the seven service-orientation design guidelines applied to microservices
  - standardized service contract
  - service loose coupling
  - service reusability
  - service autonomy
  - service statelessness
  - service discoverability
  - service composability

## Prerequisites

Participants should have attended the Designing Modern Service-Based Systems course or have a sound understanding of distributed systems and REST.

## Materials

Participants will receive copies of the course presentation slides, the class exercises, and a “cheat sheet” with the most important concepts. Participants will also receive a printed Certificate of Completion at the end of the class.

## Two Ways to Attend

1. Public, instructor-led offering at an SEI office
2. Private, instructor-led training at customer sites

## For More Information

To learn more and to register for the course, visit [sei.cmu.edu/education-outreach/courses](http://sei.cmu.edu/education-outreach/courses)

*Training courses provided by the SEI are not academic courses for academic credit toward a degree. Any certificates provided are evidence of the completion of the courses and are not official academic credentials.*

---

## About the SEI

The Software Engineering Institute is a federally funded research and development center (FFRDC) that works with defense and government organizations, industry, and academia to advance the state-of-the-art in software engineering and cybersecurity to benefit public interest. Part of Carnegie Mellon University, the SEI is a national resource in pioneering emerging technologies, cybersecurity, software acquisition, and software lifecycle assurance.

## Contact Us

CARNEGIE MELLON UNIVERSITY  
SOFTWARE ENGINEERING INSTITUTE  
4500 FIFTH AVENUE; PITTSBURGH, PA 15213-2612

[sei.cmu.edu](http://sei.cmu.edu)  
412.268.5800 | 888.201.4479  
[info@sei.cmu.edu](mailto:info@sei.cmu.edu)