2010
Research, Technology, and System Solutions Program
Software Architecture Curriculum
Software Engineering Institute
Carnegie Mellon
OVERVIEW

The Carnegie Mellon® Software Engineering institute (SEI) is pleased to offer its software architecture courses and certificate/certification programs. Based on decades of experience architecting software-reliant systems and supported by four widely acclaimed books in the SEI Addison-Wesley Series, this collection of six courses equips software professionals with state-of-the-art practices, so they can efficiently design software-reliant systems that meet their intended business and quality goals.

Software professionals can take individual courses based on specific needs or interests or complete one or more of the following certificate or certification programs:

- Software Architecture Professional
- Architecture Tradeoff Analysis Method® (ATAM®) Evaluator
- SEI-Certified ATAM Leader

The ATAM Evaluator certificate program qualifies individuals to participate in SEI-authorized ATAM evaluations; the SEI-Certified ATAM Leader certification program qualifies individuals to lead ATAM evaluations.

The matrix table below shows the requirements for earning each certificate or certification.

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<th>Requirements</th>
<th>Software Architecture Professional</th>
<th>ATAM Evaluator</th>
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The Software Architecture: Principles and Practices exam is required for those who are seeking SEI software architecture certificate, certification, or instructor credentials. A passing score on the exam is a prerequisite for any of the software architecture certificate, certification, or instructor programs.

A standards-based assessment test gives students the opportunity to demonstrate that they have learned the material. This requirement accords with industry standards for certifications or professional certificates, which require that candidates pass an examination based on a set of uniform standards after taking a required sequence of professional development courses.

The courses listed above are described on pages 2-7 of this booklet. On page 8, a related course, Modeling System Architectures Using the Architecture Analysis & Design Language (AADL), is described. This course provides instruction on an approach to modeling and validating quality attributes for real-time, embedded systems.
SOFTWARE ARCHITECTURE CURRICULUM

SOFTWARE ARCHITECTURE: PRINCIPLES AND PRACTICES

Purpose
This two-day course helps practicing software professionals quickly gain insight into the latest concepts of what software architecture is and how to use it successfully.

This course is for
professionals who design, develop, or manage the construction of software-reliant systems

Learning objectives
This course, which is based on the book *Software Architecture in Practice, Second Edition*, provides attendees with a thorough overview of software architecture. It uses case studies to illuminate the key technical and organizational issues regarding software architectures.

Participants gain a better understanding of the relationships between system qualities and software architectures. They also learn about software architecture evaluation, attribute-driven design, software architecture documentation, and architectural reuse.

Prerequisites for this course
• significant experience in the development of software-reliant systems
• some familiarity with modern software engineering concepts

Registration
This course is offered in classroom and eLearning formats.
For classroom registration details, go to www.sei.cmu.edu/training/p35.cfm.
For eLearning registration details, go to www.sei.cmu.edu/training/v07.cfm.
For more information on the eLearning version of this course, go to www.sei.cmu.edu/go/sapptraining.
SOFTWARE ARCHITECTURE CURRICULUM

DOCUMENTING SOFTWARE ARCHITECTURES

Purpose
This two-day course provides in-depth coverage of effective software architecture documentation practices that meet the needs of the entire architecture stakeholder community.

This course is for
• software architects and software lead designers whose jobs include producing architectural documentation
• software technical managers whose jobs include overseeing and/or managing the architecture definition process
• software engineers who may be expected to use architecture documentation

Learning objectives
This course shows software architects how to produce a comprehensive documentation package for a software architecture that is useful to stakeholders.

Participants learn how to choose the set of views that will be most valuable to the architecture’s community of stakeholders, use formal and informal notations (including UML†) to represent elements and relations in a view, and document a software interface and software behavior.

Prerequisites for this course
• experience in designing and developing software-reliant systems
• understanding of the basic concepts of software architecture. If desired, participants can gain this understanding by completing the Software Architecture: Principles and Practices course.

Registration
For registration details, go to www.sei.cmu.edu/training/p33.cfm.

†Unified Modeling Language
SOFTWARE ARCHITECTURE DESIGN AND ANALYSIS

Purpose
The goal of this two-day course is for participants to gain deep understanding of the concepts needed to effectively design and analyze a software architecture.

This course is for
• practicing software architects
• designers and developers of software-reliant systems

Learning objectives
This course provides an in-depth coverage of the concepts needed to effectively design and analyze a software architecture. It is based on the books Software Architecture in Practice, Second Edition and Evaluating Software Architectures: Methods and Case Studies.

Participants learn about the essential considerations in any architectural design process, the SEI Quality Attribute Workshop (QAW) for eliciting critical quality attributes, the SEI Attribute-Driven Design (ADD) method for designing a software architecture, and the SEI ATAM for evaluating a software architecture based on a set of quality attribute-specific measures of the system such as performance, availability, modifiability, and security.

Prerequisites for this course
• successful completion of the Software Architecture: Principles and Practices course

Registration
For registration details, go to www.sei.cmu.edu/training/p34.cfm.
SOFTWARE ARCHITECTURE CURRICULUM

SOFTWARE PRODUCT LINES

Purpose
The goal of this two-day course is for participants to understand the fundamental concepts and practices involved in software product lines.

This course is for
software engineers and technical managers who are
• interested in effective reuse strategies
• adopting or using a software product line approach

Learning objectives
This course provides an overview of the essential technical and management practices needed to succeed with software product lines, as well as guidelines and patterns for applying product line techniques.

Participants learn about product line practice patterns, a roadmap for software product line adoption, and a product line diagnostic method; determine which product line practice patterns best apply to their organizations; and form a path to software product line adoption.

Prerequisites for this course
• experience in designing and developing software-reliant systems
• familiarity with modern software engineering concepts and management practices

Registration
For registration details, go to www.sei.cmu.edu/training/p36.cfm.

Please note
The Software Product Lines course is based on the book Software Product Lines: Practices and Patterns. This course is also included in the SEI Software Product Line Curriculum.
ATAM EVALUATOR TRAINING

Purpose
This two-day course prepares software professionals to conduct a software architecture evaluation using the ATAM. It is based on the book *Evaluating Software Architectures: Methods and Case Studies.*

This course is for
- anyone who is responsible for or involved in the evaluation of software architectures, such as software architects, system architects, software designers, and system designers
- individuals who want to participate in SEI-authorized ATAM evaluations

Learning objectives
Through lectures and interactive exercises, participants learn the ATAM and how to apply it to evaluate software architectures. A significant portion of the course is dedicated to participants performing an ATAM evaluation exercise with guidance from instructors.

Participants will gain a better understanding of quality attributes and their role in software architectures, quality attribute tradeoffs, how to execute an ATAM evaluation, and the artifacts created during the evaluation.

Prerequisites for this course
- significant experience in designing and developing software-reliant systems
- familiarity with modern software engineering concepts
- successful completion of the Software Architecture: Principles and Practices course

Registration
For registration details, go to [www.sei.cmu.edu/training/p31.cfm.](http://www.sei.cmu.edu/training/p31.cfm)
SOFTWARE ARCHITECTURE CURRICULUM

ATAM LEADER TRAINING

Purpose
This two-day course focuses on the social and leadership skills needed to successfully lead an architecture evaluation using the ATAM.

This course is for
• ATAM evaluators who want to improve their ATAM facilitation skills
• ATAM evaluators who want to become SEI-Certified ATAM Leaders

Learning objectives
The course presents ATAM facilitation requirements and challenges in the context of general facilitation and consulting principles. Through exercises, participants practice being an ATAM Leader.

Participants will gain a better understanding of how to apply proven meeting management and facilitation techniques during an ATAM evaluation, how to manage the roles of ATAM participants, and how to listen for architectural risks and capture them faithfully.

Prerequisites for this course
• successful completion of the Software Architecture: Principles and Practices course
• successful completion of the ATAM Evaluator certificate
• We also strongly recommend that all attendees participate in at least one ATAM evaluation before taking this course.

Registration
For registration details, go to www.sei.cmu.edu/training/p32.cfm.
MODELING SYSTEM ARCHITECTURES USING THE ARCHITECTURE ANALYSIS & DESIGN LANGUAGE (AADL)

Purpose
This four-and-a-half day course focuses on fundamental model-based engineering concepts for engineering real-time, embedded software systems through defining and documenting software and system architectures and validating system quality attributes. It uses the SAE Architecture Analysis & Design Language (AADL) standard for engineering real-time, embedded software systems.

This course is for
- software/system architects and developers who are evaluating design alternatives for engineering embedded, real-time systems
- individuals tasked with the validation of embedded, real-time system performance
- technical managers, managers, and software/system architects who are looking for an overview of system and software modeling
- individuals who make decisions about the development or acquisition of real-time, embedded systems

Learning objectives
Participants learn about the value of model-based engineering for system development in their application domains, core elements of the AADL modeling language, and the quantitative validation of quality attributes through analysis of system architecture.

Prerequisites for this course
- fundamental knowledge in the areas of developing embedded real-time systems, software engineering, and architectures
- working knowledge of a programming language and familiarity with a modeling language and the concept of abstraction
- A working knowledge of the Eclipse environment is helpful.

Registration
For registration details, go to www.sei.cmu.edu/training/p72.cfm.
SOFTWARE ARCHITECTURE CURRICULUM BOOKS

Documenting Software Architectures: Views and Beyond
by Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Robert Nord, and Judith Stafford

Evaluating Software Architectures: Methods and Case Studies
by Paul Clements, Rick Kazman, and Mark Klein

Software Architecture in Practice, Second Edition
by Len Bass, Paul Clements, and Rick Kazman

Software Product Lines: Practices and Patterns
by Paul Clements and Linda Northrop

For more information about these books, go to www.sei.cmu.edu/library/books.cfm