C9 - Software Architecture with UML

Objectives

- Discover the main software architecture methods and languages
- Discover component based system architectures
- Understand how to create an effective software architecture
- Learn how to apply software architecture patterns
- Learn to describe software architectures using perspectives and views
- Discover how to evaluate architecture definitions.
- Discover leading architectural processes

Course environment

- One PC for two trainees

Exercice: Labs will be conducted under Enterprise Architect – Business and Software Engineering Edition

Pre-requisites

- Good knowledge of the UML language

Plan

First Day

Introduction

- Definitions of Architecture
  - System architecture
  - Business architecture
  - Software architecture
  - Technical architecture
  - Product line architecture
  - Enterprise architecture
- What is Software Architecture
  - What problem does it target
  - What is not Software Architecture
- Why do we need Software Architecture
- The ANSI/IEEE-1471-2000 standard
  - Architecture and Architectural descriptions
  - The IEEE 1471 Conceptual Framework
  - Views and Viewpoints
- Architecture elements and principles
Software Architecture

- Definitions
- Architecture is not Design
- Components and relationships
- Interfaces
- Architecture models
- The basic architecture design process
- The main steps
- Key concerns
- What to do and not to do
- Architectural decisions
- Scope
- Impact
- Architecture quality
- Good and bad architectures
- Being right
- Being successful
- Making architectures work
- The management attitude
- The developers attitude

UML and Architecture Descriptions

- Define functional requirements
- Define non-functional requirements
- Identify components
- Model system behavior
- Create and document interfaces
- Allocate components
- Validate Architecture descriptions

Second Day

Architectural structures

- Module-based structure
  - Decomposition
  - Uses
  - Layered
  - Object
- Component and connector structure
  - Communication processes
  - Concurrency
  - Shared data
  - Client-server
Architectural views

Architecture views
- Views and stakeholders
- Viewpoints
- Kruchten’s 4+1 view model
  - Logical view
  - Process view
  - Development view
  - Physical view
  - Use cases view
- Siemens’ 4 view model (S4V)
  - Conceptual, Module and Code views
  - Execution view and Hardware architecture
- Software Engineering Institute (SEI) 3 view model
  - Module
  - Components and Connectors
  - Allocation
- Design rationale and the Decision view
  - The need for capturing the design rationale
  - The decision view and other view models

Third Day

Architectural styles and patterns

Patterns, Reference models and Reference Architectures
- Basic patterns
  - Event-driven
  - Pipes and filters
  - Layered architecture
  - Three-tier architecture (MVC)
  - Client-server
  - Peer to Peer
  - Share-nothing
  - Plugins
- Object oriented architecture
  - Classes and relations
  - Components and packages
  - Interfaces and dependences

Distributed systems architectures

The distributed constraints and tradeoffs
- Client-server
- Statelessness
- Specified cacheability
- Uniform interface and operations
- Layered System
- Dynamic code add-in
- Service oriented Architectures
Components versus Services
Domains and Lifecycles
Programming by contract
Registrars and brokers
Loose or late coupling
The OSGi/Java example
Resource Oriented Architecture: ReST (Representational Resource Transfer)
What are resources
Resource names
The notion of resource representation
Interface constraints
Application state

Fourth Day

Architectural processes

The Rational Unified Process (RUP)
Artefact, Roles, Workflows and Outcomes
Fundamentals and Best practices
The four phases
Why RUP was not so popular?
The Eclipse Process Framework and OpenUP
OpenUP as an Unified Process variant
OpenUP as an agile process
EPF Composer as an OpenUP support tool
The Two Tracks Unified Process (2TUP)
The Y-shaped cycle
The Technical track
The Functional track
The Build track
The Visual Architecting Process (VAP)
The technical process
The organisational process
Guiding principles
Leading, following or getting out of the way?
Leadership vs management
Leading implies following
Why getting out of the way is needed

Renseignements pratiques

Durée : 3 jours
Prix : 2100 € HT