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Sébastien Combéfis

I402A Software Architecture and Quality Assessment

Competencies List

This document provides the list of basic and advanced competencies, with a precise description, that can be acquired through the *I402A Software Architecture and Quality Assessment* activity.

Basic Competencies

Basic competencies are specific to a teaching unit or activity and a 100% mastery level for all of them is required to succeed the teaching unit or activity (10/20).

Code	The learner is able to...
Code	
SA001	understand a given GoF design patterns and explain how to use it.
SA002	understand a given bad smell and explain how to fix the code to eliminate it.
SA003	understand what is a programming paradigm and the relation with concepts and programming languages.
SA004	design and write code using any of the 23 GoF design patterns.
Software architecture	
SA101	describe an architecture at a high level with a block diagram.
SA102	describe and illustrate with relevant examples the main architectural styles.
SA103	give a relevant software example for a given architecture.
SA104	define and explain what is cloud computing and its different services models.
SA105	understand interaction-oriented architectures, propose such an architecture for a given case study and argue the choice.
SA106	understand distributed architectures, propose such an architecture for a given case study and argue the choice.
SA107	understand service-oriented architectures, propose such an architecture for a given case study and argue the choice.
SA108	understand data-oriented architectures, propose such an architecture for a given case study and argue the choice.
SA109	understand micro-service architectures, propose such an architecture for a given case study and argue the choice.
Software evaluation	
SA201	define what is software quality and explain how it can be ensured.
SA202	understand and illustrate the links between a software architecture and its quality.
SA203	explain what is a good software architecture and what can influence the choice of an architecture.
SA204	understand how the effort, the structure and the information flow can be measured thanks to metrics.
SA205	evaluate a software with function points.
TDD and CI	
SA301	understand the TDD cycle and write a software following this methodology.
SA302	understand refactoring and use it to improve the quality of a code.
SA303	choose a suitable metric and use it to evaluate a given quality criterion.

Code	The learner is able to...
SA304	deploy a set of tools for continuous integration (GitHub, Jenkins, etc.).
Architect's role	
SA401	understand what is the conceptual integrity and take actions to ensure it a for project.
SA402	understand and discuss about the questions and dilemmas that a software architect could face.
SA403	understand the evolution of architectures and relate it to the business changes.
SA404	propose one or several architectures for a given case study and argue the proposition.

Advanced Competencies

Advanced competencies could be transversal to several teaching units or activities and increasing the mastery level of any of them is global to all the teaching units and activities where it is declared.

Code	The learner is able to...
Code	
SA005	design and write code using any of the software design patterns.
SA006	understand a given bad smell and explain how to fix the code to eliminate it with a design pattern.
SA007	understand a given anti-pattern and explain what can be put in place to avoid it.
SA008	choose a suitable programming paradigm for a given case study and argue the proposition.
GA001	make a code audit, propose changes and argue them with quality criteria.
Software architecture	
SA110	understand and compare the different MVC architecture styles and compare them.
SA111	understand what is a distributed architecture compared to a centralised one.
Software evaluation	
SA206	compare several metrics to measure a given quality criterion and argue about the best choice.
SA207	choose a suitable metric and use it to evaluate a given quality criterion for an object oriented program.
GA002	make an architecture audit, propose changes and argue them with quality criteria.
Architect's role	
SA405	propose a suitable architecture style for a given case study with quality constraints.
SA406	compare different architectures using quality criteria.
GA003	explain what are principles and practices and why they have to be defined in a company for the software developments.
GA004	design a RESTful API and define routes following good practice rules.
GA005	design an architecture that uses cloud computing for a given case study.