SOFTWARE ARCHITECTURE AND DESIGN

CSC 815
3 units

MSC

BY

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Course Outline

S/N	Topic	Description
1	The Software Architecture process	describing, evaluating, and designing systems at the architectural level.
2	Relationship between software architecture and SDLC	The role of architecture and the architect in the software development cycle.
3	Architectural patterns	Architectural patterns and tactics, architecture assessment techniques, architecture driven design, and techniques for documenting architectures;
4	Software quality and testing.	Software quality and testing.
5	Software architecture	Architecture description languages, pattern-oriented software architecture, component-based development, distributed software architecture using middleware, enterprise application integration, architecture for mobile and pervasive systems and model driven architecture.
6	Design patterns	Design patterns, Architectural design issues – reliability, performance, availability, scalability, architecture evaluation methods.
7	Case studies of real-world software architectures	Case studies of real-world software architectures
8	Advanced architecture topics	selfadaptation, service-oriented architectures, software-product lines, and product line architectures, domainspecific architectures, and agent-based architectures
9	Identification of open problems in software architecture	Identification of open problems in software architecture

The Software Architecture Process

SW architecture?

- **Fundamental components of a software and the interrelationship among them.**
- **It is the organization of a system components not only how they interact among themselves but also with the environment.**

Regular review

Without regular review the software will be

- Exposed to hackers
- Break down or malfunction
- Poor performance

The Software Architecture Process (contd.)

Purpose

- It determines the direction of designing and building a software product;
- It determines the quality, performance, and the overall success of a SW product;
- It determines the continuity of the development process;
- Proper coordination;
- It determines how the software products meets business objectives

The Software Design

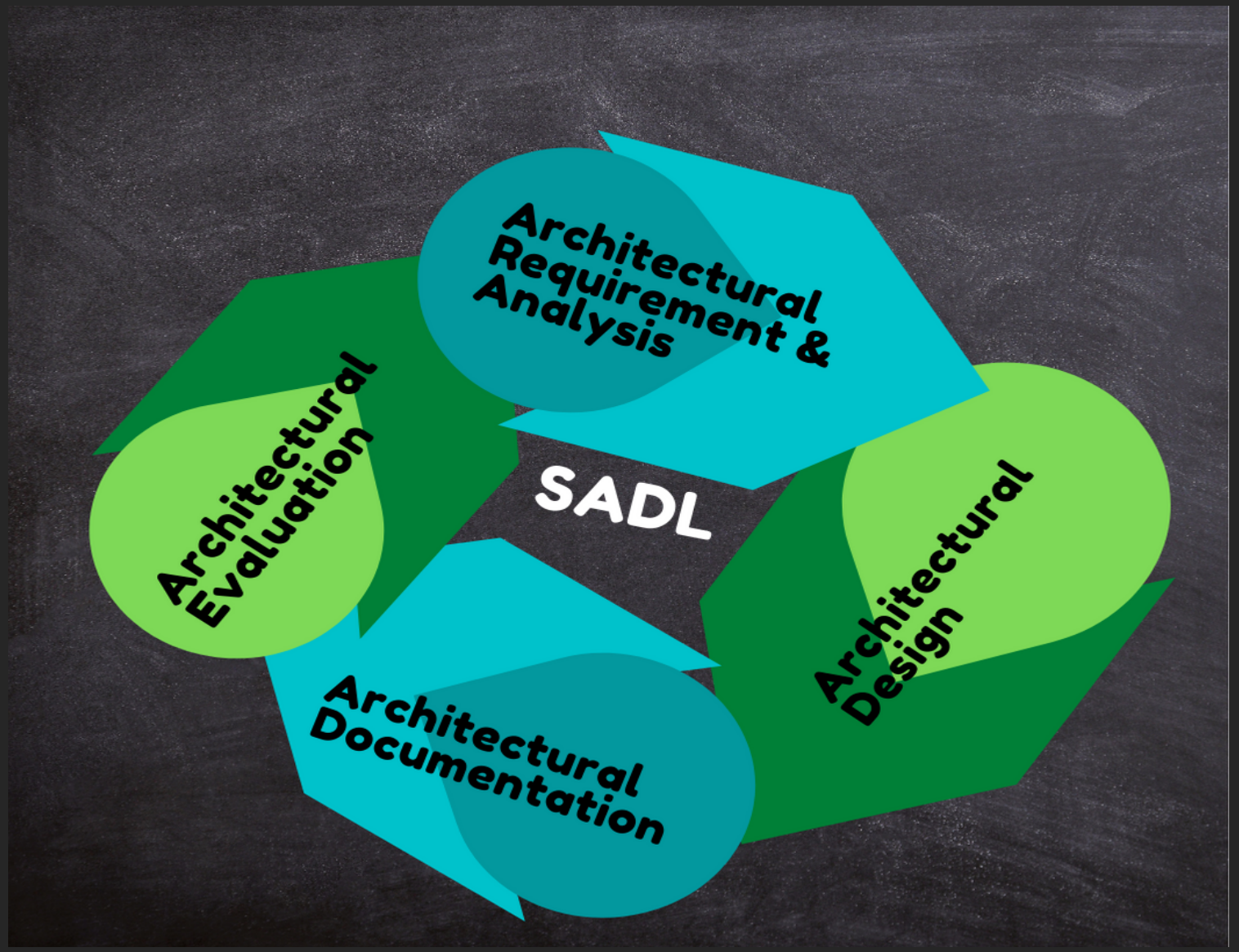
What is is?

- It provides a design plan that describes the connectivity between the elements of the system and how they fulfill system's requirement;
- It comes after requirement, domain and risk analysis

Objectives

- Analyse the system's requirements and set expectaions to meet the clients, marketing and management prospects;
- Acts a prototype during the design phase;
- Directs the implementation tasks such as coding, integration and testing

The Software Architecture Life cycle (SADL)



SADL

Arc. Requirement Analysis

- Involves extracting, analyzing, specifying and priotizing architectural requirements for design ;
- The output is separated into functional and non-functional parts

Arc. Requirement Analysis Methods

- Architectural Centric Design Method (ACDM);
- Quality Attribute Workshop (QAW);
- Rational Unified Process (RUP)

SADL

Arc. Design

- Activities of identifying and selecting the diverse structures that make up the architectural requirements;
- Allows the drivers identified during the previous phase to be satisfied

Arc. Design Methods

- Attribute driven design (ADD);
- Rational Unified Process (RUP)

SADL (Contd.)

Arc. Documentation

- Creating documents that describes the various structures that consist the architecture in order to effectively communicate it to the team members.
- Output: Ar. Views of elements that make the system structure and their relationships.
- Views are classified into:
  - Module view – Elements and implementation units;
  - Component and connector view – The behaviour of the elements in the structures at run time.
  - Allocation view – Allocation of the elements and the structures to the physical resources like h/w, files, users

Arc. Documentation Methods

- 4+1 model,view and beyond, view point and perspertive model

SADL (Contd.)

Arc. Evaluation

- Asssement whether the architectural design satisfies the architectural requirement as specified

Arc. Evaluation Methods

- Software Architecture Analysis Method (SAAM);
- Architecture Centric Design Method (ACDM);
- Perfomance Assesement of Software Architecture (PASA);
- Active Reviews for Intermediate Design (ARID);
- Rational Unified Process