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Blended Learning Series

Faculty of Computing and Digital Technology

Systems Architecture and Design

Lecture 1: Systems Development Frameworks

Topics Covered

- Introduction to Software Architecture
- Systems Development Frameworks
- Readings:
  - Ingeno, Chapter 1
  - Kendall and Kendall, Chapter 1

Introduction to Software Architecture

What is Software Architecture?

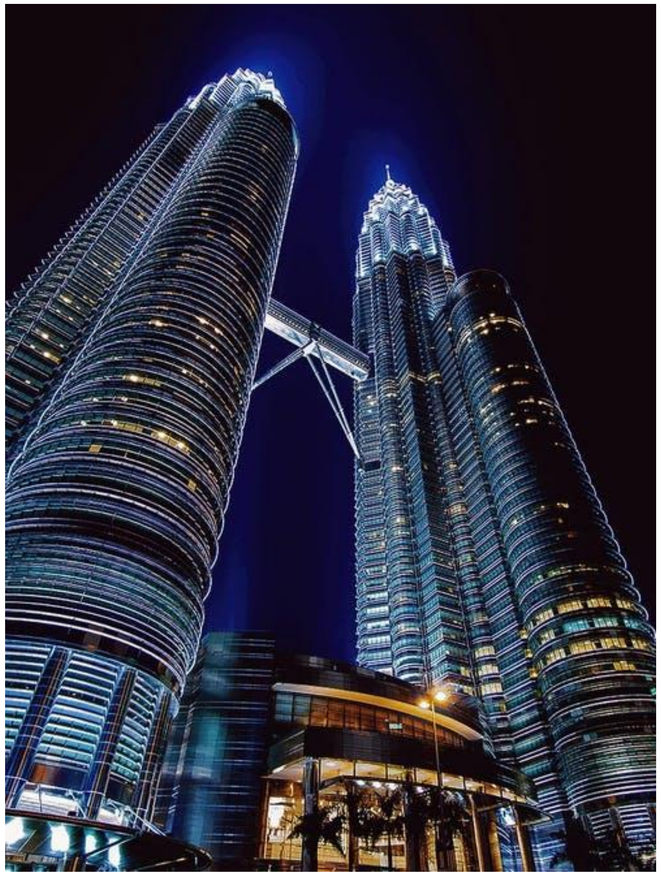

Photo by Jegathisan Manoharan from Pexels

- A software system is made up of different structures.
- “Software architecture concerns itself with defining and detailing the structures, their elements, and the relationships of those elements with each other.” (Ingeno, 2018)
- It is important for modern software architectures to be designed to adapt to change

Photo by Lex Photography from Pexels

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Introduction to Software Architecture

Importance of Software Architecture

- Software architecture provides the foundation for a software system
- Complex systems need a well-designed foundation to be able to be successfully implemented
- Good software architecture helps the organization manage changes to the software
- Architecture models and decisions can be reused.

Introduction to Software Architecture

Stakeholders

- Stakeholders refer to anyone who has an interest in the success of the system.
  - Business owner
  - System users
  - Clients
- Software architecture is aimed at meeting the requirements of stakeholders
- Software architecture can be used to communicate the various aspects of the system to the stakeholders

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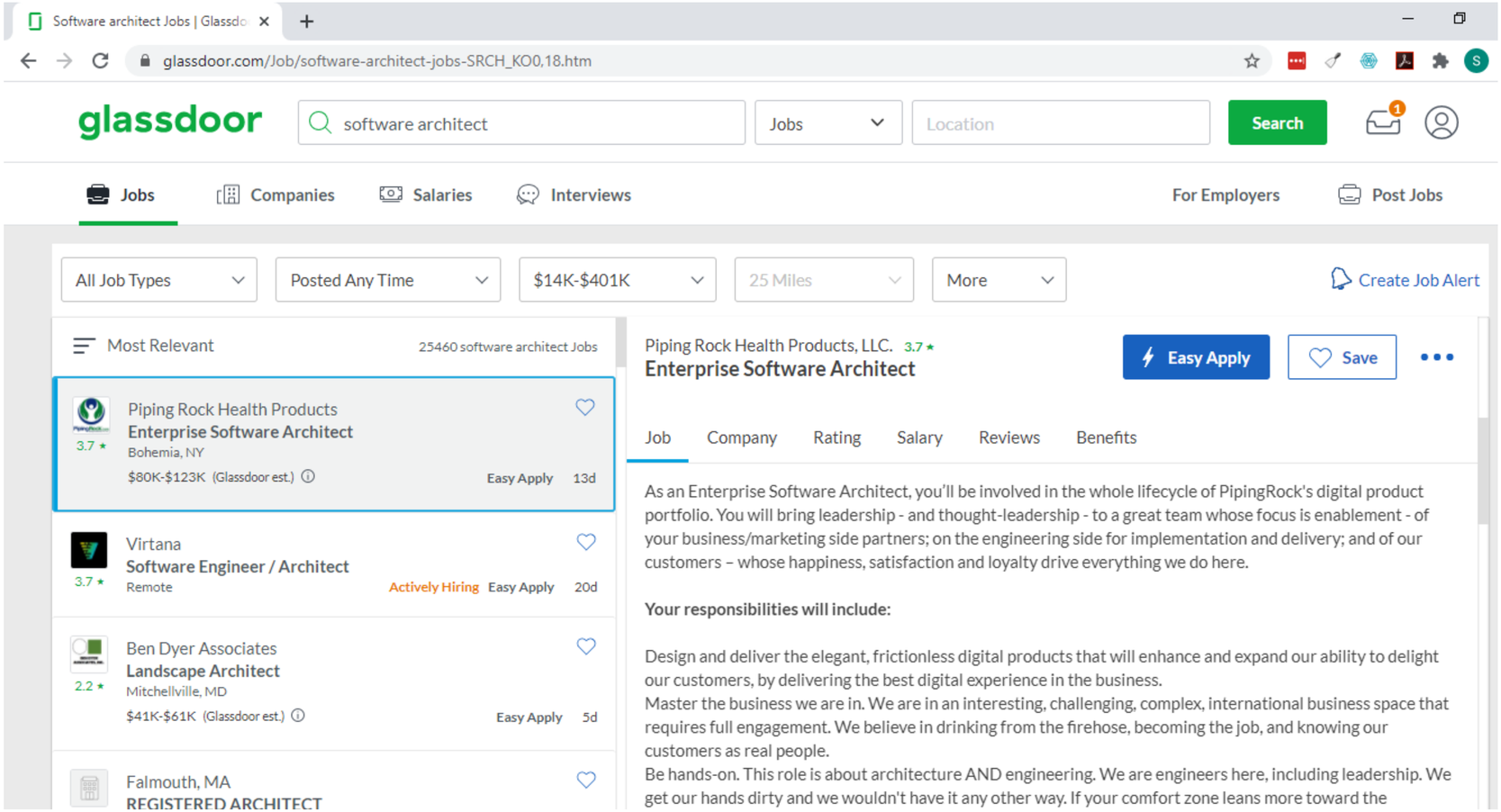
Introduction to Software Architecture

Role of the Software Architect



- A software architect must have the skills of a software developer
- But are also expected to have non technical skills and be familiar with best practices and technologies that are not currently used within the organization.

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Introduction to Software Architecture

Expected Skills of the Software Architect

Technical

- Understanding requirements
- Design software architecture
- Patterns and best practices for software development
- Managing performance and security requirements
- Understanding DevOps and deployment process

Non-Technical

- Leadership
- Project Management
- Understanding business domain
- Communicating with stakeholders

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Systems Development Frameworks

System	A **system** is comprised of interrelated components that work together
Information System	An **information system** is comprised of software, hardware, processes, procedures to store data and provide information to users
System Development	System development is concerned with creating software that fulfills an organization's information needs.

Systems Development Frameworks

- Enterprise information systems consist of multiple subsystems
- All the subsystems are interrelated and interdependent
- Architecture frameworks are used to organize and guide the systems development process

Photo by Aleksandar Pasaric from Pexels

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Systems Development Framework

- An Enterprise Architecture Framework is a set of methodologies for managing organizational systems
- The Open Group Architecture Framework (TOGAF) standard is a framework providing methods and tools for developing the enterprise architecture.

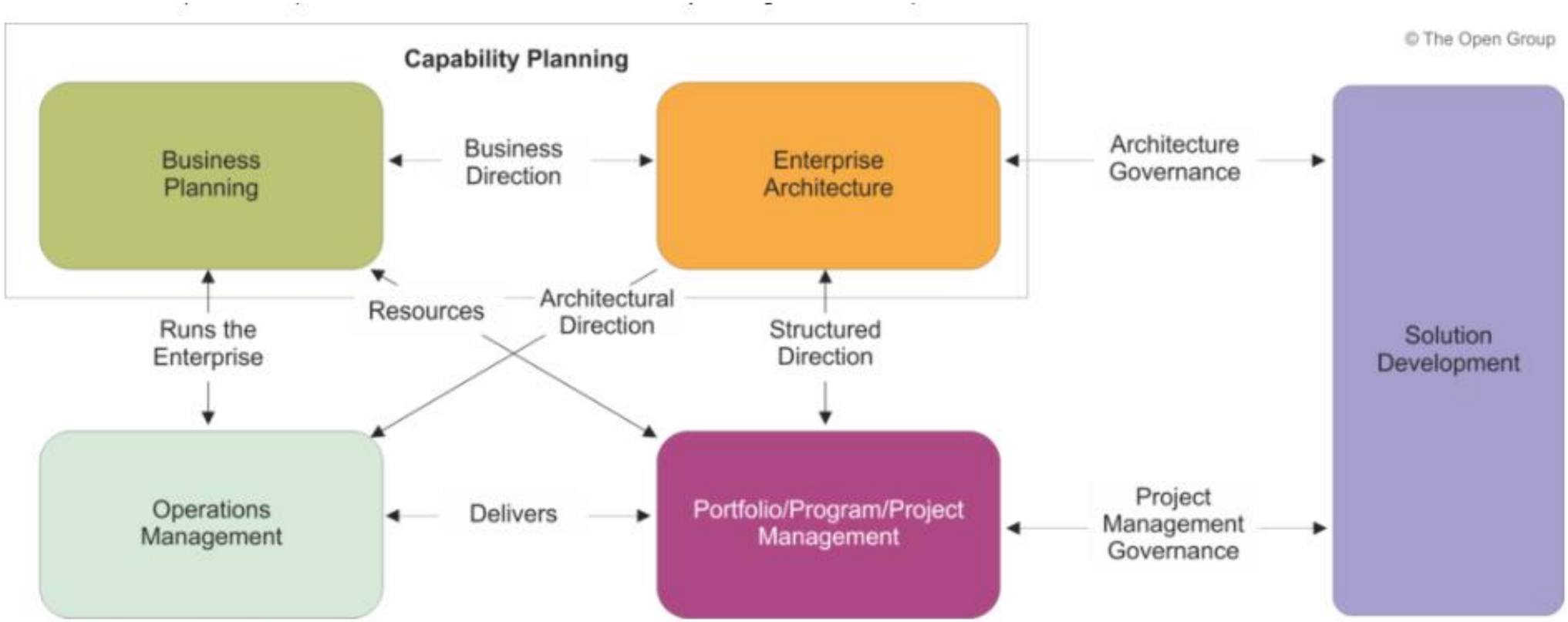
Architecture Types Supported by TOGAF

Business Architecture	Application Architecture	Data Architecture	Technical Architecture
• The business strategy, governance, organization, and key business processes.	• A blueprint for the individual applications to be deployed, their interactions, and their relationships to the core business processes of the organization.	• The structure of an organization's logical and physical data assets and data management resources.	• The logical software and hardware capabilities that are required to support the deployment of business, data, and application services. This includes IT infrastructure, middleware, networks, communications, processing, and standards.

Josey, A. (2018) *An Introduction to the TOGAF Standard, Version 9.2,* The Open Group, opengroup.org

Systems Development Framework

Information Systems that are developed should be in line with the enterprise architecture framework



The Open Group (2018) *The TOGAF Standard, Version 9.2*, opengroup.org

Systems Development Framework

- The Systems Development Life Cycle (SDLC) is a framework for developing software solutions
- Activities in the SDLC can be organized into phases

Planning

identify scope and objectives

ensure feasibility

obtain approval

Analysis

Understand business information needs and processing requirements

Design

Define solution based on system requirements

Implementation

Construct the system

Testing

Train Users

Deploy (install) the system

Maintenance

keep system running

make improvements

Systems Development Framework

Systems Development Life Cycle

- Two important phases in the SDLC are Systems Analysis and Design

Systems Analysis

- process of understanding in detail **what** a system should accomplish

Systems Design

- process of specifying in detail **how** components of an information system should be physically implemented

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Systems Development Framework

Activities of ***Planning*** Phase of SDLC

- Define business problem and scope
- Identify objectives of the system
- Confirm project feasibility
  - Economic, organizational, technical, resource, and schedule
- Produce detailed project schedule

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Systems Development Framework

Activities of ***Analysis*** Phase of SDLC

- Perform requirements gathering from stakeholders
- Model the problem domain
- Define system requirements

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Systems Development Framework

Activities of ***Design*** Phase of SDLC

- Design the network
- Design the application architecture
- Design the user interfaces
- Design the system interfaces
- Design and integrate the database
- Design and integrate system controls

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Systems Development Framework

Activities of ***Implementation*** Phase of SDLC

- Construct software
- Verify requirements
- Set up database
- Train users and document the system
- Install the system

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Systems Development Framework

Activities of ***Maintenance*** Phase of SDLC

- Maintain system
- Enhance system
- Support users

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Summary

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