Service Oriented Application Development L-T-P-C: 2-1-1-4

Course Description:

This is a project course, designed to train students in good software engineering practices and to help them gain the knowledge of designing, developing, and deploying applications as web services. Though web services can also use SOAP-WSDL model, we focus on the modern incarnation of web services i.e. RESTful (or GraphQL) services. In addition to learning how to expose the core business functionality as a webservice, we train the students on how to consume webservices for payment processing and other needs. SOAD is the second course in the Applied Software Engineering (ASE) stream of courses.

Course Objective:

At the end of this class, we expect the students to be able to do

1. Design a dynamic web application which supports B2B scenarios via webservices.
2. Consume useful external services for enhancing their applications.
3. Follow good Software Engineering and documentation practices.

Prerequisites:

1. Intro to C programming
2. Overview of Computers
3. Data Structures and Algorithms 1 & 2
4. Web Application Development (WAD)

Note: The course number and name might vary based on the semester/year.

Syllabus:

Technical Topics

1. Refresher on Web Application Development with Python and Django
2. Introduction to Web Services: History of Web Services, Fundamental Concepts, Flavors of Web Services, data formats and Protocols (SOAP WSDL vs REST JSON vs GraphQL vs others)
3. Practical RESTful services: Django REST
4. Testing Frameworks: Unit test with PyTest, MockTest-Mockito or Similar, Web Testing using Browser Simulation Tools, Code Coverage, Code lint, Continuous Integration, Performance testing toolkits.
5. Professional project management and documentation tools: Redmine or similar, Content management (wiki), Automated code documentation setups

Software Engineering Topics

1. Problem Search, Definition and Scoping (with focus on webservices): Identify candidate service endpoints, Define its functional and nonfunctional scope
2. Design of Application Programming Interfaces, API Documentation
3. Revisiting agile methodology (continuation from ASE-1), Sprint Planning, backlogs, Using other supporting tools.

Tentative Teaching Plan:

The course is taught by three faculty members:

1. Dr. Himangshu Sarma (HS)
2. Dr. Balaji Raman (BR)
3. Dr. Subu Kandaswamy (SK)

Lecture and assessment plan in chronological order.

1. HS will cover Module-1 in Technical Topics. Simultaneously, SK will cover Module-1 in Software Engineering.
2. We will conduct Quiz-1 and release assignment-1.
3. SK will cover Module-2 and Module-3 in Technical Topics. Simultaneously, BR will cover Module-2 in Software Engineering.
4. We will conduct Project Review-1.
5. We will conduct Quiz-2.
6. BR will cover Module-4 in Technical Topics
7. HS will cover Module-5 in Technical Topics. Simultaneously, HS will cover Module-3 in Software Engineering. (*These two topics are somewhat related*)
8. We will conduct Project Review-2.
9. We will present Case Studies, invited lectures from experts based on their availability and hold handholding/mentoring sessions for project teams.
10. We will conduct Quiz-3
11. We will conduct Final Project Review.

Assessment:

1. Assignments & Quiz (40%)
    a. Assignment-1 (10%)
    b. Quiz-1 (10%)
    c. Quiz-2 (10%)
    d. Quiz-3 (10%)
2. Project (60%)
    a. Review-1 (10%)
    b. Review-2 (20%)
    c. Final Review (30%)

Notes on Project: The project is a group project. The size of the groups will also be determined based on the total number of students in the class. The composition of the group is at the discretion of the faculty.

Text Book and Sources:

- *The course material is based on readily available online documentation and examples. Most tech stack come with a canonical example to motivate their users and to highlight the different features and capabilities.*
- *Python (Django REST) Official: https://www.django-rest-framework.org/*
- *Pytest: https://docs.pytest.org/en/latest/*

References:

- *Sommerville, I. (2001). Software engineering. 6th. Ed., Harlow, UK.: Addison-Wesley.*

Course Webpage

TBD