SYLLABUS

Advanced Architecture Design 17-655-A4
Remote – Tu, Thur 7:00-8:20
Mini 4, 2023, 6 Units

Instructor	Email	Office Location & Hours
Prof. Len Bass	lenbass@cmu.edu	by appointment

Course Description. Design is a fundamental activity in the creation of software systems. Architecture design can be accomplished through the use of an iterative method that includes proposing a design hypothesis and then analyzing that hypothsis to determine whether it satisfies the use cases, quality requirements, and constraints for the system under consideration. In this course, we will exmine architecture hypotheses from several different domains and analyze those architectures.

Pre-requisite. Software architecture (17-635)

Learning Objectives. After completing this course, you will have experience with:

1. Quality attribute achievement.

- An iterative method for designing software architecture.
- A variety of subsystems within different domains.

Resources

Software Architecture in Practice 4th edition
Designing Software Architectures: A Practical Approach
Open ADR primer
Slide decks available on Canvas

Architecture description

Each architecture we examine in this course is described by a slide deck with the following headings:

- Business context
- Use cases
- Constraints
- Quality attribute requirements
- Software architecture
- Analysis - Argument that architecture satisfies requirements
- Next steps – prepare for next iteration in architecture design

Assignments and due dates

- Provide next steps for stock market architecture. Due April 4
- Provide next steps for automotive architecture. Due April 11
- Provide analysis and next steps for HDFS architecture. Due April 20
- Provide analysis and next steps for manufacturing architecture. Due April 27.

For assignments 1 & 2, your task will be to determine the steps to prepare for the next iteration of the design method.

For assignments 3&4, your task will be to perform the analysis that the architecture satisfies the requirement. Specifically

- What requirements are satisfied?
- What are the delegated requirements on the identified components?
- What are the steps to prepare for the next iteration of ADD?

Assessments.

- **Quizes.** There will be a short quiz over each quality attribute. Six in total
- **Assignments.** Four assignments in total.
- **Participation**
- **There will be a final.**

Assessment	Final Grade %
Quizzes	30%
Assignments	30%
Class participation	10%
Final exam	30%

Grade	Percentage Interval
A	90-100%
B	80-89%
	60-69%
R (F)	59% or below

Course and Grading Policies

- **Late-work policy**: All work is expected to be handed in at the indicated due date and time. Late submissions will lose 10% per day late.
- **Participation policy**. Class participation will be graded by in-class engagement, including asking relevant questions based on a critical review of required readings, lectures, and comments made by your peers. The lack of attendance, will count against your participation grade.
- **The quiz grade will be based on the five best quiz scores.** No makeup quizzes will be given. Thus, you can miss one quiz without impact on your grade.

Course Schedule. The following schedule provides a general overview of topics covered in each class.

Class date	Activity	Readings
Tues, Mar 14	Course overview, introduction to design method, demand response requirements	
Thurs, Mar 16	Demand response architecture Interoperability	Chapter 7, SAP4 https://www.openadr.org/assets/docs/openadr_primer.pdf
Tues, Mar 21	Quiz on interoperability telephony – requirements Performance	Chapter 9, SAP4
Thurs, Mar 23	Telephony architecture Performance	
Tues, Mar 28	Quiz on performance Stock market requirements security	Chapter 11, SAP4
Thurs, Mar 30	Stock market architecture	

Class date	Activity	Readings
	Security	
Tues, Apr 4	Assignment 1 – next steps for stock market architecture Quiz on security automotive requirements Observability	
Thurs, Apr 6	Automotive architecture Observability	
Tues, Apr 11	Assignment 2 due – next steps for automotive architecture Quiz on observability HDFS requirements Availability	Chapter 4, SAP4 https://github.com/cmudevops/adacourse/blob/main/availability.pdf
Thurs, Apr 13	NO CLASS- Spring Carnival	
Tues, Apr 18	HDFS architecture Availability	
Thurs, Apr 20	Assignment 3 due – analysis and next steps for HDFS Quiz on availability Manufacturing requirements Modifiability	Chapter 8, SAP4
Tues, Apr 25	Manufacturing architecture Quiz on Modifiability	
Thurs, Apr 27	Assignment 4 due – analysis and next steps for manufacturing Comprehensive final	

Accommodations for Students Disabilities. If you have a disability and have an accommodations letter form the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu.

Academic Integrity. Honesty and transparency are important to good scholarship. Plagiarism and cheating, however, are serious academic offenses with serious consequences. If you are discovered engaging in either behavior in this course, you will earn a failing grade on the assignment in question, and further disciplinary action may be taken.

For a clear description of what counts as plagiarism, cheating, and/or the use of unauthorized sources, please see the University's Policy on Academic Integrity.

If you have any questions regarding plagiarism or cheating, please ask me as soon as possible to avoid any misunderstandings. For more information about Carnegie Mellon's standards with respect to academic integrity, you can also check out the Office of Community Standards & Integrity website.

Student Wellness. As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at the Counseling and Psychological Services website. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.

Respect for Diversity. It is my intent that students from all diverse backgrounds and perspective be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know if any of our class meetings conflict with your religious observations so that I can make alternate arrangements for you.

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Software Engineering

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