Technology
Arts Sciences
TH Köln

Course Manual LCSS

Large and Cloud-based Software-Systems

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General information

Long name	Large and Cloud-based Software-Systems
Approving CModule	LCSS_MaTIN
Responsible	Prof. Dr. René Wörzberger Professor Fakultät IME
Valid from	summer semester 2021
Organisation and materials	Ilu course
Level	Master
Semester in the year	summer semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. René Wörzberger Professor Fakultät IME

Literature

Overview video

Final exam

Details	The final examination is either written or oral. Students must demonstrate that they can apply the knowledge and skills of the course.
Minimum standard	50% of all achievable points
Exam Type	EN Klausur

Requirements	• advanced programming skills • basic knowledge of web technologies • basic knowledge of databases • basic knowledge in software architectures • basic knowledge of Unified Modeling Language (UML)
Language	English
Separate final exam	Yes

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Basic concepts of large distributed systems
Knowledge	Quality attributes and their interdependencies
Knowledge	Formulate and analyze requirements for response times, throughput and utilization of a system
Knowledge	Analyze and formulate requirements for the reliability of a system
Knowledge	Basic concepts of maintainability of a system
Knowledge	Basic concepts of the security of a system
Knowledge	System design goals, requirements, principles and patterns
Knowledge	Decomposition patterns
Knowledge	Trading the advantages and disadvantages of monolithic architectures against architectures of distributed systems (microservices)
Knowledge	Patterns for scaling systems
Knowledge	Communication patterns in distributed systems
Knowledge	Modeling of large systems from different viewpoints with the Unified Modeling Language (UML)
Knowledge	Common infrastructure and middleware components in large systems
Knowledge	Principles and terms of cloud computing
Knowledge	Virtualization and container technologies

Special requirements

none

Accompanying material	• Lecture notes (in English) • Exercise materials • Lab materials • Free coupons to use with cloud providers for free .
Separate exam	No

Knowledge	Application layer protocol, especially HTTP and related technologies and standards such as REST, OpenAPI, GraphQL, gRPC, WebSockets, Server-sent events.
Knowledge	Web security protocols such as TLS, OAuth, OpenID Connect
Knowledge	Messaging and streaming
Knowledge	Database systems, their data models, scaling and consistency models
Knowledge	Distributed database transaction programming

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	1

− Practical training

Learning goals

Goal type	Description
Skills	Be able to formulate and present a research question in the topic area of the course.
Skills	Design an application prototype that serves to investigate the research question.
Skills	Develop the application prototype and run it in the cloud
Skills	Design and conduct test scenarios and experiments with the application prototype to answer the research question.
Skills	Consolidate results into one report according to an IEEE template
Skills	Work collaboratively in a team of about four people

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1

Special requirements

none

Accompanying material	• Lab assignments • templates
Separate exam	Yes

Separate exam

Exam Type	EN Projektaufgabe im Team bearbeiten (z.B. im Praktikum)
Details	The lab consists of several milestones and attendance dates, in which the research question, the design of the prototype, a mutual review, the presentation and documentation of the final results must be submitted or presented. The performance in the lab will be 50% of the final grade.
Minimum standard	A qualitatively and quantitatively sufficient contribution of each team member must be evident in the presentations and deliveries.