Spaninks,Luka L.

Modules s3

Software

Inhoud

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# Distributed Software System

## Expected outcomes:

* You can present an architecture that describes your system as a distributed software system and clearly makes use of important distributed architectural principles.
* You divided your application into several components that each could run (in theory) on a separate server and have a clear single task in the system.
* Your architecture describes the system on multiple levels: system overview, component overview, infrastructural overview, a dynamic and static overview of components
* You designed several APIs that offer sufficient possibilities for your components to communicate with each other (exchange data). You are using messaging & event techniques to achieve communication.

## Questions:

* What is a distributed software system?
* What is the difference between a monolith and a distributed software system?
* Which advantages does a distributed software system offer?
* Explain why your architecture is distributed
* What are the important architectural principles and techniques when developing a distributed software system?

# Front-End Development

## Expected outcomes:

* You selected a JavaScript framework based on research.  
  You are able to explain why the framework you choose is a good, if not the best, choice for your project. A report might be needed as a result of your research, and as a means of communicating your selection.
* You build a front-end for your project that has as a primary language the selected framework.
* You demonstrate applied UX practices in your project in the analysis, design, implementation, and test phases of your project.

## Questions:

* What is the difference between JavaScript and a JavaScript framework?
* What are the advantages and disadvantages of using a JavaScript framework?
* What are some recent popular JavaScript frameworks?
* What were the specific reasons for choosing your JavaScript framework?
* Can you name and demonstrate some best practices within your JavaScript framework of choice?
* What does UX mean?
* What are common practices within UX to match the expectation of your user target group?
* What are some examples of techniques to analyze your UX expectations?
* What are some examples of techniques to test your UX expectations?

# Back-End Development

## Expected outcomes:

*For your project, you need to select a back-end framework applicable for your project. This will be your primary 'language' in which you will create the back end of your application.*

*Further requirements for the back-end are to use persistence (using an*[*ORM*](https://fhict.instructure.com/courses/10457/modules/items/542273)*), and distributed client-server communication. Also, we need you to take*[*concurrency*](https://fhict.instructure.com/courses/10457/modules/items/542271)*into consideration.*

#### **By the end of the semester**

* You have implemented a distributed software system by using an OO application framework, which has been agreed upon with your teacher. For this, you make a choice which object-oriented language you want to use for your project. In principle we want you to choose between Java and .NET.
* Your back end also integrates the expected outcomes as mention in modules:
  + [Distributed Communication](https://fhict.instructure.com/courses/10457/modules/items/542269)
  + [Data Persistency](https://fhict.instructure.com/courses/10457/modules/items/542272)

## Questions:

* What is the definition of software back-end?
* What is an application framework?
* What are some commonly used application frameworks?
* Why is the framework I chose suitable for my application?

# Distributed Communication

## Expected outcomes:

* How your individual components in your distributed system communicate with each other.
* Demonstrate both direct messaging to other components and handling events triggered by components in your distributed system.
* Have an overview of used API's in your system

## Questions:

* What is a technique that can be used to sent messages to other components in your distributed system?
* What is a technique that can be used to implement an Observer or publish-subscribe pattern in your distributed system?
* What is REST?
* What is a Websocket?
* What does API mean?
* Can you name some architectural styles that can be considered a distributed software architecture?
* What is Swagger?

# Data Persistency

## Expected outcomes:

* You are able to select the best fitting database for your application.
* You design and build the database layer in your application using an ORM framework.
* You have created several ORM queries that combine information from multiple tables.
* Within your architecture, you have a description of your data model.
* You used the data model in your architecture to describe your domain objects in your ORM code.  
  *This means you did****not****generate ORM code from an existing database.*

## Questions:

* What is data persistence?
* What are some commonly used types of databases?
* What is an ORM?
* Which ORMs are available?
* Which ORM did you use in your software application?
* What is an entity Manager?
* What is the difference between eager and lazy loading and when do you use which one?
* How did you define 1-1; 1-N; N-M relations in your ORM code?

# Quality Assurance

## Expected outcomes:

* You have a written test plan for your software application that describes which type of tests are included, if there is automation present, *why*these tests are necessary, and how much of your project is covered. This test plan is a prove that you have planned the necessary steps to guarantee a certain level of quality of your software project.
* The plan clearly distinguishes between unit, integration, and acceptance tests. These tests should complement each other.
* You have implemented tests mentioned in your test plan with the proper tools and frameworks.
* You use static code analysis tools to score your software quality.
* All of the used tools and frameworks for testing and analysis are integrated into your continuous integration environment.
* You addressed security and performance testing in your test plan.
* *Bachelor only*: By following the approach of the DOT research framework, you perform research specifically on the topic of security.

## Questions:

* What do you consider to be software of high quality?
* Which software properties can you measure or test, so you can say something about the quality of your project? (possible answers: functionality, performance, resource usage, usability, security, etcetera)
* Which activities can be performed with the goal to increase software quality? (possible answers: code reviews, static code analysis, all types of testing)
* Can you name some methods of testing to measure software quality properties? (possible answers: unit testing, e2e test, performance test, pen testing, usability testing)
* What is an indicator to determine how much of my code has been tested? (possible answer: coverage)
* Should you test all your code and in exactly the same way? (possible answers: no, risk-based)
* What are the advantages and disadvantages of automated testing?
* Which security issues are to be taken into account for a (distributed) web application?
* How can I test the basic performance of my application?
* What are the tools and frameworks that can help me test and analyze the quality of my code?

# Software Release Management

## Expected outcomes:

* You have version control set-up for your personal project and used it appropriately.
* You have built a CI/CD pipeline that automates all software development activities relevant to your project.
* You have integrated the tooling to measure SQA (e.g. performance, e2e, unit tests, etc) in your CI/CD pipeline. These tools you will discover in [What is Quality Assurance and why is it important?](https://fhict.instructure.com/courses/10457/modules/items/542275)
* You have set-up your CI/CD pipeline following the principle of  'Configuration as Code'.
* You have containerized your software using technology like e.g. Docker and perform deployment from within your CI/CD pipeline
* You make use of multiple branches in your software version management of which you can explain why these branches are relevant in your project.

## Questions:

* What is a CI/CD pipeline?
* Which software development activities can be integrated and automated in a CI/CD pipeline?
* What is the difference between CI and CD?
* What does the deployment of software mean?
* Why would I need multiple branches in my software version control system (GitLab)?
* What is 'Containerized Software' and what are the advantages of using this technology?
* What is ‘Configuration by Code’?