

Arquitectura de Sistemas de Software

27th April 2016 • Personal paper notes allowed • Duration: 75+15 minutes

Please carefully read the description of the software system below and answer the questions **always justifying them succinctly and clearly**, eventually mentioning the bibliography or references that fundament them. When needed, you should explicit all the assumptions you did to answer the questions.

OpenFEUP aims to offer an integrated set of digital services useful for the FEUP community. OpenFEUP combines digital services already available through existing systems such as SIGARRA, but also other new digital services, openly created by the FEUP community (students, teachers, staff, etc.); e.g. “Queues Status of the Refectories and Bars”.

OpenFEUP provides different kinds of services through easy to use frontend web apps and mobile apps, and also backend services using REST APIs.

OpenFEUP can be seen as structured in the following kinds of subsystems: end-user apps, information repositories, device managers, and social graph.

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1. From a global perspective, which key architectural styles (2-3) do you see as helpful to design the overall system, and why. Please explain by identifying some examples of components and connectors of OpenFEUP that may instantiate those styles.
3x20%
2. Considering the design patterns you studied (mainly GoF), suggest patterns for each one of the issues below and **justify** their usefulness to solve each issue.
 - a. OpenFEUP must support the notion of digital resources of different kinds, such as apps, features, services, and devices. Apps aggregate features, which possibly depend on services (e.g. backend, information systems, etc.), and some of them eventually connect to devices (e.g. sensors, webcams, etc.). The access to each kind of resource should be authenticated by SIGARRA authentication system (who is this user?) and managed by the OpenFEUP authorization system (which resources this user can access?).
How to dynamically manage the access policies of users to the myriad of OpenFEUP resources in a flexible way, to be able to dynamically lock and unlock access per user and per groups of users?
 - b. OpenFEUP resources can be very different in nature (apps, features, services, devices), possibly implemented using different technologies, but must be seen by OpenFEUP as similar, to be easy to manage. How to cope with this need?
 - c. Many features of OpenFEUP apps rely on monitoring services of different situations (e.g. queue status, locked room, etc.). To enable resources to notify other resources and users interested on those situations, how OpenFEUP must be designed to solve these needs?

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3. Focus now in the social graph of OpenFEUP (users and their interrelationships) and identify three features that might need to vary in concrete implementations and therefore should be designed in a way that is easy to adapt without much effort. For each feature, describe it succinctly, its variability needs, and name the design patterns that you have in mind to apply.

The End.