

## Arquitectura de Sistemas de Software

30th April 2014 • Personal 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**, mentioning the bibliography or references that fundament them. When required, you should make explicit all the assumptions you did to answer the questions.

**Social Learning Environments** (aka **SLE**) are web platforms that allow “learners” to easily develop their own knowledge, on their own specific topics of interest, at their own pace, using their own social network.

SLE provide access to the available sources of contents (web contents, open access, proprietary, devices, labs, etc.). The platform is structured in the following subsystems, below described in detail: web app, content management, social network, collaboration mechanisms, gamification engine, and back office.

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 SLE that may instantiate those styles.
2. Considering the design patterns you studied (mainly GoF), suggest a **partial class diagram** for each issue below (specific for the issue) and **justify** which patterns (if any) you think are appropriate to solve it.
  - a. SLE is a system that must support the notion of learners, educators, groups, classes, schools, contents, and all relations between them. Shortly, it must support the idea of groups of persons (social circles), which may contain or be part of other groups, in a nested way. Persons may be part of different groups.
  - b. Persons relate to other persons through relationships of different types in SLE. Different kinds of relationships should be configurable at runtime (teacher-of, classmate-of, responsible-of, colleague-of, etc.) and may have different properties and behaviour (dates, reasons, etc.). However, there are some commonalities between them all (name, start date, end date, status).
  - c. Learners do activities in context of projects, which all are usually listed as an activity stream, that can be subscribed by others, to keep in touch with the activity of a certain group or person. Persons may therefore follow projects, to be notified when things of the project change, or some activity is done.
  - d. To engage learners, a gamification system is capable of sensing the activities of the learners and groups, and reward them with badges, credits, new contents, etc., according to predefined rules and strategies.
3. Focus now in one of the subsystems of SLE and identify two features that are fixed (frozen spots, ie. not changeable) and two others that might need easy adaptation (hot spots) across different instantiations and usages of the system. For those hot spots try to define how they could be implemented referring know design patterns.

Note: each question has a value of 15% and the global evaluation values 10%.

**The End.**