Software Analysis and Design Project
Exam
May 2016

A temporary work agency (TWA), which specializes in offering recruiting services, asks you to develop an application to automate some of its processes. The application should allocate labour resources (workers or service companies) to requests of such resources. The allocation is performed based on *profiles* requiring certain qualities for a job. The application must fulfil the following requirements in a flexible and efficient manner.

A *profile* has its own unique identifier, and is characterized by a set of qualities that a candidate must meet to satisfy that profile. Qualities have a name and a description, and may reflect a wide variety of required abilities, including general, technical, personal, training, past experience, etc. The manager of the TWA is in charge of adding new qualities through the application. However, removing qualities is not needed.

There are two types of profiles: individual and collective. Individual profiles are applicable to workers or service companies. Collective profiles are described by a series of profiles. Collective profiles are applicable to a group of candidates. In order to say that a collective profile is satisfied, all its component profiles are to be satisfied by at least one candidate from the group.

After logging into the application, candidates in search of employment must register (whether as workers or service companies) and describe their qualities by selecting them from among the catalogue of qualities offered by the application as potential options. Candidates can delete their account from the system at any time. Any registered candidate can create a group of candidates by selecting which (previously registered) candidates should be part of the group. When selected for a group, candidates are notified automatically through the application. The notification asks the candidates to confirm or reject their agreement to participate in the group.

The employers (i.e., any company seeking workforce), upon subscription to the application, can introduce requests for labour resources that reflect their desire of hiring workers or service companies. Subscription to the application involves the payment of a fee. This is to be paid by connection through an external payment system, which grants employers credentials (user and password) to access the application. Each request that employers enter in the application must be associated with a profile, either one stored in the application or created at that time by the employer itself. When a profile is created, the application will search for all candidates satisfying it and will keep them associated with the profile until they cancel their account within the application. All profiles created by employers in their requests will remain stored in the application and may be reused in other requests.

When a new candidate registers into the system, the application will verify if he/she satisfies some profile. In such case, the candidate will be associated with the satisfied profiles. Every time a profile with no candidates of a (non-cancelled) request is assigned a new candidate, an e-mail notification is sent to the owner employer. Each employer can consult his requests and view the contact details of the candidates associated with them (if any). If the employer owning a request hires one of the candidates associated with it, he may enter such fact into the application. Then, the application will mark that request as *hired* and, therefore, excluded from the process allocating new candidates.

At any time, employers can cancel any of their requests not yet hired. However, cancelled requests must remain stored in the application. Employers can reactivate any of their cancelled requests (without having to re-enter all previous data of the request). In such case, they can choose to assign the request a profile different from the one it had before. Such profile can be one newly created or an existing one. Cancelled requests, same as hired ones, remain stored in the application for the purpose of preparing statistical and labour market analysis reports when requested by the manager of the TWA.

Questions are not allowed during the exam

Please, limit your answers to the strict content of the exam text. You may need to make assumptions over details not covered by the exam text. You are allowed to do so, but always in a grounded, reasonable way, which should not contradict the exam text. Please carefully document such assumptions in your answers.

ANSWER EACH QUESTION IN A SEPARATE SHEET

In all sections, you must use the UML notation, so that your answers become formalized in a standard way, as all analysis and design models in a real project should be. Expressing your ideas, even correct, in a language different from UML is not acceptable in this exam.

Section 1. (2.5 points)
Draw the use case diagram of the application.

Section 2. (4 points)
Draw the complete class diagram of the application. Do not forget to include all necessary attributes and methods to implement the functionality described in the exam text. You do not need to include constructors, getters or setters.

Section 3. (1.75 points)
Draw the state transition diagram that describes the behaviour of class Request.

Section 4. (1.75 points)
Draw the sequence diagram reflecting the process of verifying if a collective profile is satisfied by a group of candidates.