



ECE PARIS
ÉCOLE D'INGÉNIEURS

Prénom :
NOM :
Promotion :
Groupe :

ING 4
Génie logiciel avec UML
Devoir surveillé

Int.

09 décembre 2016

08:30 - 10:30

Durée : 02:00

Sujet proposé par : ZIADI Tewfik
Calculatrice autorisée : NON
Documents autorisés : NON
Ordinateur autorisé : NON

RAPPEL :

- ✦ NOM et Prénom de l'élève doivent être portés sur toutes les copies rendues.
- ✦ Les copies doivent être numérotées.
- ✦ Tous les appareils électroniques (téléphones portables, PDA, ordinateurs, montre connectée, etc.) doivent être éteints et rangés.
- ✦ **Toute erreur constatée sur le sujet doit être signalée sur la copie. Le correcteur en tiendra compte lors de la correction du devoir.**
- ✦ Il est interdit de communiquer.
- ✦ Toute fraude, ou tentative de fraude, qu'elle soit passive ou active, fera l'objet d'un rapport de la part du surveillant et sera sanctionnée par la note zéro, assortie d'une convocation devant le Conseil de discipline. Aucune contestation ne sera possible. Tous les documents et supports utilisés frauduleusement, devront être remis au surveillant.
- ✦ Les élèves ne sont pas autorisés à quitter la salle où se déroule l'épreuve moins de 45 minutes après le début de l'épreuve. Au-delà de ces 45 premières minutes, toute sortie est définitive (sauf dans le cas d'une épreuve durant plus de deux heures).

Software Engineering with the UML (2016-2017)

- Duration 2 hours. 20 points.
- All documents, computers, and smartphones forbidden.
- Read all the questions before answering.
- International section students MUST reply in English.

Theory (6 points)

- 1) Justify the differences between an *actor* and a *class* in UML models?
- 2) What are the differences between sequence and communication diagrams?
- 3) Explain briefly the notion of software product lines.
- 4) What do we mean by reverse engineering and round trip engineering.
- 5) Illustrate the *extend* relation in use case diagram using a simple example.

Case study (14 points)

A training organization, IT-Training, wants to completely rebuild its Information System (SI). To this end, IT-Training has prepared a preliminary draft of the system specification. The following paragraphs summarize this specification:

IT-Training aims at providing through its information system, access to its catalog, renewed every year and with more than 800 training courses. The trainings are grouped by themes, i.e., *Networks*, *Operating Systems*, *Project Management*, *Programming Language*, etc. Each theme can be composed of other themes (eg, the *Programming Language* theme contains the four themes *JAVA*, *C #*, *C ++*, *WEB Language*, etc.). A theme contains the list of its trainings. For example, the *JAVA* theme includes the list of *JAVA for beginners*, *JAVA for expert*, *JAVA and the web*, etc. Of course, a training can be part of several themes. For example, the *JAVA and Web* training is part of the *Programming Language* theme and the *WEB Language* theme. A client consults the trainings for get their information (price, duration, objectives, program, target audience, dates and locations of the next scheduled sessions). The catalog is managed by the catalog manager who can at any time add new trainings, delete them or modify their contents.

If a client is interested in a specific training, he/she must register online by choosing a session date and the location of the session and then indicating his/her contact details. The system then provides it with an enrollment identifier. He/she can cancel his/her registration to the training through the system using his/her enrollment identifier. This is possible as long as it is done at least 15 days before the training. In either case, the client receives a confirmation email from IT-Training. The sessions are fixed and planned according to a defined calendar throughout the year. For example, for *JAVA for beginner*, there is systematically one planned session per month and per training center (Paris, Lyon, Lille). To organize a session, the

logistics manager decides on a starting date, a maximum number of participants and a training center for the session.

Questions:

- 1) Provide a **use case diagram** for the IT-Training system.
- 2) Provide a **class diagram** for the IT-Training system.
- 3) Provide a **sequence diagram** specifying the following behavior:
 - a. The catalog manager creates a training called “Mobile app development” related to the theme *Programming Language*.
 - b. The logistics manager creates two sessions (1 sessions per semester) related to the Mobile app development training.
 - c. The client registers to attend the first session.
- 4) **What are the classes** from your class diagram of Question 2 for which we can specify a state machine? **Justify** the identified classes. **Provide one state machine** related to one class for you choice from the identified ones.