ST5 – 64 – MODELLING AND DEVELOPMENT OF SUPERVISION SOFTWARE

Dominante : Info&Num (Informatique et Numérique) et SCOC (Systèmes Communicants et Objets Connectés)
Langue d'enseignement : French
Campus où le cours est proposé : Rennes

Engineering problem

Today, information technology is omnipresent, and in particular allows the supervision of sensors and connected objects, as well as the processing and analysis of data from them. For example, in the medical field, connected insulin pumps or pacemakers can be used to collect information in order to produce histories, statistics on groups of individuals, etc. In the "smart building" context, the information systems deport, for example, the management or billing.

The objective of such a supervision system is on the one hand to provide aggregated information to users and supervisors, but also to enable system regulation by sending control commands to sensors and connected objects. Thus, the software implementation of such a system is based on several services, with multiple users manipulating data specific to their role. The difficulty of such an implementation lies in the modelling and the volume of data processed in real time, but also in the choice and definition of the software architecture that will allow to obtain an efficient system while ensuring an easy maintainability.

In this ST, we propose to study the design of such a system. To do this, we will study on the one hand the modelling and the data management, and on the other hand, the design patterns that will allow to accelerate the development while facilitating the maintainability of the system. In addition, the teaching of integration will be the occasion to illustrate the benefits of an AGILE organisation by allowing to design a functional system as soon as possible and to make it evolve according to the customer's needs.

Adviced prerequisites

None

Context and issue modules : The context and issues modules of this thematic sequence are based on those of the two other thematic sequence topics proposed on the Rennes campus, "Health" and "Smart Building". The first two workshops are therefore "shared" with these other thematic sequences. Then, workshops specific to software development are

494

presented. Depending on the availability of industrialists, the subjects covered are embedded development, Lora networks and UML modelling. Practical workshops on basic software development tools (git, command line, etc.) complete the lectures given.

Specific course (60 HEE) : *Data models and design patterns*

– **Brief description** : This course allows the students to discover the notions necessary for the design of software manipulating large quantities of data. It approaches the object-oriented programming, through two languages, Java and Kotlin. It then approaches the methodologies of software engineering in close connection with the course of system modeling in which the various diagrams (classes, sequence, etc.) are seen. The course allows the student to question the relevance of the structuring of a software code with regard to the existing design patterns. To this end, the tutorials, which are based on the system modelling course that takes place in parallel, will be carried out in a reversed pedagogy.

– In a second part, the course focuses on the storage and manipulation of data. It will be a question of discovering the bases of the data base software and the theoretical problems which that poses (formatting, queries). Finally, this part concludes with the introduction of object-relationship mapping software which allows to link data with the business code of the application and for which a particular modelling skill must be acquired.

Challenge Week : *Development of a sensor monitoring system*

– **Associated partner:** None directly but some in partnership with other ST5s on campus

– - **Location:** Rennes campus

– - **Brief description:** In collaboration with the students of the thematic sequences of the Rennes campus "Smart Building" and "Health", the objective is to develop the information system that will allow to collect and process the data coming from sensors, and to provide services for their regulation. The pedagogical objective is to discover the specificities of development in the Cloud and to perceive the interest of design choices to facilitate software evolution as well as the benefits of an AGILE organisation.