Ph.D. in Information Technology: Theses Defenses

June 26th, 2018

DEIB Seminar Room “Alessandra Alario” (building 21)
10.30 am

First Ph.D. presentation and discussion:
Anita IMANI – XXX Cycle
LIQDROID: A Middleware for Direct Interaction between Multiple Proximal Android Devices
Advisor: Prof. **Luciano Baresi**

Abstract: Nowadays, the speed of technology improvements in computing devices is very fast, and users benefit from them interchangeably to carry out various daily tasks. But despite the improvements that have occurred in the field of mobile technology and the connection protocols, the current situation as regards multiple-device interaction techniques is still far behind what it could be, and these computing devices are still mostly working in isolation. This dissertation covers the motivation, design, and development of a novel paradigm to support multiple-device direct interaction by benefiting from the current potentials that exist in the Android OS to offer more advanced features. The proposed solution is a middleware, which is called LIQDROID, that enhances the creation of distributed Android applications and oversees their execution on a dynamically user selected set of Android devices. It will transform the current pattern of single-user single-device to a fully cooperative environment which let a user benefit from the maximum capabilities that exists on the proximal devices or easily involve proximal users in the execution of a currently running task. Technically speaking, LIQDROID is an Android service that both augments each single Android machine and manages their cooperation. As well as it will provide a proper framework for the application developers to easily distribute their applications' components on the proximal devices.

Second Ph.D. presentation and discussion:

Giovanni MERONI – XXX Cycle

Artifact-driven Business Process Monitoring :

Advisor:Prof. **Pierluigi Plebani**

Abstract: Today, business process management is moving from a single-party perspective, where processes are confined inside a single organization, to a multi-party one, where portions of the process are externalized to other organizations. As a consequence, manipulating goods that belong to other organizations (e.g., as in the logistics domain) is becoming a quite common practice. Since organizations can enforce the execution of only those activities under their responsibility (i.e., internal) to adhere to the planned process execution, they have no control on the portions of the process that are externalized. Similarly, the owners of the goods cannot be sure that their goods will be manipulated as originally agreed with the other organizations. Consequently, unexpected deviations in the execution of the process and in the usage of the goods may occur. If not promptly identified and notified to all the organizations participating in the process, such deviations may cause delays, coordination problems, and consequently dissatisfaction for the customers. This thesis addresses these issues by proposing a novel technique to monitor the execution of multi-party processes, named “artifact-driven process monitoring”. This technique exploits the Internet of Things (IoT) paradigm to turn the goods participating in the process into smart objects, equipped with sensors, computational devices and transmission interfaces. This way, smart objects are able to automatically and autonomously monitor the process the participate in, and to detect when the process deviates from the expected behavior. To let smart objects be aware of the process to monitor, an extension of the Guard-Stage-Milestone artifact-centric modeling language, named E-GSM, has been defined. With respect to other modeling languages, E-GSM does not enforce dependencies among activities. This way, deviations in the execution of the process can be tracked at runtime without interrupting the monitoring. Additionally, E-GSM provides constructs to determine, based on the information collected by the smart objects’ sensors, when activities are started or ended. E-GSM also allows to model and monitor the lifecycle of the goods, thus allowing to detect when they are misused. To relieve process designers from learning E-GSM, and to reuse preexisting process models, a method to instruct smart objects given BPMN collaboration diagrams has also been developed. Additionally, an approach to determine to which extent smart objects are suited to monitor a particular process, given their sensing capabilities, has been introduced. To validate the artifact-driven process monitoring approach, a prototypical monitoring platform, named SMARTifact, has been developed and tested against real processes and both historical and real-time data from the logistics domain.

PhD Committee:

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