Ph.D. in Information Technology:
Miglierina Final Dissertation

DEIB Conference Room
May 4th, 2017
11.30 am

Ph.D. presentation and discussion:

Marco MIGLIERINA – XXVIII Cycle
"Monitoring Modern Distributed Software Applications. Challenges and Solutions"
Advisor: Prof. **Elisabetta Di Nitto**

Abstract:

The advent of cloud computing brought a huge change in the software release cycle. Deployments procedures, which previously could only be performed manually, became fully automatable. This brought an increasing number of companies to release faster and respond to market demand at an unprecedented rate. In this context Quality of Service (QoS) monitoring is an essential part of the software release cycle.

This thesis tries, first, to address some of the main open challenges in monitoring by proposing our approach and runtime platform, Tower 4Clouds, a multi-cloud monitoring platform developed as part of this thesis. The solution mainly focuses on configuring the runtime monitoring since the first design phases, starting from the QoS requirements definition on top of a provider independent model of the software system. At runtime, the platform is able to cope with the heterogeneity and the ephemerality of the resources being monitored and is able to autonomously reconfigure itself when the system changes or is migrated to another cloud provider.

In the second part, we conducted an empirical study in order to discover the main obstacles that industries are facing in monitoring their software systems. For such purpose, more than 140 practitioners from various industries were surveyed. Results showed that effective monitoring is still a difficult task, hardly affordable by small and medium enterprises with few resources and expertise. A huge number of monitoring tools, both commercial and open-source ones, proliferated in the last few years. However, no clear established solution has yet arisen. The study, after trying to identify main challenges in the adoption of monitoring, is used to evaluate Tower 4Clouds and how it is able to address such problems.

In the third part, we addressed the open challenges revealed by the survey by proposing Omnia, a re-interpretation of the factory design-pattern for building and managing ad-hoc monitoring platforms by composing existing monitoring tools and offering an interoperable monitoring interface to developers. Comparing with practitioner surveys and the state of the art, Omnia shows the promise of delivering an effective solution that tackles the steep learning curve and entry costs needed to embrace cloud monitoring and monitoring-based DevOps continuous improvement.

PhD Committee:

Prof. **Elisabetta Di Nitto**, DEIB – Politecnico di Milano
Prof. **Paul Grünbacher,** Johannes Kepler Universität Linz
Prof. **Dimka Karastoyanova,** Kühne Logistics University Hamburg