

## Lecture Proposal

**Speaker:** Dr. Eng. Christian Esposito, Ph.D.  
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### **Title: Reliable and Timely Event Notification over Wide Area Networks**

Publish/subscribe services are required in several long-term on-going industrial projects that envision a radical rethinking of software systems by integrating existing legacy systems in large-scale federating architectures. In fact, such systems are made of a constellation of systems that cooperate with each other by means of the event notification provided by publish/subscribe services over wide-area networks. Such services have met an enthusiastic success in implementing these large-scale federations thanks to their intrinsic decoupling properties that improve the offered scalability guarantees. However, a very important requirement of such federations is the capability of the adopted publish/subscribe service to tolerate faults occurring in the network and/or computing nodes composing the federation, without negatively affecting the provided event notification. Therefore, it is crucial that publish/subscribe services are equipped with proper methods to support reliable event notification.

In this talk, we present this topic of reliable event notification by introducing its definition, a model of the faults that have to be tolerated, the available methods to recover from such faults and how current publish/subscribe products deal with reliability. Afterwards, we present an innovative solution for reliable event notification by properly combining two different approaches: gossiping, to retrieve missing packets in case of incomplete information, and coding, to reduce the number of retransmissions and, consequently, the latency. We provide an analytical model that describes the information recovery capabilities of our algorithm and a simulation-based study, taking into account a real workload from the Air Traffic Control domain, which evidences how the proposed solution is able to ensure reliable event notification over a WAN within a reasonable bounded time window. We conclude the talk by presenting our current work on improving gossiping by taking a distributed strategic learning in order to determine the best set of nodes to send a gossip message, so as to optimize the utility of such gossip messages.

### Short Bio

Christian Esposito is currently a Research Associate at the University of Salerno, and also an Adjunct Professor in programming tools and techniques at the University of Naples Federico II from 2015. He graduated in Computer Engineering in 2006 and got his PhD in 2009, both at the University of Naples Federico II. He was a two-year Research Fellow and short-term Researcher at the Institute of High Performance Computing and Networking (ICAR) of the Italian National Research Council (CNR) from 2011 to 2015. He has regularly been involved in advanced courses for private enterprises belonging to the Finmeccanica group, the leading industrial group in the high-technology sector in Italy and one of the main global players in aerospace, defence and security. His interests include positioning systems, reliable and secure communications, and multi-objective optimization. He regularly serves as a reviewer in journals and conferences in the field of distributed and dependable systems, and is member of the editorial board of the International Journal of Computational Science and Engineering and the International Journal of High Performance Computing and Networking, both by Inderscience.