

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

**DOTTORATO DI RICERCA / PHD PROGRAM IN  
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING**

## **Seminar announcement**

**Thursday 26 February 2026, Time: 16:00 - 17:15**

**Room C2/A, Ground Floor, Building 3/A, DIETI - Via Claudio, 21 - NAPOLI**



### **Prof. Laurent Mathy**

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## **Memory deduplication for unikernels**

**Abstract:** In modern cloud-native and edge computing environments, improving resource efficiency while maintaining strong isolation remains a central challenge. Unikernels — specialized, single-purpose virtual machines built by compiling applications together with only the required operating system components — offer compelling advantages in performance, security, and deployment footprint. However, their specialization can introduce unexpected memory inefficiencies. Even when built from similar software bases, unikernels frequently differ structurally, limiting opportunities for memory deduplication.

This talk presents techniques to improve memory sharing in unikernel-based deployments. A memory layout alignment approach is first introduced to increase cross-instance page similarity, enabling more effective deduplication and significant reductions in memory usage without compromising performance. The limitations of traditional memory deduplication mechanisms such as Kernel Same-page Merging (KSM) in highly specialized environments are discussed, alongside alternative strategies better suited to FaaS workloads. Scenarios in which multiple unikernels embed different versions of libraries are also examined, together with a framework combining alignment techniques with differential analysis to maximize deduplication opportunities despite code diversity.

**Lecturer short bio:** Laurent Mathy has been a professor of networked systems and security in the EECS department at ULiège, Belgium, since January 2012. Prior to that, he held a personal chair in networked systems at Lancaster University, UK. During a sabbatical year in 2006-2007, he was a visiting research director at LAAS-CNRS, France, and a visiting professor at ULiège and UCLouvain, Belgium. Since May 2012, he has also been a PIFI research fellow at the Institute of Computing Technologies, The Chinese Academy of Sciences, Beijing, China. He received a PhD in Computer Science from Lancaster University in 2000 and a Master in Electrical Engineering from ULiège in 1993.

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