The NECSTLab Experience on Teaching, MOOC, and Continuous Learning

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Research and Education empowered by the online experience

In the NECSTLab we have been always working with the perception that a close connection between research and education has to be pursued to properly prepare the bachelor students. Research and education have been often perceived as a dichotomy. It has often been hard to couple them in a productive and virtuous cycle. We believed that Research can obtain great benefits from Teaching and the other way around. In particular, one one hand, involving students in research activities will heavily increase the creative and brainstorming phase of a research group. On the other hand, from an educative point of view, giving to the student the chance to be involved in real projects will mean giving them the chance to experience real design and development challenges and by guiding them during the design and development we can, in a maieutic way, teach them how to approach real life projects. Within this context opening our courses to a wider audience, not constrained to be a PoliMi student, was the natural evolution of our work. MOOCs are the perfect platform to create content that can be shared worldwide. Moreover, this is allowing us to improve our teaching experience by collecting feedbacks from students with different background and to investigate research opportunities because of the ideas that we are brainstorming online with the students.

1st MOOC:
FPGA computing systems: Background knowledge and introductory materials

A learner with no previous FPGA experience will be able to design, and implement and FPGA-based system. The coruse is introducing students with the concept of reconfigurability in FPGAs, presenting the available mechanisms and technologies at the device level and the tools and design methodologies required to design FPGA-based reconfigurable embedded systems. This first course presents the different aspects of the design of FPGA-based reconfigurable systems, focusing in particular on dynamically self-reconfigurable systems. The design methodologies and tools required to design a dynamically-reconfigurable system will be introduced and described, together with the problems that need to be considered.
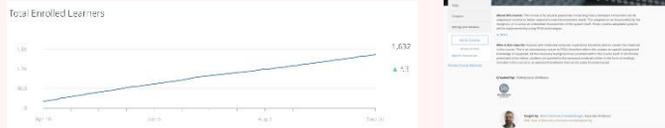
Already online and available @
https://www.coursera.org/learn/fpga-intro

The NECSTLab Specialization on Coursera
FPGA Computing

A **Specialization**, also known as s12n, is a series of related courses designed to help students to master a specific topic. Within this context, at **NECSTLab**, we are working with several companies, like **Xilinx** and **Amazon**, to create the first s12n focusing on FPGA based computing.

The specialization will be composed by **four courses**, but we are planning to extend it to five. The **FPGA Computing Specialization** has been designed as journey to guide the learners to familiarize themselves with FPGAs (1st course), to learn how to move from a single FPGA-based computing system to a distributed environment, exploiting Xilinx SDAccel (2nd course), to optimize their designs to meet the desired performance (3rd course), and finally, to have a closer hands-on experience on how to implement an FPGA-based solution by implementing a Machine Learning system based on AWS F1 instances.

The idea is to use this s12n as a **learning environment** where both **newcomers** can find materials to start their research and **experienced users** can continue to improve their continuous learning experience by the introduction of new courses, with respect to these four, targeting novel technologies and products.

2nd MOOC:
Developing FPGA-accelerated cloud applications with SDAccel

Today we are entering in an era in which technology progress induces **paradigm shifts** in computing!
As a tradeoff between the two extreme characteristics of GPP and ASIC, we can find a new concept, a new idea of computing. the Reconfigurable Computing, which has combined the advantages of both the previous worlds.
This is exactly the case of the Xilinx SDx Environments.
This course is focusing on distributed, heterogeneous cloud infrastructures, its objective is to let the learners to dig more into the details on how to use **Xilinx SDAccel** providing you also with working examples, and on how to bring your solutions to life by using the **Amazon EC2 F1 instances**.

It will be online and available in late December
https://www.coursera.org/learn/fpga-sdaccel/