Alessandra Fais | CV

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PERSONAL DATA

Residence: Via Angelo Cuccuru 56, 08018, Sindia (NU), Italy
Postal address: Via Alessandro Scarlatti 13, 56017, San Giuliano Terme (PI), Italy
Date of birth: 22/07/1992
Place of birth: Sassari (SS), Italy
Nationality: Italian

PERSONAL SUMMARY

I'm a Ph.D. student in the Department of Information Engineering, University of Pisa. I received both my Bachelor's and Master's Degrees from the Department of Computer Science, University of Pisa. During my Master Degree's thesis, I started approaching the data stream processing research area. My main research interests are related to data stream processing applications in the networking domain, high performance network processing, data plane acceleration, SmartNICs and software defined networks.

TEACHING EXPERIENCE

Course "Wireless Networks" - A.A. 2019/2020 **Pisa, Italy**
Teaching Support for the Laboratory Part *Feb. 2020 - May 2020*

The "Wireless Network" course is part of both the Telecommunications Engineering and Computer Science and Networking Master's Degrees at the University of Pisa. The "Virtualization Lab" module had the aim of introducing the concepts of virtualization, hypervisors, virtual machines and containerization. In particular, the focus has been put on Docker; the Docker architecture and objects, Dockerfile and best practices and Docker Compose have been presented. One last section has been devoted to introduce the students to the concepts of cloud computing, Software Defined Networks and Network Function Virtualization; the Red Hat OpenStack cloud computing platform has been described.

- Course register:
  `https://unimap.unipi.it/registri/dettregistriNEW.php?re=3298109::::&ri=9677`

PUBLICATIONS

Conference and Workshop Papers

2020

[C1] **A. Fais, G. Procissi, S. Giordano, F. Oppedisano. Data Stream Processing in Software Defined Networks: Perspectives and Challenges.** In proceedings of the 2020 IEEE 25th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD) // Virtual Conference, September 14-16, 2020.

EDUCATION

Università di Pisa **Pisa, Italy**
Ph.D. in Information Engineering *Nov. 2019 - Present*

- Supervisors: Prof. Stefano Giordano, Dr. Gregorio Procissi
- Research Area: high performance network processing, data stream processing, data plane acceleration, software defined networking, network function virtualization
- PhD Courses:
  - English for Research Publication and Presentation Purposes, C1 level (Prof. Joanne Spataro, UniPi Language Center, Italy)
  - On Cyber-Physical Social Systems (CPSSs): challenges and new research directions (Prof. Antonella Longo - UniSalento, Italy)
  - Credibility assessment in social media with a focus on social bot detection (Dr. Stefano Cresci - IIT CNR Pisa, Italy)
  - 5G and V2X communications (Dr. Dario Sabella - Intel Deutschland GmbH, Germany)
  - Computing in Communication Networks for 5G and the Tactile Internet (Prof. Dr. Frank H. P. Fitzek - TU Dresden CeTI, Germany)
  - 5G, Beyond 5G and 6G: the next frontier (Dr. Emilio Calvanese Strinati - CEA-LETI Grenoble, France)
  - High Performance Computing: architectures and systems (Dr. Vassilis Papaefstathiou - ICS-FORTH Heraklion, Crete, Greece)

Università di Pisa and Scuola Superiore Sant'Anna **Pisa, Italy**
Master's Degree in Computer Science and Networking *Sep. 2016 - Oct. 2019*

- Mark: 110/110 cum laude
- Master's Thesis Title: Benchmarking Data Stream Processing Frameworks on Multicores
- Supervisor: Dr. Gabriele Mencagli
- Abstract: The work shows a comparison in terms of performance (bandwidth and latency) between traditional Data Stream Processing (DaSP) systems and WindFlow (`https://paragroup.github.io/WindFlow/`), an efficient C++17 streaming library based on FastFlow's building blocks (`http://calvados.di.unipi.it/fastflow`). The goal is to quantify the benefit that may be achieved by using the C++ solution w.r.t. modern Java-based ones.
  A benchmark of four real-world DaSP applications have been designed and implementations are provided using Apache Storm, Apache Flink and WindFlow. Experiments show a significant throughput improvement and latency reduction by using the C++ solution w.r.t. the state-of-the-art frameworks on single multicore machines. The results obtained are encouraging for future works which aim at designing innovative DaSP frameworks based on C++ and providing high-level abstractions like Storm and Flink, that may be able to overcome modern Java-based Stream Processing Engines on distributed scenarios too.
- Master's Thesis Text: `https://etd.adm.unipi.it/t/etd-09162019-220730/`
- Produced Software:
  `https://github.com/alefais/storm-applications`
  `https://github.com/alefais/flink-applications`
  `https://github.com/alefais/windflow-applications`
- Master Programme: Relevant courses cover parallelization methodologies, parallel programming models, architectures of high-performance computing systems, management and configuration of IP networks, Software Defined Networks, analysis of packet switching architectures, SOA, cloud computing, microservices, virtualization techniques.
- Language: the master programme is entirely given in english.

Università di Pisa **Pisa, Italy**
Bachelor's Degree in Computer Science *Sep. 2011 - Mar. 2016*

- Mark: 105/110

- Bachelor's Thesis Title: Programming techniques for FPGA devices
- Supervisor: Prof. Marco Danelutto
- Abstract: The thesis is a dissertation about FPGA programming methodologies (Hardware Description Languages, Chisel and OpenCL), with an overview of current technological trends.
- Bachelor Programme: Relevant courses cover theory of programming languages, architectures of calculators and networks, network management and IP network monitoring, traffic monitoring and elements of operational research, cryptography, software engineering.

Istituto di Istruzione Superiore "G. A. Pischedda" Bosa **Bosa, Italy**
High School Education - Liceo Scientifico *Sep. 2006 - Jul. 2011*

- Mark: 100/100
- High School Paper: The work is a concept map oriented to topics like the birth of the Universe, the artistic and social movement of Futurism and the period of the Belle Époque, all presented following the central theme of the Dawn.

ACADEMIC PROJECTS

Parallel and Distributed Systems (paradigms and models) project *Sep. 2018 - Nov. 2018*
C++ and FastFlow implementation of the parallel scan Blelloch algorithm with a master-worker architecture schema and tests.

- Link to the code: `https://github.com/alefais/spm-18`

Programming Tools for Parallel and Distributed Systems homework *Sep. 2018 - Nov. 2018*
C++ implementation of the Mandelbrot set computation using the Intel Threading Building Blocks library.

- Link to the code: `https://github.com/alefais/spd-18`

Networks and Technologies for Telecommunications project - FPGA part *Jul. 2018 – Jul. 2018*
Verilog implementation of Adders, Subtractors and Multipliers and tests on both the Quartus University Program Waveform Simulator and on the DE2-115 series FPGA board.

- Link to the code: `https://github.com/alefais/rtt-18-fpga`

Networks and Technologies for Telecommunications project - SDN part *Jun. 2018 – Jul. 2018*
Portion of an In-Band Telemetry application to monitor the latency of packets traversing a certain path/tunnel established between two switches. Programming language/framework: Java, P4, P4 Runtime, ONOS, Mininet.

- Link to the code: `https://github.com/alefais/rtt-18-sdn`

Packet Switching and Processing Architectures project *Mar. 2018 – May 2018*
C++ monitoring application that captures traffic with libpcap and identifies and analyses different flows.

- Link to the code: `https://github.com/alefais/aed-18`

Advanced Programming projects *Sep. 2016 – Jan 2017*
Collection of four projects:

- OCaml Domain Specific Language for a Software Defined Network model and a simulation of the behavior of the network.
- Python API for a Software Defined Network model and a simulation of the behavior and state of the network.
- Multiset data structure implemented in Java using different concurrency policies.
- Simple Scala IRC-style chat program.
- Link to the code: `https://github.com/alefais/ap-fall-16`

Network Management project *Jul. 2014 – Aug. 2014*
Lua script that monitors system events with Sysdig to measure the performance of an application and the amount of resources required.

- Link to the code: `https://github.com/alefais/net-man`

Computer Networks project *May 2014 – Jun. 2014*
Java implementation of a distributed chat system.

- Link to the code: `https://github.com/alefais/rcl-14`

OTHER ACTIVITIES

Università di Pisa **Pisa, Italy**
Master Students' Representative *Oct. 2016 - Oct. 2018*

SCHOLARSHIPS, GRANTS, AWARDS

NetResults S.r.l. **Pisa, Italy**
Ph.D. Scholarship: *Nov. 2019*
Three years Ph.D. scholarship granted by NetResults S.r.l. on subject "Study and Resolution of 5G hyper-scalability problems for the slicing of voice, video, messaging and unified communication service stations" within the Information Engineering Ph.D. Programme.

Istituto di Istruzione Superiore "G. A. Pischedda" Bosa and Rotary Club Bosa **Bosa, Italy**
Scholarship award: *Jul. 2011*
The award has been assigned by Rotary Club Bosa to distinguished students with the best performance among those of the I.I.S. "G. A. Pischedda" Bosa that obtained their High School diploma in the scholastic year 2010/2011.

SKILLS

Programming:
C, C++, Java, Python (basic), OCaml (basic), Verilog (basic), Scala (basic), Bash scripting (basic), GNU Make (basic), CMake (basic)

Parallel Programming:
FastFlow, Intel TBB (basic), MPI (basic), OpenCL (basic)

Network Programming (basic knowledge):
libpcap, P4, ONOS, OpenFlow, Mininet, XDP, eBPF

Version Control and IDEs:
git, JetBrains suite

Productivity:
LaTeX, Office suite, gnuplot (basic), R (basic)

LANGUAGES

- Italian: mother tongue

- English: B2 level