

Alessandra Fais | CV

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PERSONAL DATA

Residence: 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 "Programming Languages" - A.A. 2020/2021

Pisa, Italy

Project IFTS "Digital Media Designer"

Jun. 2021 - Jul. 2021

Topics: introduction to JavaScript and HTML

Course "Wireless Networks" - A.A. 2020/2021

Pisa, Italy

Teaching Support for the Laboratory Part ("Virtualization Lab")

Feb. 2021 - Jun. 2021

Topics: SDN, NFV, MEC, Cloud and Edge computing, SOA architectures, virtualization approaches (hypervisors, VMs, containers), RedHat OpenStack, VirtualBox, Docker, Kubernetes)

Course "Wireless Networks" - A.A. 2019/2020

Pisa, Italy

Teaching Support for the Laboratory Part ("Virtualization Lab")

Feb. 2020 - Jun. 2020

Topics: virtualization approaches (hypervisors, VMs, containers), VirtualBox, Docker, SDN, NFV, RedHat OpenStack

PUBLICATIONS

Journal Papers

2021

[J2] G. Mencagli, M. Torquati, A. Cardaci, **A. Fais**, L. Rinaldi, M. Danelutto. **WindFlow: High-Speed Continuous Stream Processing with Parallel Building Blocks**. IEEE Transactions on Parallel and Distributed Systems (TPDS). 2021. DOI: 10.1109/TPDS.2021.3073970.

[J1] **A. Fais**, G. Lettieri, G. Procissi, S. Giordano, F. Oppedisano. **Data Stream Processing for Packet-Level Analytics**. MDPI Sensors 2021, vol. 21, no. 5:1735. DOI: 10.3390/s21051735.

Conference and Workshop Papers

2021

[C3] **A. Fais**, G. Lettieri, G. Procissi, S. Giordano. **Towards Scalable and Expressive Stream Packet Processing**. IEEE GLOBECOM '21. Madrid, Spain. Dec. 7-11, 2021.

UNDER REVIEW (SUBMITTED APR. 2021)

2020.....

[C2] A. Fais, S. Giordano, G. Procissi. **On the Design of Fast and Scalable Network Applications Through Data Stream Processing**. IEEE NfV-SDN '20. Leganes - Madrid, Spain. Nov. 9-12, 2020.

[C1] A. Fais, G. Procissi, S. Giordano, F. Oppedisano. **Data Stream Processing in Software Defined Networks: Perspectives and Challenges**. IEEE CAMAD '20. Pisa, Italy. Sep. 14-16, 2020.

EDUCATION

Università di Pisa

Ph.D. in Information Engineering

Pisa, Italy

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 and C1+ levels (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)
 - Arm Architectures for High-Performance Real-Time (Dr. Matteo Andreozzi - Arm, UK)

Università di Pisa and Scuola Superiore Sant'Anna

Master's Degree in Computer Science and Networking

Pisa, Italy

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

Bachelor's Degree in Computer Science

Pisa, Italy

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

High School Education - Liceo Scientifico

Bosa, Italy

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

Master Students' Representative

Pisa, Italy

Oct. 2016 - Oct. 2018

SCHOLARSHIPS, GRANTS, AWARDS

IEEE NFV-SDN '20 // Virtual Conference

Leganes - Madrid, Spain

Intel Award: Student Participation Grant

Nov. 2020

NetResults S.r.l.

Pisa, Italy

Ph.D. scholarship within the Information Engineering Ph.D. Programme

Nov. 2019

Istituto di Istruzione Superiore "G. A. Pischedda" Bosa and Rotary Club Bosa

Bosa, Italy

Scholarship Award

Jul. 2011

Award 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, WindFlow, Apache Storm, Apache Flink, Intel TBB (basic), MPI (basic), OpenCL (basic)

Network Programming (basic knowledge):

Libpcap, Netmap, P4, ONOS, OpenFlow, Mininet, AF_XDP, XDP, eBPF

Version Control and IDEs:

git, JetBrains suite

Productivity:

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

LANGUAGES

- Italian: mother tongue
- English: C1+ level (C1+ CEFR certification enclosed)

Last updated on May 6, 2021.



UNIVERSITÀ DI PISA

Alessandra Fais

born in Sassari on July 22, 1992

has successfully attended the **English for Research Publication and Presentation Purposes** course for PhD students. The skills assessed at the end of the course involve **Writing** (academic writing skills related also to scientific manuscripts) and **Speaking Skills** (presenting and debating the PhD student's research project). For the above-mentioned skills, the overall final level is comparable to **C1+ (CEFR)**.

The Director
Prof. Silvia Bruti

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CLI – Centro Linguistico dell'Università di Pisa - Organizzazione con Sistema di gestione qualità certificato UNI EN ISO 9001:2015

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Segreteria Amministrativa: tel. 0502215921, fax: 0502210662, e-mail: amministrazione@cli.unipi.it