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 "Wireless Networks" - A.A. 2020/2021 **Pisa, Italy**
Teaching Support for the Laboratory Part ("Virtualization Lab") *Feb. 2021 - Jun. 2021*
Topics: virtualization (hypervisors, virtual machines, containers), SDN and NFV

Course "Wireless Networks" - A.A. 2019/2020 **Pisa, Italy**
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Topics: virtualization (hypervisors, virtual machines, containers), SDN and NFV

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 TPDS. 2021.
Under Review (submitted Jan. 2021)
[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

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 **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 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)

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

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, 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, 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 March 3, 2021.

UNIVERSITÀ DI PISA

CENTRO LINGUISTICO

Alessandra Fais

born in Sassari on July 22, 1992

attended a **C1_PLUS** Course of ***English for Research Publication and Presentation Purposes*** of 30 hours from October 6, 2020 to December 9, 2020 (attendance: 80%) with the following result:

Grade*: Excellent

(*) Scale: Pass, Good, Very good, Excellent

The Director

Prof. Silvia Bruti

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The present **Certificate of ATTENDANCE and ACHIEVEMENT** is given to students who attend at least 80% of the course and certifies that the student has fulfilled the **C1+ Level** objectives for **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**).

Sulla base delle disposizioni di cui al comma 5 dell'articolo 43 della legge 445/2000 e dell'interpretazione fornita dall'Agenzia delle Entrate con Risoluzione 29/E del 12 marzo 2014, tutti i documenti riepilogativi emessi dal CLI saranno rilasciati ai fini dell'aggiornamento della posizione curricolare dello studente. Nessun uso ulteriore può essere consentito. In caso di utilizzo di tali documenti per fini privati, ma comunque nel rispetto dei principi di de-certificazione previsti dalla legge 445/2000, è necessario che sia corrisposta dall'utente l'imposta di bollo nella misura di legge vigente (per l'anno 2020: 16€ ogni 100 righe) e sia tempestivamente comunicato al CLI via e-mail (impostadibollo@cli.unipi.it) il numero identificativo di 14 cifre assegnato al contrassegno telematico utilizzato sul documento ai sensi della Risoluzione nr. 89/2016 dell'Agenzia delle Entrate consapevole della nullità dell'utilizzo compiuto in violazione.

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

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UNIVERSITÀ DI PISA

CENTRO LINGUISTICO

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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