

# Luca Rinaldi

PH.D. STUDENT · PARALLEL PROGRAMMING MODELS

born in 1991 and resident in Pisa (Italy)

✉ to@lucar.in | 🏠 lucar.in | 📧 lucarin91 | 🐦 lucarin91 | 📧 lucarin91

## Education

### Università di Pisa

Pisa, Italy

PH.D. STUDENT

November 2017 - Exp. December 2020

My research activity is focused on High-Performance Computing, and in particular on design and build tools/libraries to support parallel programming. I am currently focusing on the Actor Model as a concurrency model and I analyze possible improvement to the model by integrating it with some Structured Parallel programming based on Parallel Patterns. My immediate research objective is to design a high-level library to support Parallel Patterns on top of an Actor Model.

- Thesis: High-level structured parallel programming with Actors
- Prototype: [//github.com/ParaGroup/caf-pp](https://github.com/ParaGroup/caf-pp)

### Università di Pisa

Pisa, Italy

ACADEMIC ENGLISH COURSE

February 2018 - April 2018

- An English course about scientific paper writing
- Level: C1

### Università di Pisa & SSSUP Sant'Anna

Pisa, Italy

MSC IN COMPUTER SCIENCE & NETWORKING

September 2014 - March 2017

- Degree: 109/110
- Thesis: Orchestrating applications with TOSCA and Docker
- Prototype: [//github.com/di-unipi-socc/TosKer](https://github.com/di-unipi-socc/TosKer)

### Università di Perugia

Perugia, Italy

BSC IN COMPUTER SCIENCE

September 2011 - September 2014

- Degree: 110 with honor
- Thesis: Mean-payoff Game: Algorithms and Optimization

## Experience

### ATS - Advanced Technology Solutions [//atscom.it](https://atscom.it)

Milan, Italy

INTERNSHIP

June 2019 - June 2019

I was in charge of studying and analyzing the architecture of their product for financial applications. The software was developed using C++ and the Actor Model abstraction and it needs critical requirements of latency. I proposed some possible refactoring and optimization by using the Structured Parallel Programming approach.

### Università di Pisa [//di.unipi.it](https://di.unipi.it)

Pisa, Italy

RESEARCH ASSISTANT

March 2017 - October 2017

As a grant holder at the SOCC research group, I was involved in research activities on Microservice-based applications, Deploying and Orchestrating applications and Cloud computing.

### CardZbox project

Pisa, Italy

TECHNICAL MANAGER

May 2016 - May 2017

I was involved in designing, prototyping, and testing the CardZbox mobile app offering a hybrid experience to play board and social games. The project won the Lucca Start&Up Award and it was brought for early-stage testing at the Lucca Comics convention in 2016.

### Xpreso [//xpreso.com](https://xpreso.com)

Dublin, Ireland

INTERNSHIP

August 2015 - August 2015

I was in charge of analysing data and trying to find better statistic metrics that could be later added to their Dashboard. At the end of the study, I also implemented a PHP/AngularJS application to dynamically compute that new statistics on a snapshot of the databases, to better evaluate their performance.

## Teaching Activity

### Università di Pisa [//di.unipi.it](https://di.unipi.it)

Pisa, Italy

TEACHING ASSISTANT

2nd semester of 2018 and 2019

For two consecutive years, I assisted the Operating System Laboratory course of the Computer Science Bachelor Degree at the University of Pisa. The laboratory course teaches the students the basis of Operating System programming in C and some Bash scripting skills.

As an external expert hired by the school, I co-designed and taught a course of Computational Thinking, tailored for children 13-14 years old. The course was focused on problem solving and game development, and it used the Python programming language as a teaching tool.

**Fibonacci Middle School**

As an external expert hired by the school, I designed and taught a course of Computational Thinking, tailored for children that 11-12 years old. The course was mainly focused on the Scratch programming language but it also covered the installation of an OS on the lab machines (Edubuntu).

## Papers

---

**High-Throughput Stream Processing with Actors**

Workshop paper

AGERE! WORKSHOP

November 2020

Luca Rinaldi, Massimo Torquati, Gabriele Mencagli, Marco Danelutto

**Improving the Performance of Actors on Multi-cores with Parallel Patterns**

Journal paper

INTERNATIONAL JOURNAL OF PARALLEL PROGRAMMING

June 2020

Luca Rinaldi, Massimo Torquati, Daniele De Sensi, Gabriele Mencagli, Marco Danelutto

**Enforcing Reference Capability in FastFlow with Rust**

Conference paper

PARALLEL COMPUTING: TECHNOLOGY TRENDS, PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PARALLEL COMPUTING (PARCO)

October 2019, Prague (Czech Republic)

Luca Rinaldi, Massimo Torquati, Gabriele Mencagli, Marco Danelutto, Tulio Menga

**Are Actors Suited for HPC on Multi-Cores?**

Conference (no proceedings)

12TH INTERNATIONAL SYMPOSIUM ON HIGH-LEVEL PARALLEL PROGRAMMING AND APPLICATIONS (HLPP)

June 2019, Linköping (Sweden)

Luca Rinaldi, Massimo Torquati, Daniele De Sensi, Gabriele Mencagli, Marco Danelutto

**Accelerating Actor-Based Applications with Parallel Patterns**

Conference paper

27TH EUROMICRO INTERNATIONAL CONFERENCE ON PARALLEL, DISTRIBUTED AND NETWORK-BASED PROCESSING (PDP)

February 2019, Pavia (Italy)

Luca Rinaldi, Massimo Torquati, Gabriele Mencagli, Marco Danelutto, Tulio Menga

**TosKer: A synergy between TOSCA and Docker for orchestrating multi-component applications**

Journal paper

JOURNAL OF SOFTWARE PRACTICE AND EXPERIENCE

February 2018

Antonio Brogi, Davide Neri, Luca Rinaldi and Jacopo Soldani

**Orchestrating incomplete TOSCA applications with Docker**

Journal paper

JOURNAL OF SCIENCE OF COMPUTER PROGRAMMING

December 2017

Antonio Brogi, Davide Neri, Luca Rinaldi and Jacopo Soldani

**TosKer: Orchestrating applications with TOSCA and Docker**

Workshop paper

3RD INTERNATIONAL WORKSHOP ON CLOUD ADOPTION AND MIGRATION (CLOUDWAYS 2017)

27 September 2017, Oslo (Norway)

Antonio Brogi, Luca Rinaldi and Jacopo Soldani

**From (incomplete) TOSCA specifications to running applications, with Docker**

Workshop paper

15TH INTERNATIONAL WORKSHOP ON FOUNDATIONS OF COORDINATION LANGUAGES AND SELF-ADAPTATIVE SYSTEMS (FOCLASA 2017)

4-8 September 2017, Trento (Italy)

Antonio Brogi, Davide Neri, Luca Rinaldi and Jacopo Soldani

**Towards a reference dataset of microservice-based applications**

Workshop paper

MICROSERVICES: SCIENCE AND ENGINEERING (MSE 2017)

4 September 2017, Trento (Italy)

Antonio Brogi, Andrea Canciani, Davide Neri, Luca Rinaldi and Jacopo Soldani

## Projects

---

**CAF-PP** //github.com/ParaGroup/caf-pp

Research project (C++)

PARALLEL PATTERN LIBRARY FOR THE C++ ACTOR FRAMEWORK (CAF)

September 2019 - ongoing

Efficient and optimized Parallel Patterns implementation for the Actor Model. The library especially targets multi-cores and it exploits shared-memory to efficiently implement Parallel patterns. The Parallel patterns provided so far are: Pipeline, Farm, Map, Divide&Conquer.

**ff\_buffer.rs** //github.com/lucarin91/ff\_buffer

WRAPPER OF FASTFLOW QUEUE FOR RUST

A wrapper of the C++ FastFlow lock-free queue for Rust. The library is a simple interface that mimics the mpsc queue of standard Rust and internally uses the C++ implementation of the FastFlow unbounded lock-free buffer.

*Research project (Rust)*

*October 2019 - December 2019*

**TosKer** //github.com/di-unipi-socc/TosKer

ORCHESTRATE APPLICATION WITH TOSCA AND DOCKER

TosKer is an orchestrator engine capable of automatically deploying and managing multi-component applications specified in OASIS TOSCA on Docker. This project was the subject of my Master Thesis and my initial research activity at the University of Pisa.

*Research project (Python)*

*August 2016 - August 2017*

**GolfScript-rs** //github.com/lucarin91/golfscript-rs

A SIMPLE GOLFSRIPT INTERPRETER

A fork and extended version of a GolfScript interpreter written in Rust. The interpreter almost supports all the base language features and a simple set of unit tests. The future development will improve performances and some benchmarks against the reference version written in Ruby.

*Personal project (Rust)*

*March 2020 - ongoing*

## Honors & Awards

---

2017 **3-years PhD Scholarship**, fund my PhD studies and research

*Pisa, Italy*

2016 **Lucca Start&Up Award**, cardZbox project

*Pisa, Italy*

2014 **Master in Computer Science & Networking**, third ranked in closed selection

*Pisa, Italy*

## Volunteering

---

**Pisa CoderDojo** //pisa.coderdojo.it

MENTOR AND CO-FOUNDER

Together with some friends, I found the CoderDojo local field in Pisa. Coderdojo is a community of free programming workshops for young people between 7 and 17. In the Pisa CoderDojo, we mostly teach Scratch, Python, and the micro:bit board.

*Pisa, Italy*

*February 2015 - July 2018*

## Skills

---

|                         |  |
|-------------------------|--|
| <b>Programming</b>      | C · C++20 · Rust · Python · JavaScript · TypeScript · Java |
| <b>Web</b>              | Express.js · Flask · AngularJS · React                     |
| <b>Mobile</b>           | Android · Apache Cordova · Ionic                           |
| <b>Database</b>         | MongoDB · PostgreSQL · SQLite                              |
| <b>Operating system</b> | Debian/Ubuntu · Arch Linux                                 |
| <b>Languages</b>        | Italian · English  |