

Joaquim Magalhães Esteves da Silva

Curriculum Vitae

PERSONAL DETAILS

Birthday May 13, 1990
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EDUCATION

PhD. in Computer Science

2015-2021

MAP-i Doctoral Programme

I obtained my Ph.D. in CS at the MAP Doctoral Program in Computer Science. The MAP Doctoral Program is a joint Ph.D. degree by the Universities of Minho, Aveiro, and Porto. My Ph.D. research was on Edge-Computing, with the theme Adaptive computation offloading in mobile edge clouds. During my Ph.D. I've published several research papers related to my research topic and developed a framework for edge-computing called Jay that runs on a plethora of devices and provides the means for developers and researchers to develop and test with edge-computing efficiently. My work was done in collaboration with the *Hyrax (CMUPERI/FIA/0048/2013)* project, and now is part of the *SafeCities (POCI-01-0247-FEDER-041435)*.

MSc. in Computer Science

2013-2015

Faculdade de Ciências da Universidade do Porto

In July 2015, I completed my MSc. in Computer Science at Faculdade de Ciências da Universidade do Porto, with a major in Parallel and Distributed Systems. Final grade: 18 out of 20 (a B). Classification in masters dissertation: 19 out of 20.

BSc. in Computer Science

2008-2013

Faculdade de Ciências da Universidade do Porto

I completed in September 2013 the BSc. in Computer Science at Faculdade de Ciências da Universidade do Porto, with a final grade of 14 out of 20 (an A).

WORK EXPERIENCE

Research Grant

April 2014 -
October 2014

CRACS-INESC TEC

I worked on the *Authenticus (AE2013-0040)* project. During my grant, I worked on String-Matching algorithms to match scientific journal metadata, a tool to export and print publication lists using XSLT transformations, and implemented several new interfaces and functionalities to the platform.

Summer Internship

July 2014 -
August 2014

UT-Austin

I was one of 4 students from UP selected for a Summer Internship at the University of Texas at Austin, within the UT Austin-Portugal initiative. At Austin, I worked with Professor Keshav Pingalli's research group in the *Galois Project*.

Research Grant

Nov. 2014 -
Sep. 2015

CRACS-INESC TEC

I worked on the *Hyrax (CMUPERI/FIA/0048/2013)* project. During my grant, I studied different simulation tools and performed several simulations. Namely, I compared multiple WiFi technologies and distinct overlays for mobile ad-hoc networks. Furthermore, I contributed to the development of an Android app that implements mobile ad-hoc networks using Bluetooth, WiFi, WiFi Direct, and WiFi TDLS to form the network and

distribute content between devices. In the context of this project, I spent one month at Carnegie Mellon University with Professor Priya Narasimhan, Co-PI of the Hyrax project.

PhD Grant

Sep. 2015 -
Sep. 2019

MAP-i/FCT & CRACS-INESC TEC

I was awarded a merit scholarship from MAP-i/FCT. During this scholarship, I worked on the preliminary steps of my Ph.D., including one year of classes and thesis proposal preparation. After the first year, I developed a version of P^3 (Parallel Peer to Peer) for Android devices using Wi-Fi and Wi-Fi Direct for device-to-device communication and the Mandelbrot set as a computation-intensive problem. I presented this work in the CrossCloud'17 workshop. After P^3 -Mobile, I have done some simulation work using ns-3 and Mininet-Wifi. I worked with some MSc students and contributed to their MSc thesis. In the later months of this scholarship, I started developing Jay, the framework that enabled me to do most of the most relevant work for my Ph.D., and also, in parallel, I have worked on developing automation mechanisms to perform experiments with multiple devices and configurations.

Teaching Assistant

Oct. 2017 -
Jan. 2017

Faculty of Sciences of University of Porto

I've been a Lab Technician for the Introduction to Computers [CC1002] course of the Bachelor's Degree in Computer Science. During this period, I helped the Professor during practical classes.

Guest Lecturer

Jan. 2019 -
Aug. 2019

Faculty of Sciences of University of Porto

I've been a Guest Lecturer for the Databases [CC2005] course of the Bachelor's Degree in Computer Science and Master's Degree in Network and Information Systems Engineering. During this period, I taught the Databases course to 2 classes (4 hours weekly).

Research Grant

Feb. 2020 -

FCUP

During my Safe Cities grant, I've been working on the Jay framework, developing it, and using it to study different edge-computing offloading strategies and configurations. To do this, I designed a demo application that has real-life use cases. The demo application relies on machine-learning models, using TensorFlow, to detect multiple objects in images. This demo application runs on Android devices and x86 machines (such as Cloudlets and Cloud servers) using the Jay framework. Using this demo, I have done two different studies. The first focused on optimizing task placement to minimize task completion time. To do this, I've envisioned a scenario with three tiers: Mobile devices, a cloudlet server, and a cloud server (using Google Cloud Compute Instances). In this study, I've implemented multiple scheduling policies and used multiple image datasets (varying in size and image resolution), and showed that one could benefit from using all network tiers to distribute computations, minimizing multiple common bottlenecks (such as data transfers and limited computational resources). On the second study, I shifted the goal, and instead of simply looking for the fastest task completion optimization, I introduced energy-aware scheduling policies to optimize task energy consumption while keeping a good quality of experience. This work showed that it is possible to obtain significant energy savings with minimal impact on the users quality of experience

Guest Lecturer

Feb. 2021 -

Faculty of Sciences of University of Porto

I am currently a Guest Lecturer of the Databases [CC2005] course of the Bachelor's Degree in Computer Science and Master's Degree in Network and Information Systems Engineering. I am lecturing the Databases course to 2 classes (4 hours weekly).

PUBLICATIONS

1. Joaquim Silva. Simulation of Algorithms for Mobile Ad-Hoc Networks. Master's thesis, Faculdade de Ciências da Universidade do Porto, 2015.
2. João Rodrigues, Joaquim Silva, Rolando Martins, Luís Lopes, Utsav Drolia, Priya Narasimhan, and Fernando Silva. Benchmarking wireless protocols for feasibility in supporting crowdsourced mobile computing. In Distributed Applications and Interoperable Systems, pages 96–108. Springer, 2016.
3. Joaquim Silva, Daniel Silva, Eduardo R. B. Marques, Luís Lopes, and Fernando Silva. 2017. P3-Mobile: Parallel Computing for Mobile Edge-Clouds. In Proceedings of the 4th Workshop on

CrossCloud Infrastructures & Platforms (Crosscloud'17). ACM, New York, NY, USA, Article 5, 7 pages. DOI: <https://doi.org/10.1145/3069383.3069388>

4. Pedro Silva, João Rodrigues, Joaquim Silva, Rolando Martins, Luís Lopes, and Fernando Silva. Using Edge-Clouds to Reduce Load on Traditional WiFi Infrastructures and Improve Quality of Experience In International Conference on Fog and Edge Computing. IEEE, 2017.
5. João Rodrigues, Eduardo R. B. Marques, Joaquim Silva, Luís Lopes, and Fernando Silva. Video Dissemination in Untethered Edge-Clouds: A Case Study. In: Bonomi S., Rivière E. (eds) Distributed Applications and Interoperable Systems. DAIS 2018. Lecture Notes in Computer Science, vol 10853. Springer, Cham.
6. Tiago Castanheira, Joaquim Silva, Eduardo R. B. Marques, Luís M. B. Lopes. Simulation of mobile edge-cloud applications using Mininet-Wi-fi. INFORUM 2018.
7. Miguel Garcia, João Rodrigues, Joaquim Silva, Eduardo R. B. Marques, Luís M. B. Lopes. RAMBLE: Opportunistic Crowdsourcing of User-Generated Data using Mobile Edge Clouds. FMEC 2020.
8. Joaquim Silva, Eduardo R. B. Marques, Luís M. B. Lopes, Fernando Silva. Jay: adaptive computation offloading for hybrid cloud environments. FMEC 2020.
9. Joaquim Silva, Eduardo R. B. Marques, Luís M. B. Lopes, Fernando Silva. Energy-Aware Adaptive Offloading of Soft Real-Time Jobs in Mobile Edge Clouds. J Cloud Comp **10**, 38 (2021). <https://doi.org/10.1186/s13677-021-00251-9>

SKILLS

<i>Languages</i>	Portuguese (Mother Tongue) English (Fluent) Spanish
<i>Software</i>	Mininet-WiFi, ns-3, L ^A T _E X, MICROSOFT OFFICE, Linux, MacOS, Windows, Android, Emacs, Android Studio, IntelliJ IDEA, and Eclipse.
<i>Programming</i>	Good knowledge in Kotlin, Java, Python, Java for Android, TensorFlow, gRPC, C++, C, PHP, javascript, SQL (MySQL and SQLite), Haskell and Shell Script. Knowledge of VBA, MIPS-R2000, Shell, Prolog and R. Experience in CakePHP, MVC and parallel programming using MPI, OpenMP and Pthreads.
<i>Knowledge</i>	Networking technologies: WiFi, WiFi Direct, TDLS and Bluetooth, Cloud: Google Cloud Computing Platform and gcloud tool. Network simulation with ns-3 and Mininet-Wifi. Version Control: Git and Apache Subversion. Documentation: JavaDoc and Doxygen. Unit Testing: JUnit. Web Programming and databases: HTML (incl. HTML5), CSS. Data Mining using R. Markup: Markdown, XML (incl. XSD and XSLT transformations.) and HTML. Embedded Systems: Arduino and Raspberry pi (model B+, 2 and 3). Computer Graphics: OpenGL 3 and OpenCL.