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SUMMARY

My name is Kiko Fernandez-Reyes and I am applying for the Formal Methods Developer position. I will be finishing my PhD soon (end of December), and I would like to continue growing as engineer and researcher with Prover. I am used to work in an environment where there is uncertainty and I have an open mind when it comes to solving complex problems. I am a team player and can work independently, but I enjoy and learn much more collaborating with others.

AWARDS

- Distinguished Artifact Award at Software Language Engineering (SLE), 2019
- Distinguished Artifact Award at European Conference in Object-oriented Programming (ECOOP), 2019
- Best Paper Award at International Federated Conference on Distributed Computing Techniques (DisCoTec), 2018
- Best Paper Award at International Conference on Coordination Models and Languages (COORDINATION), 2018

SCHOLARSHIPS

- Scholarship from MINT [1] to present our gamification approach in an advance course at the Educational Symposium (EduSymp'18).
- Scholarship (*Beca de Proyecto de Colaboración, 2011*) from the Programming Language department at Universidad de Málaga, awarded with 3 000 Euros, to collaborate and expand the teaching platform of the NGO Doctors Without Borders (Médecins Sans Frontières).

ACADEMIC EXPERIENCE

PhD in Computer Science, October 2014 - December 2020

- I co-developed **a compiler in Haskell and runtime in C** for the concurrent object-oriented language Encore
- **The design of our Haskell compiler won an award**[2]
- I developed (mathematically and its implementation) **optimisation phases for Future abstractions and its compilation**
- **Won 3 awards for our different approaches to Future-based optimisations (code written in Scala)** [3] [4] [5]
- **Designed an optional and gradual type systems**
- Collaborated with **remote** researchers from New Zealand (+12 h difference)

[1] Centrum för Ämnesdidaktisk Forskning inom Matematik, Ingenjörsvetenskap, Naturvetenskap och Teknikvetenskap (MINT); (English) Center for Subject Didactics Research in Mathematics, Engineering, Natural Sciences and Engineering Science

[2] Distinguished Artifact Award at Software Language Engineering (SLE) 2019, for our paper with title **Developing a Monadic Type Checker for an Object-Oriented Language**

[3] Distinguished Artifact Award at European Conference in Object-oriented Programming (ECOOP) 2019, for our paper Godot: All the Benefits of Implicit and Explicit Futures

[4] Best Paper Award at International Federated Conference on Distributed Computing Techniques (DisCoTec) 2018, for our paper Forward to a Promising Future

[5] Best Paper Award at International Conference on Coordination Models and Languages (COORDINATION) 2018, for our paper Forward to a Promising Future

- I was main lecturer of Advanced Software Design course, teaching **OOP design patterns and UML** to more than 300 students in 4 years

INDUSTRIAL EXPERIENCE

Trifork Consultant (Backend Engineer), June 2013 – October 2014

- I developed a **Python** application deployed on Raspberry Pi to get information from RFID readers. The RFID readers had noise and reported false readings. I developed an algorithm that could remove 90% of false readings. The Python application communicates through a **REST API** to a Django-based application that showed in real-time the information from the RFID readers.
- I developed (in collaboration with other team members) an asset management application from scratch, written in **Clojure**. This software automated the process of getting stocks and a prediction algorithm according to a set of rules specified by the client. A process that took a month to perform manually was automated to 10 minutes.
- I developed a **Ruby on Rails** application for a client, which polls for the geolocation and generates reports for tax authorities, to certify that the client has not been in a country more than X number of days. The report generated a PDF.
- All of these projects were heavily tested using a Test-Driven Development approach, automated for easy of deployment using Capistrano, Ansible, and deployed on AWS, using Nginx, PostgreSQL, etc.

Software Engineer, February 2012 – May 2013

- I developed a social travelling platform, using Java and a document store database (MongoDB).
- The application was easy to scale and deploy on AWS
- My main duties was developing new features in the backend and integration with a mobile application that we developed using Sencha Touch 2 (JavaScript) and PhoneGap.
- All code was tested using Test-Driven Development.

EDUCATION

M.Sc. **Computer Science**
Universidad de Málaga, Spain

5-year Engineering degree in Computer Science where I took courses in parallel programming, statistics, neural networks, compilers, object-oriented, functional, and logic programming, among others.

M.Sc. **in Artificial Intelligence**
Luxembourg University, Luxembourg

Erasmus scholarship I did the first year of the Artificial Intelligence programme with focus on different logics, knowledge representation, and data mining.

VOLUNTEER

- **Student Volunteer**
  Student Volunteer Co-Chair of ACM SIGPLAN Conference on Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH 2019).

- **Promotion of Gender Equality**
  I have been the vice-chair of the ACM-W student chapter at Uppsala University for the last 3 years, promoting gender equality. As part of this activity, we successfully got a 6 000 $ grant from Microsoft, to continue promoting gender equality at Uppsala University. This led to the organisation of the Ada Lovelace celebration in 2017, where we brought international speakers and researchers to promote gender equality. We also successfully got a 30 000 SEK scholarship from ID24 to promote gender equality.
- **Promotion of Open Source technology**
  In my spare time I write articles at `opensource.com`. These articles are always posted also in different student channels to promote open source technology among students at Uppsala University.
- **Advocating for Privacy**
  I am part of a student chapter in Uppsala that promotes privacy and security technologies, ranging from topics such as email encryption to how to surf the web safely.
- **Bridging the gap between industry and academia**
  As part of promoting the open source technologies, I was accepted to Partial-Conf'18, where I explained how we have built the open source compiler for the language Encore, developed at Uppsala University (Partial'18 in Sofia).
- **Helping NGOs**
  To guide my Master thesis project, I did a collaboration with the NGO, Doctors Without Borders (Médecins Sans Frontières), where I was in close communication (remote work) with the e-Learning Project Leader Manuel Lorente, and where I built and designed a new Personal Learning Environment. This platform was integrated with their learning platform, Moodle. I also developed a REST API and a simple Android client application for ease of use.

FUN PROJECTS ***Type checker for an object-oriented language*** 2019

I developed (together with Elias Castegren) a type checker for an object-oriented language. We took inspiration from the implementation of the Encore type checker and wrote it Haskell. We started with a very basic type checker and added more advanced features with minimal changes to the compiler, using concepts such as monads, functors, monoids, monad transformers, typestate, and phantom types.

Automatic conversion of tests: parsing and code generation 2016

The Encore language transpiles Encore files into C files, which are linked to the runtime library to produce an executable. The idea of this project was to automatically update tests from the old Encore syntax to the new Encore syntax during a one day (8 h) hackathon. This task involed updating the code generation phase of the Encore compiler, to output Encore code using the new syntax instead of emitting C code, and creating a new parser for the new syntax. A flag was added to the compiler so that we can use the old parser, read test files, call the code generator that outputs new Encore syntax, parse the new Encore syntax, continue with the typechecking phase, call the C code generator and run the tests. It end up working quite nicely.

Prototype a parallel collection in Clojure 2016

Prototype implementation of the ParT parallel collection with influences of Orc combinators. The end result is a parallel collection that can create pipeline parallelism relying on futures and future chaining operation. The lack of types in plain Clojure

made me take some pragmatic decisions against the Encore implementation, such as flattening the structure due to lack of type information.

PROGRAMMING LANGUAGES

- *Java:* I have taught advanced software design patterns in Java from 2014 – onwards, and I have used it professionally during my industry experience for writing a scalable backend.
- *C:* I have used it to extend the concurrent Encore runtime, designed and developed a lock-free data structures as well as runtime libraries.
- *Haskell:* I have used it from 2014 – onwards to build the Encore compiler. I have influenced the design of the compiler, and used advanced typing extensions. I fear no monads nor arrows.
- *Scala:* I prototyped a research artifact and test the limits of the language. I wrote the implementation in an object-oriented fashion and toy with functional implementation written in terms of the indexed state transformer monad (but I did not succeed in making it perform good enough).
- *Python:* I used it when I worked in industry some years ago, to track the status of goods using RFID. The system interacted with a REST API, was running on a Raspberry Pi, and the information was displayed in a website as well as on an iPhone app.
- *Ruby:* I used it when I worked in industry some years ago, to geographically track the location of the user and generate a report as proof for to tax authorities. I worked on the REST API and it was integrated with an iOS application.
- *Clojure:* I used it when I worked in industry as the backend of a large asset management company, where the application generated reports and predictions on securities on the stock market.

ONLINE CV Please visit my LinkedIn profile and personal website

REFERENCES Upon request.