

# Diogo Castro

---

## *Curriculum Vitae*

---

### Summary

I'm a Software Engineer based in Belfast, United Kingdom.

My professional journey began as a C# developer, but Functional Programming (FP) soon piqued my interest and led me to learn Scala, Haskell, PureScript and even a bit of Idris.

I love building robust, reliable and maintainable applications.

I also like teaching and I'm a big believer in "paying it forward". I've learned so much from many inspiring people, so I make it a point to share what I've learned with others. To that end, I'm currently in charge of training new team members in Scala and FP, do occasional presentations at work and aim to do more public speaking.

I blog about FP and Haskell at <https://diogocastro.com/blog>.

---

### Experience

Nov 2017-Present **Principal Software Engineer**, *SpotX*, Belfast, UK.

**Senior Software Engineer**, *SpotX*, Belfast, UK.

Developed RESTful web services in Scala, using the cats/cats-effect framework and Akka HTTP. Used Apache Kafka for publishing of events, and Prometheus/Grafana for monitoring.

Worked on a service that aimed to augment Apache Druid, a timeseries database, with features such as access control, a safer and simpler query DSL, and automatic conversion of monetary metrics to multiple currencies.

Authored a Scala library for calculating the delta of any two values of a given type using Shapeless, a library for generic programming.

Taught a weekly internal Scala/FP course, with the goal of preparing our engineers to be productive in Scala whilst building an intuition of how to program with functions and equational reasoning.

I also train new hires and help them bridge the gap between what they already know and the world of FP in Scala.

May 2013–Nov 2017 **Senior Software Engineer**, *NantHealth*, Belfast, UK.

**Software Engineer**, *NantHealth*, Belfast, UK.

Responsible for designing, unit testing, implementing and deploying a variety of applications, such as:

- RESTful APIs, using ASP.NET Web API, ActiveMQ and Couchbase, MS SQL Server;
- Front-end single-page applications, using AngularJS, JavaScript / TypeScript, LESS;
- Internal libraries (e.g. for standardised logging and messaging) written in C#;
- An internal framework that acts as a concurrent general-purpose service host, handling multiple cross-cutting concerns;
- Routing of messages between applications using Java and Apache Camel.

I've also built some small internal tools to help streamline my coworkers' and my day-to-day activities, using Scala, Haskell and PureScript.

I helped organise a weekly Brown Bag Session during lunch hour, in which people talk about topics that interest them. Sometimes brought a kata (i.e. an exercise) for people to solve in a language of their choice, and share their solutions at the end.

Aug 2012–Mar 2013 **Researcher**, *Fraunhofer*, Porto, Portugal.

Developed the navigation module for an Android application, using both turn-by-turn and landmark-based approaches. Studied and compared the efficiency of these approaches in navigating older adults with mild dementia. Developed complex heuristics to evaluate landmarks data retrieved from OpenStreetMap, and used the device's sensors (e.g., gyroscope, accelerometer) to locate and navigate the user.

---

## Talks

Jan 2019 **The Haskell Epidemic**, *The Crystal Ball BASH*, Belfast.

A presentation about some of Haskell's most influential features and how Haskell has shaped the software engineering landscape.

Recording: <https://youtu.be/nnoOF1HeAls>

Slides: <https://talks.diogocastro.com/the-haskell-epidemic/>

---

## Open Source

- haskell-flatbuffers** <https://hackage.haskell.org/package/flatbuffers>  
Haskell implementation of FlatBuffers, a protocol for memory efficient serialisation, originally designed by Google. It uses TemplateHaskell for generating code from a given schema, megaparsec for parsing schemas and binary for low-level bytestring manipulation.
- csi-init** <https://github.com/dcastro/csi-init>  
Csi-init is a simple command line tool written in Haskell, which allows you to launch Roslyn's C# REPL (csi) preloaded with all the assemblies found in one or more directories.
- sequences** <https://github.com/dcastro/sequences>  
Sequences is a port of Haskell's immutable lazy lists or Scala's Stream[+A] to C#.
- DequeNET** <https://github.com/dcastro/DequeNET>  
A concurrent lock-free deque (double-ended queue) implementation in C# - push/pop/peek operations in constant time  $O(1)$  - and a regular deque implemented as a ring buffer.
- Contributed to AutoFixture** <https://github.com/AutoFixture/AutoFixture>  
AutoFixture is a .NET library designed to minimise the 'Arrange' phase of unit tests in order to maximise maintainability. It leverages runtime reflection to create complex object graphs containing randomised test data.
- JSend WebApi & Client** <https://github.com/dcastro/JSendWebApi>  
JSend.WebApi is an extension of ASP.NET Web API for designing APIs using the JSend protocol (<https://labs.omniti.com/labs/jsend>). JSend.Client is a library for consuming JSend APIs.
- Smaller contributions**
- mono-traversable: A Haskell library with typeclasses for working with both polymorphic and monomorphic containers.
  - Monocle: An optics library for Scala, inspired by Haskell's lens.
  - Circe: A JSON library for Scala.
  - Refined: A refinement types library for Scala, i.e. enables the constraining of types using type-level predicates.
  - Newts: Scala library with commonly used newtypes and associated typeclass instances.

---

## Projects

- 2048 AI** <https://github.com/dcastro/twenty48>  
An AI for the 2048 game using minimax and alpha-beta pruning, as described by John Hughes in the paper "Why Functional Programming Matters". The AI was written in Haskell and runs in a Yesod backend. The decisions are streamed to the browser via a websockets connection. The user's scores are saved in a PostgreSQL database. Deployed on AWS using Docker.  
Demo: <https://2048.diogocastro.com/>.

---

## Trainings

- 2016 **JavaScript Training**, *Instil Software*.  
Functional programming in JS, prototype inheritance, Angular.
- 2015 **Advanced C# Course**, *Instil Software*.  
Focused on concurrency, functional programming in C#, LINQ.

---

## Certificates

- 2014 **Microsoft Certified Professional - Programming in C#**, *Microsoft*.
- 2013 **Functional Programming Principles in Scala**, *Martin Odersky, École Polytechnique Fédérale de Lausanne*, Coursera.

---

## Education

- 2007-2013 **Master's in Informatics and Computing Engineering**, *Faculty of Engineering of the University of Porto*, Portugal.

---

## Skills

- Languages    General purpose: Haskell, Scala, C#  
                  Web: PureScript, JavaScript, TypeScript, CoffeeScript, CSS/Sass/Less  
                  SQL: MS SQL Server, MySQL
- Frameworks    Yesod, cats, Akka HTTP, ScalaCheck/QuickCheck/Hedgehog
- Tools          Git, Docker, Elastic Search, Apache Druid, Apache Camel, ActiveMQ
- Other          Experience in an agile setting, using Kanban and Lean principles.  
                  Property-based testing, test-driven development. Typed functional programming.