Diogo Castro

Education

2007-2013 **Master's in Informatics and Computing Engineering**, *Faculty of Engineering of the University of Porto*, Portugal.
Main Topics: Software Engineering, Project Management, Agile Development, Mobile Computing, Algorithms and Data Structures, Databases, Web Development, Artificial Intelligence, Distributed Systems.

Trainings

2015 **Advanced C# Course**, *Instil Software*.
Focused on concurrency, functional programming in C#, LINQ.

2016 **JavaScript Training**, *Instil Software*.
Functional programming in JS, prototype inheritance, Angular.

Certificates

2013 **Functional Programming Principles in Scala**, *Martin Odersky, École Polytechnique Fédérale de Lausanne*, Coursera.

2014 **Microsoft Certified Professional - Programming in C#**, *Microsoft*.

Skills

Languages General purpose: Scala, Haskell, C#
Web: PureScript, JavaScript, TypeScript, CoffeeScript, CSS/Sass/Less
SQL: MS SQL Server, MySQL

Frameworks Yesod, Akka HTTP, ASP.NET, Angular, Apache Camel, WinRT, ScalaCheck/QuickCheck

Tools Git, Docker, Elastic Search, Druid, ActiveMQ, Jenkins, TeamCity, Chef

Other Experience in an agile setting, using Kanban and Lean principles. Property based testing, test driven development. Typed functional programming.

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Experience

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.

May 2013-Jun 2014 **Software Engineer**, *NantHealth*, Belfast, UK.

Jul 2014-Nov 2017 **Senior 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, Castle Windsor, Bootstrap, Coffeescript, LESS, MS SQL Server;
- Front-end single page applications, using AngularJS, JavaScript / TypeScript;
- 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 I bring a kata (i.e. an exercise) for people to solve in a language of their choice, and share their solutions at the end.

Nov 2017-Present **Senior Software Engineer**, *SpotX*, Belfast, UK.
Developed RESTful web services in Scala and Akka HTTP, deployed using Docker.

Authored a Scala library for calculating the delta of any two values of a given type. Leveraged Shapeless, a library for generic programming, for automatic typeclass instances derivation.

I teach a weekly internal Scala/Functional Programming 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.

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Talks

Jan 2019 **The Haskell Epidemic**, *The Crystal Ball BASH, Belfast*.
A presentation about Haskell's most influential features and how Haskell has shaped the software engineering landscape.

Recording: https://youtu.be/nnoOF1HeAIs

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

Open Source

haskell-flatbuffers https://github.com/dcastro/haskell-flatbuffers

Work in progress. Haskell implementation of FlatBuffers, a protocol for memory efficient serialisation, originally designed by Google.

safe-buffer-monad https://hackage.haskell.org/package/safe-buffer-monad

An mtl-style typeclass that models a monadic buffer resilient to exceptions, written in Haskell. If an exception is thrown, the user will still be able to proccess the contents of the buffer up to the point where the computation was interrupted.

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/.

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 lists or Scala's `Stream[+A]` to C#. A `Sequence<T>` is an immutable lazy list whose elements are only evaluated when they are needed. It is composed by a head (the first element) and a lazily-evaluated tail (the remaining elements).

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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 an open source library for .NET designed to minimise the 'Arrange' phase of your unit tests in order to maximise maintainability. Its primary goal is to allow developers to focus on what is being tested rather than how to setup the test scenario, by making it easier 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

- 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: Newtypes and associated typeclass instances.

Projects

MetroTasks https://www.microsoft.com/store/p/metrotasks/9wzdncrdfxdk

Metro Tasks is a productivity application for Windows 8 / Windows RT that helps you keep track of your to-do's. The app features synchronisation with Google Tasks, type-to-search, tile and lock screen updates.

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