James Diffley

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Education

University of St Andrews 2018–2023

MSci (Hons) Computer Science, First Class

Graduated June 2023 with First Class Honours. Placed on Dean's List for exemplary academic achievement four years running (2019-2023).

Relevant Modules: Computer Architecture; Software Architecture; Computer Graphics; Language Processing; Signal Processing; Programming Languages; Artificial Intelligence; Visualisation; Concurrency and Multi-Core Architectures; Databases; Data Encoding; Operating Systems

Greenhead College 2016–2018

A Levels (grades AAAA) in Mathematics, Physics, Chemistry, Music

Work Experience

University of St Andrews 09/2020–01/2021

Undergraduate Research Assistant Scheme

- Developed a benchmark suite for **Idris 2** using **Bash**, under supervision of Dr. Edwin Brady. Idris 2 is a purely functional, **open source** programming language with first class types.
- Conducted profiling using **GNU** `gprof` to identify bottlenecks in the reference counting **C** runtime for Idris 2
- Gained experience working in an academic environment

Shrowze Ltd. 03/2020–04/2020

Web Developer

- Developed front-end for a content management system using **Angular** with both a public facing website and an admin panel to facilitate interaction with the database
- Worked as part of a team of 4 developers over the course of a month, testing and interfacing with API **microservices** written using **Node.js** with **Couchbase**
- Gained experience working on a real-world application for a client, using both **agile** and plan-driven methodologies

Projects

Generative Music — MSci Dissertation 2022–2023

- A four-month dissertation exploring real-time, endless generation of music and visuals
- Applied a Markov model to musical harmony, implemented in **Python** using a large dataset
- Backtracking constraint solver applied to the problem of chord voicing
- Real-time synthesis of audio using **Csound**, with visuals dynamically reflecting the musical material
- Highly interactive design, allowing users to become a part of the music

Real-time Collision Detection using Deep Learning — Stacshack 2023 2023

- Worked as part of a hackathon team of three to create a networked 3D game in **Kotlin** with **Processing**
- Delegated tasks effectively to achieve a complex piece of software under strict time constraints (24 hours)
- Clients can connect to lobbies and play against one another, implemented using sockets in **Python**
- Application of YOLO object detection model to a custom training set. Achieved very high accuracy in practice.

Federated Social Network — Software Engineering Team Project 2020–2021

- Following **agile**/**scrum** best-practices, produced a social network allowing propagation of markdown text posts, images and live chat. Work was done as part of a five-person team, split loosely into front- and back-end sub-teams
- Worked as part of the back-end team to build and test a robust HTTP server in **Go** serving our API.
- Helped to build a responsive, clean user interface using **Angular**
- Designed a relational database schema to capture a complex scenario
- As team leader, participated in weekly meetings with 10 other groups. Collaboratively developed a protocol allowing propagation of content between our different applications

Skills

Languages: Kotlin, Java, Python, C, C++, Rust, TypeScript, JavaScript, SQL, Go, Haskell, Prolog
Tools: Git, Linux, Angular, NodeJS, DBMS (e.g. MariaDB), UNIX utilities, Agile, Scrum
Skills: Confident programmer, Mathematics, Problem solving, Team player, Creative thinker
Other Interests: I enjoy making noise with my guitar and trumpet, partaking in hackathons, and consuming comedy