

Akilan Selvacoumar

CHERI researcher

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Edinburgh, United Kingdom

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Website: <https://akilan.io>

Github : <https://github.com/Akilan1999>

Skills

Fields:

1. Bluespec hardware engineer (PhD research on CHERI)
 2. Server Infrastructure
 3. Horizontal Scaling of Databases (i.e Vitess)
 4. P2P networks
 5. Kernel Development (CheriBSD a fork of FreeBSD for the CHERI architecture)
 6. Real-time streaming of flight simulations
 7. Software virtualisation (i.e Docker, Qemu)
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Experience

(Part-time) Software Lead / Konpanion

October 2025 - present , Edinburgh, United Kingdom

Part-time during my PhD research period to design and implement the back-end infrastructure and to setup P2PRC for p2p orchestration to scale workload in a zero-configuration manner.

DevOps / ESG360

March 2025 - January 2026 , Edinburgh, United Kingdom

Work 3 days a month during my PhD research period to maintain the back-end infrastructure and set standards for future server side development.

Senior Software Engineer / Karaz and Maman LLC

Oct 2021 - June 2024 , Remote

Maintaining/developing the backend for Karaz and other R&D projects associated with Maman LLC. The work below highlights the work done with Karaz and Maman LLC.

- **Error detection and correction:** Applied Reed-Solomon error correction to various data streams, ensuring accurate and efficient identification of copyright music. (Maman LLC)
- **Reverse engineered glucose devices:** Ported over various glucose devices to Karaz an unified platform designed for doctors and parents to track their kids glucose readings.
- **Lead backend development:** Was initially in charge of the entire backend team for Karaz helping the company to have the largest glucose patients user base in Saudi Arabia.

Core Developer / Peernet

Nov 2021 - November 2023 , Remote / Prague, Czech Republic

Implementing a p2p open standard for a pure decentralized protocol for content sharing.

Maintainer of repos:

- <https://github.com/PeernetOfficial/core> (The main protocol)
 - <https://www.youtube.com/watch?v=kWAwfkh4vOA> (Conf42 explaining the work done on the protocol)
- <https://github.com/PeernetOfficial/Peernet-test-framework> (Test simulation framework for the protocol)
- <https://github.com/PeernetOfficial/Abstraction> (Abstraction for the protocol, blog post: <https://gopheradvent.com/calendar/2022/peernet-protocol/>)
- <https://github.com/PeernetOfficial/core-android> (Prototype phone app to demonstrate the protocol).
- **Website:** <https://peernet.org/>

Maintainer / P2PRC

January 2021 - Present

Maintainer of a project I created and currently developing. P2PRC is a p2p network designed to orchestrate custom tasks on a P2P network. The project is built entirely using GoLang and is on the transition through language bindings for extendability:

Source code:

<https://github.com/Akilan1999/p2p-rendering-computation>

Derived from P2PRC:

<https://github.com/Akilan1999/remotegameplay>

- **Flight simulation:** Designing a streaming service for flight simulators (i.e X Plane) so that users can easily create automated workloads to test new flight sim workloads.
 1. <https://xplane.akilan.io/> (Landing page)
 2. <https://www.youtube.com/watch?v=WVDSVhMW7o4> (Prototype demo)
- **Distributed machine learning on a p2p network (Ray):**
Source code: <https://github.com/Akilan1999/P2PRC-Ray> (Still on progress, To be continued on September 2026)

Software Engineer Intern / PlanetScale

August 2020 - March 21 2021 , Remote / Mountain View, CA, United States

Working on an open source project to benchmark the project Vitess (A database clustering system for horizontal scaling MySQL) and contributed to the official Vitess repository.

Benchmark created:

Website: <https://benchmark.vitess.io>

More info: <https://akilan.io/projects/arewefastyet/>

Source code: <https://github.com/vitessio/arewefastyet>

Heriot Watt / Tech Club President

November 2018 - May 2021, Dubai , United Arab Emirates

My role as tech club president is to work on projects that seem to help towards building a strong community.

Links :

- <https://github.com/HWTechClub> (Open source projects)
- <https://github.com/HWTechClub/Reference> (Project lead during my term)

Education

Heriot Watt / PhD Computer Science

Jan 2022 - PRESENT

Modern out-of-order processors face growing Translation Lookaside Buffer (TLB) pressure as increasing memory footprints and pointer-intensive workloads lead to frequent address translation misses. These misses trigger costly page table walks that can stall instruction execution and reduce overall performance. We introduce **Fat Address Translations (FAT)**, a capability-aware memory allocation scheme that embeds allocation metadata within fat pointer capabilities and manages memory using block-based allocations inside huge pages, reducing reliance on conventional TLB-based address translation. To evaluate the architectural impact of FAT, we integrate and study the design within the **Bluespec-based** Toooba processor framework, enabling cycle-accurate exploration of memory-system behavior and TLB interactions. FAT reduces TLB walks by up to 99% and improves runtime performance by up to 11% on macro-benchmarks, while FAT Jemalloc achieves comparable benefits with minimal changes to existing software. These results demonstrate that capability-based addressing can substantially reduce translation overheads and that the Bluespec Toooba implementation provides an effective environment for evaluating memory-management innovations in modern out-of-order processors.

Supervisors: Rob Stewart<r.stewart@hw.ac.uk>, Hans-Wolfgang<h.w.loidl@hw.ac.uk> and Ryad Soobhany<r.soobhany@hw.ac.uk>

BlueSpec implementation of the changes done to the Toooba Fork:

<https://git.akilan.io/Cheri-research/Toooba>

- **Teaching Assistant:** Distributed and Parallel programming

Heriot Watt / Bsc (Hons) Computer Science

September 2017 - July 2021

- **Dissertation: p2p system for computation** (<https://github.com/Akilan1999/p2p-rendering-computation>)
- **Teaching Assistant:** Software Development, Data structure and algorithms and Functional programming languages.

Publications:

- ICITA conference 2021: "P2PRC a p2p network designed for computation"
- EuroPar 2022: Parallel processing workshop "Benchmarking parallelism with Uni-kernels"