Daniel Duclos-Cavalcanti
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SUMMARY

Creative thinker and problem-solver with a masters and bachelors in traditional german electrical engineering. Today, I am in New York, collaborating on research with Dr.Sivaraman (NYU) on distributed low-latency networking on the cloud.

TECHNICAL SKILLS

Languages: C, C++, Python, Golang, Rust, Bash, Lua, VHDL, Tcl, JavaScript, HTML/CSS
Tools: Terraform, Docker, Packer, AWS, Google Cloud (GCP), Git, Unix Shell, Makefile, CMake, Linux, Jenkins, Vim
Technologies: Cloud Computing, Computer Networking, Machine Learning, TCP, UDP, IP, FPGA, RTOS, IoT, HPC
Frameworks: ZeroMQ, DPDK, Tensorflow, TFLite, Numpy, Pandas, OpenMPI, OpenMP
Certificates: UCSD: Data Structures Fundamentals, UT Austin: Embedded Systems - uC I/O

EXPERIENCE

Research Assistant   Jul 2022 – Oct 2022
TU Munich   *Munich, Germany*
- Generated reports to establish a Design-Space Exploration framework to guide ML model deployments.
- Evaluated and compared the performance of various Machine Learning models across GPUs, CPUs and TPUs.
- Analyzed USB traffic through PyShark between the host and externally added TPUs.

Embedded Engineer Intern   Aug 2021 – Jan 2022
Molabo GmbH   *Ottobrunn, Germany*
- Developed tooling for state simulations of their electric motor via Linux's virtual CAN interface and mock APIs.
- Added unit-tests and code coverage to safety critical features of their motor drive embedded controller.
- Automated build and testing workflows via Jenkins and CMake for a team of over 10 engineers.

Tutor - Embedded Systems Programming Lab   Apr 2021 – Aug 2021
TU Munich   *Munich, Germany*
- Supervised and aided 20+ students on their final embedded FreeRTOS laboratory projects in C.

PROJECTS

Cloud TreeFinder | *GCP, Terraform, Python, C++, Distributed Systems, ZMQ, Protobufs*   March 2024 – Present
- Launches a cloud cluster and from it's pool of **N** VMs **forms** an optimal multicast tree of depth **D** and fanout **F**.
- Deploys probe jobs on randomly selected node subsets, collecting and processing resulting reports (JSON).
- Applies a developed heuristic from the collected data to select nodes in the tree layer by layer.
- Uses terraform to manage cloud state, ZMQ for node communication and Protobufs for data (de)-serialization.

Open-MPI Value Iteration | *C++, Multi-Threaded, HPC*   Sept 2021 – Feb 2022
- Asynchronous value iteration model to distribute workload on an HPC cluster.

PUBLICATIONS

Jasper: Fair Multicast for Financial Exchanges in the Cloud | *(Paper)*   Jan 24 – Present
- Novel cloud hosted financial exchange achieving low latency multicast service for up to 1000 market participants.
- Achieves better scalability and around 50% lower latency than the multicast service provided by AWS.
- Used kernel-bypass techniques (DPDK) to achieve ultra-low latency at up to 35K multicast packet rate.

EDUCATION

New York University: Courant Institute of Mathematical Sciences   Sept 2023 – May 2024
Computer Science - Visiting Non-Degree Graduate Student   *GPA 4.0*
- Co-Authored Publication: Jasper: Fair Multicast for Financial Exchanges in the Cloud
- **Related Coursework**: Operating Systems, Technologies in Finance

Technical University of Munich   Oct 2020 – **Sept 2024**
M.Sc. Electrical and Computer Engineering
- M.Sc. Thesis: **VM Selection Heuristic for Multicast Overlay Trees in the Cloud**
- **Related Coursework**: Machine Learning Methods and Tools, Embedded Design for Machine Learning, Chips Multicore Processors, Secure SoCs for IoT, High Performance Computing for Machine Intelligence

Technical University of Munich   Oct 2016 – Sept 2020
B.Sc. Electrical and Computer Engineering