QUENTIN KHAN

R&D SOFTWARE ENGINEER

pelikhan.xyz

qukhan

qukhan

LANGUAGES

French (native)

English (native)

Spanish (basics)

HOBBIES

- Squash (competitive, 17 years)
- Tap dancing
- Web tinkering

SKILLS

GNU/Linux
Libre Office
MS Office
C++
C
Bash
VueJS
CSS
Python
GNU Make
HTML
Java
WPS Office
Javascript
Valgrind
Apache
GDB
VM
CLI
SQLite
Git
SSH

REFERENCES

Contact info given upon request.

Guillaume Quintin
CEO at Agenium Scale

Alan Kelly
Software Engineer at Google

Charly Chevalier
Firmware App. Engineer at Ledger

WORK EXPERIENCE

R&D SOFTWARE ENGINEER | AGENIUM SCALE

May 2017 – Today, Gif-sur-Yvette, France

HPC, C++98/.../20, Python 3, SIMD, HTML/CSS/Javascript, VueJS, Algorithmics, Management, Business Development

- Development of high frequency image analysis systems.
- Development of SIMD optimised data manipulation routines in C++.
- Development of user interfaces for the aerospace industry.
- Software engineering for the automotive industry.
- Creation and coordination of training material for the company training subsidiary Agenium Campus (C++, Fortran, software engineering).
- Co-leader for the QUALIOPI certification of the training activity.
- Technical advisor for the exploitation of deep neural networks using FPGAs on-board satellites.
- Creation of a web platform for the e-learning activities.
- Feasibility assessment and workload evaluation of new projects.

RESEARCH ENGINEER | INRIA BORDEAUX – SUD-OUEST

November 2015 – April 2017, Bordeaux, France

HPC, C++11, Algorithmics, FMM

Development of an adaptive tree for the Fast Multipole Method. Several parallel implementations of the algorithm using shared and distributed memory model in the ScalFMM library.

INTERNSHIP | INRIA BORDEAUX – SUD-OUEST

February 2015 – July 2015, Bordeaux, France

HPC, C++11, Algorithmics, FMM

Creation of a balancing algorithm for a shared memory implementation of the Fast Multipole Method in the ScalFMM library developed by the HIEPACS team.

INTERNSHIP | REDBITE SOLUTIONS LTD.

June 2014 – August 2014, Cambridge, England, UK

Software Engineering, Java, Embedded Programming, Database Management

Continuous integration setup for the company projects. Development of a modular monitoring system for RFID readers.

EDUCATION

ENSEIRB-MATMECA

2012 – 2015 – Bordeaux, France

École Nationale Supérieure d'Électronique, Informatique, Télécommunication, Mathématiques et Mécanique de Bordeaux. Computer science cursus.

WORK EXPERIENCE DETAILS

R&D SOFTWARE ENGINEER | AGENIUM SCALE

I spent 4½ years at Agenium Scale, during which I had the chance to be part of many different projects.

- **Development of high frequency image analysis systems for railroad maintenance.** The aim of this project was to design and implement from the ground up an algorithm capable of analysing thousands of images per second in order to analyse the wear of overhead lines on-board of maintenance trains.
  This project was done in C++, with prototyping and done with Python and QML. It involved designing and testing the algorithm, generating theoretical test data sets as well as using real world ones provided by the client. The algorithm was multithreaded to take advantage of manycore machines.
- **Development of SIMD optimised data manipulation routines in C++.** These routines have been implemented in the Open Source library NSIMD (https://github.com/agenium-scale/nsimd) to load and store mangled data, for instance RGB pixel values, into packs of R, G and B values. Those were done by hand for patterns of 2, 3 and 4 values and for Intel (SSE2, SSE4.2, AVX, AVX2, AVX512), Arm (NEON64) and Power PC (VSX) architectures.
- **Development of a prototype user interface for the aerospace industry.** This project involved the creation of a GUI using C++ and the Qt framework that allowed monitoring the video feed of several cameras, redirecting it to an analysis module and displaying the results. The system was showcased a the Paris Air Show.
- **Software engineering for the automotive industry.** As a support engineer, my job was to design a C++ API and plugin system to let users make use of a mobility simulator. The support also entailed helping the client's team add new functionalities to the simulator and giving advice as to how performance could be improved.
- **Creation, coordination and presentation of training material for the company training subsidiary Agenium Campus.** I provided technical expertise to create courses in C++, Fortran and general software engineering.
  - C++: basics, good practices, undefined behaviour, multithreading, general performance optimisation.
  - Fortran: basics and general performance optimisations.
  - Software engineering: design patterns.
- **Co-leader for the technical aspects of the QUALIOPI course quality cerfitication.** The material I created was used to prove the quality of the company training material during the certification process.
- **Technical advisor for the use of deep neural networks using FPGAs on-board satellites**. My work for this project was to explore the use of Xilinx's FPGA development board (ZCU102) to run in-house deep neural networks. This was done using the DNNDK framework and its successor, Vitis AI. For both, I used the low level C API. I also got to tinker with lower-level FPGA programming using Verilog and the Xilinx Vivado SDK.
- **Creation of a web platform for the e-learning activities of Agenium Campus.** This internal project aimed at creating a new web platform to support the training activity of Agenium Campus for remote sessions during the pandemic. For this project, I assumed the role of lead developer. The backend was coded using Python with the Flask micro-framework and the frontend was developed using VueJS.

RESEARCH ENGINEER | INRIA BORDEAUX – SUD-OUEST

I spent a total of 2 years at Inria, counting my internship and my first job as a research engineer. There, I focused on developing and improving the in-house Fast Multipole Method (FMM) C++ implementation: ScalFMM (https://gitlab.inria.fr/solverstack/ScalFMM). The FMM is an algorithm that reduces the complexity of N-body system computation from n^2 to $n \bullet \log(n)$ by approximating long distance interactions.

- My work started with the construction of the FMM octree on multiple nodes using MPI. The construction of the octree entails sorting particles along a 3D curve that spans the simulated space (Z curve, Hilbert curve).
- I worked on studying a few multithreading strategies: conventional threading, task based threading and task based with dependency tracking using OpenMP and StarPU, in order to see which fitted best the algorithm.
- I studied the implementation of using an adaptive tree, with leaves at different depths, and studied its impact on execution time over several particle distributions.
- I started studying the distribution of the algorithm across several nodes. This entails dividing the tree and the tasks across nodes and choosing which computation results must be propagated to neighbouring nodes, how and when.