ARNO DUVENHAGE

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Software Engineer

Profile

Programming is awesome! I started with C++ while still at school. Discovered star-fields and doom fire in sweet 320x240. Was inspired by the PC demoscene, created my own graphics demos for school events and really wanted to make game engines.

Went on to study engineering. Worked on a Quake 3 Arena player model decoder and viewer just for fun. Became interested in AI, 3D graphics and aircraft flight dynamics. Created an air-to-air combat flight simulator as my final year engineering project.

Got a research and development job at South Africa's leading research institute and worked in the area of real-time modelling and simulation. Worked on simulation models for aircraft, missiles, air-defence guns, RADARs and command and control systems. Worked on 3D viewers and simulation based decision support tools.

Led the development of an in-house high-performance distributed real-time simulation framework, using C++. Extended this framework to integrate with a whole range of military systems to support live training exercises and field trials. Ran with all of this for about 10 years and helped many others to make use of the framework too.

Moved on to the earth observation and remote sensing domain as a Principle Engineer, working on vessel tracking and analysis. Enjoyed creating a high performance web-socket backend for realtime vessel data (using C++) — creating a whole web-server and data integration framework in the process. Used this a part of a vessel tracking system for the South African government. Also led the development of other web-based systems (using Python).

Left the research institute and joined Takealot, South Africa's largest online retailer, as a Senior Python Engineer. Currently working in the Supply Chain team, developing and maintaining micro-service based systems (with Python, Kafka and Kubernetes).

I like working in teams that deliver complex high performance systems.

Skills

- C++ (15+ years)
- Python (3+ years)

Worked in

- Realtime simulation
- Performance critical software
- Distributed and networked systems
- 3D Visualisation
- Web-development
- Location based tracking
- System integration

Worked with

- Qt and wxWidgets
- OpenSceneGraph
- OpenGL, DirectX, Cesium
- OpenAL, libopus & portaudio
- OpenCV
- Docker & Kubernetes
- Django, Flask & NGINX
- MySQL, PostgreSQL & SQLite
- RabbitMQ & Kafka
- Cmake (6+ years)
- Visual Studio (10+ years)
- Qt Creator (4+ years)
- Xcode (6+ years)
- HTML, CSS, Java-script
- Java, C# (limited experience)
- Digital Ocean & AWS
- NMEA, AIS, ADS-B, RADAR & Tactical data-links

Experience

CSIR, DPSS, *Principle Software Engineer*

(2005 – 2017)

Team lead and architect of a distributed real-time modelling and simulation framework within the Defence, Peace Safety and Security (DPSS) unit of the CSIR. The Council for Scientific and Industrial Research (CSIR) is South Africa's leading research and development organisation. Using C++, I designed and built all major components of the simulation framework These include: the multi-threaded and distributed model execution engine, 3D viewer, 3D audio for demos, external system and live links and even two-way radio relays.

I also developed many of the simulation models used for air defence simulations (aircraft, sensors, air defence guns and fire controls systems). Once or twice, I even got to develop 3D entity models using GMax for our 3D viewer.

The framework has been used by many different teams within the CSIR to create simulations and decision support tools for the South African defence force and local defence industry.

Part of my role was also to coach team members as well as members from the local industry on C++, software development, real-time simulation and system integration.

CSIR, Meraka, *Principle Software Engineer*

(2017 – 2019)

Working in the earth observation and remote sensing domain, I was part of a small team that created a vessel tracking system for the South African government.

I was in charge of developing the real-time high performance sensor information integration backend for the web-based system. This same framework was also use to build low-cost in-situ vessel and aircraft tracking sensors and cameras. I enjoyed this work a lot! Got to build and optimise my own C++ multi-threaded web-server and learned so much about web-sockets and web technology in general.

Also led the development of the backend, for a web-based land classification system (developed in Python).

Takealot, *Senior Software Engineer*

(2019 - present)

Takealot is South Africa's largest online retailer. As part of the Supply Chain team I help maintain the existing systems (micro-service based architecture, developed in Python) as well as help to successfully deliver new projects for the business. Takealot has a big engineering team and we use SCRUM daily, to plan and execute our work.

Most recently I designed and developed a new parcel label service (rendering label images) as part of a larger drop-ship project.

CSIR Awards

Outstanding Contribution by a Team, 2018
Oceans and Coasts Information Management System (OCIMS)

Outstanding Contribution by a Research Team, 2016
Rhino Poaching Prevention Team (CMORE)

Outstanding Impact Award, 2015
Technology to Combat Poaching Team (CMORE)

Outstanding Contribution by a Team, 2011
Mission Simulation Framework Team

Established Researcher, 2016

RGL Special Award: Macadamia Border Safeguarding Team, 2014

RGL Special Award, GBADS Team, 2013

Outstanding Technical Work by a Senior Researcher, 2013

Technical Leadership, 2012

Outstanding Contribution by a Team, 2011

Outstanding Contribution by a Team, 2010

Outstanding Contribution by an Individual, 2009

Outstanding Contribution by a Team, 2009

Education

I studied computer engineering (2000 - 2004). Some of my favourite subjects were programming and software engineering. Also completed a honours and masters degree while working.

While studying, I played quite a lot with 3D visualisation (software rasterisers, OpenGL and DirectX 9). Created a Quake 3 Arena player model file decoder and viewer using OpenGL. Ported all of it to DirectX and used it as the starting point for my final year project, which was an air-to-air combat flight simulator. At the time, I was very interested in aircraft flight dynamics. After I made some demos, I convinced my supervisor to take on the project and I enjoyed it a lot — did a whole networked player on player thing as well.

Degree(s)

- Software Engineering Masters, MEng (with distinction), University of Pretoria, South Africa, 2011, A Software Framework to Support Distributed Command and Control Applications

- Software Engineering Honours, BEng (Hons), University of Pretoria, South Africa, 2007, Specialising in Distributed Systems and Artificial Intelligence

- Computer Engineering, BEng (1st class), University of Pretoria, South Africa, 2004

Short Courses / Training

- Structuring Machine Learning Projects, Coursera, January 2020

- Python and Flask Bootcamp: Create Websites using Flask!, Udemy, January 2020

- AI for Everyone, deeplearning.ai, November 2019

- Google Cloud Platform Big Data and Machine Learning Fundamentals, Coursera, September, 2019

- Enterprise Architect Training, 2016, Pretoria, South Africa

- AnyLogic Advanced Training, 2011, Blue Stallion Technologies

- Multi-Sensor Fusion, 2005, Alan Steinberg, Johns Hopkins University, Washington DC, USA

- CCNA & CCNP (done as part of BEng course work)

Also presented some of my CSIR research at international peer reviewed conferences.

References

Available on request

Interests

Recently started playing with Raytracing — great fun!

C++ language updates

Home automation

Relocation

I am looking for opportunities outside of South-Africa. Also have family that recently relocated to Canada.

Looking for a software engineering opportunity in the game development or vfx industry. I believe I would enjoy it and be able to make a good contribution there.