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. Became interested in AI and pathfinding, 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 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 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 (using Python, Kafka and Kubernetes).

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

Skills

- C++, 15+ years
- Python, 2+ years

Worked in

- Realtime simulation and high performance computing
- Distributed and networked systems
- 3D Visualisation
- Web-development
- Location based tracking

Worked with

- Docker and Kubernetes
- Django, Flask and NGINX
- Digital Ocean and AWS
- RabbitMQ and Kafka
- Qt and wxWidgets
- OpenSceneGraph
- OpenGL and DirectX9
- Cmake
- Bootstrap.js
- OpenCV
- RTL-SDR (ADS-B & AIS)
- NMEA, AIS, ADS-B, RADAR and Tactical data-links

Experience

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 (developed in Python) as well as help to successfully deliver new projects for the business.

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

CSIR, Meraka, *Principle Software Engineer*

(2017 – 2019)

The Council for Scientific and Industrial Research (CSIR) is South Africa's leading research and development organisation. Working in the earth observation and remote sensing domain, I was part of a small team that created a vessel tracking systems for the South African government.

I was in charge of developing the real-time sensor information integration backend — a high performance web backend. Developed it from the ground up, in C++. This same framework was also use to build low-cost in-situ vessel and aircraft tracking sensors and cameras.

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

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. Using C++, I designed and built all major components of the simulation framework (execution engine, networking and distribution, 3D viewer, external system integrations and live links). I also helped develop many models used for air defence simulations (aircraft, sensors, air defence guns and fire controls systems).

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 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

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