Christian Blume, PhD

Experienced Software Developer

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bloomen
christian-blume

Summary

Results-driven, highly-experienced software developer with over 10 years of expertise in high-performance computing, machine learning, and software architecture. Proven track record in contributing to innovative projects, optimizing performance, and providing technical guidance. Holds a Ph.D. in geoscience, with peer-reviewed publications, conference speaking, and authorship of popular open-source libraries. Fluent in C++, Python, Rust, and experienced in Linux environments. Website: `https://bloomen.github.io`

Core Skills

Programming	C++ (11-20), C, Python, Rust, JavaScript, Java, Go, CUDA, Bash, UML, SQL, QML, Matlab
Libraries	Boost, Armadillo, Eigen, NetCDF4, HDF5, Qt, React, OpenMP, NumPy, Scikit, SciPy, Pandas, TensorFlow, Keras, IntelMKL, ROOT, LIBSVM, OpenCV, FFTW, inotify, dlib, LIBSVM, Curl, Juce, etc.
Domains	Machine Learning, High-Performance Computing, Low-Latency, Concurrency, Audio, Acoustic Sensing, Digital Signal Processing, Computer Graphics, Data Storage, Software Testing, Linux, Networking, Virtualization, Web Services
Languages	English (fluent), German (native), Spanish (basic), Mandarin (elementary)

Work Experience

Since Aug 21 **Principal Software Engineer** at **Nyriad** in Auckland, New Zealand.
- Contribute to UltraIO, Nyriad's converged storage solution exploiting both CPU and GPU
- Analyze UltraIO performance characteristics at block, file, and object level
- Pioneer a novel, highly-available cluster solution for file and object storage
- Develop a virtualization engine for UltraIO using QEMU/KVM for rapid deployments and testing
- Research erasure coding techniques on both CPU and GPU
- Assist development teams with researching features and resolving issues
- Provide technical guidance including software design & architecture
- Tech: Linux, C++, Python, Bash, ISCSI, RDMA, Samba, NFS, MinIO, S3, QEMU/KVM, REST, Pacemaker/Corosync, Keepalived, Networking

Apr 20 - Jul 21 **Senior Research Engineer II** at **Soul Machines** in Auckland, New Zealand.
- Contribute to the character animation engine of Soul Machine's Digital DNA Studio
- Implement novel high-performance strategies for predicting 3D geometries using machine learning and contribute to patented technologies
- Refine the facial animation engine of digital humans; collaborate with 3D artists
- Research and implement new methods to rapidly generate unique digital humans
- Design and implement various algorithms, e.g., expression transfer, geometry blending, laplace smoothing
- Develop efficient, low-latency software in C++ from libraries and command line tools to end user interfaces
- Mentoring, guide research engineers, literature and code reviews, unit testing
- Tech: Windows, Linux, C++, Python, Eigen, dlib, LIBSVM, OpenCV, Maya, Boost, HDF5, Visual Studio

Apr 19 - Mar 20 **Senior Software Developer** at **Mega Limited** in Auckland, New Zealand.
- Develop cross-platform software in C++ for Mega's desktop and mobile applications
- Implement a novel synchronization strategy that allows for the one-way transfer of data
- Various improvements to the open-source SDK, e.g., FAT filesystem support, two-factor auth, high-speed logging, better performance and stability

- Implement a tool to allow for the quick analysis of chat archives for monitoring purposes
- Focus on highly efficient and scalable solutions; Continuous integration and unit testing
- Tech: Linux, Windows, Mac, C++, C, Crypto, Qt, SQLite, gtest, inotify

Jul 16 - Mar 19 **Senior Software Engineer** at **Serato Limited** in Auckland, New Zealand.
- Build real-time applications (Serato DJ, Serato Studio) for the audio industry on Mac/Windows
- Develop object-oriented, multi-threaded, low-latency software in C++
- Improve graphical user interfaces using Qt and in-house GUI technology
- In-depth work with MIDI and audio interfaces and hardware
- Helped with releasing Serato DJ v2.0 and Serato Studio v1.0
- Unit testing, mentor fellow developers, sharing knowledge in seminars
- Tech: Mac, Windows, C++, Python, Bash, SQL, Qt, Boost, Juce, XCode, Visual Studio, LLDB, QML, Curl

Mar 14 - Jun 16 **Senior Software Developer, Team Lead** at **Fotech Solutions Ltd** in Calgary, Canada.
- Develop server-based Distributed Acoustic Sensing (DAS) applications on Linux
- Lead a team of four to five developers within an agile environment
- Build high-throughput, multi-threaded, low-latency software in C++ and CUDA
- Develop algorithms for data analysis, signal processing, and machine learning
- Design and implement novel noise floor estimation using support vector machines
- Design and implement a new data storage system based on HDF5 and lossless compression
- Real-time data processing, graph-based data flow, high-performance storage
- Unit testing, system testing in Python, and continuous integration
- Tech: Linux, C++, C, CUDA, Python, Ruby, Bash, SQL, SQLite, Qt, Boost, libunittest, Armadillo, NetCDF4, HDF5, LIBSVM, Eclipse, GDB, REST, Websockets, Curl

Jun 12 - Feb 14 **Software Developer** at **Blue Yonder GmbH** in Karlsruhe, Germany.
- Develop an automated cloud-based prediction service on Linux
- Object-oriented, high-performance software in Python and C++
- Build software for data analysis, web services, machine learning, user interaction
- Work with data scientists on improving predictions and feature understanding
- Build and test REST interfaces, in-depth work with relational databases
- Unit testing, system testing, and continuous integration
- Tech: Linux, Python, C++, Bash, SQL, Redis, PostgreSQL, EXASOL, Boost, CppUnit, NumPy, Pandas, Scikit, SciPy, Flask, GDB, REST, Nginx

Feb 09 - Apr 12 **Research Scientist** at **Freie Universität Berlin**, Germany.
- Predict stratospheric phenomena using machine learning and pattern recognition
- Compare methods such as neural networks and support vector machines including ensemble techniques
- Apply clustering techniques to gain insights and manage the feature space
- Develop novel high-performance applications to model high-dimensional, geophysical data
- Publish several peer-reviewed papers and present results at conferences
- Hold seminars in statistics and data analysis
- Tech: Linux, C++, Python, Matlab, Bash, NetCDF3, ROOT, TMVA, LIBSVM, FFTW, GDB, LaTeX

Sep 08 - Jan 09 **Intern** at **Siemens** in Munich, Germany.
- Build the prototype of a web interface for internal business processes using PHP and MySQL

Oct 07 - Jan 08 **Intern** at **IBM Research and Development** in Böblingen, Germany.
- Evaluate the Linux I/O Stack on an IBM Mainframe using C and C++

Education

Feb 09 - Apr 12 **Doctorate degree** in **geoscience** from Freie Universität Berlin, Germany.
Areas of research: Atmospheric interactions, stratospheric weather and climate patterns, prediction and pattern recognition, machine learning. Develop software in C++, Python, and Matlab for machine learning, signal processing, and data analysis.
Thesis: *Statistical Learning to Model Stratospheric Variability*.
`https://refubium.fu-berlin.de/handle/fub188/13901`

Oct 05 - Jan 09	**Master's degree** in **physics** from Technical University Munich, Germany. Specialized in particle and computational physics. Develop software in C++ for simulations and data analysis. Thesis: *Simulation of Frictional Cooling*. `https://bloomen.github.io/pub/simulation_of_frictional_cooling.pdf`
Feb 05 - Aug 05	**Study abroad** at Universitat de València, Spain. Majoring in physics.
Apr 03 - Feb 05	**Intermediate diploma** in physics from the University of Bonn, Germany.

Authored Open-Source Projects (Selected)

Hosted at `https://github.com/bloomen`

circbuf	*A circular buffer for C++20.* `https://github.com/bloomen/circbuf`
cxxpool	*A header-only thread pool for C++.* `https://github.com/bloomen/cxxpool`
densitas	*A C++ library for density estimation of regression problems.* `https://github.com/bloomen/densitas`
featureimpact	*A Python package for estimating the impact of features on machine learning models.* `https://github.com/bloomen/featureimpact`
gcl	*A tiny graph concurrent library for C++.* `https://github.com/bloomen/gcl`
libpca	*A C++ library for principal component analysis.* `https://github.com/bloomen/libpca`
libunittest	*A portable C++ library for unit testing.* `https://github.com/bloomen/libunittest`
gmlp	*A multi-layer perceptron trained via either backprop or GA.* `https://github.com/bloomen/gmlp`
rsgrep	*A simple version of grep implemented in Rust.* `https://github.com/bloomen/rsgrep`
scriptor	*A high-performance logger using unix/tcp sockets implemented in C++.* `https://github.com/bloomen/scriptor`
svmegn	*A C++ wrapper library around libsvm & liblinear using the Eigen linear algebra library.* `https://github.com/bloomen/svmegn`
transwarp	*A header-only C++ library for task concurrency.* `https://github.com/bloomen/transwarp`
vca	*A prototype for file indexing and discovery (C++, QML).* `https://github.com/bloomen/vca`

Public Speaking

Dec 2019	**A quick intro to Mega's open-source SDK** at Auckland C++ Meetup `https://github.com/bloomen/talks`
Oct 2017	**Using tasks to simplify concurrency in modern C++** at Pacific++ conference `https://youtu.be/xuL7rfkcWus`
May 2017	**transwarp - a header-only C++ library for task concurrency** at Auckland C++ Meetup `https://github.com/bloomen/talks`
Jun 2012	**Statistisches Lernen zur Modellierung von Stratosphärischer Variabilität** at Freie Universität Berlin. PhD Defense in German language. `https://bloomen.github.io/pub/phd_defense.pdf`
Sep 2011	**Can we statistically forecast sudden stratospheric warmings?** at 11th EMS Annual Meeting/10th European Conference on Applications of Meteorology (ECAM) (Berlin 2011) `https://bloomen.github.io/pub/forecast_of_ssw_abstract.pdf`
May 2010	**Investigating the occurrence of sudden stratospheric warmings with non-linear statistical methods** at General Assembly European Geosciences Union (Vienna, Austria 2010) `https://bloomen.github.io/pub/occurrence_of_ssw.pdf`

Publications

Mar 2022 C. Mauger, C. **Blume**, F. Marcon Swadel, J. Shin, S. Van Hove, T. Szu-Hsien Wu. *Conversational Digital Character Blending and Generation*. WO2023187730. Filed Mar 31, 2023. https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2023187730

Jul 2012 **Blume**, C., 2012: *Statistical Learning To Model Stratospheric Variability*. Doctoral thesis, Institute for Meteorology, Freie Universität Berlin. https://refubium.fu-berlin.de/handle/fub188/13901

Jul 2012 **Blume**, C. and K. Matthes, 2012: *Understanding and forecasting polar stratospheric variability with statistical models*. Atmos. Chem. Phys., 12, 5691–5701. https://www.atmos-chem-phys.net/12/5691/2012

Jun 2012 **Blume**, C., K. Matthes and I. Horenko, 2012: *Supervised Learning Approaches to Classify Sudden Stratospheric Warming Events*. J. Atmos. Sci., 69 (9), 1824–1840. https://journals.ametsoc.org/doi/full/10.1175/JAS-D-11-0194.1

Jul 2010 SPARC CCMVal, *SPARC CCMVal Report on the Evaluation of Chemistry-Climate Models*. V. Eyring, T. G. Shepherd, D. W. Waugh (Eds.), SPARC Report No. 5, WCRP-X, WMO/TD-No. X, 2010, C. **Blume** contributed to chapter 8. https://www.sparc-climate.org/activities/previous-activities/ccmval

Aug 2009 Bao, Y., A. Caldwell, D. Greenwald and C. **Blume**, 2009: *Frictional Cooling Demonstration at MPP*. Proceedings of COOL 2009, TUM1MCCO03, Lanzhou, China. http://epaper.kek.jp/COOL2009/papers/tum1mcco03.pdf

Feb 2009 **Blume**, C., 2009: *Simulation of Frictional Cooling*. Master's thesis, Max-Planck-Institute for Physics, Technical University of Munich. https://bloomen.github.io/pub/simulation_of_frictional_cooling.pdf

My favorite software related books

- *Clean Code: A Handbook of Agile Software Craftsmanship* by Robert C. Martin
- *The Clean Coder: A Code of Conduct for Professional Programmers* by Robert C. Martin
- *Design Patterns: Elements of Reusable Object-Oriented Software* by the Gang of Four
- *Template Metaprogramming with C++* by Marius Bancila
- *C++ Concurrency in Action* by Anthony Williams
- *A Tour of C++* by Bjarne Stroustrup
- *Effective Modern C++* by Scott Meyers
- *The Rust Programming Language* by Steve Klabnik & Carol Nichols et al
- *Programming in Python 3* by Mark Summerfield
- *The Go Programming Language* by Alan A. A. Donovan & Brian W. Kernighan
- *Quantitative Finance - An Object-Oriented Approach in C++* by Chapman & Hall

Hobbies

- Passionate about volleyball, running, and various outdoorsy activities
- Enthusiastic about coffee from growing to roasting to brewing
- Actively involved in contributing to open source projects

Please contact me for any further information or references.