NIKLAS HAAS

Staff Software Engineer — Performance Engineering, GPU Computing & Compilers

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Professional Summary

Performance engineering specialist with nearly 20 years of programming experience, including 7+ years optimizing production systems processing billions of operations daily. Serves as a technical committee member shaping technical direction of FFmpeg (2600+ companies) and VideoLAN (5B+ downloads), influencing decisions affecting operations at Meta, Google, Netflix, Spotify, Comcast, Twitch and more. Track record of 5x-10x performance improvements through SIMD optimization, GPU acceleration, and algorithmic innovation. Expert in low-level optimization, high-performance computing, GPU programming, and making data-driven tradeoffs between performance, quality, and complexity in production-scale systems.

Core Competencies

- **Performance Engineering:** Profiling, benchmarking, optimization achieving 5x-10x improvements in production systems; performance analysis and tuning for high-throughput, low-latency workloads

- **Low-Level Optimization:** SIMD programming (x86 SSE/AVX2/AVX512, RISC-V Vectors), assembly language, cache optimization, memory hierarchy tuning

- **Algorithm Design:** Developing novel algorithms and data structures; prototyping and validation; navigating tradeoffs between performance, quality, and complexity

- **Compiler Development & Language Design:** Designed and implemented 5+ domain-specific languages; experience with functional programming paradigms, type systems, program analysis, and code generation; applied programming language theory to solve practical optimization challenges

- **GPU Computing:** Vulkan compute shaders, GPU pipeline optimization, OpenGL/GLSL, parallel algorithm design for throughput-oriented workloads

- **Systems Programming:** C/C++, lock-free algorithms, concurrency, memory management, thread-safe data structures

- **Technical Leadership:** Design reviews, mentorship, cross-company collaboration (Meta, Dolby, Comcast), technical decision-making for projects with 50+ contributors

Professional Experience

Independent Consultant   *January 2024 — Present*
Self-employed · Full Time

- Provided specialized consulting on performance optimization, algorithm design, and feature development for multimedia infrastructure

- Led complete rewrite of FFmpeg's pixel format conversion system (libswscale), achieving 4-5x average speedup through novel runtime code generation approach combining SIMD fragments at runtime

Senior Software Engineer   *2021 — Present*

FFlabs SAS · Remote

- Core developer for FFmpeg, used by 2600+ companies including Meta, Google, Netflix, Spotify; work affects infrastructure processing billions of videos daily

- Led redesign of core format negotiation system, enabling support for advanced codecs across the ecosystem; coordinated implementation across multiple contributors

- Developed and published novel tone-mapping algorithm combining real-time frame analysis with psycho-visual models; algorithm adopted by multiple downstream projects

- Mentored junior engineers through code reviews and design feedback; 50+ substantial code reviews annually, focusing on maintainability, style, and correctness

- Authored first open-source implementations of industry-standard video technologies (Dolby Vision, ITU-R H.274, SMPTE RDD5, MV-HEVC), reducing industry dependency on proprietary solutions

- Debugged and fixed critical race conditions in multi-threaded processing pipeline affecting production deployments at major streaming companies

Software Engineer   *2018 — 2021*

Videolabs SAS · Remote

- Created and maintain libplacebo, a GPU computing framework integrated into VLC, mpv, and FFmpeg; processing millions of frames daily across diverse platforms

- Designed and implemented GPU-accelerated real-time video processing pipeline using Vulkan compute shaders, achieving 10x+ performance improvements over CPU-only approaches

- Implemented advanced algorithms for HDR tone mapping, upscaling, and color management, optimized for real-time performance on GPU

- Led Vulkan integration enabling HDR and Dolby Vision playback in VLC; feature used by 50M+ monthly active users

- Contributed fixes and debugging work improving stability of the Linux AMD ecosystem, used by millions of users including Steam Deck

Software Engineer   *2018*

Pebbles Digital Media · Contract · Remote

- Developed a Vulkan backend for use in multimedia applications

- Integrated libmpv for seamless video playback and control

System Administrator   *2015 — 2018*

Ulm University · Part-time · On-site

- Administration of Linux servers and user-facing systems for the computer science faculty

- Managed infrastructure, security, and reliability of critical university systems

- Provided technical support and troubleshooting for faculty and students

Leadership & Impact

Open Source Community Leadership

- **Technical Committee Member:** FFmpeg (50 active developers, 10,000+ commits/year) and VideoLAN (VLC media player, 200+ active contributors)

- Review and approve major architectural changes, set technical direction, resolve disputes on API design and performance tradeoffs

- **Mentorship:** Guided 10+ first-time contributors through their initial patches; several became regular contributors

- **Maintainership:** Active maintainer on FFmpeg, VLC, and libplacebo; reviewed and merged 1000+ pull requests

Project Leadership & Adoption

- **libplacebo:** Created and maintain GPU computing framework (3,700+ commits, 50 community contributors); integrated into VLC (5B+ downloads), FFmpeg, mpv and more (17,700+ GitHub references, 660+ stars)

- **libswscale:** Led team of 3 engineers through complete rewrite achieving 4-5x performance improvement; coordinated testing across 200+ supported formats and 5+ supported architectures

- **checkasm:** Overhauled benchmarking and correctness validation tool used by 10+ major projects including FFmpeg, dav1d, and x264 (350+ GitHub references); improvements reduced benchmark runtime and noise floor by 80%+

Technical Influence

- **Design Documents:** Authored 4+ technical design proposals for major architectural changes in FFmpeg

- **Conference Speaking:** Held 4+ presentations on optimization techniques and algorithm designs at VideoLAN Dev Days, fostering knowledge sharing across the community

- **Publications:** Author of technical documentation and blog posts; referenced during the hiring process at Open Broadcast Systems

Technical Skills

Languages: C (expert), Haskell (expert, functional programming), Assembly (x86/RISC-V), GLSL/HLSL, Python, Lua, Go, C++

Compiler & Language Design: Type systems, program analysis, intermediate representations, code generation, DSL design and implementation; experienced with functional programming paradigms and programming language theory

GPU & Parallel Computing: Vulkan, OpenGL, Compute Shaders, GPU Architecture, Pipeline Optimization

Performance Optimization: SIMD (SSE, AVX2, AVX512, RVV), Profiling (CPU, GPU), Cache Optimization

Systems: Linux, Threading/Concurrency, Memory Management, GPU Drivers (Mesa)

Domains: High-Performance Computing, Algorithm Design, Signal Processing, Codec Development, Real-time Systems

Tools: Git, GDB, GCC/LLVM, Meson, Docker

Leadership & Communication: Technical writing (design documents, performance analysis reports, public blog posts), cross-team coordination across distributed open-source communities

Education

Bachelor of Science in Computer Science
Ulm University, Germany   2014 — 2019
Graduated with highest honors

Honors & Awards

- **Landessieger Mathematik & Informatik** (State Winner), Jugend Forscht Baden-Württemberg 2013
  Project: Developed a Haskell library using type system metaprogramming to automatically track and verify physical units throughout computations, preventing dimensional analysis errors at compile time

Additional Information

- **Languages:** German (native), English (native), Norwegian (B2)

- **Location:** Currently based in Germany, open to relocation (e.g. Dublin, Zurich, Munich)

- **Work Authorization:** EU citizen (German)