

# Aaron Bannert

CTO - Software Engineer - Entrepreneur

## Summary

I am the lead engineer for AWS's HTTP Load Balancer product suite. Load Balancing is a fundamental building block of modern highly available internet services. Many of the world's largest products are built on AWS. Load balancing is not just for websites and mobile apps, but it's also a critical component of bank ATMs, restaurant kiosks, game consoles, payment processing systems, and countless other systems. My work has increased security, reduced downtime, and improved performance for a significant portion of the world's internet applications. When there are issues, I lead the charge to find and mitigate the issues in realtime, day and night, and then I lead the charge to diagnose and correct the error so that it does not repeat.

I hire and develop the top talent, creating an inclusive environment focused on learning, curiosity, and productivity. I believe people thrive in cultures that are psychologically safe, so I work to create an atmosphere that is free from blame and strong on good judgement. My teams deliver incredible value on short deadlines with industry leading security and quality.

Ultimately, I build high quality, high performance mobile and web products that users love. My deep knowledge of software engineering is powered by a relentless curiosity about computers, and comes from 20+ years of experience in the field, contributions to major open source projects (Apache, PHP), leading my own consulting firm, and as lead engineer of a major cloud provider's suite of HTTP load balancing products. My cross-functional experience allows me to bridge the gap between product design and software development.

## Experience

### Amazon AWS

Seattle

Jan. 2016 - Present

#### Principal Engineer

Principal Software Development Engineer for the teams that build and support Application Load Balancer (ALB), Classic Load Balancer (CLB), as well as S3's Load Balancer. During my tenure on ALB some notable launches are TLS 1.3 support, Unhealthy State Routing, Mutual-TLS, and Automatic Target Weights (target anomaly detection and mitigation). I work across AWS to drive improvements in security, availability, and blast radius reduction. My designs improve availability for the cloud, and work closely with the Network Load Balancer, API Gateway, WAF (Web Application Firewall), Shield (DDoS protection), and Route53 teams.

### Smart Ride

San Francisco

Jul. 2010 - Dec. 2019

#### Founder and CEO

Building the next generation of public transit freedom on your mobile device. We bring the world closer through ease of transportation, and achieve that with quick access to live, real-time transit information, trip planning, and location-aware transit tools.

Built a location-based public transit info app on iOS that is used by thousands of people each day in 130+ North American cities. Powered by high performance geo-spatial transit database serving 10s of millions of real-time vehicle arrivals per month on low-cost hardware. Transit routing system allows multi-mode and cross-agency routing in multiple time zones. Unified transit database created from municipal transit data in multiple formats, both real-time and schedule-based and kept automatically up to date. Built website to showcase our data capabilities and expand to more customers.

My many hats as Entrepreneur: Team Leader, Marketer, Mobile Developer, Business Development, Systems Architect, Server Admin / Cluster Designer, UI Designer, Performance Analyst, Scalability Expert, Web Developer, Cook, Janitor.

### Codemass

San Francisco

Apr. 2004 - Dec. 2019

#### Owner / Software Architect Consultant

Software Architects for hire. Specialized in leveraging high quality Open Source and Internet-related technologies to suit your particular needs at low cost and high quality.

Well versed in the full stack of modern web and mobile internet software architectures. Particularly focused on high-performance, massively-scaled systems both in the cloud and on private hardware. Deep experience in location-based mobile applications (iOS/Android/mobile-web), big-data mining (Hadoop ecosystem), natural language search (Lucene/Solr), path finding and routing (OpenTripPlanner), geo-spatial (PostgreSQL+PostGIS), real-time transportation (GTFS+GTFS-RT, NextBus API, OneBusAway), mobile-video (x264/ffmpeg on iOS), embedded Linux (ARM), custom Linux kernel drivers (TTY over JTAG), and other unique solutions.

## Contact Info

📍 Seattle, WA

✉ resume@aaronbannert.com

🔗 http://aaronbannert.com/resume

## Skills

- High Performance Web Architecture
- Massive Scalability
- Mobile Apps
- Mobile Web
- Responsive Web Design
- Distributed Systems
- Entrepreneurship
- Location-based Apps
- Low-latency Web Services
- Multi-platform Apps
- Open Source
- iOS
- Android
- Apache
- Cloud Computing (EC2)
- REST

## Education

### University of California, Irvine BS, Information and Computer Science

1995 - 2000

Specialization in Artificial Intelligence

Education Abroad Program in Bayreuth, Germany

## Projects

### Apache Software Foundation

Jun. 2001 - Present (22 years, 10 months)

Member. Former system admin, founding member of Incubator project.

### Apache Webserver

Jun. 2001 - Present (22 years, 10 months)

Member & Committer. Numerous contributions throughout the years on many aspects of the project.

Tend to focus on high performance. Primary author of the Worker MPM.

### Apache Portable Runtime (APR)

Jun. 2001 - Present (22 years, 10 months)

Member & Committer. Redesigned and reimplemented the multiprocessing APIs: threads, mutexes, conditions variables, semaphores, and shared memory systems.

### Apache Flood Load Testing Tool

Oct. 2001 - Present (22 years, 6 months)

Co-author. Designed the multi-process/multi-threaded aspects that allow Flood to scale to huge numbers of simulated client connections.

## **AXS.com**

Los Angeles

Jan. 2012 - Dec. 2012

### **Chief Architect**

Defined highly scalable, resilient and cost efficient architecture to support AEG's newly launched AXS.com ticketing and entertainment promotion website. Multi-faceted approach that took into account current team talents, available talent pool in Los Angeles, budget, business timelines, and other factors and designed a system based on PHP, Redis, Solr, PostgreSQL, Linux, Hadoop and other technologies. Included dynamic-scaling capabilities, support for both public and private cloud, and was able to use both legacy hardware and cloud-hosted hardware to minimize costs while maximizing performance.

Founded mobile project and helped craft AXS's early vision for the push into the mobile entertainment ticketing and marketing space.

Founded big-data initiative which was designed to assist in personalization of AXS.com, optimize marketing campaigns, and support analytics for entertainment venues.

## **Limelight Networks**

San Francisco

Nov. 2010 - Jul. 2012

### **iOS Software Consultant**

Built proof of concept for interactive video advertisement iOS SDK, including analytics hooks and video control overlay.

Led small team to implement real-time low-latency H.264 over RTMP video and audio decoding, in software, for iOS platforms. Delivered a drop-in SDK for use within other iOS projects, such as a real-time car auction app that required very low-latency audio/video for effective auctioneering.

## **Live Nation**

San Francisco

May. 2006 - Apr. 2010

### **Software Architecture Consultant**

Designed and helped implement a high performance Lucene-based search engine that survived multiple very high traffic surge ticket sales days.

Designed Livenation's 2nd generation website architecture. The primary challenge was building a site that could withstand massive ticket sales volume during brief periods of time, while efficiently serving nominal traffic load at other times. The original architecture had serious bottlenecks and was failing on large traffic days. Leveraged team's strengths and talents to build a new system that could be easily understood, maintained and improved upon. Designed seamless upgrade path that achieved 100x improvement in requests per second using the same hardware.

Designed and implemented a high performance, real-time XSLT processing engine to service livenation.com and replace obsolete IBM XSLT hardware at a fraction of the cost, and at higher performance and flexibility.

## **Technorati**

San Francisco

May. 2004 - May. 2007

### **Open Source Software Consultant**

One of the first few engineers at Technorati.

Wrote a "mux" that powered search queries on Technorati.com for many years. It was a multi-process, multi-threaded MySQL proxy that could parse SQL and then distribute queries across a sharded, 100+ node MySQL cluster. Was able to understand and perform aggregate queries even across shards (by combining raw results from each shard in a temp in-memory DB and then aggregating over the combined data).

Wrote a real-time link counting system that could predict the top news stories on major news sites about 15 minutes before those same news sites promoted those articles to be top articles (kind of like Twitter Trending, but 5 years ahead of its time).

Redesigned the Technorati server architecture to eliminate single points of failure, reduce bottlenecks and improve throughput and performance. New architecture prevented a catastrophic downtime during a major partial power outage at our Tier-1 data center.

## **American Arium**

Orange County, CA

Sep. 2002 - Mar. 2004

### **Open Source Software Consultant**

American Arium produced a powerful In-Circuit-Emulator (ICE) that could perform very low-level hardware debugging on ARM and Intel chips, and which gave engineers deep inspection tools and step-by-step control of their microprocessors.

Ported Linux to Arium's ARM-based reference board, and included support for a serial device, ethernet device, and a small flash drive (some of which were programmed at boot into an onboard FPGA). Set up cross-compiling toolchain for compiling the custom Linux kernel and for creating ARM-compatible userspace executables for the device.

Wrote a custom Linux kernel driver that allowed for running multiple TTY consoles over a multiplexed JTAG interface. This allowed ARM-Linux developers to interact with the Linux console of their device directly from within Arium's IDE, even if that device had no native console (critical for embedded ARM devices without displays).

## **Foodspotting**

Jul. 2009 - Aug. 2009 (1 month)

Hackathon Co-member. Original project contributor at iOSDevCamp Hackathon (we won for our category)

## **Snapfresh**

May. 2011 - Present (12 years, 11 months)

Co-Founder and Maintainer. Founding member during the Apps for Good Hackathon in San Francisco, which we won 1st place. Current system admin and project maintainer.

## **Plethora**

May. 2006 - Present (17 years, 10 months)

Author. Very high performance HTTP load testing tool.

**Covalent**

San Francisco

Aug. 2001 - Sep. 2002

**Software Engineer**

Major contributor to Apache 2.0. Redesigned Apache's handling of threads, mutexes, shared memory and other IPC mechanisms to be more efficient, easier to use, and more cross-platform friendly. Took over the Worker MPM project and did extensive improvements, performance tuning and testing. Contributed to mod\_php PHP plugin, and in numerous other major parts of both Apache 1.3 and 2.0.

Wrote an Apache "emulation" module that allowed for legacy support for Apache 1.3 modules running within an Apache 2.0 server, including verbatim support for the Apache 1.3 config files.

**eBuilt**Orange County,  
CA

Feb. 2000 - Aug. 2001

**Software Engineer**

C/C++/Java/Perl developer working on large-scale internet server and web-based applications. Helped design and implement a highly concurrent advertisement tracking and delivery system. Also installed and maintained numerous in-house development tools, including Bugzilla, CVS, ViewCVS, Mailman, and various internal webservers.