Benjamin Tobler Resumé

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ABOUT

I'm a software engineer working in distributed systems, networking & virtualization. My start in cloud was at AWS building EC2. I developed and owned the control plane hypervisor agent & VM resource manager from inception to GA. When EC2 expanded to VPC I owned development & delivery of VPC's control plane and APIs.

After VPC GA, I joined the nascent Amazon Aurora project where I developed the storage RPC stack, IO and task scheduling and coordinated DB engine storage client development between Palo Alto and Seattle teams.

At Oracle Cloud I owned the delivery of Virtual Machines, coordinating development and integration across networking, storage and compute teams. Later I designed & patented novel server arbitrated operations for OCC based database systems. The innovation eliminated common class commit conflicts that could cause performance & availability issues.

Recently I've been working in B2B on an EDI platform.

In the past I've worked in EFT implementing transaction processing platforms. I implemented 10K connection support for Java (before non-blocking IO support in the JDK) enabling customers to support entire fleets of POS and ATMs with a single transaction system. Additionally I implemented EMV support and a HSM vendor independent cryptographic library.

EDUCATION

M.Sc. Computer Science (Distinction), *Network Security Protocols*, University of Cape Town, 2005
Awarded NRF Prestige Scholarship for Masters study
Papers published in IFIP SEC 2004 Toulouse (.pdf) & ISSA 2003 Johannesburg (.pdf)

SELECTED PATENTS

US9223843, US9552242, US20170083565, US20210342311, US9055117, US8504691, US8190682

WORK

Oracle Cloud

2016 - 2021, Consulting MTS

Virtual Machines

Owned development Virtual Machine service and delivered within aggressive TTM goal. Coordinated development & integration across block storage, virtual networking and compute teams. Designed control plane architecture involving command distribution and state collation from VM hosts. Responsible for operational readiness at GA. Fast followed GA with competitor beating bulk provisioning for Gartner evaluation.

Responsible for post GA roadmap, including BYOI support. Owned delivery incremental customer post GA features & system functionality. Including capacity management automation, improved operational insights & troubleshooting tooling. Defined requirements for Bring Your Own Image to enable lift & shift of users' VMWare (etc) VMs to OCI. Implemented BYOI PoC integration of key technologies and planned development tasks and schedule.

Control Plane DB Service

Transitioned the internal database system used by OCI control planes from ORM style database library layer to a service using a cell architecture for tenant isolation to limit blast radius and mitigate noisy neighbours.

Developed novel transactor arbitrated operations. These commit time operations eliminate transaction aborts caused by hot key contention under common workload patterns. The innovation

means that concurrent transactions that would have aborted due to conflicts on, for example, incrementing quota counters or allocating from a pool of resources, can have these operations arbitrated and completed at commit time by the transactor.

Developed and PoC'd a new KV store leveraging existing distributed systems components and collaborated to use formal methods (TLA+) to verify strict serializability.

AWS

2005 - 2014, Senior SDE

Amazon Aurora

Developed high performance storage RPC stack, IO and task scheduling. Implemented and used zero copy, M:N user mode task scheduling, scatter-gather IO and resource partitioning and core assignment to achieve low latency, high concurrency log write request processing. Coordinated DB engine client developed and integrate against storage between Palo Alto and Seattle based teams. Profiled and optimized hot path to achieve close to line rate RPC capability.

Virtual Private Cloud

Owned development and delivery of the control plane frontend, user facing and internal APIs. The control plane processes API calls, from users and internal compute services, to modify virtual network topology, VM attachments, external routing and security ACLs. The API requests are converted into commands that it reliably delivers to 100,000s of hypervisors hosts and network & edge devices.

Collaborated with AWS Linux kernel team on successful effort to improve packet throughput on hypervisors. Achieved by moving source identification logic from control plane agent in user space, to a kernel module.

Extended and maintained the distributed firewall system that implements EC2 instance security groups across all the hypervisors in a data center.

Optimized in-memory representation of VPC network topology and security policy on hypervisors to support massive VPC & EC2 scaling while making efficient use of limited dom0 hypervisor memory.

EC2

Developed & and owned the EC2 control plane hypervisor agent & VM resources coordinator from conception through GA. The agent manages the VM lifecycle on each of the many thousands (now millions) of hypervisor hosts. Implemented collaborative peer boot image download when original pre-GA object storage read capacity was highly limited.

Implemented internal and public tooling and microservices, including AMI packager and up-loader CLI, dynamic DNS vendor and intra data center network rate limiting to mitigate noisy neighbours.

Helped grow the EC2 team in Seattle by ramping up new team members tasked with developing new EC2 networking and security functionality.