Boston, MA

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Christopher Pacejo

Experienced network and storage systems programmer and distributed systems architect with a strong background in formal techniques.

I am a...

- detail-oriented engineer, attentive to the big picture
- self-motivated and independent multidisciplinary learner
- creative and practical system architect

My employers ask me to...

- lead groups in design and specification of novel highly-performant and highly-reliable distributed systems
- empower peers by giving accessible and informative presentations on complex topics
- evaluate, propose, and implement solutions to system-wide architectural issues
- provide technical guidance for critical decisions
- research academic literature and technical specifications to fully understand a problem space

My peers seek my help with...

- navigating solution spaces of novel cross-disciplinary problems
- validating correctness of complex high-level designs
- solving low-level data-path performance issues
- learning unfamiliar systems and languages
- understanding obscure language semantics issues

Ask me to share more about...

- developing a 31-qubit GPU-accelerated quantum circuit simulator
- proving correctness of distributed algorithms running on eventually consistent storage
- developing competitive AIs to play my two favorite board games
- simulating the output stage of an analog drum machine in software

Experience

2020–present **Amazon/Amazon Web Services** (Boston, MA)
Software Development Engineer II, File Gateway team

- architected next-generation file server caching proxy, adding support for high availability, enhanced durability, crash-consistent disaster recovery, and nondisruptive data migration
- designed and implemented new metadata cache storage engine to eliminate scaling and startup time issues
- maintained integrations with two critical open-source data path components, including triaging and fixing mutliple performance and stability issues encountered when integrating new versions
- regular on-call responsibilities including triaging network misconfigurations, data path performance issues, and software stability issues
- mentored teammates on the use of network and data-path diagnostics tools such as WireShark, `ss`, `sar`, `openssl`, `sysfs` and `procfs`

2018–2020 **NuoDB** (Cambridge, MA)
Software Engineer, indexing team

- developed formal verification framework for distributed object replication protocol in TLA$^+$
- applied automatic theorem solver (Z3) to discover bugs in code refactor
- developed and formally verified online algorithm to reduce arbitrarily large histograms with logarithmic memory overhead
- advised redesign of networking subsystem to minimize latency and stalls

Specialties

Languages: C++; C; Python; Java; F♯/.NET; OCaml; Prolog; assembly (various); SQL; CUDA; domain-specific language (DSL) design

Formal verification: TLA$^+$/PlusCal; SMT; Z3; Coq

Systems programming: GNU/Linux; concurrency/multi-threading; inter-process communication; queueing; scheduling; network processing; optimization

Distributed systems: distributed algorithm design and verification; eventual consistency

Storage: replication; write-ahead logging (WAL); block/SAN; file/NAS; object/cloud

Networking: Ethernet; IPv4; IPv6; TCP; HTTP; REST; XML

Security: X.509 PKI; TLS/SSL; OpenSSL

- took on responsibility for orphaned feature (distributed statistics collection), delivering several solutions to ease immediate customer pain points

Databases: PostgreSQL; LMDB; schema design; indexing

2014–2018 **CLEARSKY DATA** (Boston, MA)
Consulting Engineer (2018–)
Principal Software Engineer (2014–2018)

- designed and formally verified distributed algorithm to transfer ownership of portions of petabyte-scale copy-on-write data structure
- designed, implemented, and formally verified system for fail-safe non-disruptive cross-datacenter migration of data path services
- applied formal verification to discover bugs and verify fixes in data path interaction with eventually consistent storage
- designed and implemented failover mechanism for highly-available and robust NFS & SMB frontend appliance
- designed and implemented system for non-disruptive asynchronous upgrade of data path services
- architected non-disruptive migration path between highly-available synchronously-replicated relational database services
- provided technical expertise in the use of PostgreSQL, HTTP, TCP, X.509/TLS, Pacemaker, and POSIX/Linux networking and block APIs
- gave technical talks on PostgreSQL, REST, TLA$^+$, and several internal topics

2014 **EMC/XTREMIO** (Hopkinton, MA)
Senior Software Engineer

- designed networking strategy for asynchronous data replication protocol
- developed protocol for configuration synchronization within replicating pair

2011–2014 **CORERO NETWORK SECURITY** (Hudson, MA)
Software Engineer

- designed and implemented system to generate inter-process communication layer and resource assignments for multicore processor from interface definitions (US Patent 9,442,782)
- developed 40 Gbps network packet classifier and queueing system
- designed and implemented 20 Gbps packet capture and indexing application
- developed instruction scheduler for VLIW processor

2009–2010 **BROWN UNIVERSITY** (Providence, RI)
Research Assistant, Computer Science department

- co-taught graduate course on reduction semantics

Education

2008–2010 **BROWN UNIVERSITY** (Providence, RI)
Ph. D. candidate, Computer Science

2002–2008 **WORCESTER POLYTECHNIC INSTITUTE** (Worcester, MA)
M. S., Computer Science (2008)
B. S., Electrical & Computer Engineering (2006)