Jeffrey D. Nelson

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Summary

Senior Software Engineer with 10 years of experience designing, developing, debugging, and maintaining complex software systems. Strong background in distributed systems, cloud networking, and cloud infrastructure. Passionate about security/privacy and its intersection with networking and distributed systems.

Experience

Amazon Web Services Austin, TX

Software Development Engineer, Tools as a Service (TaaS) ***Mar 2024 – April 2025***

- Led design and development of code execution engine leveraging Typescript and AWS CDK. Implemented regional fail over to improve redundancy and EC2 auto-scaling to improve scalability.
- Designed and implemented strict authentication/authorization model for access to service resources in corporate network. Documented and presented service threat model, service monitoring strategy, and penetration testing strategy.
- Maintained and provided operational support for five web services deployed on AWS as part of oncall responsibilities.
- Mentored peer Amazonians to grow their technical and communication skills, focusing on defining clear and measurable outcomes for growth.

Software Development Engineer, Elastic Kubernetes Service (EKS) ***Aug 2022 – Mar 2024***

- Developed features for the Amazon Virtual Private Cloud (VPC) Container Networking Interface (CNI), including IPv6 Security Groups for Pods, iptables-nft support, and more.
- Led maintenance effort and long-term design strategy for the AWS VPC CNI.
- Led effort to improve VPC CNI scalability, specifically decreasing the number of Kubernetes API server calls by 10x, decreasing EC2 API calls by a factor of N, and decreasing application memory consumption by 2x.
- Developed and maintained operational pipelines across the EKS ecosystem, focusing on continuous delivery, observability, and security.
- Debugged and provided support during customer oncall escalations, helping customers recover from outages, detect issues, and increase availability and reliability.

Arista Networks Austin, TX

Software Project Lead, Network Gateway Solutions ***Feb 2021 – Aug 2022***

- Led a team of software engineers in architecting, implementing, and testing network gateway solutions based on Border Gateway Protocol (BGP). Solutions drew from customer requirements and IETF standards and were primarily geared toward data center interconnect.
- Developed testing framework to improve and evaluate gateway solutions based on convergence time, memory utilization, hitless restart, and vendor interoperability; utilized internal tooling along with industry tools including Valgrind, InfluxDB, and Telegraf.
- Helped architect new userspace virtual switching agent to implement forwarding and functionality for protocols not supported by the Linux kernel; design focused on memory and computational efficiency of packet processing.
- Debugged and provided solutions for customer production and development networks experiencing issues related to VxLAN, BGP/EVPN gateways, and software-based forwarding.
- Worked with Solutions Engineers to develop and debug customer proof of concept networks.

Software Engineer, Network Virtualization Overlays ***Nov 2017 – Feb 2021***

- Designed and implemented customer requests for networking features related to virtualization overlays and software-defined networking.
- Implemented and maintained software forwarding support for protocols including Virtual Extensible LAN (VxLAN), Multiprotocol Label Switching (MPLS), and Ethernet OAM.
- Refactored VxLAN packet software processing pipeline to decrease memory usage by 5x, primarily through use of a shared memory model.
- Developed, implemented, and maintained testing frameworks for validation and evaluation of features.
- Worked with technologies and frameworks such as Docker, OpenConfig, and OpenFlow.

IBM Austin, TX

Logic Design Engineer, POWER Processor ***July 2016 – Nov 2017***

- Designed, implemented, and debugged POWER ISA microarchitecture in the Memory Management Unit, utilizing skills in RTL design and knowledge of processor architecture.
- Validated and debugged POWER9 hardware implementation in Virtual Bringup Lab. Developed tooling to automate validation and debugging of ISA implementation.

Community Service

Austin ISD Victory Tutoring Austin, TX

Volunteer Tutor ***Jan 2024 – Present***

- Tutored and assisted students in grades 2 through 9 with homework and test preparation.

Education

The University of Texas at Austin Austin, TX

M.S. in Electrical and Computer Engineering ***Aug 2018 – Dec 2021***

Relevant Papers: *Speculative Messages*, *Community Segmentation*, *Parallel Barnes-Hut*

The Pennsylvania State University University Park, PA

B.S. in Computer Engineering ***Aug 2012 – May 2016***

Minor in Information Sciences and Technology

Technical Skills

Languages: Golang, C++, C, Java, Python, TypeScript, Bash

Frameworks/Expertise: Kubernetes, Cloud Networking, AWS CDK, NodeJS