Aviral Singh LFX-Antrea-T1

PROPOSAL

Comparison of Antrea BPF Generation for PacketCapture

I discovered this opportunity through the CNCF/mentoring repository and Slack channel, and I am excited about the prospect of working on cloud-native, open-source applications.

As an aspiring software engineer with proficiency in TypeScript, Rust, Go, BPF/eBPF, Kubernetes, and Docker, I am eager to contribute to Antrea which is a CNCF project providing Kubernetes networking based on Open vSwitch. Antrea's mission to deliver efficient, scalable networking solutions for Kubernetes aligns with my passion for low level systems programming and production grade infrastructure tools. I see this mentorship as a unique opportunity to work on packet capture optimization, gain deep expertise in BPF filter generation, and collaborate with experienced maintainers in the CNCF ecosystem.

I have been actively contributing to the Antrea project, focusing on fixing critical race conditions, enhancing networking features, and improving reliability.

You can view my contributions and pull requests here:

In addition to my contributions, I have created detailed flow diagrams of the Antrea codebase to illustrate key components, data flow, and integration points. This visual not only deepens my own understanding but also serves as a quick-reference resource for contributors and maintainers.

You can view the diagrams in this album.

What are your time commitments during the mentorship term?

Throughout the LFX period, I will allocate approximately 40 hours weekly to project related tasks, including coding, testing, documentation, and communication with mentors. I don't have any other engagements. Although as a pre-final year engineering student, I have two academic windows respectively -> Feb 26 to March 3 & May 2 to May 11, where I'll be offline for exams. I plan to front load my tasks leading up to these dates to ensure we stay on track with the deliverables.

What do you hope to get out of this mentorship experience?

Through this mentorship, I hope to deepen my understanding of BPF internals and packet capture mechanisms while applying my learned understanding and engineering skills to

testing infrastructure. I am particularly interested in building an automated 'source of truth' validator, using tcpdump as the reference implementation to programmatically verify Antrea's BPF output; this would directly validate the accuracy and correctness of Antrea's packet filtering mechanisms. Working with experienced mentors in the production networking infrastructure will help me grow both technically and professionally, while making impactful contributions to the open-source community and learning the engineering practices that make CNCF projects reliable at scale.

Coding Challenge (An MVP for the Antrea PacketCapture feature):

As per the mentorship test task I have produced a poor-man's version of the Antrea PacketCapture feature that implement a Kubernetes controller that runs as a DaemonSet and performs packet captures on demand

You can view my implementation here.

Sincerely,

Aviral Singh

aviral02singh@gmail.com

GitHub (Aviral)