LFX Mentorship Showcase @ OSS India

Contributions to Antrea: Kubernetes Networking with Open vSwitch

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THE LINUX FOUNDATION
OPEN SOURCE SUMMIT INDIA

LFX MENTORSHIP SHOWCASE

ANTREA

About Me

- CS undergrad at IIT Kharagpur
- New member of the Kubernetes and Antrea Community
- Member of Kharagpur Open Source Society(kossiitkgp.org), a student led club at IIT Kharagpur
- Interested in systems programming, performance tuning and networks.
- Casual photographer, avid reader and movie geek

What is Antrea?

- Antrea is a Kubernetes-native networking and security solution powered by Open vSwitch for high-performance Pod networking.

- It Handles:
  - Kubernetes network policies
  - Load balancing
  - Multi-cluster networking
  - Observability & Policy enforcement

- Cross-platform support: Linux + Windows

Antrea Architecture

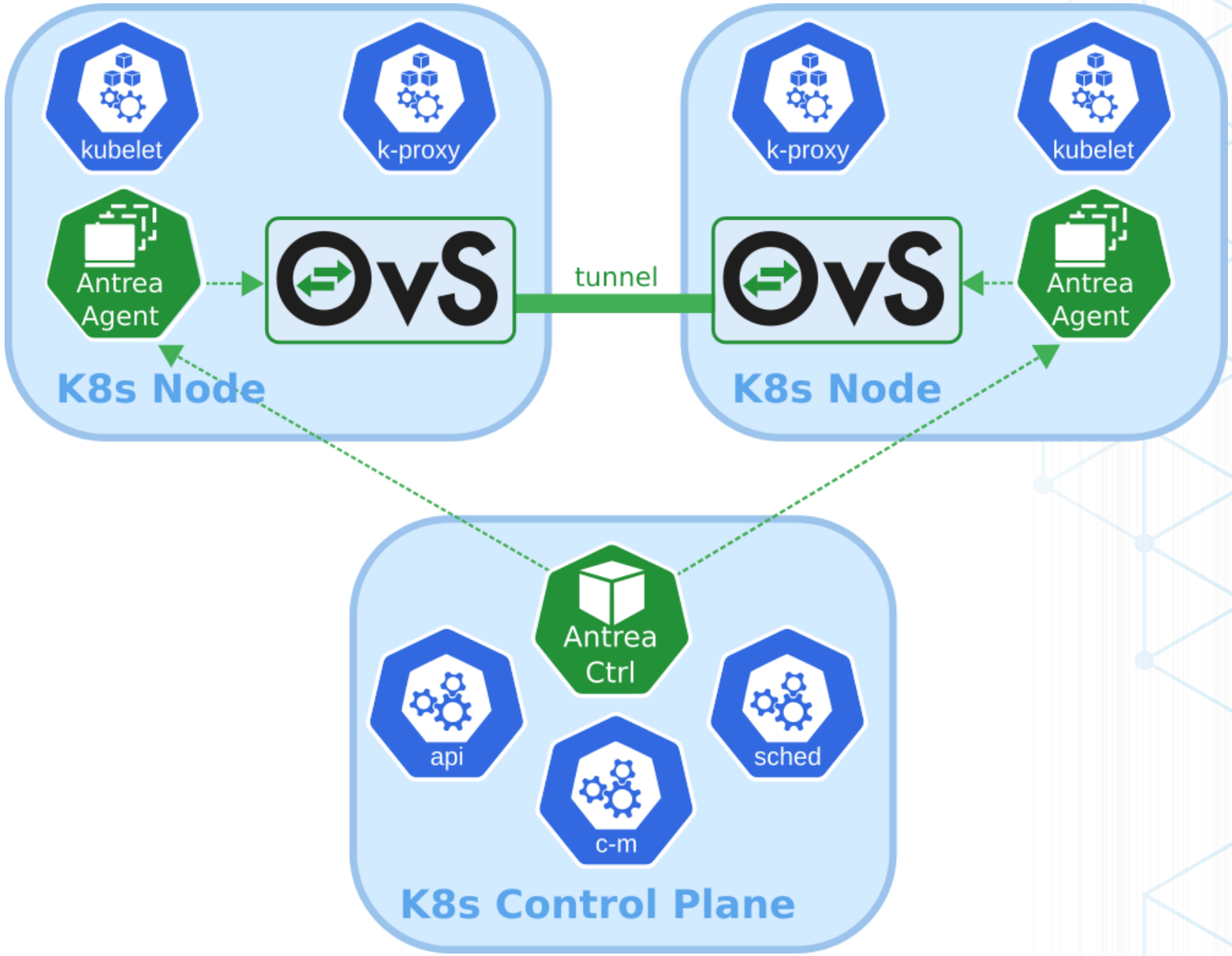


Image source:https://github.com/antrea-io/antrea/

Antrea Architecture

- **Antrea Controller:**
  - Watches Pods, Namespaces, and NetworkPolicy objects.
  - Computes policies centrally → distributes to relevant nodes only.
  - Exposes a Protobuf-based REST API (via kube-apiserver proxy).
  - Scalable, memory-resident, single source of policy truth.

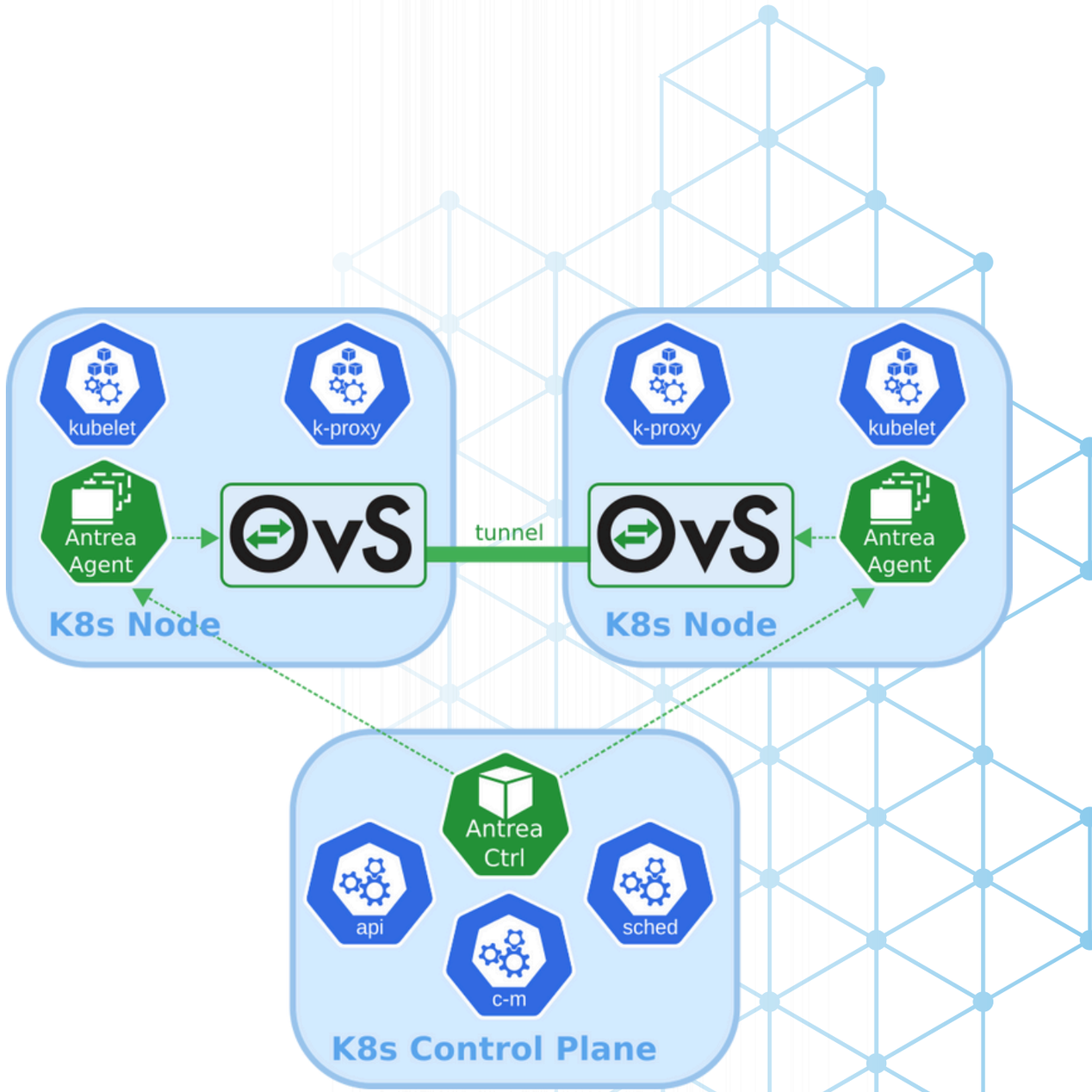


Image source:https://github.com/antrea-io/antrea/

Antrea Architecture

- **Antrea Agent (on every node):**
  - Manages local Pod interfaces using Open vSwitch.
  - Connects new Pods to the OVS bridge.
  - Handles CNI calls via a local gRPC service.
  - Installs flows for routing and enforcing NetworkPolicies

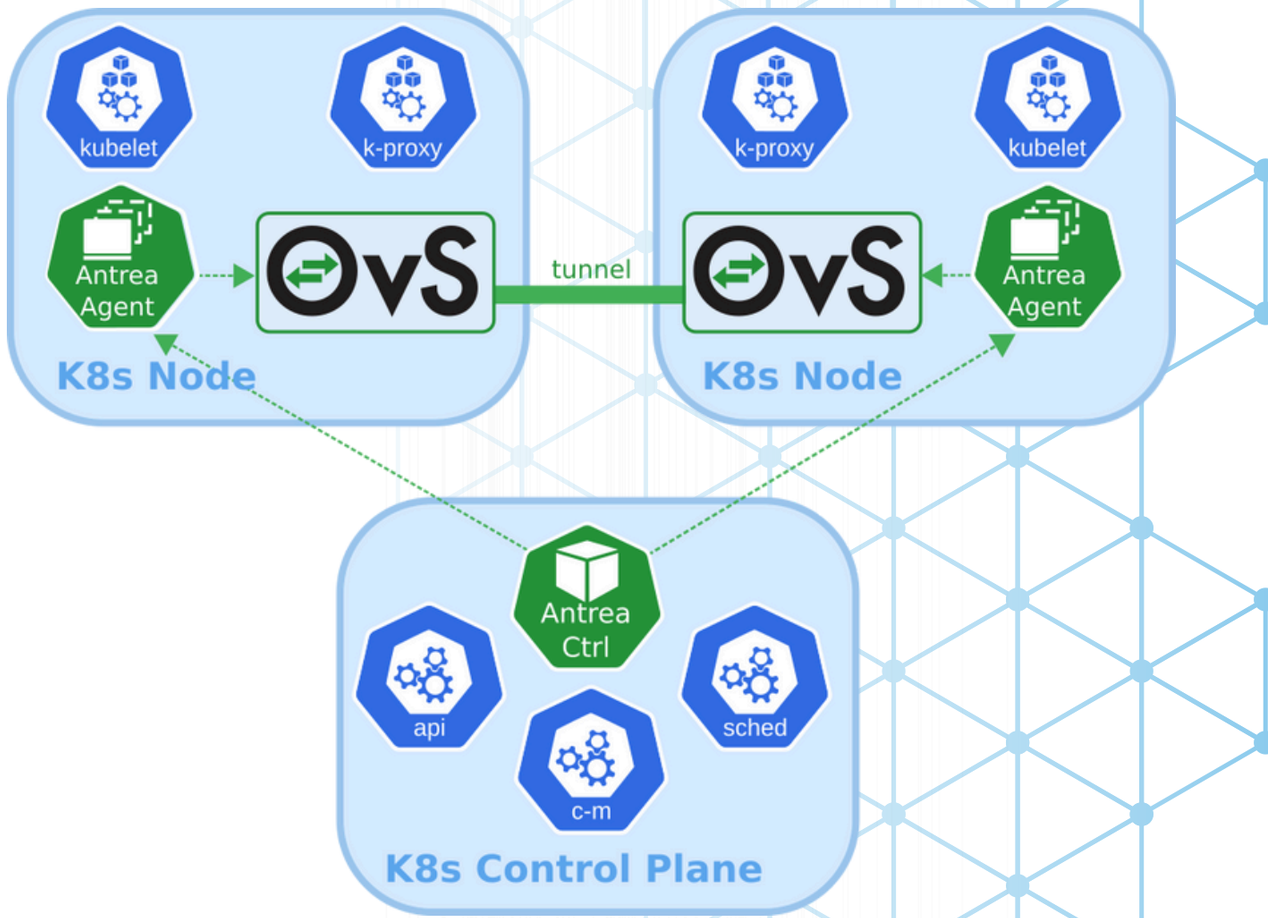
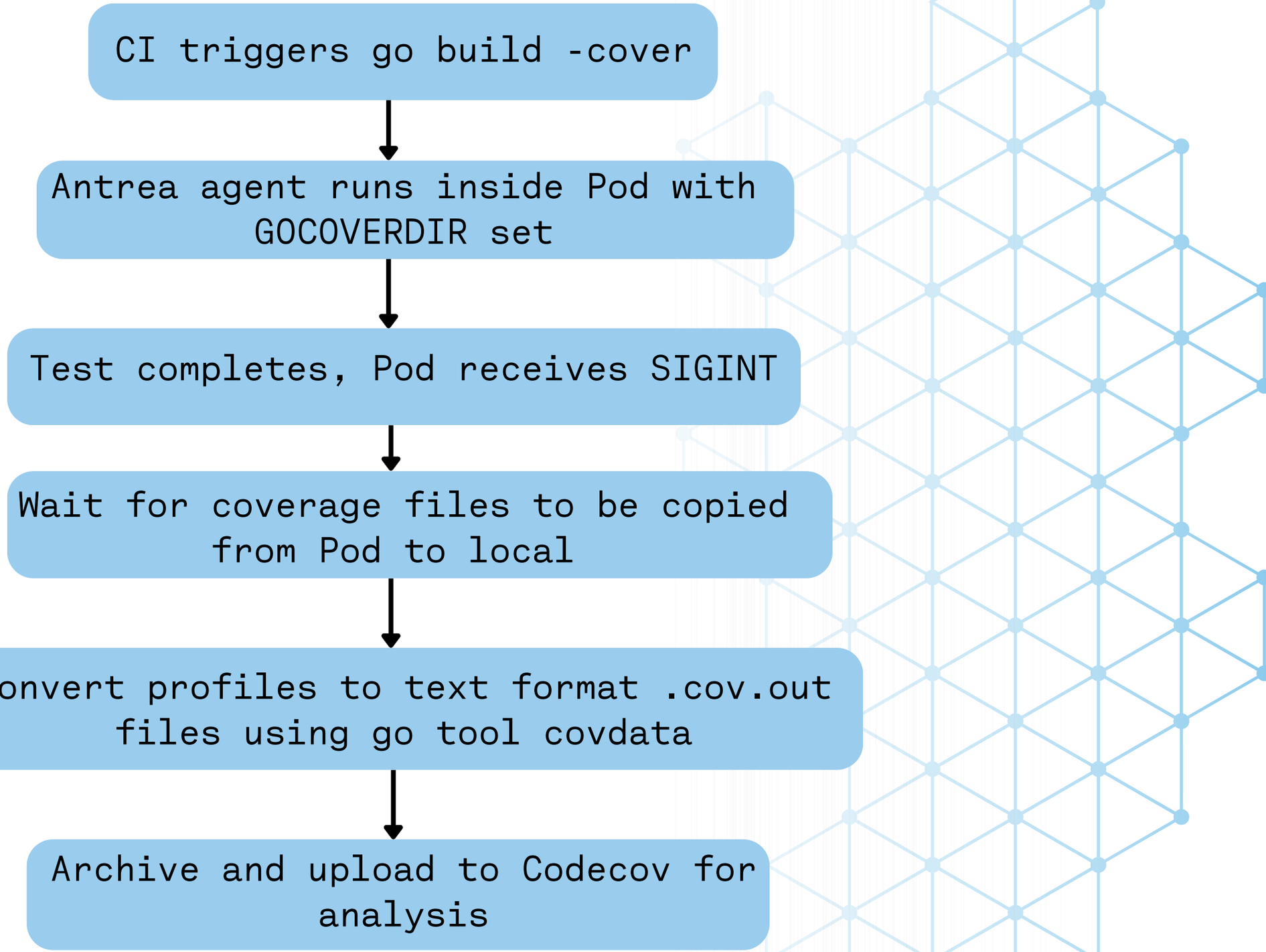


Image source:https://github.com/antrea-io/antrea/

My Work in Antrea - Coverage Tooling

- Before: Used Bincover to measure test coverage
  - limited, verbose, non-native
  - difficult to maintain across CI and support complex integration tests
  - difficult to obtain data from pods
- Go 1.20 introduced:
  - `go build -cover -coverpkg=...`
  - `GOCOVERDIR` env
  - `go tool covdata` to merge profiles

Coverage Workflow



My Work in Antrea - Helm Charts

- Helm is a package manager for Kubernetes
- Enables templated deployment using yaml configs
- Introduced Helm-based manifest generation for Windows deployments
- Ensured consistency with Linux manifest generation flow, which already uses Helm
- Unified deployment workflow across platforms

What I learned

- Working on a real production system with a large codebase

- Understanding large-scale open source workflows:
  - PR reviews
  - CI/CD jobs
  - Documentation & test requirements

- Writing platform-agnostic scripts

- Community etiquette + async collaboration

Other Projects

IQPS - Intelligent Question Paper Search

- Crowd-sourced platform to find past year question papers
- used by 2000+ of students on campus
- open-sourced, with 20+ contributors

HyperKV

- In-memory key-value store based on RESP protocol
- Written in pure C, focusing on performance and simplicity

References

- Antrea Github: https://github.com/antrea-io/antrea
- Bincover: https://www.confluent.io/blog/measure-go-code-coverage-with-bincover/
- The Go blogs and docs:
  - https://go.dev/blog/cover
  - https://go.dev/doc/build-cover

Thanks for listening!

Let’s Connect

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