Ryan Kavanagh

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Summary — System Lead with over 4 years experience of architecting and delivering 'SecureRedact' an ML powered application, with proven expertise in Rust, Typescript and Kubernetes. Through technical leadership and innovatively addressing customer problems, have developed a product from infancy to its current state of having more than 100 new signups a week while obtaining over $10 million in funding.

Skills

Languages Rust, C++ , Typescript, Python
Frameworks Axum, Tokio, Gstreamer, React, Node.js
Devops AWS, Azure, Docker, Kubernetes, Helm, Istio, ArgoCD, Rabbitmq, Github Actions
Databases PostgreSQL, Redis, LevelDB, Cassandra, DynamoDB

Experience

Pimloc **Jan 2021 – Current**
System Lead

When I joined Pimloc I was the third engineer and "SecureRedact" had one customer. Presently, "SecureRedact" is averaging over 120 new signups a week, there are three private clusters deployed, and two additional on-prem deployments. Given the nature of work at a startup I've worked across the stack.

Frontend

- Orchestrated and implemented a full rewrite of the website, managing the system team to successfully deliver the project within a 6-month time frame, directly supporting a subsequent multi-million dollar investment round by enhancing user experience.
- Engineered and integrated WebAssembly (WASM) client-side Single Object Tracking (SOT), utilising AsyncGenerators to establish an interactive user-ML feedback loop, significantly improving user engagement with tracking features.
- Set up a client-side bounding box cache using IndexedDB API, achieving a 10x performance improvement in video seeking for previously viewed section.
- Used the AudioContext api to facilitate precise audio playback and guarantee edits will match what is in the final video.
- Implemented frame-accurate client-side video navigation using existing custom video data.

Backend

- Developed a proof-of-concept Gstreamer encoding/decoding pipeline for a "Selective encryption" patent. Demonstrating that it was possible for secure, conditional unredaction of a video during playback.
- Created a custom Gstreamer plugin, written in Rust, that injects data to a h264 encoded video through the SEI unregistered user data NAL.
- Collaborated with our ML team and altered our C++ video reader to give the ML team access to the h264 motion vectors using libraries from ffmpeg. Which improved tracking results, thus reducing manual work for our customers.
- Extracted the part of our pre-existing monolithic system that handled user edits into a new service, which was built using the axum framework. To maintain backwards compatibility, created a "-sys" crate to handle ffi bindings to levelDB.
- Addressed customer requests for fine-grained access controls by migrating the authorization system from legacy SQL to Google Zanzibar - inspired SpiceDB, improving system flexibility.
- Enabled the product to handle audio only files by writing a transcription service utilising WhisperX. Which improve user's ability to redact keywords from an audio stream across all medias and allowed.

Devops & Workflow

- Enhanced release reliability and streamlined deployment processes by transitioning Kubernetes resource management to a declarative GitOps model using ArgoCD and version control, replacing a less stable Python script-based approach.
- Migrated our Kubernetes clusters from Nginx ingress to use istio as a service mesh on EKS & AKS.
- Led the change from single AWS account to a multi account approach improving security and cost management.
- Incrementally changed our git workflow from feature branches to branch per environment to trunk based development.
- Made achieving SOC 2 compliance easier by proactively introducing CI pipelines across our repos github actions and installing Renovate for dependency management, allowing sales to close multiple enterprise deals for clients that required SOC 2.
- Improved the reliability of provisioning our infastructure by setting up terraform plans being generated during PRs and applied on merge.
- Allowed sales to preview upcoming features to clients and enabled us to release more features safely by introducing feature flags. Leading to earlier feedback on novel features and better customer engagment.
- Created a 'request for comment' (RFC) repository for large decisions to establish reliable documentation and to encourage our developers to look into prior art, promoting shared learning.

Education

University of Oxford **Oct 2015 – Jul 2019**
Master of Physics

A Levels **Jul 2014**
Maths, Further Maths, Physics & Philosophy

References

Available on request