Envoy Research

# Research Questions

In this section important research questions will be asked and answered. This will help with the deeper understanding of how computer networking works from the eyes of a software engineer, and in turn help with the understanding of what Envoy is and how it works.

* What is microservice architecture?
* How does an API request usually works?
* What was the OSI model, and is it relevant here?
* What are ports and how do they work?
* What is a proxy?
* What is the difference between a proxy and a reverse-proxy?
* What is network balancing and when and how is it used?

1. Microservices & Networking

What are the advantages and challenges of microservice architectures?

How do microservices communicate with each other (e.g., HTTP, gRPC, TCP)?

What are the common patterns for service discovery in microservice architectures?

How does service-to-service authentication work in microservices?

2. Proxies & Load Balancing

What are the key functions of a Layer 7 proxy?

How does Envoy perform load balancing (strategies like round-robin, least-request, etc.)?

How does Envoy compare to other popular proxies (like HAProxy, NGINX)?

3. Envoy-Specific Concepts

What is Envoy, and what problems does it solve in a microservice architecture?

How does Envoy manage traffic routing between services?

How does Envoy handle resilience features such as circuit breaking and retry policies?

How does Envoy handle observability (metrics, logging, and tracing)?

What is Envoy’s role in a service mesh (e.g., with Istio)?

How does Envoy support communication protocols (HTTP/1.x, HTTP/2, gRPC)?

4. Security

What are the security implications of using a reverse proxy?

How does Envoy handle TLS termination and mutual TLS (mTLS)?

How can Envoy enforce authentication and authorization policies?

5. Configuration & Deployment

How is Envoy typically deployed (sidecar pattern, standalone)?

What is the structure of Envoy’s configuration file?

How does dynamic configuration and control plane interaction work in Envoy (e.g., xDS APIs)?

How does Envoy integrate with orchestration systems like Kubernetes?

6. Performance and Optimization

What are the performance considerations when using Envoy in a high-traffic environment?

How does Envoy’s performance compare to other reverse proxies in terms of latency and throughput?