Service Mesh

What is it?

An infrastructure layer that facilitates *communication*, as well as *observability*, *security*, and *load balancing* between discrete components of a microservice application.

How does it work in the context of distributed systems?

A service mesh consists of two key components:

1. Proxy instances called **sidecars**:
    - Attached to each service instance
    - Handle communication to and from the service instance
    - Also take care of monitoring and security
    - Service instances, sidecars, and their interactions form the "**data plane**" – this refers to the fact that this is the part of the architecture that carries user traffic
2. The **"control plane"**:
    - Oversees creation of service instances, and implementation of network security and management protocols
    - Often connected to a GUI for application management

Why is it beneficial to a technology organization?

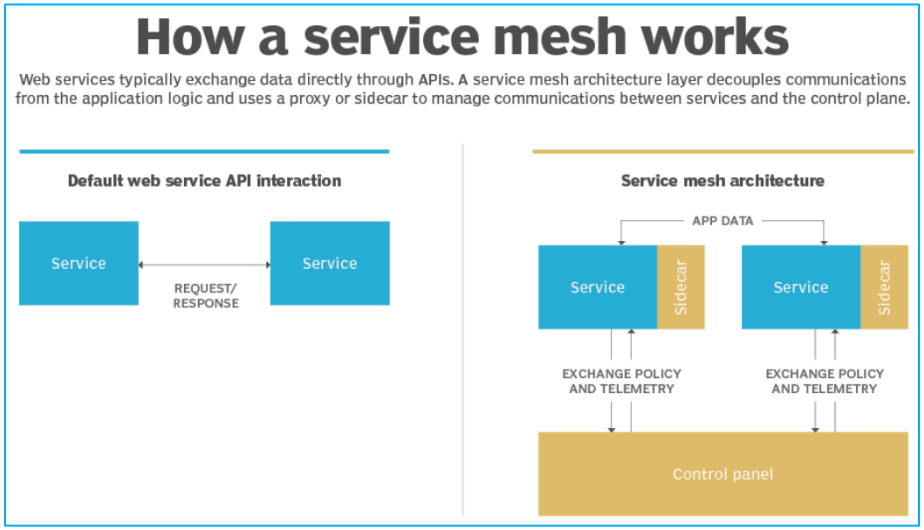
- Abstracts inter-service communication from business logic
- Simplifies resolution of communication-related bugs
- ↑ # of microservices == ↑ benefits of using a service mesh
- Automates much of the process of scaling

What are its use cases?

- **Highly regulated industries**: Service meshes allow consistent and uniform implementation of security protocols.
- **Optimizing application performance (and debugging):** Increased observability can help highlight a whole host of problems.
- **Meeting rapidly growing demand:** A service mesh automates away the creation of new service instances, allowing an application to seamlessly handle increasing traffic.

Drawbacks

- A developer is required to set up and configure a service mesh
- Service meshes can be very costly
- The control plane could act as a single point of failure
- Extra step involved in communication (passing through side car) could result in increased latency



Sources: What is a Service Mesh and How Does it Work? (techtarget.com); Service Mesh & Your Infrastructure | NGINX Learning; Evaluate key service mesh benefits and architecture limitations (techtarget.com)
Helpful: Above + Service Mesh concept explained in plain English | by Alex Burnos | The Startup | Medium (provides intuition for the why of service meshes)