

Building Distributed Applications with Go

Elements of a Distributed System



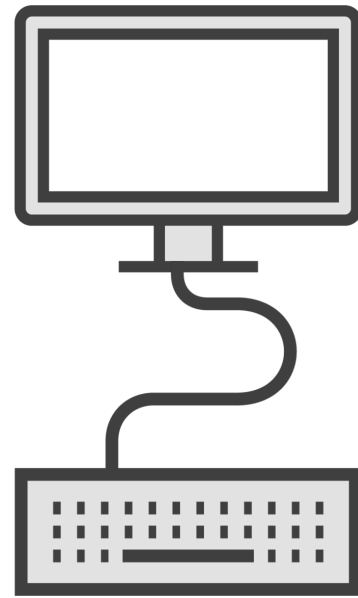
Michael VanSickle

@vansimke

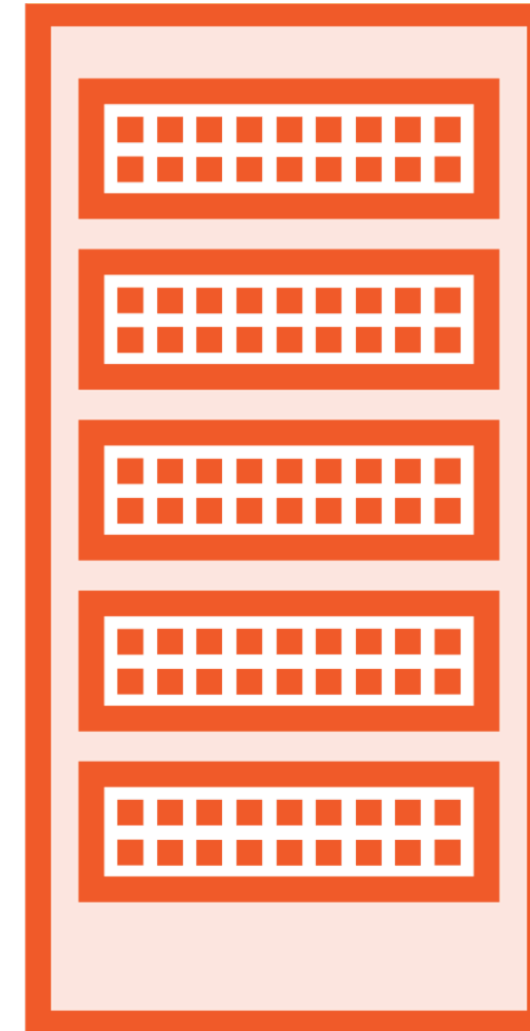
Introduction to Distributed Systems

Evolution of System Architectures

Mainframes



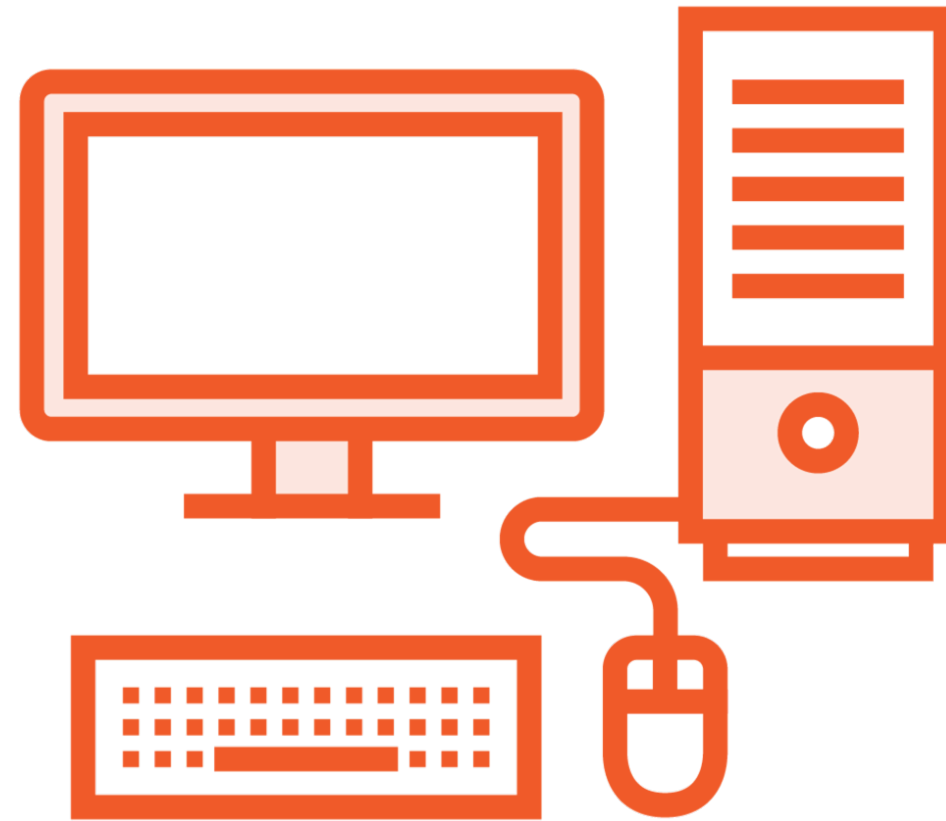
Terminal



Computer

Evolution of System Architectures

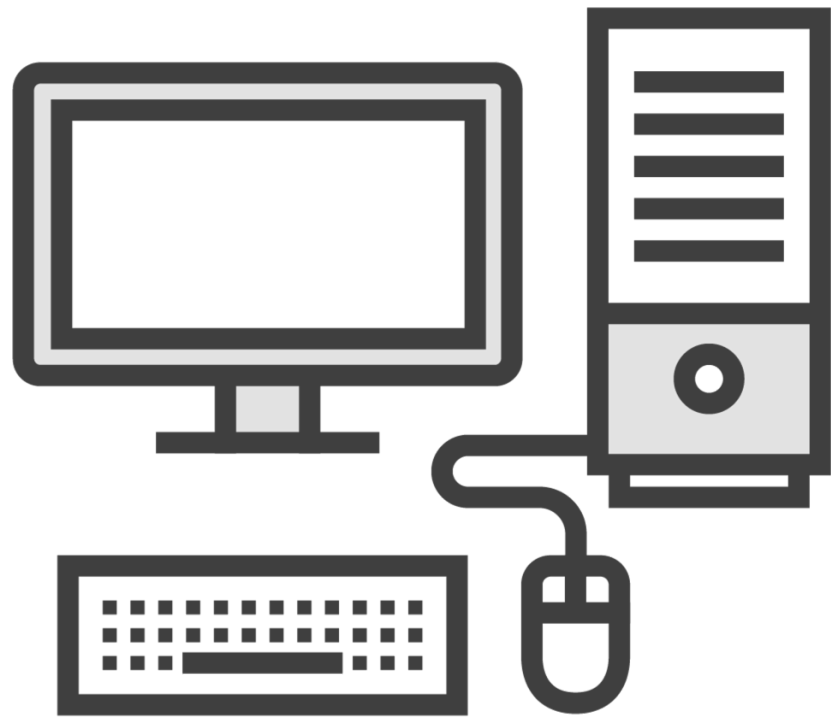
Personal Computer



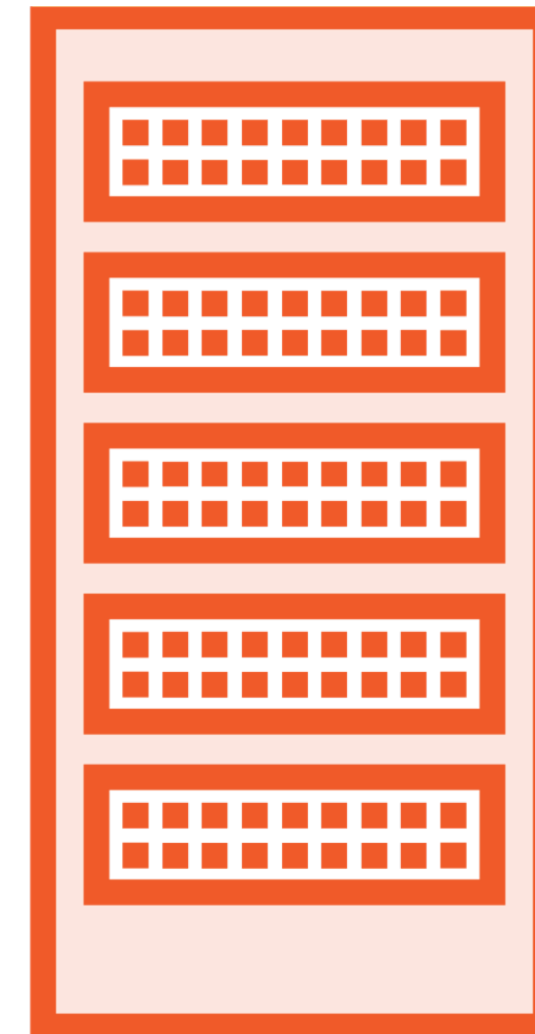
Computer

Evolution of System Architectures

Web Applications



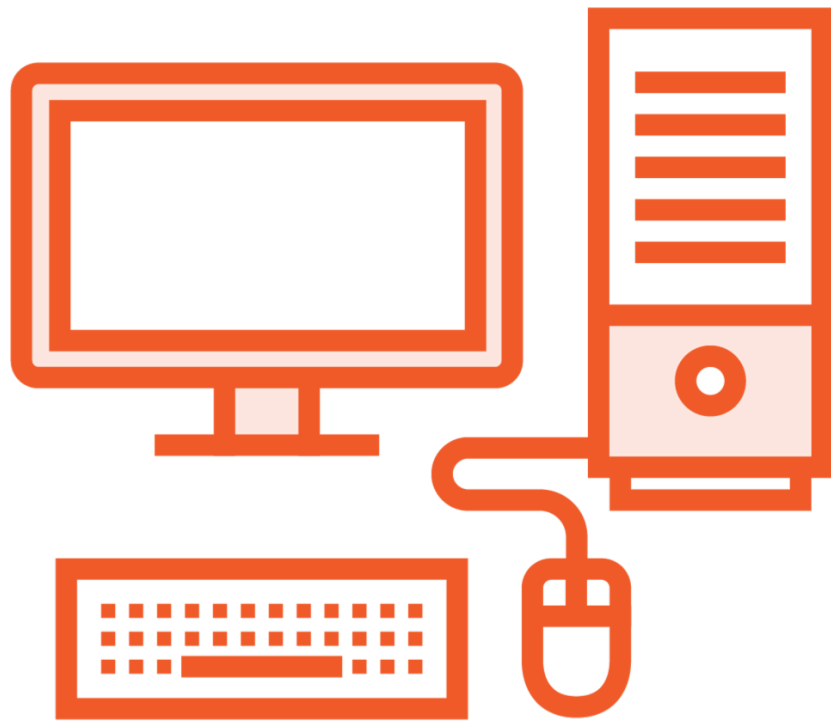
Client



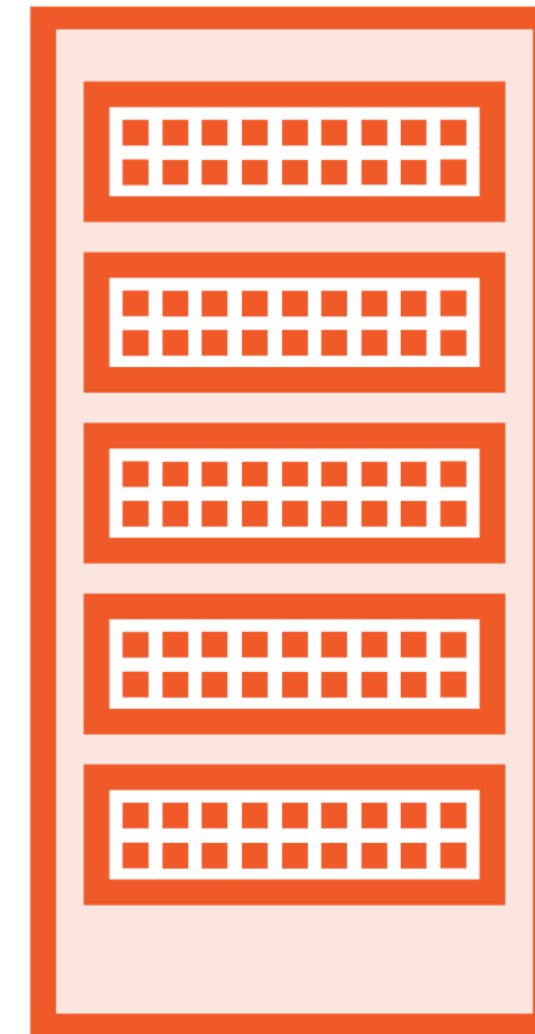
Server

Evolution of System Architectures

Web Apps with Smart Clients



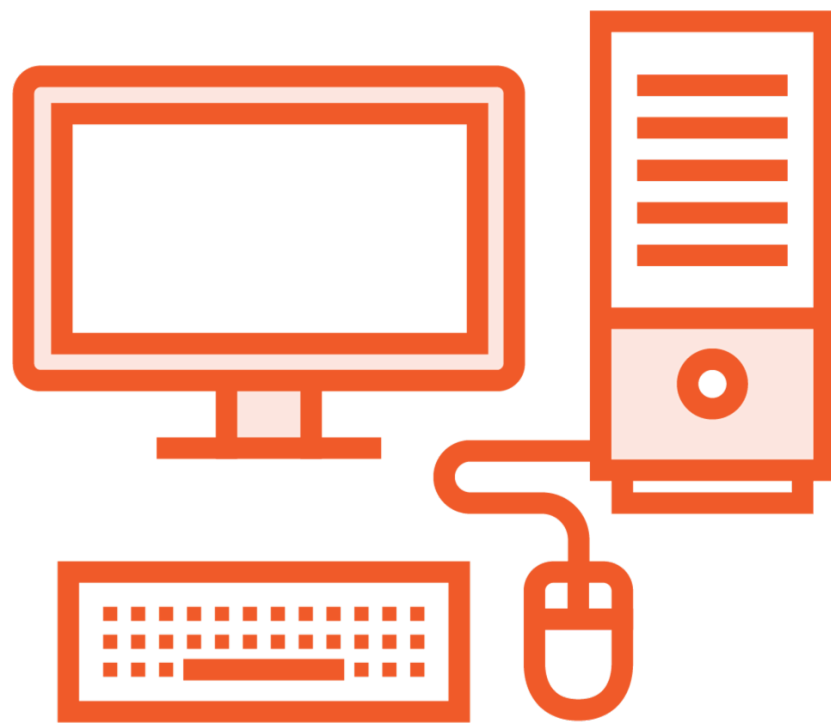
Client



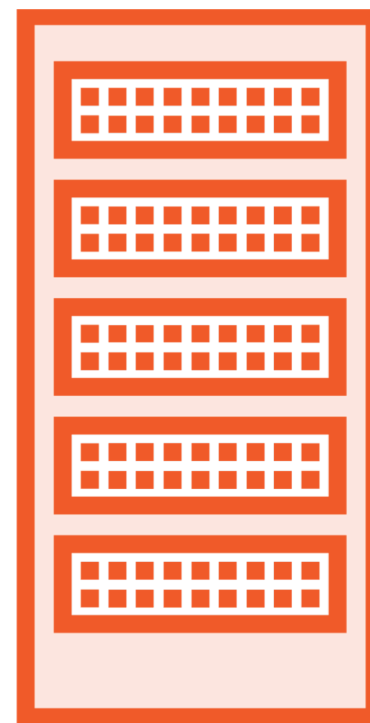
Server

Evolution of System Architectures

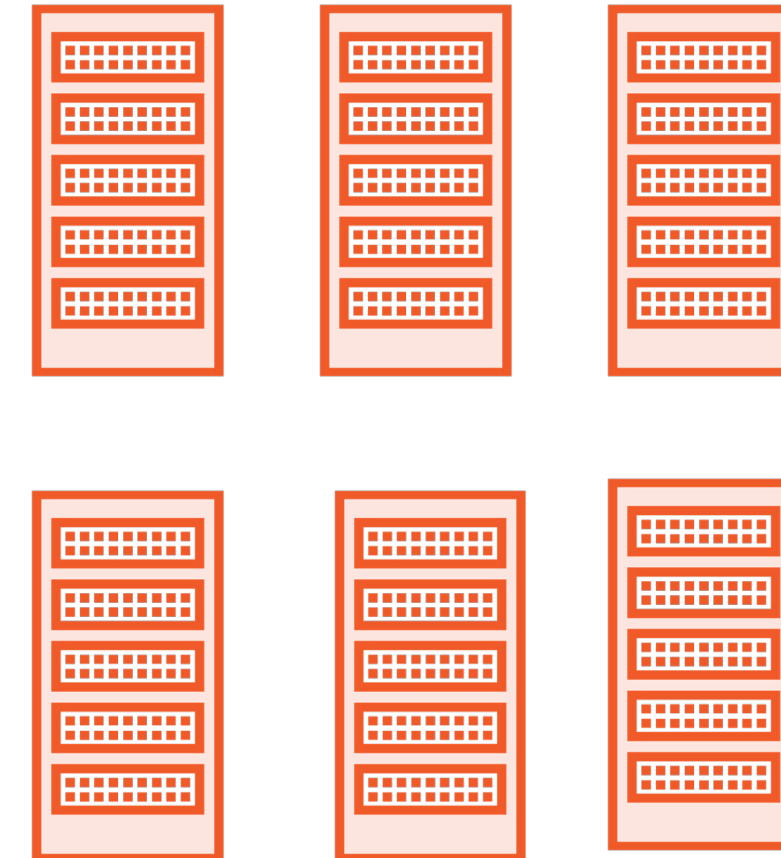
Distributed Application



Client



Gateway



Backend Services

Overview



Characteristics of a Distributed System

Types of Distributed Systems

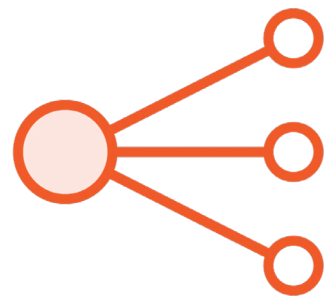
Architectural Elements

What We'll be Building

Characteristics of a Distributed System



Service discovery



Load balancing

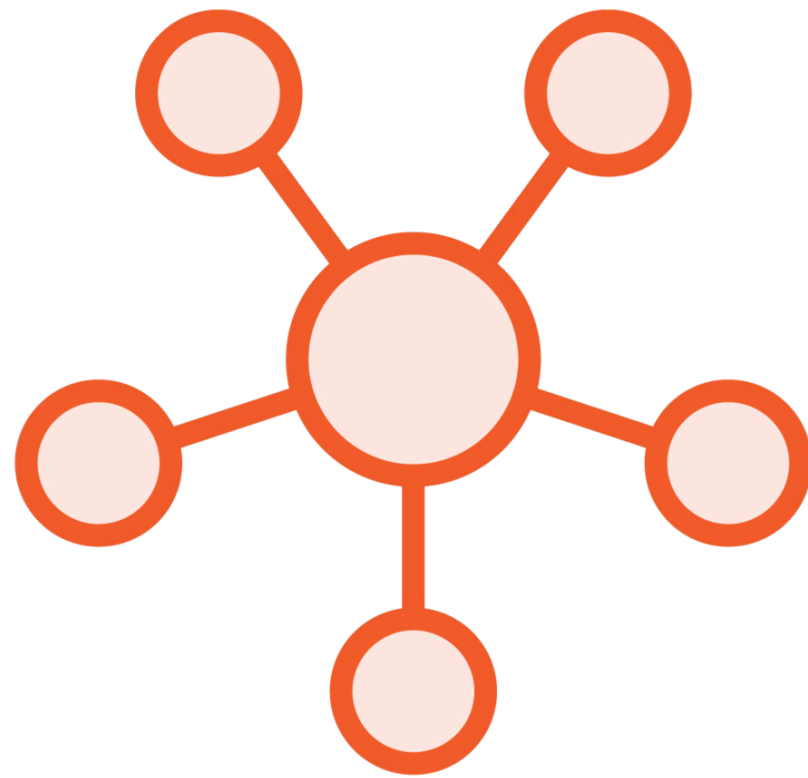


Distributed tracing and logging

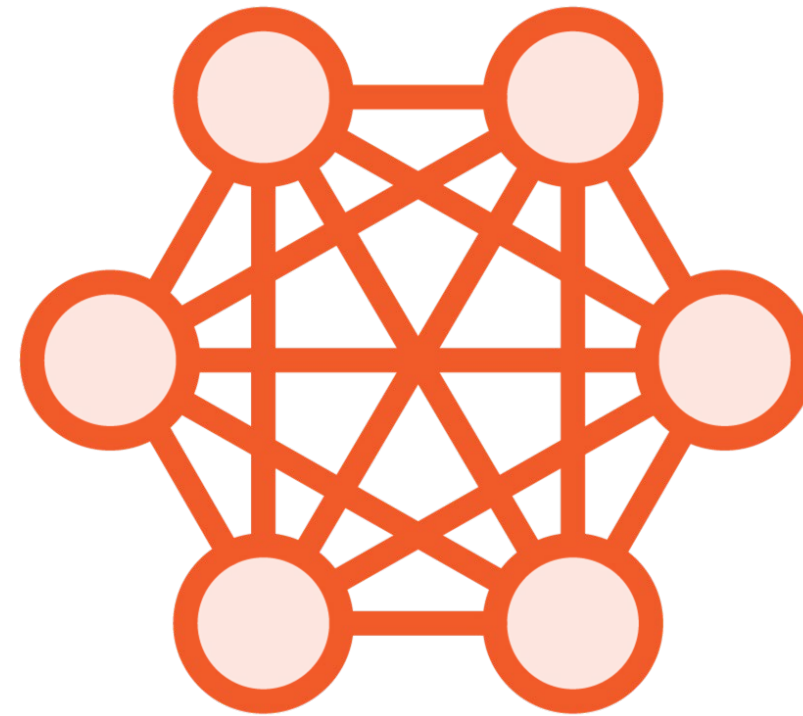


Service monitoring

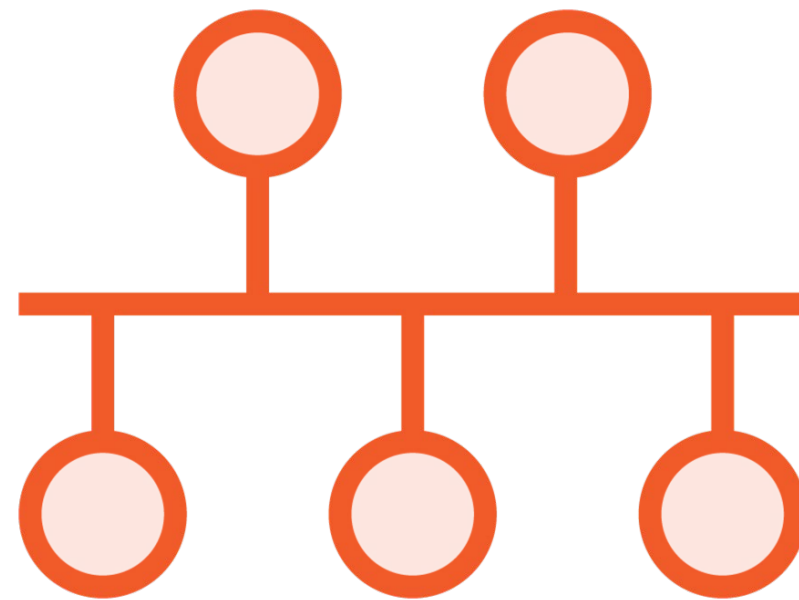
Types of Distributed Systems



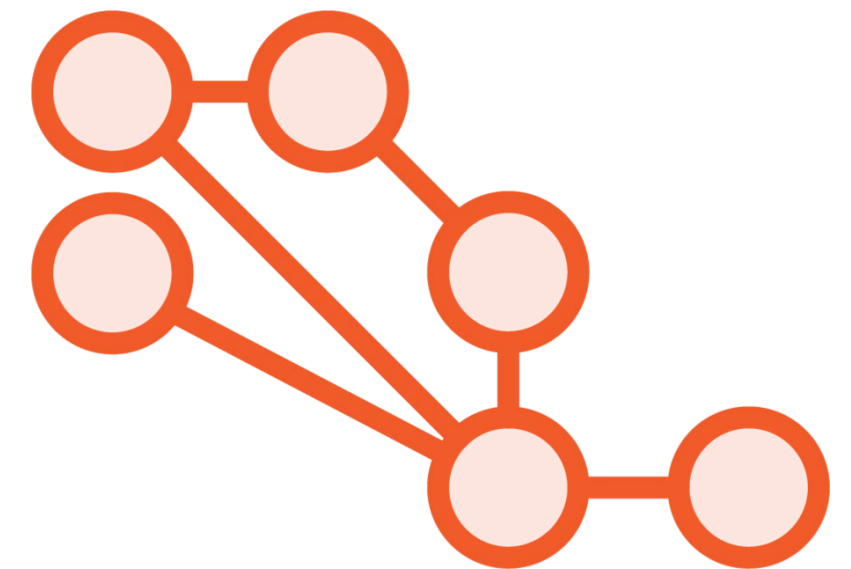
Hub and Spoke



Peer to Peer

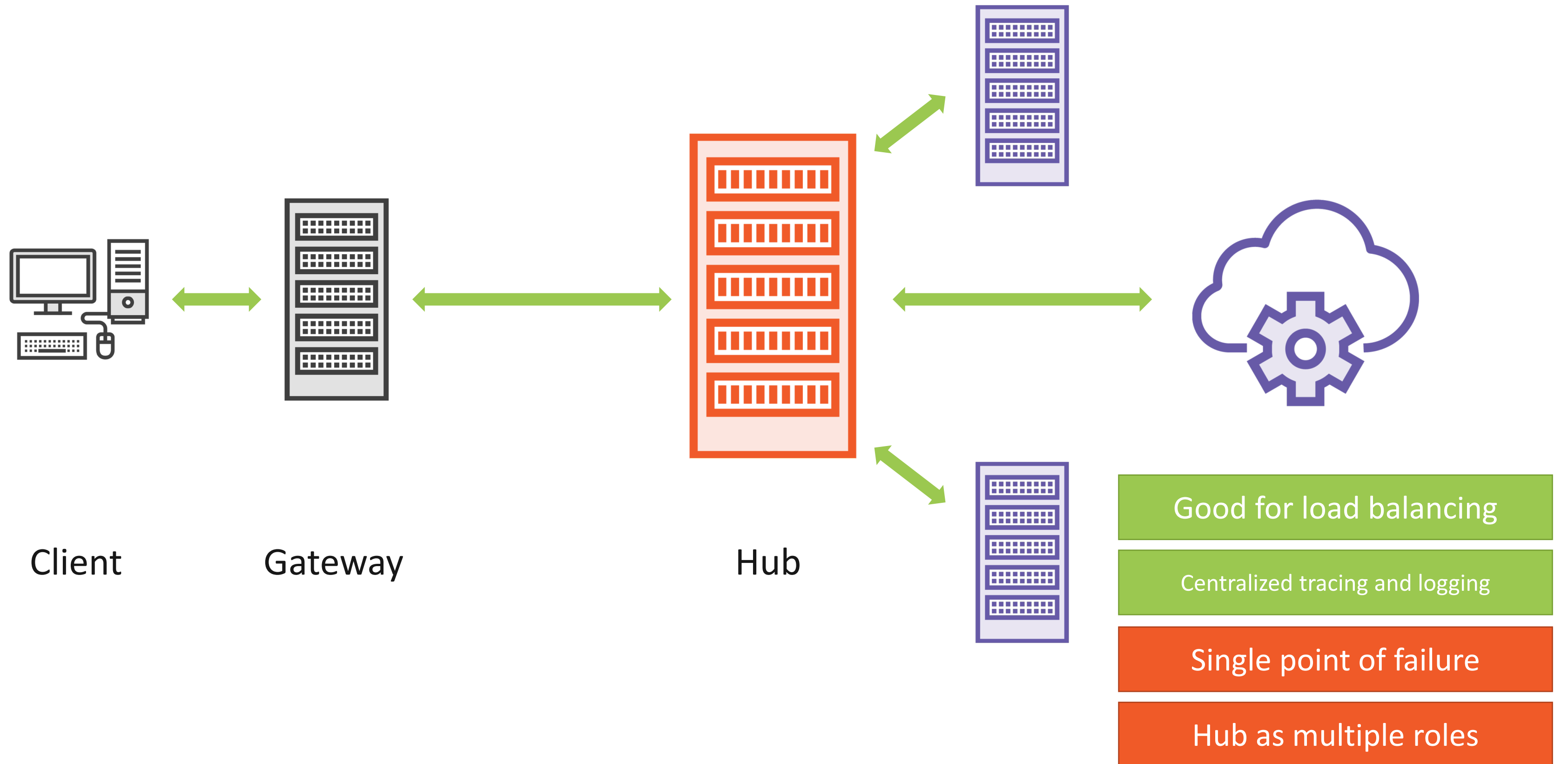


Message Queues

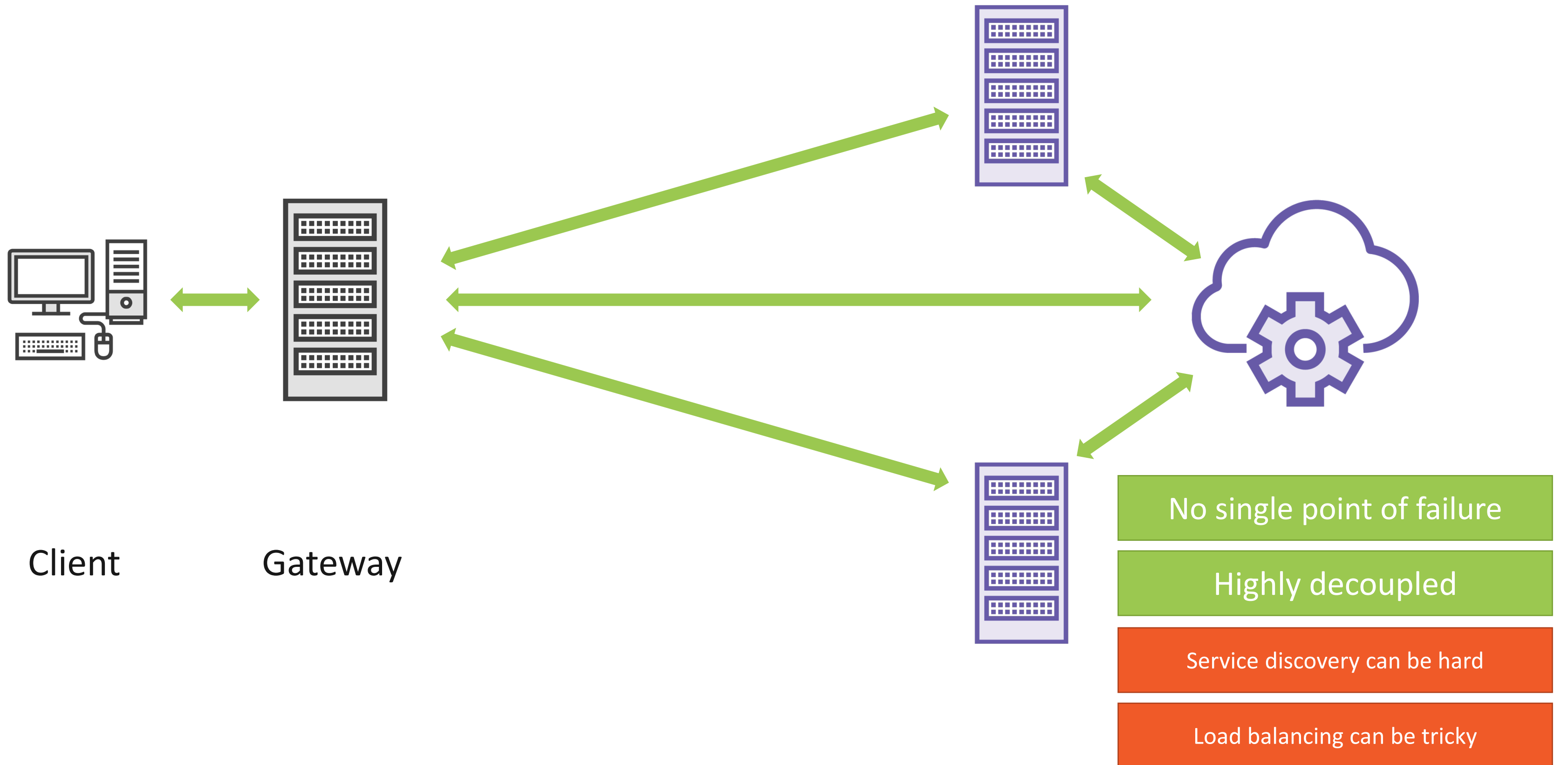


Hybrid

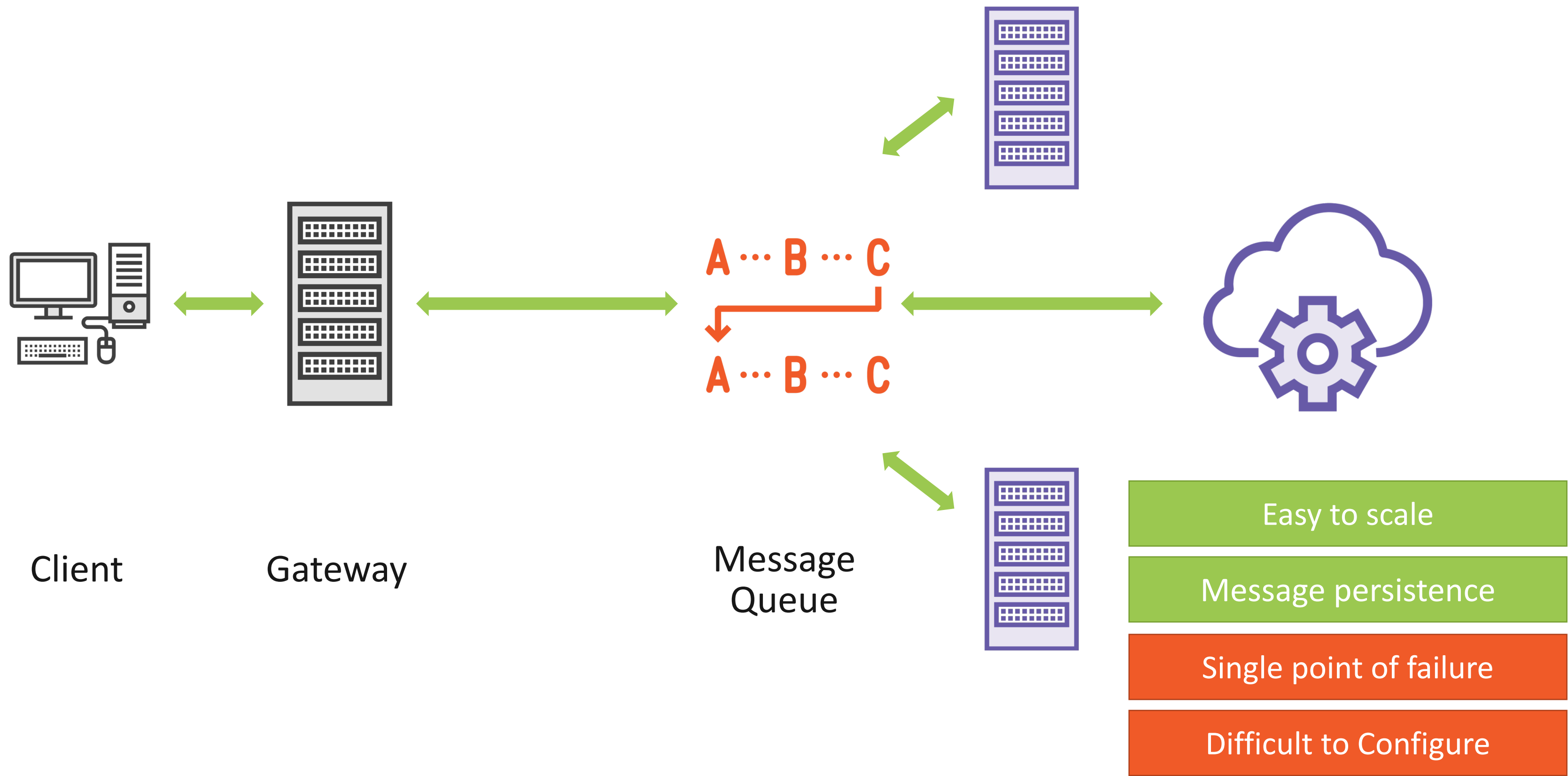
Hub and Spoke System



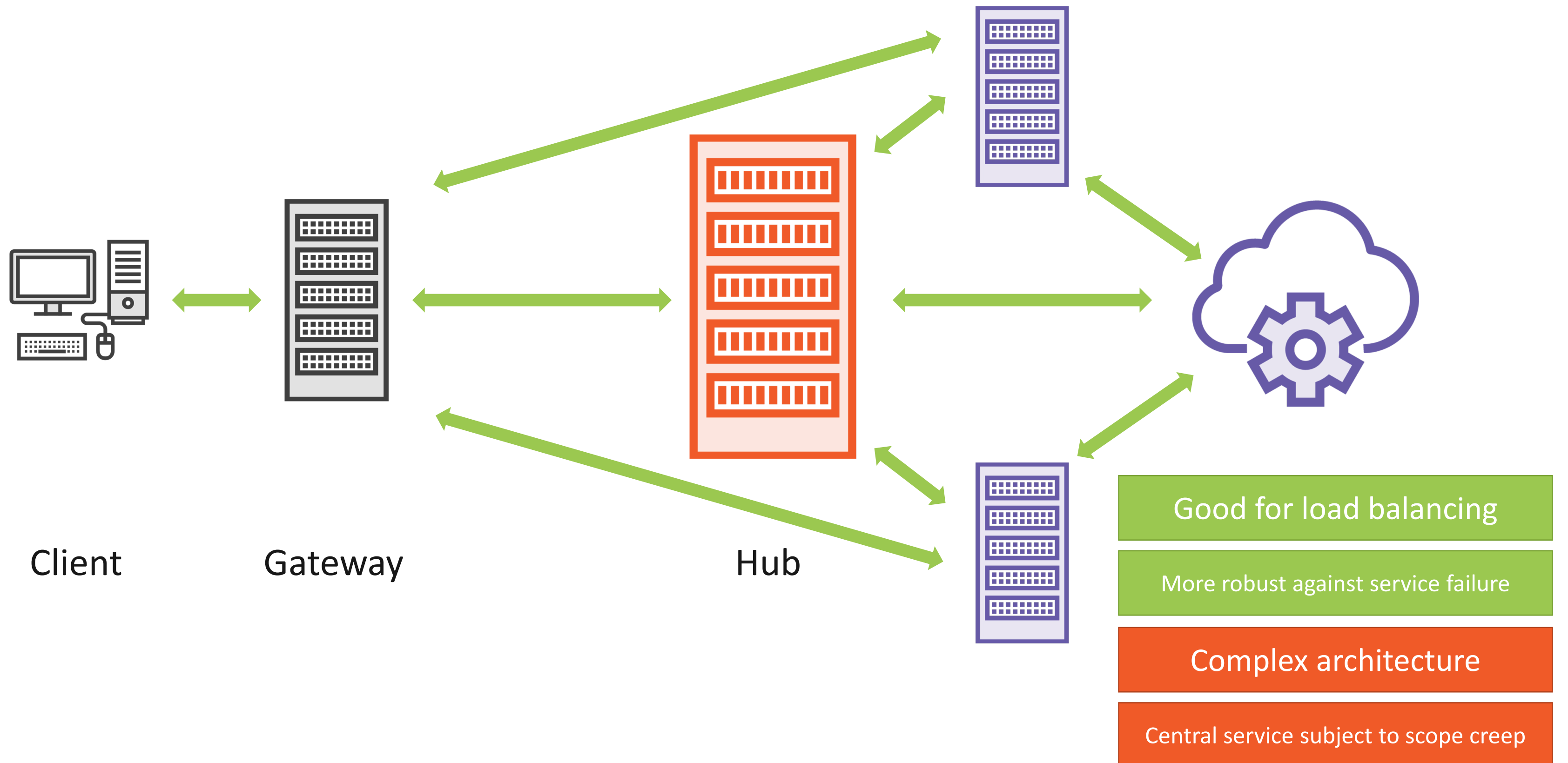
Peer to Peer



Message Queue



Hybrid



Architectural Elements



Languages



Frameworks



Transports



Protocol

Architectural Elements: Languages

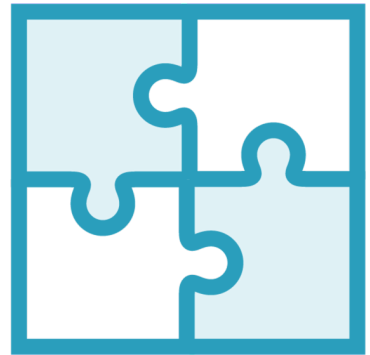


Single

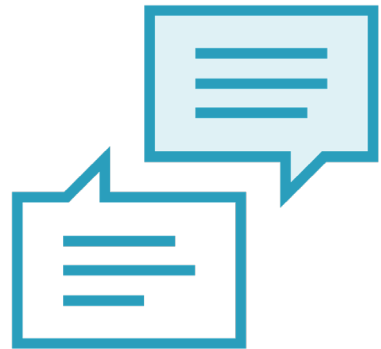
Multiple

JavaScript

Architectural Elements: Frameworks



Are architectures compatible?



Do they support required transports and protocols?



How stable are they?
Are they easy to upgrade?

Architectural Elements: Transport

HTTP

gRPC

Other RPC

Mixed

Architectural Elements: Protocols

Language specific
encoding/gob

JSON

Protocol Buffers

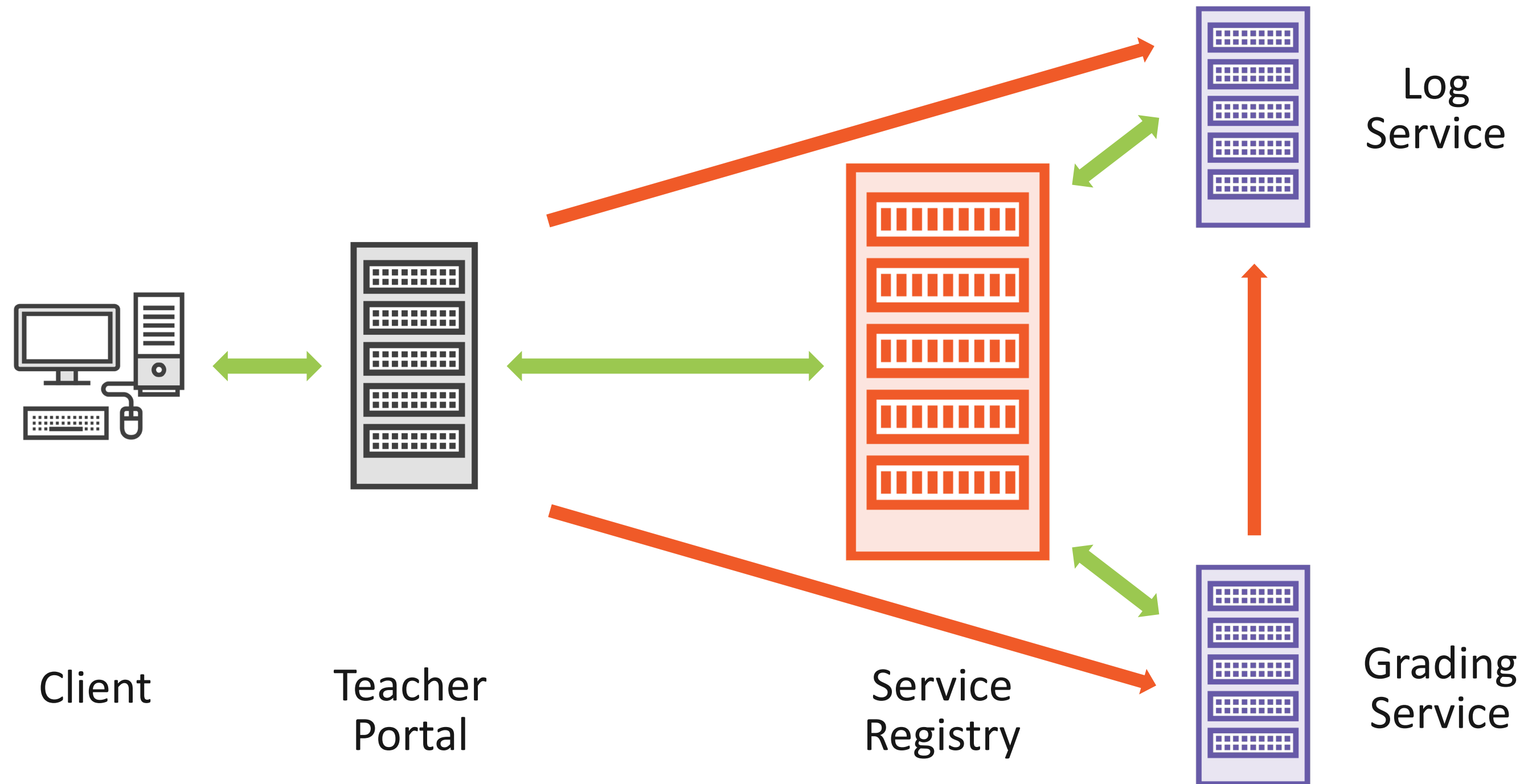
XML, SOAP, ...

Mixed

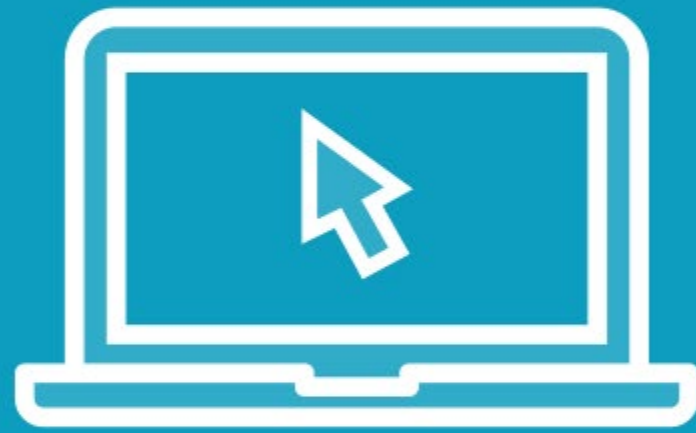
What We'll be Building

Element	Our choice
Type	Hybrid - central registry and monitoring
Language	Go
Frameworks	None
Transports	HTTP
Protocol	JSON

Gradebook Application



Demo



Overview of teacher portal

Components

Service Registry

Service registration

Health monitoring

Teacher Portal

Web application

API Gateway

Log Service

Centralized logging

Grading Service

Business logic

Data persistence

Course Overview

Elements of a Distributed System

Service Registration

Service Discovery

Status Monitoring

Go Distributed System Frameworks

Go-Kit

<https://gokit.io/>

Go-Micro

<https://go-micro.dev/>

Summary



Characteristics of a Distributed System

Types of Distributed Systems

Architectural Elements