

46. What is an API Gateway?

An API Gateway is a single entry point for all client requests in a microservice architecture. It routes, authenticates, rate-limits, and aggregates responses. Popular tools include Spring Cloud Gateway, Zuul, Kong, and NGINX.

47. Why do we use an API Gateway in microservices?

To centralize authentication, routing, logging, and error handling. It hides internal services and simplifies the client interface.

48. What are some popular API Gateways?

- Spring Cloud Gateway
- Netflix Zuul
- Kong
- NGINX
- Istio Gateway

49. What is routing in API Gateway?

Routing maps incoming request paths to backend services. For example, `/products/**` could route to the Product Service.

50. What is filtering in API Gateway?

Filters allow pre-processing (e.g., authentication) and post-processing (e.g., logging) of requests and responses.

51. What is service discovery?

Service discovery allows services to find each other dynamically without hardcoded URLs. It uses a registry for tracking live service instances.

52. What is a service registry?

A service registry stores the network locations (IP, port) of service instances. Examples: Eureka, Consul, Zookeeper.

53. Client-Side vs Server-Side Discovery

Client-side: The client queries the registry and picks a service.

Server-side: A load balancer or gateway routes requests.

Examples: Eureka + Ribbon (client-side), Kubernetes (server-side).

54. What is Netflix Eureka?

Eureka is a REST-based service registry from Netflix. Services register themselves and discover others through it. Widely used with Spring Cloud.

55. What is @EnableEurekaClient?

A Spring Boot annotation that enables a service to register with Eureka and discover others.

56. What is @LoadBalanced in Spring Cloud?

Used to mark a RestTemplate bean for client-side load balancing using service discovery.

57. What is Spring Cloud Config?

It externalizes configuration management for microservices. Services pull configs from a central source like Git or Vault.

58. application.yml example for Config Client

```
spring:
  application:
    name: payment-service
  cloud:
    config:
      uri: http://localhost:8888
```

59. How does a service register with Eureka?

1. Add dependency
2. Add @EnableEurekaClient
3. Configure Eureka URL in application.yml

60. What happens when a service goes down in Eureka?

Eureka marks it as DOWN after missed heartbeats. It removes the instance from the registry until it's back online.