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**microservices Question Bank with Answer**

**1. What are Microservices?**

- Microservices are a software architectural style that structures an application as a collection of loosely coupled services, each responsible for a specific business function.

**2. How do Microservices communicate with each other?**

- Microservices communicate via lightweight protocols such as HTTP/REST, messaging queues like RabbitMQ or Apache Kafka, or through RPC frameworks like gRPC.

**3. What is Spring Boot, and how does it relate to Microservices?**

- Spring Boot is a framework that simplifies the development of Java-based applications. It's commonly used in Microservices architecture due to its ease of use, auto-configuration, and built-in support for Microservices patterns.

**4. What are the benefits of using Microservices?**

- Benefits include improved scalability, better fault isolation, faster deployment cycles, technology flexibility, and easier maintenance and testing.

**5. Explain the concept of service discovery in Microservices.**

- Service discovery is the mechanism by which Microservices locate and communicate with each other dynamically. Tools like Eureka, Consul, or ZooKeeper are commonly used for service discovery.

**6. What is API Gateway in Microservices architecture?**

- An API Gateway is a server that acts as an API front-end, receiving API requests, applying security, routing requests to appropriate Microservices, aggregating results, and caching responses if needed.

**7. How do you handle distributed transactions in Microservices?**

- Distributed transactions are typically avoided in Microservices architecture due to complexity and scalability issues. Instead, patterns like Saga, CQRS, and Event Sourcing are used to maintain consistency across services.

**8. What is Circuit Breaker pattern, and why is it important in Microservices?**

- The Circuit Breaker pattern is used to prevent a cascading failure in a distributed system. It allows a Microservice to detect and handle failures in dependent services gracefully, thereby improving system resilience.

**9. How do you ensure data consistency in a Microservices architecture?**

- Data consistency can be achieved through techniques such as eventual consistency, compensating transactions, distributed transactions (though not recommended), and using an event-driven architecture.

**10. What are some common challenges faced when implementing Microservices?**

- Challenges include managing distributed data, ensuring service resilience, maintaining communication between services, monitoring and debugging, implementing security across services, and handling versioning and backward compatibility.

**11. How does Microservices architecture differ from Monolithic architecture?**

In a Monolithic architecture, the entire application is developed and deployed as a single unit, while in Microservices architecture, the application is divided into smaller, loosely coupled services that can be developed, deployed, and scaled independently.

**12. How do you handle service-to-service communication in Microservices?**

Service-to-service communication can be achieved using lightweight protocols like HTTP/REST, messaging queues such as Kafka or RabbitMQ, or RPC frameworks like gRPC.

**13. Explain the concept of eventual consistency in Microservices.**

Eventual consistency means that the system will eventually reach a consistent state after a period of time, even though different parts of the system might have temporarily inconsistent data.

**14. What is the role of API Gateway in Microservices architecture?**

An API Gateway is a server that acts as a single entry point for client requests and handles tasks such as routing requests to appropriate services, load balancing, authentication, and rate limiting.

**15. How do you ensure fault tolerance in Microservices?**

Fault tolerance can be achieved through techniques like implementing Circuit Breaker pattern, retry mechanisms, graceful degradation, and designing services to be stateless and independently scalable.

**16. What is Spring Cloud, and how does it relate to Microservices?**

- Spring Cloud provides tools and libraries for building robust, distributed systems with Microservices architecture. It offers solutions for service discovery, configuration management, circuit breakers, and more.

**17. Explain the role of Eureka in Spring Cloud Microservices.**

- Eureka is a service registry and discovery server provided by Spring Cloud. It allows Microservices to register themselves and discover other services dynamically, enabling communication between them.

**18. How does Spring Cloud Config facilitate externalized configuration in Microservices?**

- Spring Cloud Config provides a centralized externalized configuration management solution. It allows Microservices to retrieve their configuration from a central configuration server, promoting consistency and ease of management.

**19. What is Ribbon, and how does it enhance client-side load balancing in Microservices?**

- Ribbon is a client-side load balancing library provided by Spring Cloud. It enables Microservices clients to distribute requests among multiple instances of a service, improving scalability and fault tolerance.

**20. Explain the purpose of Hystrix in Spring Cloud Microservices.**

- Hystrix is a latency and fault tolerance library provided by Spring Cloud. It helps to prevent cascading failures in distributed systems by isolating and controlling points of access to remote systems, providing fallback mechanisms when necessary.

**21. How does Feign simplify RESTful service consumption in Spring Cloud Microservices?**

- Feign is a declarative REST client provided by Spring Cloud. It allows Microservices to define RESTful service interfaces using annotations, reducing boilerplate code and simplifying integration with other services.

**22. What is Zuul, and how does it facilitate API Gateway functionality in Spring Cloud Microservices?**

- Zuul is an edge service provided by Spring Cloud. It acts as an API gateway, routing requests from clients to the appropriate Microservices, implementing cross-cutting concerns such as authentication, logging, and rate limiting.

**23. Explain the purpose of Spring Cloud Sleuth and Zipkin in Microservices architecture.**

- Spring Cloud Sleuth provides distributed tracing capabilities for Microservices. It generates and propagates trace and span IDs across service boundaries, allowing developers to monitor and diagnose distributed systems. Zipkin is a distributed tracing system that collects and displays tracing data generated by Spring Cloud Sleuth.

**24. What are Spring Cloud Stream and Spring Cloud Bus, and how do they facilitate messaging in Microservices?**

- Spring Cloud Stream provides a framework for building event-driven Microservices with messaging systems such as Apache Kafka or RabbitMQ. Spring Cloud Bus enhances communication between Microservices by providing a way to broadcast configuration changes across the system.

**25. How does Spring Cloud Netflix help with building resilient and scalable Microservices?**

- Spring Cloud Netflix integrates various Netflix OSS components such as Eureka, Ribbon, Hystrix, and Zuul into the Spring Cloud ecosystem. These components provide essential features for building resilient, scalable, and fault-tolerant Microservices architectures.