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Spring Boot Microservices Interview Guide 2021

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Spring Boot Internals Interview Questions – Part 1

1. What is a Framework ?

- Framework is a special kind of Software which provides some common logics which are required for application development in less time.

2. How many types of framework available in Market ?

- ORM Frameworks
- Web Frameworks
- Application Frameworks

3. Difference between Web application and Distributed Application ?

Web Application	Distributed Application
Web applications are meant for C 2 B (Customer to Business)	Distributed applications are meant for B 2 B
A web application is a software or program which is accessible using any web browser	A distributed application is software that is executed or run on multiple computers

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To develop web applications we can use Spring MVC

To develop distributed applications we will use Webservices

4. What is Spring Framework ?

- Spring is a alternative framework for EJB Technology.
- Spring is a application development framework
- Using Spring we can develop all types of applications (end to end)
- The main feature of Spring is Dependency Injection & IOC Container.
- Spring is non-invasive framework.

5. Which technology is alternative for Spring ?

- EJB

6. How many types of applications we can develop in Spring ?

- Standalone applications
- Web Applications
- Distributed Applications

7. Please explain modules available in Spring Framework ?

- Spring core is the base module for all other modules
- Spring DAO/Spring JDBC module provides abstraction layer on plain JDBC to develop persistence logic.
- Spring ORM Module provides abstraction layer on other ORM flows like Hibernate & Ibatis
- Spring AOP module is given to apply aspects on Spring Applications
- Spring Web Module is given to make spring application communication from other web framework software applications like Structs, JSF e.t.c
- Spring Web-MVC is given spring own web framework develop MVC Architecture based web applications.
- Spring Context/JEE Module provides abstraction layer on multiple core technologies like EJB, RMS, JMS, Java Mail to develop Distributed applications & other applications.

8. What is Spring Boot ?

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- Spring Boot is the combination of Spring framework and embedded servers
- Spring Boot is a framework for RAD build using spring framework with extra support of auto-configuration and embedded application server(like tomcat, jetty)
- It helps us in creating efficient fast stand-alone applications which you can just run it basically removes a lot of configurations and dependencies

9. Why Spring Boot ?

- To Design any spring based application, a developer needs to be taken care on manual setup on Hibernate data source, Entity manager, Session Factory and Transaction management everything.
- To Design all those common setup, a developer doesn't need to define everything individually, @SpringBootConfiguratoin annotation enough to manage everting at the time of deployment.

10. What is the latest version of Spring Boot ?

- 2.6.0 – Snapshot
- 2.3.12 - Release

11. What are the advantages of using Spring Boot ?

- Develop Spring Application Faster
- Avoid Boiler Plate code
- Convention over configuration
- Embedded Tomcat
- Actuators
- Embedded Databases

12. What is GroupId and ArtifactId while creating spring boot project ?

- **GroupId** : A unique base name of the company or group that created the project
- **ArtifactId** : A unique name of the project

13. How to create standalone application using Spring Boot ?

- Using Spring Initializer
- Using STS or Eclipse or IntelliJ Idea

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14. What is Spring Boot Starter ?

- Spring Boot starters can help to reduce the number of manually added dependencies just by adding one dependency. So instead of manually specifying the dependencies just add one starter.

15. What is the use of parent pom and child pom.xml file ?

- **Maven parent POM** (or super POM) is used to structure the project to **avoid redundancies or duplicate configurations** using *inheritance between pom files*. It helps in easy maintenance in long term.
- Now child POM need to refer the parent POM using parent tag and specifying groupId/artifactId/version attributes

16. How to monitor Spring Boot Application ?

- Actuators
- /health – predefined endpoint to check monitor of the application

17. Which starter is required to develop web applications and distributed applications ?

- Spring-boot-starter-web

18. How many steps follow when spring boot application starts ?

- This run() method contains boot strapping logic to start spring boot application.
 - Start Stopwatch
 - Start Listeners
 - Prepares Environment
 - Create IOC Container
 - Print Banner
 - Print Application Startup Time
 - Call Runners
 - Return Context.

19. What is start class of Spring Boot ?

- Start class is the entry point for Spring Boot Application Execution.
- Start class contain main method to start program execution
- As part of Spring Boot start class main method we are calling `SpringApplication.run(..)` method

20. What is the importance of @SpringBootApplication ?

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- This annotation is equivalent to using `@Configuration`, `@EnableAutoConfiguration` and `@ComponentScan` with their default attributes.
- Spring Boot enables the developer to use a single annotation instead of using multiple
- Spring provided loosely coupled features that we can use for each individual annotation as per our project needs.

21. How to override custom package using Component Scanning ?

- `@ComponentScan(basePackages = {"org.javaexpress", "com.javaexpress"})`

22. Which annotation trigger auto-configuration functionalities in Spring Boot App ?

- `@EnableAutoConfiguration` annotation triggers auto-configuration functionalities for our application

23. Which annotation need to use if we create custom object in Spring Boot App ?

- `@Bean`

24. How to check predefined autoconfiguration classes in Spring Boot ?

- Spring-boot-autoconfigure jar file contain all configuration classes and we can in this path `META-INF/spring.factories`

25. Which annotation internally using `@SpringBootConfiguration` ?

- `@Configuration`

26. Which design pattern following while fetching IOC Container Object?

- Abstract Factory Design Pattern

27. How to represent java class as Spring Bean ?

- We can represent spring bean by using Stereotype Annotations
- `@Component`
- `@Service`
- `@Repository`

28. What is Spring Bean ?

- Any normal java class is initialized by Spring IOC container is called Spring Bean.
- Spring IOC manages the life cycle of Spring bean cycle, bean scopes and injecting any required dependencies in the bean

29. How to prove spring is providing singleton classes ?

- `Product p1 = context.getBean(Product.class)`

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- Product p2 = context.getBean(Product.class)
- Print p1 and p2

30. How to change singleton classes to prototype and which annotation need to use ?

- `@Scope("prototype")` apply for Spring Bean classes

31. Difference between `@Configuration` and `@Bean` ?

- The class in which you want to provide the configuration about other beans, that class is called configuration class and you need to annotation with `@Configuration`.
- `@Bean` annotation is used to create custom objects by IOC Container

32. Difference between `@Component` and `@Service` ?

- This act as a more generic stereotype annotation to manage any component by spring where as the other annotations are specialized for the specific use cases
- Business layer class are annotated with `@Service` annotation even though the current release of the spring doesn't has any impact on using it(other than exposing that class as spring bean)

33. Can I use `@Component` instead of `@Service` ?

- Yes, good practice we need to use `@Component` for generic classes and utility classes.
- `@Service` is used for business classes.

34. Difference between `@Service` and `@Repository` ?

- `@Repository` : This is used for exposing a DAO class as a spring bean. It helps you in applying exception translations on these `@Repository` classes
- Business layer class are annotated with `@Service` annotation even though the current release of the spring doesn't has any impact on using it(other than exposing that class as spring bean)

35. When will get `NoSuchBeanDefinitionException` in Spring ?

- If we miss `@Component` annotation in Spring bean classes

36. What is IOC Container ?

- Giving control to the container to get instance of object is called IOC.
- IOC is a principle which is used to manage and collaborate dependencies among the objects in the application.

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- IOC Container is a mechanism to achieve loose coupling between object dependencies.
- IOC will use dependency injection to manage

37. Difference between Dependency Injection and IOC Container ?

- IOC will use dependency injection to manage
- The process of injecting one class object into another class is called as Dependency Injection
- Dependency Injections is a design pattern in order to remove dependency from the programming code.
- In Spring Framework IOC will perform Dependency Injection

38. How many Types of Dependency Injection ?

- Setter Injection
- Constructor Injection
- Autowired

39. How to enable setter injection in Spring Boot ?

```
private Engine engine;  
  
@Autowired  
public void setEngine(Engine engine) {  
    this.engine = engine;  
}
```

40. Is it Mandatory @Autowired annotation in Constructor Injection ?

- If we have more then one constructor we have to specify @Autowired else it is optional.

41. What is Field Injection or Interface Injection and how it is working internally ?

- If we use @Autowired at variable level then IOC will perform field Injection
- When we use Field Injection, Internally IOC will use reflection api to inject dependent object into target object.
- Field Injection is not recommended because there is a chance to violate Single Responsibility Principle.

42. What are the solid principles available in java ?

- Single Responsibility principle
 - i. A class should have one and only one reason to change,, meaning that a class should have only one job

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- Open Closed principle
 - i. You should be able to extend classes behaviour, without modifying it.
- LisKov Substitution principle
 - i. Derived classes must be Substitutable for their base classes
- Interface Segregation principle
- Dependency Inversion principle

43. Difference between Setter Injection and Constructor Injection ?

- **Partial dependency:** can be injected using setter injection but it is not possible by constructor. Suppose there are 3 properties in a class, having 3 arg constructor and setters methods. In such case, if you want to pass information for only one property, it is possible by setter method only.
- **Overriding:** Setter injection overrides the constructor injection. If we use both constructor and setter injection, IOC container will use the setter injection.
- **Changes:** We can easily change the value by setter injection. It doesn't create a new bean instance always like constructor. So setter injection is flexible than constructor injection.

44. When will get NoUniqueBeanDefinitionException ?

- If one interface has multiple implementation classes, then if we use autowire at interface level then will get this exception.
- To overcome this issue, we need to use `@Primary` or `@Qualifier`

45. When to use `@Primay` for Spring bean classes ?

- If we have one interface has multiple implementation classes, then if we want to provide default configuration then will use `@Primary`

46. Difference between `@Primary` and `@Qualifier` ?

- Both are same but if we use `@Qualifer` we can customize alias names for component names.

47. Difference between Application Runner and Command Line Runner ?

- Runners are used to execute the logic only one time once application got started
- Runners will be executed only once after SpringBoot Application got started
- Above two runners are functional interfaces and contain single method – run method
- Both are same only arguments are different

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48. Can we write main method in interface ?

- Yes

49. What are use cases for Application Runner or Command Line Runner ?

- Loading data to Cache
- Configuring CRON jobs
- Spring Batch framework will trigger jobs using Runners only

50. How to provide priority for Spring Bean classes if we implement multiple Runners?

- `@Order(1)`

51. How to implement runners using Lambda Expression ?

```
ApplicationRunner fetchUserData() {  
    return runner -> {  
        System.out.println("ApplicationRunner executed");  
    };  
}
```

-

52. Which property need to enable to customize Spring Boot Banner mode ?

- Create banner.txt file in resources folder(default filename)
- `spring.banner.location=classpath:banner_dev.txt`

53. How to disable a specific auto-configuration class ?

- `@EnableAutoConfiguration(exclude= {DataSourceAutoConfiguration.class})`

54. How to enable debug logs in Spring Boot Application ?

- `logging.level.root=trace`

55. How to generate jar file in SpringBoot Application ?

- `java -jar applicationName`

56. How to append timestamp for SpringBoot Jar File ?

- `${project.build.finalName}-${maven.build.timestamp}`

57. How to customize maven time format while generating jar file ?

- `<maven.build.timestamp.format>yyyy-MM-dd-HH-mm</maven.build.timestamp.format>`

58. How to configure project logs in application.properties ?

- `logging.level.com.javaexpress=debug`

59. How to configure log pattern or file pattern in application.properties?

- `logging.pattern.console=%d{yyyy-MM-dd HH:mm:ss} [%thread] %-5level %logger{36} - %msg%n`

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60. How can we add external jar file in Spring Boot Project ?

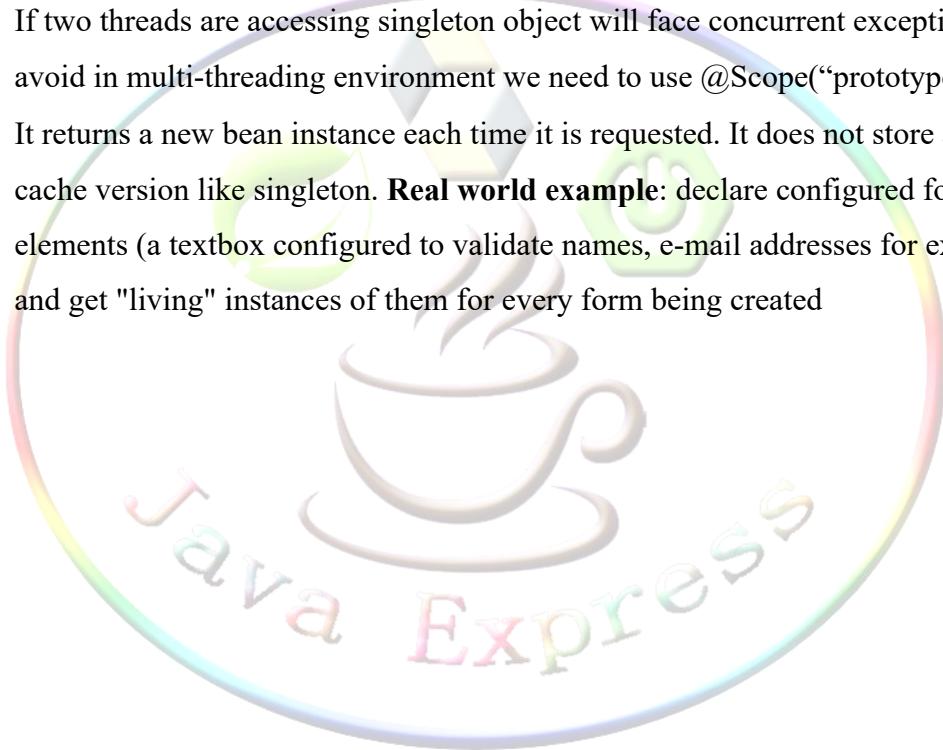
- Rightclick on project -> buildPath -> configureBuildPath -> Libraries tab ->add ExternalJars

61. How to exclude module in Pom.xml file ?

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
    <exclusions>
        <exclusion>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-tomcat</artifactId>
        </exclusion>
    </exclusions>
</dependency>
```

62. Real time scenario of Prototype scope ?

- If two threads are accessing singleton object will face concurrent exception to avoid in multi-threading environment we need to use @Scope("prototype")
- It returns a new bean instance each time it is requested. It does not store any cache version like singleton. **Real world example:** declare configured form elements (a textbox configured to validate names, e-mail addresses for example) and get "living" instances of them for every form being created



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Spring Boot Data JPA Interview Questions – Part 2

1. What are the technologies available to develop persistence layer ?

- JDBC
- ORM
- Spring JDBC
- Spring ORM
- Spring Data JPA

2. What are the advantages of using ORM over JDBC ?

JDBC	Hibernate/JPA
JDBC is Persistence Technology	Hibernate is Persistence/ORM Framework
It will not represent data in the form of object.	It will not represent data in the form of object.
In JDBC user is responsible for creating and closing the connection	Hibernate Runtime system takes care of creating and closing the connections
Does not support Associations	Support Associations
Native SQL	HQL, Native SQL
In JDBC, mapping between two tables needs to write lot of codes and query. If there is change in database or table, you need to change the code and query as well.	Mapping between two tables done through XML or annotations. If there is a change in database or in any table, you need to change annotated model class.
Every line throw SQL Exception	No need to handle any exceptions

3. Which design pattern using internally for JdbcTemplate and HibernateTemplate ?

- Template Design Pattern

4. Difference between CRUD Repository vs JPA Repository ?

- Both are predefined interfaces

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- CRUD Repository interface we can perform curd operations in our application
- JPA Repository interface is superior to CRUD Repository ?

5. When will get access Denied exception while connecting to databases in Spring Boot Application?

- Wrong password or wrong username

6. When will get unknow database exception while connecting to database in SB?

- If schema is not available in database, then will get this exception
- Solution : Need to create schema manually in mysql DB

7. when will get Communications link failure or Connection refused in SB ?

- Wrong URL in application.properties

8. Which properties need to enable database properties in SB ?

- spring.datasource.url=jdbc:mysql://localhost:3306/user_dev_07
- spring.datasource.username= root
- spring.datasource.password= India@123
- spring.jpa.hibernate.ddl-auto=create

9. Which dependency need to enable for MySQL in SB ?

- ```
<dependency>
 <groupId>mysql</groupId>
 <artifactId>mysql-connector-java</artifactId>
 <scope>runtime</scope>
</dependency>
```

**10. What are the parameters required to pass for CRUD Repository ?**

- First Parameter represents Entity class Name
- Second Parameter represents primary key datatype of entity class
- interface UserRespository extends CrudRepository<User, Integer> { }

**11. What are the mandatory annotations to apply in entity class ?**

- `@Entity`
- `@Id`

**12. Difference between `@Entity` and `@Table` annotation ?**

- The java class which represents DB table structure is called as Entity Class
- It is used to map class name to particular table
- If `@Table` is not mentioned then SB Data considers our class name as table name

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**13. What is @GeneratedValue in entity class ?**

- Generators are used to generate value for primary key column when record is inserting to table.
- @GeneratedValue

**14. Which property need to enable for schema generation in SB ?**

- `spring.jpa.hibernate.ddl-auto=update/create/validate/create-drop`

**15. How many ways can execute queries using Spring Data JPA ?**

- By using predefined methods (`save()`, `findById()`, `findAll()` ....)
- By writing `findBy` methods ( `findByCustomerName()`, `findByEmail()` )
- By writing custom queries (`@Query`)
- Ex : "from User where userEmail=:email"

**16. What are the methods available to perform curd operations and please mention below**

- `save(entity)`
- `delete(id)`
- `findAll()`

**17. What is Optional in Java ?**

- It is introduced in java 8 and to order to avoid null check manually.

**18. Which design pattern using internally to perform CURD operations ?**

- Proxy Design pattern

**19. Which property enable to display sql statements in console ?**

- `spring.jpa.show-sql=true`

**20. Difference between HQL vs SQL queries ?**

- In HQL queries we will use entity className and entity class variable names.
  - i. Native SQL works on column names and table Name
- HQL queries can't be executed in DB directly because databases knows only Sql.
  - i. NATIVE SQL queries are DB dependent (DB specific)
- When we write HQL queries in the application, those queries should be converted into sql queries to execute.

**21. How to log Sql statements in SpringBoot ?**

- `spring.jpa.properties.hibernate.format_sql=true`

**22. What is the use of @Param tag in Spring data JPA ?**

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- Method parameter names should match with positional parameter names then Spring Data will bind method parameter values to positional parameters names in run time to execute that query.

### 23. Write HQL Query using Named Parameters in Repository interfaces ?

- `@Query("select u from User u where u.userName = :name and u.emailId = :uEmail")`
- `User findByNameAndEmailId(@Param("name")String username, @Param("uEmail")String emailId);`

### 24. Write HQL Query for – input: List of Names - output: List of Users ?

- `@Query(value="select u from User u where u.userName IN :names")`
- `List<User> findUsersByNamesList(@Param("names")Collection<String> usernames);`

### 25. Write HQL Query to update record in DB ?

- `@Modifying`
- `@Query("update User u set u.userName = :uName where u.emailId = :uEmail")`
- `@Transactional`
- `int updateUserNomeforEmail(@Param("uName")String username,@Param("uEmail")String userEmail);`

### 26. Write HQL Query for Positional Parameters in Repository interface ?

- `@Query("select u from User u where u.userName = ?1 and u.emailId= ?2")`

### 27. Which method need to use for pagination in JPA Repository ?

- `Page<User> userPagination = userRepository.findAll(PageRequest.of(0, 2, Direction.ASC, "emailId"));`

### 28. How to sort based on column value using JPA Repository ?

- `List<User> userList1 = userRepository.findAll(Sort.by("emailId").descending());`

### 29. How to read sql queries in interface using Properties file

- 1) Create META-INF Folder in src/main/resources
- 2) create a file jpa-named-queries.properties
- 3) provide key and values
- `Contact.fetchAllUsers=SELECT t FROM User t`

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- Contact.fetchAllUsersByEmailId=SELECT t FROM User t where t.emailId = :emailId
- 4) Add below methods in Repository
- List<User> fetchAllUsers();
- List<User> fetchAllUsersByEmailId(@Param("emailId")String emailId);

**30. Write syntax for NamedQuery in Entity class ?**

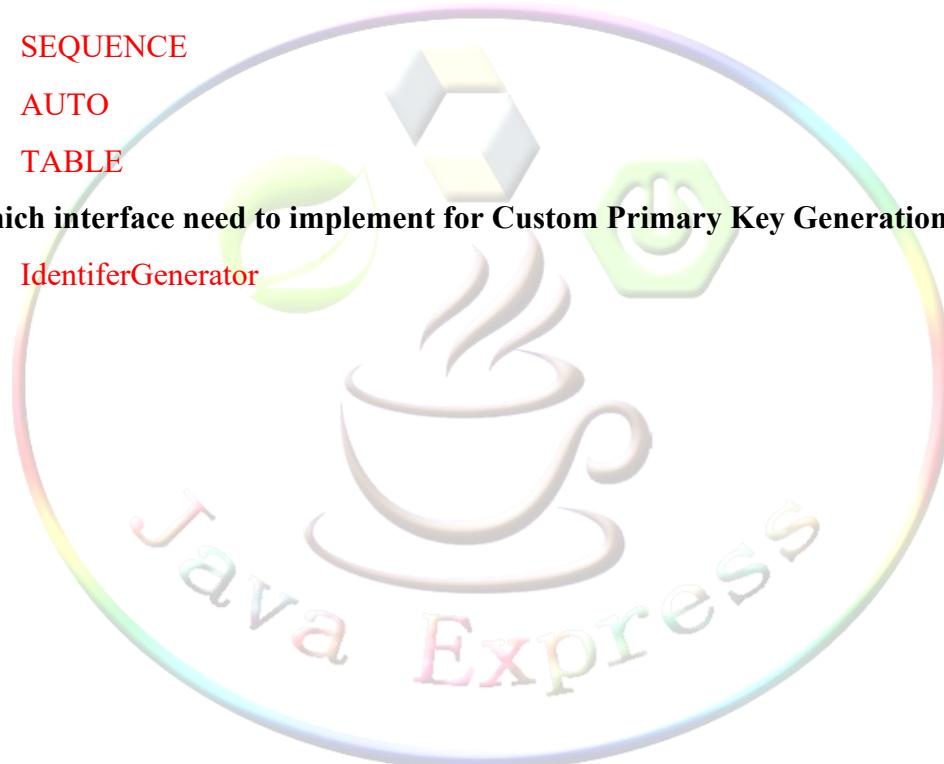
- @NamedQuery(name="User.findUserDetailsByNameAndEmail2", query = "select u from User u where u.userName=?1 and u.emailId=?2")

**31. What are the generators available for Primary Key Generation ?**

- IDENTTY
- SEQUENCE
- AUTO
- TABLE

**32. Which interface need to implement for Custom Primary Key Generation?**

- IdentifierGenerator



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### **Spring Boot Restful Interview Questions – Part 3**

#### **1. What is a web service ?**

- Webservices is a technology which is used to develop distributed applications with interoperability.

#### **2. What is Interoperable Applications ?**

- Irrespective of platform, irrespective of programming language if two applications are communicating with each other then they are called as Interoperable applications.

#### **3. How many ways we can develop Soap Based Webservices?**

- JAX-RPC
- JAX-WS

#### **4. What are the implementations available for JAX-RPC ?**

- SI
- Apache Axis
- WebLogic

#### **5. What are the implementations available for JAX-WS ?**

- RI
- Apache Axis2
- CXF

#### **6. What are the problems available if we use Soap Based Webservices ?**

- Adoptability issue (only soap people can access soap based webservices)

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- Interoperability issue (only support xml)

## 7. What are the implementations available for JAX-RS ?

- Jersey(SUN)
- Rest Easy(JBOSS)

## 8. Difference between Producer vs Consumer in Soap-Based Webservices?

- Once Producer development is completed, provider will share WSDL file to consumer
  - i. Note: Email, SharePoint, repository, UDDI
- Once we got the WSDL file, we can start Consumer Development
- Once Consumer development is completed, consumer will send SOAP Xml request to provider
- Producer will process consumer request and will send response to consumer.

## 9. What is a Contract or what is WSDL ?

- Contract means WSDL
- WSDL -> Webservices Description Language
- WSDL is a special XML which describes how provider is providing business services to consumers

## 10. Difference between Contract First Approach vs Contract Last Approach ?

- Contact First Approach means WSDL file will be created first then Development will be started.
- Contact Last Approach means First we will develop the service then we will prepare WSDL for that.

## 11. What are the REST Principles available ?

- 1) Unique Addressability
- 2) Uniform Constraint Interfaces
- 3) Message Oriented Representation
- 4) Communication Stateless
- 5) HATEOS

## 12. If webserver failed to start then How to change different tomcat port number ?

- Server.port = 8097

## 13. How to change JDK version in Spring Boot Project ?

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- Buildpath->configurebuildPath -> Libraries -> Add Library ->JRE SystemLibrary

#### **14. Difference between @RestController vs @Controller ?**

- **@RestController** = **@Controller** + **@ResponseBody**
- **@RestController** = develop distributed based applications
- **@Controller** = develop web based applications

#### **15. Difference between Idempotent vs Non-idempotent ?**

- When we send multiple identical(same) request to server if it is producing same result then it is called as Idempotent.
  - i. Ex: GET, PUT, HEAD methods are called as idempotent.
- When we send multiple identical(same) request to server if it is producing different result then it is called as non-idempotent.
  - i. Ex: POST

#### **16. What is HTTP Protocol ?**

- To Establish communication between Client and Resource we will use HTTP protocol
- For HTTP Protocol we have 2 versions they are
  - i. 1) HTTP 1.0 ( status codes support is not available)
  - ii. 2) HTTP 1.1

#### **17. How many types of Http methods available ?**

- 1) GET (read only request)
- 2) POST
- 3) PUT
- 4) DELETE
- 5) HEAD
- 6) OPTIONS
- 7) CONNECT
- 8) TRACE
- 9) PATCH

#### **18. Difference between POST vs PUT ?**

- POST method is used to send information to server in request body (File upload, HTML form) - it creates new record at server.

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- PUT Method is used to replace all the current representation of record/resource.(current data will be updated with new data)

#### **19. Can I use PUT instead of POST ?**

- Yes, but as per standards we need to use only POST for creating new record

#### **20. Difference between PUT vs PATCH ?**

- PATCH method is used to update partial content of target resource at server.
- PUT Method is used to replace all the current representation of record/resource.(current data will be updated with new data)

#### **21. Difference between @RequestParam vs @PathVariable ?**

- **Query Parameters : - @RequestParam**
  - a. Query Parameters should present only at end of url.
  - b. Query Parameters will start with ?
  - c. Query Parameters represents data in the form of key-value pair  
`http://localhost:9090/welcome?id=40`
  - d. We can send more than one query Parameter also in URL using & Separator  
`http://localhost:9090/fetchProduct?id=1&name=oneplus`
- **Path Params :**
  - i. Path Params contains values directly ( no keys)
  - ii. To Read Path Params we will use `@PathVariable("name")` in Spring MVC Controller
  - iii. Path Params can present anywhere in the URL.  
`http://localhost:8080/product/{id}`

#### **22. To retrieve custom headers from postman, which annotation do we need to use in controller ?**

- `@RequestHeader("my-number") int num`

#### **23. Difference between Rest Resource vs Rest Client ?**

- Rest Resource is a distributed component which provides business services to other over a network.
- Rest Client can be a human, can be a device, can be an application and can be a tool.

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- Anybody/anything which is capable of sending http request can be treated as Rest Client

#### **24. Difference between Accept-Type and Content-Type ?**

- When client is making request to Rest API he will send Accept and Content-Type headers in request.
- Accept header represents in which format client is expecting response data from Rest API.
  - i. Accept = application/json
- Content-Type header represents in which format client is sending input data to rest api.
  - i. Content-Type = application/xml

#### **25. What is the syntax to support json and xml in controller http methods ?**

- `@GetMapping(value="/products", produces= { "application/json" , "application/xml" } )`

#### **26. When to bind our rest controller method to PUT Request ?**

- If our rest controller method is responsible for updating existing record data then we will bind that method to PUT Request method.

#### **27. When to bind our rest controller method to Delete Request ?**

- If our rest controller method is responsible for delete a record at server then we will bind that method to DELETE Request method.

#### **28. Which HTTP Status codes to use for Every CRUD App ?**

- Mostly 200,201,204 – success status codes

#### **29. Which status codes you encounter as part of your projects and explain ?**

- 200 OK - Our Request processed successfully
- 201 - Created
- 204 - No Content
- 400 - Bad Request
- 401 – Unauthorized
- 403 - Forbidden
- 405 - Method Not Allowed
- 406 - Not Acceptable
- 500 – Internal Server Error

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**30. Which library is required to perform object to json and json to object data ?**

- Jackson-databind

**31. Which library is required to perform object to xml and xml to object data ?**

- JAX-B

**32. Which tag need to enable in controller method to support json and xml for post request ?**

- JSON – no need to use any annotation by default it will support SpringBoot
- @XmlRootElement – to bind our POJO class with XML

**33. Which headers are required while sending post request to controller method ?**

- Accept-Type = response value – application/xml
- Content-Type = input value – application/json

**34. Which annotations are required to support global exception handing in Spring boot Application ?**

- @ControllerAdvice
- @ExceptionHandler

**35. To enable Swagger framework in Spring boot, which annotation is required ?**

- @EnableSwagger2

**36. Which design pattern using for Docket object in Swagger ?**

- Builder Design Pattern

**37. How to access swagger UI and apidocs ?**

- <http://localhost:8090/swagger-ui.html>
- <http://localhost:8090/v2/api-docs>

**38. What are the annotations used in Swagger Documentation ?**

- Models :
  - @ApiModelProperty
  - @ApiModel
- Controllers :
  - @ApiOperation
  - @ApiResponse

**39. Which maven command (goal) need to generate jar file as below ?**

- Output : Spring-boot-dev.jar
- Command Prompt : mvn package -Dspring.profiles.active=dev

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- <finalName>applicationName-\$ {spring.profiles.active}</finalName>

#### 40. How to configure Query parameters as optional in Spring Boot Application ?

- @RequestParam(name="pageNumber", required=false, defaultValue="10")

#### 41. Which command need to configure spring profiles in application.properties ?

- spring.profiles.active=dev/prod/uat/test

#### 42. Difference between RestTemplate vs Web Client ?

- RestTemplate supports Synchronous communication
  - i. Web Client supports both Synchronous and Asynchronous Communication.(introduced in spring 5)
- Rest Template After Making a request it will block the thread until we receive the response)
  - i. Asynchronous communication means after making a request it won't wait for the response it will continue its execution further.

#### 43. Is this possible to change port of Embedded Tomcat server in Spring Boot ?

- Yes , using server.port = 8090

#### 44. Can we override or replace the Embedded Tomcat server in Spring Boot ?

- Yes, we can replace using different starter like spring-boot-starter-jetty and exclude tomcat from web starter.

```
<dependency>
 <groupId>org.springframework.boot</groupId>
 <artifactId>spring-boot-starter-web</artifactId>
 <exclusions>
 <exclusion>
 <groupId>org.springframework.boot</groupId>
 <artifactId>spring-boot-starter-tomcat</artifactId>
 </exclusion>
 </exclusions>
</dependency>
<dependency>
 <groupId>org.springframework.boot</groupId>
 <artifactId>spring-boot-starter-jetty</artifactId>
</dependency>
```

#### 45. Can we disable the default web server in the Spring Boot Application ?

- It is providing flexibility to build you application loosely coupled.
- Yes, we can disable by using below property
  - i. spring.main.web-application-type=none

#### 46. How to display current running port in console ?

- Using @Value("\${server.port}")

#### 47. How to use a property defined in application.properties file into your java class ?

- Using @Value("\${server.port}")

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## Spring Boot Microservices Interview Questions – Part 4

### **1. What is Monolithic Architecture ?**

- A monolithic application is built as a single unit.
- If all the functionalities of a project exists in a single codebase, then that application is known as monolithic application.
- In our application, we will have several modules and several components also will be available
- In a project, we have several functionalities.
- All the functionalities of the project will be divided into several modules

### **2. What are the drawbacks of Monolithic Architecture ?**

- As we are deploying fat war file into server, all modules related requests comes to same server.
- Burden will increase on the server
- Server may take more time to process the request
- Due to heavy traffic server may crash
- If We want to deploy latest code related to one module then we have to bring down the entire application.

### **3. What is a Microservice ?**

- Microservices design pattern came into market to avoid the problems of Monolithic Architecture.

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- Microservices Architectural design pattern not only related to java. It is an universal design pattern any body can follow this design pattern.
- Microservice is not a technology.
- Microservice is not a framework
- Microservice is not an API
- The main aim of Microservices architecture is 'Divide & Conquer ' principle
- To achieve easy maintenance of the project, microservices architecture is telling don't develop all the functionalities as single application.

#### **4. What are the advantages of using Microservices ?**

- Easy Maintenance
- Adopting new Technology
- Faster Releases
- Parallel Development
- Easy Scaling

#### **5. What are the challenges of Microservices ?**

- 1) Bounded Context
  - i. It is very difficult to decide boundary for Rest api functionality in Microservices architecture.
- 2) Lot of configuration
- 3) Less visibility
- 4) Pack of cards problem
  - i. Circuit Breaker Design Pattern

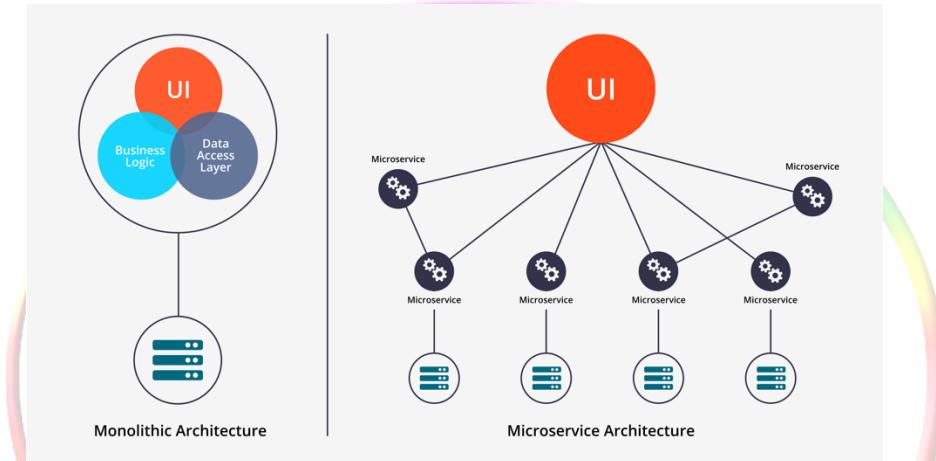
#### **6. Difference between Monolithic vs Microservices ?**

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Monolithic Architecture	Microservices Architecture
Consists of a single codebase with multiple modules within according to the business functionalities.	Consists of individual services with each service being responsible for exactly one functionality.
Do not need expert domain knowledge for development.	Risky to implement without domain expertise and container knowledge.
Easier deployment.	Relatively complex deployment.
Updating the system is a tedious process which would need the entire system to be redeployed.	Only the service which is updated needs to be redeployed.
Reusing the modules from one software into other software systems is difficult.	Microservices can be easily used in development of other software.



## 7. What are the modules available for any project in Monolithic or Microservices ?

- Business Modules
- Presentation Module
- Authorization Module
- Database Module
- Notification Module
- Integration Module

## 8. What are the components available in Microservice Architecture ?

- REST APIs
  - i. Rest APIs contains business logic to process the request
- Service Registry

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- i. Service Registry is used to register all the services available in our application. Eureka Server we can use as Service Registry. Eureka Server Provided by Netflix library .
- API Gateway
  - i. Api Gateway will act as Front Gate for all our apis(services) available in the project. Zuul Proxy we can use as Api Gateway. Zuul Proxy provided by Netflix library.

## **9. What is Service Registry ?**

- Service Registry is used to register services available in our project.
- Service Registry will provide a dashboard with services information like Status, Health and URL etc..
- We can use Eureka Server as a Service Registry and it is open Source
- Each Microservice is nothing but REST API

## **10. Difference between Eureka Server vs Eureka Client ?**

- Eureka Server provided by Spring Cloud Netflix Libraries
- Eureka server will contain multiple clients
- Eureka Server will provide below details of registered services
  - 1) Service Name
  - 2) Service Status
  - 3) Service Endpoint URL
- The Rest api which is registered with Eureka Server is called as Eureka Client.

## **11. How to access eureka dashboard and what is the default port number ?**

- <http://localhost:8761/eureka>
- 8761 – Default Port Number

## **12. Which annotation required to enable Eureka Server & Eureka Client?**

- `@EnableEurekaServer`
- `@EnableDiscoveryClient` – optional annotation at client side if we use default port number of Eureka Server

## **13. What are the dependencies required to develop Eureka Server and Eureka Client ?**

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```
<dependency>
 <groupId>org.springframework.cloud</groupId>
 <artifactId>spring-cloud-starter-netflix-eureka-server</artifactId>
</dependency>
<dependency>
 <groupId>org.springframework.cloud</groupId>
 <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
</dependency>
```

#### 14. Which configuration need to enable while creating Eureka Server ?

```
server:
 port: 8761

eureka:
 client:
 register-with-eureka: false
 fetch-registry: false
 #service-url:
 # defaultZone: http://localhost:9999/eureka
```

#### 15. Which configuration need to enable while creating Eureka Client ?

- `@EnableDiscoveryClient` – optional annotation at client side if we use default port number of Eureka Server
- Add Eureka Client Dependency
- If we change Eureka port number is different then need to configure in eureka client

```
server:
 port: 1111

spring:
 application:
 name: HI-SERVICE

eureka:
 client:
 service-url:
 defaultZone: ${DISCOVERY_URL:http://localhost:9999}/eureka/
```

#### 16. Which cloud version using for Spring Boot 2.3.9.RELEASE ?

- 2.3.9.RELEASE – Hoxton.SR11

#### 17. How many ways available to communicate between Services ?

- Rest Template
- Web Client
- Feign Client

#### 18. What is Inter-Service Communication ?

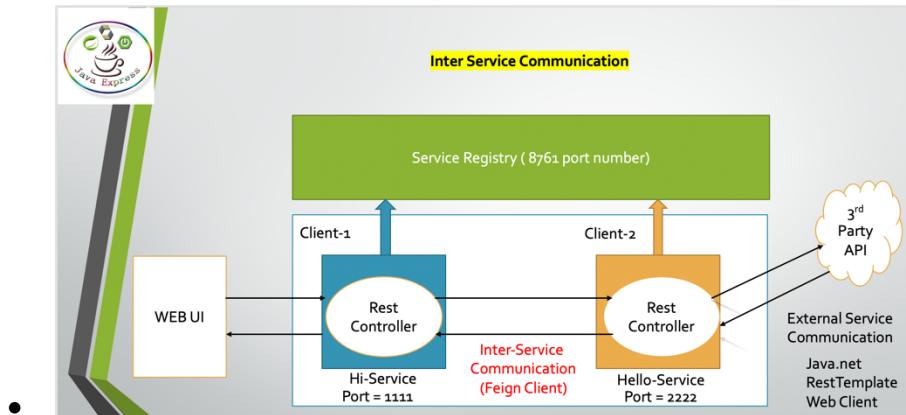
- In our project, if one micro-services accessing another microservice then it is called as Inter-service communication.

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- When we use FeignClient, we no need to configure API URL to access. Using api-name we can access api ( FeignClient will get API URL from Service Registry)



#### 19. Which dependency is required to develop feign client ?

```
<dependency>
 <groupId>org.springframework.cloud</groupId>
 <artifactId>spring-cloud-starter-openfeign</artifactId>
</dependency>
```

#### 20. Which annotation need to enable for feign client in Spring Boot ?

- `@EnableFeignClients`

#### 21. How to communicate between two microservices?

- Using Feign Client
- Create one interface and use Autowired while using interface

```
@FeignClient(name="HELLO-SERVICE")
public interface HelloClient {
 @GetMapping(value="/hello/{name}")
 public String invokeHelloService(@PathVariable("name")String name);
 // @PostMapping(value="/createOrder")
 // public String createOrderRequest(@RequestBody Order order);
}
```

#### 22. What is Api Gateway and why we need?

- API gateways acts as Single Entry point for all clients

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- API Gateway is used to manage all the apis which are available in our application.
- An API gateway is an API management tool that sits between a client and a collection of backend services.
- An API gateway acts as a reverse proxy to accept all API calls, aggregate the various services required to fulfil them, and return the appropriate result.
- In API gateway we can write the logic to filter user requests

### 23. What are the api gateways available in market?

- 1)APIGEE (Google)
- 2) Zuul Proxy (Spring Cloud) - Open Source
- 3) AWS Api Gateway

### 24. Which dependency required for API-Gateway ?

```
<dependency>
 <groupId>org.springframework.cloud</groupId>
 <artifactId>spring-cloud-starter-netflix-zuul</artifactId>
</dependency>
```

### 25. Could you please some snippet for API-Gateway for two services ?

```
spring:
 application:
 name: API-GATEWAY

zuul:
 prefix: /api
 routes:
 hiservice:
 path: /client1/**
 service-id: HI-SERVICE
 helloservice:
 path: /client2/**
 service-id: HELLO-SERVICE
```

### 26. What is Spring Boot Actuator and Why we need ?

- Actuators are used to provide production ready features of our application.
- Using Actuators we can monitor and manage our applications
- Actuator endpoints are available to get information about application
- We need to add spring-boot-starter-actuator dependency in pom.xml file
- Actuators provided several pre-defined endpoints to monitor our application.

### 27. What are the production ready features of any Application ?

- Information about application
- Health of the application
- Which beans loaded by our application
- What are config props loaded by our application

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- How many threads are running
- How many objects are created
- What are the URL mappings available in our application
- Shutdown the application

## 28. How to enable all actuator endpoints in Spring Boot Application ?

```
management:
 endpoints:
 web:
 exposure:
 include: '*'
 exclude:
 - health
 - beans
 endpoint:
 shutdown:
 enabled: true
```

## 29. Have you know which endpoints providing spring boot actuators ?

- By default **health** & **info** endpoints are exposed.
- **heapdump** endpoint is used to down JVM heap details. To analyze heap dump files we can use MAT (Memory analyzer tool).
- **threaddump** endpoint provides information about threads available in our application.
- **shutdown** endpoint is a special endpoint. It is used to stop the application.
  - i. This shutdown endpoint by default in disable state.
  - ii. shutdown endpoint is binded to HTTP POST Request.

## 30. If we add actuator starter, default which endpoints will enable in SB ?

- When we add 'actuator' starter, by default it will expose 2 endpoints they are 'health' and 'info' (we can access them directly).
- In Spring Boot 2.x v '/actuator' is mandatory in URL to access Actuator endpoints
- In Spring Boot 1.x v '/actuator' should not be there in URL

## 31. Why we need Spring Boot Admin Server and Admin Client ?

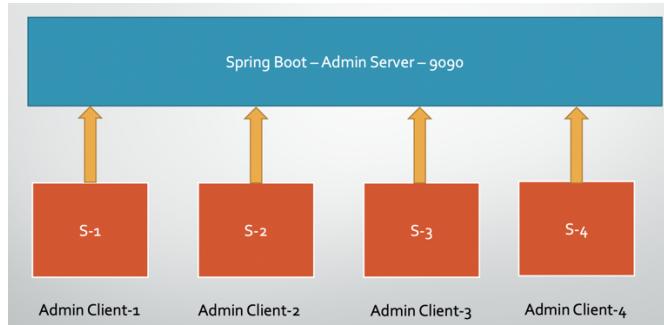
- In Microservices Architecture based project, we will have several services (REST APIs)
- To monitor Rest APIs, we will enable and expose actuator endpoints
- If we have more number of services, it will would be very difficult to monitor and manage all our services available in project.

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- To overcome this problem, Spring Boot Provided Admin Server & Admin Client Concepts.
- If we use Admin Server, it will provide beautiful user interface to monitor and manage our REST apis.
- Our Rest apis should be registered with Admin server then our rest api is called as Spring Boot Admin Client.



### 32. Which dependency required to enable Spring Boot Admin Server and Admin Client?

- ```
<dependency>
    <groupId>de.codecentric</groupId>
    <artifactId>spring-boot-admin-starter-server</artifactId>
</dependency>
<dependency>
    <groupId>de.codecentric</groupId>
    <artifactId>spring-boot-admin-starter-client</artifactId>
</dependency>
```

33. Which annotation required to enable Spring Boot Admin Server & Admin Client?

- `@EnableAdminServer`
- Admin Client -> Need to add dependency actuator & admin client

34. What is Load Balancer ?

- When all components are in same application, all requests comes to same server then burden will increase on server.
- When burden increased on server, it will process requests slowly sometimes server might get crash also.
- To reduce burden on the server, people will use Load Balancers for applications.
- Our application will be deployed to multiple servers and all those servers will be connected to Load balancer.

35. If I don't use load Balance, what will happen?

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- Without a load balancing program, a million users would make million API requests. If a single server were to respond to all of these requests in real time it'd crash!

36. How many types of Load Balancers are available?

- Load Balancing is used to reduce burden on the server
- Load Balancing can be implemented in 2 ways
 - Client Side Load Balancing
 - Server Side Load Balancing

37. What is Client Side Load Balancing ?

- When application is running in multiple servers, at client side we will decide to which server we have to make the request.
- In Client side load balancing client will understand in how many servers the application is running.
 - @RibbonClient("Service-Name")

38. What is Server Side Load Balancing ?

- When our applications is running in Multiple Servers then all those servers will be connected to one LBR machine
- When client send a request it will be received by LBR
- LBR will be configured with algorithms which help the LBR to identify particular server to process the request.
 - 1) Round Robin
 - 2) Sticky Session
 - 3) IP Hashing

39. How to achieve Distributed logging in Microservices?

- Zipkin is very efficient tool for **distributed tracing** in Microservice ecosystem
 - Need to run as a separate jar file in command prompt
- Sleuth is a tool from Spring cloud family. It is used to generate the trace id, span id
 - Need to enable dependencies in Spring Boot Application

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```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-sleuth</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-zipkin</artifactId>
</dependency>
```

40. How to access Zipkin dashboard for logging ?

- http://localhost:9411/zipkin/
- Default Port Number is 9411

41. What is Circuit Breaker (Netflix Hystrix Library) and How to Implement ?

- Circuit Breaker is used to implement Fault Tolerance
- In Microservices Architecture, multiple services will be available.
- If one microservice is not able to process the request, then request processing can't be completed.....
- To implement Circuit breaker, we will use Spring Cloud Netflix Hystrix Library

42. Which dependency required to implement Hystrix(Circuit Breaker)?

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-hystrix</artifactId>
</dependency>
```

43. Which annotations required to enable Hystrix ?

- @EnableCircuitBreaker
- @HystrixCommand(fallbackMethod = "callStudentServiceAndGetData_Fallback")

44. Why we need YML files ?

- YML stands for Yet Another Markup Language (YAML)
- It is used to store the data
- Earlier people used to work with properties files but now people are using YAML or YML files to store the data
- To avoid hardcoding in java classes we will use YML files in Spring Boot
- YML files are widely used format for configuration properties YML files are widely used format for configuration properties

45. Which annotations need to use to read application properties data to pojo class ?

- @Configuration

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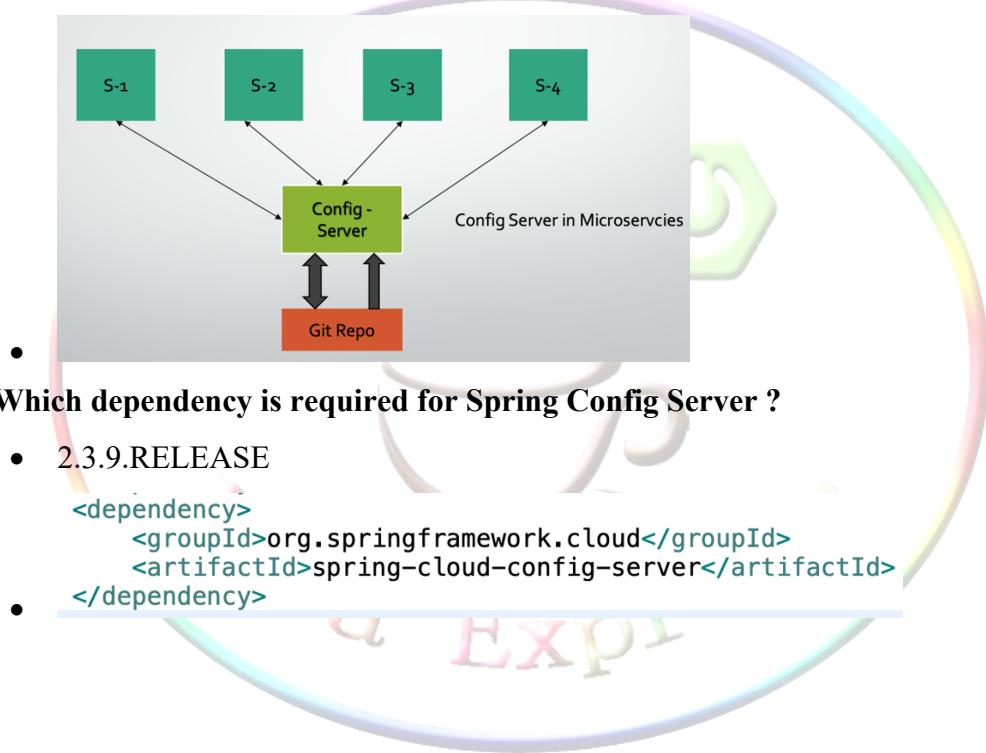
- @ConfigProperties(prefix="ies")
- @EnableConfigProperties

46. When to use application.yml and when to use bootstrap.yml?

- If we have both application.yml and bootstrap.yml in our application, Spring Boot will load bootstrap.yml first.
- In bootstrap.yml we will configure, application-name, config-server-url etc.

47. How to manage Centralized Configuration in Microservices ?

- Spring Cloud Provided Config Server & Config Client
- Config Server is used to externalize configuration properties from our application.



48. Which dependency is required for Spring Config Server ?

- 2.3.9.RELEASE

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-config-server</artifactId>
</dependency>
```
-

49. How to connect git repo through Spring Config Server?

```
spring:
  cloud:
    config:
      server:
        git:
          uri: https://github.com/javaexpresschannel/configserver
          search-paths:
            - '*service'
```

50. How to access dev profile information through spring config server ?

- <http://localhost:8871/stock/dev>

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- http://localhost:8871/stock-dev.yml
- http://localhost:8871/stock-dev.json
- http://localhost:8871/stock-prod.yml

51. Which configuration need to enable for Spring Config Client and dependency ?

- In application.yml
 - i. spring.application.name = stock
- In bootstrap.yml
 - i. spring.cloud.config.uri = <http://localhost:8871>
 - ii. spring.cloud.config.profile=dev

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-config-client</artifactId>
</dependency>
```

52. What do you know about Kafka ?

- Apache Kafka is a distributed streaming platform.
- Apache kafka is used to process real time data feeds with high throughput and low latency.
- Apache Kafka will act as Message Broker
- When we are working with Apache Kafka, two parties will be available. one application will acts as Publisher another application will act as Subscriber.
- If one application publish a message, multiple applications can subscribe to that message.

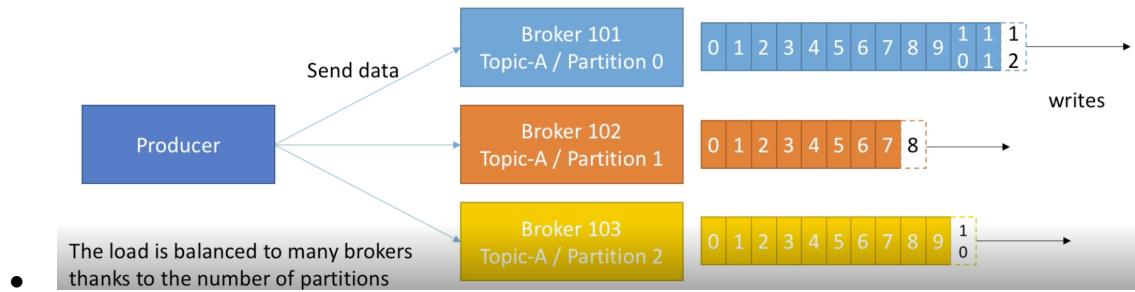
53. Difference between Topic & Partition?

- Topic is nothing but it's a name like stock_message_topic, LogMesageTopic
- Topics are split in partitions, which are the unit of parallelism in Kafka.
 - i. Each Partition is ordered.
 - ii. Each Partition within a partition gets an increment id called offset.
 - iii. Each partition should fit in a single Kafka server.

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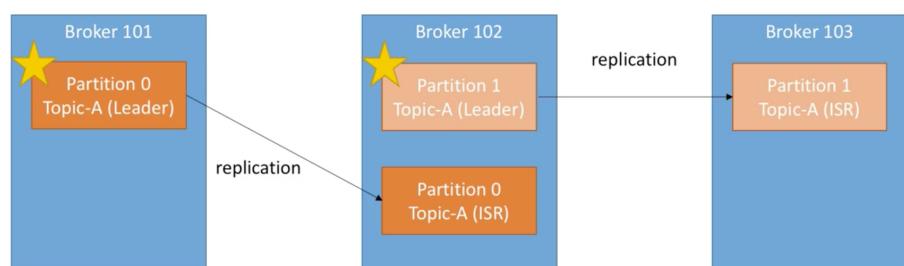


54. What is bootstrap Broker ?

- Broker is nothing but a server inside cluster
- A Kafka cluster is composed of multiple brokers (servers)
- Each broker is identified with its ID (integer)
- Each broker contain certain topics and Partitions
- After connecting to any broker (called a bootstrap broker), you will be connected to entire cluster.

55. What is ISR (In-Sync-Replica) ?

- At any time only one broker can be a leader for a given partition only that leader can receive and serve data for a partition.
- The other brokers will synchronize the data
- Therefore each partition has one leader and multiple ISR (in-sync-replica)



Spring MVC Interview Questions – Part 5

1. What is Spring MVC ?

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- Spring MVC is a module available in Spring framework
- Using Spring MVC we can develop MVC based web application & we can develop distributed applications
- MVC is an universal design pattern
- Using MVC design pattern we can develop loosely coupled applications
- We can developer application in layered architecture in fashion

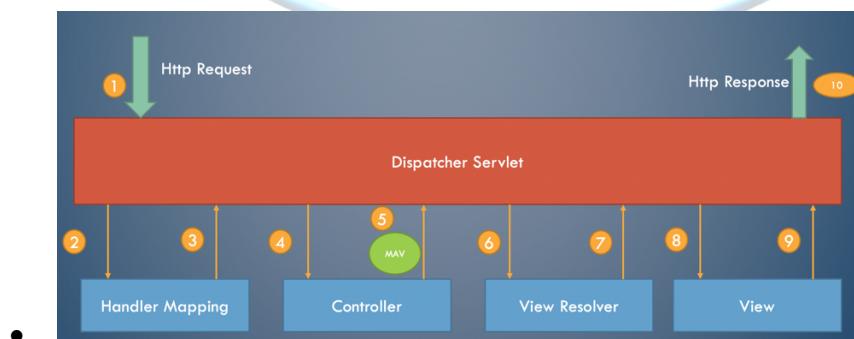
2. What are the advantages of using Spring MVC ?

- In Spring MVC, Components roles are very clearly separated.
- Spring MVC supports for multiple presentation technologies
- Spring MVC supports for Forms development
- They provided their own form tag library to simply forms development
- Spring MVC supports form Form binding object.
- Spring MVC supports for I18N applications development
- Spring MVC supports for Interceptors to intercept every request

3. Explain Components available in Spring MVC ?

- Front Controller (DispatcherServlet)
- Handler Mapper
- Controller
- ModelAndView
- ViewResolver
- View

4. Explain Spring MVC Flow ?



- Incoming Http Request will be received by DispatcherServlet. DS is a predefined Servlet class in Spring MVC and it is acting as Front Controller.
- DispatcherServlet will send requested URL to Handler Mapper

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- Handler Mapper will identify request handler which is responsible to handle this request and will send request handler details to DispatcherServlet.
- DispatcherServlet will call respective Controller class method
- Controller method will process request and will send ModelAndView object to DispatcherServlet
- DispatcherServlet will send view name to ViewResolver
- ViewResolver will identify view location & extension and sends data to DispatcherServlet.
- DispatcherServlet will give model and view details to View Component
- Model data will be rendered on view sends back to DispatcherServlet
- DispatcherServlet will send response back for the received request

5. Can we store one object as a value in model objects ?

- Yes, we can store.

6. Can we access object data in view file ?

- Yes, we can access object data in view file using variable name.

7. How to access model data in View File?

- Using Expression language we can access data available in model scope
- \${key}

8. Can we return direct response from Controller method?

- Yes, using @ResponseBody
- When we use @ResponseBody annotation for controller method, then DispatcherServlet will not execute ViewResolver.

9. How many ways we can send data UI to Controller ?

- we can send data UI to Controller in below 3 ways
 - Query Parameters
 - Path Parameters
 - Forms

10. Why Thymeleaf is required in Spring Boot ?

- Thymeleaf is a true template engine which takes HTML file, parse it and then produce web content on browser directly.
- Thymeleaf is more like HTML View
- Using Thymeleaf we can display dynamic data in HTML files.

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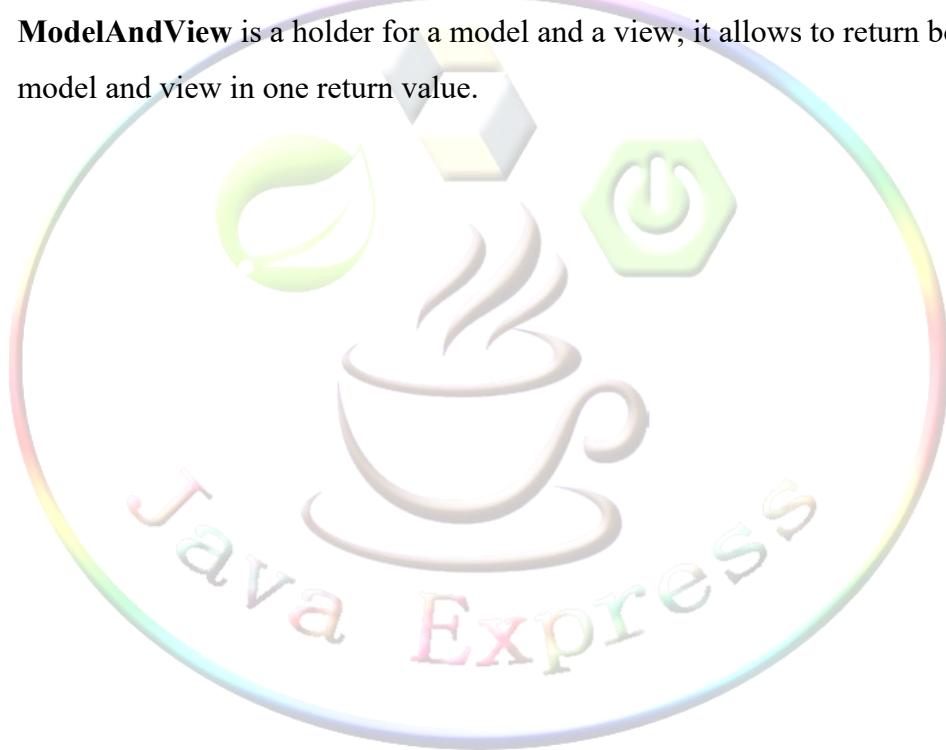
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- Spring Boot supports for Thymeleaf as a presentation technology
- Spring Boot provided below starter
 - i. spring-boot-starter-thymeleaf

11. Difference between Model, ModelMap & ModelAndView ?

- Model, ModelMap, and ModelAndView are used to define a model in a Spring MVC application.
- **Model** defines a holder for model attributes and is primarily designed for adding attributes to the model.
- **ModelMap** is an extension of Model with the ability to store attributes in a map and chain method calls.
- **ModelAndView** is a holder for a model and a view; it allows to return both model and view in one return value.



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