Java & Spring Boot Interview Notes

Core Java Concepts

Core Java Concepts (Step-by-Step):

1. Basics of Java:
- Data Types (int, float, boolean, char)
- Variables, Operators, Type Casting
- Control Statements (if, else, switch)
- Loops (for, while, do-while)
- Arrays and Strings

2. OOPs Concepts:
- Class & Object
- Inheritance
- Polymorphism (Overloading & Overriding)
- Abstraction (abstract class & interface)
- Encapsulation

3. Exception Handling:
- try, catch, finally
- throw, throws
- Custom Exceptions

4. Collections Framework:
- List, Set, Map, Queue
- ArrayList, LinkedList, HashSet, TreeSet, HashMap
- Iterator, Comparator, Comparable

5. Multithreading:
- Thread class and Runnable interface
- Synchronization
- Inter-thread communication

6. File I/O:
- FileReader, FileWriter, BufferedReader
- Serialization and Deserialization

7. Java 8+ Features:
- Lambda Expressions
- Stream API
- Functional Interfaces (Predicate, Consumer, etc.)
- Optional class

Spring vs Spring Boot

Spring vs Spring Boot:

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Spring:
- Requires XML or Java Config
- External web server (Tomcat)
- Manual dependency management
- Slower development

Spring Boot:
- Auto-configuration
- Embedded server (Tomcat/Jetty)
- Starter dependencies
- Faster development

Important Spring Boot Annotations

Important Spring Boot Annotations:

1. @SpringBootApplication - Combines @Configuration, @EnableAutoConfiguration, @ComponentScan
2. @RestController - For REST APIs, combines @Controller + @ResponseBody
3. @Controller - Handles web pages (used with Thymeleaf, JSP)
4. @Repository - DAO classes, exception translation
5. @Component - Generic bean
6. @Service - Business logic layer
7. @RequestMapping - Map all HTTP methods
8. @GetMapping / @PostMapping / @PutMapping / @DeleteMapping - HTTP method-specific routes
9. @Bean - Manually define beans
10. @Configuration - Used for config classes

Database Normalization

Database Normalization:

1NF: Atomic values, no repeating groups
2NF: No partial dependency (for composite keys)
3NF: No transitive dependency
BCNF: Advanced form of 3NF

Goal: Remove redundancy, maintain consistency.

SQL Joins Summary

MySQL Join Types:

1. INNER JOIN - Only matched rows
2. LEFT JOIN - All from left + matches from right
3. RIGHT JOIN - All from right + matches from left
4. FULL JOIN - All records from both (use UNION)

5. CROSS JOIN - Cartesian product

Palindrome Programs in Java

Palindrome String in Java:
String str = "madam";
Check with two-pointer technique (i=0, j=str.length-1)

Palindrome Array:
int[] arr = {1,2,3,2,1};
Compare from both ends i and j.

Method:
```
while(i < j) {
  if(arr[i] != arr[j]) return false;
}
```