

Core Java Basic Interview Questions

Navigating the Core Java Interview: A Journey Through Essential Concepts

The realm of software development is vast, but within it lies a core foundation: Java. For many, mastering Java is a gateway to a fulfilling career. This explores the essential concepts covered in core Java interview questions, combining academic rigor with practical examples to empower you to confidently navigate this critical step in your career journey. **Understanding the**

Fundamentals The core Java interview delves into the fundamental building blocks of the language. Let's break down these essential topics: **1. Data Types and Variables** | Data Type | Description | Example | ||| | **byte** | 8-bit integer | byte age = 25; | | **short** | 16-bit integer | short quantity = 1000; | | **int** | 32-bit integer | int score = 95; | | **long** | 64-bit integer | long population = 79000000000; | | **float** | 32-bit floating-point number | float price = 29.99f; | | **double** | 64-bit floating-point number | double distance = 3.14159; | | **char** | Single character | char initial = 'A'; | | **boolean** | True or False | boolean isLoggedIn = true; | **Real-world**

Application: Consider a banking application. We need data types to store information like account balance (double), customer age (byte), and transaction status (boolean). **2. Operators and**

Expressions Java provides various operators to perform computations, comparisons, and logical operations. The table below summarizes key operator types:

Operator Type	Description	Example
Arithmetic	+ (addition), - (subtraction), * (multiplication), / (division), % (modulo)	int result = 10 + 5;
Relational	== (equal to), != (not equal to), > (greater than), < (less than), >= (greater than or equal to), <= (less than or equal to)	boolean isEqual = (10 == 5);
Logical	&& (AND), (OR), ! (NOT)	boolean isEligible = (age >= 18) && (income > 50000);
Bitwise	& (AND), (OR), ^ (XOR), ~ (NOT)	int result = 10 & 5;

Real-world Application: Imagine a game where you have to determine if a player has enough points to unlock a new level. Relational operators are crucial for comparing the player's current score with the required score.

3. Control Flow

Statements Control flow statements dictate the execution order of your code.

a) Conditional Statements:

- **if-else:** Executes different code blocks based on a condition.
- **switch-case:** Provides efficient branching based on a variable's value.

b) Looping Statements:

- **for loop:** Repeats a block of code a specified number of times.
- **while loop:** Repeats a block of code as long as a condition remains true.
- **do-while loop:** Executes a block of code at least once and then repeats as long as a condition remains true.

Real-world Application: An e-commerce website uses loops to iterate through products in a catalog, and conditional statements to display different prices based on discounts or sales.

4. Classes and Objects

Java is an object-oriented programming language, where everything revolves around classes and objects.

a) Classes: Blueprints for creating objects. They define data (attributes) and behaviors (methods).

b) Objects: Instances of a class, representing real-world entities.

Real-world Application: A car is an object, defined by a class "Car." The class specifies attributes like color, model, and methods like "start," "accelerate," and "brake."

5.

Methods Methods are blocks of code that perform specific tasks.

a) Parameters: Values passed to a method for processing. b)

Return Values: Output generated by a method. Real-world

Application: Imagine a "calculateTax" method in an online shopping system that takes the price as a parameter and returns the

calculated tax amount. 6. **Arrays** Arrays are collections of elements of the same data type, stored in contiguous memory locations.

Real-world Application: A program managing student grades might store the grades of all students in an array, allowing for easy

access and manipulation. **Beyond the Basics: Mastering**

Advanced Concepts While the core Java fundamentals are crucial, successful interviews often require diving into more advanced

topics: 1. Inheritance Inheritance allows a class to inherit

properties and methods from a parent class. *Real-world*

Application: Imagine a "Vehicle" class with common properties like

"speed" and "fuel." We can create subclasses like "Car" and

"Motorcycle," inheriting from "Vehicle" and adding their own

specific characteristics. 2. **Polymorphism** Polymorphism enables objects of different classes to respond to the same message in

different ways. **Real-world Application**: A "Shape" class can define

a "draw" method. Subclasses like "Circle" and "Rectangle" can

override this method to draw their specific shapes. 3. **Abstraction**

Abstraction focuses on essential features while hiding unnecessary

details. Interfaces and abstract classes are key mechanisms. *Real-*

world Application: Imagine a "Remote" interface with methods like

"powerOn," "volumeUp," and "channelChange." Specific remote

types (TV remote, music player remote) can implement this

interface with their unique functionalities. 4. **Exception Handling**

Exception handling allows you to gracefully manage runtime

errors. **Real-world Application**: A banking application should handle

cases where a user enters an invalid PIN or tries to withdraw more

money than they have in their account. 5. **Generics** Generics allow

you to write type-safe code, avoiding runtime errors by enforcing

type constraints at compile time. **Real-world Application**: A "List"

of objects can be defined using generics to ensure that only objects of a specific type can be added to the list, preventing unexpected behavior. *Data Visualization for Key Concepts* **(Insert a suitable chart or infographic here)** This chart could visually represent the core Java concepts discussed, highlighting their relationships and dependencies. For example, it could depict a hierarchy of classes and their inheritance relationships, or illustrate the flow of control within conditional and looping structures. **Real-World**

Applications in Action To solidify your understanding of core Java concepts, consider how they are applied in real-world scenarios: •

Banking Application: Managing accounts, transactions, and security requires extensive use of classes, objects, inheritance, and exception handling. • *E-commerce Website:* Handling customer orders, product catalogs, and payments involves data structures, control flow statements, and input/output operations. • **Mobile**

Games: Implementing game logic, animations, and interactions utilizes core Java principles extensively. Conclusion Mastering core Java is the first step in a rewarding journey into the world of software development. By understanding fundamental concepts like data types, control flow, and object-oriented programming, you build a solid foundation for tackling more complex challenges.

Remember, it's about understanding the "why" behind the "how" - connecting the concepts to real-world problems and leveraging your knowledge to build innovative solutions. *Advanced FAQs* 1.

What is the difference between "==" and "equals" for object comparison? "==" checks for reference equality, while "equals" compares object content.

2. *Explain the concept of "this" keyword in Java.* "this" refers to the current object within a class, providing access to its attributes and methods.

3. **What are the different types of Collections in Java?** Common types include List, Set, and Map, each offering distinct functionalities for managing data collections.

4. **What are the benefits of using multithreading in Java?** Multithreading allows for parallel execution, improving

performance for tasks like background processing or handling multiple user requests. 5. **Describe the purpose of the "finally" block in exception handling.** The "finally" block guarantees code execution, regardless of whether an exception was thrown, ensuring cleanup operations are performed. By understanding these core concepts and pushing your knowledge further, you'll be well-equipped to excel in your Java interview and embark on a successful career in software development.

So, you've landed yourself a Java interview, huh? Exciting stuff! Whether you're a fresh graduate eager to dive into the world of software development or an experienced developer looking for your next big challenge, nailing those basic Java interview questions is crucial. These fundamental questions are designed to gauge your understanding of the core concepts that form the backbone of the Java programming language. They're not meant to be tricky, but rather to ensure you have a solid grasp of the building blocks.

As a professional content writer, I've helped countless developers prepare for their interviews, and I've noticed a pattern: even seasoned professionals can sometimes stumble on the basics. That's why I've put together this comprehensive guide to **core Java basic interview questions**. We'll cover the most frequently asked topics, provide clear explanations, and offer tips on how to answer them effectively. So, grab a coffee, get comfortable, and let's get you interview-ready!

Understanding the Core of Java: The Fundamentals

Before we jump into specific questions, let's briefly touch upon what "core Java" actually means. Core Java refers to the

fundamental concepts and APIs of the Java programming language. It's the foundation upon which all other Java technologies, like J2EE (now Jakarta EE) and Android development, are built. Think of it as the essential toolkit every Java developer needs in their arsenal.

Interviewers will often start with these foundational questions to assess your basic understanding and problem-solving skills. They want to know if you can articulate your thoughts clearly and demonstrate a genuine understanding, not just rote memorization. We'll explore key areas like Object-Oriented Programming (OOP), data types, control flow, and basic syntax.

Object-Oriented Programming (OOP) in Java: The Pillars of Design

Java is an object-oriented programming language, so naturally, OOP concepts will be a significant part of your interview. Understanding these principles is vital for writing scalable, maintainable, and reusable code. Be prepared to explain them in your own words and provide simple, relatable examples.

What is Object-Oriented Programming (OOP)?

This is often the very first question you'll encounter. OOP is a programming paradigm based on the concept of "objects," which can contain data (in the form of fields, often known as attributes or properties) and code (in the form of procedures, often known as methods). It's a way of structuring your programs to mimic real-

world entities and their interactions.

Key takeaway: Focus on the benefits – modularity, reusability, maintainability, and extensibility.

What are the Four Pillars of OOP?

This is a follow-up question that tests your deeper understanding. The four pillars are:

1. **Encapsulation:** Bundling data (attributes) and methods that operate on that data within a single unit (an object). It also involves data hiding, where the internal state of an object is protected from direct external access. Think of it like a capsule – you interact with the object through its defined methods, not by directly manipulating its internal parts.
2. **Abstraction:** Hiding complex implementation details and exposing only the essential features of an object. This allows us to focus on "what" an object does rather than "how" it does it. For example, when you drive a car, you don't need to know the intricate workings of the engine; you just need to know how to use the steering wheel, accelerator, and brakes.
3. **Inheritance:** A mechanism where a new class (subclass or derived class) inherits properties and behaviors (methods) from an existing class (superclass or base class). This promotes code reusability. Think of "is-a" relationships: a `Dog`` is a `*Animal``.
4. **Polymorphism:** The ability of an object to take on many forms. In Java, this is typically achieved through method overriding (runtime polymorphism) and method overloading (compile-time polymorphism). It allows you to treat objects of different classes in a uniform way.

Interview tip: For each pillar, have a simple, practical example ready. For instance, for inheritance, you could use ``Car`` inheriting

from ``Vehicle``. For polymorphism, you might explain how a ``speak()`` method could behave differently for ``Dog`` and ``Cat`` objects.

Difference between Abstraction and Encapsulation

This is a common point of confusion. While related, they are distinct.

1. **Abstraction** is about hiding complexity and showing essential features. It deals with the **design** of the object.
2. **Encapsulation** is about bundling data and methods together and controlling access to that data. It deals with the **implementation** details.

Think of it this way: Abstraction is like the blueprint of a house, showing the rooms and layout. Encapsulation is like the walls and doors that keep the internal wiring and plumbing hidden within the house.

What is a Class and an Object?

This is a fundamental question.

1. A **Class** is a blueprint or a template for creating objects. It defines the properties (attributes) and behaviors (methods) that all objects of that type will have.
2. An **Object** is an instance of a class. It's a concrete entity created from the class blueprint. Each object has its own state (values of its attributes) and behavior (methods).

Analogy: A ``Car`` class is the blueprint. A specific ``myCar`` object

is an actual car with a specific color, model, and mileage.

What is the difference between `==` and `.equals()`?

This question tests your understanding of object comparison in Java.

1. The `==` operator is used to compare primitive data types (like `int`, `char`, `boolean`) and to check if two object references point to the exact same object in memory.
2. The `.equals()` method, by default (in the `Object` class), behaves similarly to `==` for objects. However, it's commonly overridden in subclasses to provide a meaningful comparison of the *content* or state of two objects.

Example:

```
String s1 = "hello";
String s2 = "hello";
String s3 = new String("hello");

System.out.println(s1 == s2); // true (String pool
optimization)
System.out.println(s1 == s3); // false (s3 is a new
object)
System.out.println(s1.equals(s2)); // true
System.out.println(s1.equals(s3)); // true
```

Key point: For objects, always prefer `.equals()` when you want to compare their values, unless you specifically need to check if they are the same instance.

Java Basics: Data Types, Variables, and Operators

You can't build anything without the right tools. In Java, this means understanding primitive data types, how to declare variables, and the operators that allow you to manipulate data.

What are the Primitive Data Types in Java?

Java has eight primitive data types. These are the most basic data types and are not objects. They store simple values directly.

1. **Integers:** `byte` (-128 to 127), `short` (-32,768 to 32,767), `int` (approx. -2 billion to 2 billion), `long` (very large range).
2. **Floating-point numbers:** `float` (single precision), `double` (double precision).
3. **Boolean:** `boolean` (true or false).
4. **Character:** `char` (a single Unicode character).

Tip: Know the range of each integer type and the difference between `float` and `double` (precision).

What is the difference between `int` and `Integer`?

This question delves into the distinction between primitive types and their wrapper classes.

1. `int` is a primitive data type.
2. `Integer` is a wrapper class for the primitive type `int`. It allows you to treat primitive `int` values as objects.

This is important for using `int` in collections (like `ArrayList`) which can only store objects, and for using methods available on the `Integer` class (like `parseInt()`). This concept is called **autoboxing** (primitive to object conversion) and **unboxing** (object to primitive conversion).

What are the different types of Operators in Java?

Operators are symbols that perform operations on variables and values. Common types include:

1. **Arithmetic Operators:** `+`, `-`, `*`, `/`, `%` (modulo).
2. **Relational Operators:** `==`, `!=`, `>`, `<`, `>=`, `<=`.
3. **Logical Operators:** `&&` (AND), `||` (OR), `!` (NOT).
4. **Assignment Operators:** `=`, `+=`, `-=`, `*=`, `/=`, `%=`.
5. **Increment/Decrement Operators:** `++`, `--`.
6. **Bitwise Operators:** `&`, `|`, `^`, `~`, `<<`, `>>`.
7. **Ternary Operator:** `?:` (a shorthand for if-else).

Be ready to explain a few of these with examples, especially the difference between logical `&& / ||` and bitwise `& / |`.

Control Flow Statements in Java

These statements dictate the order in which your code is executed, allowing you to make decisions and repeat actions.

What are Decision Making Statements?

These allow your program to execute different code blocks based on certain conditions.

1. **`if` statement:** Executes a block of code if a condition is true.
2. **`if-else` statement:** Executes one block if the condition is true, and another if it's false.
3. **`if-else-if-else` ladder:** Allows for multiple conditions to be checked sequentially.
4. **`switch` statement:** Selects one of many code blocks to be executed based on the value of an expression (often used for comparing a variable against multiple constant values).

What are Looping Statements?

These allow you to execute a block of code repeatedly.

1. **`for` loop:** Used when you know the number of iterations in advance.
2. **`while` loop:** Executes a block of code as long as a condition is true. The condition is checked **before** each iteration.
3. **`do-while` loop:** Similar to `while`, but the condition is checked **after** each iteration, guaranteeing at least one execution of the loop body.
4. **Enhanced `for` loop (for-each loop):** A simpler way to iterate over arrays and collections.

Question hint: Be prepared to explain the differences between `while` and `do-while`, and when you would use a `for` loop versus a `while` loop.

What are `break` and `continue` statements?

These are control flow statements used within loops and `switch` statements.

1. **`break`:** Terminates the current loop or `switch` statement

immediately. Control is transferred to the statement immediately following the terminated loop/switch.

2. **`continue`**: Skips the rest of the current iteration of a loop and proceeds to the next iteration.

Methods in Java

Methods are blocks of code that perform specific tasks. They are fundamental to writing modular and reusable Java code.

What is a Method?

A method is a block of code associated with a class or object. It contains a series of statements that perform a specific task.

Methods help in breaking down a large program into smaller, manageable parts, promoting code reusability and modularity.

What is Method Overloading?

Method overloading occurs when two or more methods in the same class have the same name but different parameters (either in number, type, or order of parameters). The return type can be different, but it's not a requirement for overloading. This is an example of compile-time polymorphism.

Example: A `print()` method that can accept an `int`, a `String`, or a `double`.

What is Method Overriding?

Method overriding occurs when a subclass provides a specific implementation for a method that is already defined in its superclass. The method signature (name and parameters) must be

the same in both the superclass and the subclass. This is an example of runtime polymorphism. The subclass's method is executed when the object of the subclass is used.

Example: A `Animal` class has a `makeSound()` method. A `Dog` subclass overrides `makeSound()` to print "Woof!".

String Handling in Java

Strings are ubiquitous in programming, and Java offers powerful ways to handle them. Understanding the nuances of Java's `String` class is essential.

What is a String in Java?

In Java, a `String` is an object that represents a sequence of characters. `String` objects are immutable, meaning once a `String` object is created, its value cannot be changed. Any operation that appears to modify a `String` actually creates a new `String` object.

What is the difference between String, StringBuilder, and StringBuffer?

This is a very common and important question.

1. **`String`**: Immutable. Thread-safe. Slower for frequent modifications due to object creation.
2. **`StringBuilder`**: Mutable. Not thread-safe. Faster for frequent modifications.
3. **`StringBuffer`**: Mutable. Thread-safe. Slower than `StringBuilder` due to synchronization overhead, but safer in multi-threaded environments.

When to use which:

1. Use ``String`` when the text will not change.
2. Use ``StringBuilder`` for single-threaded applications where performance is critical.
3. Use ``StringBuffer`` for multi-threaded applications where thread safety is required.

How do you create a String object?

There are two main ways:

1. **Using String literal:** ``String str = "hello";`` - This creates the string in the String pool. If the string already exists, it reuses the existing reference.
2. **Using ``new`` keyword:** ``String str = new String("hello");`` - This always creates a new object in the heap, even if the string literal already exists.

This relates back to the ``==`` vs ``.equals()`` question for strings.

Exception Handling in Java

Robust applications need to gracefully handle errors. Java's exception handling mechanism is key to this.

What is Exception Handling?

Exception handling is a mechanism to handle runtime errors gracefully, so that the normal flow of the application can be maintained. It allows you to detect and resolve potential problems without crashing the program.

What are ``try``, ``catch``, ``finally``, ``throw``, and ``throws``?

1. **``try` block`:** Contains the code that might throw an exception.
2. **``catch` block`:** Catches and handles a specific type of exception.
3. **``finally` block`:** Contains code that will always execute, regardless of whether an exception occurred or not. It's often used for resource cleanup (e.g., closing files).
4. **``throw` keyword`:** Used to explicitly throw an exception from within a method.
5. **``throws` keyword`:** Used in a method signature to declare that the method might throw one or more exceptions. The responsibility of handling is passed to the caller.

What is the difference between checked and unchecked exceptions?

1. **Checked Exceptions:** These are exceptions that the compiler forces you to handle. If a method can throw a checked exception, you must either catch it or declare it using the ``throws`` keyword. Examples: ``IOException``, ``FileNotFoundException``.
2. **Unchecked Exceptions (Runtime Exceptions):** These are exceptions that the compiler does not force you to handle. They typically occur due to programming errors or unexpected conditions. Examples: ``NullPointerException``, ``ArrayIndexOutOfBoundsException``, ``ArithmeticException``.

Java Collections Framework

Basics

The Collections Framework provides a robust set of interfaces and classes for storing and manipulating groups of objects.

What is the Collections Framework?

It's a set of Java classes and interfaces that provide a framework for storing, retrieving, manipulating, and managing groups of objects. It offers a standard way to perform these operations, making code more consistent and easier to understand.

What are the main interfaces in the Collections Framework?

The core interfaces are:

1. **`Collection`**: The root interface for most collections.
2. **`List`**: An ordered collection that allows duplicate elements.
3. **`Set`**: An unordered collection that does not allow duplicate elements.
4. **`Queue`**: A collection designed for holding elements prior to processing (e.g., FIFO - First-In, First-Out).
5. **`Map`**: A collection that maps keys to values. Each key must be unique.

You should also be aware of some common implementations like ``ArrayList``, ``LinkedList``, ``HashSet``, ``HashMap``.

What is the difference between `ArrayList` and `LinkedList`?

This is a classic comparison question:

1. **`ArrayList`**: Implemented using a dynamic array. Offers fast random access (getting elements by index) but is slower for insertions/deletions in the middle.
2. **`LinkedList`**: Implemented using a doubly linked list. Offers fast insertions/deletions anywhere in the list but is slower for random access.

When to use which: Use `ArrayList` if you frequently access elements by index and insertions/deletions are less frequent. Use `LinkedList` if you frequently insert or delete elements, especially from the beginning or middle of the list.

What is the difference between `HashMap` and `Hashtable`?

1. **`HashMap`**: Not synchronized (not thread-safe), allows one `null` key and multiple `null` values. Faster than `Hashtable`.
2. **`Hashtable`**: Synchronized (thread-safe), does not allow `null` keys or `null` values. Slower than `HashMap`.

In modern Java development, `HashMap` is generally preferred for single-threaded applications, and concurrent collections (like `ConcurrentHashMap`) are used for multi-threaded scenarios where thread-safety is needed.

Final Thoughts for Your Core Java Interview Prep

This list covers many of the **core Java basic interview questions** you're likely to encounter. Remember, the goal isn't just to memorize answers. It's about understanding the concepts behind them. When you explain a concept, try to:

1. **Be clear and concise.**
2. **Use simple analogies or examples.**
3. **Explain the "why" behind a concept, not just the "what."**
4. **Be honest if you don't know something**, but perhaps offer to research it or explain related concepts you *do* know.

Practice explaining these concepts out loud. The more you articulate them, the more confident you'll become. Good luck with your interview – you've got this!

Core Java Basics: The Building Blocks of Technical Interviews Java remains one of the most widely used programming languages in enterprise software development, and mastering its foundational concepts is crucial for anyone preparing for technical interviews. At the heart of such assessments lie a set of core Java interview questions that test not only syntax knowledge but also a deep understanding of object-oriented principles, memory management, and application design. These questions serve as gateways to evaluating a candidate's ability to write clean, efficient, and maintainable code in a real-world context.

Understanding Object-Oriented

Programming in Java

A significant portion of core Java interviews centers around object-oriented design, with questions probing the principles of encapsulation, inheritance, and polymorphism. Candidates are often asked to explain how Java's access modifiers—public, private, protected—affect class visibility and data integrity. Equally important is the ability to demonstrate how inheritance enables code reuse through superclass and subclass relationships, while polymorphism allows objects to be treated as instances of their parent type. These concepts form the backbone of scalable and flexible software architectures, making them essential topics interviewers explore.

Beyond theoretical explanations, practical application matters. Interviewers assess how well candidates can implement these principles—such as designing well-structured classes, using constructors effectively, and leveraging interfaces to define contracts. The ability to balance abstraction with real-world constraints, like performance and readability, separates strong candidates from others. Mastery here not only answers interview questions but also shapes how developers approach problem-solving throughout their careers.

Memory Management and Garbage Collection

Java's automatic memory management through the garbage collector is both a hallmark of developer productivity and a frequent topic in technical interviews. Questions often explore how the garbage collector works—highlighting generational collection, reference types, and the impact of object lifetimes. Candidates should articulate how improper use of object references, such as

unintended static fields or circular references, can lead to memory leaks. Understanding the distinction between stack and heap memory, along with lifecycle events like object instantiation and expiration, demonstrates a candidate's grasp of performance optimization and resource handling.

In modern applications, efficient memory usage directly influences scalability and responsiveness. Interviewers use these questions to gauge a developer's awareness of memory-related bugs and their proactive strategies to avoid them, such as using weak references or optimizing data structures. This knowledge translates into building robust systems capable of handling high loads without degradation—a critical skill in today's dynamic software landscape.

Exception Handling and Robust Coding Practices

Java's structured approach to exception handling is another cornerstone of technical interviews. Candidates are expected to explain the hierarchy of exception types—distinguishing checked from unchecked exceptions—and how to use try-catch-finally blocks to maintain control flow during errors. Effective handling goes beyond catching exceptions; it involves logging meaningful messages, selecting appropriate exception types, and ensuring that resources are properly closed even when failures occur, often through the use of try-with-resources.

Beyond syntax, interviewers assess how candidates approach error recovery and system resilience. Real-world applications must gracefully handle unexpected conditions without crashing, making robustness a key quality. Demonstrating familiarity with best practices—such as validating inputs, avoiding silent failures, and using custom exceptions—reflects a mature understanding of

software reliability and user trust.

Key Applications and Industry Relevance

The core Java concepts discussed are not confined to interviews—they power countless enterprise applications, from large-scale banking systems to enterprise resource planning (ERP) platforms. Java’s portability, strong standard library, and mature ecosystem make it a preferred choice for mission-critical solutions. Interview questions often reflect real-world scenarios, such as designing thread-safe services, managing database connections, or implementing RESTful APIs with Java EE.

These technical benchmarks prepare candidates for roles in backend development, software architecture, and enterprise application engineering. As Java continues to evolve with new versions introducing concurrency improvements, modularization via Project Jigsaw, and enhanced performance features, staying grounded in these fundamentals ensures long-term adaptability and career growth.

The Future of Java in Technical Interviews

Looking ahead, while emerging languages and frameworks gain traction, Java’s stability and widespread adoption secure its relevance in technical hiring. Core Java knowledge remains a foundational prerequisite, with interviewers increasingly focusing on how candidates apply these basics in modern, distributed environments. Concepts like microservices, cloud-native development, and reactive programming build upon traditional

Java strengths, requiring a blend of legacy understanding and forward-thinking mindset.

Candidates who master core Java fundamentals—object orientation, memory management, exception handling, and practical application—position themselves strongly in today’s competitive landscape. These questions not only evaluate technical proficiency but also reveal a candidate’s problem-solving depth, attention to detail, and ability to build scalable, maintainable systems. In an ever-evolving tech world, proficiency in Java’s core principles remains a timeless asset, shaping the future of software engineering professionals.

Mastering the Fundamentals: Essential Core Java Basic Interview Questions for Aspiring Developers

The Java programming language remains a cornerstone of enterprise-level applications, web development, and mobile applications. For aspiring software engineers, a solid understanding of Core Java is paramount, and this understanding is rigorously tested during job interviews. Landing your dream Java developer role often hinges on your ability to confidently and accurately answer a range of [core Java basic interview questions](#). This comprehensive guide delves into the most frequently asked questions, providing detailed explanations and insights to help you not just prepare, but truly master these fundamental concepts.

Interviews for Java positions, especially for entry-level and junior

roles, typically start with foundational questions designed to gauge your grasp of the language's core principles. These questions aren't just about memorizing definitions; they're about understanding the 'why' behind Java's design and how these concepts translate into practical coding scenarios. Employers are looking for candidates who can demonstrate a clear understanding of object-oriented programming (OOP), data structures, memory management, and essential Java constructs. Let's break down the essential areas you need to be proficient in.

Core Java Basics: The Building Blocks of a Java Developer

This section covers the absolute essentials. Without a firm grasp here, navigating more complex topics will be challenging. These are the questions that often separate candidates with superficial knowledge from those with genuine programming aptitude.

1. What is Java? Explain its main features.

This is often the icebreaker question. Your answer should go beyond a simple definition. Focus on the key characteristics that make Java popular and powerful.

1. **Platform Independent (Write Once, Run Anywhere - WORA):** This is Java's most celebrated feature. Explain that Java code is compiled into bytecode, which is then executed by the Java Virtual Machine (JVM). The JVM is specific to the operating system, but the bytecode is not, allowing the same compiled code to run on any platform with a compatible JVM. This is a crucial concept for understanding Java's ubiquity.

2. **Object-Oriented Programming (OOP):** Detail the four pillars of OOP:
 1. **Encapsulation:** Bundling data (variables) and methods that operate on the data within a single unit (class). It controls access to the data, promoting data integrity.
 2. **Inheritance:** A mechanism where a new class (subclass) derives properties and behaviors from an existing class (superclass). This promotes code reusability.
 3. **Polymorphism:** The ability of an object to take on many forms. In Java, this is achieved through method overloading (compile-time polymorphism) and method overriding (runtime polymorphism).
 4. **Abstraction:** Hiding complex implementation details and exposing only the essential features. This is achieved through abstract classes and interfaces.
3. **Simple:** Compared to C++, Java has removed complex features like explicit pointers, operator overloading, and multiple inheritance of classes, making it easier to learn and use.
4. **Secure:** Java has built-in security features, such as the Security Manager, which helps prevent malicious applets from accessing local system resources.
5. **Robust:** Java emphasizes reliability through features like strong type checking, exception handling, and garbage collection, which reduce runtime errors.
6. **Multithreaded:** Java has built-in support for multithreading, allowing concurrent execution of tasks, which is essential for building responsive applications.
7. **Interpreted:** While Java code is compiled into bytecode, the JVM interprets this bytecode at runtime.
8. **High Performance:** While interpreted languages were historically slower, Java's Just-In-Time (JIT) compiler significantly improves performance by compiling frequently used bytecode into native machine code.

9. **Distributed:** Java is designed for distributed environments, enabling the development of applications that can run across networks.

2. Difference between JDK, JRE, and JVM.

This is a foundational question that tests your understanding of the Java ecosystem.

1. **JVM (Java Virtual Machine):** This is an abstract computing machine that enables your computer to run a Java program. It interprets the compiled Java bytecode. Each operating system has its own JVM.
2. **JRE (Java Runtime Environment):** This is the implementation of the JVM. It includes the JVM and the necessary library files and classes to execute Java applications. You need JRE to run Java programs, but not to develop them.
3. **JDK (Java Development Kit):** This is a superset of JRE. It includes everything that is in JRE, plus development tools needed to write and compile Java applications, such as the `javac` compiler, debugger, and archiver (`jar`). You need JDK to develop Java applications.

Analogy: Think of it like this: JVM is the engine, JRE is the car (engine + wheels + chassis), and JDK is the car factory (car + tools + blueprints).

3. What are data types in Java? Primitive vs. Non-primitive.

Understanding data types is crucial for effective variable declaration and manipulation.

1. **Primitive Data Types:** These are the basic building blocks of data. They are predefined by the language and store simple values. There are eight primitive data types in Java:
 1. **Integral Types:** ``byte``, ``short``, ``int``, ``long``
 2. **Floating-Point Types:** ``float``, ``double``
 3. **Character Type:** ``char``
 4. **Boolean Type:** ``boolean``
2. **Non-primitive Data Types (Reference Types):** These are objects created from classes. They store references to memory locations where the actual data resides. Examples include:
 1. **Strings** (``String``)
 2. **Arrays**
 3. **Classes**
 4. **Interfaces**

Key Differences: Primitive types store actual values, while non-primitive types store references. Primitive types have default values, while non-primitive types have a default value of ``null``. Primitive types are allocated on the stack (for local variables) or within objects, while non-primitive types are always allocated on the heap.

4. What are variables and constants in Java?

A fundamental concept for storing data.

1. **Variables:** A variable is a named storage location in memory that can hold a value. The value of a variable can be changed during program execution. They are declared with a data type and a name (e.g., ``int age = 30;``).
2. **Constants:** A constant is a variable whose value cannot be changed after it's initialized. In Java, constants are declared

using the `final` keyword (e.g., `final double PI = 3.14159;`).

It's a convention to use all uppercase letters for constant names.

5. Explain the difference between `==` and `.equals()` in Java.

This is a classic question that tests your understanding of object comparison.

1. **`==` operator:** This operator is used to compare primitive data types by their value. For objects, it compares the memory addresses (references) of the two objects. If the references point to the same object in memory, `==` returns `true`; otherwise, it returns `false`.
2. **`.equals()` method:** This method is part of the `Object` class and is used to compare the content or state of two objects. By default, the `.equals()` method in the `Object` class behaves like `==`. However, most classes, like `String` and wrapper classes, override the `.equals()` method to provide meaningful content-based comparison. For custom objects, you'll often need to override `.equals()` yourself to define how equality should be determined.

Example:

```
String s1 = new String("hello");
String s2 = new String("hello");
String s3 = "hello";
String s4 = "hello";

System.out.println(s1 == s2); // false (different
objects in memory)
System.out.println(s1.equals(s2)); // true (content
```

is the same)

```
System.out.println(s3 == s4); // true (string  
interning makes them point to the same object)
```

```
System.out.println(s1 == s3); // false (s1 is a new  
object, s3 is interned)
```

Object-Oriented Programming (OOP) in Depth

OOP is fundamental to Java. Expect a significant portion of your interview to revolve around these principles. Mastering these concepts will not only help you pass interviews but also write better, more maintainable code.

6. Explain the concepts of Encapsulation, Inheritance, Polymorphism, and Abstraction with examples.

As mentioned in the features section, these are critical. Elaborate with concrete examples.

1. **Encapsulation:** Imagine a capsule containing medication. It holds the ingredients (data) and the mechanism to deliver them (methods) together and protects them from external interference. In Java, this means declaring instance variables as ``private`` and providing public getter and setter methods to access and modify them. This allows you to control access and validate data.
2. **Inheritance:** Think of a family tree. A child inherits traits from their parents. In Java, a ``Car`` class can inherit properties (like

``brand`, `model`)` and methods (like ``startEngine()``) from a ``Vehicle`` class. This promotes code reuse. Keywords: ``extends``, ``super``.

3. **Polymorphism:** This means "many forms."

1. **Method Overloading (Compile-time):** Defining multiple methods with the same name but different parameter lists within the same class. The compiler determines which method to call based on the arguments passed. Example:

``print(int i)``, ``print(String s)``.

2. **Method Overriding (Runtime):** A subclass provides a specific implementation for a method that is already defined in its superclass. The decision of which method to execute is made at runtime based on the object's actual type. Keywords: ``extends``, ``@Override``.

4. **Abstraction:** Think of driving a car. You know how to use the steering wheel, accelerator, and brakes, but you don't need to know the intricate details of how the engine works. In Java, abstraction is achieved using:

1. **Abstract Classes:** Classes declared with the ``abstract`` keyword. They can have abstract methods (without implementation) and concrete methods (with implementation). A class can extend only one abstract class.

2. **Interfaces:** A blueprint of a class. It contains abstract methods (implicitly ``public abstract``) and constants. A class can implement multiple interfaces. Interfaces define a contract that implementing classes must adhere to.

7. Difference between Abstraction and Encapsulation.

A nuanced distinction that often trips up candidates.

1. **Abstraction:** Focuses on **what** an object does (its behavior

and essential features), hiding the complex implementation details. It's about simplifying complexity by providing a high-level view.

2. **Encapsulation:** Focuses on *bundling* data and methods that operate on that data within a single unit and controlling access to that data. It's about data hiding and protection.

You can achieve abstraction through abstract classes and interfaces, while encapsulation is achieved through access modifiers (`private`, `public`, `protected`). Abstraction is a design concept, while encapsulation is an implementation concept.

8. What is an Abstract Class and an Interface? When to use which?

A deeper dive into abstraction mechanisms.

1. Abstract Class:

1. Can have abstract and concrete methods.
2. Can have instance variables and static variables.
3. Can have constructors.
4. A class can extend only one abstract class.
5. Use when you want to share common code (concrete methods) and define a common structure (abstract methods) among closely related classes.

2. Interface:

1. All methods are implicitly `public abstract` (before Java 8).
2. Can have `public static final` constants.
3. Cannot have constructors.
4. A class can implement multiple interfaces.
5. Use when you want to define a contract that unrelated classes can adhere to, enabling polymorphism and loose coupling. It's also used for achieving a form of multiple

inheritance.

Java 8+ Enhancements: Interfaces can now have `default` and `static` methods with implementations, blurring the lines slightly but still maintaining the core purpose of defining contracts.

Control Flow, Loops, and Core Constructs

These questions assess your ability to write procedural logic and manage program execution.

9. Difference between `break`, `continue`, and `return`.

Essential for controlling loop and method execution.

1. **`break` statement:** Used to exit a loop (`for`, `while`, `do-while`) or a `switch` statement prematurely. It terminates the innermost enclosing loop or switch.
2. **`continue` statement:** Used to skip the rest of the current iteration of a loop (`for`, `while`, `do-while`) and proceed to the next iteration.
3. **`return` statement:** Used to exit a method. It can optionally return a value from the method if the method's return type is not `void`.

10. Explain different types of loops in Java (`for`, `while`, `do-while`, `for-each`).

Basic but crucial for iterating over data.

1. **`for` loop:** Used for iterating a specific number of times. It has an initialization, condition, and update expression.
2. **`while` loop:** Executes a block of code as long as a specified condition is true. The condition is checked **before** each iteration.
3. **`do-while` loop:** Similar to `while` loop, but the condition is checked **after** each iteration. This guarantees that the loop body executes at least once.
4. **`for-each` loop (Enhanced `for` loop):** Used for iterating over arrays and collections. It provides a simpler syntax for traversing elements without needing explicit index management.

11. What is the `switch` statement? Explain its usage and any limitations.

A control flow statement for multiple conditional branches.

1. The `switch` statement allows you to select one of many code blocks to be executed based on the value of an expression.
2. The expression in a `switch` statement can be of type `byte`, `short`, `char`, `int`, an enum type, or a `String` (since Java 7).
3. **`case` label:** Specifies a value to match against the switch expression.
4. **`break` statement:** Crucial to prevent "fall-through" to the next case.
5. **`default` label:** Optional; executes if no `case` matches the expression.
6. **Limitations:** Cannot be used with `long`, `float`, `double`, or `boolean`.

Robustness through Exception Handling

Handling errors gracefully is a sign of a professional developer. Exception handling is a vital part of Java programming.

12. What is Exception Handling? Explain ``try``, ``catch``, ``finally``, ``throw``, and ``throws``.

The core components of Java's exception handling mechanism.

1. **Exception Handling:** A mechanism to handle runtime errors so that the normal flow of the application can be maintained.
2. **``try`` block:** Contains the code that might throw an exception.
3. **``catch`` block:** Catches and handles a specific type of exception thrown in the ``try`` block.
4. **``finally`` block:** Contains code that will always execute, regardless of whether an exception is thrown or caught. It's often used for cleanup operations (e.g., closing resources).
5. **``throw`` keyword:** Used to explicitly throw an exception from a method or block of code.
6. **``throws`` keyword:** Used in a method signature to declare that the method *might* throw one or more checked exceptions. It tells the caller that they need to handle these potential exceptions.

13. Difference between Checked and

Unchecked Exceptions.

Understanding this distinction is crucial for proper exception management.

1. **Checked Exceptions:** These are exceptions that the compiler forces you to handle. If a method can throw a checked exception, you must either catch it using a `try-catch` block or declare it using the `throws` keyword in the method signature. Examples include `IOException`, `FileNotFoundException`.
2. **Unchecked Exceptions (Runtime Exceptions):** These exceptions are not checked by the compiler. They typically occur due to programming errors. Examples include `NullPointerException`, `ArrayIndexOutOfBoundsException`, `ArithmeticException`. You are not *required* to handle them, but it's good practice to do so where appropriate.

14. What is `Error` vs. `Exception` in Java?

Distinguishing between unrecoverable and recoverable problems.

1. **`Error`s:** Represent serious problems that are usually outside the control of the application, such as `OutOfMemoryError` or `StackOverflowError`. These are typically unrecoverable, and the application should usually terminate.
2. **`Exception`s:** Represent conditions that an application might be able to recover from. They are further divided into checked and unchecked exceptions.

The Power of the Collections Framework

Efficient data management is key. The Collections Framework is a set of interfaces and classes that provide powerful ways to store and manipulate groups of objects.

15. Explain the difference between `ArrayList` and `LinkedList`.

Two fundamental `List` implementations with different performance characteristics.

1. `ArrayList`

1. Implemented using a dynamic array.
2. **Advantages:** Fast random access (retrieval by index) - $O(1)$.
3. **Disadvantages:** Slow insertions and deletions in the middle of the list - $O(n)$, as elements need to be shifted.
4. Good for scenarios where you frequently access elements by index and rarely insert/delete in the middle.

2. `LinkedList`

1. Implemented using a doubly linked list.
2. **Advantages:** Fast insertions and deletions at the beginning/end and in the middle - $O(1)$ (if you have a reference to the node).
3. **Disadvantages:** Slow random access - $O(n)$, as you need to traverse the list.
4. Good for scenarios where you frequently add/remove elements, especially at the beginning or end.

16. Difference between `HashSet` and `LinkedHashSet`.

Understanding set implementations and their ordering guarantees.

1. `HashSet`

1. Stores unique elements.
2. Does not guarantee any specific order of elements. It uses hashing for efficient storage and retrieval.
3. Best performance for add, remove, and contains operations (average $O(1)$).

2. `LinkedHashSet`

1. Stores unique elements.
2. Maintains insertion order of elements. It's implemented using a hash table and a linked list.
3. Slightly slower than `HashSet` due to the overhead of maintaining the linked list.
4. Useful when you need the uniqueness of a `Set` but also want to iterate through elements in the order they were added.

17. Difference between `HashMap` and `Hashtable`.

A crucial distinction for understanding concurrent access and null handling.

1. `HashMap`

1. Not synchronized (not thread-safe). If multiple threads access and modify a `HashMap` concurrently, it can lead to data inconsistency.
2. Allows one `null` key and multiple `null` values.
3. Iterators are **fail-fast** (throw

`ConcurrentModificationException` if the map is structurally modified while iterating).

2. `Hashtable`

1. Synchronized (thread-safe). Each method is synchronized, which can be a performance bottleneck in single-threaded environments.
2. Does not allow `null` keys or `null` values.
3. Enumerators are **not fail-fast**.

Recommendation: For most single-threaded applications, `HashMap` is preferred due to better performance. For multi-threaded applications, consider `ConcurrentHashMap` from the `java.util.concurrent` package, which offers better performance than `Hashtable`.

18. What is `Comparable` and `Comparator`?

Essential for sorting collections.

1. **`Comparable` interface:** Used to define the **natural ordering** of objects. A class implements `Comparable` and overrides the `compareTo()` method. This is used for default sorting.
2. **`Comparator` interface:** Used to define a custom ordering for objects. You create a separate class that implements `Comparator` and overrides the `compare()` method. This allows you to sort objects in multiple ways or sort objects that don't implement `Comparable`.

Understanding Java Memory

Management

Garbage collection and memory allocation are core to Java's performance and stability.

19. What is Garbage Collection in Java?

Java's automatic memory management system.

1. Garbage Collection (GC) is the process by which the JVM automatically reclaims memory occupied by objects that are no longer in use by the application.
2. It frees up developers from manual memory deallocation, reducing the risk of memory leaks and dangling pointers.
3. The JVM identifies "unreachable" objects (objects that cannot be accessed from the root set of active objects) and reclaims their memory.
4. There are different GC algorithms (e.g., Mark-Sweep, Copying, Generational), each with its own trade-offs in terms of performance and pause times.

20. Difference between Stack and Heap memory.

Key areas where Java objects and variables are stored.

1. **Stack Memory:**

1. Used for storing local variables, method parameters, and method call information (stack frames).
2. Memory is allocated and deallocated automatically as methods are called and returned.
3. Faster allocation and deallocation compared to heap.
4. Fixed size, and exceeding it results in a

``StackOverflowError``.

2. **Heap Memory:**

1. Used for storing objects (instances of classes).
2. Memory is allocated when objects are created using the ``new`` keyword.
3. Deallocated by the Garbage Collector when objects are no longer referenced.
4. Can grow dynamically, but exceeding its capacity results in an ``OutOfMemoryError``.

String Manipulation and Immutability

Strings are ubiquitous, and understanding their behavior is crucial.

21. What is String immutability in Java?

A core characteristic of the ``String`` class.

1. An immutable object is an object whose state cannot be modified after it is created.
2. In Java, the ``String`` object is immutable. Once a ``String`` object is created, its value cannot be changed.
3. When you perform operations that seem to modify a string (e.g., concatenation), you are actually creating a new ``String`` object with the modified value. The original ``String`` object remains unchanged.
4. **Benefits:** Immutability makes ``String``'s thread-safe, allows them to be used as keys in ``HashMap``, and enables string pooling for efficiency.

22. Difference between ``String``, ``StringBuilder``, and ``StringBuffer``.

Understanding the nuances of string manipulation.

1. ``String``

1. Immutable.
2. When you concatenate strings using ``+``, new ``String`` objects are created, which can be inefficient for repeated concatenations.

2. ``StringBuilder``

1. Mutable.
2. Not synchronized (not thread-safe).
3. More efficient for string manipulations like appending or inserting characters, as it modifies the existing object.
4. Generally preferred for single-threaded environments.

3. ``StringBuffer``

1. Mutable.
2. Synchronized (thread-safe).
3. More overhead than ``StringBuilder`` due to synchronization, making it slower in single-threaded environments.
4. Use when multiple threads might access and modify the same string buffer concurrently.

Other Important Core Java Topics

Beyond the absolute basics, these topics demonstrate a deeper understanding.

23. What is a ``static`` keyword in Java?

A keyword that affects class-level behavior.

1. The ``static`` keyword can be applied to variables, methods, blocks, and nested classes.
2. **``static` variables`**: Class variables. They belong to the class itself, not to any specific instance. There is only one copy of a static variable, shared among all objects of the class.
3. **``static` methods`**: Class methods. They can be called without creating an object of the class. They can only directly access static members of the class.
4. **``static` blocks`**: Used for initializing static variables. They execute only once when the class is loaded into memory.
5. **``static` nested classes`**: Also known as top-level nested classes. They are not associated with any instance of the outer class.

24. What is the ``final`` keyword in Java?

Used for constants, preventing inheritance, and preventing method overriding.

1. **``final` variables`**: Cannot be reassigned after initialization. If ``final`` and ``static``, it becomes a constant.
2. **``final` methods`**: Cannot be overridden by subclasses.
3. **``final` classes`**: Cannot be extended or inherited by any other class (e.g., ``String`` class is ``final``).

25. What is a constructor in Java?

Default constructor? Parameterized constructor?

How objects are initialized.

1. A constructor is a special method used to initialize objects. It has the same name as the class and no return type.

2. **Default Constructor:** If you don't define any constructor in your class, the Java compiler provides a default no-argument constructor. It initializes instance variables with their default values.
3. **Parameterized Constructor:** A constructor that accepts one or more arguments. It's used to initialize objects with specific values provided by the caller.

26. What is Method Overloading and Method Overriding?

Reiterated for emphasis, as this is a critical OOP concept.

1. **Method Overloading:** Defining multiple methods with the same name but different parameter lists (number, type, or order of parameters) within the same class. It's a compile-time polymorphism.
2. **Method Overriding:** A subclass provides a specific implementation for a method that is already defined in its superclass. The method signature (name and parameter list) must be the same. It's a runtime polymorphism.

27. What is the purpose of `Object` class in Java?

The root of the class hierarchy.

1. The `Object` class is the parent of all classes in Java.
2. Every class in Java is implicitly or explicitly a subclass of the `Object` class.
3. It provides fundamental methods like `equals()`, `hashCode()`, `toString()`, `clone()`, `wait()`, `notify()`, `notifyAll()`, and `getClass()`.

28. Explain `hashCode()` and `equals()` contract.

Crucial for correctly using collections like `HashMap`.

1. **Contract:**

1. If two objects are equal according to the `equals()` method, then calling the `hashCode()` method on each of the two objects must produce the same integer result.
 2. If two objects are unequal according to the `equals()` method, then calling the `hashCode()` method on each of the two objects might produce different integer results. However, producing the same integer result does not necessarily imply that two objects are unequal.
 3. If two objects have the same `hashCode()`, they may or may not be equal.
2. Failure to adhere to this contract can lead to unexpected behavior, especially when using objects as keys in hash-based collections like `HashMap` and `HashSet`.

Preparing for Success: Beyond the Questions

While mastering these [core Java basic interview questions](#) is essential, preparation doesn't stop there. Employers also look for:

1. **Problem-Solving Skills:** Be ready to solve simple coding challenges on the spot. Practice algorithms and data structures.
2. **Understanding of Best Practices:** Familiarize yourself with coding conventions, clean code principles, and design patterns.
3. **Enthusiasm and Willingness to Learn:** Show genuine interest in Java and a proactive attitude towards learning new

technologies.

4. **Clear Communication:** Explain your thought process clearly and concisely.

By thoroughly understanding these fundamental Core Java concepts and practicing your explanations, you'll be well-equipped to tackle the basic interview questions and lay a strong foundation for a successful career in software development.

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Questions & Answers About core java basic interview questions

No	Question	Answer
1	What's the difference between `==` and `.equals()` in Java, and when should you use each?	The `==` operator compares object references (memory addresses), checking if two variables point to the exact same object. The `.equals()` method, on the other hand, compares the content or state of two objects. You use `==` for primitive types and to check if two object references are identical. Use `.equals()` to compare the logical equality of objects, especially with classes like String.

2	Can you explain the concept of 'pass-by-value' in Java and why it's important?	Java is strictly 'pass-by-value'. This means that when you pass a variable to a method, a copy of the variable's value (or the reference for objects) is passed. Modifying the parameter inside the method won't affect the original variable outside the method. For primitives, the value is copied. For objects, the reference is copied, so you can modify the object's internal state through the copied reference, but you can't reassign the original reference.
3	What are the 'final' keyword's different uses in Java?	The `final` keyword has three primary uses: 1. For variables: Makes a variable immutable (its value cannot be changed after initialization). 2. For methods: Prevents a method from being overridden by subclasses. 3. For classes: Prevents a class from being extended (made into a superclass).
4	Could you describe the difference between an abstract class and an interface in Java?	An abstract class can have both abstract (no implementation) and concrete (with implementation) methods, and can also have instance variables. A class can inherit from only one abstract class. An interface , on the other hand, primarily defines a contract with abstract methods (before Java 8) and static/default methods (from Java 8 onwards). It cannot have instance variables. A class can implement multiple interfaces.

5	What is polymorphism, and can you provide a simple Java example?	Polymorphism means 'many forms'. In Java, it allows objects of different classes to be treated as objects of a common superclass or interface. A common example is method overriding. If you have a <code>`Shape`</code> abstract class with a <code>`draw()`</code> method, and <code>`Circle`</code> and <code>`Square`</code> classes extend <code>`Shape`</code> and override <code>`draw()`</code> , you can call <code>`draw()`</code> on a <code>`Shape`</code> reference pointing to either a <code>`Circle`</code> or <code>`Square`</code> object, and the correct <code>`draw()`</code> method will be executed.
6	Explain the difference between <code>`String`</code> , <code>`StringBuilder`</code> , and <code>`StringBuffer`</code> in Java.	<code>`String`</code> objects are immutable. Every time you modify a <code>String</code> , a new <code>String</code> object is created. <code>`StringBuilder`</code> is mutable and non-synchronized, making it faster for single-threaded environments. <code>`StringBuffer`</code> is also mutable but is synchronized, making it thread-safe and suitable for multi-threaded applications where performance is less critical than safety.
7	What is the purpose of the <code>`static`</code> keyword in Java?	The <code>`static`</code> keyword in Java is used to create members (variables or methods) that belong to the class itself, rather than to any specific instance of the class. Static variables have a single copy shared among all objects of the class. Static methods can be called directly using the class name without creating an object, and they can only access other static members of the class.

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