CDAC Mumbai PG-DAC August 24

Assignment No- 4

1) Write a program that demonstrates widening conversion from int to double and prints the result.

Solution:

```
public class Windning {
public static void main(String[] args) {
    int intValue = 100; // Integer value
    double doubleValue = intValue; // Widening conversion from
int to double
    System.out.println("Integer value: " + intValue);
    System.out.println("Double value: " + doubleValue);
}
}
```

Output:

```
D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>javac Windning.java

D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>java Windning
Integer value: 100
Double value: 100.0
```

2) Create a program that demonstrates narrowing conversion from double to int and prints the result.

Solution:

```
public class Program2 {
   public static void main(String[] args) {
      // Declare a double variable
       double doubleValue = 123.45;
      // Perform narrowing conversion from double to int
       int intValue = (int) doubleValue;
      // Print the original double value and the converted int value
```

```
        System.out.println("Original double value: " + doubleValue);
        System.out.println("Converted int value: " + intValue);
    }
}
```

```
D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>javac Program2.java

D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>java Program2
Original double value: 123.45
Converted int value: 123
```

3) Write a program that performs arithmetic operations involving different data types (int, double, float) and observes how Java handles widening conversions automatically.

Solution:

```
    public class Program3 {
    public static void main(String[] args) {
    int intValue = 10;
    double doubleValue = 5.5;
    float floatValue = 3.3f;

    double result1 = intValue + doubleValue;  // int to double
    float result2 = intValue + floatValue;    // int to float
    double result3 = floatValue + doubleValue; // float to double

    System.out.println("Result of int + double: " + result1);
    System.out.println("Result of int + float: " + result2);
    System.out.println("Result of float + double: " + result3);
    }
}
```

Output:

```
D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>java Program3
Result of int + double: 15.5
Result of int + float: 13.3
Result of float + double: 8.799999952316284

D:\CDAC Daily Notes Assignment\Class Work\JAVA_MODULE\Assignment\Mam Assignment\Assignment_4\Notepad files>
```

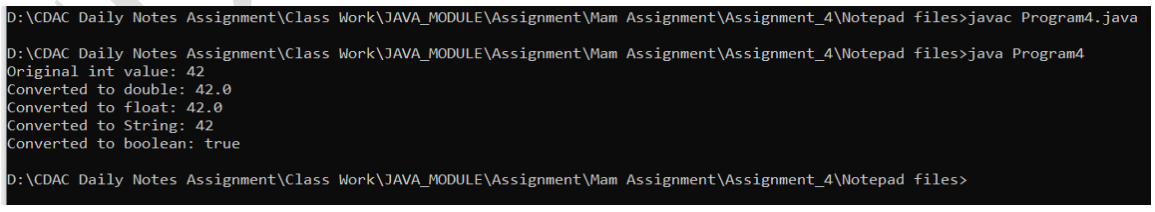
4) Write a Program that demonstrates widening conversion from int to (double,float, boolean, string) and prints the result.

Solution:

```
    public class Program4{
    public static void main(String[] args) {
    int intValue = 42;
    double doubleValue = intValue;   // int to double
    float floatValue = intValue;     // int to float
    String stringValue = Integer.toString(intValue); // int to String
    boolean booleanValue = (intValue != 0); // int to boolean

    System.out.println("Original int value: " + intValue);
    System.out.println("Converted to double: " + doubleValue);
    System.out.println("Converted to float: " + floatValue);
    System.out.println("Converted to String: " + stringValue);
    System.out.println("Converted to boolean: " + booleanValue);
  }
}
```

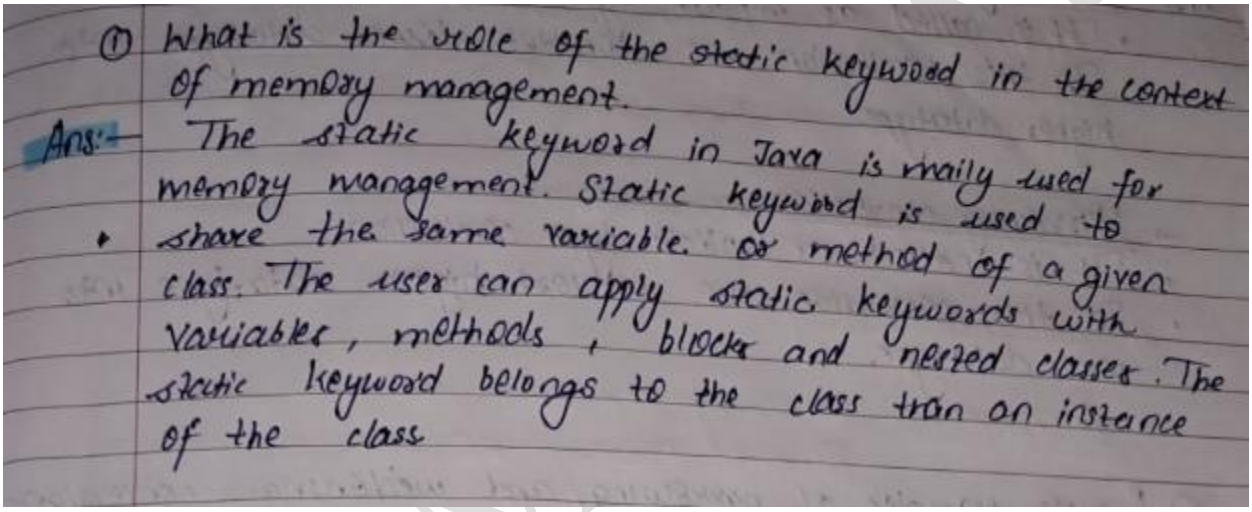
Output:



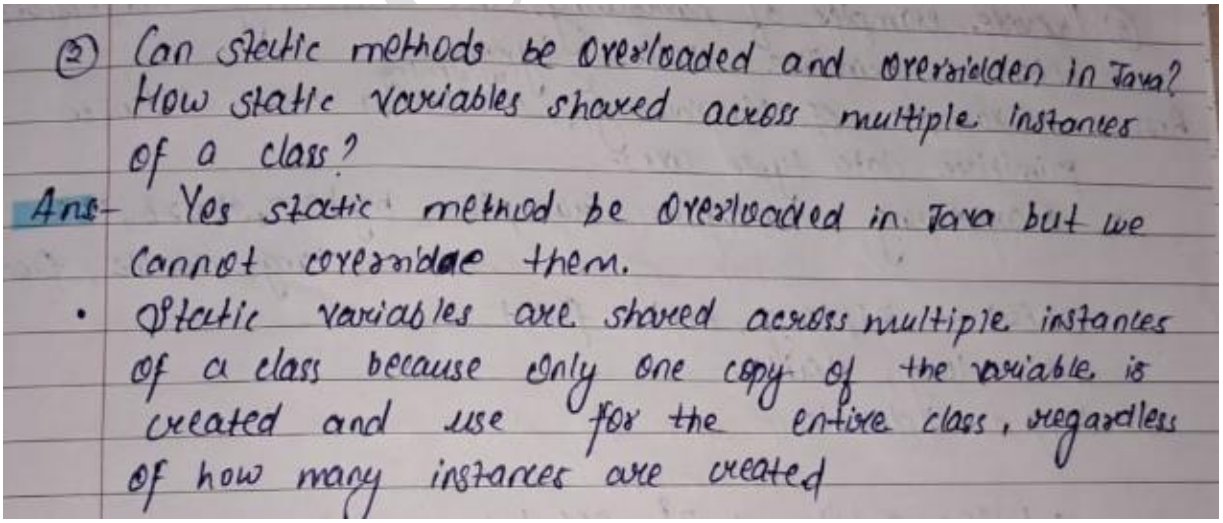
Interview Questions

Note: Write down this interview question on your notebook ,Take a screenshort & Paste that SS in the word document & upload on your Github.
What does the static keyword mean in Java? Explain the difference between static and non-static methods.

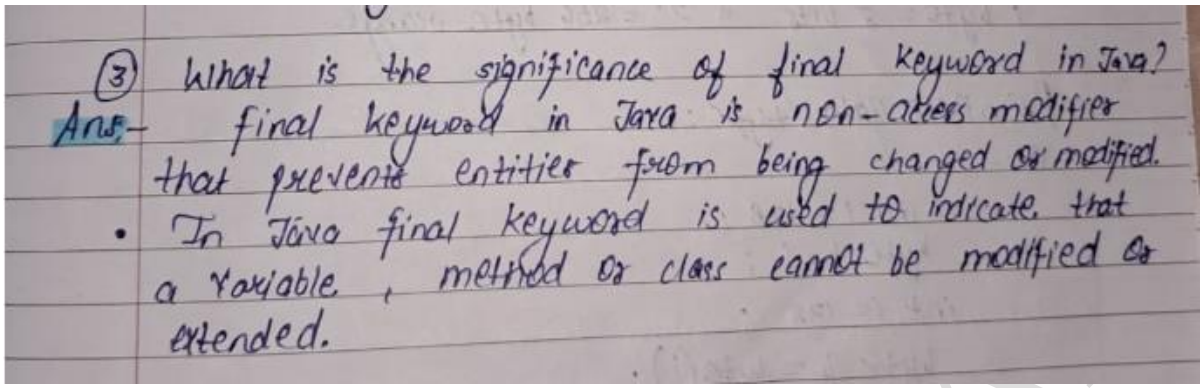
1. **What is the role of the static keyword in the context of memory management.**



2. **Can static methods be overloaded and overridden in Java?Howstatic variables shared across multiple instances of a class?**



3. **What is the significance of the final keyword in Java?**

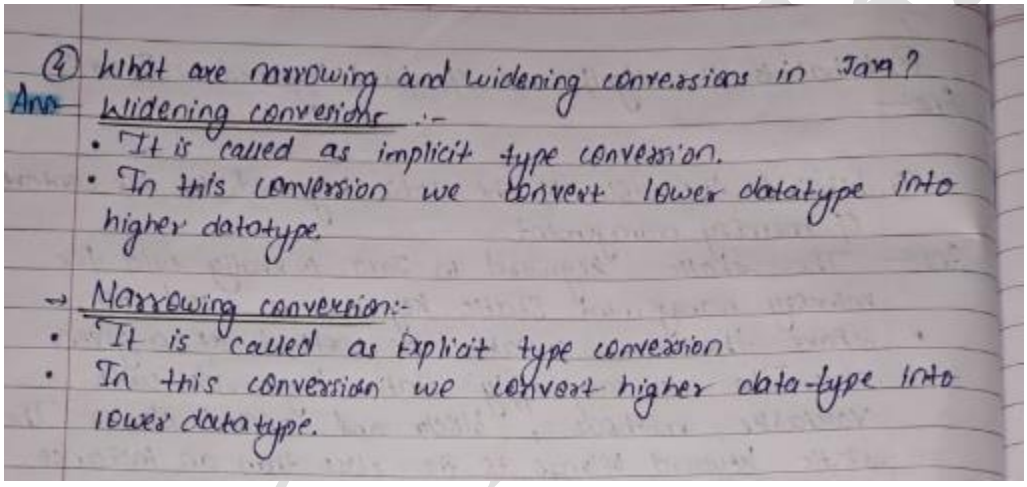


(3) What is the significance of final keyword in Java?

Ans:- final keyword in Java is non-access modifier that prevents entities from being changed or modified.

- In Java final keyword is used to indicate that a variable, method or class cannot be modified or extended.

4. **What are narrowing and widening conversions in Java?**



(4) What are narrowing and widening conversions in Java?

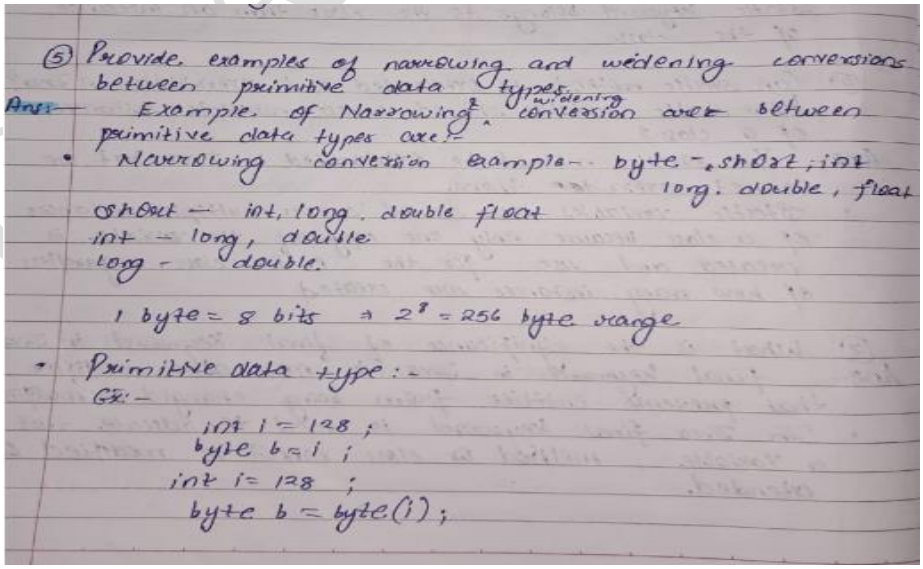
Ans:- Widening conversion :-

- It is called as implicit type conversion.
- In this conversion we convert lower datatype into higher datatype.

→ Narrowing conversion:-

- It is called as Explicit type conversion
- In this conversion we convert higher data-type into lower datatype.

5. **Provide examples of narrowing and widening conversions between primitive data types.**



(5) Provide examples of narrowing and widening conversions between primitive data types.

Ans:- Example of Narrowing & widening conversion are between primitive data types are:-

- Neverowing conversion example- byte - short, int long, double, float

short - int, long, double float
int - long, double
long - double.

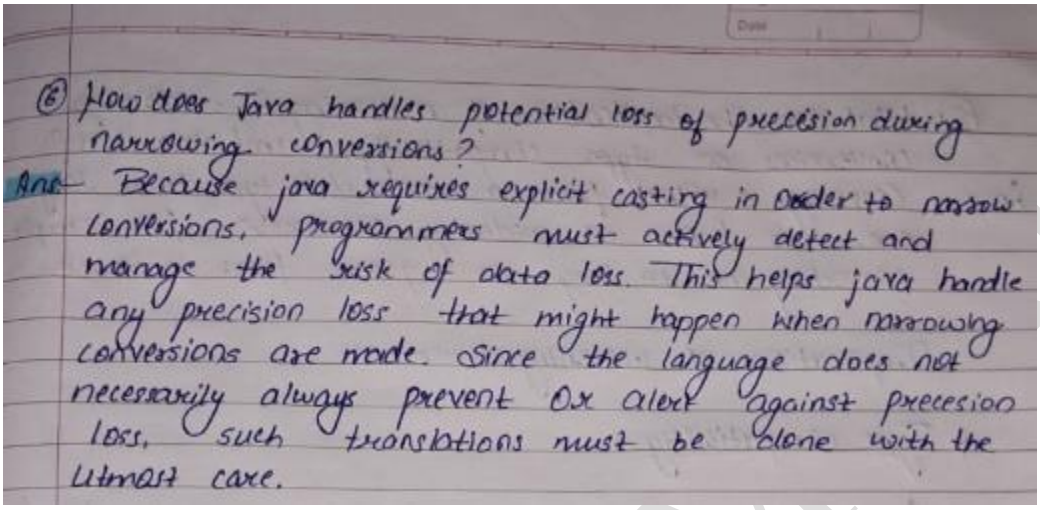
1 byte = 8 bits ⇒ 2^8 = 256 byte range

- Primitive data type :-

Ex:-

```
int i = 128;
byte b = i;
int i = 128;
byte b = byte(i);
```

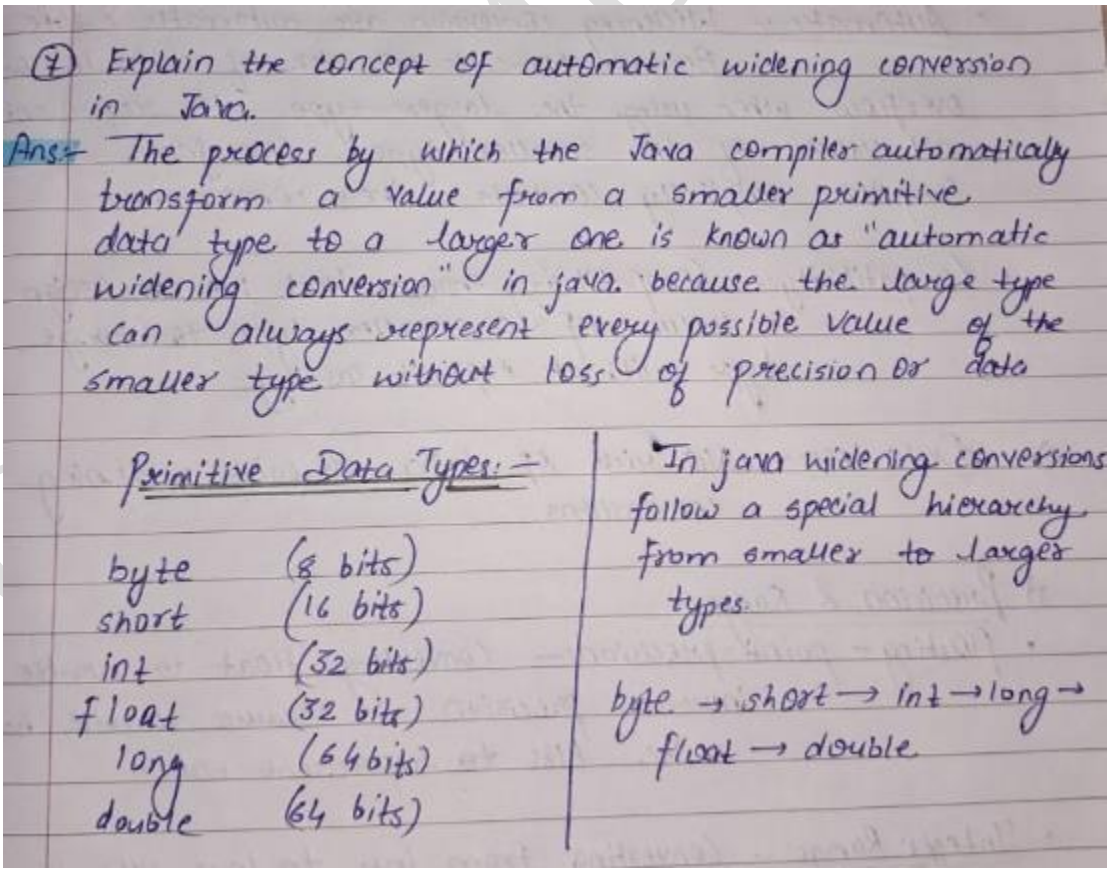
6. **How does Java handle potential loss of precision during narrowing conversions?**



⑥ How does Java handles potential loss of precision during narrowing conversions?

Ans- Because java requires explicit casting in order to narrow conversions, programmers must actively detect and manage the risk of data loss. This helps java handle any precision loss that might happen when narrowing conversions are made. Since the language does not necessarily always prevent Or alert against precision loss, such translations must be done with the utmost care.

7. **Explain the concept of automatic widening conversion in Java.**



⑦ Explain the concept of automatic widening conversion in Java.

Ans- The process by which the Java compiler automatically transform a value from a smaller primitive data type to a larger one is known as "automatic widening conversion" in java. because the large type can always represent every possible value of the smaller type without loss of precision or data

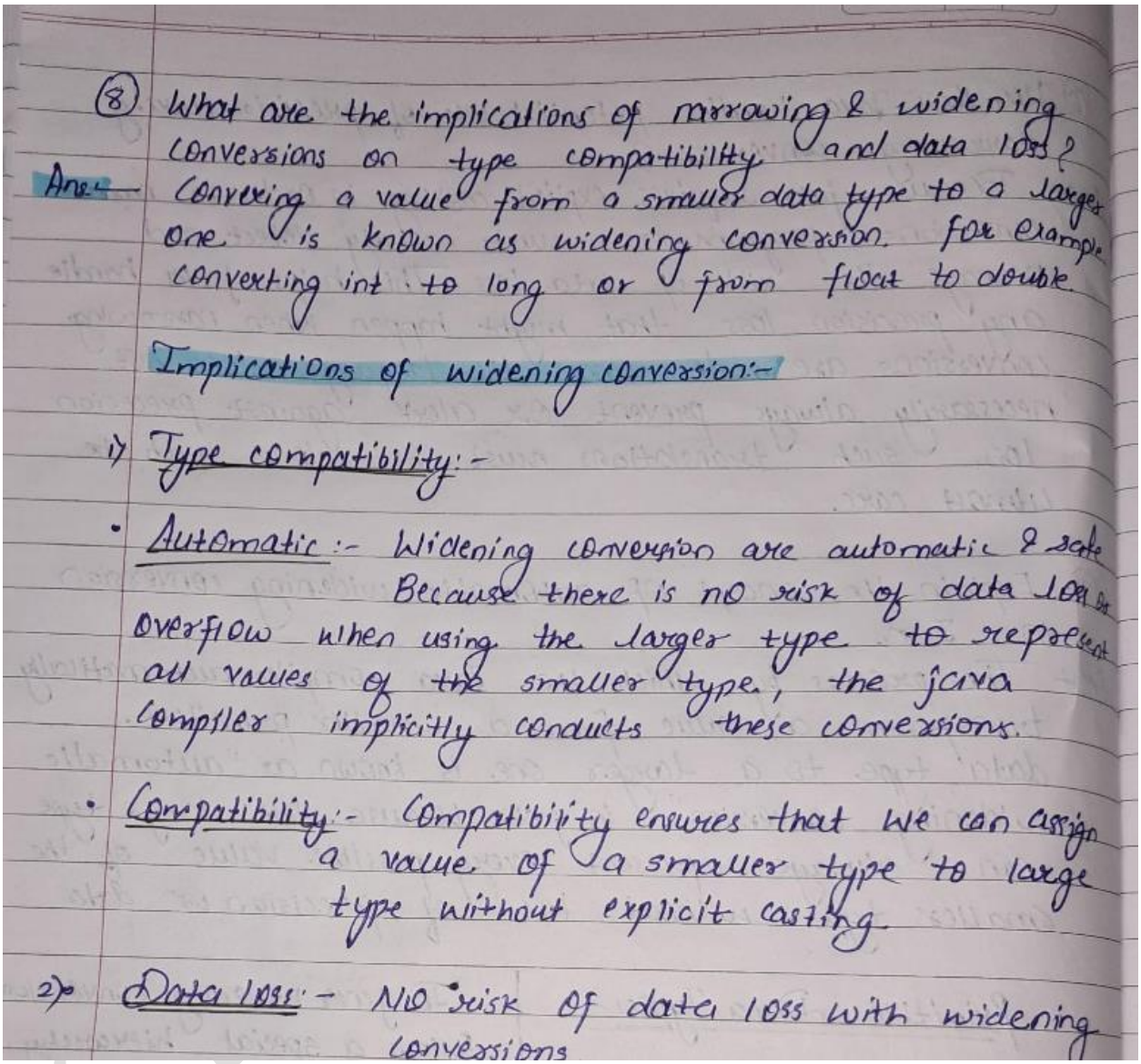
Primitive Data Types:-

byte (8 bits)
short (16 bits)
int (32 bits)
float (32 bits)
long (64 bits)
double (64 bits)

In java widening conversions follow a special hierarchy from smaller to larger types.

byte → short → int → long → float → double

8. What are the implications of narrowing and widening conversions on type compatibility and data loss?



(8) What are the implications of narrowing & widening conversions on type compatibility and data loss?

Ans:- Converting a value from a smaller data type to a larger one is known as widening conversion. for example converting int to long or from float to double.

Implications of widening conversion:-

1) Type compatibility:-

- Automatic :- Widening conversion are automatic & safe Because there is no risk of data loss or overflow when using the larger type to represent all values of the smaller type, the java compiler implicitly conducts these conversions.
- Compatibility:- Compatibility ensures that we can assign a value of a smaller type to large type without explicit casting.

2) Data loss:- No risk of data loss with widening conversions

* Narrowing Conversion:- Converting a value from a bigger data type to a smaller one is known as a narrowing conversion. Ex: converting double to float or long to int.

- Implications:-

i) Type Compatibility:-
Explicit Casting:- Narrowing conversions require explicit casting. Due to the possibility of data loss, the Java compiler does not carry out these transformation (conversions) automatically.

2) Data loss:-
- Potential Data loss:- Narrowing conversion can result in data loss or truncation.

- Overflow:- When narrowing between integer types, values outside the range of the target type are lost.