Star Pattern Programs in Java

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Pattern programs in Java are a type of problem that uses nested loops to produce different patterns of numbers, stars (*), or other characters. In this blog, we will dive deeper, specifically into star pattern programs in Java.

Star pattern programs in Java are popular for practising nested loop control structures. They involve using loops to print out a particular pattern of stars (*) on the screen.

Also, read Number Pattern Programs in Java

Explore Pattern Programs in C

Why Are Star Pattern Programs Important?

- **Understanding Control Structures:** Assists in learning and

mastering loops and control structures by providing practical, hands-on experience.

- **Problem-Solving Skills:** Bolsters logical thinking and problem-solving abilities as it requires innovative thinking to form specific patterns.
- **Attention to Detail:** Enhances focus on minute details, essential for precise pattern creation and efficient coding.
- **Preparation for Interviews:** Often used in technical interviews, aiding invaluable preparation and practice for real-world coding assessments.

Basic Approach to Solve a Star Pattern Program Using an Example

A step-by-step guide using a simple example: **printing a right-angled triangle star pattern.**

```
*
**
***
****
*****
```

Steps to Solve

1. Understand the Pattern

Analyze the pattern to understand the relation between the row numbers and the number of stars in each row. In this example, the number of stars in each row equals the row number.

2. Initialize the Loop for Rows

Use a loop to iterate through the rows. The number of iterations should equal the number of rows in the pattern.

Copy code

```
for(int i=1; i<=5; i++) {
}
```

3. Nested Loop for Printing Stars

Inside the loop for rows, use another loop to print stars in each row. The number of stars is equal to the current row number.

Copy code

```
for(int j=1; j<=i; j++) {
    System.out.print("*");
}
```

4. Move to the Next Line After Printing Stars in a Row

After printing stars in a row, print a newline character to move to the next row.

Copy code

```
System.out.println();
```

Complete Code

Copy code

```
public class Main {
    public static void main(String[] args) {
        // Outer loop for number of rows
        for (int i = 1; i <= 5; i++) {
            // Inner loop for number of stars in each row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            // Move to the next line after printing stars in each row
            System.out.println();
        }
    }
}
```

This basic approach can be adapted to solve various other star pattern programs in Java.

Top 10 Star Pattern Programs in Java

- **Square Star Pattern**
- **Inverted Pyramid Star Pattern**
- **Pyramid Star Pattern**
- **Diamond Star Pattern**
- **Hollow Square Star Pattern**
- **Butterfly Pattern**

- **Downward Triangle Star Pattern**
- **Hollow Diamond Star Pattern**
- **Cross Star Pattern**
- **Hollow Pyramid Star Pattern**

Let's understand each of these one by one in detail :

1. Square Star Pattern: This pattern forms a square with stars.

```
*****
*****
*****
*****
*****
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i++) {
            for (int j = 0; j < 5; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

2. Inverted Pyramid Star Pattern: This pattern forms an inverted pyramid with stars.

```
* * * * *
 * * * *
  * * *
   * *
    *
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i++) {
            // Print spaces
            for (int j = 0; j < i; j++) {
                System.out.print(" ");
            }
            // Print asterisks
            for (int j = i; j < 5; j++) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

3. Pyramid Star Pattern: This pattern forms a pyramid with stars.

```
    *
   * *
  * * *
 * * * *
* * * * *
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        for (int i = 0; i <  5; i++) {
            // Print spaces
            for (int j = 5; j >  i; j--) {
                System.out.print(" ");
            }
            // Print asterisks
            for (int k = 0; k  <= i; k++) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

4. Diamond Star Pattern: This pattern prints a diamond shape with stars.

Copy code

```
public class Main {
    public static void main(String[] args) {
        int n = 5;

        // Upper half of the diamond
        for (int i = 0; i < n; i++) {
            // Print spaces
            for (int j = n - 1; j > i; j--) {
                System.out.print(" ");
            }
            // Print asterisks
            for (int k = 0; k <= i; k++) {
                System.out.print("* ");
            }
            System.out.println();
        }

        // Lower half of the diamond
        for (int i = 1; i < n; i++) {
            // Print spaces
            for (int j = 0; j < i; j++) {
```

```
            for (int j = 0; j < i; j++) {
                System.out.print(" ");
            }
            // Print asterisks
            for (int k = n - 1; k >= i; k--) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

5. Hollow Square Star Pattern: This pattern prints a square but leaves the middle portion hollow.

```
*****
*   *
*   *
*   *
*****
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        int n = 5;

        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                // Check if it's a border position
                if (i == 0 || i == n - 1 || j == 0 || j == n - 1)
                    System.out.print("*");
                else
                    System.out.print(" ");
            }
            System.out.println();
        }
    }
}
```

6. Butterfly Pattern: This pattern looks like a butterfly, with two symmetrical sides filled with stars.

```
*         *
**       **
***     ***
****   ****
**********
**********
****   ****
***     ***
**       **
*         *
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        int n = 5;

        // Upper half of the diamond
        for (int i = 1; i <= n; i++) {
            // Print left half of the row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            // Print spaces in the middle
            for (int j = 1; j <= 2 * (n - i); j++) {
                System.out.print(" ");
            }
            // Print right half of the row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }

        // Lower half of the diamond
        for (int i = n; i >= 1; i--) {
            // Print left half of the row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            // Print spaces in the middle
            for (int j = 1; j <= 2 * (n - i); j++) {
```

```
                System.out.print(" ");
            }
            // Print right half of the row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

Pascal's Triangle – Definition, Properties, Applications… and More

Pascal's Triangle, named after the French mathematician Blaise Pascal, has roots that stretch much further back in history. The discovery of Pascal's Triangle wasn't a single event but rather a**…read more**

Floyd's Triangle – Definition, Properties and More

Floyd's Triangle is a right-angled triangular array of natural numbers named after the American computer scientist Robert W. Floyd. Floyd's Triangle is a simple geometric arrangement of numbers. Let us**…read more**

Array Programs in Java | Beginner to Expert Level

Array programs in Java traverse from basic single-dimensional arrays to complex multi-dimensional arrays and dynamic arrays using ArrayList. From initializing and accessing array elements, to advanced operations like sorting and**…read more**

7. Downward Triangle Star Pattern: This pattern forms a downward-facing triangle with stars.

```
*****
****
***
**
*
```

Copy code

```java
public class Main {
    public static void main(String[] args) {
        // Loop to print rows
        for (int i = 5; i >= 1; i--) {
            // Loop to print asterisks in each row
            for (int j = 1; j <= i; j++) {
                System.out.print("*");
            }
            // Move to the next line after each row
            System.out.println();
        }
    }
}
```

8. Hollow Diamond Star Pattern: This pattern prints a diamond shape with stars, leaving the middle portion hollow.

```
**********
****  ****
***    ***
**      **
*        *
**      **
***    ***
****  ****
**********
```

Copy code

```java
public class Main {
    public static void main(String[] args) {
        int n = 5;

        // Upper half of the diamond
        for (int i = 0; i < n; i++) {
            // Print left side of the upper half
            for (int j = i; j < n; j++) {
                System.out.print("*");
            }
            // Print spaces in the middle
            for (int k = 0; k < 2 * i; k++) {
                System.out.print(" ");
            }
            // Print right side of the upper half
            for (int j = i; j < n; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
```

```
        // Lower half of the diamond
        for (int i = 1; i <  n; i++) {
            // Print left side of the lower half
            for (int j = 0; j  <= i; j++) {
                System.out.print("*");
            }
            // Print spaces in the middle
            for (int k = 2 * (n - i - 1); k  >  0; k--) {
                System.out.print(" ");
            }
            // Print right side of the lower half
            for (int j = 0; j  <= i; j++) {
                System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

9. Cross Star Pattern: This pattern prints a cross shape with stars.

```
   *
   *
   *
*******
   *
   *
   *
```

Copy code

```
public class Main {
    public static void main(String[] args) {
        int n = 7; // Must be odd

        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++) {
                // Check if the current position is in the center row or center column
                if (i == n / 2 || j == n / 2) {
                    System.out.print("*");
                } else {
                    System.out.print(" ");
                }
            }
            // Move to the next line after each row
            System.out.println();
        }
    }
}
```

10. Hollow Pyramid Star Pattern: This pattern forms a pyramid with stars, leaving the middle portion hollow.

Copy code

```
public class Main {
    public static void main(String[] args) {
        int n = 5;

        for (int i = 0; i < n; i++) {
            // Print leading spaces
            for (int j = n - 1; j > i; j--) {
                System.out.print(" ");
            }

            // Print the first and last rows
            if (i == 0 || i == n - 1) {
                for (int k = 0; k <= i; k++) {
                    System.out.print("* ");
                }
            } else {
                // Print the first asterisk
                System.out.print("*");

                // Print spaces inside the pyramid
                for (int k = 1; k < i; k++) {
                    System.out.print("  ");
                }

                // Print the second asterisk
                System.out.print(" *");
            }

            // Move to the next line
            System.out.println();
        }
    }
```

```
    }
}
```

Conclusion

Thus, star pattern programs in Java are an essential part of foundational programming learning and practice. They help understand the use and manipulation of loops and control statements and enhance logical thinking and problem-solving skills.

FAQs

What are star pattern programs in Java?

How do you create a simple triangle star pattern in Java?

Can you modify star patterns to use other characters besides the asterisk?

What are some common variations of star patterns in Java?

Why are star pattern programs important for Java learners?