A white paper with black text and blue text

Description automatically generated

A screenshot of a computer

Description automatically generated

BUBBLE SORT

public class BubbleSort {

    public static int[] sortFunction(int[] a) {

        int n = a.length;

        for (int i = 0; i < n - 1; i++) {

            for (int j = n - 1; j > i; j--) {

                if (a[j] < a[j - 1]) {

                    // Swap elements if they are in the wrong order

                    int temp = a[j];

                    a[j] = a[j - 1];

                    a[j - 1] = temp;

                }

            }

        }

        return a;

    }

    public static void main(String[] args) {

        int[] data = {1, 3, 5, 2, 6};

        int[] sortedData = sortFunction(data);

        System.out.println("Sorted Array:");

        for (int i = 0; i < sortedData.length; i++) {

            System.out.println(sortedData[i]);

        }

    }

}

SCREENSHOT OF OUTPUT:  
A screenshot of a computer

Description automatically generated

BUBBLE SORT OPTIMIZATION

public class BubbleSortOptimization {

    public static int[] sortFunction(int[] a) {

        int n = a.length;

        // Optimization 1: Use a boolean flag to check if any swaps were made

        boolean swapped;

        // Optimization 2: Reduce the upper bound of the inner loop to avoid unnecessary comparisons

        for (int i = 0; i < n - 1; i++) {

            swapped = false;

            for (int j = n - 1; j > i; j--) {

                if (a[j] < a[j - 1]) {

                    // Swap elements if they are in the wrong order

                    int temp = a[j];

                    a[j] = a[j - 1];

                    a[j - 1] = temp;

                    swapped = true;

                }

            }

            // Optimization 3: If no swaps were made, the array is already sorted

            if (!swapped) {

                break;

            }

        }

        return a;

    }

    public static void main(String[] args) {

        int[] data = {1, 3, 5, 2, 6};

        int[] sortedData = sortFunction(data);

        System.out.println("Sorted Array:");

        for (int i : sortedData) {

            System.out.println(i);

        }

    }

}

SCREENSHOT BUBBLE SORT OPTIMIZATION OUPUT:

A screenshot of a computer program

Description automatically generated

ALL CODE WORKS AS INTENDED