

ДААЛГАВАР №9. CODE-TUNING TECHNIQUES

Code-complete номын Ху- 609 буюу 646 хуудснаас эхлэн Жава дээр кодын гүйцэтгэлийн хугацааг хэмнэх дараах даалгавруудыг доорх форматын дагуу хийж гүйцэтгэнэ.

Оноо: 10

Үүнд:

1. Оюутын код, овог нэр:

19B1NUM0020 Munkhzaya Gankhuyag

2. Өөрийн туршилт хийсэн компьютерийн үзүүлэлт:

I7 11th gen 8gb ram

Хэсэг А::

1. 26.1 Logic

a. Stop Testing When You Know the Answer

C++ Example of Not Stopping After You Know the Answer

```
negativeInputFound = false;
for ( i = 0; i < count; i++ ) {
    if ( input[ i ] < 0 ) {
        negativeInputFound = true;
    }
}
```

Дээрх кодыг жава хэл дээр бичиж, хурдыг нь сайжруулахын тулд break үйлдэл нэмлээ.

```
package lab9;
import java.util.Scanner;

public class stop {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        int count = 10; // length of array
        int input[] = new int[count]; // array
        boolean negativeInputFound = false;

        Scanner scan = new Scanner(System.in); // input
        System.out.print("Enter any number: ");

        for (int i = 0; i < count; i++) {
            input[i] = scan.nextInt(); // add input to the array
            if (input[i] < 0) {
                negativeInputFound = true;
                break;
            }
        }

        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("Difference: " + timeElapsed);
    }
}
```

Үр дүнгийн харьцуулалт:**Break үйлдэл хийгээгүй үед болон хийсэн үед:**

```
Enter any number: 3
```

```
4
2
4
-1
```

```
3
4
2
4
2
Difference : 9546
```

```
Enter any number: 2
```

```
4
-3
```

```
Difference : 6904
```

Дээрх кодон дээр break үйлдэл нэмж бичсэнээр хүснэгтэд сөрөг утга орж ирмэгч давталт зогсоно. Харин break үйлдлийг бичихгүй байснаар хэдий хүснэгтэд сөрөг утга орж ирсэн ч тухайн хүснэгтийн уртыг дуустал утга оруулсны дараа давталт зогсоно. Тиймээс дээрх 2 зөрүү гарч ирсэн.

b. Substitute Table Lookups for Complicated Expressions

2. 26.2 Loops

a. Unswitching

Switched Loop

```

package lab9;

import java.util.Scanner;

public class Switched {
    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        int count = 10; // length of array
        int sumType = 0, SUMTYPE_NET = 0, netSum = 0, grossSum =
0;

        int amount[] = new int[count]; // array
        Scanner scan = new Scanner(System.in); // input
        System.out.print("Enter any number: ");
        for (int i = 0; i < count; i++) {
            amount[i] = scan.nextInt(); // add input to the
array

            if (sumType == SUMTYPE_NET) {
                netSum = netSum + amount[i];
            } else {
                grossSum = grossSum + amount[i];
            }
        }

        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}

```

Үр дүн:

```

Enter any number: 2
1
4
3
2
34
2
-1
0
234

Difference: 14324

```

Unswitched Loop

```
package lab9;

import java.util.Scanner;

public class UnSwitchingFast {
    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        int count = 10; // length of array
        int sumType = 0, SUMTYPE_NET = 0, netSum = 0,
grossSum = 0;
        int amount[] = new int[count]; // array
        Scanner scan = new Scanner(System.in); // input
        System.out.print("Enter any number: ");
        if (sumType == SUMTYPE_NET) {
            for (int i = 0; i < count; i++) {
                amount[i] = scan.nextInt(); // add input
to the array

                netSum = netSum + amount[i];
            }
        } else {
            for (int i = 0; i < count; i++) {
                grossSum = grossSum + amount[i];
            }
        }

        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}
```

Үр дүн:

```
Enter any number: 2
3
4
2
4
5
24
42
4
2

Difference: 5739
```

Харьцуулалт:

If болон for-ын байрыг сольж эхлээд нөхцөлийг нь шалгаснаар илүү цөөн үйлдэл хийх боломжтой болно.

```
Enter any number: 2
3
4
2
4
5
24
42
4
2

Difference: 5739
```

```
Enter any number: 2
1
4
3
2
34
2
-1
0
234

Difference: 14324
```

b. Jamming

Тус тусдаа for давталт хийх үед:

```
package lab9;

public class Jamming {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        int[] array1 = { 1, 10, 100 };
        int[] array2 = { 2, 22, 44 };
        int[] array3 = { 3, 33, 66 };
        for (int i = 0; i < 1000000; i++) {
            int sum = 0;
            for (int x = 0; x < array1.length; x++) {
                sum += array1[x];
            }
            for (int x = 0; x < array1.length; x++) {
                sum += array2[x];
            }
            for (int x = 0; x < array1.length; x++) {
                sum += array3[x];
            }
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}
```

Үр дүн:

```
Difference: 23
```

Jamming

```
package lab9;

public class JammingFast {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();
        int[] array1 = { 1, 10, 100 };
        int[] array2 = { 2, 22, 44 };
        int[] array3 = { 3, 33, 66 };
        for (int i = 0; i < 1000000; i++) {
            int sum = 0;
            for (int x = 0; x < array1.length; x++) {
                sum += array1[x];
                sum += array2[x];
                sum += array3[x];
            }
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}
```

Үр дүн:

```
Difference: 13
```

Харьцуулалт:

If болон for-ын байрыг сольж эхлээд нөхцөлийг нь шалгаснаар илүү цөөн үйлдэл хийх боломжтой болно.

```
Difference: 13
```

```
Difference: 23
```

Тус тусдаа хийж буй гурван давталтыг нэг for давталтад оруулснаар дээрх өөрчлөлт гарч байна.

c Unrolling

Loop That Can Be Unrolled

```
package lab9;

public class Rolling {
    public static void main(String[] args) {

        long start = System.currentTimeMillis();

        int i = 1;
        int count = 10;
        int a[] = new int[count];
        while (i < count) {
            a[i] = i;
            i = i+1;
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println(" Difference: " + timeElapsed);
    }
}
```

```
package lab9;

public class Unrolling {
    public static void main(String[] args) {

        long start = System.currentTimeMillis();

        int i = 0, count = 100, a[] = new int[count];
        ;
        while (i < count - 2) {
            a[i] = i;
            a[i + 1] = i + 1;
            a[i + 2] = i + 2;
            i = i + 3;
        }
        if (i <= count - 1) {
            a[count - 1] = count - 1;
        }
        if (i == count - 2) {
            a[count - 2] = count - 2;
        }

        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println(" Difference: " + timeElapsed);
    }
}
```

e. Sentinel values

```
package lab9;

public class Sentinel {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        boolean found = false;
        int i = 0, count = 10, item[] = new int[count], testValue = 3;
        while ((!found) && (i < count)) {
            if (item[i] == testValue) {
                found = true;
            } else {
                i++;
            }
        }
        if (found) {
            System.out.println("Value found!");
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println(" Difference: " + timeElapsed);
    }
}
```

```

package lab9;

public class SentinelSpeedUp {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();

        boolean found = false;
        int i = 0, count = 10, item[] = new int[count], testValue = 3;
        int initialValue = item[ count ];
        item[ count ] = testValue;
        i = 0;
        while ( item[ i ] != testValue ) {
            i++;
        }
        if ( i < count ) {}

        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println(" Difference: " + timeElapsed);
    }
}

```

f. Putting the Busiest Loop on the Inside

Nested Loop That Can Be Improved/Busiest Loop нь гадна талдаа байх үед:/

```

package lab9;

import java.util.Scanner;

public class BusiestLoopOutside {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();
        int sum = 0;
        Scanner scan = new Scanner(System.in); // input
        for (int column = 0; column < 100; column++) {
            for (int row = 0; row < 5; row++) {
                int table[][] = new int[5][100];
                System.out.println("Enter any number: ");
                table[row][column] = scan.nextInt(); // add input to the
array
                sum = sum + table[row][column];
            }
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}

```

Improved/Busiest loop inside/ Busiest Loop нь дотор талдаа байх үед:


```
package lab9;

import java.util.Scanner;

public class BusiestLoopInside {

    public static void main(String[] args) {
        long start = System.currentTimeMillis();
        int sum = 0;
        Scanner scan = new Scanner(System.in); // input
        for (int row = 0; row < 5; row++) {
            for (int column = 0; column < 100; column++) {
                int table[][] = new int[5][100];
                table[row][column] = scan.nextInt(); // add input to the array
                System.out.println("Enter any number: ");
                sum = sum + table[row][column];
            }
        }
        long finish = System.currentTimeMillis();
        long timeElapsed = finish - start;
        System.out.println("\nDifference: " + timeElapsed);
    }
}
```

Баганын тоог 10 болгож цөөрүүлээд гараас утга оруулж үзэхэд дараах утгууд гарч байна.

```
Difference: 11292
```

```
Difference: 14221
```