

**Activity #1:**

```

1 import java.util.Scanner;
2
3 public class ConvertHexaToDecimal {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         System.out.println("Please enter Hexadecimal number: ");
8         Scanner scanner = new Scanner(System.in);
9         String hexadecimal = scanner.next();
10
11         //Converting Hexa to decimal in Java
12         int decimal = Integer.parseInt(hexadecimal,16);
13         System.out.println("Converted Decimal number is: "+decimal);
14
15         //Converting hexadecimal number to binary in Java
16         String binary = Integer.toBinaryString(decimal);
17         System.out.printf("Hexadecimal to Binary conversion of %s is %s %n",hexadecimal,binary);
18
19         //Converting Hex to String to Octal in Java
20         String octal = Integer.toOctalString(decimal);
21         System.out.printf("Hexadecimal to Octal conversion of %s is %s %n",hexadecimal,octal);
22
23     }
24 }
25
26

```

Console

```

<terminated> ConvertHexaToDecimal [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 16, 2022, 3:59:19 PM - 3:59:29 PM)
Please enter Hexadecimal number:
A
Converted Decimal number is: 10
Hexadecimal to Binary conversion of A is 1010
Hexadecimal to Octal conversion of A is 12

```

**Activity #2:**

```

1 import java.util.Scanner;
2 class MainClass{
3     public static void main(String[] args) {
4         // TODO Auto-generated method stub
5         Binary_Decimal obj = new Binary_Decimal();
6         obj.getVal();
7         obj.convert();
8     }
9 }
10
11
12 public class Binary_Decimal {
13     Scanner scan;
14     int num;
15     void getVal() {
16         System.out.println("Binary to Decimal");
17         scan = new Scanner(System.in);
18         System.out.println("\nEnter the number: ");
19         num = Integer.parseInt(scan.nextLine(),2);
20     }
21     void convert() {
22         String decimal = Integer.toString(num);
23         System.out.println("Decimal Value is: "+decimal);
24     }
25 }
26
27

```

Console

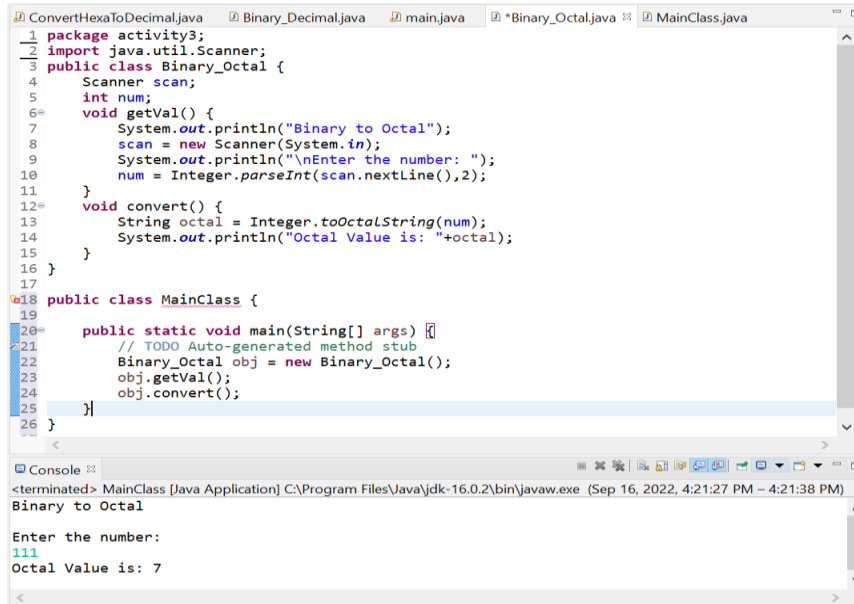
```

<terminated> main [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 16, 2022, 4:17:19 PM - 4:17:46 PM)
Binary to Decimal

Enter the number:
011
Decimal Value is: 3

```

### Activity #3:



```
1 package activity3;
2 import java.util.Scanner;
3 public class Binary_Octal {
4     Scanner scan;
5     int num;
6     void getVal() {
7         System.out.println("Binary to Octal");
8         scan = new Scanner(System.in);
9         System.out.println("\nEnter the number: ");
10        num = Integer.parseInt(scan.nextLine(),2);
11    }
12    void convert() {
13        String octal = Integer.toOctalString(num);
14        System.out.println("Octal Value is: "+octal);
15    }
16 }
17
18 public class MainClass {
19
20     public static void main(String[] args) {
21         // TODO Auto-generated method stub
22         Binary_Octal obj = new Binary_Octal();
23         obj.getVal();
24         obj.convert();
25     }
26 }
```

Console

<terminated> MainClass [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 16, 2022, 4:21:27 PM – 4:21:38 PM)

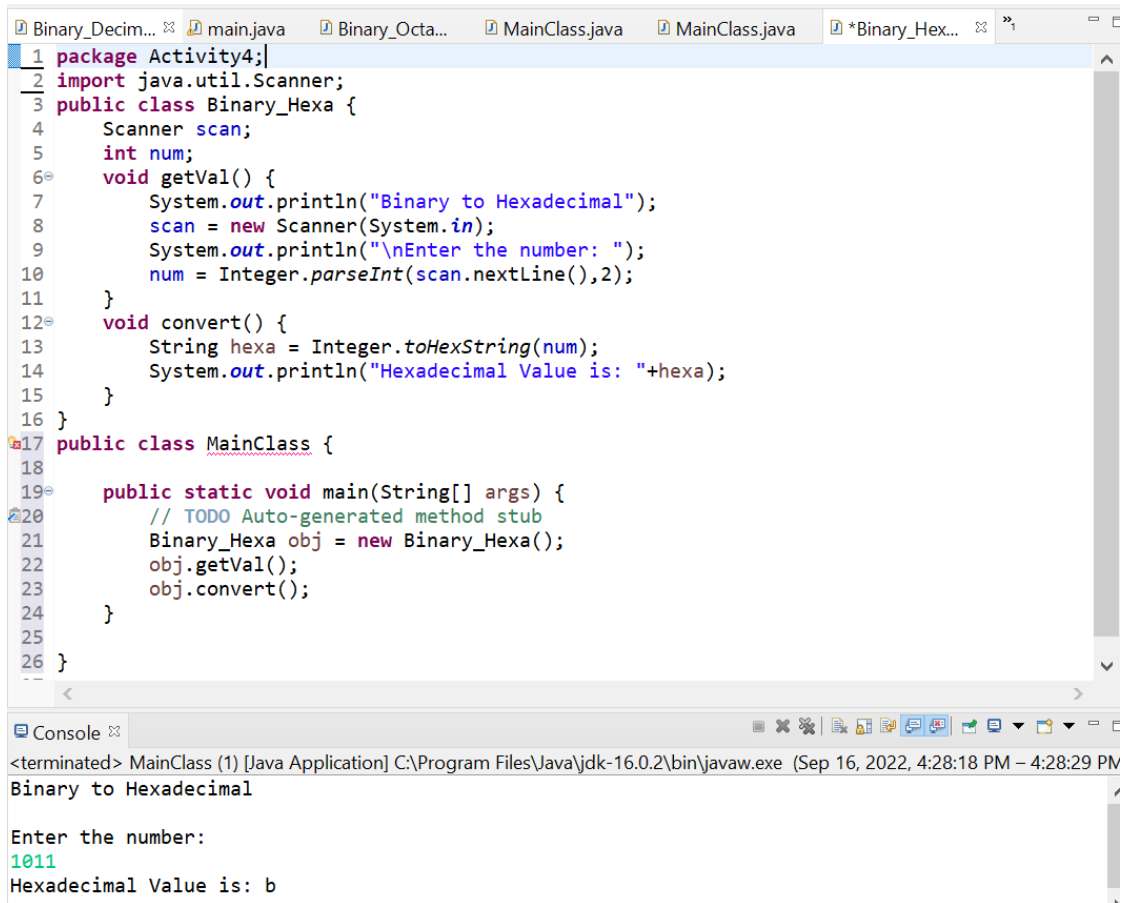
Binary to Octal

Enter the number:

111

Octal Value is: 7

### Activity #4:



```
1 package Activity4;
2 import java.util.Scanner;
3 public class Binary_Hexa {
4     Scanner scan;
5     int num;
6     void getVal() {
7         System.out.println("Binary to Hexadecimal");
8         scan = new Scanner(System.in);
9         System.out.println("\nEnter the number: ");
10        num = Integer.parseInt(scan.nextLine(),2);
11    }
12    void convert() {
13        String hexa = Integer.toHexString(num);
14        System.out.println("Hexadecimal Value is: "+hexa);
15    }
16 }
17
18 public class MainClass {
19
20     public static void main(String[] args) {
21         // TODO Auto-generated method stub
22         Binary_Hexa obj = new Binary_Hexa();
23         obj.getVal();
24         obj.convert();
25     }
26 }
```

Console

<terminated> MainClass (1) [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 16, 2022, 4:28:18 PM – 4:28:29 PM)

Binary to Hexadecimal

Enter the number:

1011

Hexadecimal Value is: b

## Activity #5:

```
5 public static void main(String[] args) {
6     // TODO Auto-generated method stub
7     System.out.println("Result 1:"+Integer.bitCount(9));
8     System.out.println("Result 2:"+intbitCount(9));
9     System.out.println("Result 3:"+intbitCount1(9));
10    System.out.println("Result 4:"+intbitCount2(9));
11
12
13    }
14    public static int intbitCount(int input) {
15        int count = 0;
16        for (int i = 0; i < 32; i++)
17            count = count + (input >> i & 1);
18        return count;
19    }
20    public static int intbitCount1(int x) {
21        if (x == 0) return 0;
22        return (x & 1) + intbitCount1(x >> 1);
23    }
24    public static int intbitCount2(int i) {
25        i = i - ((i >> 1) & 0x55555555);
26        i = (i & 0x33333333) + ((i >> 2) & 0x33333333);
27        i = (i + (i >> 4)) & 0xf0f0f0f;
28        i = i + (i >> 8);
29        i = i + (i >> 16);
30        return i & 0x3f;
31    }
}
```

Console

```
<terminated> activity5 [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 23, 2021)
Result 1:2
Result 2:2
Result 3:2
Result 4:2
```

## HOME ACTIVITY

### Activity #1:

```
7 public static void main(String[] args) {
8     // TODO Auto-generated method stub
9     int base = 2;
10    System.out.println("Please enter binary input: ");
11    Scanner scanner = new Scanner(System.in);
12    String Binarystr = scanner.next();
13    System.out.println("Decimal equivalent of "+Binarystr+
14        " in base "+ base + " is: "+toDecimal(Binarystr, base));
15    base = 16;
16    System.out.println("Please enter hexadecimal input: ");
17    Scanner scanner1 = new Scanner(System.in);
18    String hexadecimal = scanner1.next();
19    System.out.println("Decimal equivalent of "+hexadecimal+
20        " in base "+ base + " is: "+toDecimal(hexadecimal, base));
21
22    }
23    static int toDecimal(String str,int base){
24        int len = str.length();
25        int power = 1;
26        int num = 0;
27        int i;
28        for (i = len - 1; i >= 0; i--){
29            if (val(str.charAt(i)) >= base){
30                System.out.println("Invalid Number");
31                return -1;
32            }
33            num += val(str.charAt(i)) * power;
34            power = power * base;
35        }
36        return num;
37    }
38
39    static int val(char c) {
40        if (c >= '0' && c <= '9')
41            return (int)c - '0';
42        else
43            return (int)c - 'A' + 10;
44    }
45
46 }
47 }
```

Console

```
<terminated> toDecimal [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 23, 2021)
Please enter binary input:
011
Decimal equivalent of 011 in base 2 is: 3
Please enter hexadecimal input:
16A
Decimal equivalent of 16A in base 16 is: 362
```

## Activity #2:

```
6
7 public static void main(String[] args) {
8     // TODO Auto-generated method stub
9     int base = 2;
10    System.out.println("Please enter a number input: ");
11    Scanner scanner = new Scanner(System.in);
12    int str = scanner.nextInt();
13    System.out.println("Binary of "+str+
14        " in base "+ base +" is: "+fromDecimal(str, base));
15    base = 16;
16    System.out.println("hexaDecimal of "+str+
17        " in base "+ base +" is: "+fromDecimal(str, base));
18    }
19    static String fromDecimal(int num, int base){
20        String s = "";
21        while (num > 0){
22            s += val(num % base);
23            num /= base;
24        }
25        StringBuilder ix = new StringBuilder();
26        ix.append(s);
27        return new String(ix.reverse());
28    }
29    static char val(int num){
30        if (num >= 0 && num <= 9)
31            return (char)(num + 48);
32        else
33            return (char)(num - 10 + 65);
34    }
35 }
36
```

Console

<terminated> fromDecimal [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe (Sep 23 2021 10:10:10 AM)

Please enter a number input:  
282

Binary of 282 in base 2 is: 100011010  
hexaDecimal of 282 in base 16 is: 11A

## Activity #3:

```

1 package HomeActivities;
2
3 import java.util.Scanner;
4
5 public class BinaryToDecimal {
6
7     static double binaryToDecimal(String binary,int len){
8         int point = binary.indexOf('.');
9         if (point == -1)
10             point = len;
11         double intDecimal = 0,
12             fracDecimal = 0,
13             twos = 1;
14         for(int i = point - 1; i >= 0; i--){
15             intDecimal += (binary.charAt(i) - '0') * twos;
16             twos *= 2;
17         }
18         twos = 2;
19         for(int i = point + 1; i < len; i++){
20             fracDecimal += (binary.charAt(i) - '0') / twos;
21             twos *= 2.0;
22         }
23         return intDecimal + fracDecimal;
24     }
25
26     public static void main(String[] args){
27         System.out.println("Please enter a binary number input: ");
28         Scanner scanner = new Scanner(System.in);
29         String n = scanner.next();
30         System.out.println("Result: "+binaryToDecimal(n, n.length()));
31         System.out.println("Please enter a another number input: ");
32         Scanner scanner1 = new Scanner(System.in);
33         String n1 = scanner1.next();
34         System.out.println("Result: "+binaryToDecimal(n1, n1.length()));
35     }
36 }
37

```

Console

```

<terminated> BinaryToDecimal [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.
Please enter a binary number input:
1101.1101
Result: 13.8125
Please enter a another number input:
10.1101
Result: 2.8125

```

## Activity #4

```

1 package HomeActivities;
2
3 import java.util.Scanner;
4
5 public class decimalToBinary {
6
7     static String decimalToBinary(double num, int k_prec){
8         String binary = "";
9         int Integral = (int) num;
10        double fractional = num - Integral;
11        while (Integral > 0){
12            int rem = Integral % 2;
13            binary += ((char)(rem + '0'));
14            Integral /= 2;
15        }
16        binary = reverse(binary);
17        binary += ('.');
18        while (k_prec-- > 0){
19            fractional *= 2;
20            int fract_bit = (int) fractional;
21            if (fract_bit == 1){
22                fractional -= fract_bit;
23                binary += (char)(1 + '0');
24            }
25            else{
26                binary += (char)(0 + '0');
27            }
28        }
29        return binary;
30    }
31
32    static String reverse(String input){
33        char[] temparray = input.toCharArray();
34        int left, right = 0;
35        right = temparray.length - 1;
36        for (left = 0; left < right; left++, right--){
37            char temp = temparray[left];
38            temparray[left] = temparray[right];
39            temparray[right] = temp;
40        }
41        return String.valueOf(temparray);
42    }
43
44    public static void main(String[] args){
45        System.out.println("Please enter a decimal number input: ");
46        Scanner scanner = new Scanner(System.in);
47        double n = scanner.nextDouble();
48        int deciPlace = 2;
49        System.out.println("Result: "+decimalToBinary(n, deciPlace));
50        System.out.println("Please enter a another number input: ");
51        Scanner scanner1 = new Scanner(System.in);
52        double n1 = scanner1.nextDouble();
53        deciPlace = 4;
54        System.out.println("Result: "+decimalToBinary(n1, deciPlace));
55    }
56 }

```

Console

```

<terminated> decimalToBinary [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw
Please enter a decimal number input:
64.98
Result: 1000000.11
Please enter a another number input:
238.78
Result: 11101110.1100

```

## Activity #5:

```
1 package HomeActivities;
2
3 import java.util.Scanner;
4
5 public class floatingPoint {
6
7     public static void main(String[] args) {
8         // TODO Auto-generated method stub
9         System.out.println("Please enter a decimal number input: ");
10        Scanner scanner = new Scanner(System.in);
11        double n = scanner.nextDouble();
12        int deciPlace = 2;
13        String binForm = decimalToBinary(n, deciPlace);
14        System.out.println("Result: "+binForm);
15        System.out.println("The Floating Point Number is "+converttofloatingpoint(binForm));
16        System.out.println("Please enter a another number input: ");
17        Scanner scanner1 = new Scanner(System.in);
18        double n1 = scanner1.nextDouble();
19        deciPlace = 4;
20        binForm = decimalToBinary(n1, deciPlace);
21        System.out.println("Result: "+binForm);
22        System.out.println("The Floating Point Number is "+converttofloatingpoint(binForm));
23    }
24
25    static String decimalToBinary(double num, int k_prec){
26        String binary = "";
27        int Integral = (int) num;
28        double fractional = num - Integral;
29        while (Integral > 0){
30            int rem = Integral % 2;
31            binary += ((char)(rem + '0'));
32            Integral /= 2;
33        }
34        binary = reverse(binary);
35        binary += ('.');
36        while (k_prec-- > 0){
37            fractional *= 2;
38            int fract_bit = (int) fractional;
39            if (fract_bit == 1){
40                fractional -= fract_bit;
41                binary += (char)(1 + '0');
42            }
43            else{
44                binary += (char)(0 + '0');
45            }
46        }
47        return binary;
48    }
49 }
```

```

48 static String reverse(String input){
49     char[] temparray = input.toCharArray();
50     int left, right = 0;
51     right = temparray.length - 1;
52     for (left = 0; left < right; left++, right--){
53         char temp = temparray[left];
54         temparray[left] = temparray[right];
55         temparray[right] = temp;
56     }
57     return String.valueOf(temparray);
58 }

```

```

59 private static String converttofloatingpoint(String bin) {
60     char[] temp = bin.toCharArray();
61     int i = 0;
62     int first1 = -1;
63     int first2 = -1;
64     for(; temp[i] != '.'; i++) {
65         if(temp[i]=='1' && first1==-1) {
66             first1=i;
67         }
68     }
69     int k = i;
70     for(; k < temp.length; k++) {
71         if(temp[k]=='1' && first2==-1) {
72             first2=k;
73         }
74     }
75     double binary = Double.parseDouble(bin);
76     int count = 0;
77     if(first1 > -1) {
78         while(binary>2){
79             count++;
80             binary/=10;
81         }
82         String number = String.valueOf(binary);
83         String expo=String.valueOf(count);
84         number=number+"x"+"2^"+ expo;
85         return number;
86     }
87     else {
88         while(binary<1){
89             count--;
90             binary*=10;
91         }
92         String number = String.valueOf(binary);
93         String expo=String.valueOf(count);
94         number=number+" x "+"2^"+ expo;
95         return number;
96     }
97 }
98 }

```

```

<terminated> floatingPoint [Java Application] C:\Program Files\Java\jdk-16.
Please enter a decimal number input:
23.89
Result: 10111.11
The Floating Point Number is 1.011111x2^4
Please enter a another number input:
0.25
Result: .0100
The Floating Point Number is 1.0 x 2^-2

```

## LAB 2



```

simulator.java
1 package HomeActivities;
2
3 import java.util.Scanner;
4
5 public class simulator {
6
7     public static void main(String[] args) {
8         // TODO Auto-generated method stub
9         int []Registers = {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0};
10        int []Memory = {10,20,30,40,50,60,70,80,90,30,50,60,70,80,90,10};
11        System.out.println("Please enter instruction(1,3,5): ");
12        Scanner scanner = new Scanner(System.in);
13        int instruction = scanner.nextInt();
14        System.out.println("Please enter register(0-15): ");
15        scanner = new Scanner(System.in);
16        int reg = scanner.nextInt();
17        String register= "R"+reg;
18        System.out.println("Please enter Memory(0-15): ");
19        scanner = new Scanner(System.in);
20        int mem = scanner.nextInt();
21        String memory = "M"+mem;
22        System.out.println("*****ISA Simulator*****");
23        System.out.println("*****Cycle #1*****");
24        System.out.println("Fetch Instruction          Decode Instruction          Execut
25        System.out.println(instruction+" "+reg+" "+mem);
26        System.out.println();
27        System.out.print("Register: ");
28        for(int i =0; i < Registers.length; i++) {
29            System.out.print(Registers[i]+" ");
30        }
31        System.out.println();
32        System.out.println("*****");
33        System.out.print("Memory: ");
34        for(int i =0; i < Memory.length; i++) {
35            System.out.print(Memory[i]+" ");
36        }
37        System.out.println();
38        System.out.println();
39        System.out.println();
40        System.out.println();
41        System.out.println();
42        System.out.println();
43        System.out.println("*****ISA Simulator*****");
44        System.out.println("*****Cycle #2*****");
45        System.out.println("Fetch Instruction          Decode Instruction          Execut
46        System.out.println(instruction+" "+reg+" "+mem+" "+LOAD");
47        System.out.println("REGISTER "+register);
48        System.out.println("MEMORY "+memory);
49        System.out.println();
50        System.out.print("Register: ");
51        for(int i =0; i < Registers.length; i++) {
52            System.out.print(Registers[i]+" ");
53        }
54        System.out.println();
55        System.out.println("*****");
56        System.out.print("Memory: ");
57        for(int i =0; i < Memory.length; i++) {
58            System.out.print(Memory[i]+" ");
59        }
60        System.out.println();
61        System.out.println();
62        System.out.println();
63        System.out.println();
64        System.out.println();
65        System.out.println();
66        System.out.println("*****ISA Simulator*****");
67        System.out.println("*****Cycle #3*****");
68        System.out.println("Fetch Instruction          Decode Instruction          Execut
69        System.out.println(instruction+" "+reg+" "+mem+" "+LOAD");
70        System.out.println("REGISTER "+register);
71        System.out.println("MEMORY "+memory);
72        System.out.println();

```

```

73     int temp=0;
74     for(int i =0; i <= mem; i++) {
75         if(i == mem) {
76             temp = Memory[i];
77         }
78     }
79     System.out.print("Register: ");
80     for(int i =0; i < Registers.length; i++) {
81         if(i==reg) {
82             Registers[i]=temp;
83             System.out.print(Registers[i]+" ");
84         }
85         else {
86             System.out.print(Registers[i]+" ");
87         }
88     }
89     System.out.println();
90     System.out.println("#####");
91     System.out.print("Memory: ");
92     for(int i =0; i < Memory.length; i++) {
93         System.out.print(Memory[i]+" ");
94     }
95 }
96 }
97
98 }
99

```

Please enter instruction(1,3,5):

1

Please enter register(0-15):

1

Please enter Memory(0-15):

1

```

*****ISA Simulator*****
*****Cycle #1*****
Fetch Instruction          Decode Instruction          Execute Instruction
1      1      1

Register: 0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
#####
Memory:  10      20      30      40      50      60      70      80      90      30      50      60      70      80      90      10

```

```

*****ISA Simulator*****
*****Cycle #2*****
Fetch Instruction          Decode Instruction          Execute Instruction
1      1      1
                                LOAD
                                REGISTER R1
                                MEMORY  M1

Register: 0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
#####
Memory:  10      20      30      40      50      60      70      80      90      30      50      60      70      80      90      10

```

```

*****ISA Simulator*****
*****Cycle #3*****
Fetch Instruction          Decode Instruction          Execute Instruction
1      1      1
                                LOAD
                                REGISTER R1
                                MEMORY  M1

Register: 0      20      0      0      0      0      0      0      0      0      0      0      0      0      0      0
#####
Memory:  10      20      30      40      50      60      70      80      90      30      50      60      70      80      90      10

```