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Sp20-BCS-044

Activity #1:

ConvertHexaToDecimal.java

```java
import java.util.Scanner;

public class ConvertHexaToDecimal {

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        System.out.println("Please enter Hexadecimal number: ");
        Scanner scanner = new Scanner(System.in);
        String hexadecimal = scanner.next();

        //Converting Hexa to decimal in Java
        int decimal = Integer.parseInt(hexadecimal,16);
        System.out.println("Converted Decimal number is: "+decimal);

        //Converting hexadecimal number to binary in Java
        String binary = Integer.toBinaryString(decimal);
        System.out.printf("Hexadecimal to Binary conversion of %s is %s %n",hexadecimal,binary);

        //Converting Hex to String to Octal in Java
        String octal = Integer.toOctalString(decimal);
        System.out.printf("Hexadecimal to Octal conversion of %s is %s %n",hexadecimal,octal);

    }

}
```

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:

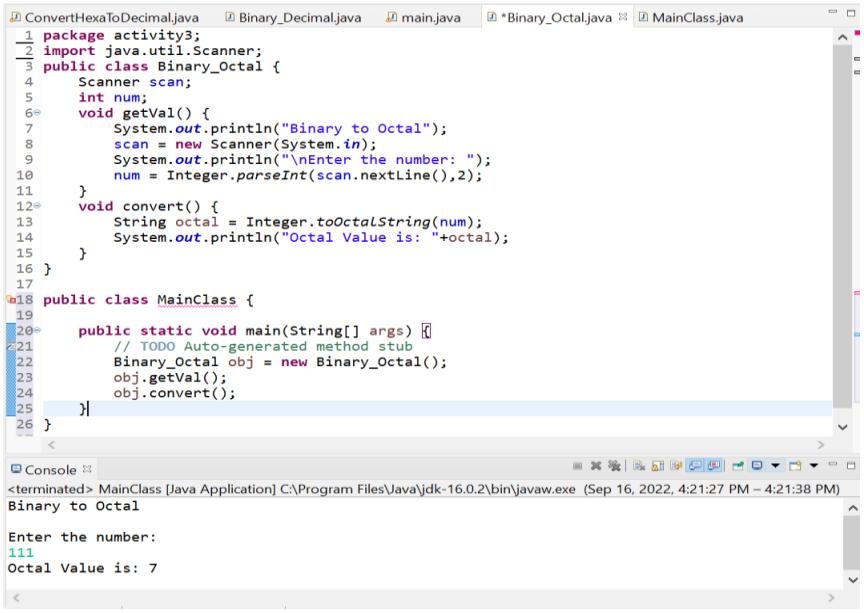
ConvertHexaToDecimal.java | Binary_Decimal.java | main.java

```java
import java.util.Scanner;
class MainClass{
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        Binary_Decimal obj = new Binary_Decimal();
        obj.getVal();
        obj.convert();

    }
}

public class Binary_Decimal {
    Scanner scan;
    int num;
    void getVal() {
        System.out.println("Binary to Decimal");
        scan = new Scanner(System.in);
        System.out.println("\nEnter the number: ");
        num = Integer.parseInt(scan.nextLine(),2);
    }
    void convert() {
        String decimal = Integer.toString(num);
        System.out.println("Decimal Value is: "+decimal);
    }

}
```

Console

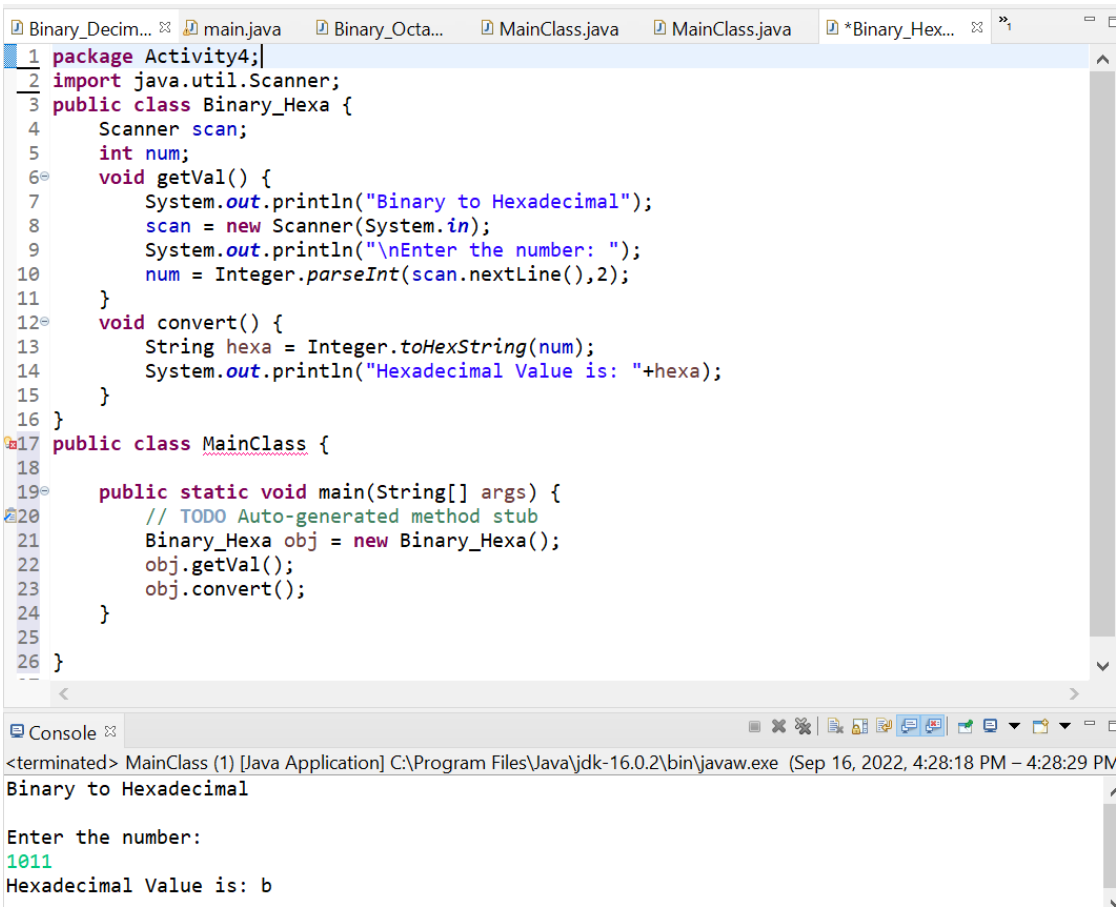
```
<terminated> main [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe  (Sep 16, 2022, 4:17:19 PM – 4:17:46 PM)
Binary to Decimal

Enter the number:
011
Decimal Value is: 3
```

Activity #3:



```
ConvertHexaToDecimal.java  Binary_Decimal.java  main.java  *Binary_Octal.java  MainClass.java
 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:



```
Binary_Decim...  main.java  Binary_Octa...  MainClass.java  MainClass.java  *Binary_Hex...
 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 public class MainClass {
18
19     public static void main(String[] args) {
20         // TODO Auto-generated method stub
21         Binary_Hexa obj = new Binary_Hexa();
22         obj.getVal();
23         obj.convert();
24     }
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:

```
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        System.out.println("Result 1:"+Integer.bitCount(9));
        System.out.println("Result 2:"+intbitCount(9));
        System.out.println("Result 3:"+intbitCount1(9));
        System.out.println("Result 4:"+intbitCount2(9));

    }
    public static int intbitCount(int input) {
        int count = 0;
        for (int i = 0; i< 32; i++)
            count = count + (input >>>i & 1);
        return count;
    }
    public static int intbitCount1(int x) {
        if (x == 0) return 0;
            return (x & 1) + intbitCount1(x >>> 1);
    }
    public static int intbitCount2(int i) {
        i = i - ((i>>> 1) & 0x55555555);
        i = (i& 0x33333333) + ((i>>> 2) & 0x33333333);
        i = (i + (i>>> 4)) & 0x0f0f0f0f;
        i = i + (i>>> 8);
        i = i + (i>>> 16);
        return i& 0x3f;
        }
```

Console

```
<terminated> activity5 [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe  (Sep 23, 202
Result 1:2
Result 2:2
Result 3:2
Result 4:2
```

HOME ACTIVITY

Activity #1:

```
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        int base = 2;
        System.out.println("Please enter binary input: ");
        Scanner scanner = new Scanner(System.in);
        String Binarystr = scanner.next();
        System.out.println("Decimal equivalent of "+Binarystr+
                " in base "+ base +" is: "+toDecimal(Binarystr, base));
        base = 16;
        System.out.println("Please enter hexadecimal input: ");
        Scanner scanner1 = new Scanner(System.in);
        String hexadecimal = scanner1.next();
        System.out.println("Decimal equivalent of "+hexadecimal+
                " in base "+ base +" is: "+toDecimal(hexadecimal, base));
    }
    static int toDecimal(String str,int base){
        int len = str.length();
        int power = 1;
        int num = 0;
        int i;

        for (i = len - 1; i >= 0; i--){
          if (val(str.charAt(i)) >= base){
          System.out.println("Invalid Number");
          return -1;
          }
          num += val(str.charAt(i)) * power;
          power = power * base;
        }

        return num;
    }
    static int val(char c) {
        if (c >= '0' && c <= '9')
            return (int)c - '0';
        else
            return (int)c - 'A' + 10;
    }

}
```

Console

```
<terminated> toDecimal [Java Application] C:\Program Files\Java\jdk-16.0.2\bin\javaw.exe  (Sep 23,
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:

```java
    public static void main(String[] args) {
        // TODO Auto-generated method stub
        int base = 2;
        System.out.println("Please enter a number input: ");
        Scanner scanner = new Scanner(System.in);
        int str = scanner.nextInt();
        System.out.println("Binary of "+str+
            " in base "+ base +" is: "+fromDecimal(str, base));
        base = 16;
        System.out.println("hexaDecimal of "+str+
                " in base "+ base +" is: "+fromDecimal(str, base));
    }
    static String fromDecimal(int num, int base){
        String s = "";
        while (num > 0){
            s += val(num % base);
            num /= base;
        }
        StringBuilder ix = new StringBuilder();
        ix.append(s);
        return new String(ix.reverse());
    }
    static char val(int num){
        if (num >= 0 && num <= 9)
            return (char)(num + 48);
        else
            return (char)(num - 10 + 65);
    }
}
```

Console

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

```
Please enter a number input:
282
Binary of 282 in base 2 is: 100011010
hexaDecimal of 282 in base 16 is: 11A
```

Activity #3:

```java
package HomeActivities;

import java.util.Scanner;

public class BinaryToDecimal {

    static double binaryToDecimal(String binary,int len){
        int point = binary.indexOf('.');
        if (point == -1)
            point = len;
        double intDecimal = 0,
        fracDecimal = 0,
        twos = 1;
        for(int i = point - 1; i >= 0; i--){
            intDecimal += (binary.charAt(i) - '0') * twos;
            twos *= 2;
        }
        twos = 2;
        for(int i = point + 1; i < len; i++){
            fracDecimal += (binary.charAt(i) - '0') / twos;
            twos *= 2.0;
        }
        return intDecimal + fracDecimal;
    }
```

```java
    public static void main(String[] args){
        System.out.println("Please enter a binary number input: ");
        Scanner scanner = new Scanner(System.in);
        String n = scanner.next();
        System.out.println("Result: "+binaryToDecimal(n, n.length()));
        System.out.println("Please enter a another number input: ");
        Scanner scanner1 = new Scanner(System.in);
        String n1 = scanner1.next();
        System.out.println("Result: "+binaryToDecimal(n1, n1.length()));
    }

}
```

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

```java
package HomeActivities;

import java.util.Scanner;

public class decimalToBinary {

    static String decimalToBinary(double num, int k_prec){
        String binary = "";
        int Integral = (int) num;
        double fractional = num - Integral;
        while (Integral > 0){
            int rem = Integral % 2;
            binary += ((char)(rem + '0'));
            Integral /= 2;
        }
        binary = reverse(binary);
        binary += ('.');
        while (k_prec-- > 0){
            fractional *= 2;
            int fract_bit = (int) fractional;
            if (fract_bit == 1){
                fractional -= fract_bit;
                binary += (char)(1 + '0');
            }
            else{
                binary += (char)(0 + '0');
            }
        }
        return binary;
    }
```

```java
    static String reverse(String input){
        char[] temparray = input.toCharArray();
        int left, right = 0;
        right = temparray.length - 1;
        for (left = 0; left < right; left++, right--){
            char temp = temparray[left];
            temparray[left] = temparray[right];
            temparray[right] = temp;
        }
        return String.valueOf(temparray);
    }
    public static void main(String[] args){
        System.out.println("Please enter a decimal number input: ");
        Scanner scanner = new Scanner(System.in);
        double n = scanner.nextDouble();
        int deciPlace = 2;
        System.out.println("Result: "+decimalToBinary(n, deciPlace));
        System.out.println("Please enter a another number input: ");
        Scanner scanner1 = new Scanner(System.in);
        double n1 = scanner1.nextDouble();
        deciPlace = 4;
        System.out.println("Result: "+decimalToBinary(n1, deciPlace));
    }
}
```

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:

```java
package HomeActivities;

import java.util.Scanner;

public class floatingPoint {

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        System.out.println("Please enter a decimal number input: ");
         Scanner scanner = new Scanner(System.in);
         double n = scanner.nextDouble();
         int deciPlace = 2;
         String binForm = decimalToBinary(n,deciPlace);
         System.out.println("Result: "+binForm);
         System.out.println("The Floating Point Number is "+converttofloatingpoint(binForm));
         System.out.println("Please enter a another number input: ");
         Scanner scanner1 = new Scanner(System.in);
         double n1 = scanner1.nextDouble();
         deciPlace = 4;
         binForm = decimalToBinary(n1,deciPlace);
         System.out.println("Result: "+binForm);
         System.out.println("The Floating Point Number is "+converttofloatingpoint(binForm));
    }
```

```java
    static String decimalToBinary(double num, int k_prec){
        String binary = "";
        int Integral = (int) num;
        double fractional = num - Integral;
        while (Integral > 0){
            int rem = Integral % 2;
            binary += ((char)(rem + '0'));
            Integral /= 2;
        }
        binary = reverse(binary);
        binary += ('.');
        while (k_prec-- > 0){
            fractional *= 2;
            int fract_bit = (int) fractional;
            if (fract_bit == 1){
                fractional -= fract_bit;
                binary += (char)(1 + '0');
            }
            else{
                binary += (char)(0 + '0');
            }
        }
        return binary;
    }
```

```java
    static String reverse(String input){
        char[] temparray = input.toCharArray();
        int left, right = 0;
        right = temparray.length - 1;
        for (left = 0; left < right; left++, right--){
            char temp = temparray[left];
            temparray[left] = temparray[right];
            temparray[right] = temp;
        }
        return String.valueOf(temparray);
    }
```

```java
    private static String converttofloatingpoint(String bin) {
        char[] temp = bin.toCharArray();
        int i =0;
        int first1 = -1;
        int first2 =-1;
        for(; temp[i] != '.'; i++) {
            if(temp[i]=='1' && first1==-1) {
                first1=i;
            }
        }
        int k = i;
        for(; k < temp.length; k++) {
            if(temp[k]=='1' && first2==-1) {
                first2=k;
            }
        }
        double binary = Double.parseDouble(bin);
        int count = 0;
        if(first1 > -1) {
            while(binary>2){
                count++;
                binary/=10;
            }
            String number = String.valueOf(binary);
            String expo=String.valueOf(count);
            number=number+"x"+"2^"+ expo;
            return number;
        }
        else {
            while(binary<1){
                count--;
                binary*=10;
            }
            String number = String.valueOf(binary);
            String expo=String.valueOf(count);
            number=number+" x "+"2^"+ expo;
            return number;
        }
    }
}
```

```
<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

```java
package HomeActivities;

import java.util.Scanner;

public class simulator {

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        int []Registers = {0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0};
        int []Memory = {10,20,30,40,50,60,70,80,90,30,50,60,70,80,90,10};
        System.out.println("Please enter instruction(1,3,5): ");
        Scanner scanner = new Scanner(System.in);
        int instruction = scanner.nextInt();
        System.out.println("Please enter register(0-15): ");
        scanner = new Scanner(System.in);
        int reg = scanner.nextInt();
        String register= "R"+reg;
        System.out.println("Please enter Memory(0-15): ");
        scanner = new Scanner(System.in);
        int mem = scanner.nextInt();
        String memory = "M"+mem;
        System.out.println("**********************************************************ISA Simulator*********************");
        System.out.println("**********************************************************Cycle #1**************************");
        System.out.println("Fetch Instruction                        Decode Instruction                          Execut");
        System.out.println(instruction+"    "+reg+" "+mem);
        System.out.println();
        System.out.print("Register: ");
        for(int i =0; i < Registers.length; i++) {
            System.out.print(Registers[i]+" ");
        }
        System.out.println();
        System.out.println("#########################################################################################################");
        System.out.print("Memory:  ");
        for(int i =0; i < Memory.length; i++) {
            System.out.print(Memory[i]+"    ");
        }
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println("**********************************************************ISA Simulator*********************");
        System.out.println("**********************************************************Cycle #2**************************");
        System.out.println("Fetch Instruction                        Decode Instruction                          Execut");
        System.out.println(instruction+"    "+reg+" "+mem+"                          "+"LOAD");
        System.out.println("                                         REGISTER "+register);
        System.out.println("                                         MEMORY   "+memory);
        System.out.println();
        System.out.print("Register: ");
        for(int i =0; i < Registers.length; i++) {
            System.out.print(Registers[i]+" ");
        }
        System.out.println();
        System.out.println("#########################################################################################################");
        System.out.print("Memory:  ");
        for(int i =0; i < Memory.length; i++) {
            System.out.print(Memory[i]+"    ");
        }
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println();
        System.out.println("**********************************************************ISA Simulator*********************");
        System.out.println("**********************************************************Cycle #3**************************");
        System.out.println("Fetch Instruction                        Decode Instruction                          Execut");
        System.out.println(instruction+"    "+reg+" "+mem+"                          "+"LOAD");
        System.out.println("                                         REGISTER "+register);
        System.out.println("                                         MEMORY   "+memory);
        System.out.println();
```

```
        int temp=0;
        for(int i =0; i <= mem; i++) {
            if(i == mem) {
                temp = Memory[i];
            }
        }
        System.out.print("Register: ");
        for(int i =0; i < Registers.length; i++) {
            if(i==reg) {
                Registers[i]=temp;
                System.out.print(Registers[i]+" ");
            }
            else {
                System.out.print(Registers[i]+" ");
            }

        }
        System.out.println();
        System.out.println("##########################################################################################################################");
        System.out.print("Memory:  ");
        for(int i =0; i < Memory.length; i++) {
            System.out.print(Memory[i]+"    ");
        }
    }

}
```

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