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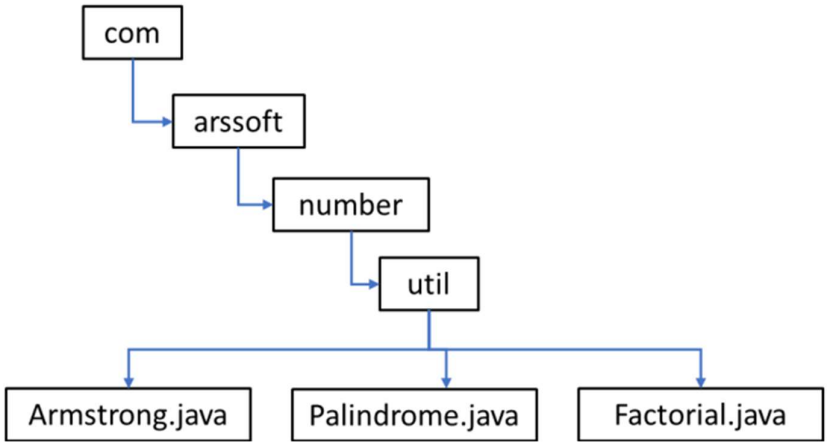
20BCD7138

Q.1] Develop Number Utilities package and provide following classes with supported functionalities :



Develop a NumberUtilTest class to test the Number Utilities package.

Class	Method	Description
Armstrong.java	static boolean armstrong(int n)	returns true if the number 'n' is Armstrong
Palindrome.java	static boolean palindrome(int n)	returns true if the number 'n' is palindrome
Factorial.java	static int factorial(int n)	returns the factorial of the given number 'n'

Armstrong.java :–

```
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
public class Armstrong {
    public static void main(String[] args) {
        int number = 371, originalNumber, remainder, result = 0;
        originalNumber = number;
        while (originalNumber != 0)
        {
            remainder = originalNumber % 10;
            result += Math.pow(remainder, 3);
            originalNumber /= 10;
        }
        if(result == number)
            System.out.println(number + " is an Armstrong number.");
        else
            System.out.println(number + " is not an Armstrong number.");
    }
}
```

Output

```
java -cp /tmp/SjmtLmalsQ Armstrong
371 is an Armstrong number.
```

Palindrome.java :–

```
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
class Palindrome {
  public static void main(String[] args) {
    int num = 1221, reversedNum = 0, remainder;
    int originalNum = num;
    while (num != 0) {
      remainder = num % 10;
      reversedNum = reversedNum * 10 + remainder;
      num /= 10;
    }
    if (originalNum == reversedNum) {
      System.out.println(originalNum + " is Palindrome.");
    }
    else {
      System.out.println(originalNum + " is not Palindrome.");
    }
  }
}
```

Output

```
java -cp /tmp/SjmtLmalsQ Palindrome
1221 is Palindrome.
```

Factorial.java :–

1) Using for loop –

```
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
public class Factorial {
    public static void main(String[] args) {
        int num = 5;
        long factorial = 1;
        for(int i = 1; i <= num; ++i)
        {
            factorial *= i;
        }
        System.out.printf("Factorial of %d = %d", num, factorial);
    }
}
```

Output

```
java -cp /tmp/NGal2p1RAd Factorial
Factorial of 5 = 120
```

2) Using while loop –

```
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
public class Factorial {

    public static void main(String[] args) {

        int num = 5, i = 1;
        long factorial = 1;
        while(i <= num)
        {
            factorial *= i;
            i++;
        }
        System.out.printf("Factorial of %d = %d", num, factorial);
    }
}
```

Output

```
java -cp /tmp/NGal2p1RAd Factorial
Factorial of 5 = 120
```

Creating & executing the package :–

Armstrong.java

Source | History

```
1  /*KHAN MOHD OWAIS RAZA 20BCD7138 */
2  /*CSE2005 LAB-6 */
3  package NumberUtilities;
4  public class Armstrong {
5      public static void main(String[] args) {
6          int number = 371, originalNumber, remainder, result = 0;
7          originalNumber = number;
8          while (originalNumber != 0)
9          {
10             remainder = originalNumber % 10;
11             result += Math.pow(remainder, 3);
12             originalNumber /= 10;
13         }
14         if(result == number)
15             System.out.println(number + " is an Armstrong number.");
16         else
17             System.out.println(number + " is not an Armstrong number.");
18     }
19 }
```

Palindrome.java

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package NumberUtilities;
class Palindrome {
  public static void main(String[] args) {
    int num = 1221, reversedNum = 0, remainder;
    int originalNum = num;
    while (num != 0) {
      remainder = num % 10;
      reversedNum = reversedNum * 10 + remainder;
      num /= 10;
    }
    if (originalNum == reversedNum) {
      System.out.println(originalNum + " is Palindrome.");
    }
    else {
      System.out.println(originalNum + " is not Palindrome.");
    }
  }
}
```

Factorial.java

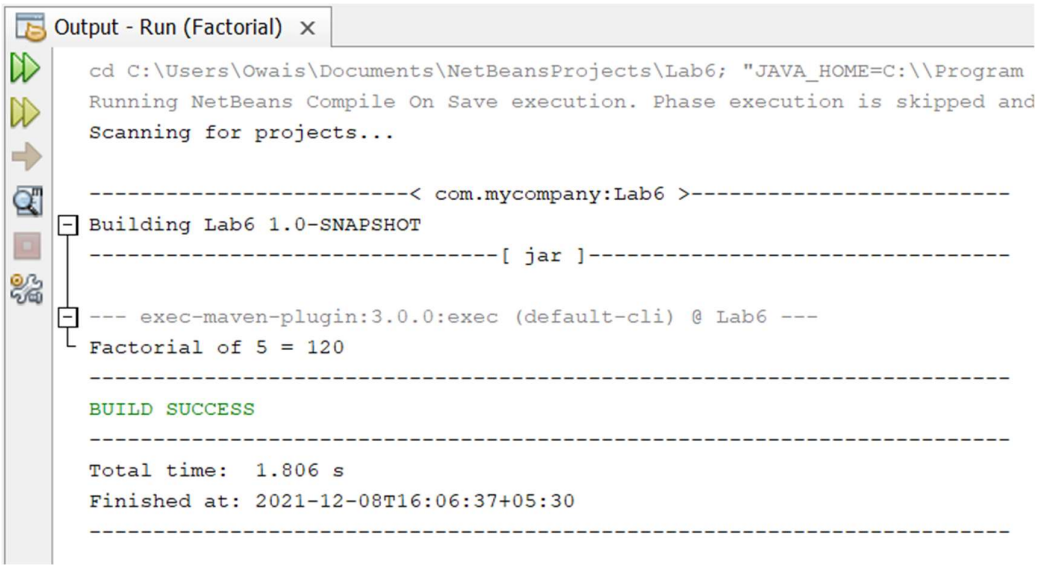
```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package NumberUtilities;
public class Factorial {
    public static void main(String[] args) {
        int num = 5, i = 1;
        long factorial = 1;
        while(i <= num)
        {
            factorial *= i;
            i++;
        }
        System.out.printf("Factorial of %d = %d", num, factorial);
    }
}
```

Output :–

```
Output - Run (Armstrong) | Factorial.java | Armstrong.java
cd C:\Users\Owais\Documents\NetBeansProjects\Lab6; "JAVA_HOME=C:\\Program
Running NetBeans Compile On Save execution. Phase execution is skipped an
Scanning for projects...

------------------------< com.mycompany:Lab6 >------------------------
Building Lab6 1.0-SNAPSHOT
--------------------------------[ jar ]---------------------------------

--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab6 ---
371 is an Armstrong number.
------------------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------------------
Total time:  1.615 s
Finished at: 2021-12-08T16:02:16+05:30
------------------------------------------------------------------------
```


Output - Run (Factorial)
cd C:\Users\Owais\Documents\NetBeansProjects\Lab6; "JAVA_HOME=C:\\Program
Running NetBeans Compile On Save execution. Phase execution is skipped and
Scanning for projects...
------------------------< com.mycompany:Lab6 >------------------------
Building Lab6 1.0-SNAPSHOT
--------------------------------[jar]---------------------------------
--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab6 ---
Factorial of 5 = 120

BUILD SUCCESS

Total time: 1.806 s
Finished at: 2021-12-08T16:06:37+05:30


Output - Run (Palindrome)
cd C:\Users\Owais\Documents\NetBeansProjects\Lab6; "JAVA_HOME=C:\\Program Fil
Running NetBeans Compile On Save execution. Phase execution is skipped and ou
Scanning for projects...
------------------------< com.mycompany:Lab6 >------------------------
Building Lab6 1.0-SNAPSHOT
--------------------------------[jar]---------------------------------
--- exec-maven-plugin:3.0.0:exec (default-cli) @ Lab6 ---
1221 is Palindrome.

BUILD SUCCESS

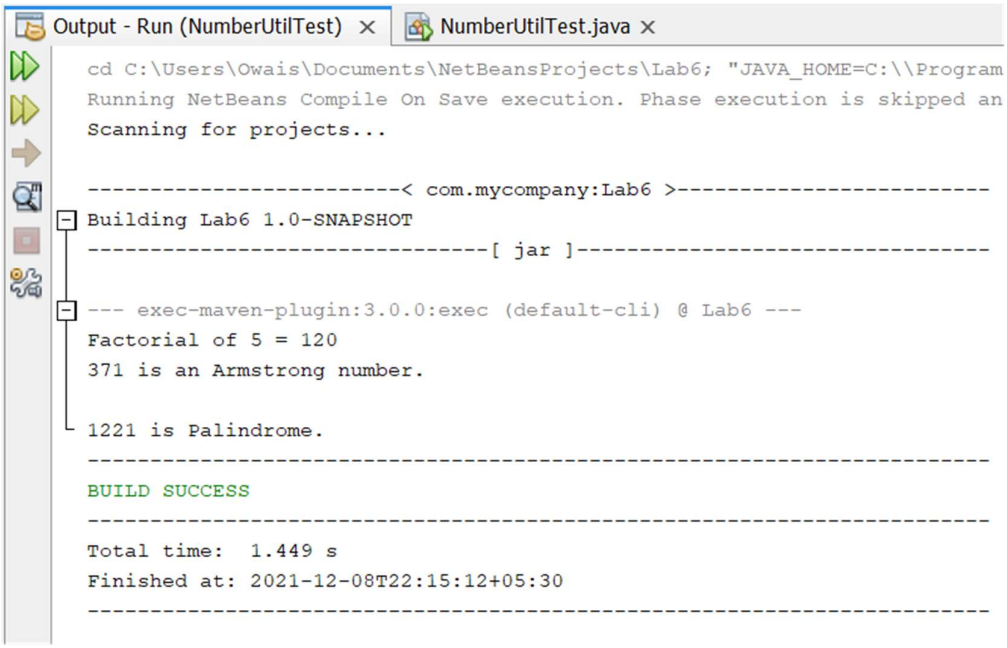
Total time: 1.634 s
Finished at: 2021-12-08T16:05:34+05:30

NumberUtilTest.java :–

NumberUtilTest.java ×

Source | History

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
package NumberUtilities;
public class NumberUtilTest {
    public static void main(String[] args) {
        int a = 5;
        long factorial = 1;
        for(int i = 1; i <= a; ++i)
        {
            factorial *= i;
        }
        System.out.printf("Factorial of %d = %d\n",a,factorial);
        int b = 371, originalNumber, remainder, result = 0;
        originalNumber = b;
        while (originalNumber != 0)
        {
            remainder = originalNumber % 10;
            result += Math.pow(remainder, 3);
            originalNumber /= 10;
        }
        if(result == b)
            System.out.println("371 is an Armstrong number.\n");
        else
            System.out.println("371 is not an Armstrong number.\n");
        int c = 1221, reversedNum = 0, R;
        int originalNum = c;
        while (c != 0) {
          R = c % 10;
          reversedNum = reversedNum * 10 + R;
          c /= 10;
        }
        if (originalNum == reversedNum) {
        System.out.println(originalNum + " is Palindrome.");
        }
        else {
           System.out.println(originalNum + " is not Palindrome.");
        }
    }
}
```



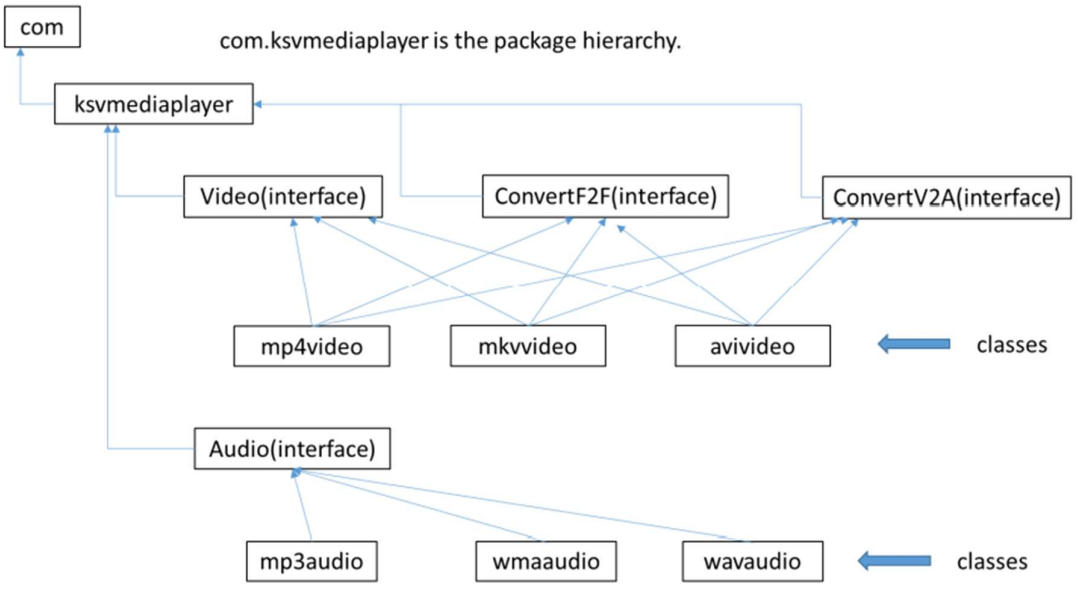

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package NumberUtilities;
public class NumberUtilTest {
    public static void main(String[] args) {
        int a = 5;
        long factorial = 1;
        for(int i = 1; i <= a; ++i)
        {
            factorial *= i;
        }
        System.out.printf("Factorial of %d = %d\n",a,factorial);
        int b = 371, originalNumber, remainder, result = 0;
        originalNumber = b;
        while (originalNumber != 0)
        {
            remainder = originalNumber % 10;
            result += Math.pow(remainder, 3);
            originalNumber /= 10;
        }
        if(result == b)
            System.out.println("371 is an Armstrong number.\n");
        else
            System.out.println("371 is not an Armstrong number.\n");
        int c = 1221, reversedNum = 0, R;
        int originalNum = c;
        while (c != 0) {
          R = c % 10;
          reversedNum = reversedNum * 10 + R;
          c /= 10;
        }
        if (originalNum == reversedNum) {
        System.out.println(originalNum + " is Palindrome.");
        }
        else {
           System.out.println(originalNum + " is not Palindrome.");
        }
    }
}
```

Output

```
java -cp /tmp/wsJTeBRRBf NumberUtilTest
Factorial of 5 = 120
371 is an Armstrong number.
1221 is Palindrome.
```

Q.2] KSV Company is trying to develop media player to play audio and video formats. It supports as many as formats in both categories.
In addition, it supports conversion of one format into another and also support converting video into audio.
Develop a package with suitable functionalities and interfaces as depicted in the following figure in such a way that any third party can utilize them for their development.
Video and Audio interfaces have play() method, and ConvertF2F and ConvertV2A interfaces have format2format(), video2audio() methods respectively.

Develop a KSVMediaPlayerTest class to utilize the KSV company's media player functionality.



Video (interface) :–

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package KSV_Media_Player.newpackage;
public interface Video {
    void display();
}
class mp4video implements Video {
    @Override
    public void display()
    {
        System.out.println("Video file type : MP4");
    }
    public static void main (String[] args)
    {
        mp4video t = new mp4video();
        t.display();
    }
}
class mkv_video implements Video {
    @Override
    public void display()
    {
        System.out.println("Video file type : MKV");
    }
    public static void main (String[] args)
    {
        mkv_video t = new mkv_video();
        t.display();
    }
}
class avi_video implements Video {
    @Override
    public void display()
    {
        System.out.println("Video file type : AVI");
    }
    public static void main (String[] args)
    {
        avi_video t = new avi_video();
        t.display();
    }
}
```

Output

```
java -cp /tmp/f0itJxy34Y Video
Video file type : MP4
Video file type : MKV
Video file type : AVI
```

ConvertF2F (interface) :–

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package KSV_Media_Player.newpackage;
public interface ConvertF2F {
    void display();
}
class mp4video implements ConvertF2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : MP4");
    }
    public static void main (String[] args)
    {
        mp4video t = new mp4video();
        t.display();
    }
}
class mkv_video implements ConvertF2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : MKV");
    }
    public static void main (String[] args)
    {
        mkv_video t = new mkv_video();
        t.display();
    }
}
class avi_video implements ConvertF2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : AVI");
    }
    public static void main (String[] args)
    {
        avi_video t = new avi_video();
        t.display();
    }
}
```

Output

```
java -cp /tmp/rOyFmdvjfw ConvertF2F
Video file type : MP4
Video file type : MKV
Video file type : AVI
```

ConvertV2A (interface) :–

```java
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-6 */
package KSV_Media_Player.newpackage;
public interface ConvertV2F {
    void display();
}
class mp4video implements ConvertV2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : MP4");
    }
    public static void main (String[] args)
    {
        mp4video t = new mp4video();
        t.display();
    }
}
class mkv_video implements ConvertV2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : MKV");
    }
    public static void main (String[] args)
    {
        mkv_video t = new mkv_video();
        t.display();
    }
}
class avi_video implements ConvertV2F {
    @Override
    public void display()
    {
        System.out.println("Video file type : AVI");
    }
    public static void main (String[] args)
    {
        avi_video t = new avi_video();
        t.display();
    }
}
```

Output

```
java -cp /tmp/fWjOxpwytS ConvertV2F
Video file type : MP4
Video file type : MKV
Video file type : AVI
```

Audio (interface) :–

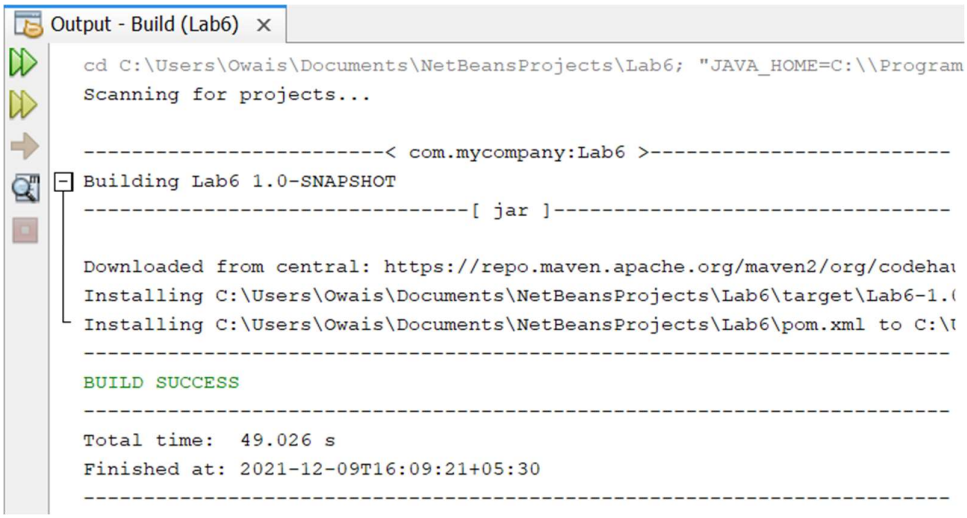
```
/* KHAN MOHD OWAIS RAZA 20BCD7138 */
/* CSE2005 LAB-7 */
package KSV_Media_Player.newpackage;
public interface Audio {
    void display();
}
class mp3audio implements Audio {
    @Override
    public void display()
    {
        System.out.println("Audio file type : MP3");
    }
    public static void main (String[] args)
    {
        mp3audio t = new mp3audio();
        t.display();
    }
}
class wma_audio implements Audio {
    @Override
    public void display()
    {
        System.out.println("Audio file type : WMA");
    }
    public static void main (String[] args)
    {
        wma_audio t = new wma_audio();
        t.display();
    }
}
class wav_audio implements Audio {
    @Override
    public void display()
    {
        System.out.println("Video file type : WAV");
    }
    public static void main (String[] args)
    {
        wav_audio t = new wav_audio();
        t.display();
    }
}
```

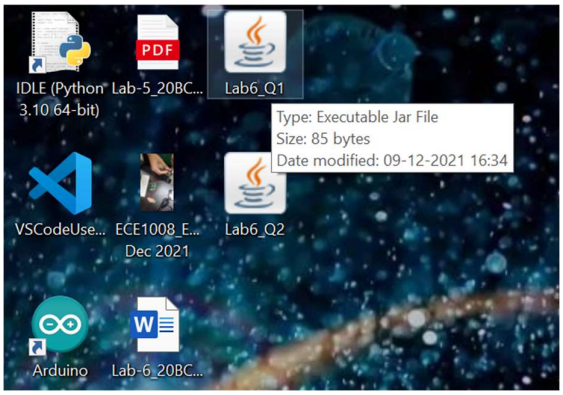
Output

```
java -cp /tmp/tcrXFvHCgi Audio
Audio file type : MP3
Audio file type : WMA
Audio file type : WAV
```

Q.3] Creating the JAR file :–

Creating JAR file for Q.1 –





Creating JAR file for Q.2 –