

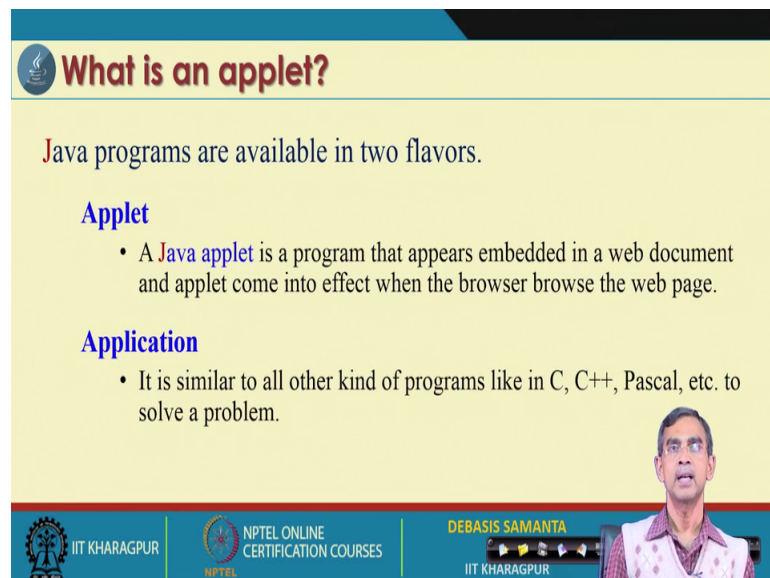
Programming in Java
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Lecture - 34
Applet Programming – I

Now, we will learn second part of this course. It is basically Applet Programming. Regarding this applet programming, at the very beginning of this course we have discussed about what exactly an applet is, we will basically recapture because it is a long term back we have discussed it. We will recapitulate all that consider we have once learned and then finally, we have planned a series of module other modules to cover the concept of applet programming in details.

It is infact, a very huge and then many mechanisms, many concept, many ideas and many tricks are to be learnt actually. So, all those things we have learned one by one. So, again first let us have the applet programming.

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What is an applet?

Java programs are available in two flavors.

Applet

- A **Java applet** is a program that appears embedded in a web document and applet come into effect when the browser browse the web page.

Application

- It is similar to all other kind of programs like in C, C++, Pascal, etc. to solve a problem.

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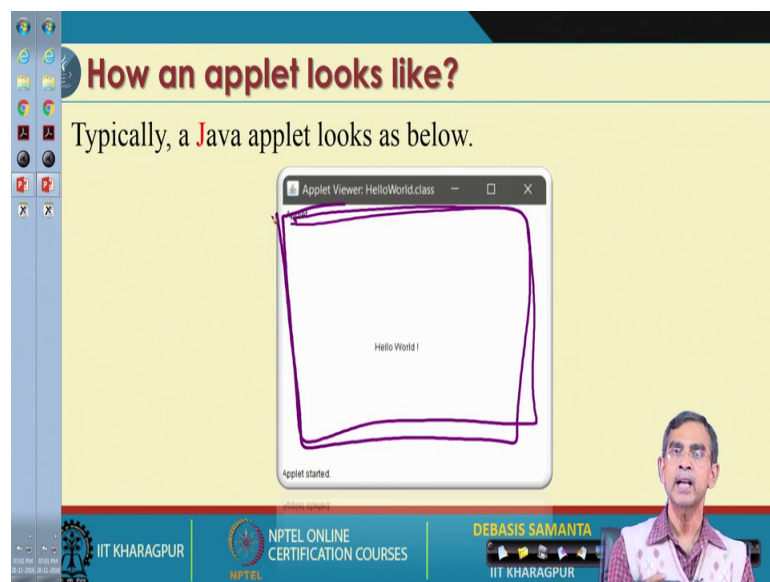
Now, definitely so for the applet programming is concerned you know applet is something different then what ever the programming that we have learned so for, using the convention mechanism. So, they are called applications. Now a java applet is basically is a small program, which is usually embedded in a web document; web page.

And this way whenever you browse a web page, a particular applet will be viewed or applet will be display its results and then applet will allow you to do lot of interaction from the user using this applet; a user can play music, user can play video, user can enter the data, user can login to the system, user can receive data from the database; what is not.

So, applet is more versatile. And you know if we add applet in an application, it really adds beauty to the application and whatever the (Refer Time: 02:00) program we see nowadays, there basically embedded. That mean applet is embedded into the java program, then it becomes more fascinating, more user friendly and more useful to many people who do not know much about the programming actually.

So, really it adds beauty to the programming. Now many programming language as you know C, C plus plus, Pascal they usually do not have this applet facility. The java is an exception in this regard. So, Java provides applet and managing this applet in a variety of ways, in a very professional ways actually. There are many mechanisms are for this purpose only on which we are going to learn actually.

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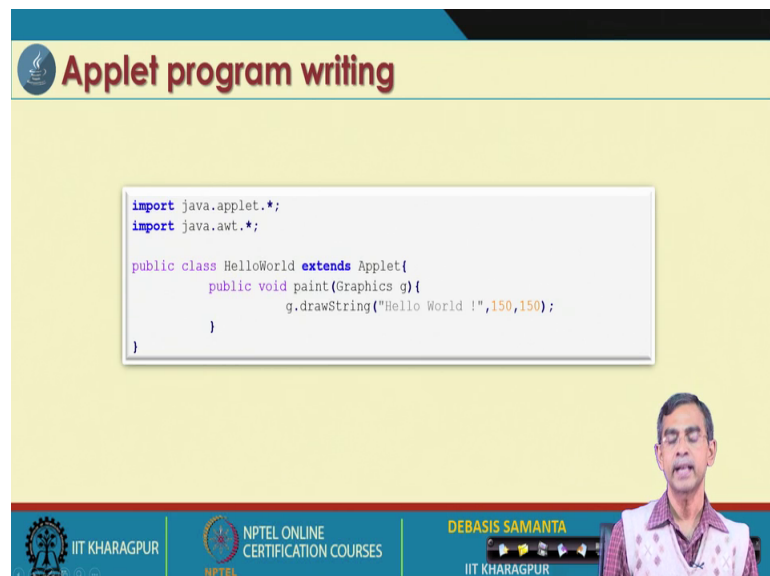
Now, in very simple words if we see what exactly applet is. An applet is nothing, but an window we can say. So, that is why the operating system which based on this concept is name as the windows operating system; what is the most popular one operating system from the Microsoft corporation ink.

So, an applet is nothing but an window and as we see, this window has few things are there. There is basically title of the window or we can say applet I should not say window here. Window which is a special term coined by the Microsoft, but applet is the basic things which basically used to develop any windows of your own.

And then here is basically the status of the applets. So, the two things are basically the title and the status at the top and bottom and then, this is basically the view area of the applet. Here it contain it includes many things. In one example where we have discussed about the graphical user interface concept, these basically text entry areas, it can include to display the image or a video or it can include multimedia content image, video and then text and everything. So, these basically the area which basically used to display many elements in it. It can also display the menus, sub items of the menus and everything.

So, this basically typically and applet is. So, applet programming is basically the idea about how we can develop this kind of user interface. More precisely, it is called the Graphical User Interface and more popularly it is called the GUI; so GUI, so that is the applet actually.

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The slide is titled "Applet program writing" and features a code editor window with the following Java code:

```
import java.applet.*;
import java.awt.*;

public class HelloWorld extends Applet{
    public void paint(Graphics g){
        g.drawString("Hello World !",150,150);
    }
}
```

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And usually, how we can write an applet? It is very simple as we see here, this is the simple most code that basically an applet can be. Whatever the applet we have shown just now, is basically product from this program. So, this program already we have

appear. So, to write an applet as we know we have to import java dot applet dot star, because this basically applet programming follows many class, many method, many constructor from this applet class.

So, there is a class called capital APPLET, applet class which is there in the package java dot awt, java dot applet. In addition to, this is also one awt package is there abstract window toolkit, which basically used for managing the different working or activities in an applet. So, this is the two important packages already built in the JDK and we have to import it and use it in our program.

And here is the simple most code, which we already familiar to earlier and this is the name of the java class that we have declared and this class should be extends and applet class so, that is the user syntax whenever you have to write and applet class or a program for applet. And this is the one method we use here paint and this is the Graphics g this is also one class that is there in the Graphic class which is in the java dot lang package is there, and then for this we just drawString "Hello World".

So, this is basically idea is that in this location of the applet window 150, 150; it will print this things. So, this is a very simple one applet program which will basically display only one element namely a stream, which is as "Hello World" on the view areas actually. So, this is the way that applet can be written and as you know once the applet is written; we have to we can run it, we can compile it. Obviously this file can be compiled HelloWorld dot java. If this is the name of the program, then after compilation HelloWorld dot class will be created.

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Building an applet

Edit → Save → Compile

- Edit the code in the same fashion as an application.
- The name of the applet will be same as the public class, defining the applet, for example, here
`HelloWorld.java`

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Once this is created, this class file can be viewed using any browser. For example, an applet viewer is a browser which can be used to view it. So, basically we have to edit, save and compile. So, as we told you this is the name of the file that is java and then once the compiler javac is used, it will produce the HelloWorld.class file.

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Building an applet

Edit → Save → Compile

The program can be compiled in the same fashion as a Java application is compiled. That is,

```
javac HelloWorld.java
```

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Building an applet

Edit → Save → Compile

After the successful compilation, the `javac` will produce a file named

`HelloWorld.class`

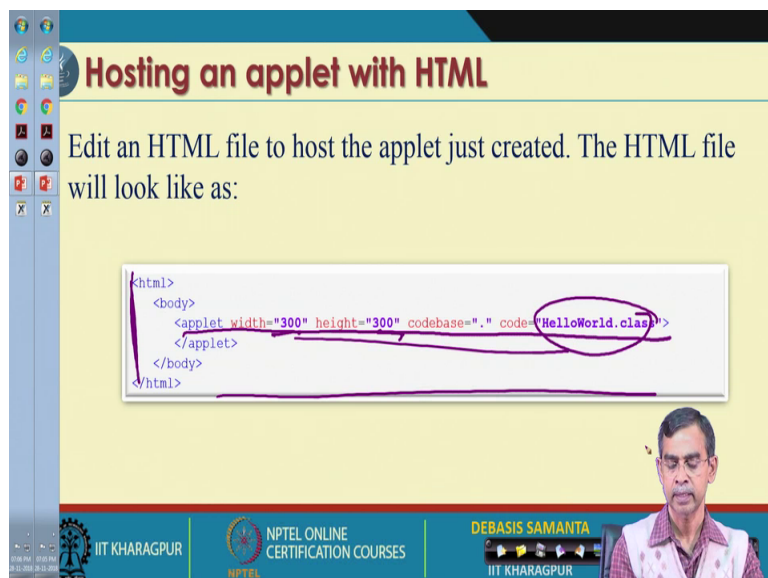


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Hosting an applet with HTML

Edit an HTML file to host the applet just created. The HTML file will look like as:

```
<html>
<body>
<applet width="300" height="300" codebase="." code="HelloWorld.class">
</applet>
</body>
</html>
```



Now, this class file needs to be embedded and to do it we should follow one html file. So, this is basically look of an html file will look like this and there is basically this is typical structure of the html file. And their applet code that is the code which basically used to embedded the file HelloWorld dot class. So, this is the name of the class file that we have created and we have included here and this width 30 and height 30 is indicates that what will be the size of the applet in your case, in this case actually. So, 300 cross 300 so, 300 pixels this one and then 300 pixel this one. So, this way the applet is configured and ready for browsing.

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Hosting an applet with HTML

```
<html>
<body>
  <applet width="300" height="300" codebase="." code="HelloWorld.class">
</applet>
</body>
</html>
```

- Write this program using any editor, for example, Notepad, Wordpad, etc.
- Save this to file giving a file name HelloJava.html
Note: The name of the file is not necessarily be the same as the name of the class; but extension should be .html
- Now, the applet is ready for its execution!

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Now once this a html file is created, our next time next task is to open this browser and this browser can be open using any browser as I told you. And obviously this file should be stored on html file as we see here HelloJava dot html, but not necessary HelloJava, it can give any name of the program. It is not decide to give the same name as a dot class file or dot java file; any file name can be given here.

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Running an applet

Execution

- A .html file can be run with a browser such as [Internet Explorer](#), [Netscape Navigator](#), etc.
- Java has its own program called [appletviewer](#) to run an applet.

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Now so, this file can be browsed using many browser and there is a one popular browser in this reaction is called the appletviewer. So, it is basically appletviewer and appletviewer and then following the applet viewer dot html file that can be used here. Now earlier versions of the Internet Explorer, Netscape Navigator; they allowed it, but

now because of the security reasons and many more aspects the modern browsers like Mozilla, Safari they are basically do not allowed to browse any applet code.

So, that is why we cannot use this one which were earlier possible but nowadays it is not possible. Anyway, so appletviewer is the best way to browse and html file to see it.

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Running an applet

Execution

- Open the [command prompt](#) and go to the program directory
- Run applet by typing `appletviewer <file name>.class`

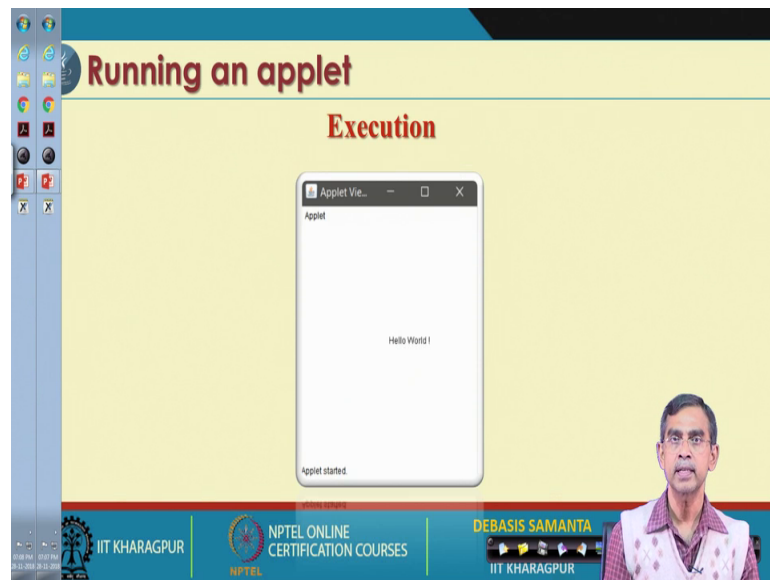
```
Command Prompt
C:\Users\ > \Desktop>appletviewer HelloWorld.html
```

- Alternatively, double click on the .html file so that the default browser in your machine can run the .html file

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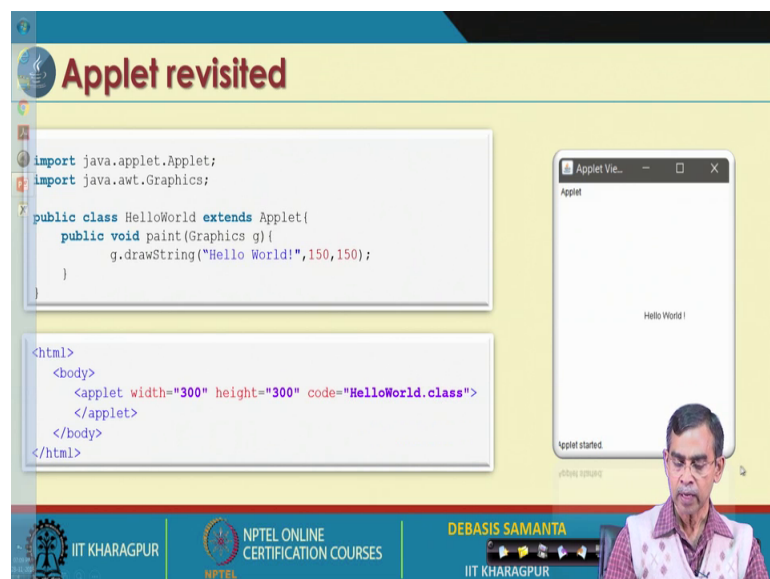
So, here is the way that how you can see it basically, so appletviewer and the name of the html file. So, you can see it here dot html file can be this page, then it will display. And then typically the output for the program that we have discussed, it is basically the typical output it will look like. So, this is the output that you can see on your screen.

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So, this way we can see, how a code. Very simple applet code can be written, can be processed and finally can be viewed. And this is enough for the beginners so, that you can understand about, how it will work.

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Now, we will quickly see about the general features that is there in an applet. So, basically we will discuss about the structure of an applet. And as we see in this program it has 3 different parts as we see here. The first part is basically, this part is called the package part and this is basically the main body of the applet.

Now, the main body in this case is very simple, but actually there is many more things that needs that can be incorporated here and ok. This is the 1, it is called the dot java component and this is basically call the dot html component which basically embedded the applet, after the successful compilation. If the composition is fail at this stage and if you do it, this view will open it; but it will not display anything. So, it will be totally a blank.

And if you do not give this code and then applet viewer you can use it, the applet viewer will do it; but it will give only a blank applet. Now, so this is the 3 things are there is a dot java file versus the dot class file and then this is basically the html file and finally the browse; browsing of the output.

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The slide titled "Basic structure of an applet" illustrates the components of a Java applet code. It is divided into four parts:

- Part 1:** Import Section
- Part 2:** `public class NewAppletName extends Applet {`
- Part 3:** Variable declaration(s)
- Part 4:** Method(s) for object interaction declared and defined here, containing `Java code to accomplish a task`

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Now so, now I will just discuss about the structure of the applet code that may be there that mean java dot java component it is there. As we have already discussed about there is basically one section or first part in the body is input. Here many things can be imported as in the last example as we see import dot applet dot star, import dot java dot awt dot star like ((Refer Time: 11:34) . So, there are many import section that mean those are the class or library that you want to include in your java code that you can use it here.

So, this is a first part and second part as we see, this should be applet should be a public, because applet needs to be browse. So it should be public, you cannot provide any other modifier like default or private or protected. Only the public is allowed, then class and

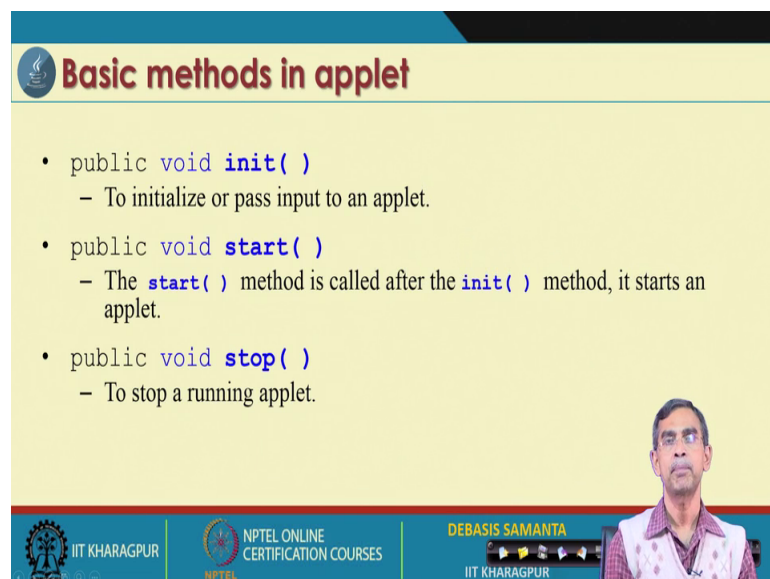
then by default actually it will take public. So, if you do not give anything is public it will take and then class name and that this is a name of the java class name that you want to do as we say it is extends Applet. So, this basically part 2.

Now, part 2 includes many more things, it will allow to declare any variable that is required in your applet. So, it is a variable declaration part and then applet allowed to invoke many methods. You can write your own method or you can write some method which is there in this package, libraries. So all these method section will be there.

So, all together there are 4 parts, import part, this basically the class declaration, the variable declaration and this is the method declaration. And obviously, it is the mandatory parts so, but seems have applet you do not you may not have any variable declaration, you can ignore it. So, it is not necessarily that all parts are mandatory which is some parts are optional required if it is there otherwise not there even we can write an applet without method part also. This means that it will just do not display anything, do not do anything. So, it is a blank applet will be displayed like this one. Anyway so, this is the general structure that an applet program should have.

Now, so here is an example check one by one. So, this basically import section as we see here and this is basically public class declaration, there is no variable part in this case and this is the method part that we see. This is a method part. So, these are the 3 parts are related to the small applet that we have discussed just now.

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Basic methods in applet

- `public void init()`
 - To initialize or pass input to an applet.
- `public void start()`
 - The `start()` method is called after the `init()` method, it starts an applet.
- `public void stop()`
 - To stop a running applet.

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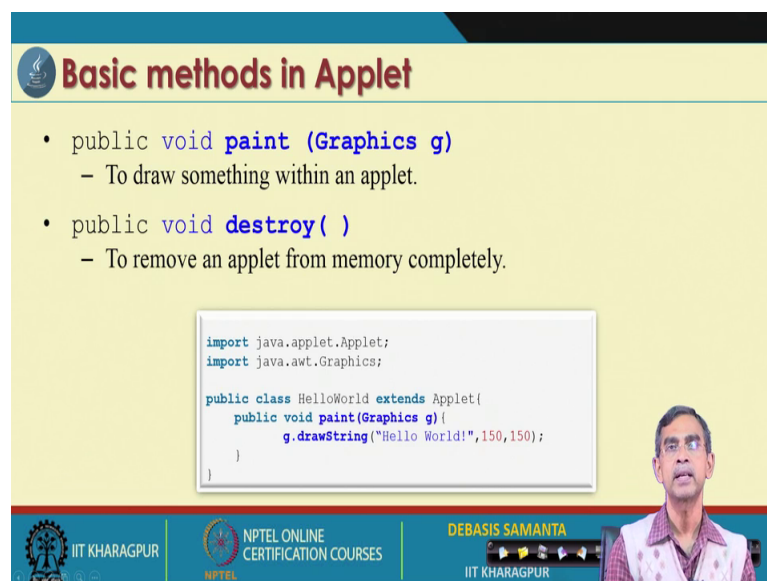
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Now, so far the applet methods are concerned, I will just give a few hints about it what are the refund method is possible. You cannot include any method of your own rather you should include some method which are basically the method declared in the applet class and in basically you have to over write that method.

Now, the method which can be over written in an applet is misted here. The init method, this is the init method, the start method and stop method. So, init method is basically use to initialize an applet before giving it and start method actually, it will follow the init method once the initialization is over, then start method will start execution of the applet and stop is basically while an applet is running. So, if you want to stop it, then you can use it.

So, these are the three methods that we can use it. Actually these are the method as I told you is basically to over write the method means we have to write the code for this methods in our own applet program.

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The slide is titled "Basic methods in Applet" and features a yellow background. It lists two methods:

- `public void paint (Graphics g)`
 - To draw something within an applet.
- `public void destroy()`
 - To remove an applet from memory completely.

Below the list is a code block with the following Java code:

```
import java.applet.Applet;
import java.awt.Graphics;

public class HelloWorld extends Applet{
    public void paint(Graphics g){
        g.drawString("Hello World!",150,150);
    }
}
```

The slide also includes a small video inset of a man in the bottom right corner and logos for IIT KHARAGPUR, NPTEL ONLINE CERTIFICATION COURSES, and DEBASIS SAMANTA in the bottom left.

So, this is the way that different method can be created, there are two more method also. They are basically already we are familiar to one method the paint method we have; this basically for painting. Now, whenever you have to display something, it is basically via paint. If we have to paint image there also via paint and you see we how we can displays thing that is also void paint. That means, using the paint method anything you can draw on the applet.

And the destroy method is basically it is the method which is basically to remove and applet compactly from the memory. So, it is basically closing the applet forever ok. So, this is the idea about the different method very simple only 5 method; init, start, stop and then paint and destroy. There are few more methods also. Those are basically standard methods there, I will discuss one by one.

Now, let us first discuss about very quickly about the different methods and how we can write a code for all these methods in our own applet. Now, so this is the simple that using the paint method as we already used it there, but I will see exactly; we will I will discuss about the other method like init, stop how they can be incorporated in your applet code.

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```
// Use of init( ) method in an applet //  
  
import java.applet.Applet;  
import java.awt.Graphics;  
  
public class HelloWorld extends Applet{  
    public void init( ) {  
        resize(200,200);  
    }  
  
    public void paint(Graphics g){  
        g.drawString("Hello world!", 150,150);  
    }  
}
```

Now, here let us have the quick look about this program here. The this is basically idea about how we can declare init method in an applet. Now, what is purpose of the init method? As I told you the init method is for initializing and applet. Now, what do you mean by the initialization of an applet? Suppose, whenever you use the html code, there you have to fix that what should be the size of the applet, say 300 cross 300, but the regarding the program and whatever it is there in one what is called the graphical display, I want to show many applets here and there.

So, definitely I can reconfigure the size of the applet. So, here is basically from the program only, we can reconfigure the size of the applet and to do these things we can take the confidence of the init method. So, here I can declare about, init method public

void init. All this method should be public because those methods are public only. So, in applet everything should be public there is no concept of private, protected or default concept is there because applet is publicly useful. So, that is a it should be public; everything is public, class is public, all methods are public like, main method is public. Now, so init method we are declaring and here is the resize method. This resize is the one built in method there in dot Applet package.

So, you can just use it without creating this is basically static methods. So, no object needs to be created, we can call this method resize. And resize, it has a 2 parameter 200 cross 200, it indicates that it will be basically allowed to create an applet which has the 200 size and 200 width. So, this is the init method that means so whenever applet will be viewed, so it will be initialize as 200 cross 200.

And then finally, this applet will include the paint method, that is basically again paint method is that is there in the applet class, we are over writing this paint method. In this, this is our own added code we are using this one. That mean it will print “Hello World” at the location 150 150 of this applet.

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Basic methods in applet

```
// Use of init() method in an applet //  
import java.applet.Applet;  
import java.awt.Graphics;  
  
public class HelloWorld extends Applet(  
    public void init() {  
        resize(200,200);  
    }  
  
    public void paint(Graphics g){  
        g.drawString("Hello World!",150,150);  
    }  
}
```

```
<html>  
<body>  
<applet width="300" height="300" code="HelloWorld.class">  
</applet>  
</body>  
</html>
```

Applet started.
Hello World

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So, this is way about init method is there. Now there is a basically you can see the output how it will look like this. So, this is the applet code, dot java file, compile dot class file, embedded into the html file, and finally if you run this, then it will show this one. As you

see, we cannot display the whole thing this is because the applet size that you have init it is a 200 200.

So, in this case actually it cannot fit the whole things. If you do it little bit bigger maybe the whole the stream can we can we better so, applet size can be this one. So, this is an example here we can see, how this init method can resize your applet view, viewing the program or when it is running.

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```
// Use of init() to pass value through HTML to applet //  
  
import java.applet.*;  
import java.awt.*;  
  
public class RectangleTest extends Applet {  
    int x, y, w, h;  
    public void init ( ) {  
        x = Integer.parseInt(getParameter (" xValue" ));  
        y = Integer.parseInt(getParameter (" yValue" ));  
        w = Integer.parseInt(getParameter (" wValue" ));  
        h = Integer.parseInt(getParameter (" hValue" ));  
    }  
  
    public void paint ( Graphics g ) {  
        g.drawRect (x, y, w, h );  
    }  
}
```

Now, there is also may another application of init method, by which we can provide an input to an applet. Now, here we can see, how the input can be provided to an applet, for the second we have to rewrite our own init method here. So, here is an attempt to rewrite the init method as we see here, this is the init method we are discussing, and these are the few code that basically we have mention here so, that it can read the value x value, y value, w value, h value from where; from the html file.

The value because applet cannot be useful to read, using the standard input output mechanism actually, does not allow ok. Applet cannot be directly from the keyboard or it cannot directly something from the output, stream or whatever it is there.

So, whatever the value that applet can be it will read through html file only. That means these are the value will be supplied, using some applet code, in the applet itself and then from that applet get parameter will get the value and this value will be converted into

integer, and they will store in a integer variable x, y, w and h like. And then finally, here the drawRect so, it is basically one method that is there in graphics package, it basically can draw a rectangle having x, y coordinate is basically if this is the rectangle, this is the xy coordinate and this is the w and this is the h, so these are the 4 parameters needs to be placed.

So, in order to draw and rectangle, so this is basically draw a rectangle via a paint method. Now here you can see, here we use the init method to read the value for drawing a rectangle from the from the user, rather I can say from an html file. Now obviously, the html file should be accordingly, now lets see what is the look of an html file in this case.

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The screenshot shows a presentation slide with the following content:

- Title:** Basic methods in Applet - without resize
- Code Block:**

```
<applet code = " RectangleTest" width = 150 height = 100 >
< param name = xValue value = 30 >
< param name = yValue value = 30 >
< param name = wValue value = 30>
< param name = hValue value = 30 >
</applet >
```
- Applet View:** A small window titled "Applet View" showing a simple rectangle.
- Footer:** IIT KHARAGPUR, NPTEL ONLINE CERTIFICATION COURSES, DEBASIS SAMANTA, IIT KHARAGPUR.

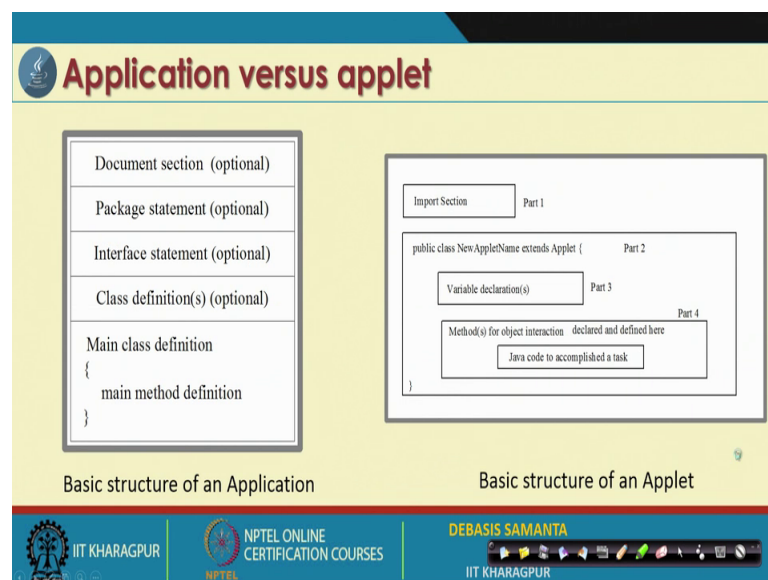
So, this is basically a simple look of the html file as we see. So, these are applet code is as usual RectangularTest this is a name of the java dot class file and this is the size of the applet and here these are the code, that is the html code I should say that html code, param name, x value, y value, w value these are the parameter name actually and the value is basically 20, 40, 100 these are the specified value.

This means that, x value is 20, y value is 40, w value is 100 and h value is 50. So, these are the first value to through an html file to an applet. So, this is the idea about, that how we can pass an input and then if we run this applet; this html file it will basically draw a rectangle on the applet area. So, the typically applet will look like this. So, this is basically the output is actually that can be there.

If we change the value of this input through this applet, definitely this rectangular size can be changed and many more other things can be done. Those things are the advanced features that many more. Suppose, this rectangle can be colored with some color that that line can be thickened and whatever the things are there, those things are from the paint method only.

Anyways so, we have learned about how to resize a size of an applet, using the init method that is there. So, again the same program if we run with the different value as the output is look like this. So, it basically shows the different value if we pass through html code the different applet will be viewed on the screen.

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Now, so we have learned about the applets and then basic things about the applet that we have learned about, many more about the applets are on the way of our learning procedure. Now, we have planned applets we have also learned a lot about the application development using java, then definitely you can understand what are the differences between application and applet.

Now, application is basically a standalone program which can be written using any editor can be stored as dot java can be compiled on the successful compilation, it will produce dot class file and that the same can be run using Java command. Whereas, applet as we see if you can we can write a program dot java, it can be compiled dot class, but it cannot

be executed by Java program it should be embedded in an html file; and then that html file needs to be browse by any browser for example, appletviewer.

So, these are the basic things that we have there. And then application can includes many things which basically an applet cannot, because the applet has its shown purpose, has its shown objective, has its shown uses whereas application is totally different. So, there are two different ways of programming actually. So, usually application is for developing some programs which can help us to solve many applications; application software error, but applet is basically is to provide a graphical user interface. That mean applet can be considered, as an interface and at the backend the application can be control to run.

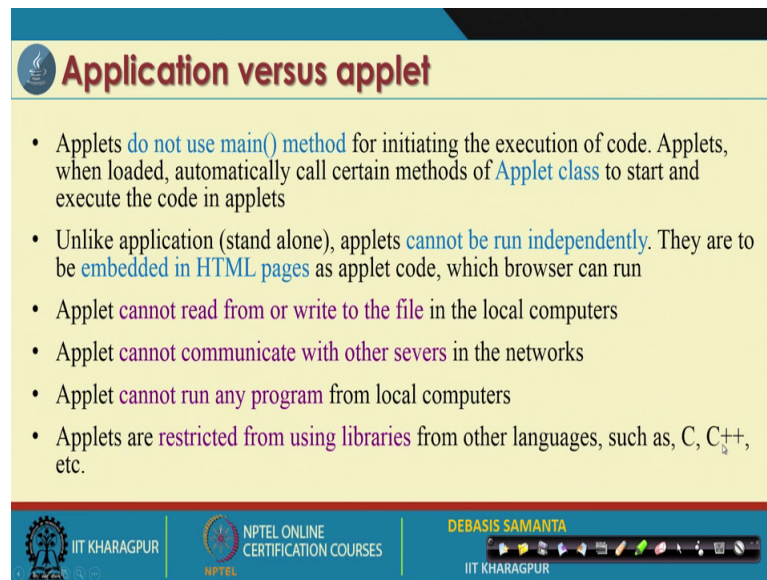
So, this is the basic idea about here. But in general, the there is a difference between the application and applet so far, the program structure is concerned. And as you know this is the structure of an applet is very simple, it has only few method like init then it is basically init method, stop start method, stop method, then destroy method, paint method these are the few methods are there. And then the input section is also very simple, either java dot applet dot star or this is java dot, awt dot star or java x dot swing, those are swing package is basically related to this graphical user interface development or applet will creation.

So, import section is basically limited to this kind of packages; other than users own package also can be included there. Now, where as if we see, so for the application is concerned it has a document section, is a package section where we can define weather input in a package or creating a package whatever it is there.

Then interface also, then class definition this is main and then finally the main class are there. And there are lot of mechanism as we have already learn encapsulation, inheritance, runtime polymorphism, binding and then static declaration what is not. So, many more things that can be include there and whatever the idea that we have learn including multithreading and everything those things as can be; can be put into this part. So, this is basically application.

Application is very versatile there, but you know a applet is also less, we will see exactly how applet can be developed. Anyway, so these are the; so for the basic structures of the 2 concepts application and applets are concerned. So, there are difference.

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Application versus applet

- Applets **do not use main() method** for initiating the execution of code. Applets, when loaded, automatically call certain methods of **Applet class** to start and execute the code in applets
- Unlike application (stand alone), applets **cannot be run independently**. They are to be **embedded in HTML pages** as applet code, which browser can run
- Applet **cannot read from or write to the file** in the local computers
- Applet **cannot communicate with other servers** in the networks
- Applet **cannot run any program** from local computers
- Applets are **restricted from using libraries** from other languages, such as, C, C++, etc.

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And now, there is again few differences are there. So, for there running is concerned as we see, an application can include a method called the main method but as we see in case of a applet there is no main method. So, it can start; from where it can start in fact, applet class to start it basically start with the main method which are there. So, it is init method if it is there it will start from the init, then start then what are the methods are there in the paint or whatever it will start in the sequence.

So, there is no main method in applet where as main method is must in an application. And as we see an application can be run independently where as an applet should be browsed via and html pages through a browser may be applet viewer. Now, again we can know we have noted that, applet cannot read or write neither from any file from standard input device or to any file or to any computer display like. So, there is no read write facilities are possible for the applet directly however, we can give input via in html file.

So, that is also not good to run a return we have to change html this one, but there is again reason for that, how we can manage it? Now, obviously there are other way using the event handling that will discuss about whenever we discuss that there is a interactive way of giving input to the applet also.

Now, again applet for example, application java application can run any program from its, any program means any class whatever it is there, but applet cannot run any program from the local computer or from the distance computer remote computer.

Now, as we see applet also cannot allow to access many libraries those are there in other packages. It is basically only those are the AWT or applet or swings those are the packages can be used in the applet. So, there are many restrictions so for the applet is concerned. Now it is little bit surprising that, why the applet is having so many restriction? Obviously, the reason is there because their objective, their purpose is different.

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? Questions to think...

- How more sophisticated applets can be designed in different applications?
- What is the latest technology known for applet?

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Now, it is our turn to run about how the more sophisticated applets can be designed and can be used and can be developed many program. And then, there are all lot of technology development around ok throughout the year and then there is very sophisticated methodology is available for developing applet. So, all this things we will be discussed in our sub sequent discussion. So, till time thank you I think you are enjoying and more on the way we shall learn it.

Thank you very much; thank you.