UNIT 12: INTRODUCTION TO APPLETS

UNIT STRUCTURE

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12.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define Applet
- describe relation between Applet and World Wide Web
- define Applet class and Applet class hierarchy
- define HTML and Applet
- explain the creating steps of Applet
- describe the life cycle of an Applet
- explain the use of Window component in Applet
- describe event handling in Applet
- explain how audio is added in Applet
- explain how animation is added in Applet

12.2 INTRODUCTION

In the earlier unit, we have learnt about the concept of file handling in detail. We have learnt how to read and write in console and tiles in the previous unit.

In this unit, you will be introduced to applets. Topics like applet and world wide web, html, applet class and the life cycle of applet are discussed in detail in this unit. In addition to these, concepts related to window components, event handling and addition of audio and animation to applets are also described in this unit. In the next unit, we will explore the topics related to AWT and Swings.

12.3 APPLET

Applet is a small java program which can be easily passes through the network from one computer to another and run using the Applet viewer or any other web browser that can supports Java. It can do the display graphics, arithmetic operation, play sound, take user input etc. It creates a fully inactive multimedia web application. We can embed applet into web pages into two ways. First is create our own applet and embedded into a web page. Second is download applet from a remote machine and embedded into web pages. First is known as local applet where second one called as remote applet. To locate and load the remote applet we must know the URL of the remote applet.

12.4 APPLET AND WORLD WIDE WEB

The "applet" is represent a small, subordinate, or embeddable application which means it's designed to be run and used within the context of a larger system. Most of the applet programs are embedded within a computer's operating system where operating system manages its native applications such as it starts, stops, suspends, and synchronizes applications; it provides them with certain standard resources; and it protects them from one another by partitioning their environments. An applet is just another type of object to display on web browser; it's embedded into an

HTML page with a special tag. It runs in a Web browser and works at client side. Browsers distinguish the inline items and items hosted via hypertext links i.e. available from external sources such as a viewer or helper application.

The safety for an application is a features of Java which make it possible to develop new kinds of applications thatwere infeasible. A web pages make with applet can contain not only static hypertext information but also full-fledged interactive applications. A Web browser navigate the user to retrieve the data and use software. Initially static information was related with portable software for interpreting and using the information which was replace a fully functional spreadsheet application embedded within it that allows users to view and manipulate the information.

Important points related to Applet

- All applets are sub-classes of java.applet.Applet class.
- Applets are not stand-alone programs. Instead, so they run within either a web browser or an applet viewer. JDK provides a standard applet viewer tool called applet viewer.
- In general, execution of an applet does not begin at main() method.
- Applet cannot perform read or write operation on a file in the local computer.
- Applet cannot communicate with other server on the network
- Applet cannot run any program from the local computer.
- Applets are restricted from using libraries from other languages.
- Output of an applet window is not performed by System.out.println().it is handled with various AWT methods, such as drawString().

Why Applet is needed?

- When something dynamic to be included in the display of a web page.
- When we require some flash output.
- When we want to create a program and make it available on the internet for us by the others on their computer.

Advantage of Applet:

There are many advantages of the applet. They are as follows:

- It works on the client side so less response time.

- It secured
- It can be executed by browsers running under many platforms, including Linux, Windows, Mac Os, etc.

Disadvantage of Applet:

- To execute the applet, plugging is required in the client browser.

12.5 APPLET CLASS

To create an applet in Java, the user can use java. applet.Applet class. There are four Methods used in the Life Cycle of the Java Applet. JDK provides an applet viewer utility to execute the applet. A Java Applet class, a part of java. applet package is responsible to create java Applet, The Applet class shows a standard interface between applets and their environment. The subclass of the Applet class is called an applet that is embedded in a Web page or viewed by the Java Applet Viewer. The Java applet class have some useful methods to give you complete control to run an Applet like initializing and destroying an applet, It also provides the methods to load and display colorful images, and play audio and video clip and Cinematic Videos on the Web.

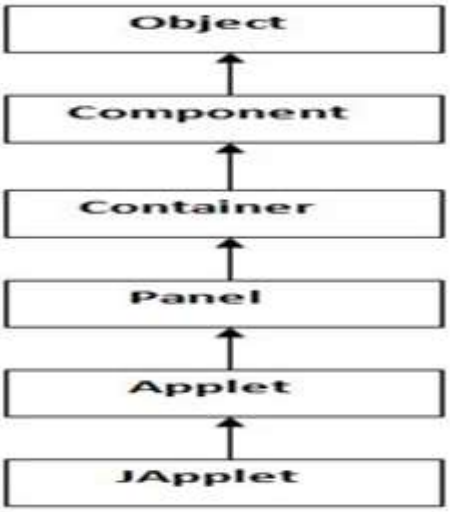


Figure 12.1: Hierarchy of applet class

12.6 APPLET AND HTML

Applets are contained in web documents whose structure is defined in HTML. In HTML, tags like head, title, body, etc. are used to define different parts like heading, the title of the page, and what content would like to display. To display applet programming, an applet tag is used with attribute CODEBASE(optional), code, ALT, width, height, alignment, and so on.

Table 12.1: Table for the attribute of the Applet tag

Attribute name	Value	Description
code	URL	It specifies the URL of the Java applet class file.
width	pixels	It specifies the display width of the applet panel.
height	pixels	It specifies the display height of the applet panel
align	Left, right, top, bottom, middle	It specifies the position of the applet application relative to the surrounding content.
alt	text	It is used to display alternative text in case the browser does not support Java.
archive	URL	This specifies the archived or compressed version of an applet application.
object	name	It specifies the URL or reference to a serialized representation of an applet.
codebase	URL	It specifies the exact or relative URL of the applets .class file specified in the code attribute.
space	pixels	It specifies the horizontal space around the applet.
space	pixels	It specifies the vertical space around the applet.
name	name	It specifies the name of the applet

Steps to developing an applet

- Build an applet code(.java file).
- Creating an executable applet (.class file)
- Designing web page using HTML tags

- Preparing <APPLET>tag.
- Incorporating <APPLET> tag into the web page.
- Creating HTML file.
- Testing the applet code.

How to run an applet?

There are two ways to run the applet

- By Web browser: open the HTML file using that browser
- By appletviewer tool: This is the easiest way to run an applet.

To execute a file with an applet viewer use code

appletviewer filename.html

Features of Applets over HTML

- Displaying dynamic web pages of a web application.
- Playing sound files.
- Displaying documents
- Playing animations

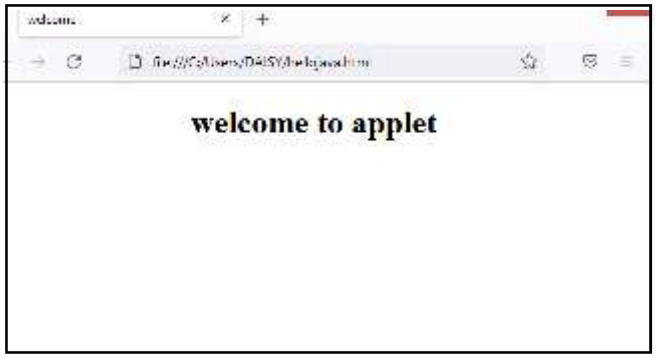
Program12.1: Program to display a line in the applet application

a. Code to create a java file

```
import java.awt.*;
import java.applet.*;
public class hellojava extends Applet
{ public void paint(Graphics g)
{g.drawString("hello java", 10,1000);
}
}
<html>
<head><title>
welcome</title></head>
<body>
<center>
<h1>welcome to applet</h1>
</center>
<br>
<center>
```

```
<applet
   code=hellojava.class
   width=400
   height=200>
</applet>  </center>
</body>    </html>
```

Output:





CHECK YOUR PROGRESS

Q 1. What is Applet?

Q 2. Write two features of Applet.

Q 3. Why the applet is necessary?

Q 4. Write name of two attributes of applet tag.

Q 5. How can you run an applet?

12.6 THE LIFE CYCLE OF AN APPLET

Java applet inherits the set of default behavior from the Applet class. When an applet is loaded it goes through the different applet states like born or initialize state, running state, idle or stopped state, and dead or destroyed state. Java plug-in software is responsible for managing the life cycle of an applet.

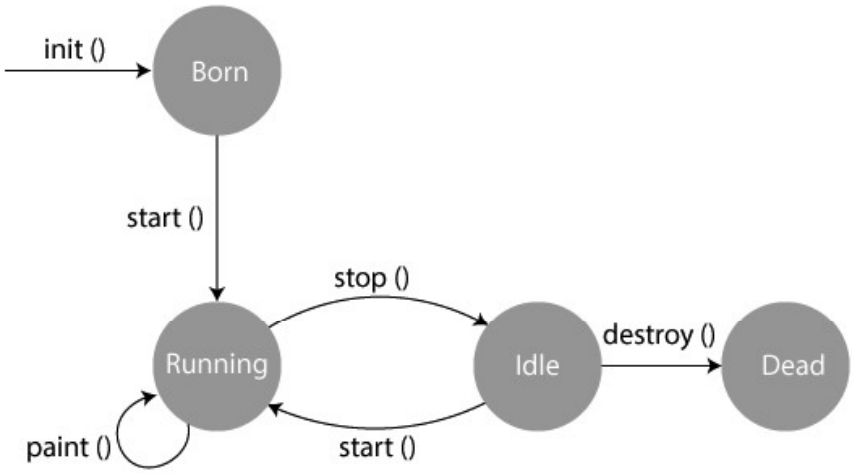


Figure 12.2: Life cycle of an Applet

Initialization state:

It goes through the following process

- The first stage of an applet. So create objects needed by the applet and it invokes only once.
- Set up initial values
- Load images or fonts
- Set colors

Running State:

- It executes when the system calls the start() method of the Applet class
- Execute after the init() method.
- Sometimes start() is occur if the applet is in a stopped / idle state.
- It can be invoked more than one time.

Idle or Stopped state

- Execute when stop from running
- Automatically execute when leaving the page containing the currently running applet.
- We can call stop() explicitly.
- Terminate the thread on the execution of stop() if the applet runs on a thread.

Dead State

- Used to destroy the applet.

- Automatically invoked when quitting the browser.
- Occur only once time
- Clean up the resources.

Display state

- Execute when the applet has to perform some output operation.
- Execute immediately after the applet enters into running state.
- Paint() accomplished this task.

12.7 USING WINDOW COMPONENTS

In java, the AWT class gives the facility to add different types of window components in the applet. AWT has a rich set of components that can be used in the window. In the applet, we can add graphical buttons, labels, text fields, etc.

Program 12.2: Program on user interactive applet

```
import java.awt.*;
import java.applet.*;
public class AWTapplet extends Applet
{    Button b1;
TextFieldtx;
Label l1;
     public void init()
{
          b1=new Button("B1");
          tx=new TextField("This is textfield");
          l1=new Label("Button not pressed");
          add(b1);
          add(tx);
          add(l1);
}
}
```

12.8 EVENT HANDLING

Changing the state of a window object is known as an event. Event Handling is the mechanism that controls the event and decides what should happen if an event occurs. This mechanism has a code which is known as an event handler that is executed when an event occurs. To take the input from the button and change the content of the label as the output of actionPerformed(). This method includes a class that implements ActionListenerInterace.

Program 12.3: Program context input by the user in an applet program

```
import java.awt.*;
import java.applet.*;
import java.awt.event.*;
public class Textinput extends Applet implements
ActionListener
{
TextField name, age;
      Public init()
      {
setSize(300,200);
            Label l1=new Label("Name");
            Label l2=new Label("Age");
            name=new TextField(25);
            age=new TextField(4);
            add(l1);
            add(l2);
            add(name);
            add(age);
            name.addActionListener(this);
            age.addActionListener(this);
}
Public void actionPerformed(ActionEvent ac)
{
```

```
repaint();
}
Public void paint( Graphics g)
{
g.drawString("Name: "+name.getText(),10,100);
g.drawString("Age: "+age.getText(),10,130);
}
}
```

12.9 ADDING AUDIO AND ANIMATION

In this section, we will learn how to add audio to an applet. We will also learn how to add animation to an applet in this section.

12.9.1 Adding Audio in Applet

The AudioClip class is used to load and play Audio files. To load a sound file the getAudioClip () Method is used. The general format of the getAudioClip () method is:

```
AudioClipgetAudioClip (URL pathname, String filename)
AudioClipgetAudioClip (URL pathname)
```

where,

pathname defines the address of the sound file,

the filename is the name of the sound file.

When the image file and the source file are in the same directory, getCodeBase () method is used as the first parameter to the method. Some of the methods from AudioClip class are void play(), void loop(), and void stop().

Program 12.4: Program to play audio clip in Applet

```
import java.applet.*;
import java.awt.*;
public class audioex extends Applet
{
```

```
private AudioClipmysnd;
      public void init()
{
       mysnd=getAudioClip(getCodeBase(),"Audio
filename.mp3");
     }
      public void start()
     {
mysnd.loop();
      }
     public void stop()
    {
mysnd.stop();
     }
}

HTML code for sound example
<HTML>
        <HEAD>
        </HEAD>
<BODY>
        <CENTER>
         <APPLET  CODE="audioex.class"  WIDTH=200
HEIGHT=130>
       </APPLET>
        </CENTER>
</BODY>
</HTML>
```

12.9.2 Adding Animation in Applet

Java provides support two common image formats: GIF and JPEG. An image of any one of these formats can be loaded by using URL,

or a filename. To get object of image class use a method getImage() with following format:

public Image getImage(URL url. String image);

Some of the other methods related to image or animation are:

- public URL getCodeBased() returns the base URL.
- public URL getDocumentBase() returns the URL of the document in which the Applet is embedded.

Program 12.5: Program to add animation in applet

```
import java.awt.*;
import java.applet.*;
public class AnimationEx extends Applet
{
      Image pic;
      Public void init()
{
      pic=getImage(getDocumentBase(),
"images.jpeg");
}
      public void paint(Graphics g)
{
      for (int i = 50; i < 600; i++)
{
      g.drawImage(pic, i, 30, this);
            try
{
      thread.sleep(400);
                        } catch(Exception e)  {}
                  }
            }
      }
```



CHECK YOUR PROGRESS

Q 6. Who is responsible to manage the life cycle of an applet?

Q 7. Which method(s) is/are responsible for display state?

Q 8. What are different state of an applet?

Q 9. What happens when an applet is loaded?



12.10 LET US SUM UP

- Applet programming is important feature of Java programming.
- It is a special kind of programme that is embedded in HTML web page.
- There are two types of applet namely local and remote.
- The HTML Applet tag consists of Codebase, code, align, ALT, height, width etc. attributes.
- Applet programming is related graphics application.
- Life cycle of an applet goes through the five different state.
- AWT components are applicable on applet.
- These components can be activate implementing ActionListener interface.
- Animation and Audio can run using applet.
- The applet class contain 23 methods that are used to get information about the applet.



12.11 FURTHER READING

1) Schieldt, H. (2010), The Complete Reference Java(7th), Tata McGraw Hill
2) Seth, A. &Juneja, B. L. (2017), Java One Step Ahead(1st), Oxford University Press.
3) Balagurusamy, E.(2019), Programming with Java(6th), Tata McGraw Hill.
4) Malhotra, S. & Choudhury, S. (2018), Programming with Java(2nd), Oxford University Press

12.12 ANSWERS TO THE CHECK YOUR PROGRESS

Ans to Q No 1. An applet is a Java program that can be embedded into a web page. It runs inside the web browser and works at client side.

Ans to Q No 2. Two features of applet are

- All applets are sub-classes of java.applet.Applet class.
- In general, execution of an applet does not begin at main() method.

Ans to Q No 3. The applet is necessary:-

- When something dynamic to be included in the display of a web page.
- When we require some flash output.
- When we want to create a program and make it available on the internet for us by the others on their computer.

Ans to Q No 4. Code and height.

Ans to Q No 5. Using Web browser or by using appletviewer.

Ans to Q No 6. Java plug-in software.

Ans to Q No 7. drawstring(), or paint()

Ans to Q No 8. Initialization, running, stop and dead state.

Ans to Q No 9. First of all, an instance of the applets controlling class is created. Then, the applet initializes itself and finally, it starts running

12.13 MODEL QUESTIONS

Q 1. What is Applet? What are features of applet differentiate it from other application?

Q 2. Write a applet program to take different values from user input and display addition of the no.

Q 3. Describe the different state of applet life cycle.

Q 4. Write about the hierarchy of applet class.

Q 5. What are the functions of different attribute used in Applet tag?

Q 6. Write the steps to create an applet.

Q 7. Write format of paint() and drawString() with example.

Q 8. Write an applet program to display calculator functions.

Q 9. Write about the procedure to add window component and event handling.

Q 10. Write an applet program to display animation with sound.

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