Java applets

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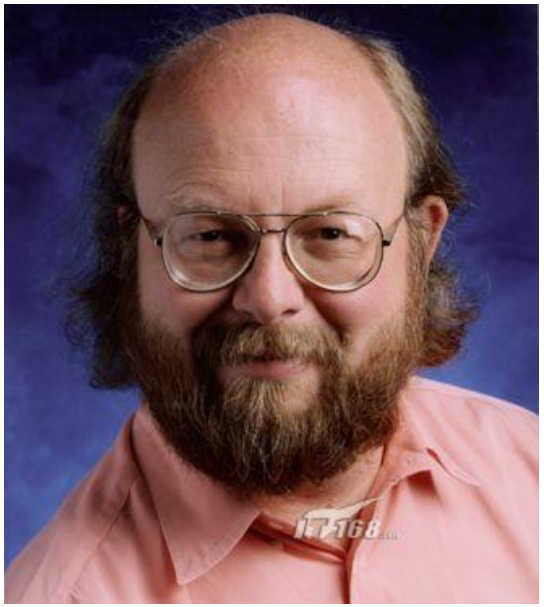
Outline

- What is Java?
- Java Applications
- Java Applets
- Java Applets Securities
- Summary

What is Java?

- Java was conceived by James Gosling at Sun Microsystems Inc. in 1991
- Java is platform independent language
- Java programming is a/an object-oriented programming.



Object oriented language

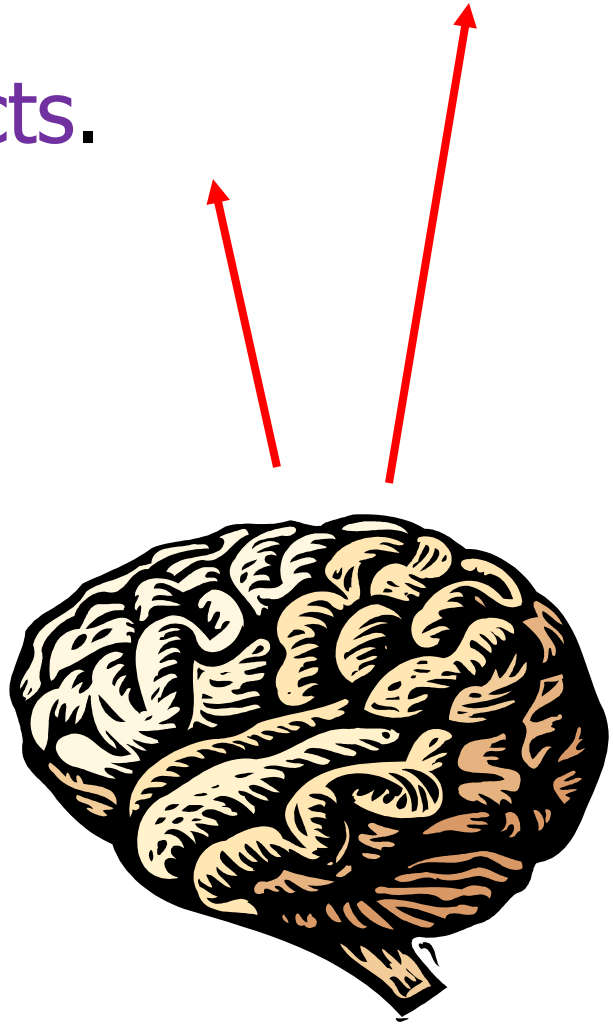
The world around us consists of objects.

e.g. the ATM

Object oriented language

The world around us consists of objects.

Let the program consist of objects.



Object oriented language

The program consist of objects.

Objects of the same kind form a class.

E.g. class ATM or
class Money.

Object oriented language

The program consist of objects.

Objects of the same kind form a class.

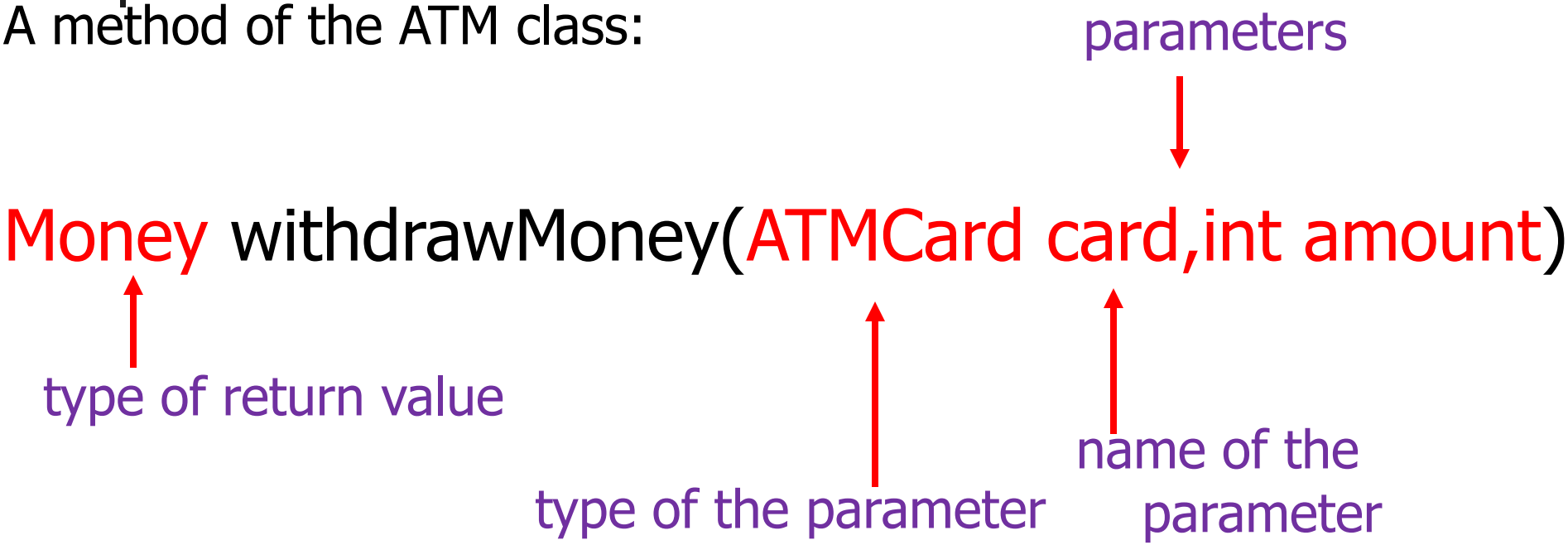
Each object has some methods.

Money *withdrawMoney*(ATMCard card,int amount)

(Objects in the same class have the same methods.)

Object oriented language

A method of the ATM class:




```
myPurse.addMoney(theATM.
withdrawMoney(myATMCard,1000));
```

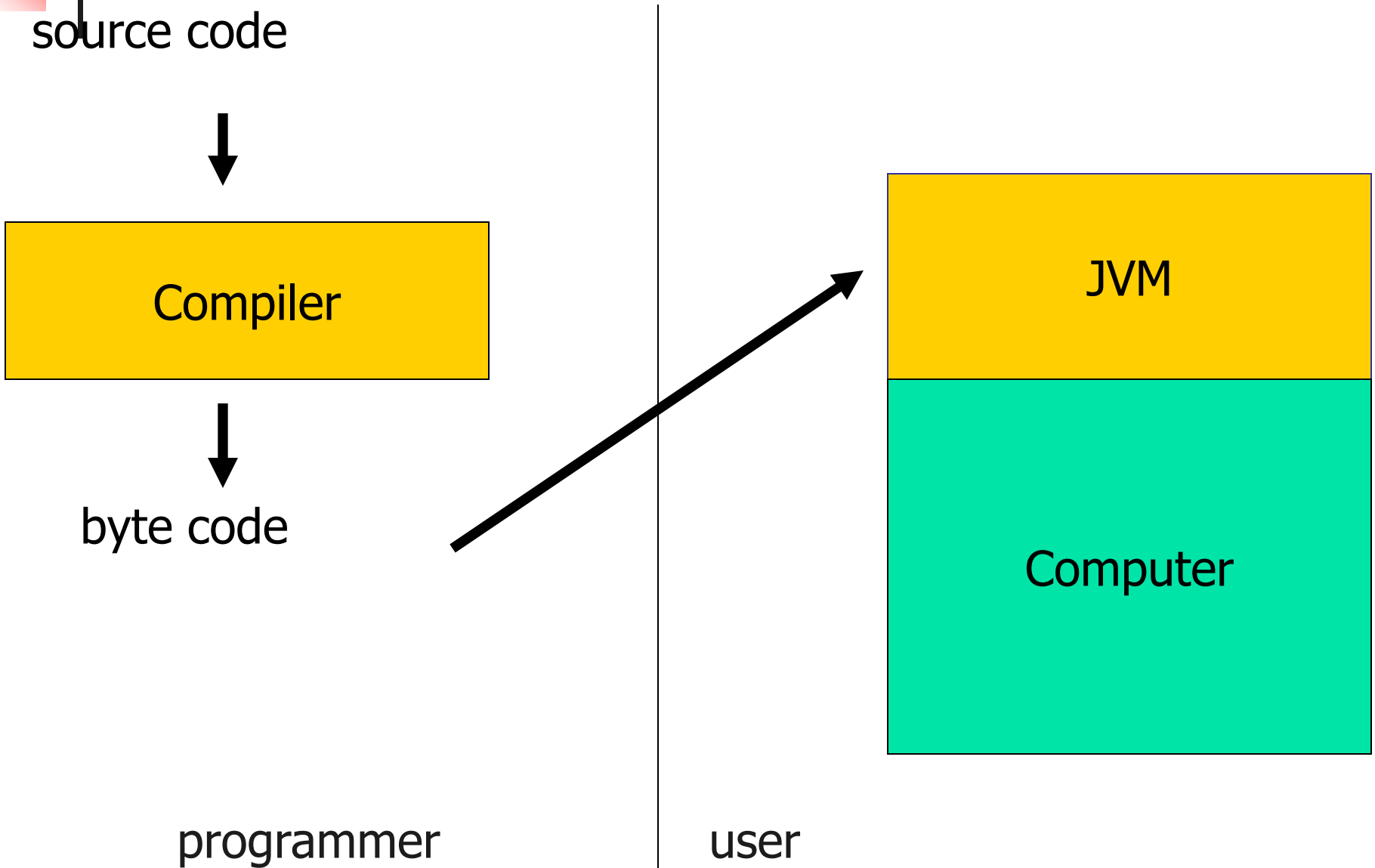
Object oriented language

more ideas borrowed from the real world:

encapsulation – you do not need to know how the ATM works inside.

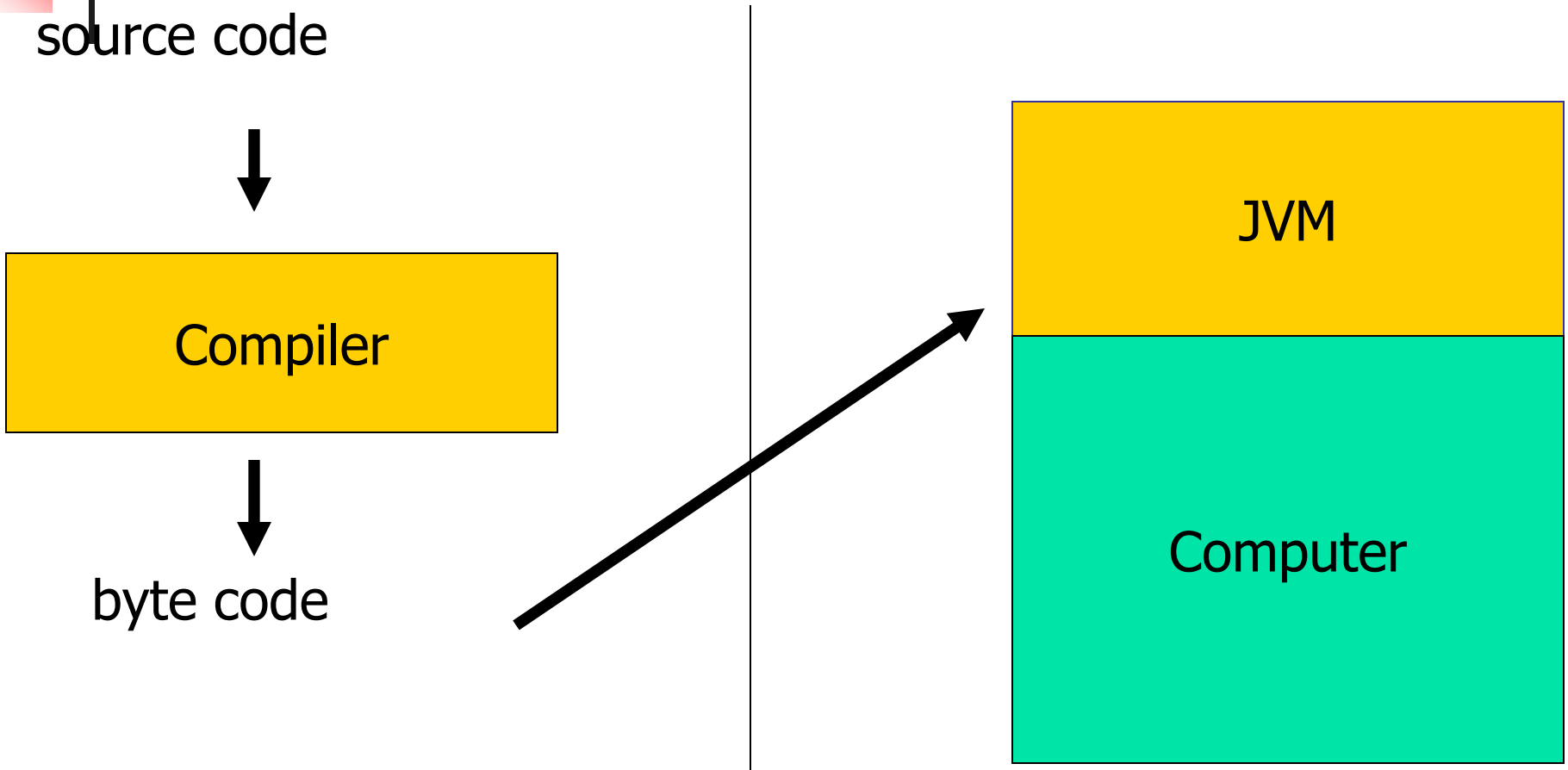
inheritance – you can easily create class ATMWithClocks extending class ATM. The new class inherits the methods of the ATM class.

Java Architecture



Java Architecure

portability
security



Why Java?

- simple
- portable
- secure
- free

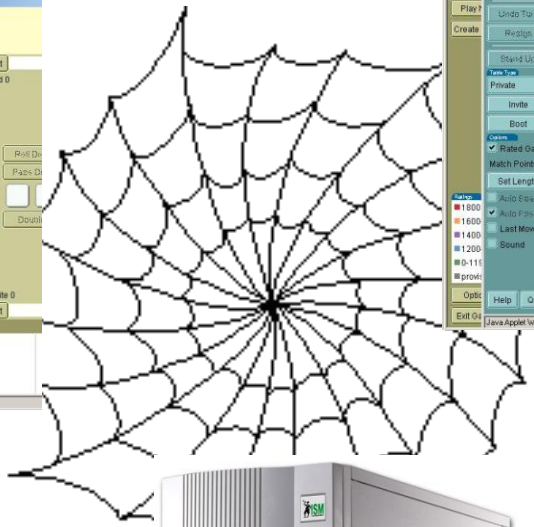
- slow

So What's Java Good For?

Web applications!

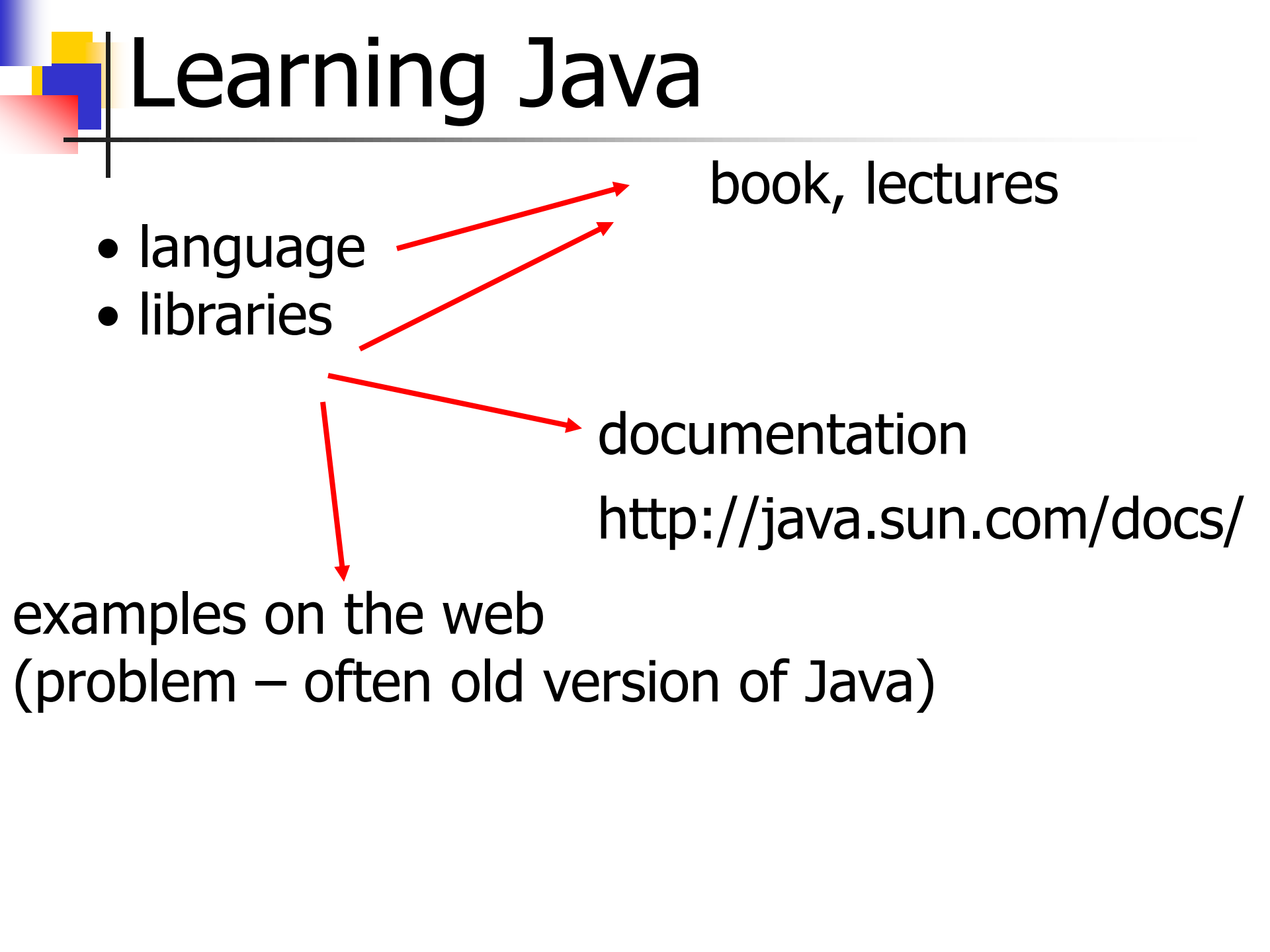
Java Applet

Java Applet



Server

Learning Java



How are Java Applications written?

- HelloWorld.java:

```
public class HelloWorld {
  public static void main (String[] args)
  {
      System.out.println("Hello, World");
  }
}
```

- Compile HelloWorld.java

```
javac HelloWorld.java
```

Output: HelloWorld.class

- Run

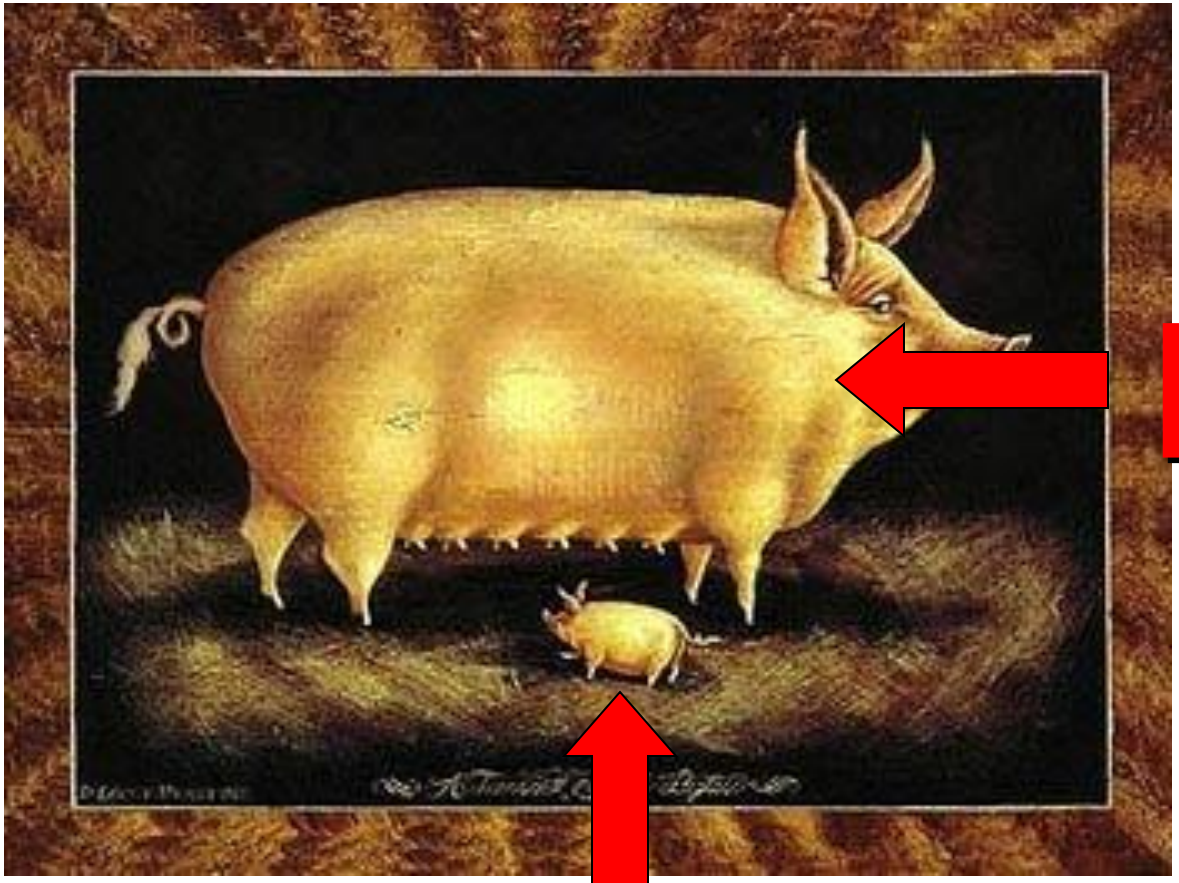
```
java HelloWorld
```

Output: Hello, World

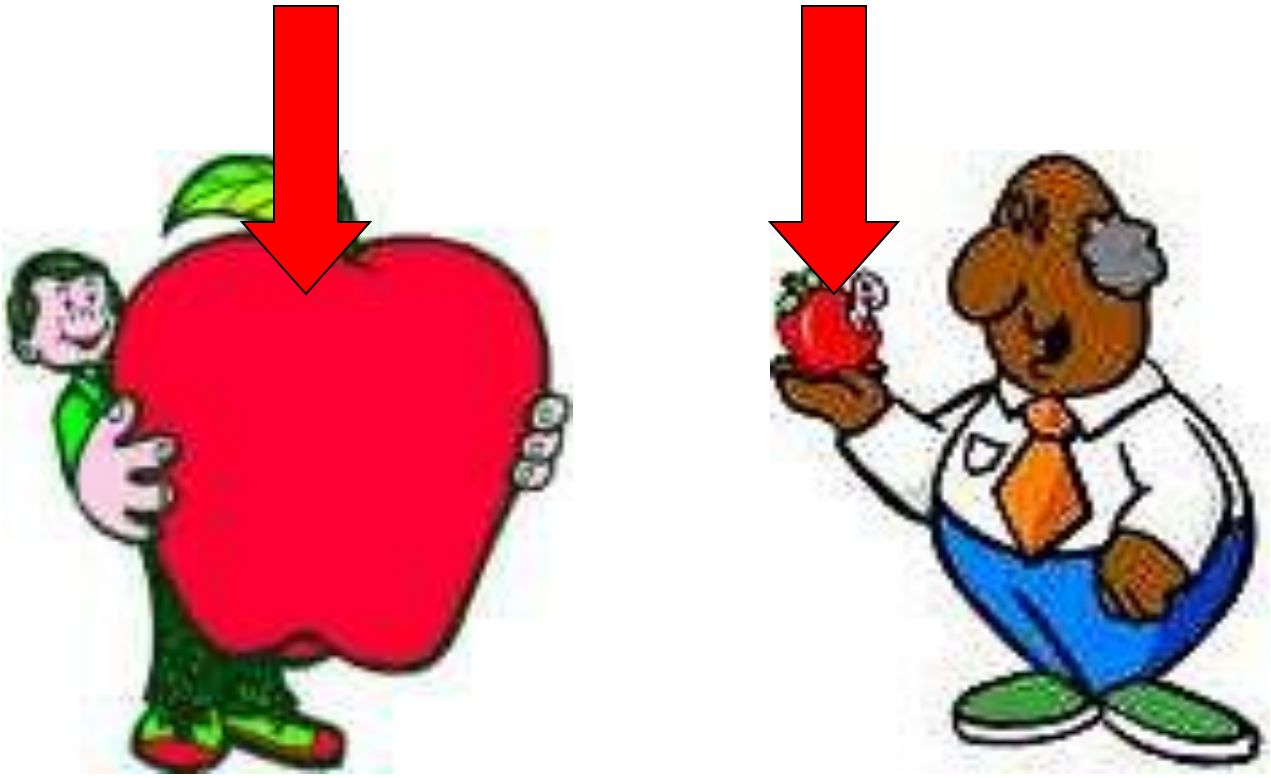
Building JAVA Application

- Prepare the file `HelloWorld.java` using an editor
- Invoke the compiler:
  - `javac HelloWorld.java`
- This creates `HelloWorld.class`
- Run the java interpreter:
  - `java HelloWorld`

What is an applet?


PIG
PIGLET

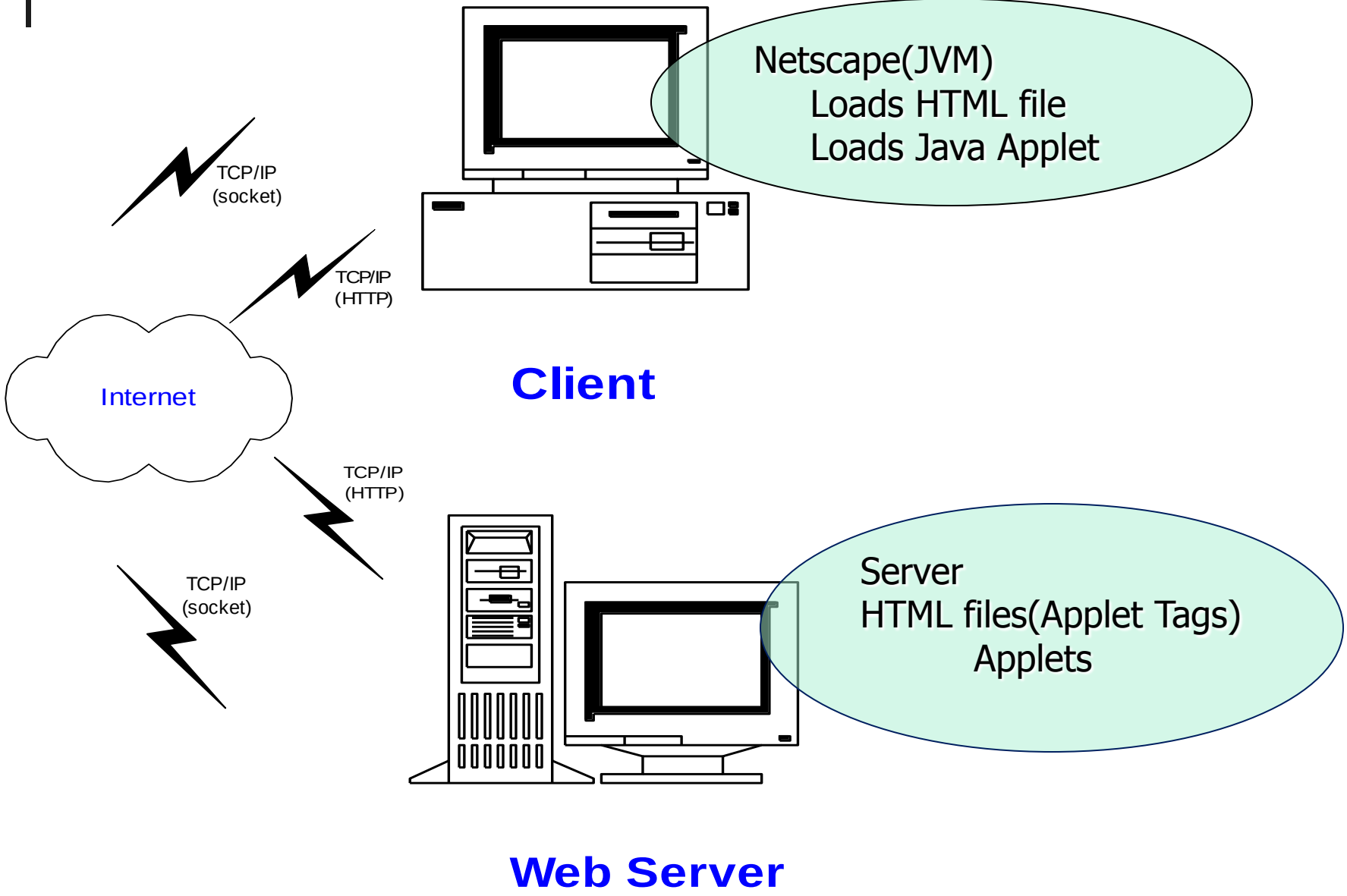
APPLE APPLET



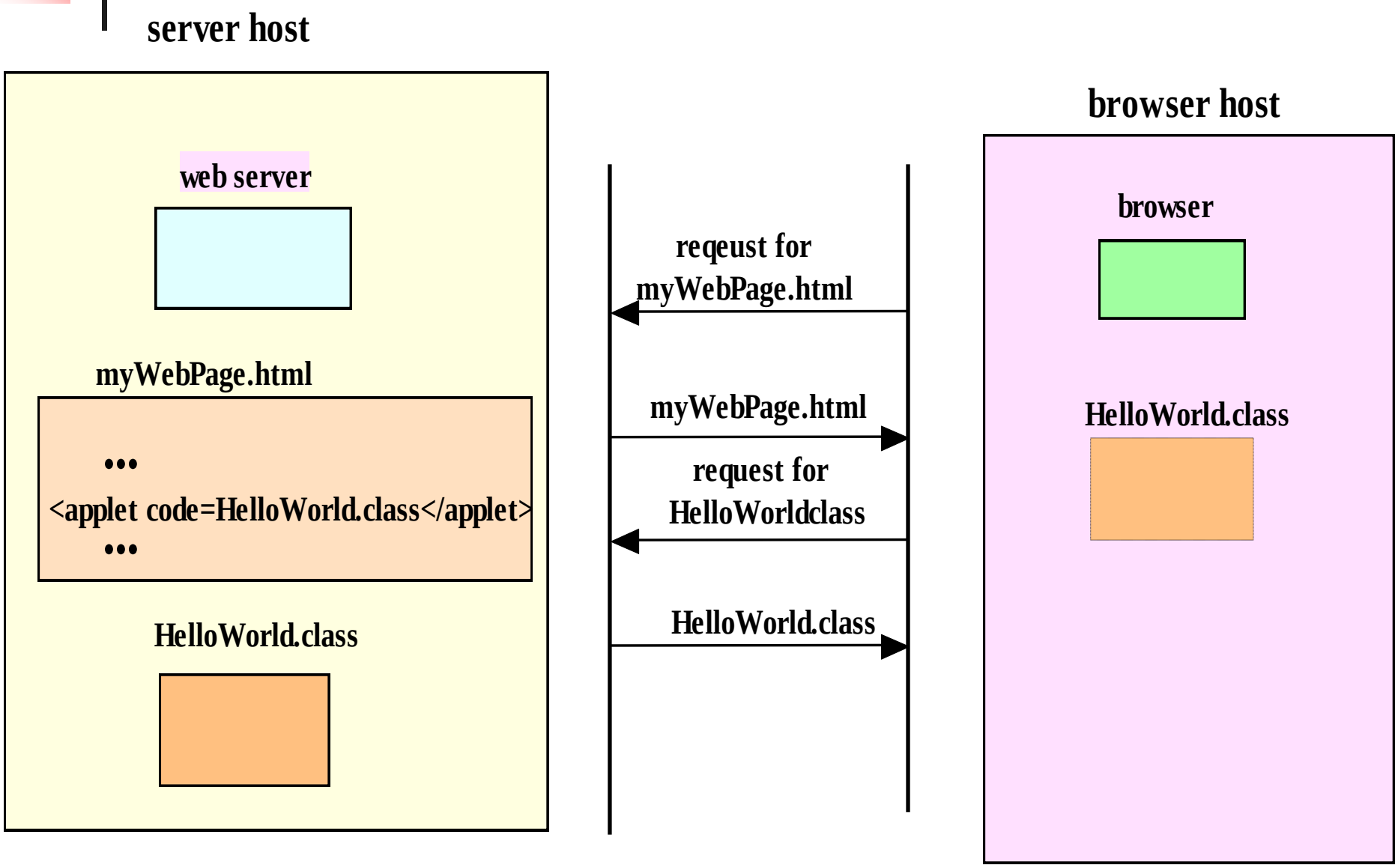
What is an applet?

- An applet is a small Java program that is embedded and ran in some other Java interpreter program such as
  - a Java technology-enabled browser
  - Sun’s applet viewer program called appletviewer

Applet


Netscape(JVM)
Loads HTML file
Loads Java Applet
TCP/IP
(socket)
TCP/IP
(HTTP)
Internet
Client
TCP/IP
(HTTP)
TCP/IP
(socket)
Server
HTML files(Applet Tags)
Applets
Web Server

Applets, web page, client, server



Applet Execution - 1

- An applet program is a written as a inheritance of the java.Applet class
- There is no main() method in an Applet.
-
- An applet uses AWT for graphics

Applet Execution - 2

- **Life Cycle of an Applet:**
  - **init: This method is intended for whatever initialization is needed for an applet.**
  - **start: This method is automatically called after init method. It is also called whenever user returns to the page containing the applet after visiting other pages.**
  - **stop: This method is automatically called whenever the user moves away from the page containing applets. This method can be used to stop an animation.**
  - **destroy: This method is only called when the browser shuts down normally.**

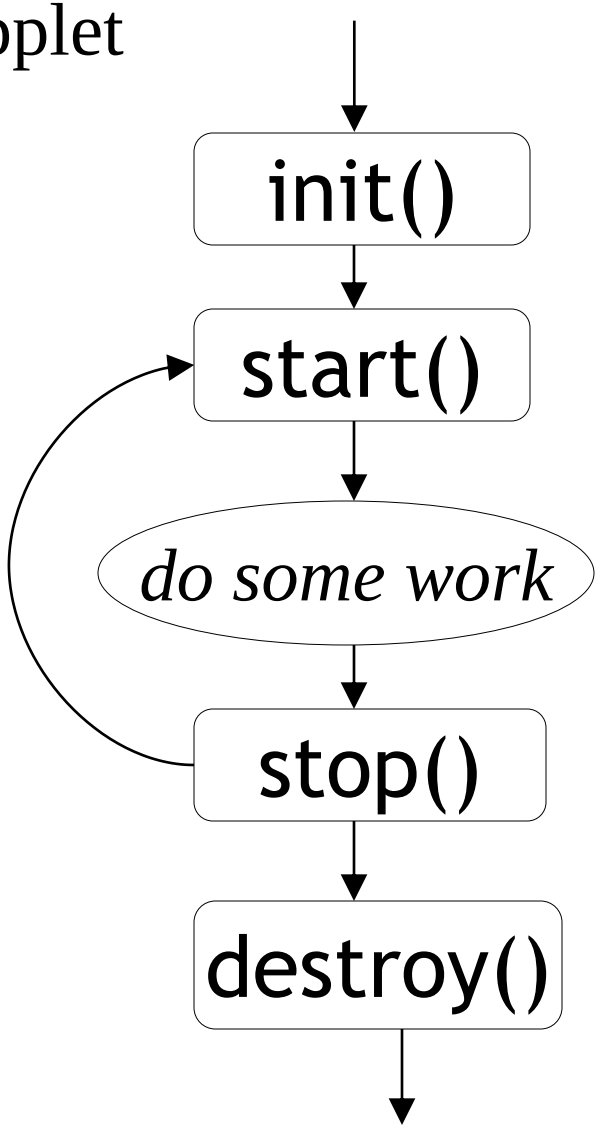
  - Ref: http://java.sun.com/docs/books/tutorial/deployment/applet/index.html/

Applet Execution - 3

- The applet is running and rendered on the web page.
- Every Applet needs to implement one or more of the init(), the start( ) and the paint( ) methods.
- At the end of the execution, the stop( ) method is invoked, followed by the destroy( ) method to deallocate the applet's resources.

Applet life cycle

- browser visits page containing an applet
  - browser calls init on that applet, once
  - browser calls start on that applet
- browser goes away from that page
  - browser calls stop on that applet
- browser comes back to that page
  - browser calls start again on that applet
- browser shuts down
  - browser calls destroy on the applet, once



HTML tags for applets - 1

```
<APPLET
  // the beginning of the HTML applet code
   CODE="demoxx.class"
   // the actual name of the applet (usually a 'class' file)
   CODEBASE="demos/"
   // the location of the applet (relative as here, or a full URL)
    NAME="SWE622"
    // the name of the instance of the applet on this page
    WIDTH="100"
    // the physical width of the applet on the page
    HEIGHT="50"
    // the physical height of the applet on the page
    ALIGN="Top"
    // align the applet within its page space (top, bottom, center)
```

HTML tags for applets - 2

```
<APPLET CODE="test.class" CODEBASE="example/"
                    WIDTH=460 HEIGHT=160
                    NAME="buddy" >
<PARAM NAME="imageSource" VALUE="images/Beans">
<PARAM NAME="backgroundColor" VALUE="0xc0c0c0">
<PARAM NAME="endImage" VALUE=10>
</APPLET>
```

Applet's Attributes

Attribute	Explanation	Example
Code	Name of class file	Code="applet0.class"
Width	Width of applet	Width=300
height	Height of applet	Height=60
Codebase	Applet's Directory	Codebase="/applets"
alt	Alternate text if applet not available	Alt="menu applet"
name	Name of the applet	Name="appletExam"
Align(top,left,right,bottom)	Justify the applet with text	Align="right"

HTML

```
<html>
  <head>
    <title> Hello World Applet </title>
  </head>

  <body>
    <applet code="HelloWorld.class”
      width=300 height=200>


    </applet>
  </body>
</html>
```

Your Turn!

- You first applet
- “Hello World”

History of an Applet

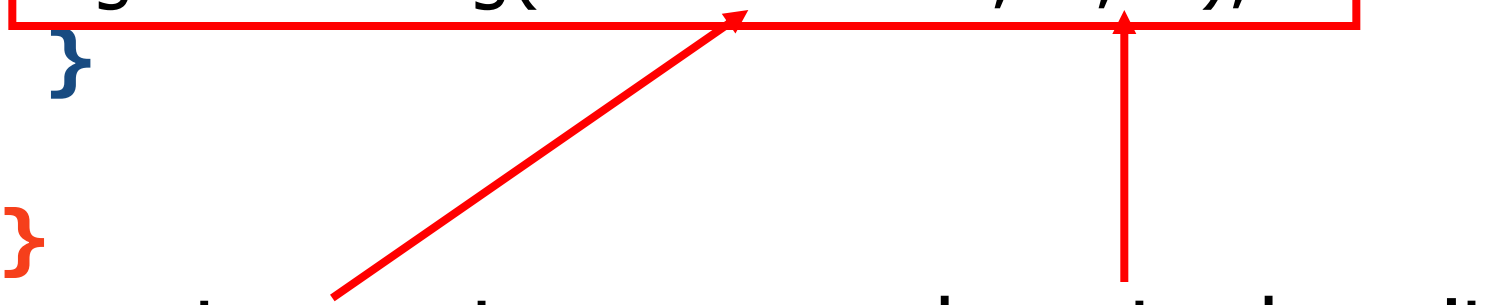
- Edit java source code & html
  - notepad Hello.java
  - notepad Hello.html
- Compile source to ByteCodes
  - javac Hello.java
  - produces Hello.class
- View applet (Java Virtual Machine)
  - appletviewer Hello.html
  - browser Hello.html

```
<html>
<body>

<applet code="Hello.class"
        width=300 height=300>
</applet>

</body>
</html>
```

```
<html>
<body>

<applet code="Hello.class"
        width=300 height=300>
</applet>

</body>
</html>
```

Save as Hello.html

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

public class Hello extends Applet {
  public void init() {
    repaint();
  }
  public void paint(Graphics g) {
    g.drawString("Hello World!",30,30);
  }

}
```



Save as Hello.java

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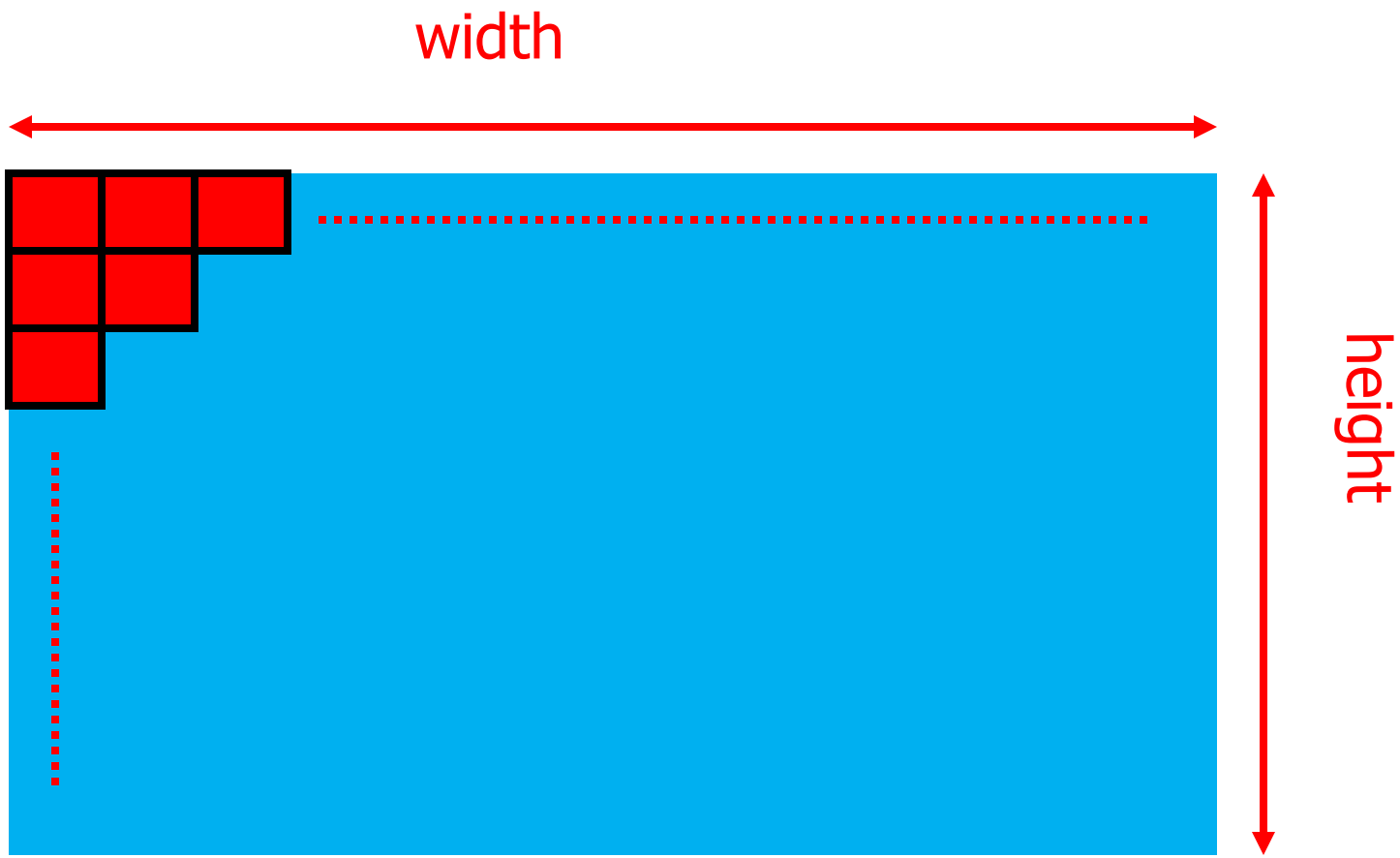
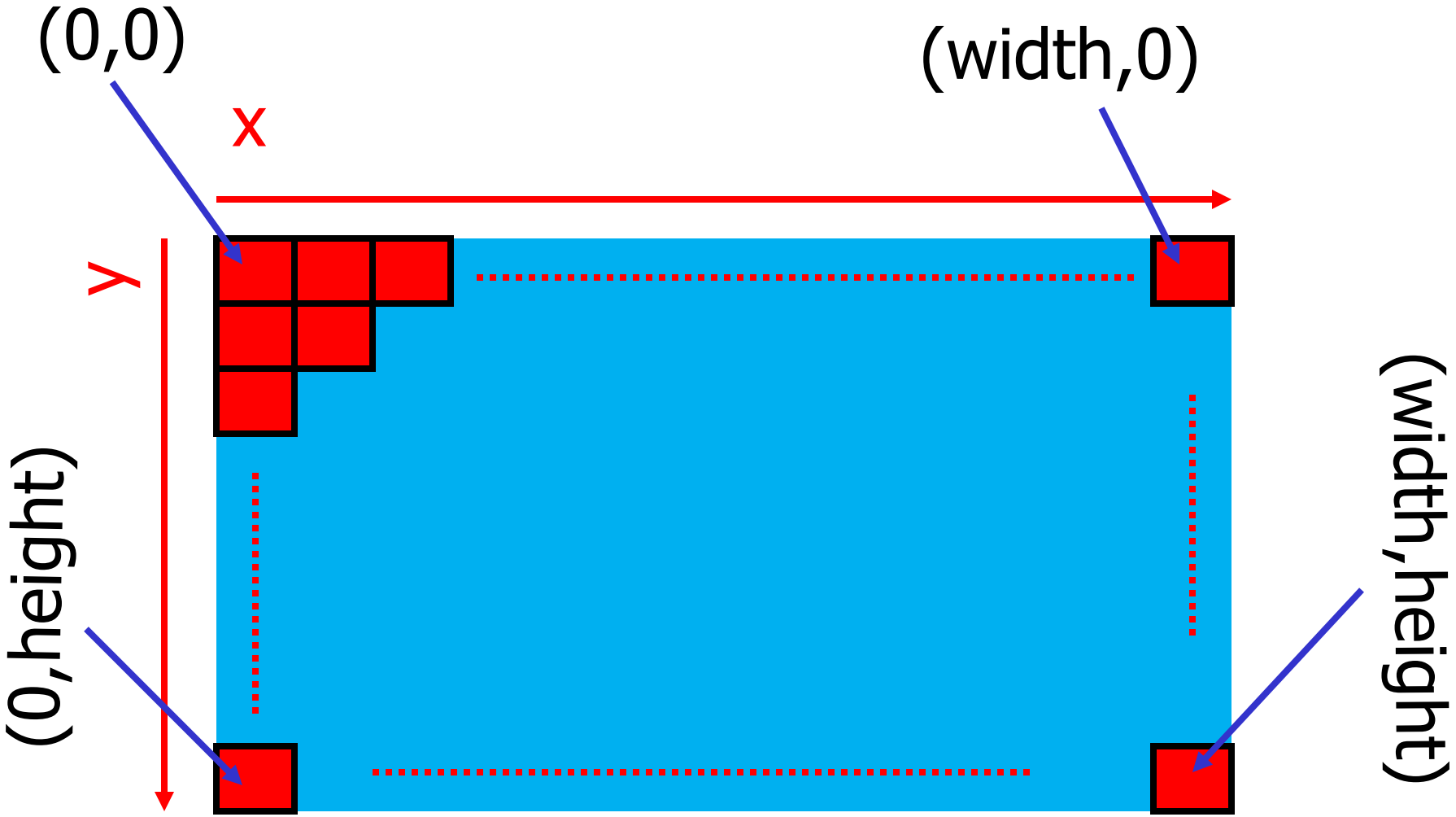
The coordinate system

The applet is drawn in a rectangle, which consists of pixels.



The coordinate system

Each pixel has a coordinate (x,y)



Sample Graphics methods

- A Graphics is something you can paint on

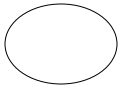
g.drawString("Hello", 20, 20);

Hello

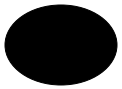
g.drawRect(x, y, width, height);

g.fillRect(x, y, width, height);

g.drawOval(x, y, width, height);



g.fillOval(x, y, width, height);



g.setColor(Color.red);

Applet Security

For security reasons, applets that are loaded over the network have several restrictions.

- an applet **cannot** ordinarily **read** or **write** files on the computer that it's executing on.
- an applet **cannot** **make** network connections except to the **host** that it came from.

- Ref: http://java.sun.com/docs/books/tutorial/deployment/applet/index.html/

What are the disadvantages of applets?

- Applets can’t run any local executable programs
- Applets can’t with any host other than the originating server
- Applets can’t read/write to local computer’s file system

What are the disadvantages of applets? (Cont'd)

- Applets can't find any information about the local computer
- All java-created pop-up windows carry a warning message
- Stability depends on stability of the client's web server
- Performance directly depend on client's machine

What are the advantages of applets?

- Automatically integrated with HTML; hence, resolved virtually all installation issues.
- Can be accessed from various platforms and various java-enabled web browsers.
- Can provide dynamic, graphics capabilities and visualizations
- Implemented in Java, an easy-to-learn OO programming language

What are the advantages of applets? (Cont'd)

- Alternative to HTML GUI design
- Safe! Because of the security built into the core Java language and the applet structure, you don't have to worry about bad code causing damage to someone's system
- Can be launched as a standalone web application independent of the host web server

Summary

- An **applet** is a Java class
- Its code is **downloaded** from a web server
- It is invoked by a browser when it scans a web page and encounters a class specified with the ***APPLET*** tag
- For security reason, the execution of an applet is normally subject to restrictions:
  - applets cannot access files in the file system on the client host
  - Applets cannot make network connection exception to the server host from which it originated

Resources

- http://java.sun.com/
  - Java[tm] 2 Platform, Standard Edition v1.6.1
    - java, javac, jar, jre, etc.
    - Any platform... FREE!
  - Online documentation and tutorials
- http://www.eclipse.org/
  - Integrated development environment (IDE) for nothing in particular
  - Java[tm] development tools (JDT) (comes with Eclips)
    - Project management
    - Editor
    - Incremental compiler
    - CVS support
  - C/C++ extension in progress
  - AspectJ support
  - Windows, Linux, and Mac.... FREE!