

15. Internet, WorldWideWeb, HTML & Java

15.1 Topics

- JavaDoc : Automatic generation of documentation in HTML
- JEditorPane – web browser component
- HTML can be interpreted by Swing components
- Applets
- Support for network communication by TCP/IP and UDP/IP

15.2 Javadoc

3 types of comments

// Comment

/*

Comment

***/**

/**

Comment

***/**

Tags

@author (classes + interfaces)

@version (classes + interfaces)

@param (methods + constructors)

@return (methods)

@exception (@throws synonym)

@see

@since

@serial (@serialfield, @serialdata)

@deprecated

15.3 Javadoc Example

```
/**  
* <p> Initial HTML comments, </p>  
* <p> author, copyright, etc ... </p>  
*/  
public class Math{  
/** Method square returns square of an integer  
@param x an integer  
@return an integer which is the input squared  
*/  
    public int square(int x){ return x * x ; }  
}
```

*This method always returns immediately, whether or not the
* image exists. When this applet attempts to draw the image o
*the screen, the data will be loaded. The graphics primitives
*that draw the image will incrementally paint on the screen.
* [@param](#) url an absolute URL giving the base location of the
*image
* [@param](#) name the location of the image, relative to the url
*argument
* [@return](#) the image at the specified URL *
* [@see](#) Image */
public Image getImage(URL url, String name) { ...

getImage

public [Image](#) **getImage**([URL](#) url, [String](#) name)

Returns an Image object that can then be painted on the screen. The url argument must specify an absolute [URL](#). The name argument is a specifier that is relative to the url argument.

This method always returns immediately, whether or not the image exists. When this applet attempts to draw the image on the screen, the data will be loaded. The graphics primitives that draw the image will incrementally paint on the screen.

Parameters:

url - an absolute URL giving the base location of the image

name - the location of the image, relative to the url argument

Returns:

the image at the specified URL

See Also:

[Image](#)

15.4 JEditorPane

- Display www-pages
- `p.setPage(http://www.nada.kth.se/~karlm);`
- To click on links
- **`p.setEditable(false);`**
- **`p.addHyperlinkListener(<HyperlinkListener>);`**

- Three kinds of hyperlink events
- **mouse onto a link, mouseclick, mouse off a link**

15.5 HyperlinkListener

```
public class WWW implements HyperlinkListener {
    public void hyperlinkUpdate(HyperlinkEvent e) {
        if(e.getEventType()==
            HyperlinkEvent.EventType.ENTERED) {
            setCursor(Cursor.
                getPredefinedCursor(Cursor.HAND_CURSOR));
        }
        else
            if(e.getEventType()==
                HyperlinkEvent.EventType.EXITED) {
                setCursor(Cursor.getDefaultCursor()); }
            else
                showPage(e.getDescription());
                // showPage is a web-browser
    }
}
```

15.6 Reading a Web Page

- Connecting to a web page

```
InputStream in=new  
URL(webpage).openConnection().getInputStream(  
);
```

```
InputStreamReader reader= new  
InputStreamReader(in);
```

- Reading HTML code symbol by symbol

```
while(reader.ready())  
System.out.println((char)reader.read());
```

Reading a Web Page (Cont.)

- Better to use Java's built-in support for managing HTML-pages!
- Use package
`javax.swing.text.html`

15.7 Swing and HTML

- Suppose we read in a www page into HTMLDocument doc:
- `new HTMLEditorKit().read(reader,doc,0);`
- Now we want to traverse document through all start tags of a particular type. First step is to make an iterator:
- `HTMLDocument.Iterator
it=doc.getIterator(HTML.Tag.B);`

Swing and HTML (Cont.)

- We have created an iterator for the start tag `` (**boldface**) which has 5 methods

it.next() one step forwards

it.isValid() false at end of file

it.getStartOffset() where text between tags starts

it.getEndOffset() where text between tags ends

it.getAttributes() tag attribute list

Swing and HTML (Cont.)

- Certain tags can have attributes, for example

```
<BODY BGCOLOR=YELLOW>
```

- And the value which attribute BGCOLOR has can be obtained by

```
it.getAttributes().
```

```
getAttribute(HTML.Attribute.BGCOLOR)
```

Swing and HTML (Cont.)

- If we know where the text between tags starts and ends we can obtain the text by `doc.getText(start, end - start);`

16. Computing Legislature

- PUL Personuppgiftslagen
- www.datainspektionen.se/lagar/pul.shtml
- Applies to all forms of information bearing media
- Databases
- E-mail
- Text
- Web pages

16.1 PUL

- All befattning med personuppgifter kräver enligt PUL *samtycke* om den inte görs i journalistisk eller konstnärlig verksamhet eller rent privat.
- För att det ska räknas som privat ska uppgifterna bara vara åtkomliga för en själv och familjen, som fotoalbum, telefonbok och dagbok

PUL (Forts.)

- Den som lägger upp sökbara personuppgifter måste anmäla detta till Datainspektionen eller till företagets eget *personuppgiftsombud*.
- Varje person har rätt att en gång om året på begäran få upplysning om allt som står om henne i företagets eller myndighetens register.

16.2 Upphovsrätten

- För att möjliggöra konstnärligt skapande har upphovsrättslagen tillkommit
- Ger ekonomisk ersättning och ensamret att bestämma över sina verk.
- Upphovsrätten uppstår automatiskt i och med verkets skapande

Upphovsrätten (Forts.)

- Man markerar ofta upphovsmannensskydd genom användande av symbolen © copyright, men detta har enligt svensk lag ingen formell betydelse för att upphovsrätt ska gälla.

16.3 Upphovsrättens omfattning

- Skönlitterär eller beskrivande framställning I skrift
- Datorprogram
- Musikaliskt eller sceniskt verk
- Filmverk
- Fotografiskt verk eller något annat alster av bildkonsten
- Alster av byggnadskonst eller brukskonst, eller verk som har kommit till uttryck på något annat sätt.

16.4 Förfoganderätt och ideell rätt

- Ekonomiska rätten – förfoganderätten
 - Framställa exemplar av verket
 - Visa det offentligt
 - Sprida det till allmänheten
 - Framföra verket offentligt
- Ideella rätten
 - Upphovsmannen skall namnges vid utnyttanden av verket
 - Verket inte får ändras på ett för upphovsmannen kränkande vis

Upphovsrätten (Forts.)

- Skyddstiden är 70 år
- Upphovsrätten till något kan ärvas
- Det är tillåtet att ta esntaka kopior av ett verk för enskilt bruk
- Ett undantag från denna regel är kopior av datorprogram
- 1720 i England kom den första upphovsrättslagen för att skydda boktryckarna

17. Advanced Java

- Component: *code that can be used without any changes* (Braude)
- Need to be able to add things to legacy code
- Programs must collaborate
- In O-O terminology these are inheritance and interfaces
- In Java: **extends** and **implements**

17.1 Self-descriptive Objects

- More or less standard for hardware, e.g. USB
- For data it's worse, many standards
- XML is an attempt at a standard way to store information
- Trend is for more self description

17.2 Interface Serializable

- Allows one to save entire objects to file or send them to another computer
- A class can implement `writeObject()` and `readObject()` if better efficiency is needed

```
class Car implements Serializable {  
    String color;  
    public void setColor(String str) {  
        color = str;  
    }  
    Public void print() {  
        System.out.println("Color =" + color); }  
    }  
}
```

```
Import java.io.*;
```

```
Public class Ser {
```

```
Public static void main(String[ ] args) {
```

```
Ser s=new Ser();
```

```
s.create();
```

```
s.retrieve();
```

```
}
```

```
Public void create() {  
    Car c=newCar();  
    c.setColor("Red");  
    try {  
        FileOutputStream fos=new  
            FileOutputStream("car_a.tmp");  
        ObjectOutputStream oos=new  
            ObjectOutputStream(fos);  
        oos.writeObject( c );  
        oos.close();  
        System.out.println("Stored one car-object to  
            file");  
    }  
    catch (IOException e) { System.err.println("Failed to  
        write object to disk"); }  
}
```

```
Public void retrieve() {  
    Car c=null;  
    try{  
        FileInputStream fis=new  
            FileInputStream("car_a.tmp");  
        ObjectInputStream ois=new  
            ObjectInputStream(fis);  
        c=(Car)ois.readObject();  
        ois.close();  
        System.out.println("Retrieved one car-  
            object from file");  
    }  
}
```

```
Catch(IOException e)  
    { System.err.println("Failed to read  
        object from disk"); }  
} catch(ClassNotFoundException e)  
    {System.err.println("Failed to locate  
        object in inputstream");  
}  
if (b!=null) { b.print(); }  
}  
}}
```

17.3 JAR-archive (Java ARchive)

- Many class files can be compressed in a jar file
- ->>jar cmf MANIFEST:MF Stan *.class
- Program can then be executed via jar file
- ->>Java -jar Stan
- Applet
- <applet codeRes.class archive="Stan.jar" width=120 height=120> >/applet>
- Jar file contains a manifest
- -Main-Class: Ser

17.4 Why JAR archives?

- Safety – contents can be “signed”. Users who trust you can give your program greater access to hardware.
- `-jarsigner jar-file alias`
- Faster downloads
- Version management
- Portability.

17.5 Socket Communication

- Two or more Java programs can cooperate via TCP/IP communication
- Java programs can run on different machines
- A computation can be divided among several processors, or assigned to the machine with the right facilities.
- E.g. a neural network with 1 million neurones and 1 billion connections has been executed as 64 coupled Java programs.

17.6 RMI – Remote Method Invocation

- A transparent way to call methods from other machines
- Important aspect is security, which is usually better than if one had implemented communication directly with sockets
- Efficient, whole objects need not be sent.

RMI (Cont.)

- Client-server
- Server has object which contains calleable methods
- Client downloads a stub file for each server object (compiled with **rmiC**)
- Stub file is a proxy for the server object. Clients calls to server go via stub-object.

RMI (Cont.)

Client

- Write classes which import **Java.rmi.***; and contain network address to RMI-server
- Start client program

Server

- Write classes which import **java.rmi.***; and implement interface **Remote**
- Compile program and generate stubs
- Make files available on network
- Start RMI-server with **rmiregistry** which listens to calls from clients on port **1099**

17.7 CORBA

- Common Object Request Broker Architecture
- CORBA makes it possible for programs on different machines in different languages to cooperate
- Components are independent of their development platform through CORBA
- Client-server architecture
- Client object calls server object via a stub
- Stub translates call to a metalanguage

CORBA (Cont.)

- Call from server to client goes via an ORB (Object Request Broker)
- ORBs can communicate using IIOP (Internet Inter-ORB Protocol)
- An ORB looks up the right server object and lets the stub make a call in the right language
- Return data go back the same path
- Stub on the server side is called a skeleton.

CORBA Stubs

- Available methods on a server object are described using IDL (Interface Definition Language)
- IDL compiler creates stubs from an IDL file
- Java (version 1.3 or later)
 - >>idlj -fall psyk.idl

Psyke.idl

```
Module psyk {  
  Interface PsykClient {  
    Void msg(in string name, in string s);  
    String getName();  
  }  
  Interface PsykMonitor {  
    Void addClient(in string name);  
    Void removeClient(in string name);  
  }  
  Interface PsykServer {  
    Boolean connect(in PsykClient cl);  
    Boolean disconnect(in PsykClient cl);  
    Boolean say(in string name, in string msg); ...  
  }  
}
```

17.8 CORBA Lab Ex.

- Strangely the client class shouldn't say implements PsikClient.
- So that the portable object adapter will accept CORBA stubs we need
- Class Client extends PsikClientPOA {

17.9. CORBA Lab

- Because client object is not of type `PsykClient` and therefore can't be used as a parameter to servers connect method (which needs a `PsykClient`) there is a method `_this(orb)` which returns a `PsykClient`.
- `Client._this(orb);`
- Same is true for `PsykMonitor`