

CS2111 is no longer required for affiliation with Computer Science

Read chapter 14, pp. 385–401

How to install newest Java <http://tinyurl.com/6qgmmmy>

CS1110 30 October 2008 Testing/Debugging

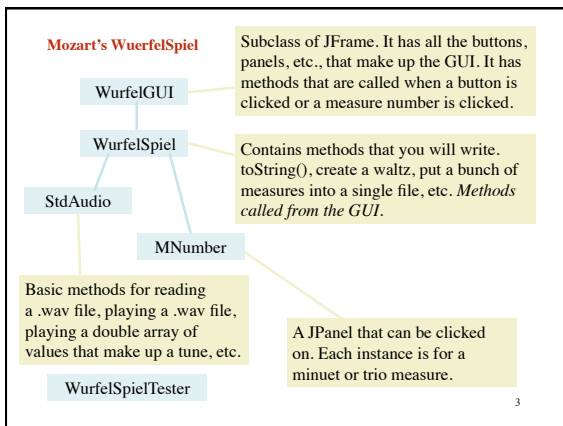
.wav file

an array of double values: `type double[]`

The file may have other things, talking about frequency or whatever. But when it is read in one gets an array of double values

Put several .wav arrays into a single one

d1	a1	v0	w0	x0	a4	v0
d2	a2	v1	w1	x1		v1
d3	a3	v2		x2		v2
						w0
						w1
						x0
						x1
						x2



```

public class WurfelGUI extends JFrame {
    JButton button1= new JButton("GO!"); // Create waltz from first row
    private String[] lastWS; // Last waltz constructed (null if none)
    private double[] lastWD; // Compression of last waltz (null if none)

    public void actionPerformed (called when a button is clicked)
    (ActionEvent e) {
        Object b= e.getSource();
        if (!(b instanceof JButton))
            { return; }
        JButton jb= (JButton) b;
        if (jb == button1)
            { create0(); return; }
        ...
    }

    public static void create0() {
        lastWS=WurfelSpiel.create0Spiel();
        System.out.println(
            "Waltz created from row 1");
        lastWaltzD= null;
    }

    public class WurfelSpiel {
        /** = array containing names of
            files in row 0 of minuet, trio */
        public static String[] create0Spiel()
            { ... }
    }
}
    
```

Connecting a GUI button to a method in WurfelSpiel

Listening to a GUI

```

/** Process a click on of the buttons button1--button 6.*/
public void actionPerformed(ActionEvent e) {
    Object ob= e.getSource();
    if (ob == button1) {
        { create0(); return; }
    }
    if (ob == button2)
        {createRandom(); return; }
    if (ob == button3)
        {compress(); return; }
    if (ob == button4)
        {printLastWaltz(); return; }
    if (ob == button5)
        {playLastWaltz(); return; }
    if (ob == button6)
        {saveLastWaltz(); return; }
}
    
```

Two-dimensional arrays

```

    0 1 2 3  b.length
    b 5 4 7 3  one-dimensional array

    0 1 2 3
    d 0 5 4 7 3  rectangular array: 5 rows and 4 columns
      1 4 8 9 7
      2 5 1 2 3
    
```

Type of d is `int[][]` ("int array array", "an array of int arrays")

To declare variable d: `int d[][];` (number of rows)

To create a new array and assign it to d: `d= new int[3][4];`

To reference element at row r column c: `d[r][c]` (number of cols)

Testing: Read chapter 14.

Bug: Error in a program.

Testing: Process of analyzing, running program, looking for bugs.

Test case: A set of input values, together with the expected output.

Debugging: Process of finding a bug and removing it.

Exceptions: When an error occurs, like divide by 0, or s.charAt[i] when i = -1, Java *throws an exception*. A lot — generally too much — information is provided.

7

Exceptions: When an error occurs, like divide by 0, or s.charAt[i] when i = -1, Java *throws an exception*.

```

06 /** = String s truncated .... */
07 public static String truncate5(String s) {
08     int b= 10 / 0;
09     if (s.length() <= 5)
10         return s;
11     return s.substring(0,5);
12 }
    
```

Turn on line numbering in DrJava. Preferences / Display Options

important part

ArithmeticException: / by zero
 at A4Methods.truncate5(A4Methods.java:8) call stack
 at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
 at sun.reflect.NativeMethodAccessorImpl.invoke(...java:39)
 at sun.reflect.DelegatingMethodAccessorImpl.invoke(...java:25)
 at java.lang.reflect.Method.invoke(Method.java:585)

8

Debugging a program

When an error occurs, you have to play detective and find it. That process is called **debugging**. The place where the bug is may be far removed from the place where an error is revealed.

Strategy 0: Find a simplest possible test case that exhibits the error.

Strategy 1: put print statements, suitably annotated, at judiciously chosen places in the program.

Strategy 2: Use the debugging feature of your IDE (Interactive Development Environment —yours is DrJava.

9

Debugging a program

When an error occurs, play detective and find it. Called **debugging**. The place where the bug is may be far removed from the place where an error is revealed.

```

public static HSV RGB2HSV(Color rgb) {
...
/**Figure out MAX and MIN*
double MAX= 0; double MIN= 0;
if (R>G && R>B) {MAX= R; }
if (G>B && G>R) {MAX= G; }
if (B>R && B>G) {MAX= B; }
if (R<G && R<B) {MIN= R; }
if (G<B && G<R) {MIN= G; }
if (B<R && B<G) {MIN= B; }
System.out.println("R " + R + ", G " + G +
    ", B " + B + ", MAX " + MAX);
    
```

If you just output the numbers without naming them, you will have trouble.

10

```

public static HSV RGB2HSV(Color rgb) {
...
if (R>G && R>B) {MAX= R; }
if (G>B && G>R) {MAX= G; }
if (B>R && B>G) {MAX= B; }
if (R<G && R<B) {MIN= R; }
if (G<B && G<R) {MIN= G; }
if (B<R && B<G) {MIN= B; }
System.out.println("R " + R + ", G " + G +
    ", B " + B + ", MAX " + MAX);
    
```

call and output

> A4Methods.RGB2HSV(new java.awt.Color(255,255,128))
 R 1.0, G 1.0, B 0.502, MAX 0.0

Look! MAX is 0 and not 1!

if conditions should be >= , not >

11

Other debugging solving tasks

1. What's wrong with this constructor in A5? It doesn't compile

```

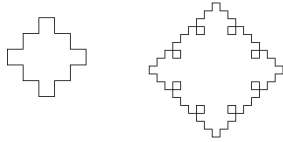
/** Constructor: a new turtle that has a ball drawn at the turtle's
position. The turtle is initially at the center of the panel,
the pen is black, the ball's radius is r, and the ball moves
with speed (vx, vy). */
public A5J(double vx, double vy, double r){
    this(getWidth(), getHeight(),r, Color.black, vx, vy);
}
    
```

Error: cannot reference this before supertype constructor has been called

12

Debugging

1. Problem with drawing square flake



2. Coloring Sierpinski triangles