



IVO WOLTRING

Ordina

Java – a journey through time



J-Fall 2021 | November 4, 2021
Pathé Ede, The Netherlands

A Journey through Time

Sounds a bit like a movie title
doesn't it?





Barbra Streisand
and Patrick Swayze
in the 1990
hit that inspired
Fast Forward

GHOST

1990

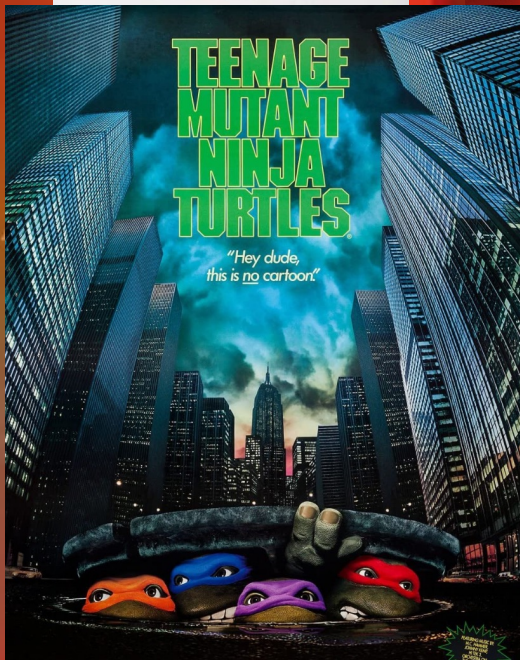


TOTAL RECALL



STEVEN SPIELBERG PRESENTS
BACK TO THE FUTURE III
PART III

@vone1



TEENAGE MUTANT NINJA TURTLES

"Hey dude,
this is no cartoon."



DIE HARD 2



BUT DON'T WORRY...
HE COOKS. HE CLEANS.
HE KICKS SOME BUTT.

FROM JOHN HUGHES
HOME ALONE
A FAMILY COMEDY WITHOUT THE FAMILY.



RICHARD GERE JULIA ROBERTS

PRETTY WOMAN

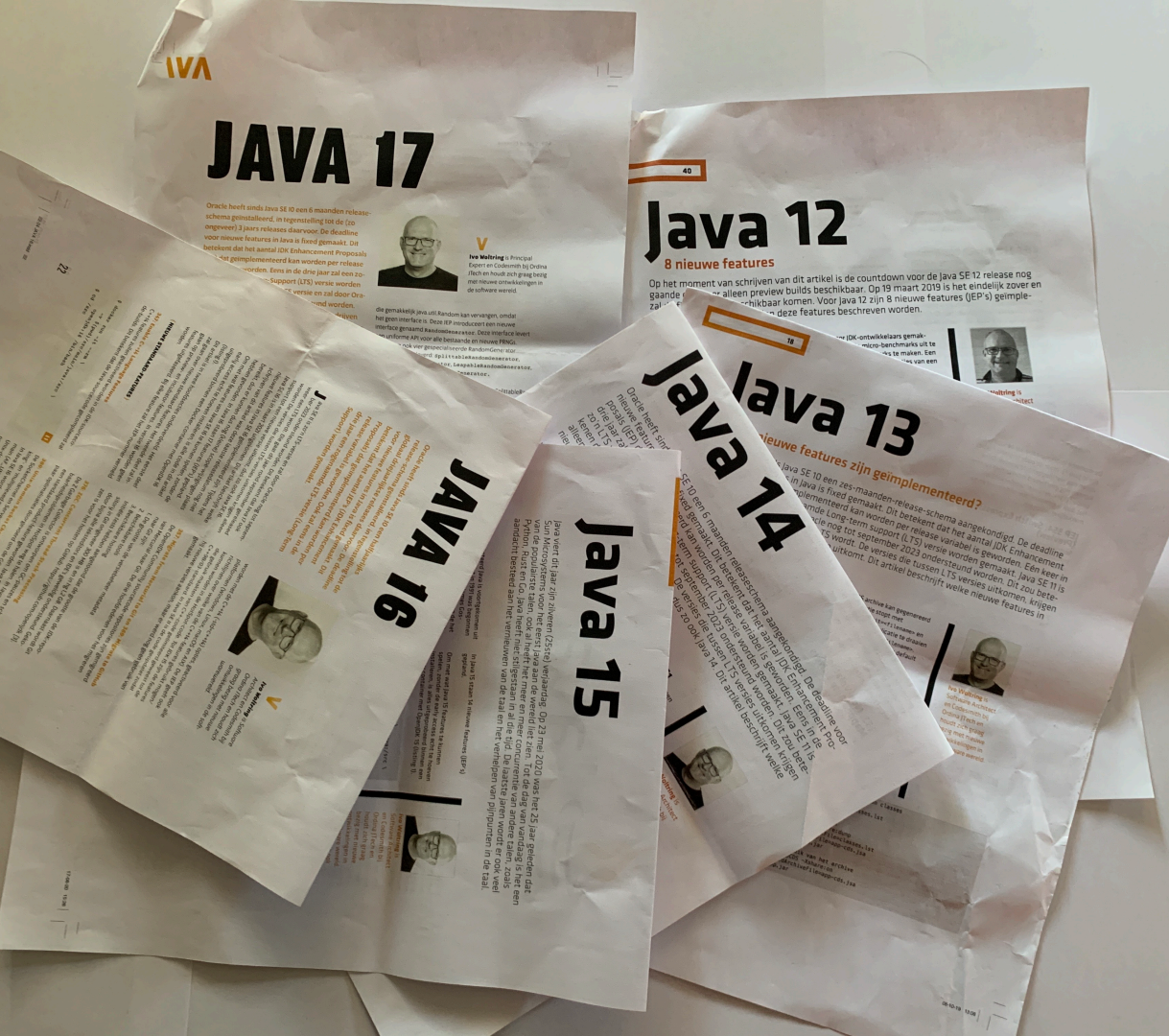
Ivo Woltring

- Principal Expert @ Ordina
- Codesmith
- Editor Java Magazine (NLJUG)
- Blogger (www.ivonet.nl)

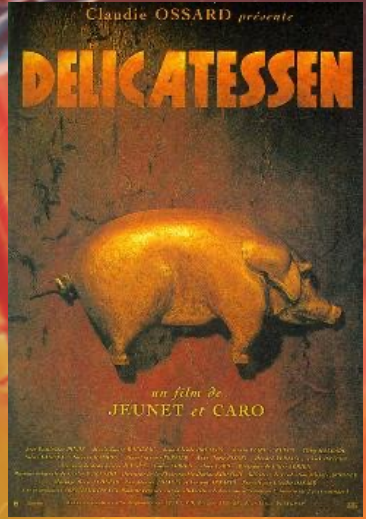


- @ivonet





JAVA JAVA
JAVA JAVA
JING JING JING



1991

STAR TREK

THE UNDISCOVERED COUNTRY

COMPOSED AND CONDUCTED BY CLIFF EIDELMAN



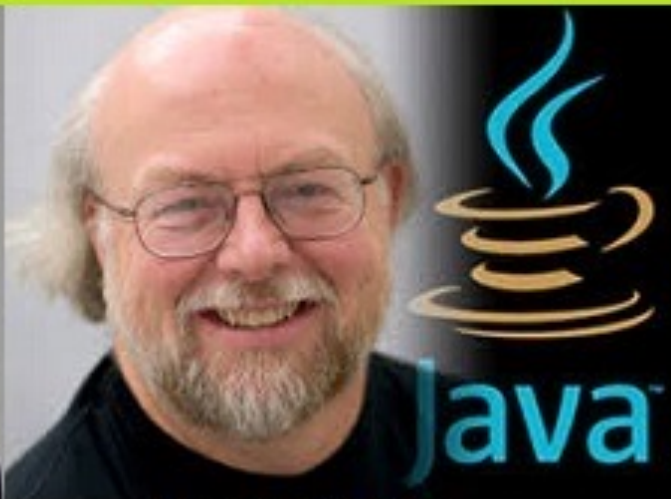
Green Team



Patrick Naughton



Mike Sheridan

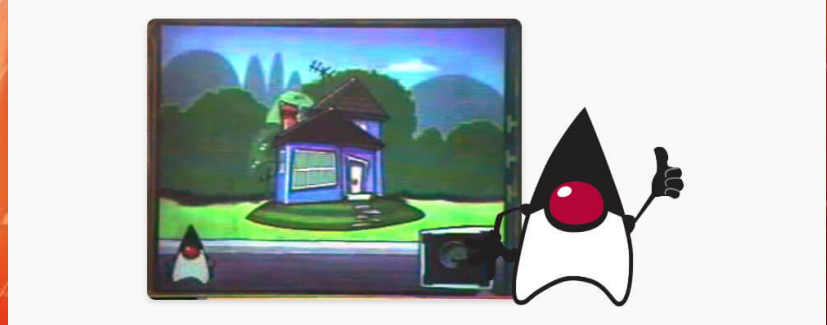


James Gosling



TV's in 1991





Star 7



The journey really begins



1996 - 2003



2003 - NOW

Gentle reminder: Selfie!



Question



What was the first name of the language later called Java?

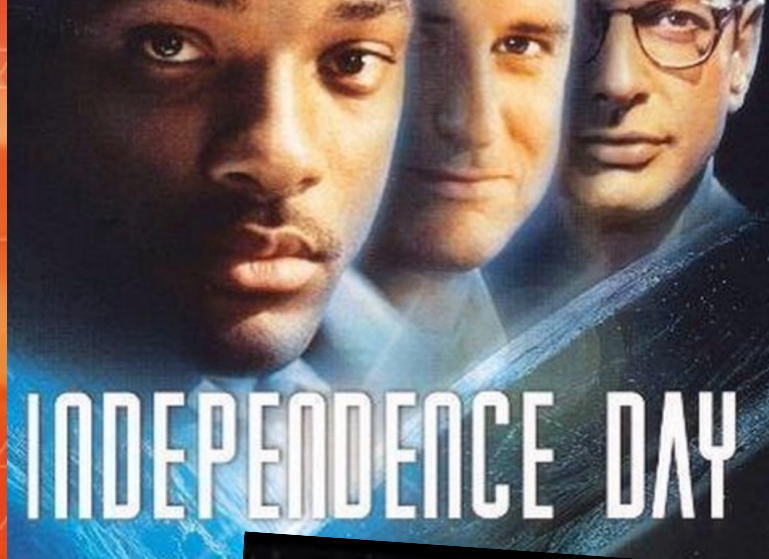
Greentalk

Oak

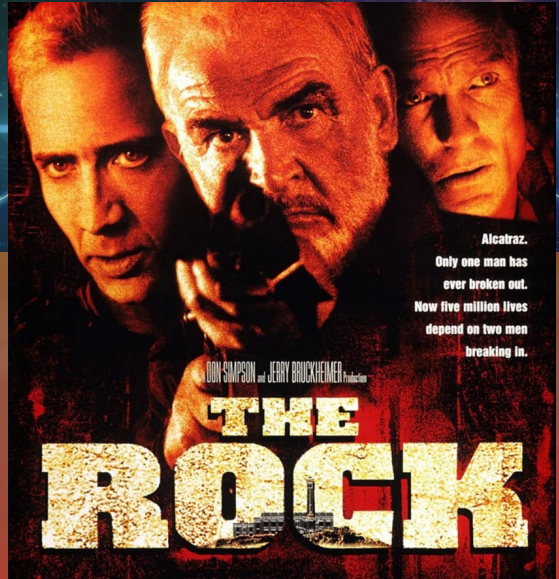
Answer

Greentalk

*.gt



 @ivonet



1996



1996



Java Development Kit 1.0 is released.



1996 - 2004



1.1 – 1.4

J2SE 1.1

Inner / Nested Classes

```
public class InnerClassDemo {
    public static void main(String[] args) {
        OuterClass myOuter = new OuterClass();
        OuterClass.InnerClass myInner = myOuter.new InnerClass();
        System.out.println(myInner.y + myOuter.x);
    }
}

class OuterClass {
    int x = 10;
    class InnerClass {
        int y = 5;
    }
}
```

1.1 – 1.4

J2SE 1.1

JavaBeans

```
class Person {  
  
    private String name;  
    private Address address;  
  
    public String getName() {  
        return name;  
    }  
  
    public void setName(final String name) {  
        this.name = name;  
    }  
  
    public Address getAddress() {  
        return address;  
    }  
  
    public void setAddress(final Address address) {  
        this.address = address;  
    }  
}
```

1.1 – 1.4

J2SE 1.1

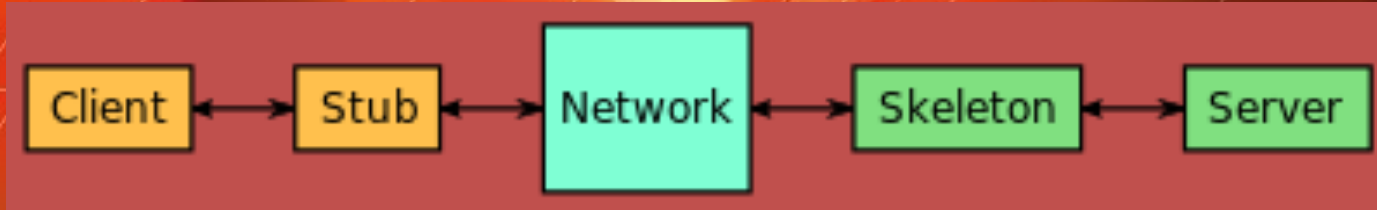
JDBC

```
Connection conn = DriverManager.getConnection(
    "jdbc:somejdbcvndor:other data needed by some jdbc vendor",
    "myLogin",
    "myPassword");
try {
    /* you use the connection here */
} finally {
    //It's important to close the connection when you are done with it
    try {
        conn.close();
    } catch (Throwable e) { /* Propagate the original exception
                             instead of this one that you want just logged */
        logger.warn("Could not close JDBC Connection",e);
    }
}
```

1.1 – 1.4

J2SE 1.1

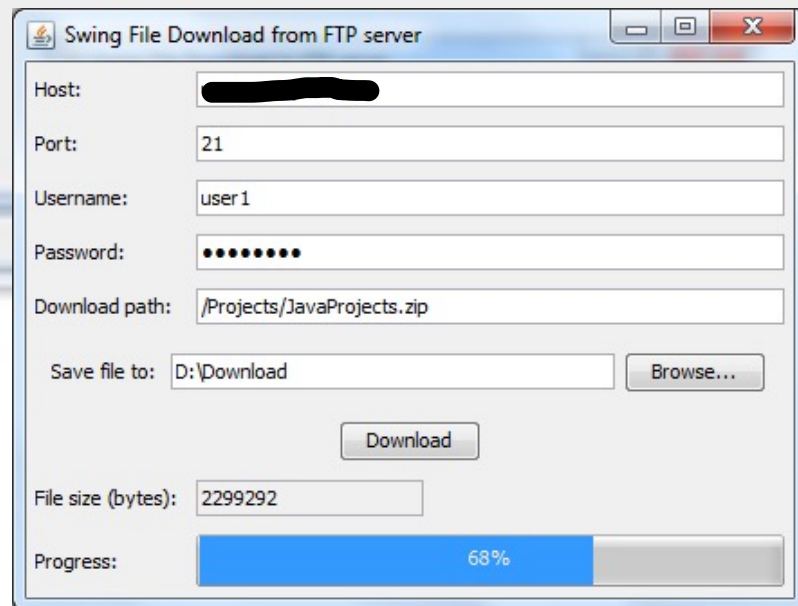
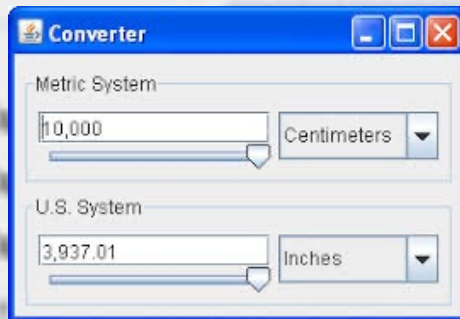
RMI



1.1 - 1.4

J2SE 1.2

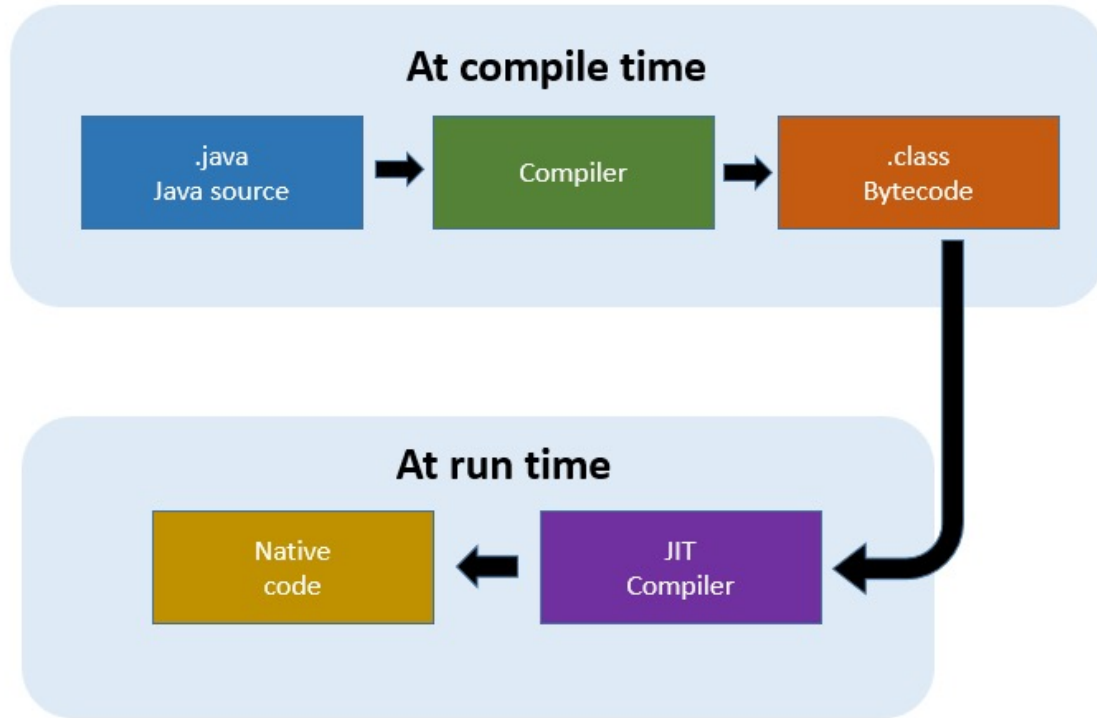
Swing



1.1 – 1.4

J2SE 1.2

JIT Compiler



1.0 – 1.4

J2SE 1.2

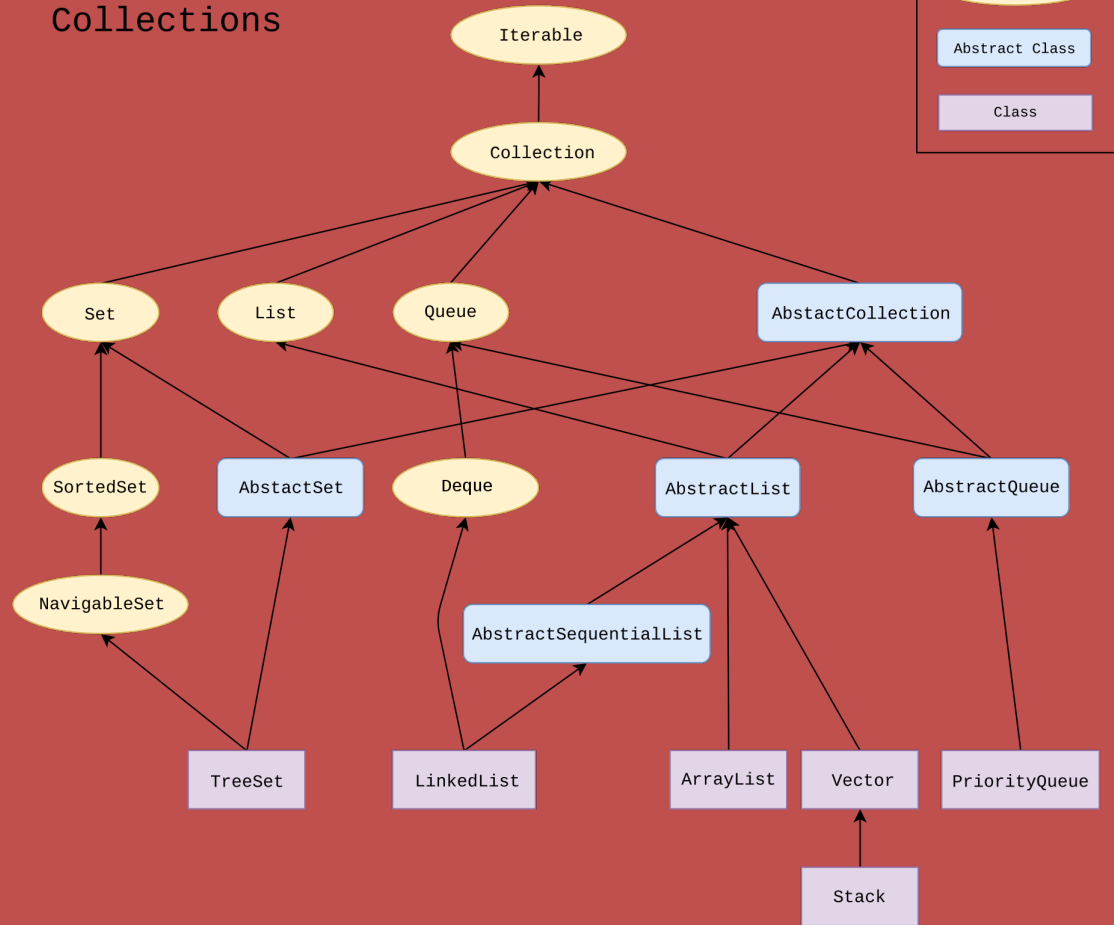
Collections Framework

Joshua Bloch



@ivonet

Collections



1.0 – 1.4

J2SE 1.3

Hotspot VM

```
java -XX:+UnlockDiagnosticVMOptions \  
-XX:+PrintFlagsFinal | egrep \  
-i "compile|tier|cache|inline"
```

1.0 – 1.4

J2SE 1.4

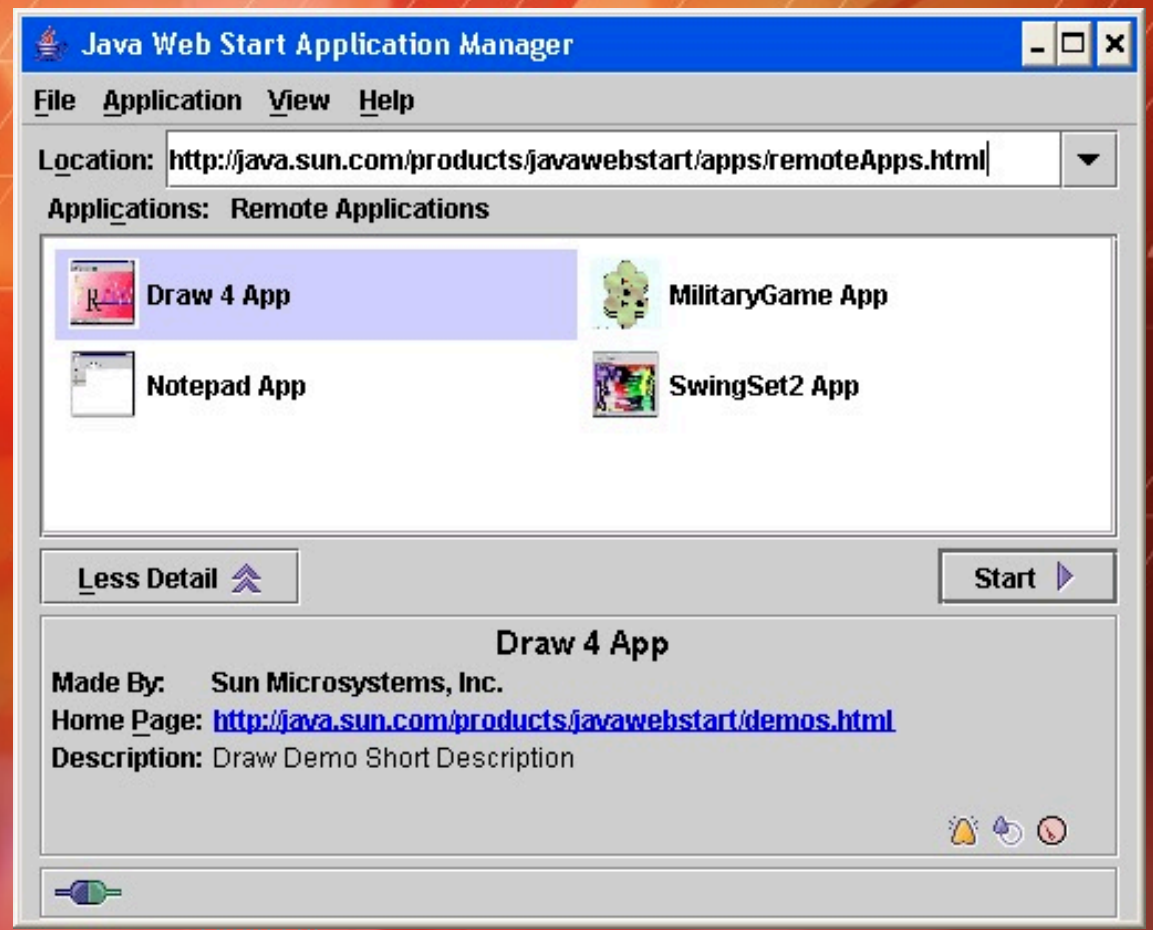
Regex like Perl

```
// Split URL into protocol, domain, port and URI  
Pattern pattern = Pattern.compile("(https?://)([^:/]*)?(:\\d*)?(.*)?");  
Matcher matcher = pattern.matcher("https://www.ivonet.nl/about");  
  
matcher.find();  
  
System.out.println("protocol = " + matcher.group(1));  
System.out.println("domain = " + matcher.group(2));  
System.out.println("port = " + matcher.group(3));  
System.out.println("uri = " + matcher.group(4));
```

1.0 – 1.4

J2SE 1.4

Java Web Start



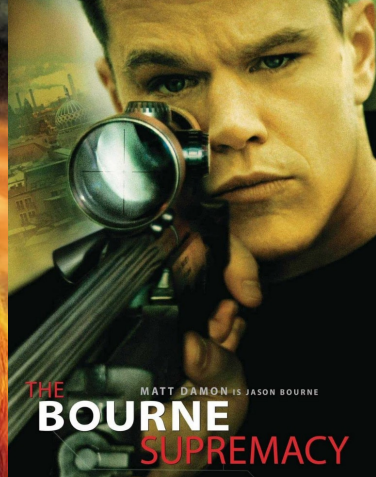
The screenshot shows the Java Web Start Application Manager window. The title bar reads "Java Web Start Application Manager". The menu bar includes "File", "Application", "View", and "Help". The "Location" field contains the URL "http://java.sun.com/products/javawebstart/apps/remoteApps.html". Below this, it says "Applications: Remote Applications". A list of applications is displayed in a grid:

- Draw 4 App (highlighted)
- MilitaryGame App
- Notepad App
- SwingSet2 App

At the bottom of the application list, there is a "Less Detail" button with an upward arrow and a "Start" button with a rightward arrow. Below the application list, the details for the selected "Draw 4 App" are shown:

Draw 4 App
Made By: Sun Microsystems, Inc.
Home Page: <http://java.sun.com/products/javawebstart/demos.html>
Description: Draw Demo Short Description

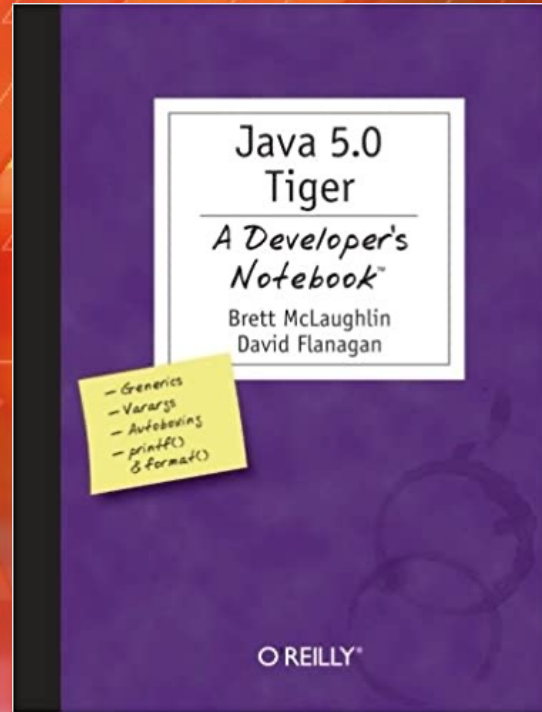
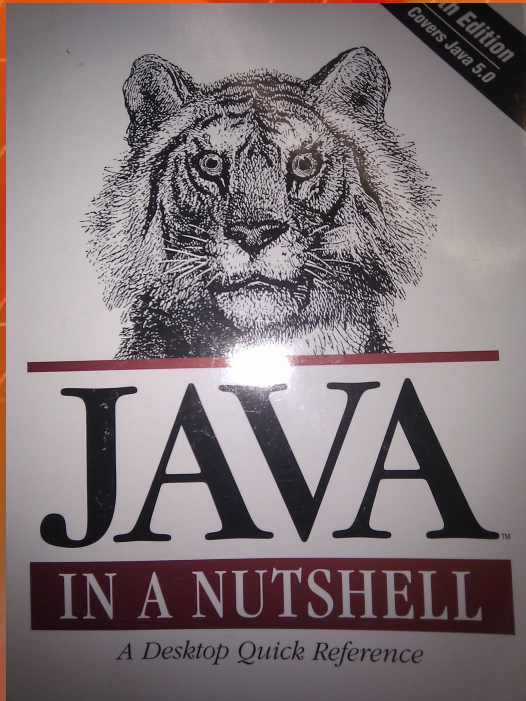
At the bottom right of the details section, there are three small icons: a yellow bell, a blue circular arrow, and a red circular arrow. At the very bottom of the window, there is a small icon of a plug.



2004



2004



Java 1.5

Generics

```
//old
List oldList = new ArrayList();
oldList.add("test"); // A String that cannot be cast to an Integer
Integer i = (Integer)oldList.get(0); // Run time error

//new
List<String> newList = new ArrayList<String>();
newList.add("test");
Integer i = (Integer)newList.get(0); // (type error) compilation-time error
```

Java 1.5

Varargs / for each / Static imports

```
import static java.lang.System.out; //Static imports
public class VarArgsDemo {
    public void varargs(Integer first, String... args) { // String... as vararg
        out.println("first = " + first);
        for (final String arg : args) { //for each enhanced for loop
            out.println("arg = " + arg);
        }
    }
    public static void main(String... args) { //String... as vararg
        VarArgsDemo demo = new VarArgsDemo();
        demo.varargs(42, args);
    }
}
```

Java 1.5

Autoboxing

```
// We write  
Integer num2 = 50;  
int inum = num2;
```

```
//what happens behind the scenes (<1.5)  
Integer num2 = new Integer(50);  
int inum = num2.intValue();
```


Java 1.5

Enums

```
public enum PizzaStatus {  
    ORDERED,  
    READY,  
    DELIVERED;  
}
```

Java 1.5

Annotations (Metadata)

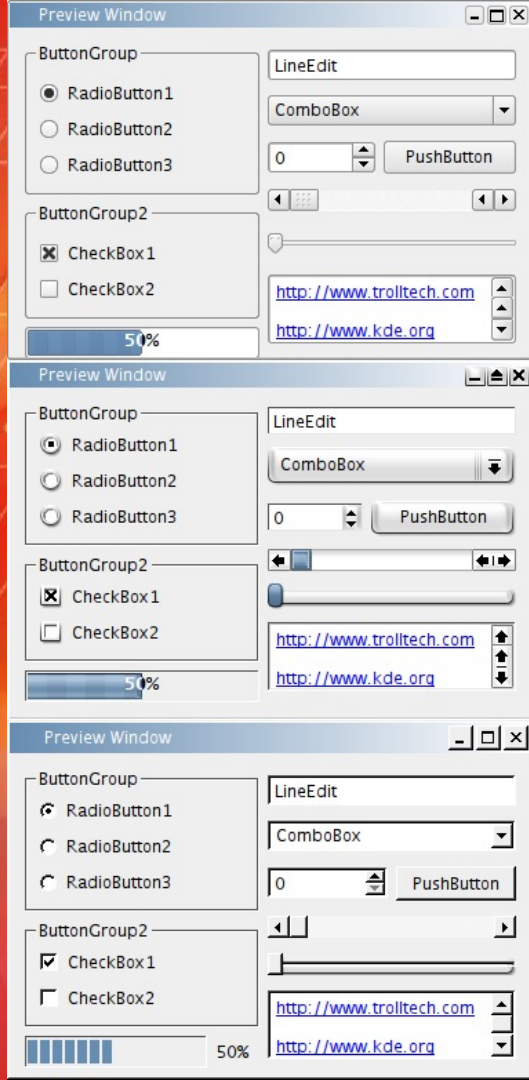
```
@Configuration
@RequiredArgsConstructor
@EnableConfigurationProperties(DigitalVaultServiceServiceClientProperties.class)
public class DigitalVaultServiceClientConfig {

    @Getter private final DigitalVaultServiceServiceClientProperties properties;

    @Bean
    public RestTemplate digitalVaultRestTemplate() {
//        ...
    }
```

Java 1.5

Swing - Skinnable



2005





2006-2008



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or



2009-2013



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Java 1.7

Generics improved

```
//java 1.5
```

```
Map<String, List<Map<String, Map<String, Integer>>>> things  
= new HashMap<String, List<Map<String, Map<String, Integer>>>>();
```

```
//java 1.7
```

```
Map<String, List<Map<String, Map<String, Integer>>>> things  
= new HashMap<>();
```




TOM CRUISE EMILY BLUNT

EDGE OF
TOMORROW

LIVE. DIE. REPEAT.



2014



CHRIS PRATT

ZOE SALDANA

BRADLEY COOPER

VIN DIESEL

DAVE BAUTISTA
@Ivoret



MARVEL
GUARDIANS OF THE GALAXY

FROM THE STUDIO THAT BROUGHT YOU THE AVENGERS

MARVEL STUDIOS PRESENTS A MARVEL FILM "GUARDIANS OF THE GALAXY" CHRIS PRATT ZOE SALDANA VIN DIESEL BRADLEY COOPER DAVE BAUTISTA LAURENCE FISHBY MICHELLE YEOH
DWAYNE "THE ROCK" JOHNSON MICHAEL FASSBENDER JOHN C. REILLY
JOSHUA HARTNETT PETER DINKLAGE
MUSIC BY TYLER BATES
EDITED BY DAN COLODROU
PRODUCTION DESIGNER DAN COLODROU
EXECUTIVE PRODUCERS JEFFREY AXELFORD PETER JACKSON
PRODUCED BY DAN COLODROU
WRITTEN BY BRADLEY COOPER
DIRECTED BY JOHNNY JOHNSON
CASTING BY JAMES GUNN
COSTUME DESIGNER JAMES GUNN
PRODUCTION OFFICE
COURTESY OF MARVEL
IN CINEMAS
SUMMER 2014
SEE IT IN 3D REALD 3D AND IMAX 3D
MARVEL.COM/GUARDIANS
FACEBOOK.COM/MARVEL
TWITTER.COM/MARVEL

Java <8, 8, 11, ...,17?

Java 8

DateTime API

```
LocalDate localDate = LocalDate.now();
System.out.println("localDate = " + localDate);

System.out.println("LocalDate.of(); = " + LocalDate.of(2021, 9, 28));
System.out.println("LocalDate.parse() = " + LocalDate.parse("2021-09-28"));

System.out.println("Tomorrow = " + LocalDate.now().plusDays(1));

LocalDate previousMonthSameDay = LocalDate.now().minus(1, ChronoUnit.MONTHS);
System.out.println("previousMonthSameDay = " + previousMonthSameDay);

DayOfWeek dow = LocalDate.parse("2016-06-12").getDayOfWeek();
System.out.println("DayOfWeek = " + dow);
```

Java 8

Streams

```
converted.addAll(epub.getAuthors()  
    .stream()  
    .map(Name::new)  
    .filter(p->!removeList.is(p.name().toLowerCase()))  
    .filter(p->authorsResource.is(p.name()))  
    .map(Name::asAuthor)  
    .collect(Collectors.toList()));
```

Java 8

Default methods in interfaces

```
public interface Vehicle {  
  
    String speedUp();  
    String slowDown();  
  
    default String turnAlarmOn() {  
        return "Turning the vehicle alarm on.";  
    }  
  
    default String turnAlarmOff() {  
        return "Turning the vehicle alarm off.";  
    }  
}
```

Static methods in interfaces

java 8

```
public interface Vehicle {  
  
    // regular / default interface methods  
  
    static int getHorsePower(int kwh, int torque) {  
        return (kwh * torque) / 4242;  
    }  
}
```

Functional interfaces

Java 8

```
@FunctionalInterface
public interface FileFilter {

    boolean accept(File pathname);
}
```


Completable Future

Java 8

```
CompletableFuture<String> cf1
    = CompletableFuture.supplyAsync(() -> "Hello");

CompletableFuture<String> cf2 = cf1
    .thenApply(s -> s + " World");

assertEquals("Hello World", cf2.get());
```

Question



Which of
these popular
languages is
older?







 @ivonet

2015

-

2017



Java 9

Jshell REPL

```
$ jshell
| Welcome to JShell -- Version 9.0.4
| For an introduction type: /help intro

jshell> System.out.println("Hello, world!")
Hello, world!

jshell> █
```



2018



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Java 10

Local type inference

```
//final List<String> languages = List.of("Java", "Python", "Kotlin");  
final var languages = List.of("Java", "Python", "Kotlin");  
  
//final List<String> otherLanguages = List.of("COBOL", "Perl", "Pascal");  
final var otherLanguages = List.of("COBOL", "Perl", "Pascal");  
  
//final List<List<String>> combined = List.of(languages, otherLanguages);  
final var combined = List.of(languages, otherLanguages);
```


Java 10

Collection copyOf()

```
final List<String> aList = List.of("a", "b", "c");  
  
var strings = List.copyOf(aList); //returns an unmodifiable List  
strings.add("foo"); //java.lang.UnsupportedOperationException
```

Java 11

Shebang

```
#!/usr/local/openjdk-11/bin/java --source 11

public class SheBangDemo {
    public static void main(final String[] args) {
        System.out.println("SheBanged yeah!!");
    }
}
```

```
$ ./shebangdemo
SheBanged yeah!!
$ █
```

Java 11

Predicate not

```
final List<Integer> numbers = List.of(1, 2, 3, 4, 5);  
  
numbers.stream()  
    .filter(Predicate.not(number -> number % 2 == 1))  
    .forEach(System.out::println);
```

Java 11

String methods

```
String str = "   "; // spaces only
str.isBlank(); //true
" L R ".strip(); //"L R"
" L R ".stripLeading(); //"L R "
" L R ".stripTrailing(); //" L R"
"Line 1\nLine 2\nLine 3\nLine 4".lines().forEach(System.out::println);

System.out.println("Hurray ".repeat(3));

// unicode 10, e.g.
System.out.println("\u20BF");
```

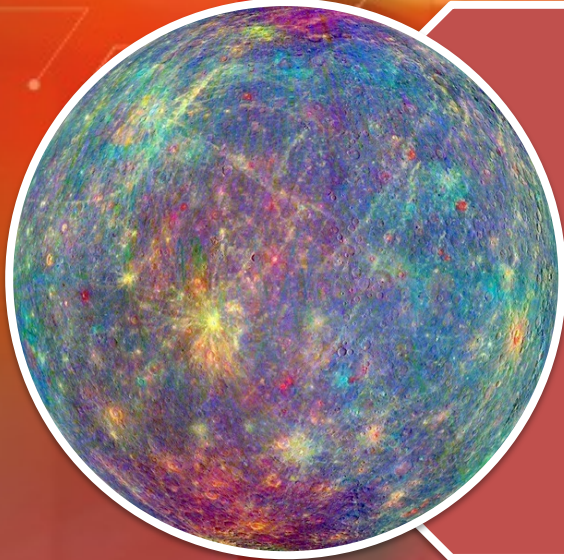
Java 11

HttpClient

```
var client = HttpClient.newBuilder().build();
var request = HttpRequest.newBuilder()
    .GET()
    .uri(URI.create("https://www.ivoweltring.org"))
    .build();

var response = client.send(request, HttpResponse.BodyHandlers.ofString());
System.out.println(response.body());
```

Question

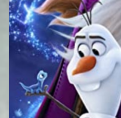


Is this statement valid in
Java 10+?

```
var var = "var";
```

Answer

- YES it is valid
- The identifier `var` is not a keyword; instead it is a *reserved type name*. This means that code that uses `var` as a variable, method, or package name will not be affected; code that uses `var` as a class or interface name will be affected
- Therefore `var var = "var";` is a completely valid statement. Not advisable but valid.



2019



Ordina.nl

2020



Useful NullPointerException messages

Java 14

```
$ java NullPointerExceptionMessages.java
Exception in thread "main" java.lang.NullPointerException
    at NullPointerExceptionMessages.main(NullPointerExceptionMessages.java:19)

$ java -XX:+ShowCodeDetailsInExceptionMessages NullPointerExceptionMessages.java
Exception in thread "main" java.lang.NullPointerException: Cannot invoke "String.length()"
    because "<local1>[1]" is null
    at NullPointerExceptionMessages.main(NullPointerExceptionMessages.java:19)
```

Switch expression

Java 14

```
public String day(final int day) {  
    return switch (day) { //switch as an expression  
        case 1, 2, 3, 4, 5 -> "weekday";  
        case 6, 7 -> "weekend";  
        default -> "unknown";  
    };  
}
```

TextBlocks

Java 15

```
final var notThis = "<html>\n" +  
    "    <body>\n" +  
    "        <p>Hello, world</p>\n" +  
    "    </body>\n" +  
    "</html>\n";
```

```
final var butThis = """"  
    <html>  
        <body>  
            <p>Hello, world</p>  
        </body>  
    </html>  
""";
```



2021

Patternmatching instanceof

java 16

```
Object str = "===Hello, World!===";  
//Assign to 's' and use it immediately  
if (str instanceof String s && s.startsWith("===")) {  
    //use the assigned 's' as a String in scope.  
    System.out.println(s.replace("=", ""));  
}
```

Records

Java 16

```
/**  
 * Simple record  
 */  
record Person(String name, String twitterHandle) {}
```

Streams to list

Java 16

```
final var numbers = List.of("1", "2", "3", "4", "5");
final var oldWay = numbers.stream()
    .map(Integer::valueOf)
    .collect(Collectors.toList()); //Collectors.toUnmodifiableList()

final var newWay = numbers.stream()
    .map(Integer::valueOf)
    .toList(); //often used so convenience
```


Read-/writestring

Java 16

```
//Read File content into a string  
var content = Files.readString(Path.of("./helloworld.c"));  
//Some changes  
  
//Write content to file  
Files.writeString(Path.of("./helloworld.cpp"), content);
```

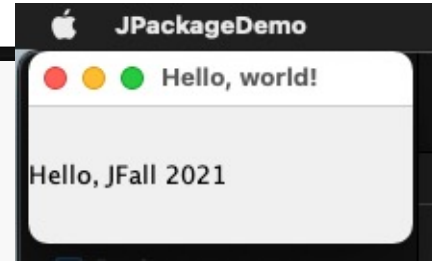
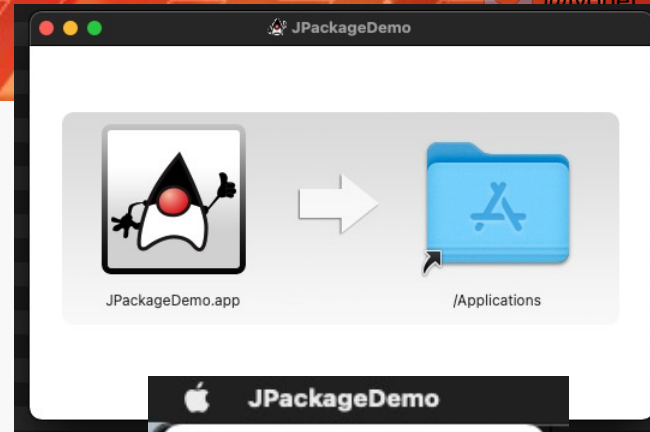
Java 16

jpackage

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```
import javax.swing.*;
public class JPackageDemo {
    private static void createAndShowGUI() {
        final JFrame frame = new JFrame("Hello, world!");
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(200, 100);
        final JLabel label = new JLabel("Hello, JFall 2021");
        frame.getContentPane().add(label);
        frame.setVisible(true);
    }

    public static void main(final String[] args) {
        javax.swing.SwingUtilities.invokeLater(JPackageDemo::createAndShowGUI);
    }
}
```



```
$ javac JPackageDemo.java
$ cat JPackageDemo.mf
Manifest-Version: 1.0
Main-Class: JPackageDemo
$ jar cmf JPackageDemo.mf JPackageDemo.jar JPackageDemo.class JPackageDemo.java
$ cd ..
$ jpackage --name JPackageDemo --input jpackage --main-jar JPackageDemo.jar --type dmg
```

Sealed classes

Java 17

```
public sealed class Fruit permits Orange, Apple {}
```

```
public non-sealed class Apple extends Fruit {}
```

```
public non-sealed class Orange extends Fruit {}
```

```
public non-sealed class Tomato extends Fruit {}
```

```
/*
```

```
javac Fruit.java Apple.java Orange.java Tomato.java
```

```
Tomato.java:3: error: class is not allowed to extend sealed  
class: Fruit (as it is not listed in its permits clause)
```

```
public non-sealed class Tomato extends Fruit {}
```

```
^
```

```
1 error
```

```
*/
```

Enhanced Pseudo-Random number Generator

Java 17

```
RandomGenerator rng1 = RandomGeneratorFactory.of("Random").create(42); // new way  
RandomGenerator rng2 = new Random(42); // old way  
RandomGenerator rng3 = RandomGeneratorFactory.getDefault().create(42); // new default  
RandomGenerator rng4 = RandomGenerator.getDefault(); // shortcut to new default
```

2022++



Useful links

- Demo code: <http://ivo2u.nl/Vy>
- Java Magazine Articles: <http://ivo2u.nl/oz> (nl)
- Blog: <https://www.ivonet.nl/>
- About: <https://www.ivowoltring.org/>
- Github: <https://github.com/ivonet>