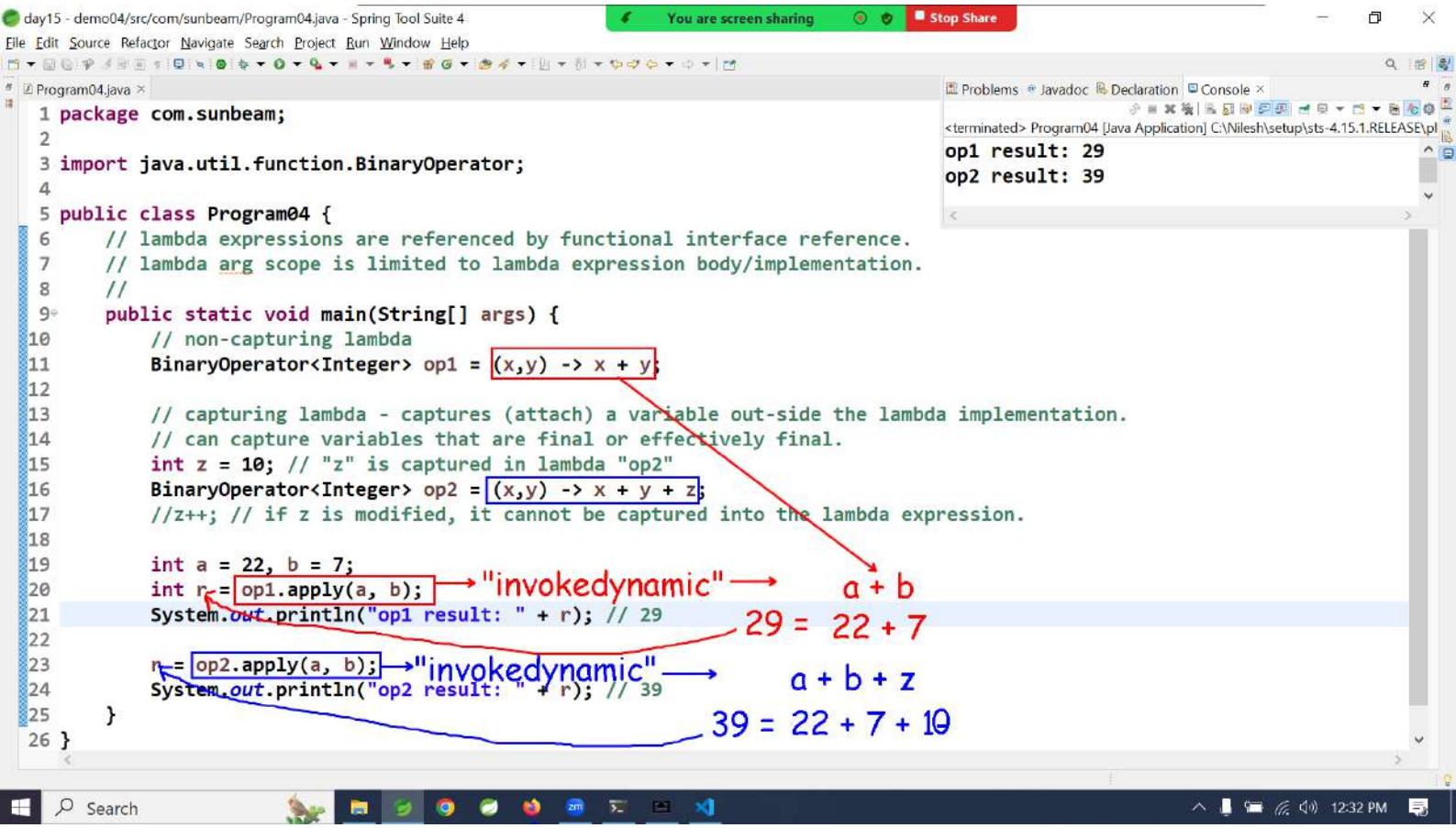
day15 - demo04/src/com/sunbeam/Program04.java - Spring Tool Suite 4
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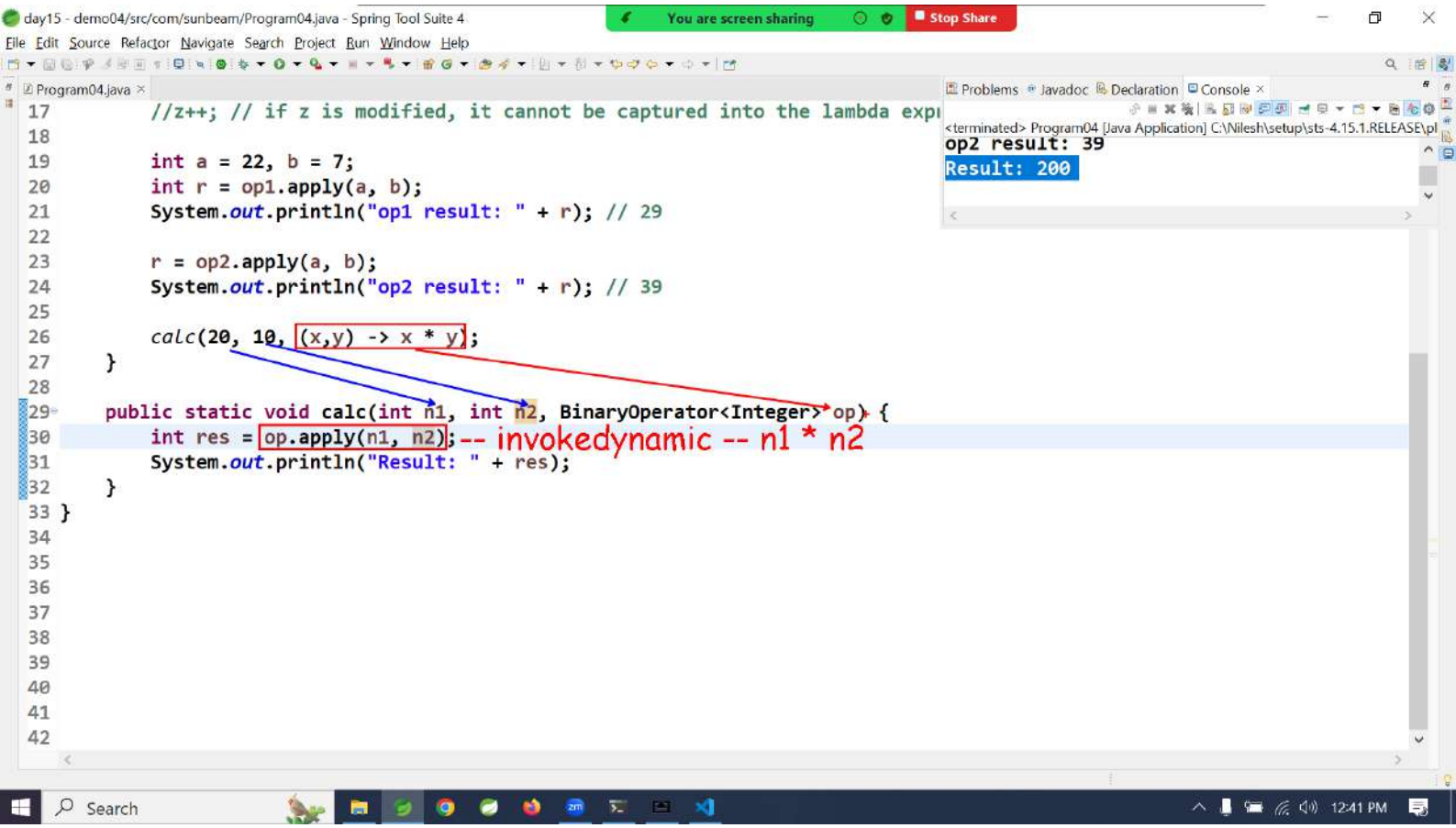
Program04.java
Problems Javadoc Declaration Console
<terminated> Program04 [Java Application] C:\Nilesh\setup\sts-4.15.1.RELEASE\pl
op1 result: 29
op2 result: 39
1 package com.sunbeam;
2
3 import java.util.function.BinaryOperator;
4
5 public class Program04 {
6 // lambda expressions are referenced by functional interface reference.
7 // lambda arg scope is limited to lambda expression body/implementation.
8 //
9 public static void main(String[] args) {
10 // non-capturing lambda
11 BinaryOperator<Integer> op1 = (x,y) -> x + y;
12
13 // capturing lambda - captures (attach) a variable out-side the lambda implementation.
14 // can capture variables that are final or effectively final.
15 int z = 10; // "z" is captured in lambda "op2"
16 BinaryOperator<Integer> op2 = (x,y) -> x + y + z;
17 //z++; // if z is modified, it cannot be captured into the lambda expression.
18
19 int a = 22, b = 7;
20 int r = op1.apply(a, b);
21 System.out.println("op1 result: " + r); // 29
22
23 r = op2.apply(a, b);
24 System.out.println("op2 result: " + r); // 39
25 }
26 }
"invokedynamic"
a + b
29 = 22 + 7
"invokedynamic"
a + b + z
39 = 22 + 7 + 10
Search
12:32 PM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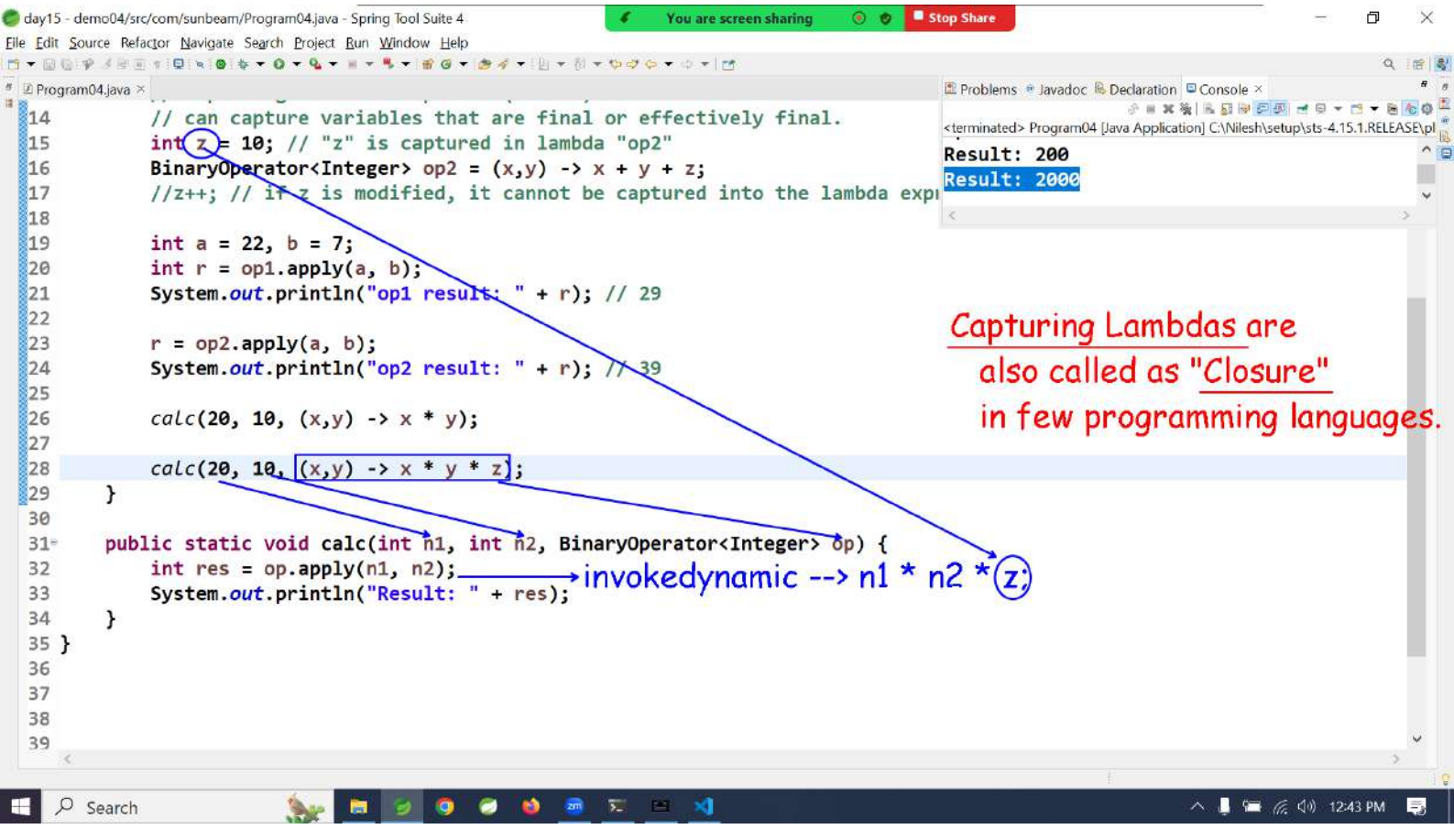
Program04.java
//z++; // if z is modified, it cannot be captured into the lambda expr
int a = 22, b = 7;
int r = op1.apply(a, b);
System.out.println("op1 result: " + r); // 29
r = op2.apply(a, b);
System.out.println("op2 result: " + r); // 39
calc(20, 10, (x,y) -> x * y);
}
public static void calc(int n1, int n2, BinaryOperator<Integer> op) {
int res = op.apply(n1, n2);
-- invokedynamic -- n1 * n2
System.out.println("Result: " + res);
}
}
Problems Javadoc Declaration Console
<terminated> Program04 [Java Application] C:\Nilesh\setup\sts-4.15.1.RELEASE\pl
op2 result: 39
Result: 200
Search
12:41 PM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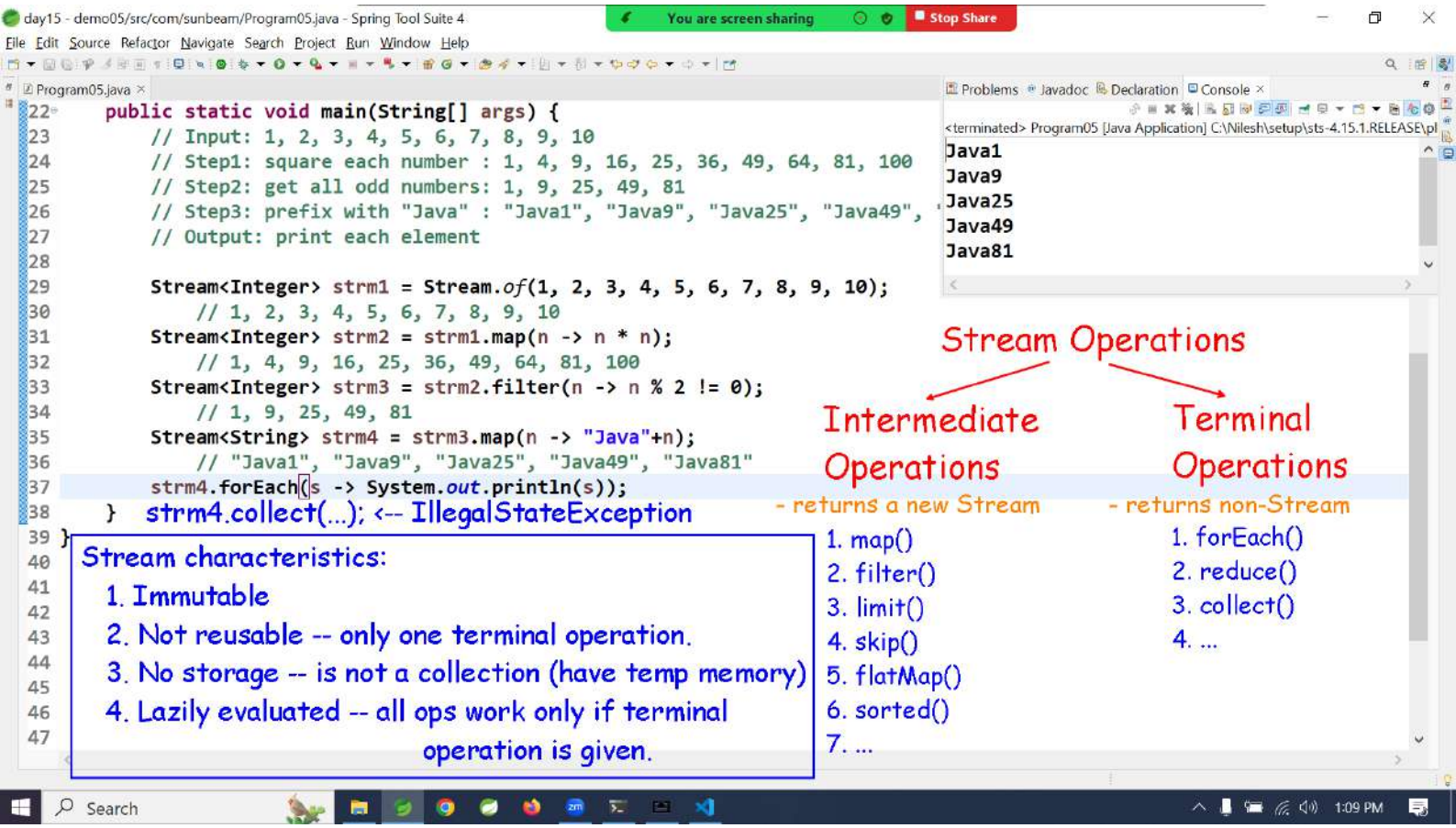
Program04.java
// can capture variables that are final or effectively final.
int z = 10; // "z" is captured in lambda "op2"
BinaryOperator<Integer> op2 = (x,y) -> x + y + z;
//z++; // if z is modified, it cannot be captured into the lambda exp
int a = 22, b = 7;
int r = op1.apply(a, b);
System.out.println("op1 result: " + r); // 29
r = op2.apply(a, b);
System.out.println("op2 result: " + r); // 39
calc(20, 10, (x,y) -> x * y);
calc(20, 10, (x,y) -> x * y * z);
}
public static void calc(int n1, int n2, BinaryOperator<Integer> op) {
int res = op.apply(n1, n2);
System.out.println("Result: " + res);
}
}
Problems Javadoc Declaration Console
<terminated> Program04 [Java Application] C:\Nilesh\setup\sts-4.15.1.RELEASE\pl
Result: 200
Result: 2000
Capturing Lambdas are also called as "Closure" in few programming languages.
invokedynamic --> n1 * n2 * z;
Search
12:43 PM


day15 - demo05/src/com/sunbeam/Program05.java - Spring Tool Suite 4
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Program05.java
Problems Javadoc Declaration Console
<terminated> Program05 [Java Application] C:\Nilesh\setup\sts-4.15.1.RELEASE\pl
Java1
Java9
Java25
Java49
Java81
22 public static void main(String[] args) {
23 // Input: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
24 // Step1: square each number : 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
25 // Step2: get all odd numbers: 1, 9, 25, 49, 81
26 // Step3: prefix with "Java" : "Java1", "Java9", "Java25", "Java49",
27 // Output: print each element
28
29 Stream<Integer> strm1 = Stream.of(1, 2, 3, 4, 5, 6, 7, 8, 9, 10);
30 // 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
31 Stream<Integer> strm2 = strm1.map(n -> n * n);
32 // 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
33 Stream<Integer> strm3 = strm2.filter(n -> n % 2 != 0);
34 // 1, 9, 25, 49, 81
35 Stream<String> strm4 = strm3.map(n -> "Java"+n);
36 // "Java1", "Java9", "Java25", "Java49", "Java81"
37 strm4.forEach(s -> System.out.println(s));
38 } strm4.collect(...); <-- IllegalStateException
39 }
40
41
42
43
44
45
46
47
Stream Operations
Intermediate Operations
- returns a new Stream
1. map()
2. filter()
3. limit()
4. skip()
5. flatMap()
6. sorted()
7. ...
Terminal Operations
- returns non-Stream
1. forEach()
2. reduce()
3. collect()
4. ...
Stream characteristics:
1. Immutable
2. Not reusable -- only one terminal operation.
3. No storage -- is not a collection (have temp memory)
4. Lazily evaluated -- all ops work only if terminal operation is given.
Search
1:09 PM

day15 - demo05/src/com/sunbeam/Program05.java - Spring Tool Suite 4

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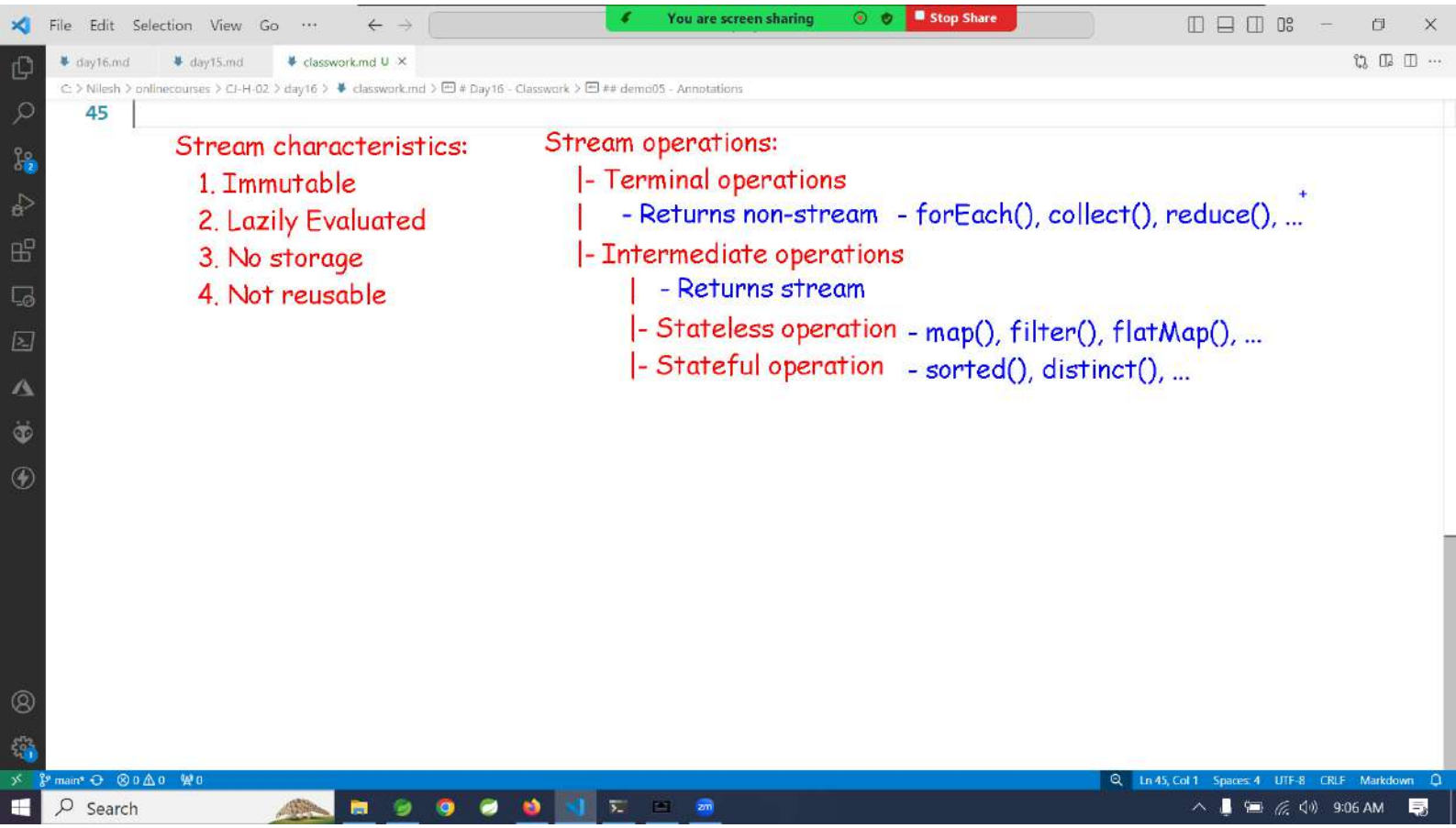
Program05.java

```
59      }
60      */
61
62      public static void main(String[] args) {
63          Stream.of(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
64              .map(n -> {
65                  System.out.println("map() -- square -- " + n);
66                  return n * n;
67              })
68              .filter(n -> {
69                  System.out.println("filter() -- odd nums -- " + n);
70                  return n % 2 != 0;
71              })
72              .sorted((x,y) -> {
73                  System.out.println("sorted() -- " + x + " <> " + y);
74                  return y - x; // desc sort
75              })
76              .map(n -> {
77                  System.out.println("map() -- prefix Java -- " + n);;
78                  return "Java"+n;
79              })
80              .forEach(s -> System.out.println("forEach() -- " + s));
81          System.out.println("Bye!");
82      }
83  }
84
```

Writable | Smart Insert | 84 : 1 : 2472

Search | 1:32 PM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day16.md
day15.md
classwork.md U
C: > Nilesh > onlinecourses > CJ-H-02 > day16 > classwork.md > # Day16 - Classwork > ## demo05 - Annotations
45
Stream characteristics:
1. Immutable
2. Lazily Evaluated
3. No storage
4. Not reusable
Stream operations:
|- Terminal operations
| - Returns non-stream - forEach(), collect(), reduce(), ...
|- Intermediate operations
| - Returns stream
|- Stateless operation - map(), filter(), flatMap(), ...
|- Stateful operation - sorted(), distinct(), ...
main*
Ln 45, Col 1
Spaces: 4
UTF-8
CRLF
Markdown
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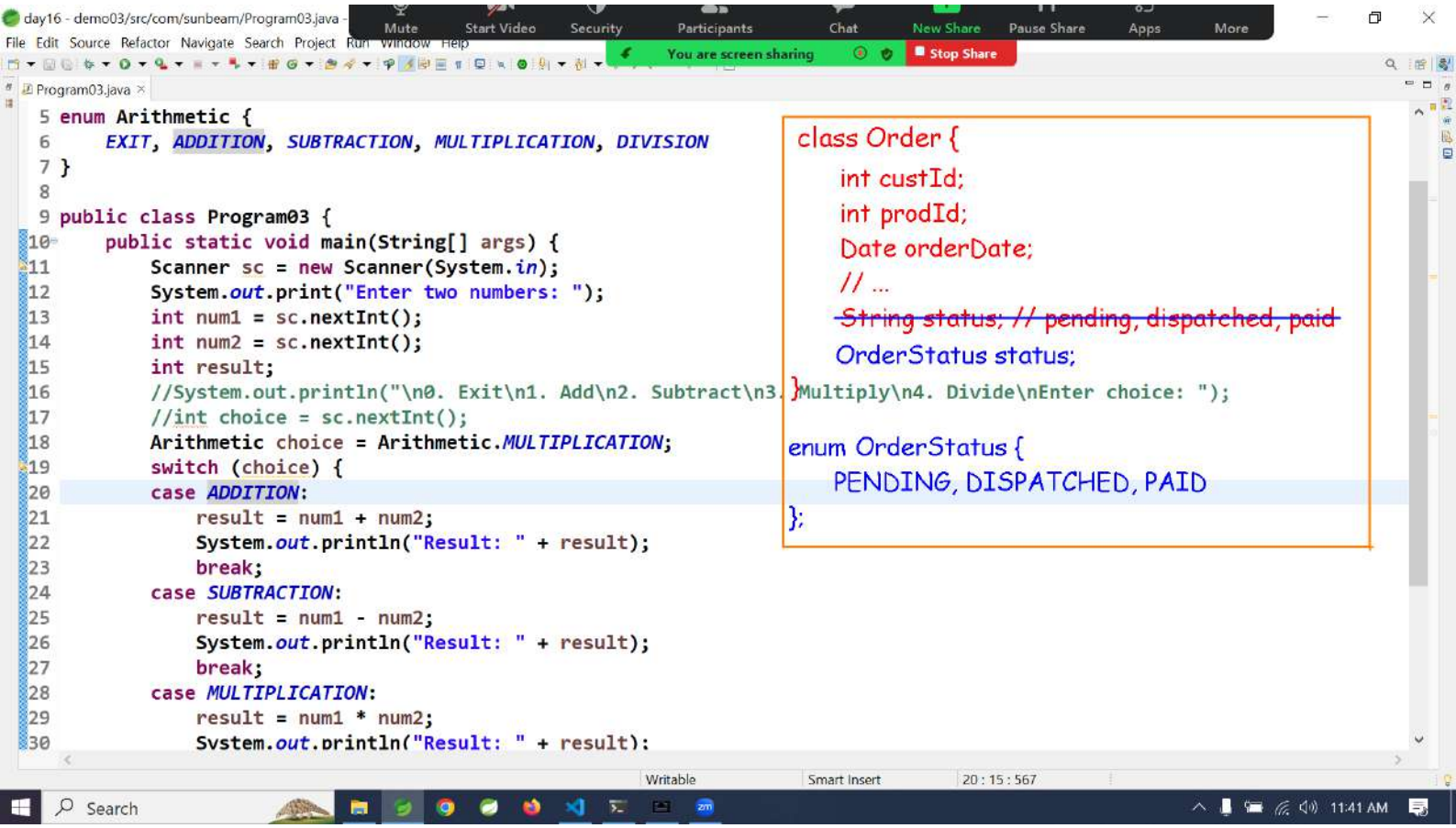
day16 - demo03/src/com/sunbeam/Program03.java - Eclipse IDE
Mute
Start Video
Security
Participants
Chat
New Share
Pause Share
Apps
More
File Edit Source Refactor Navigate Search Project Run Window Help
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Program03.java
enum Arithmetic {
EXIT, ADDITION, SUBTRACTION, MULTIPLICATION, DIVISION
}
public class Program03 {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter two numbers: ");
int num1 = sc.nextInt();
int num2 = sc.nextInt();
int result;
//System.out.println("\n0. Exit\n1. Add\n2. Subtract\n3. Multiply\n4. Divide\nEnter choice: ");
//int choice = sc.nextInt();
Arithmetic choice = Arithmetic.MULTIPLICATION;
switch (choice) {
case ADDITION:
result = num1 + num2;
System.out.println("Result: " + result);
break;
case SUBTRACTION:
result = num1 - num2;
System.out.println("Result: " + result);
break;
case MULTIPLICATION:
result = num1 * num2;
System.out.println("Result: " + result);
class Order {
int custId;
int prodId;
Date orderDate;
// ...
String status; // pending, dispatched, paid
OrderStatus status;
}
enum OrderStatus {
PENDING, DISPATCHED, PAID
};
Writable
Smart Insert
20 : 15 : 567
Search
11:41 AM

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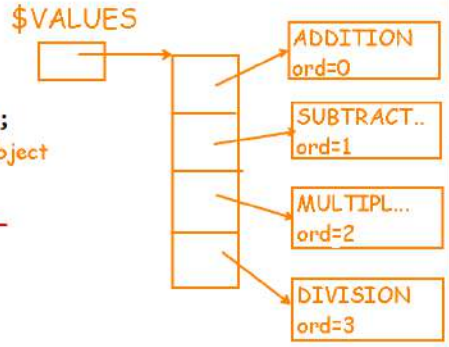
day16.md day15.md classwork.md U

day16.md > # Core Java > ## enum

```
102     // generated enum code
103     final class ArithmeticOperations extends Enum {
104         public static ArithmeticOperations[] values() {
105             return (ArithmeticOperations[])$VALUES.clone();
106         }
107         public static ArithmeticOperations valueOf(String s) {
108             return (ArithmeticOperations)Enum.valueOf(ArithmeticOperations, s);
109         }
110         private ArithmeticOperations(String name, int ordinal) {
111             super(name, ordinal); // invoke sole constructor Enum(String,int);
112         }
113         public static final ArithmeticOperations ADDITION;
114         public static final ArithmeticOperations SUBTRACTION;
115         public static final ArithmeticOperations MULIPLICATION;
116         public static final ArithmeticOperations DIVISION;
117         private static final ArithmeticOperations $VALUES[];
118         static {
119             ADDITION = new ArithmeticOperations("ADDITION", 0);
120             SUBTRACTION = new ArithmeticOperations("SUBTRACTION", 1);
121             MULIPLICATION = new ArithmeticOperations("MULIPLICATION", 2);
122             DIVISION = new ArithmeticOperations("DIVISION", 3);
123             $VALUES = (new ArithmeticOperations[] {
124                 ADDITION, SUBTRACTION, MULIPLICATION, DIVISION
125             });
126         }
```

"ADDITION" --> ADDITION object

enum ArithmeticOperations {
  ADDITION, SUBTRACTION,..
}



java.lang.Enum class

1. fields: name String, ordinal int.
2. methods:
   a. label() -- returns name string
   b. ordinal() -- returns pos/ord
   c. Enum(label,ordinal) -- ctor
   d. toString() -- returns name.
   e. valueOf() -- String to enum.

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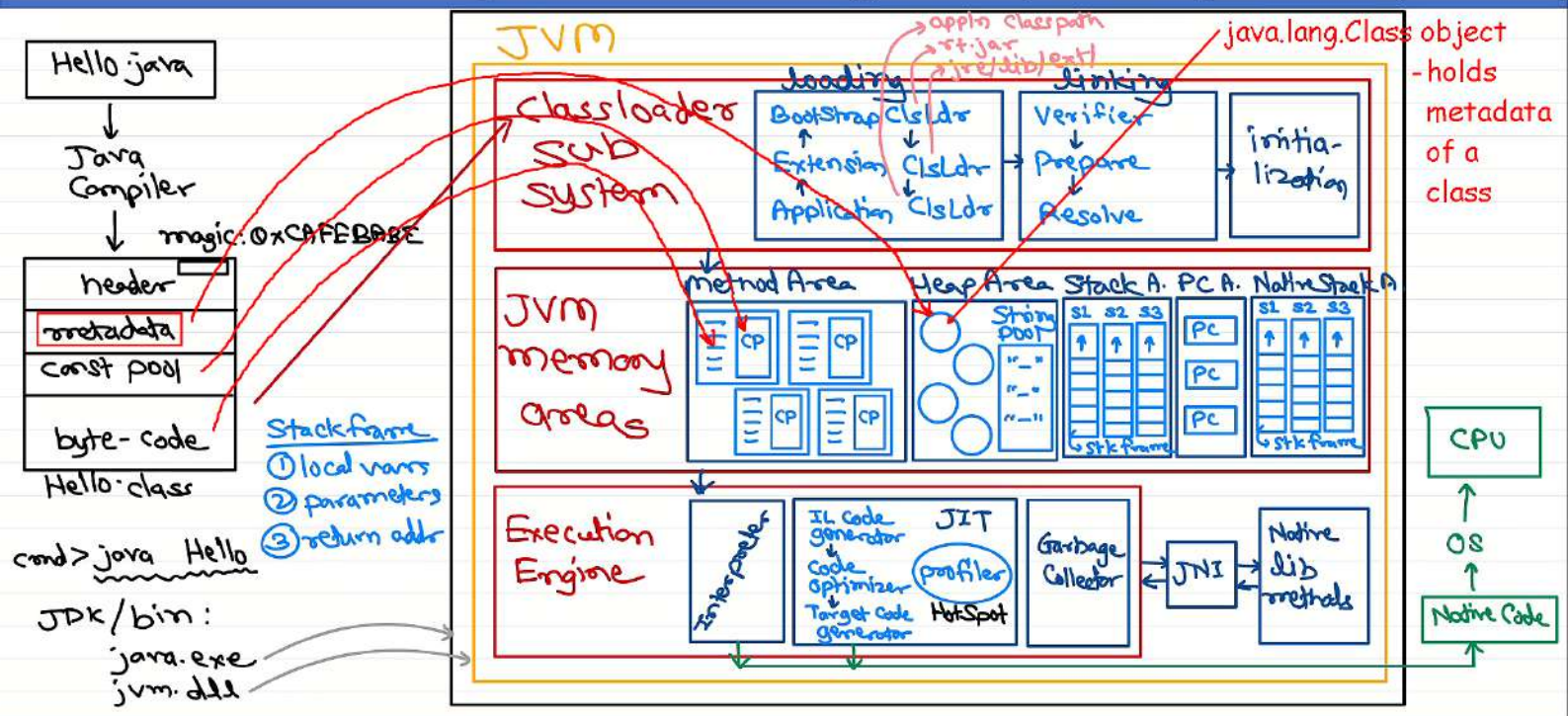
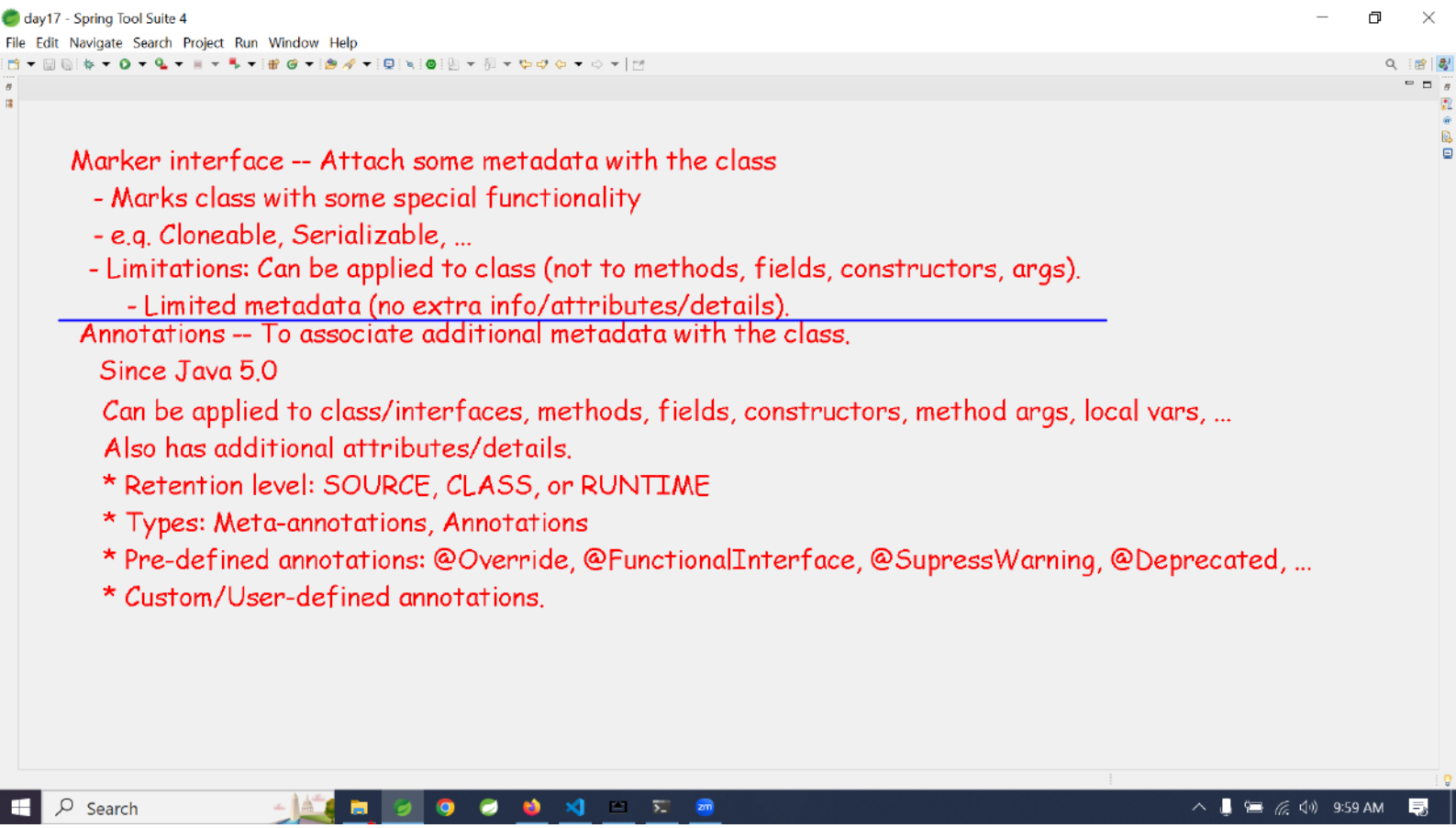
JVM architecture

OS process for "java" (java app launcher)

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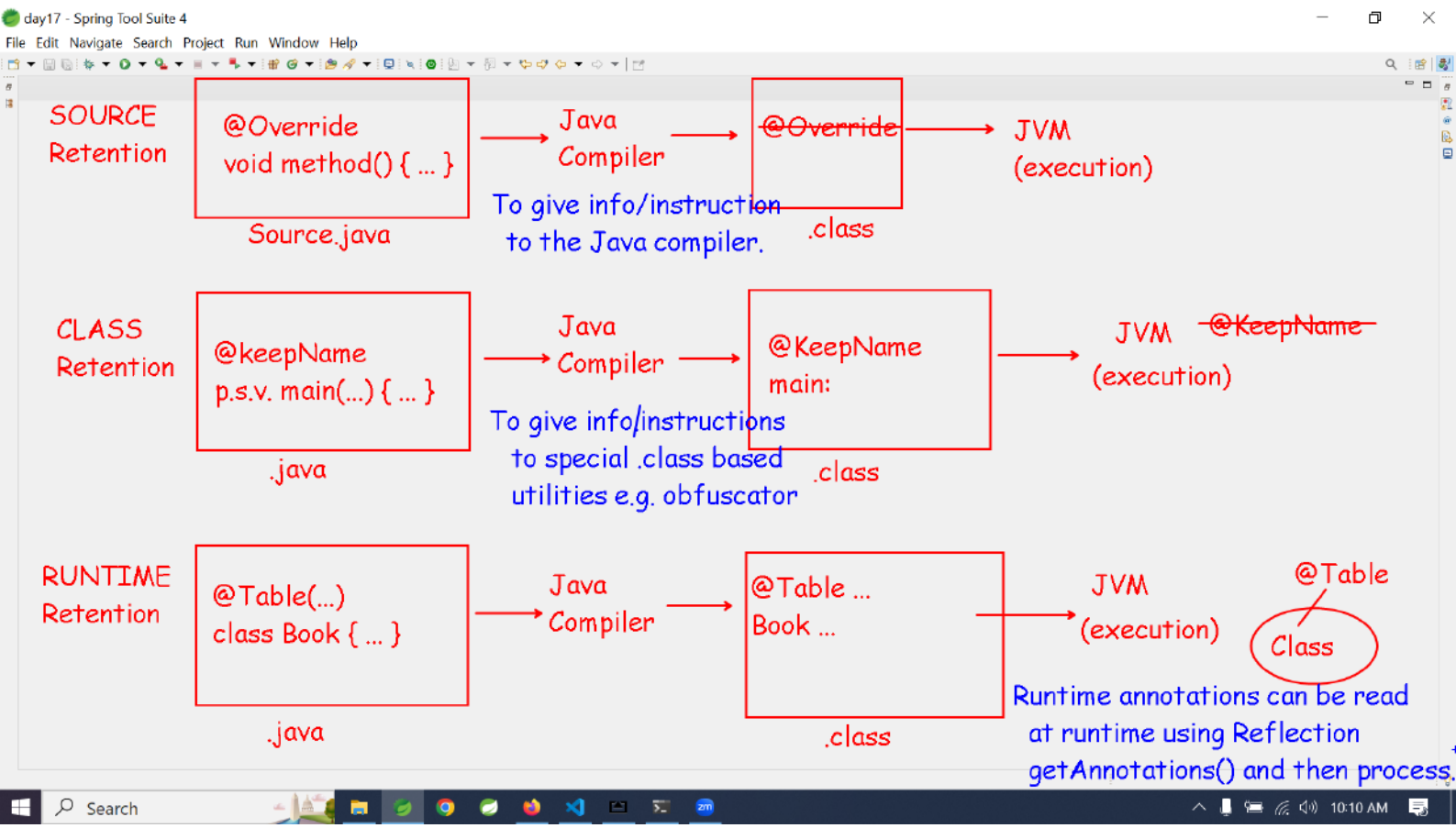
Marker interface -- Attach some metadata with the class
- Marks class with some special functionality
- e.g. Cloneable, Serializable, ...
- Limitations: Can be applied to class (not to methods, fields, constructors, args).
- Limited metadata (no extra info/attributes/details).
Annotations -- To associate additional metadata with the class.
Since Java 5.0
Can be applied to class/interfaces, methods, fields, constructors, method args, local vars, ...
Also has additional attributes/details.
* Retention level: SOURCE, CLASS, or RUNTIME
* Types: Meta-annotations, Annotations
* Pre-defined annotations: @Override, @FunctionalInterface, @SupressWarning, @Deprecated, ...
* Custom/User-defined annotations.
Search
9:59 AM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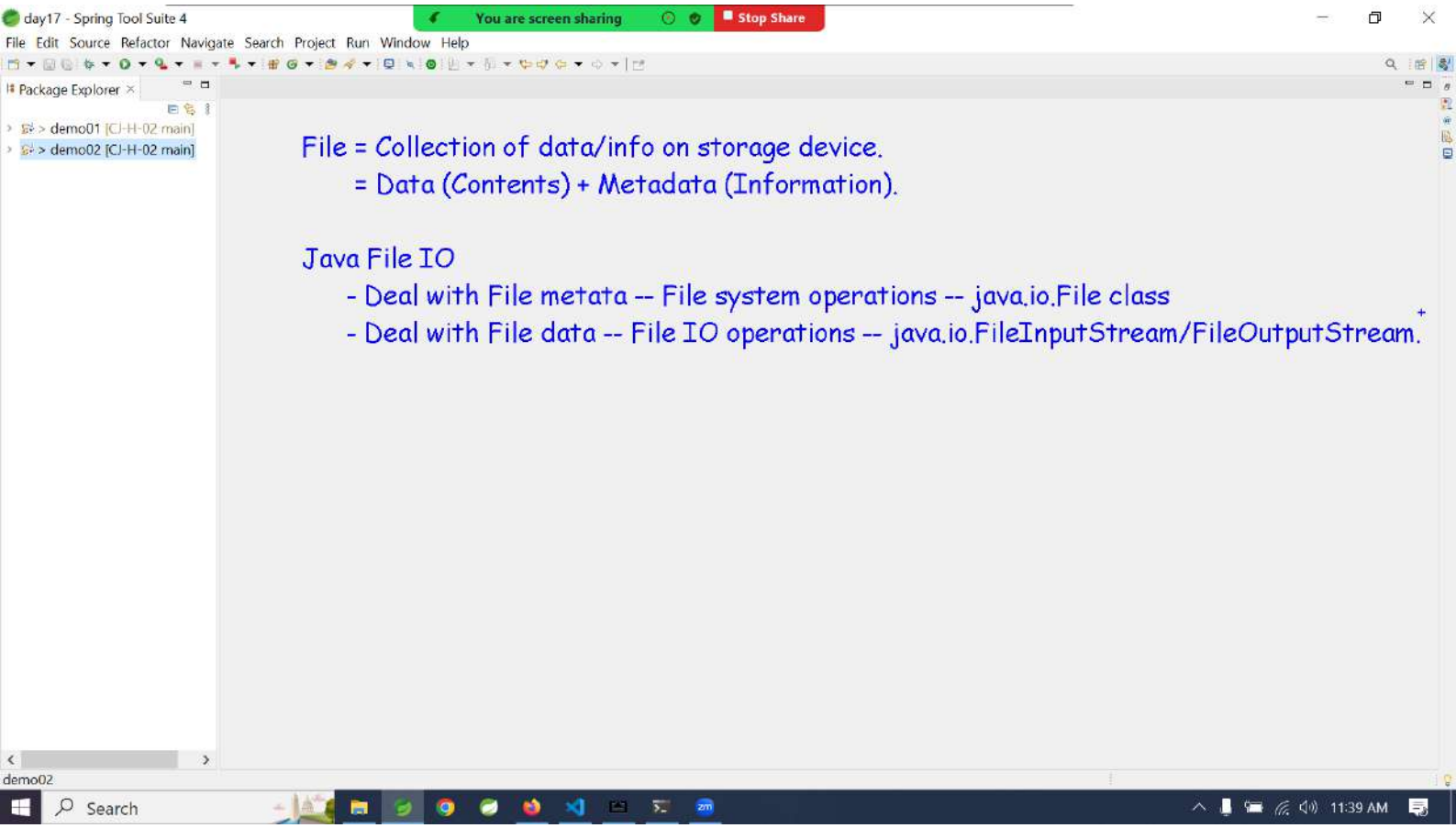
SOURCE Retention
@Override
void method() { ... }
Source.java
Java Compiler
@Override
.class
JVM (execution)
To give info/instruction to the Java compiler.
CLASS Retention
@keepName
p.s.v. main(...) { ... }
.java
Java Compiler
@KeepName
main:
.class
JVM
@KeepName
(execution)
To give info/instructions to special .class based utilities e.g. obfuscator
RUNTIME Retention
@Table(...)
class Book { ... }
.java
Java Compiler
@Table ...
Book ...
.class
JVM
(execution)
@Table
Class
Runtime annotations can be read at runtime using Reflection getAnnotations() and then process.
Search
10:10 AM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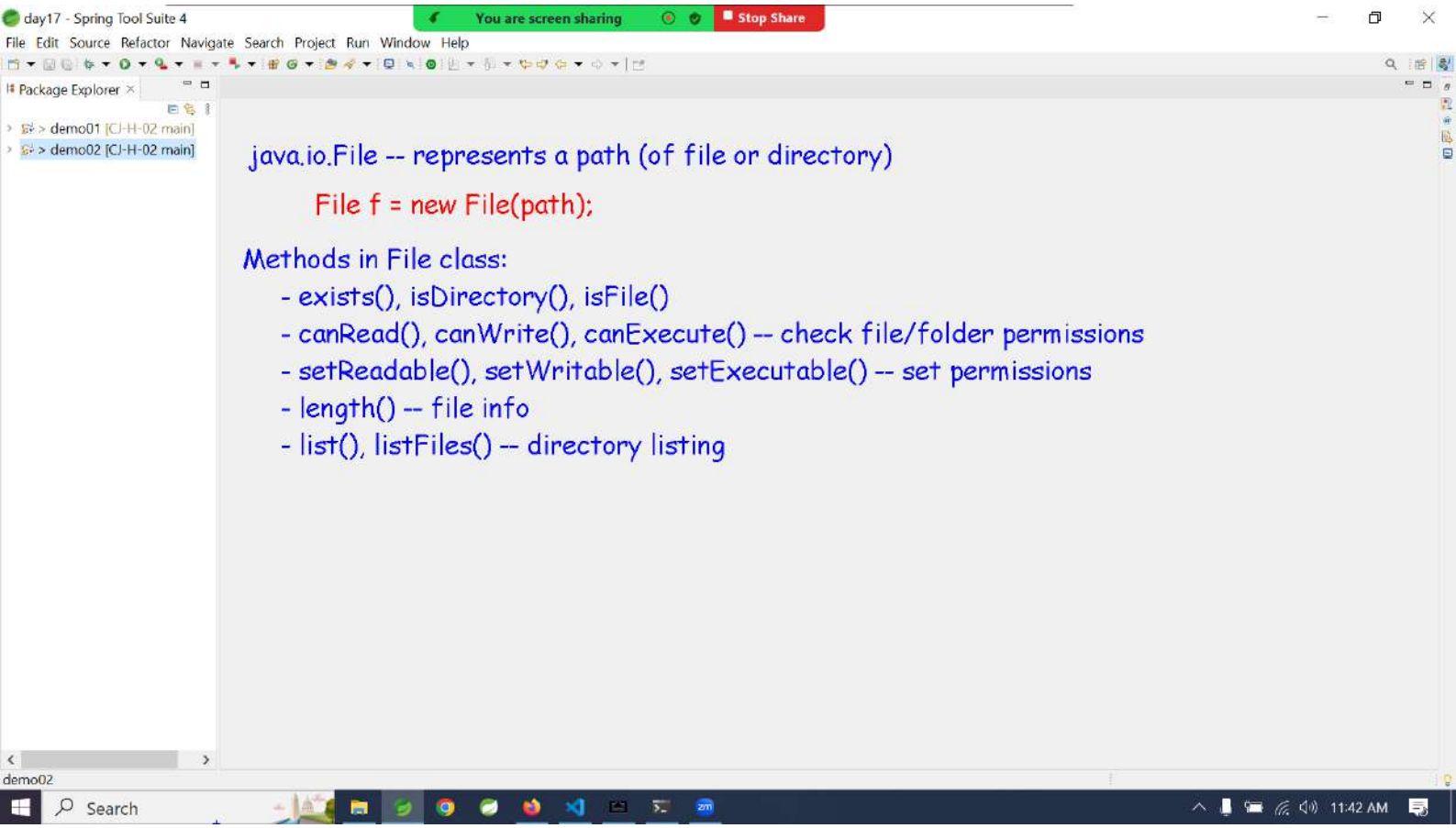
Package Explorer
> demo01 [CJ-H-02 main]
> demo02 [CJ-H-02 main]
File = Collection of data/info on storage device.
= Data (Contents) + Metadata (Information).
Java File IO
- Deal with File metata -- File system operations -- java.io.File class
- Deal with File data -- File IO operations -- java.io.FileInputStream/FileOutputStream.
demo02
Search
11:39 AM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Package Explorer
> demo01 [CJ-H-02 main]
> demo02 [CJ-H-02 main]
java.io.File -- represents a path (of file or directory)
File f = new File(path);
Methods in File class:
- exists(), isDirectory(), isFile()
- canRead(), canWrite(), canExecute() -- check file/folder permissions
- setReadable(), setWritable(), setExecutable() -- set permissions
- length() -- file info
- list(), listFiles() -- directory listing
demo02
Search
11:42 AM