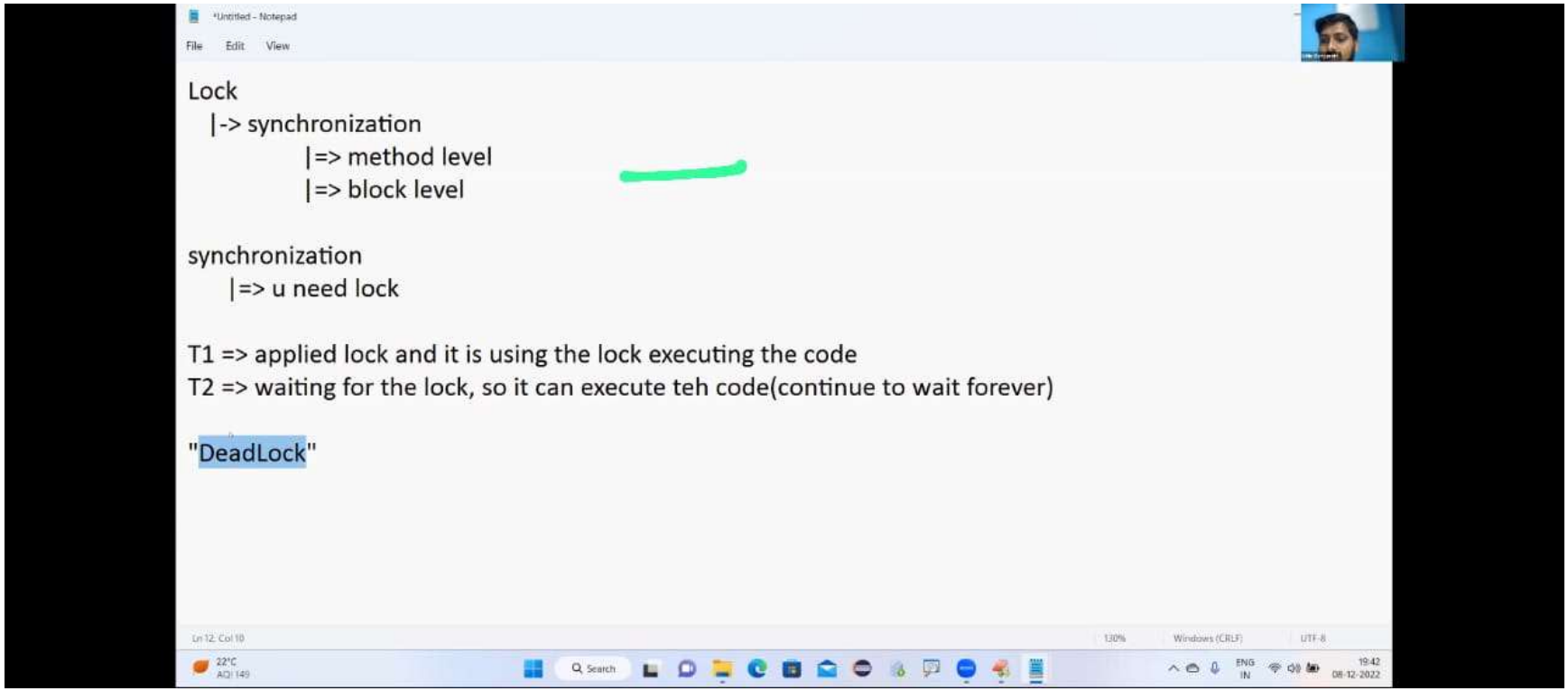
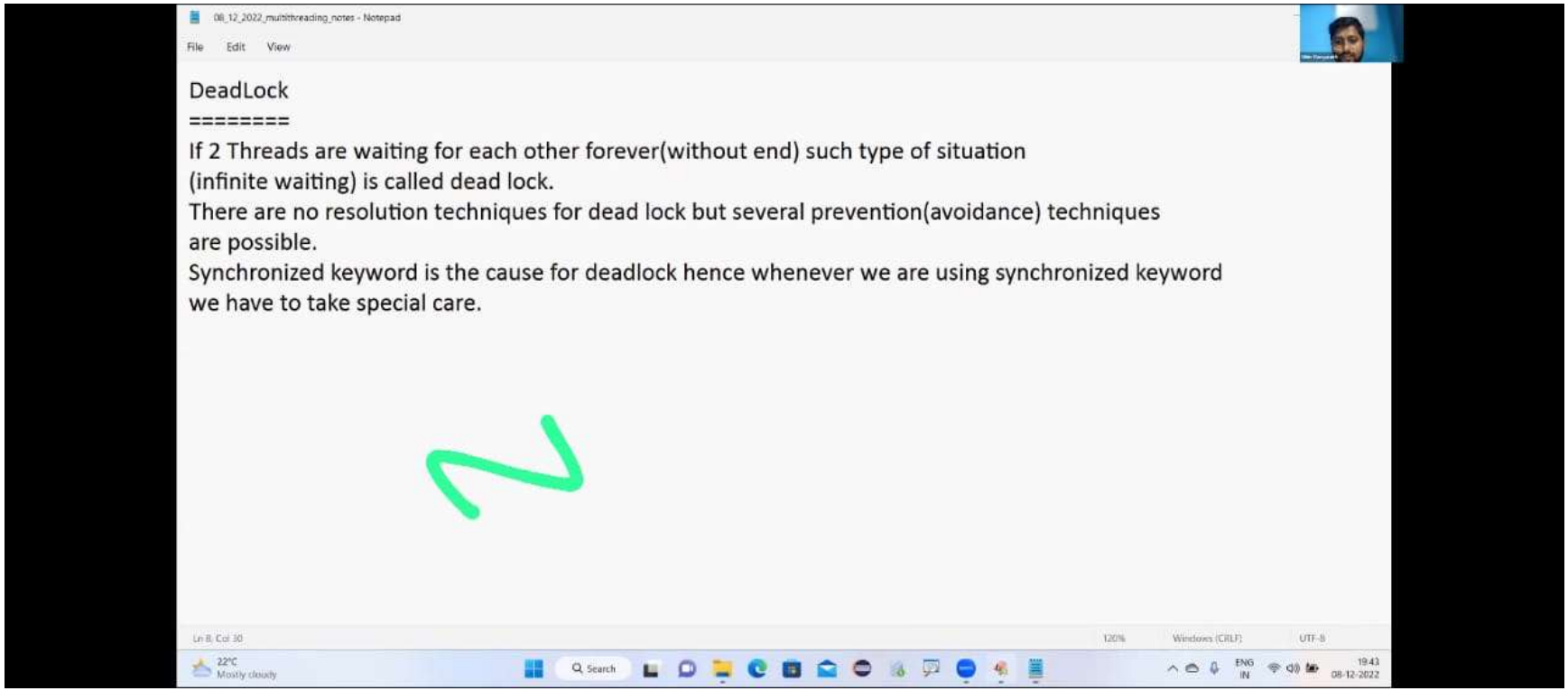
Java Multithreading Part6




08_12_2022_multithreading_notes - Notepad
File Edit View
DeadLock
========
If 2 Threads are waiting for each other forever(without end) such type of situation
(infinite waiting) is called dead lock.
There are no resolution techniques for dead lock but several prevention(avoidance) techniques
are possible.
Synchronized keyword is the cause for deadlock hence whenever we are using synchronized keyword
we have to take special care.
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120%
Windows (CRLF)
UTF-8
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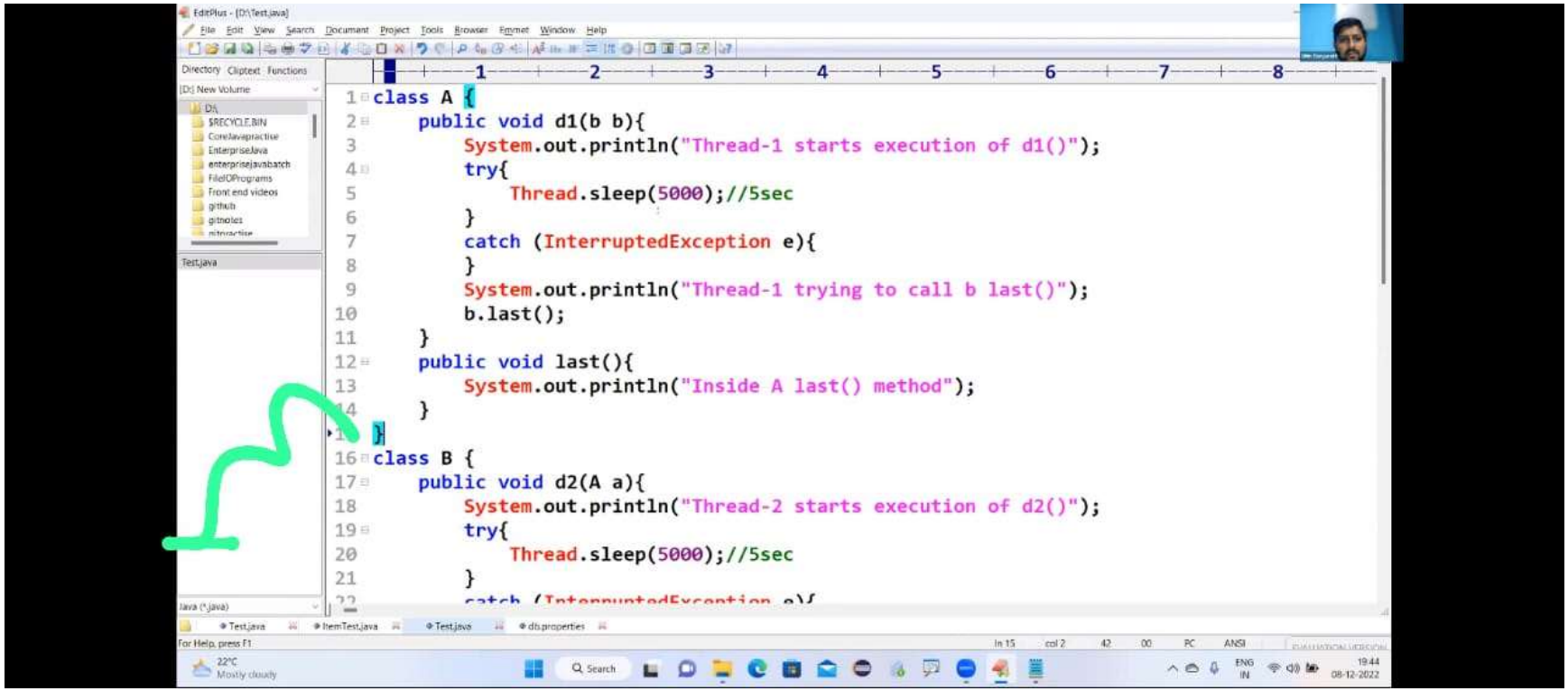
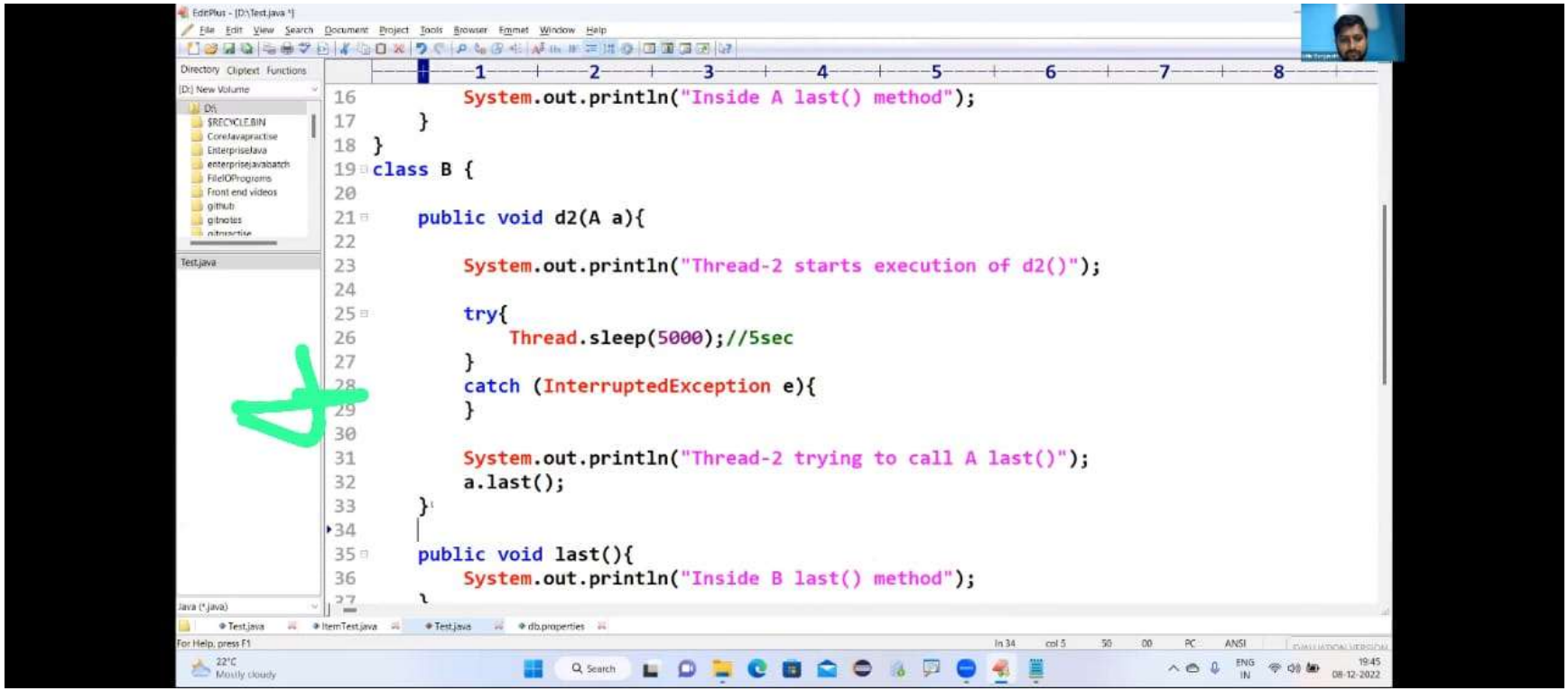
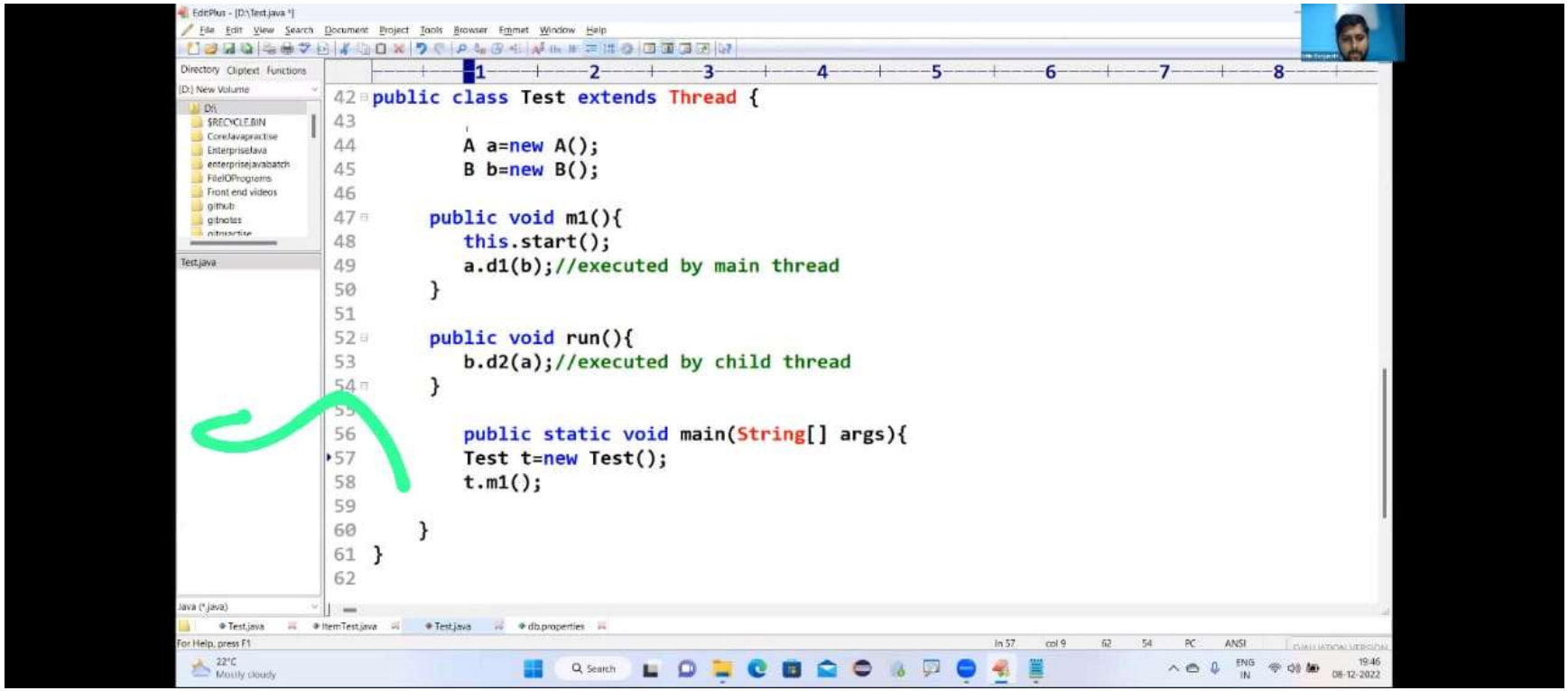
Search
ENG
IN
19:43
08-12-2022


EditPlus - [D:\Test.java]
File Edit View Search Document Project Tools Browser Emmet Window Help
Directory Cliptext Functions
[D:] New Volume
D:\
$RECYCLE.BIN
CoreJavapractise
EnterpriseJava
enterprisejavabatch
FileIOPrograms
Front end videos
github
gitnotes
Test.java
class A {
public void d1(b b){
System.out.println("Thread-1 starts execution of d1()");
try{
Thread.sleep(5000);//5sec
}
catch (InterruptedException e){
}
System.out.println("Thread-1 trying to call b last()");
b.last();
}
public void last(){
System.out.println("Inside A last() method");
}
}
class B {
public void d2(A a){
System.out.println("Thread-2 starts execution of d2()");
try{
Thread.sleep(5000);//5sec
}
Test.java
ItemTest.java
Test.java
db.properties
For Help, press F1
Search
ENG
IN
19:44
08-12-2022


EditPlus - [D:\Test.java *]
File Edit View Search Document Project Tools Browser Format Window Help
Directory Cliptext Functions
[D:] New Volume
D:\
$RECYCLE.BIN
Corejavapractise
Enterprisejava
enterprisejavabatch
FileIOPrograms
Front end videos
github
gitnotes
gitrepertire
Test.java
Java (*.java)
16 System.out.println("Inside A last() method");
17 }
18 }
19 class B {
20
21 public void d2(A a){
22
23 System.out.println("Thread-2 starts execution of d2()");
24
25 try{
26 Thread.sleep(5000);//5sec
27 }
28 catch (InterruptedException e){
29 }
30
31 System.out.println("Thread-2 trying to call A last()");
32 a.last();
33 }
34
35 public void last(){
36 System.out.println("Inside B last() method");
Test.java
ItemTest.java
Test.java
db.properties
For Help, press F1
ln 34 col 5
PC ANSI
22°C
Mostly cloudy
Search
ENG
IN
19:45
08-12-2022


EditPlus - [D:\Test.java *]
File Edit View Search Document Project Tools Browser Format Window Help
Directory Cliptext Functions
[D:] New Volume
D:\
$RECYCLE.BIN
Corejavapractise
Enterprisejava
enterprisejavabatch
FileIOPrograms
Front end videos
github
gitnotes
gitpractise
Test.java
Java (*.java)
1 2 3 4 5 6 7 8
42 public class Test extends Thread {
43
44 A a=new A();
45 B b=new B();
46
47 public void m1(){
48 this.start();
49 a.d1(b);//executed by main thread
50 }
51
52 public void run(){
53 b.d2(a);//executed by child thread
54 }
55
56 public static void main(String[] args){
57 Test t=new Test();
58 t.m1();
59
60 }
61 }
62
Test.java
ItemTest.java
Test.java
db.properties
For Help, press F1
ln 57 col 9 62 54 PC ANSI
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Search
ENG
IN
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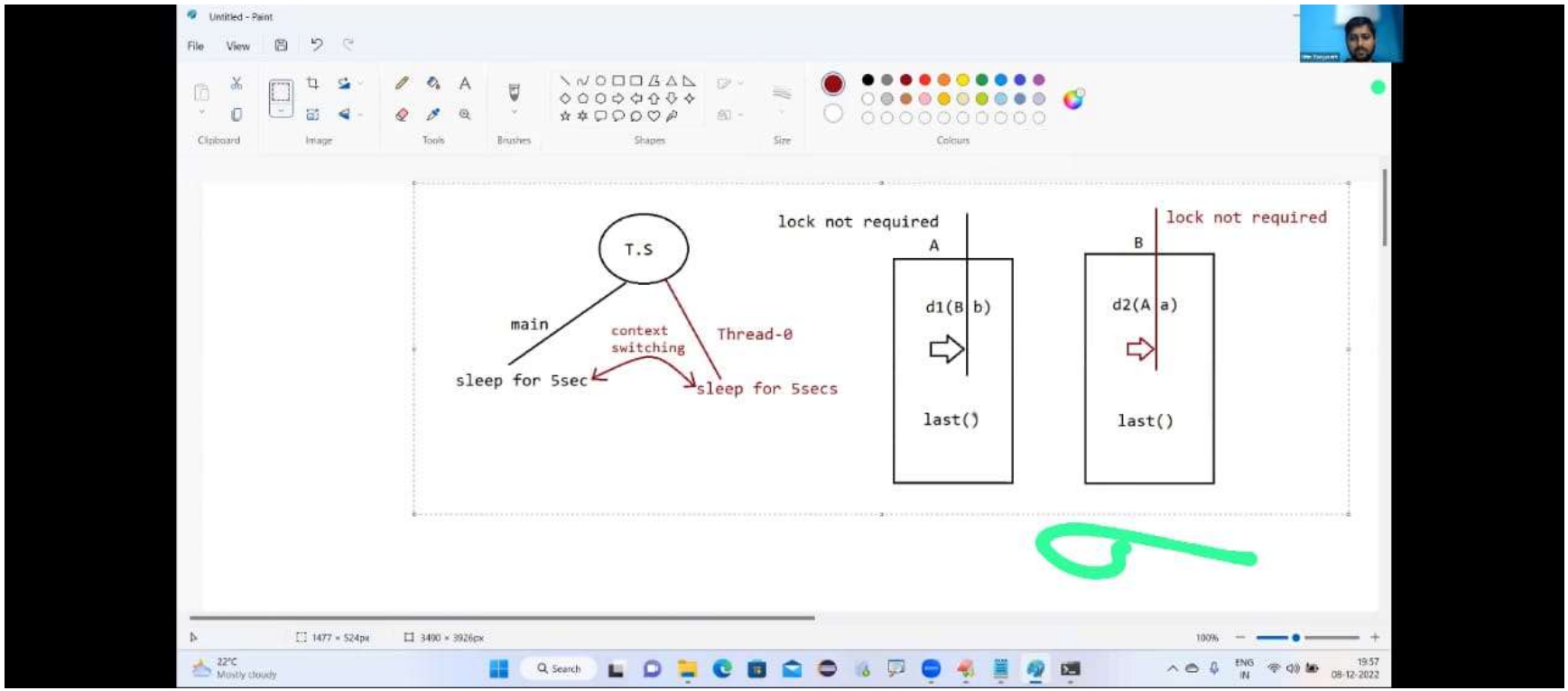
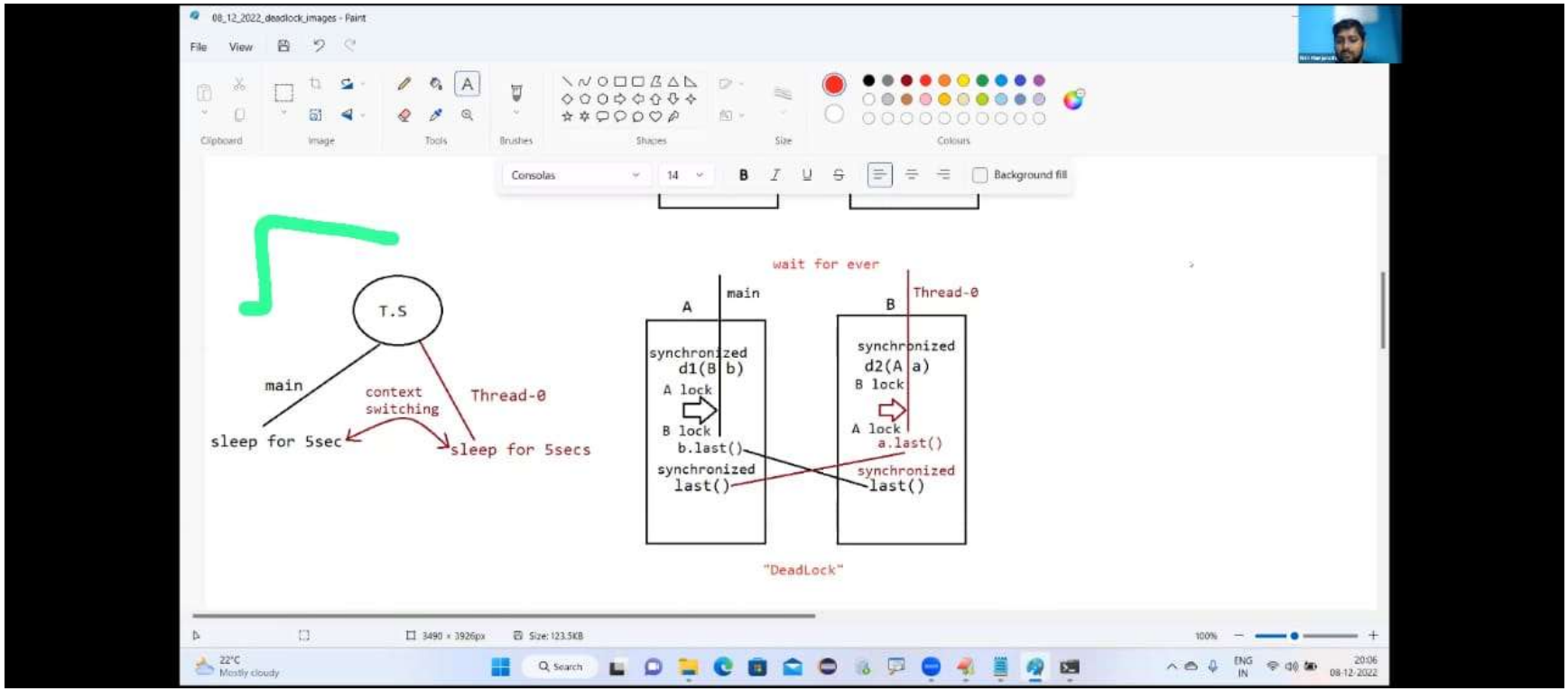
08-12-2022


Untitled - Paint
File
View
T.S
main
context switching
Thread-0
sleep for 5sec
sleep for 5secs
lock not required
A
d1(B b)
last()
lock not required
B
d2(A a)
last()


08_12_2022_deadlock_images - Paint
File
View
T.S
main
context switching
Thread-0
sleep for 5sec
sleep for 5secs
wait for ever
A
main
B
Thread-0
synchronized d1(B b)
A lock
B lock
b.last()
synchronized last()
synchronized d2(A a)
B lock
A lock
a.last()
synchronized last()
"DeadLock"

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DeadLock vs starvation

==========

Long waiting of a thread, where waiting never ends is termed "deadlock".

Long waiting of a thread, where waiting ends at certain point is called "starvation".

eg:: Assume we have 1cr threads, where all 1cr threads have priority is 10,but one thread is there which has priority 0,now the thread with a priority-0 has to wait for long time but still it gets a chance,but it has to wait for long time, this scenario is called "Starvation".

Note::

Low priority thread has to wait untill completing all priority threads but ends at certain point which is nothing but starvation.

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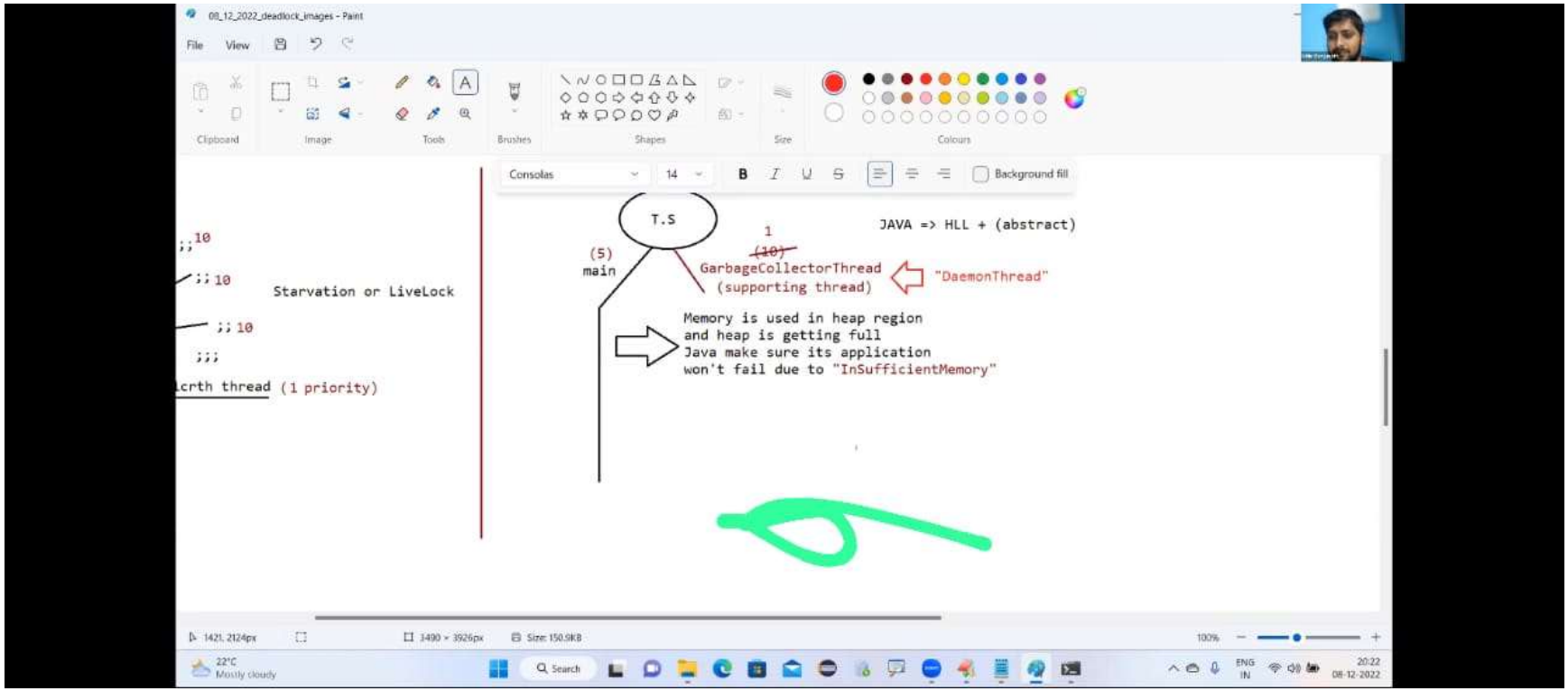
08_12_2022_deadlock_images - Paint
File
View
Clipboard
Image
Tools
Brushes
Shapes
Size
Colours
Consolas
14
Background fill
;;10
;; 10
Starvation or LiveLock
;; 10
;;;
crth thread (1 priority)
T.S
(5)
main
1
(10)
GarbageCollectorThread
(supporting thread)
"DaemonThread"
JAVA => HLL + (abstract)
Memory is used in heap region
and heap is getting full
Java make sure its application
won't fail due to "InSufficientMemory"
1421, 2124px
3490 × 3926px
Size: 150.9KB
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ENG
IN
20:22
08-12-2022

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Daemon Threads
==========
The thread which is executing in the background is called "DaemonThread".
eg: AttachListener,SignalDispatcher,GarbageCollector,....

remember the example of movie
1. producer
2. director
3. music director
4. ....
5. ....
6. ....

MainObjective of DaemonThread
The main objective of DaemonThread, to provide support for Non-Daemon threads(main thread).
eg:: if main threads runs with low memory then jvm will call GarbageCollector thread, to destroy the useless objects,so that no of bytes of free memeory will be improved with this free memory main thread can continue its execution.

Ln 191, Col 1 110% Windows (CRLF) UTF-8

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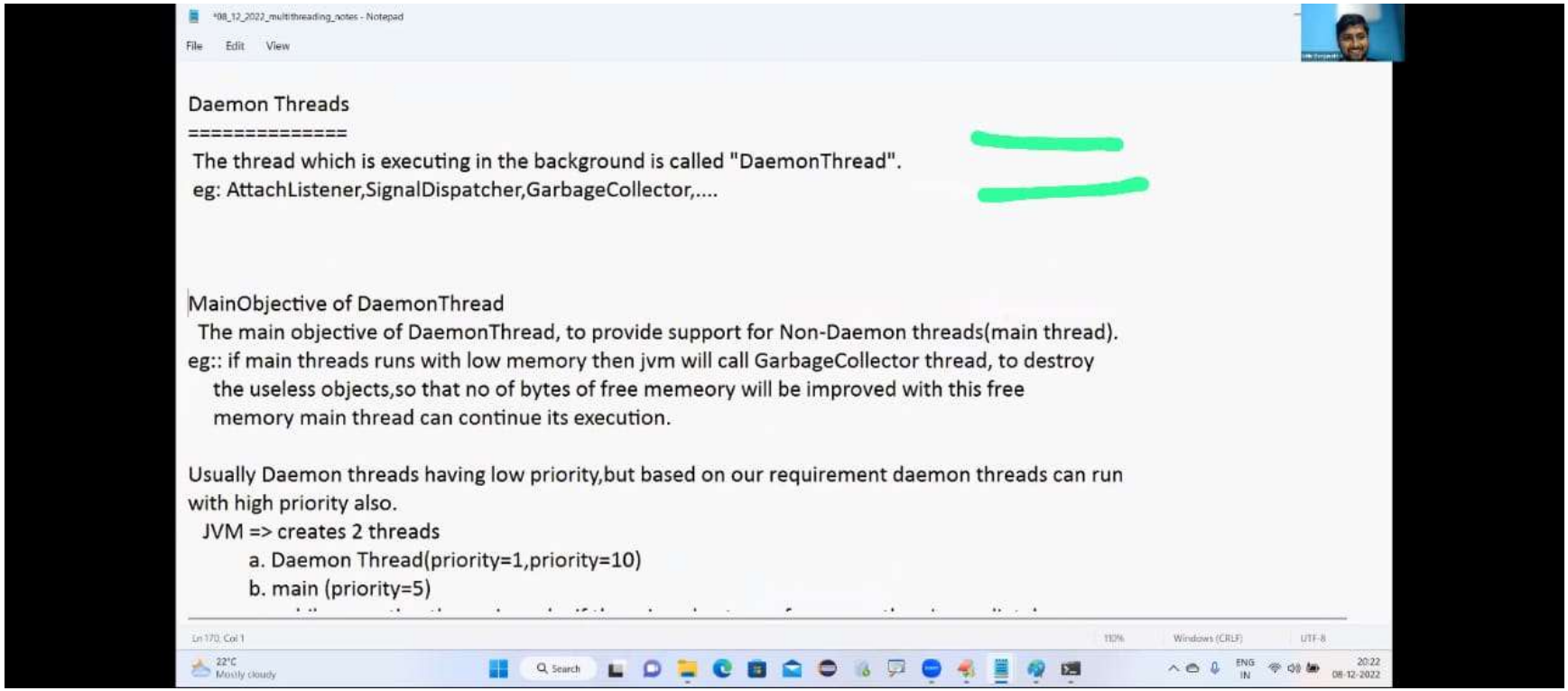
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eg:: if main threads runs with low memory then jvm will call GarbageCollector thread, to destroy
the useless objects,so that no of bytes of free memeory will be improved with this free
memory main thread can continue its execution.
Usually Daemon threads having low priority,but based on our requirement daemon threads can run
with high priority also.
JVM => creates 2 threads
a. Daemon Thread(priority=1,priority=10)
b. main (priority=5)
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UTF-8
22°C
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Search
ENG
IN
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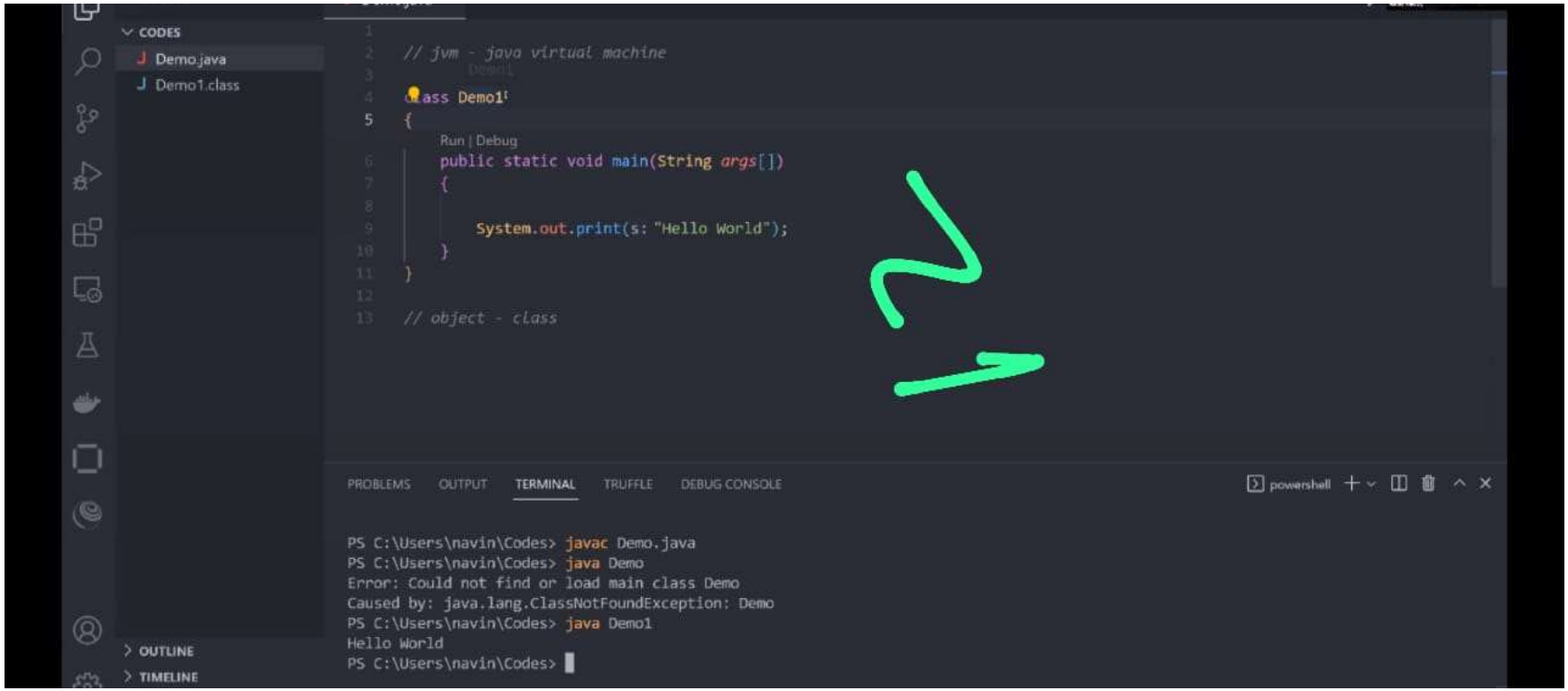
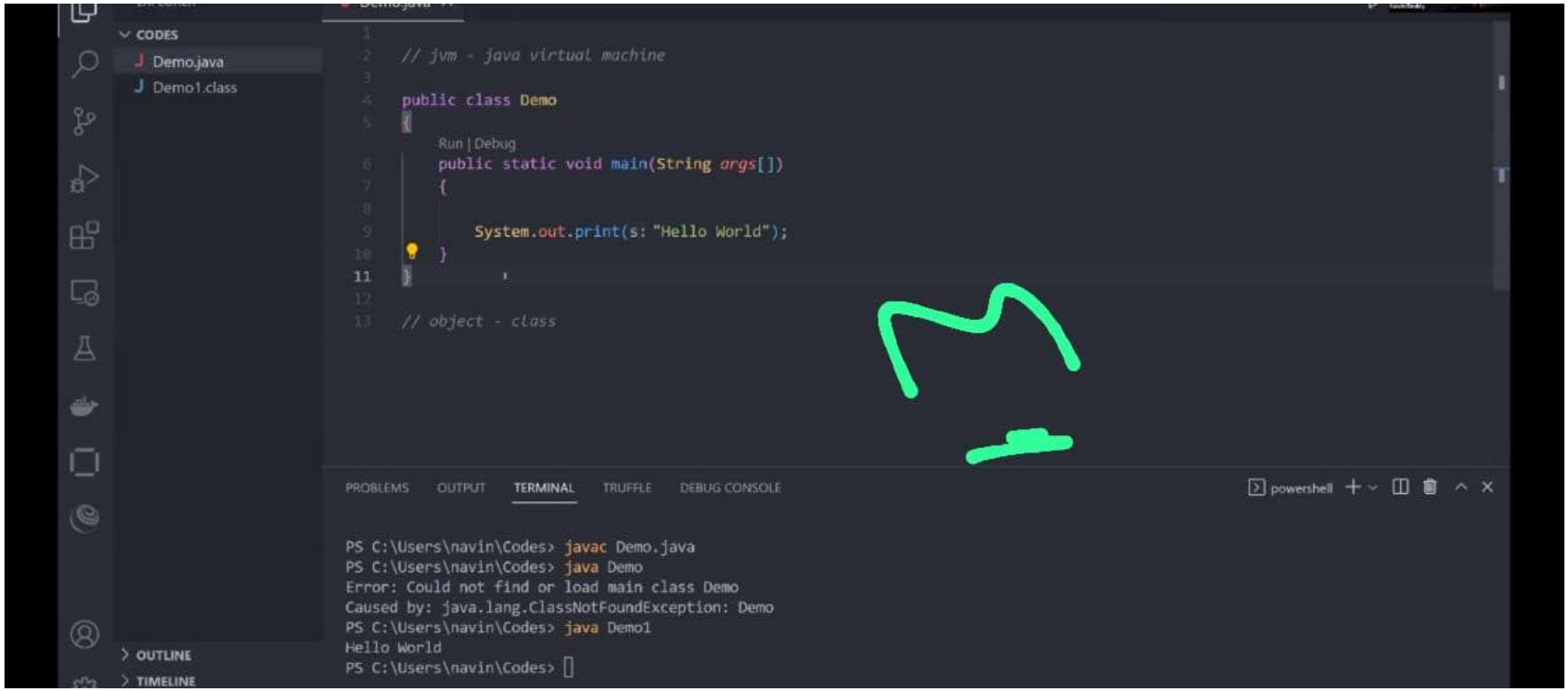
08-12-2022


CODES
Demo.java
Demo1.class
// jvm - java virtual machine
class Demo1
{
Run | Debug
public static void main(String args[])
{
System.out.print(s: "Hello World");
}
}
// object - class
PROBLEMS
OUTPUT
TERMINAL
TRUFFLE
DEBUG CONSOLE
powershell
PS C:\Users\navin\Codes> javac Demo.java
PS C:\Users\navin\Codes> java Demo
Error: Could not find or load main class Demo
Caused by: java.lang.ClassNotFoundException: Demo
PS C:\Users\navin\Codes> java Demo1
Hello World
PS C:\Users\navin\Codes>
OUTLINE
TIMELINE


CODES
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{
Run | Debug
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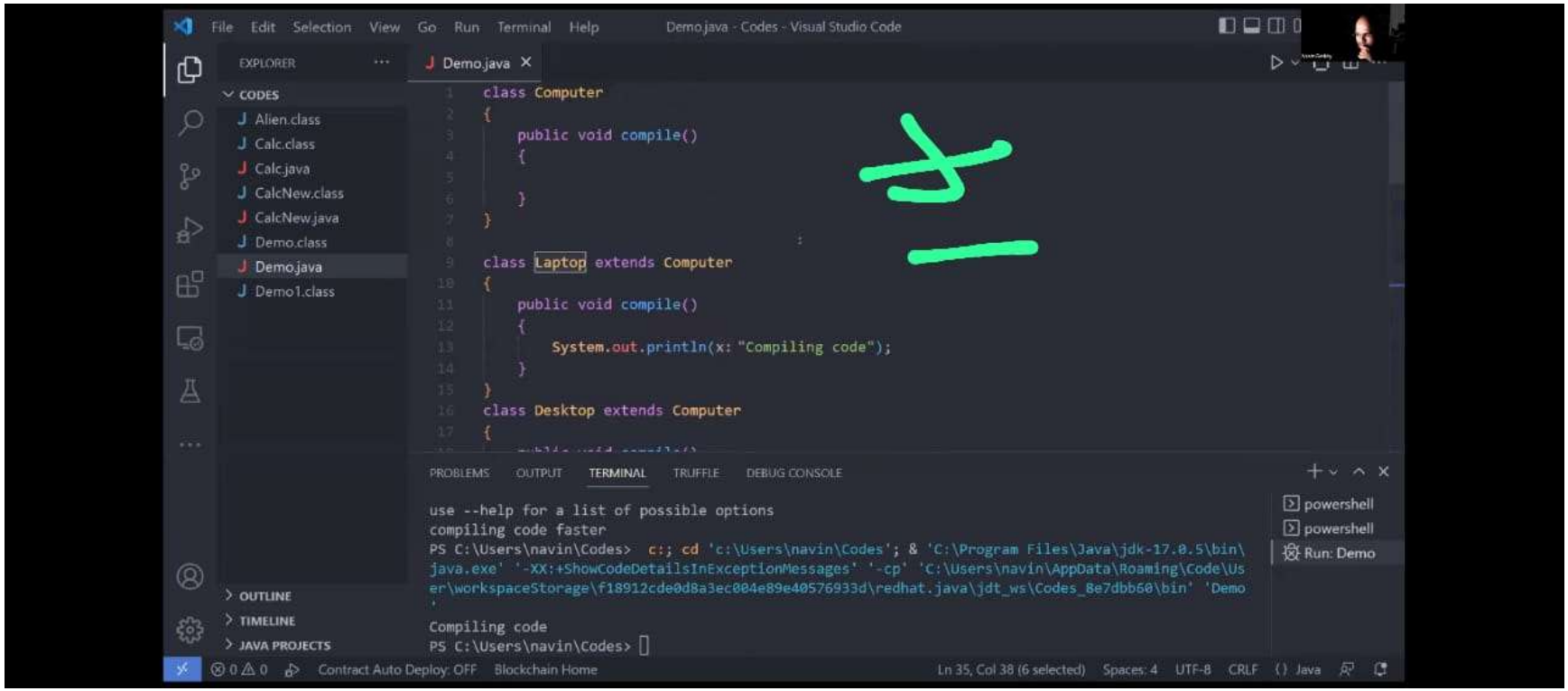
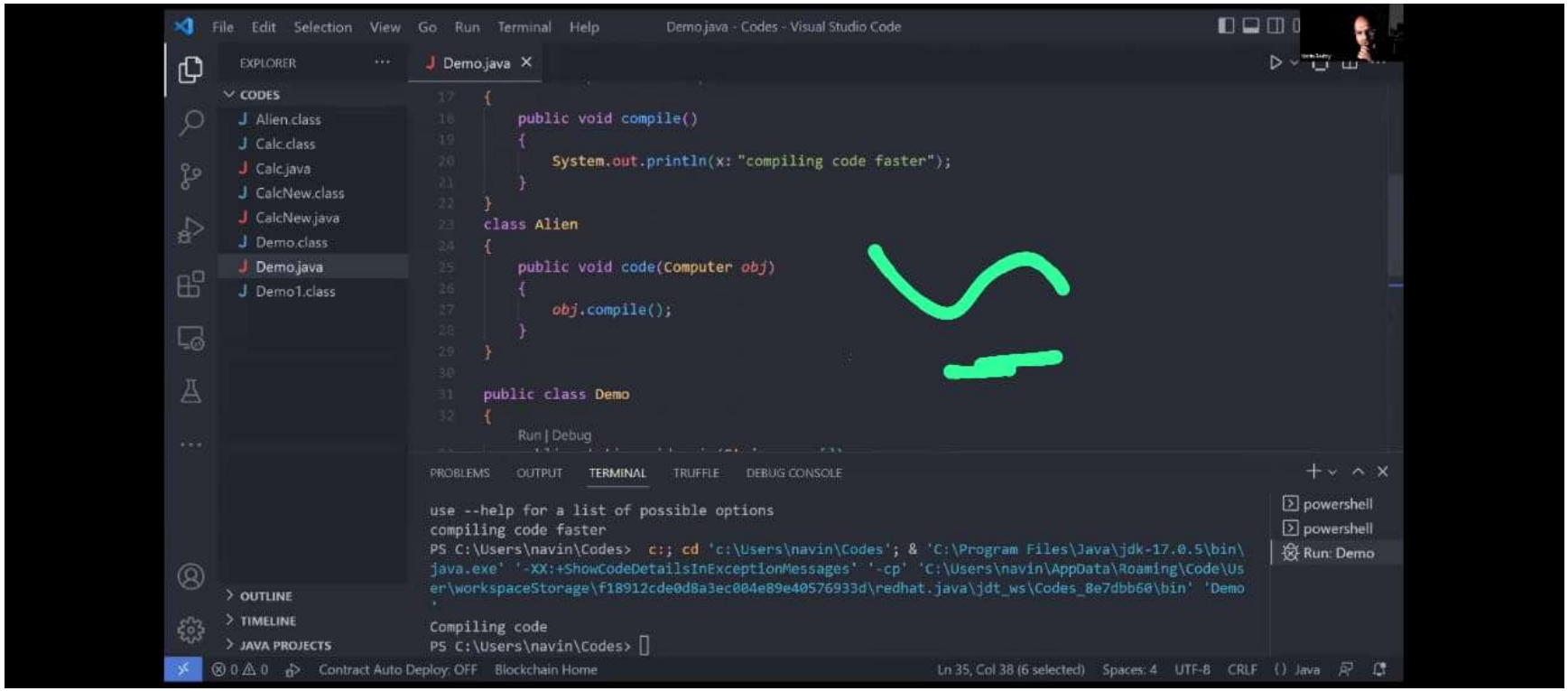
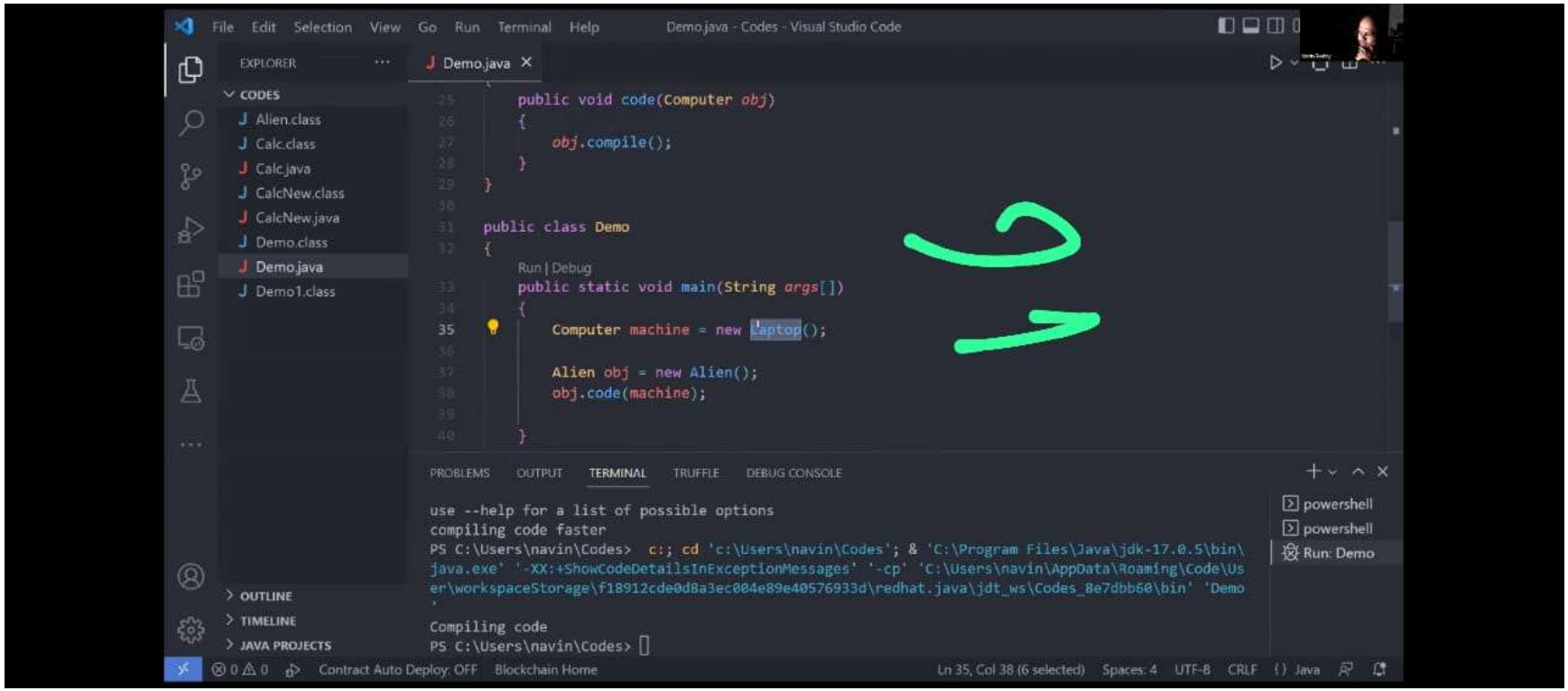
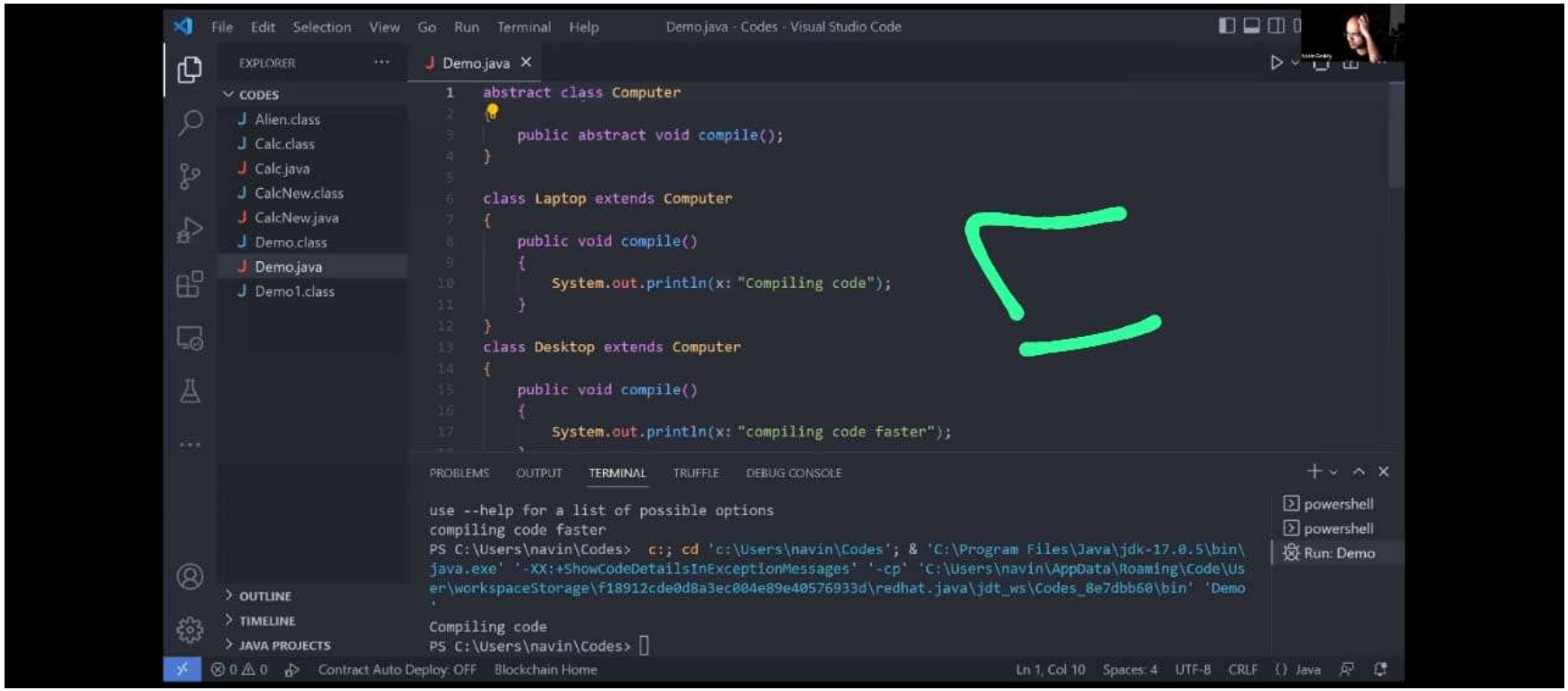
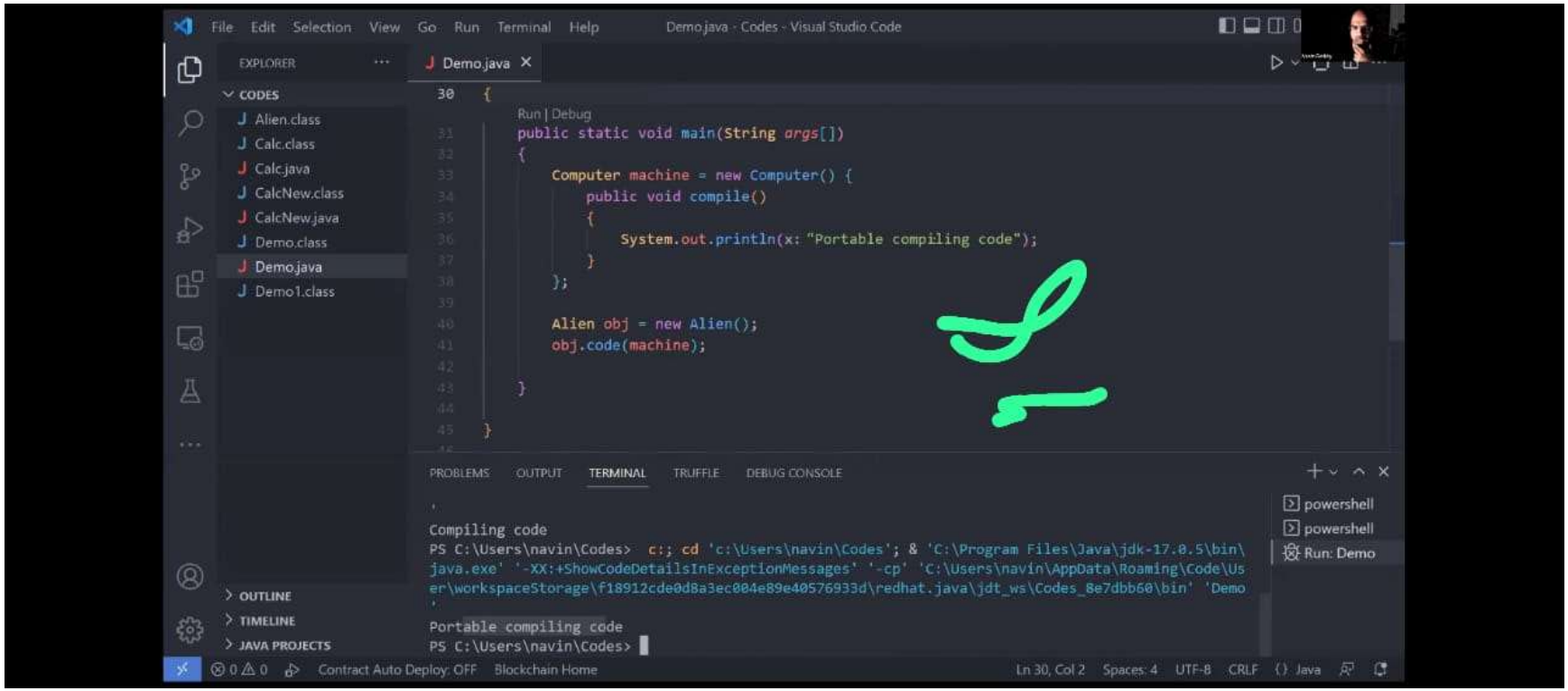
}
}
// object - class
PROBLEMS
OUTPUT
TERMINAL
TRUFFLE
DEBUG CONSOLE
powershell
PS C:\Users\navin\Codes> javac Demo.java
PS C:\Users\navin\Codes> java Demo
Error: Could not find or load main class Demo
Caused by: java.lang.ClassNotFoundException: Demo
PS C:\Users\navin\Codes> java Demo1
Hello World
PS C:\Users\navin\Codes>
OUTLINE
TIMELINE

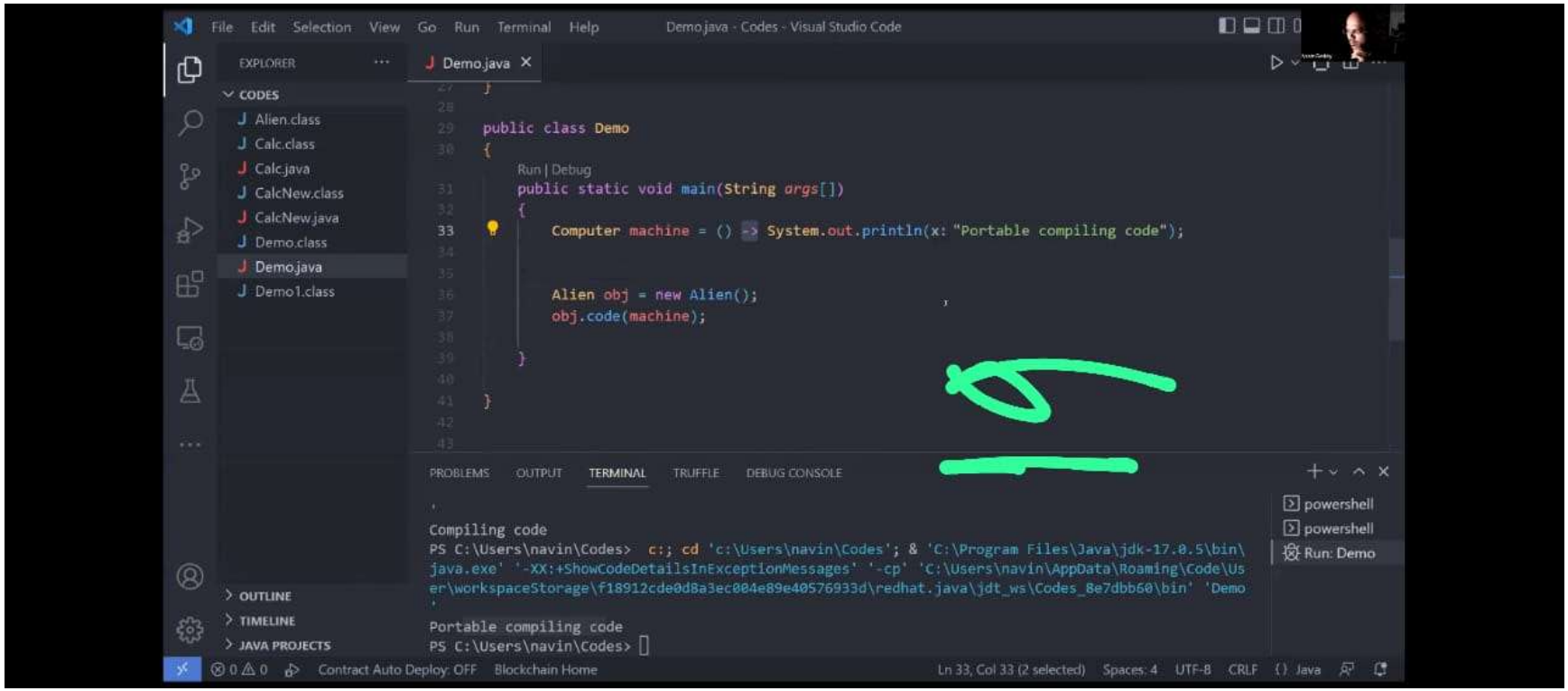

File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
Demo.java
class Computer
{
public void compile()
{
}
}
class Laptop extends Computer
{
public void compile()
{
System.out.println(x: "Compiling code");
}
}
class Desktop extends Computer
{
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
use --help for a list of possible options
compiling code faster
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
OUTLINE
TIMELINE
JAVA PROJECTS
Contract Auto Deploy: OFF
Blockchain Home
Ln 35, Col 38 (6 selected)
Spaces: 4
UTF-8
CRLF
Java

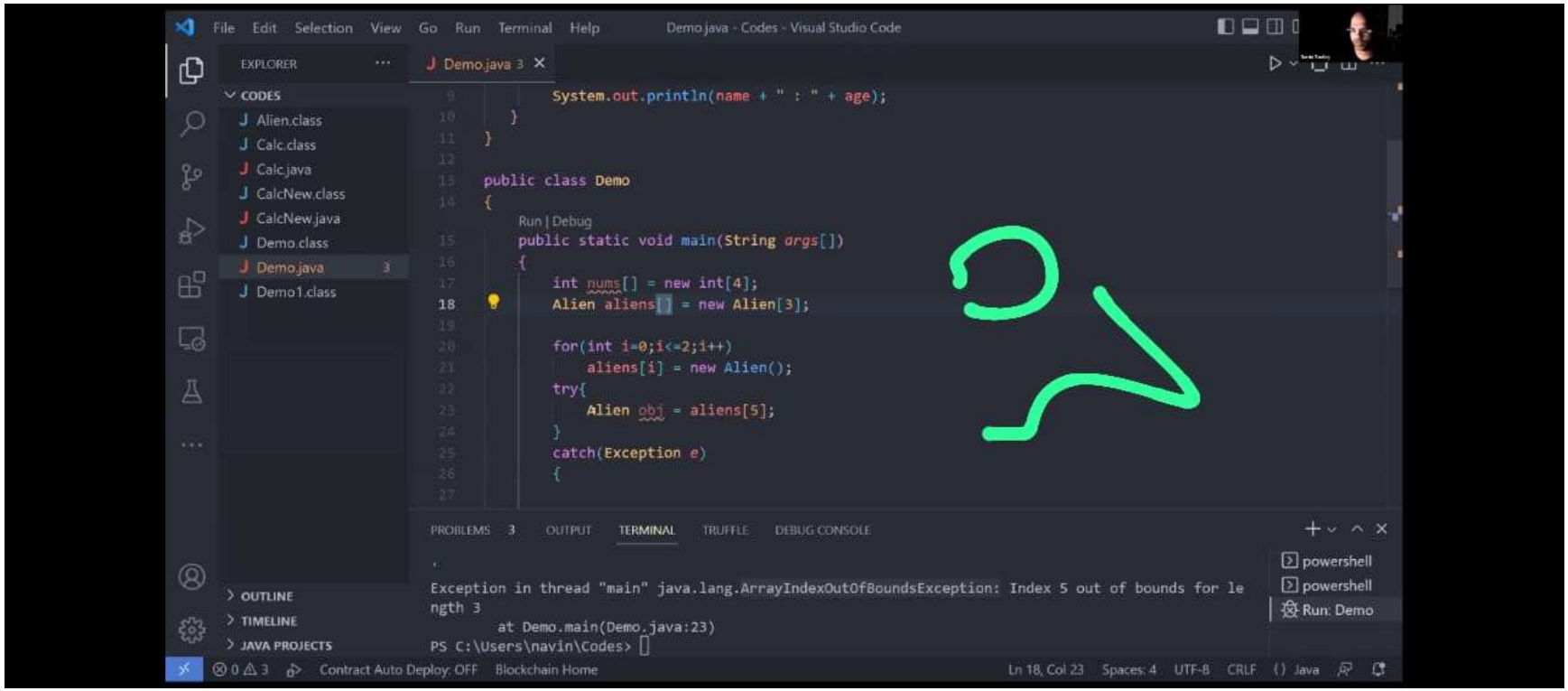

File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
Demo.java
{
public void compile()
{
System.out.println(x: "compiling code faster");
}
}
class Alien
{
public void code(Computer obj)
{
obj.compile();
}
}
public class Demo
{
Run | Debug
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
use --help for a list of possible options
compiling code faster
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
OUTLINE
TIMELINE
JAVA PROJECTS
Contract Auto Deploy: OFF
Blockchain Home
Ln 35, Col 38 (6 selected)
Spaces: 4
UTF-8
CRLF
Java


File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
OUTLINE
TIMELINE
JAVA PROJECTS
Demo.java
public void code(Computer obj)
{
obj.compile();
}
}
public class Demo
{
Run | Debug
public static void main(String args[])
{
Computer machine = new Laptop();
Alien obj = new Alien();
obj.code(machine);
}
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
use --help for a list of possible options
compiling code faster
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
Contract Auto Deploy: OFF
Blockchain Home
Ln 35, Col 38 (6 selected)
Spaces: 4
UTF-8
CRLF
Java


File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
OUTLINE
TIMELINE
JAVA PROJECTS
Demo.java
1 abstract class Computer
2 {
3 public abstract void compile();
4 }
5
6 class Laptop extends Computer
7 {
8 public void compile()
9 {
10 System.out.println(x: "Compiling code");
11 }
12 }
13 class Desktop extends Computer
14 {
15 public void compile()
16 {
17 System.out.println(x: "compiling code faster");
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
use --help for a list of possible options
compiling code faster
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
Contract Auto Deploy: OFF
Blockchain Home
Ln 1, Col 10
Spaces: 4
UTF-8
CRLF
Java


File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
OUTLINE
TIMELINE
JAVA PROJECTS
Demo.java
30 {
Run | Debug
31 public static void main(String args[])
32 {
33 Computer machine = new Computer() {
34 public void compile()
35 {
36 System.out.println(x: "Portable compiling code");
37 }
38 };
39
40 Alien obj = new Alien();
41 obj.code(machine);
42
43 }
44
45 }
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
Compiling code
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Portable compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
Contract Auto Deploy: OFF
Blockchain Home
Ln 30, Col 2
Spaces: 4
UTF-8
CRLF
Java


File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java
Demo1.class
OUTLINE
TIMELINE
JAVA PROJECTS
Demo.java
public class Demo
{
Run | Debug
public static void main(String args[])
{
Computer machine = () -> System.out.println(x: "Portable compiling code");
Alien obj = new Alien();
obj.code(machine);
}
}
PROBLEMS OUTPUT TERMINAL TRUFFLE DEBUG CONSOLE
Compiling code
PS C:\Users\navin\Codes> c:; cd 'c:\Users\navin\Codes'; & 'C:\Program Files\Java\jdk-17.0.5\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\navin\AppData\Roaming\Code\User\workspaceStorage\f18912cde0d8a3ec004e89e40576933d\redhat.java\jdt_ws\Codes_8e7dbb60\bin' 'Demo'
Portable compiling code
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
Contract Auto Deploy: OFF
Blockchain Home
Ln 33, Col 33 (2 selected)
Spaces: 4
UTF-8
CRLF
Java


File Edit Selection View Go Run Terminal Help
Demo.java - Codes - Visual Studio Code
EXPLORER
CODES
Alien.class
Calc.class
Calc.java
CalcNew.class
CalcNew.java
Demo.class
Demo.java 3
Demo1.class
Demo.java 3
System.out.println(name + " : " + age);
}
}
public class Demo
{
Run | Debug
public static void main(String args[])
{
int nums[] = new int[4];
Alien aliens[] = new Alien[3];
for(int i=0;i<=2;i++)
aliens[i] = new Alien();
try{
Alien obj = aliens[5];
}
catch(Exception e)
{
PROBLEMS 3
OUTPUT
TERMINAL
TRUFFLE
DEBUG CONSOLE
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: Index 5 out of bounds for length 3
at Demo.main(Demo.java:23)
PS C:\Users\navin\Codes>
powershell
powershell
Run: Demo
OUTLINE
TIMELINE
JAVA PROJECTS
Contract Auto Deploy: OFF
Blockchain Home
Ln 18, Col 23
Spaces: 4
UTF-8
CRLF
Java