

# Fundamentals - 1

- Data Types
- Variables
- Constants

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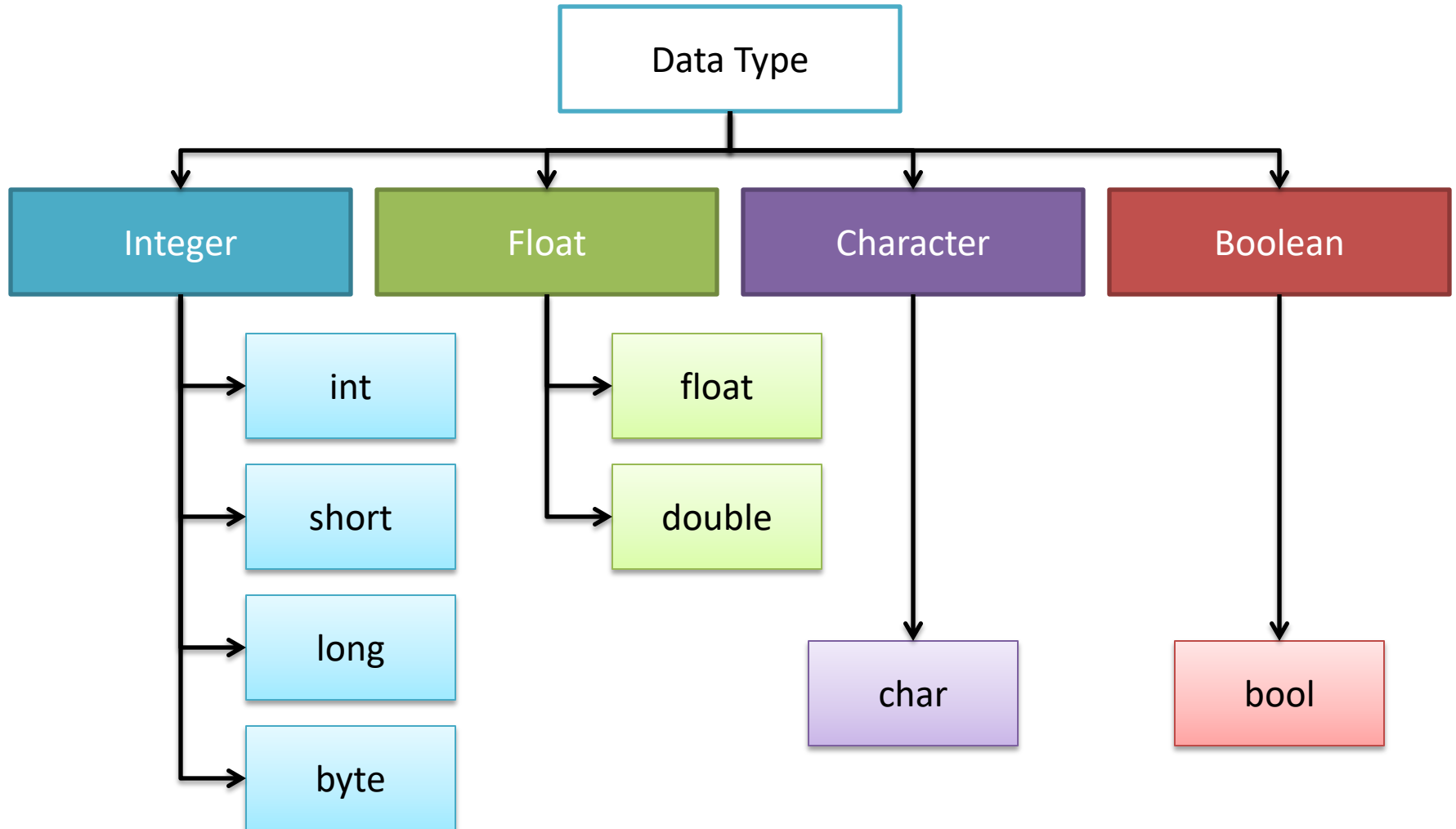
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# Data Types Supported By Java



# Integer

Type	Storage Required	Range
byte	1 byte	-128 to 127
short	2 bytes	-32768 to 32767
int	4 bytes	-2147483648 to 2147483647
long	8 bytes	-9223372036854775808 to 9223372036854775807

<http://bit.ly/2m0loFz>

# Decimal

Type	Storage Required	Range
float	8 byte	approximately $\pm 3.40282347\text{E}+38\text{F}$ (6-7 significant decimal digits)
double	16 bytes	approximately $\pm 1.797693134862315 \text{ 0E}+308$ (15 significant decimal digits)

<http://bit.ly/2KJUIZF>

# Character

Type	Storage Required	Range
char	2 bytes	0 to 65,536 (unsigned)

# Boolean

Type	Storage Required	Range
bool	-	true or false

# Escape Sequence

Escape Sequence	Name
<code>\n</code>	New Line
<code>\b</code>	Backspace
<code>\t</code>	Tab
<code>\r</code>	Carriage Return
<code>\"</code>	Double Quote
<code>\'</code>	Single Quote
<code>\\</code>	Backslash

# Variables in Java

- Variables are data holders in the programming language.
- A block of memory is named and accessed using variable name.
- The values of the variable may change during program execution.
- All variables are statically typed.
- You can't use the variable which is not declared.

# Syntax to Declare Variable

`datatype variable_name = value`

`int a = 10;`

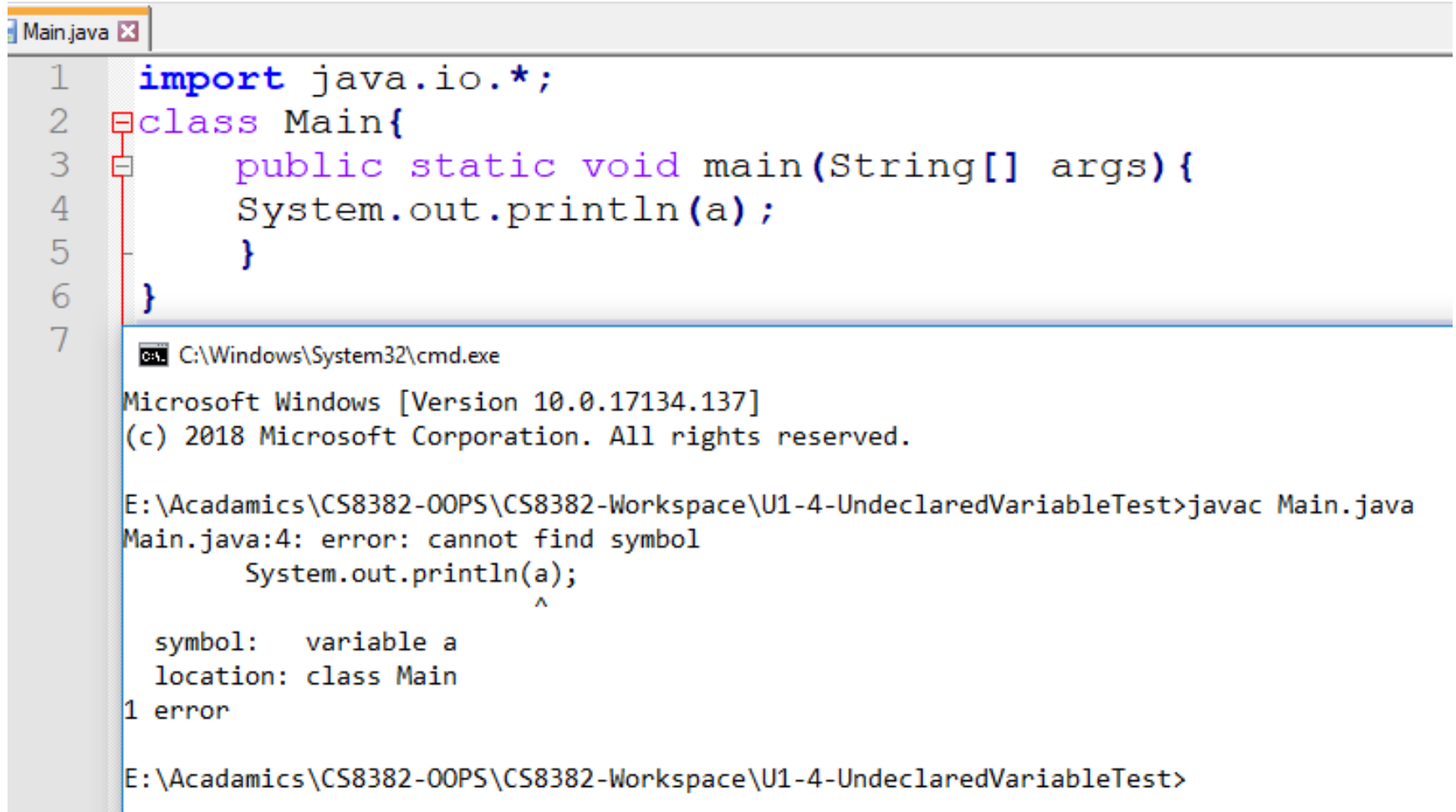
Single Step

`int a;  
a=10;`

Multi Step



# Demo of Undeclared Variable Usage



```
1  import java.io.*;
2  class Main{
3      public static void main(String[] args){
4      System.out.println(a);
5      }
6  }
7
```

C:\Windows\System32\cmd.exe

Microsoft Windows [Version 10.0.17134.137]  
(c) 2018 Microsoft Corporation. All rights reserved.

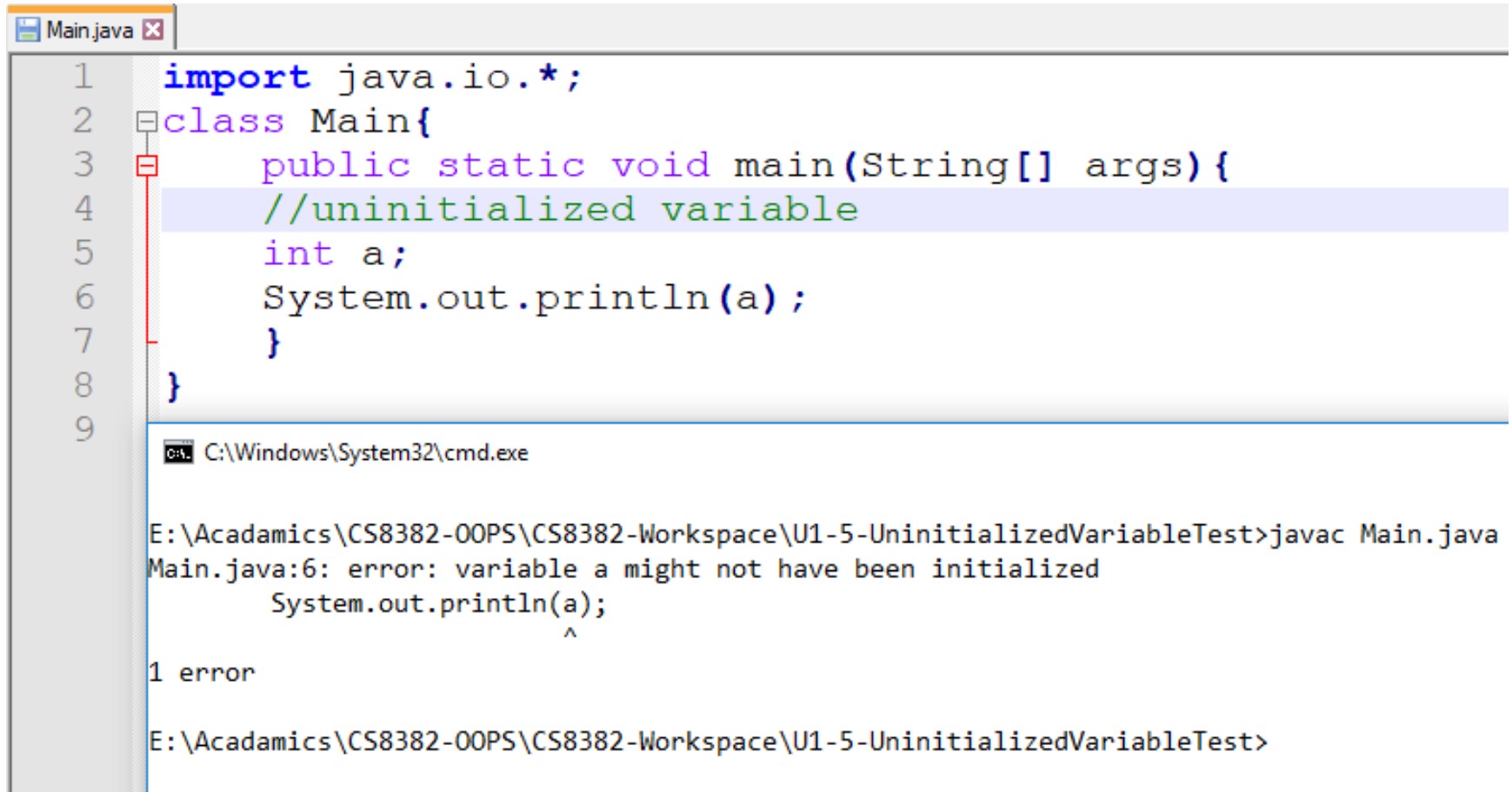
E:\Academics\CS8382-00PS\CS8382-Workspace\U1-4-UndeclaredVariableTest>javac Main.java

Main.java:4: error: cannot find symbol  
System.out.println(a);  
                    ^  
symbol: variable a  
location: class Main

1 error

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-4-UndeclaredVariableTest>

# Demo of Uninitialized Variable Usage



The screenshot shows an IDE window titled 'Main.java'. The code is as follows:

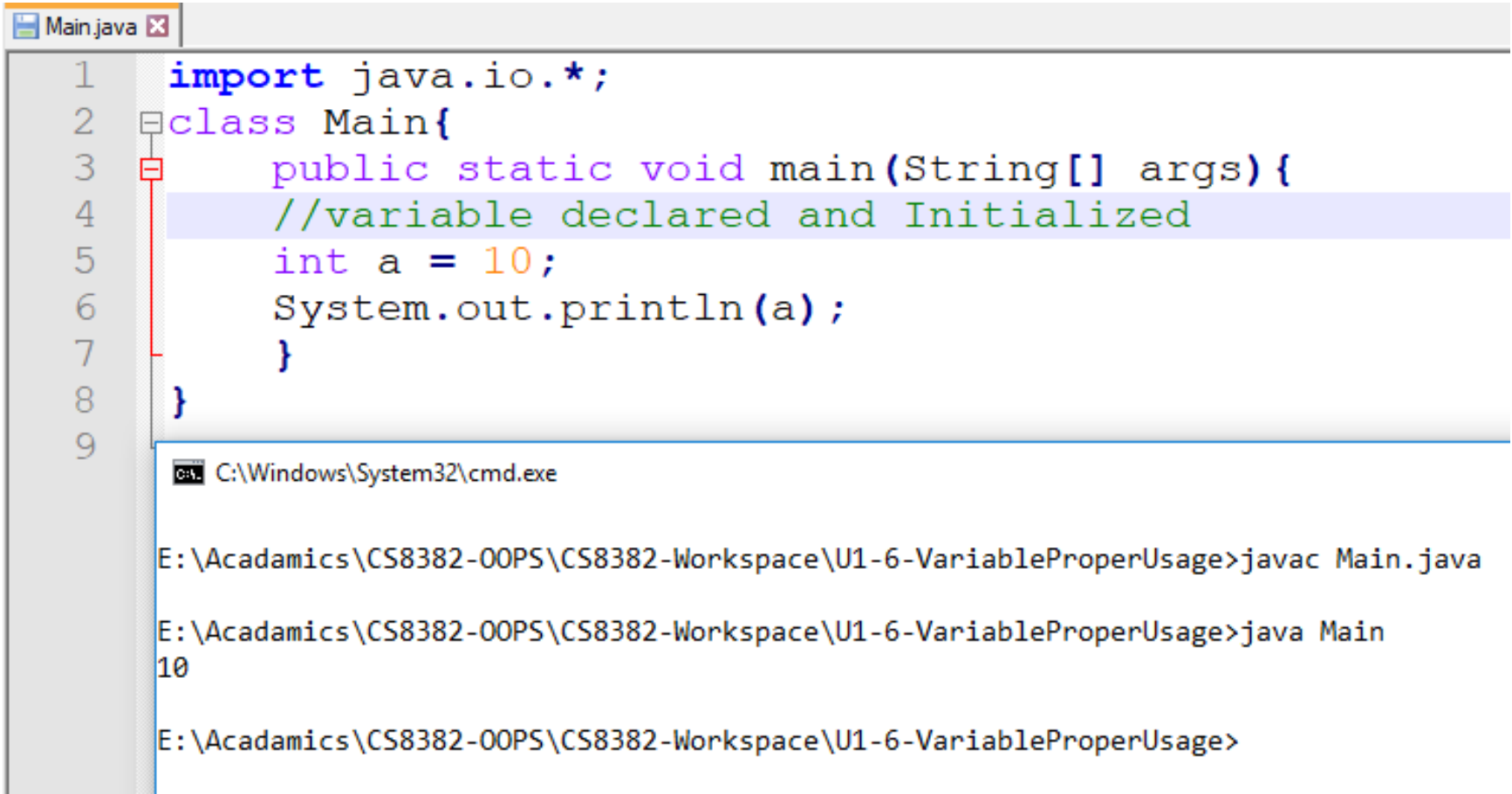
```
1 import java.io.*;
2 class Main{
3     public static void main(String[] args){
4         //uninitialized variable
5         int a;
6         System.out.println(a);
7     }
8 }
9
```

Below the code editor, a command prompt window is open, showing the command to compile the code:

```
C:\Windows\System32\cmd.exe
E:\Academics\CS8382-00PS\CS8382-Workspace\U1-5-UninitializedVariableTest>javac Main.java
Main.java:6: error: variable a might not have been initialized
    System.out.println(a);
                       ^
1 error
E:\Academics\CS8382-00PS\CS8382-Workspace\U1-5-UninitializedVariableTest>
```

The error message indicates that the variable 'a' has been used before it has been assigned a value, which is why the compilation failed.

# Demo of Proper use of Variable



The screenshot displays a Java IDE with a file named 'Main.java' open. The code in the file is as follows:

```
1 import java.io.*;
2 class Main{
3     public static void main(String[] args){
4         //variable declared and Initialized
5         int a = 10;
6         System.out.println(a);
7     }
8 }
9
```

Below the code editor, a command prompt window is open, showing the following commands and their output:

```
C:\Windows\System32\cmd.exe

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-6-VariableProperUsage>javac Main.java

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-6-VariableProperUsage>java Main
10

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-6-VariableProperUsage>
```

# Constants

- Constants are unchangeable variable.
- It can be assigned only once.
- Then further modification of the value is not allowed.
- When ever you need a variable that hold constants for operation can be created as constant variable.
- It is declared with final keyword.
- Demo
  - <https://youtu.be/AXSnWYz8mEk>

# Syntax to Declare Final Variable

```
final datatype variable_name = value
```

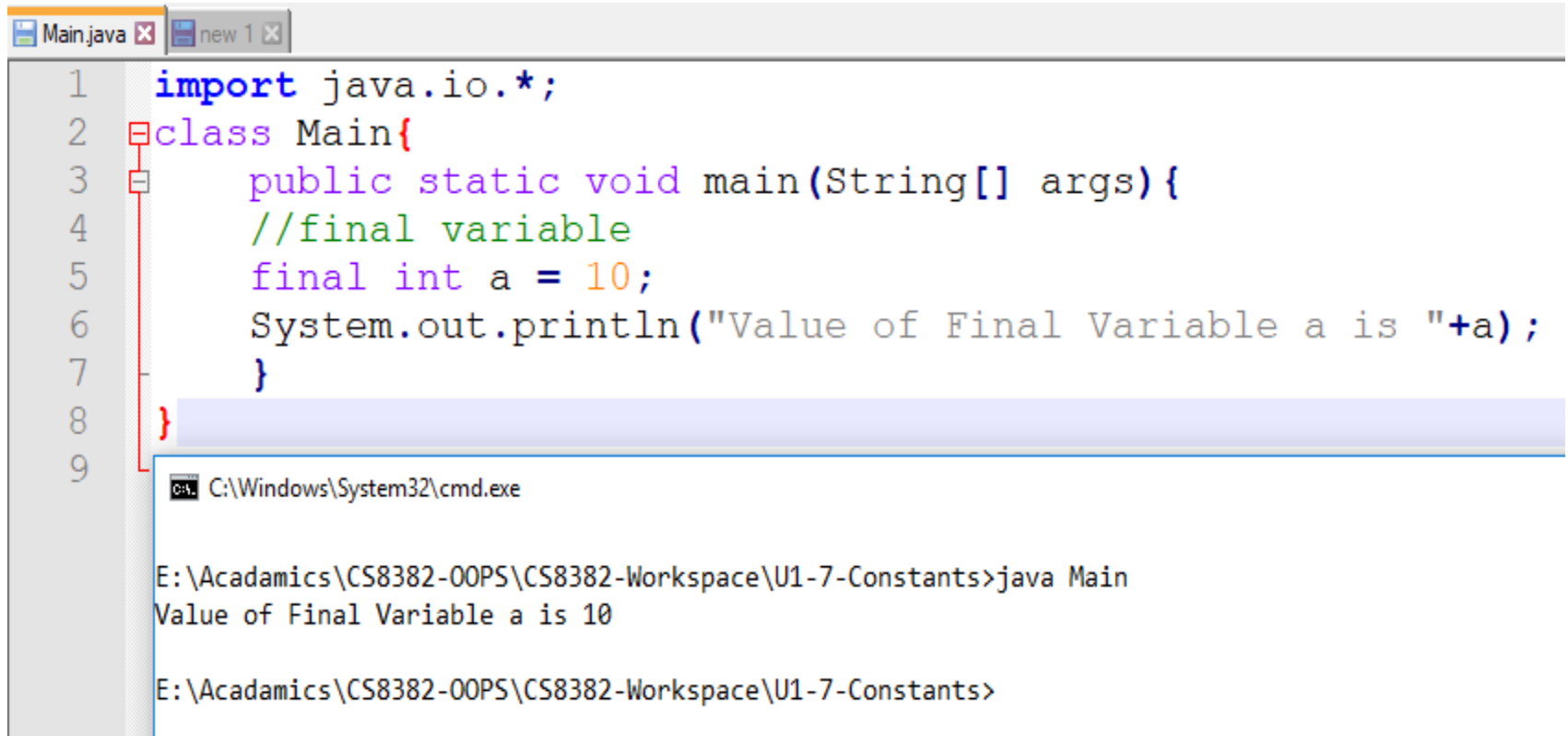
```
final int a = 10
```

Recommended

```
final int a;  
a=10
```

Accepted

# Demo of Final Variable



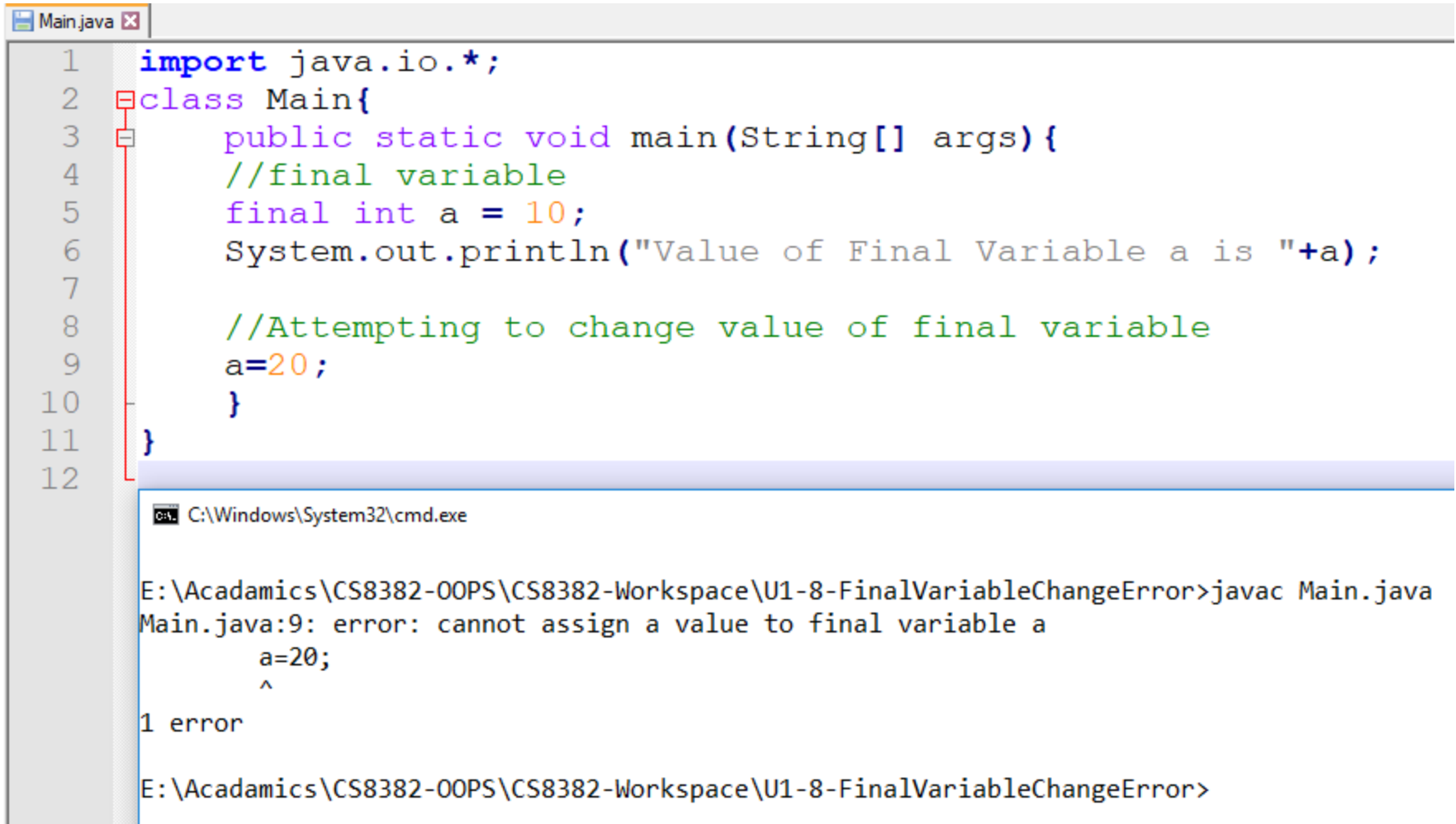
```
1  import java.io.*;
2  class Main{
3      public static void main(String[] args){
4          //final variable
5          final int a = 10;
6          System.out.println("Value of Final Variable a is "+a);
7      }
8  }
9
```

C:\Windows\System32\cmd.exe

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-7-Constants>java Main  
Value of Final Variable a is 10

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-7-Constants>

# Trying to change final value



```
1  import java.io.*;
2  class Main{
3      public static void main(String[] args){
4          //final variable
5          final int a = 10;
6          System.out.println("Value of Final Variable a is "+a);
7
8          //Attempting to change value of final variable
9          a=20;
10     }
11 }
12
```

C:\Windows\System32\cmd.exe

```
E:\Academics\CS8382-00PS\CS8382-Workspace\U1-8-FinalVariableChangeError>javac Main.java
Main.java:9: error: cannot assign a value to final variable a
    a=20;
    ^
1 error

E:\Academics\CS8382-00PS\CS8382-Workspace\U1-8-FinalVariableChangeError>
```

# Thank You

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