Week 1 Day 2

Intro to Java

Java: What is it?

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Java is a programming language that is:

- High leveled
- Compiled
- Strongly/Strictly typed
- Object Oriented

Java: Why?

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Java has many advantages including:

- Platform independent
- Very popular, huge developer base
- Object Oriented
- Simple to learn
- Free, and supported by Oracle
- Automatic memory management, and garbage collection

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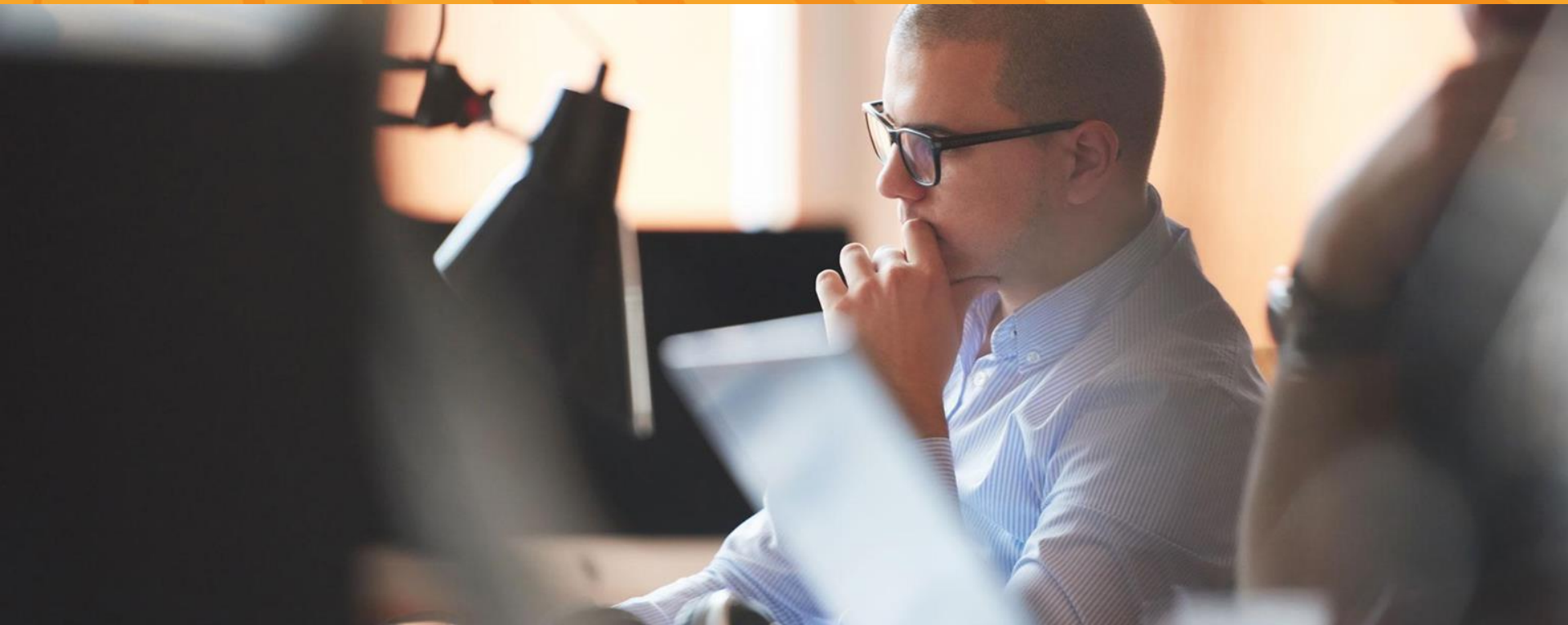
Writing and compiling our first program



Java: JDK vs JRE vs JDK

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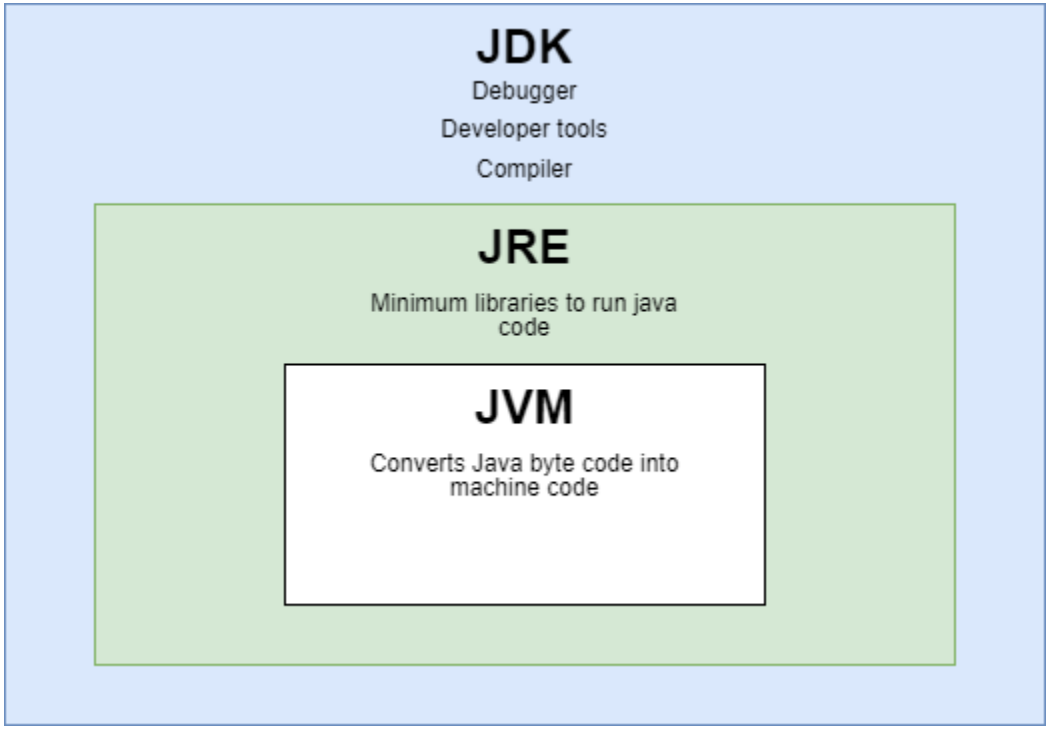
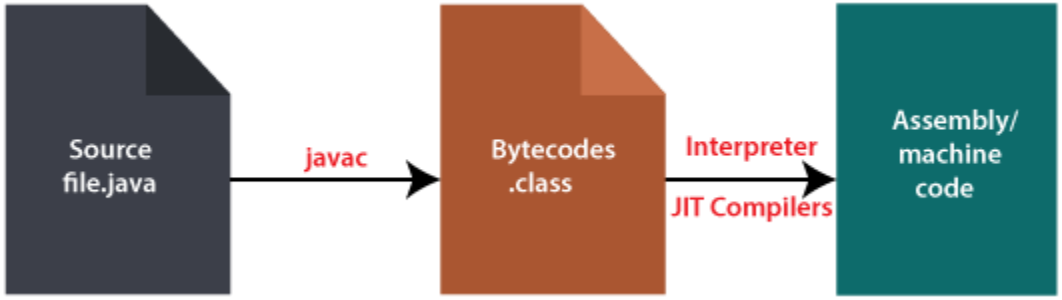
- JDK: Java Development Kit
- JRK: Java Runtime Kit
- JVM: Java Virtual Machine



Java Compilation: Whats Happening?



1. JDK compiler converts .java to .class
2. JRE runner reads .class
3. JRE calls the JVM to run the code on any machine

Source: https://static.javatpoint.com/core/images/how-to-create-a-class-file-in-java.png

Java: Classes and Objects

- Classes
  - Blueprints for objects
- Objects
  - Virtualization of real-world objects in code
  - Consists of:
    - States (property attributes)
    - Behaviors (functions)
    - Identity (name)

Java: Primitive Data Types

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Datatype	Size	Values
boolean	1 bit	true or false
byte	8 bit integer	-128 to 127
short	16 bit integer	-32768 to 32767
int	32 bit integer	~ -2 billion to 2 billion
long	64 bit integer	-2^64 to 2^64-1
float	32 bit floating point	-3.40252357 x 10^34 to 1.40239846 x 10^-45
double	64 bit floating point	-1.7976... x 10^308 to 4.9407... x 10^-324
char	16 bit unicode character	
String	Not a prim, but treated like one	

Default values:

- boolean: false
- char: \u000 (0)
- int: 0
- float: 0.0f
- reference: (objects) null

Datatype Casting:

- Widening: occurs automatically, converting smaller to larger
- Narrowing: manual, larger to smaller, could cut off data

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Java Hands on w/Primitives

Java: Methods, Parameters, main

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- Methods
  - Blocks of code which only run when called
  - Declared inside of a class, creates the objects behaviors

```
17
18      public Person createNewPerson(int id, Type t, String first, String last, String password){
19          String email = first + "." + last + "@school.edu";
20          email = email.toLowerCase();
21          Person p = new Person(id, t, first, last, email, password);
22          LoggingSingleton.logger.info("Person: \n" + p.toString() + " was created");
23          return p;
24      }
25
```

- Parameters
  - Specified inside of the method parenthesis, you pass these values to your method
- main
  - Special method where the execution of the code occurs

Java: How methods use data

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- Pass by reference takes the literal object from memory and passes it to the method/function
- Pass by value, gets the value from the object and passes it to the method/function
- Java uses pass by value for its methods

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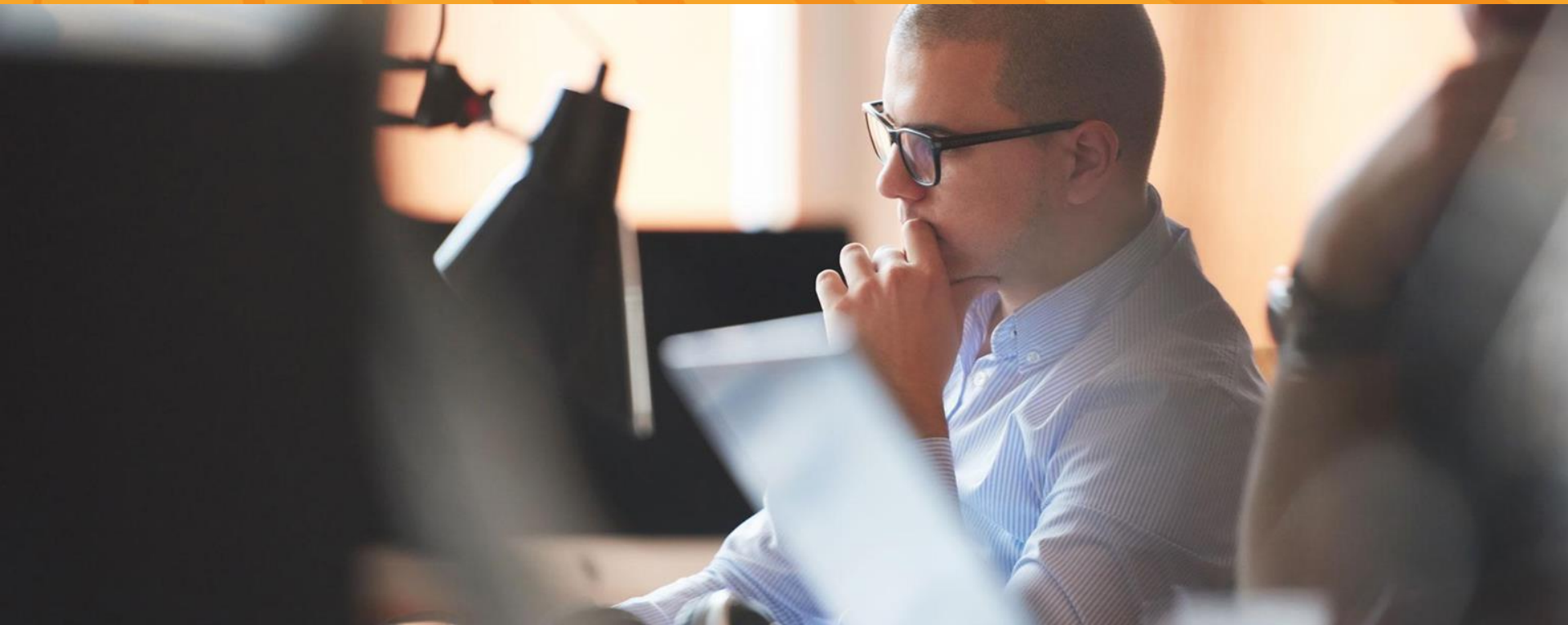
Custom Classes with Methods Demo



Java: Constructors

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Special methods that declare how objects are to be created

- Return the object type

Three types:

- default
  - Created at run time if no other constructor exists
- Arguments
  - Manually created, takes in any number of arguments
- No-arg
  - Manually created, takes in no arguments

Java: this vs this() vs super()

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- The keyword ‘this’ is used to refer to the object itself
- The keyword ‘this()’ used in the constructor
  - Can call another constructor of the current class
- The keyword ‘super()’ used in the constructor
  - Can call a constructor in the parent class

Java: Strings

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- Strings are immutable, constant objects from the String class
- String pool stores strings
  - Prevents duplicates to save memory
- StringBuilder and StringBuffer
  - Classes that hold mutable sequences of characters

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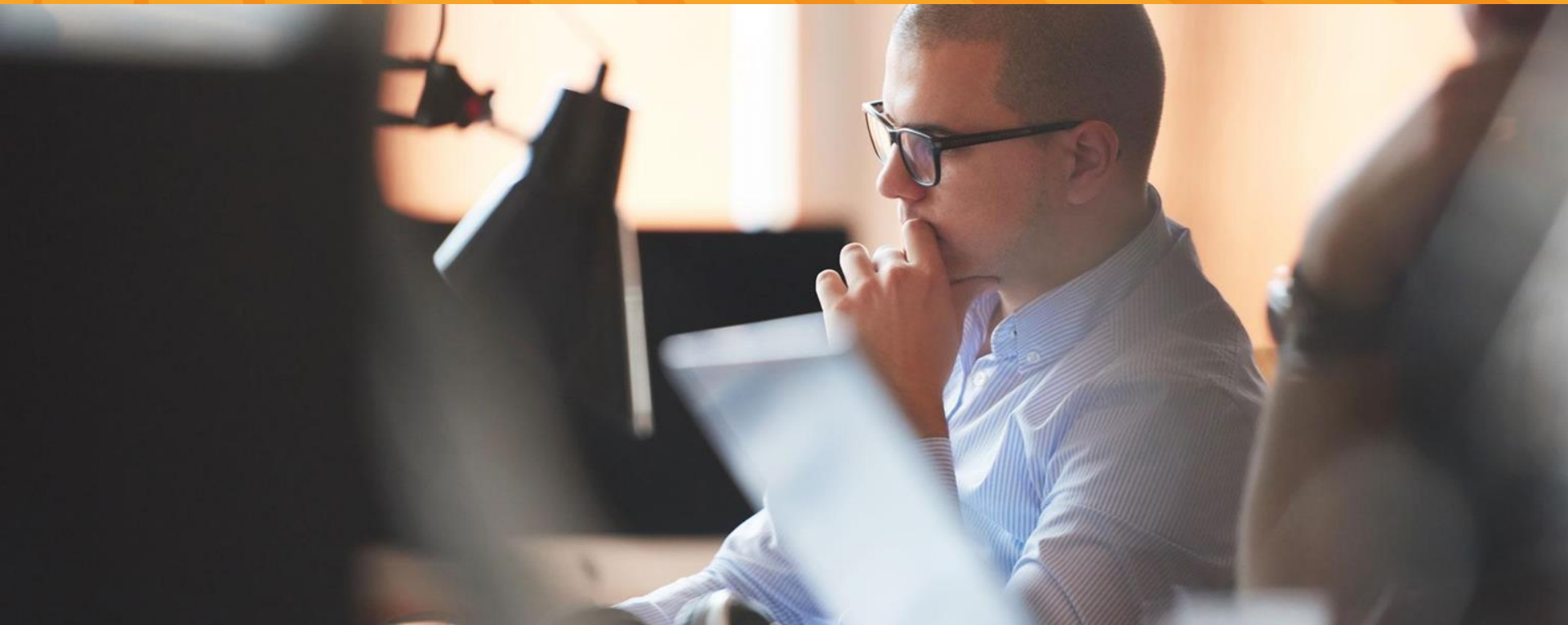
Constructors and Strings DEMO



Java: Arrays

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- Block of memory that stores a group of sequential elements
  - Must be the same data types
  - Fixed size
  - Syntax:

```
public int numbers[] = new int[] { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
```

  - Access by their indexes
    - Starts at 0
    - Length property returns the size
  - Multidimension Arrays
    - Arrays inside of arrays

Java: VarArgs

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- Variable Arguments in methods
  - Uses the … notation in the method parameters
  - Converted to an array at runtime
  - Can only be one, must be last in the list
  - Any array in a parameter list can be converted to varargs notation

```
public void varArgs(int... values) {
    for (int val : values) {
        System.out.println(val);
    }
}
```

Java: Operators

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Operator	Precedence
postfix	x++ x--
prefix	++x --x
multiplicative	* / %
additive	+ -
shift	<< >> >>>
relational	< > <= >=
equality	== !=
bitwise AND	&
bitwise exclusive OR	^
bitwise OR	|
logical AND	&&
logical OR	||
ternary	expression ? true option : false option
assignment	= += -= /= %=

- AND
  - true AND true = true
  - true AND false = false
- OR
  - true OR false = true
  - false OR false = false
- Logical AND and OR short circuit
  - If the outcome can be determined by only one side, it won't even look at the other side

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Java Operators Demo

Java: Control Flow

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Break the normal flow of an application with loops, and conditionals

- Conditionals
  - if/else
  - if/else if
  - ternary
  - switch statement
  - try/catch
- Looping
  - for loops
  - enhanced for loops
  - while loops
  - do-while loops

Break

- Loops, if, switch, break out of the code block

Continue

- ONLY loops, break out of the current iteration of the loop

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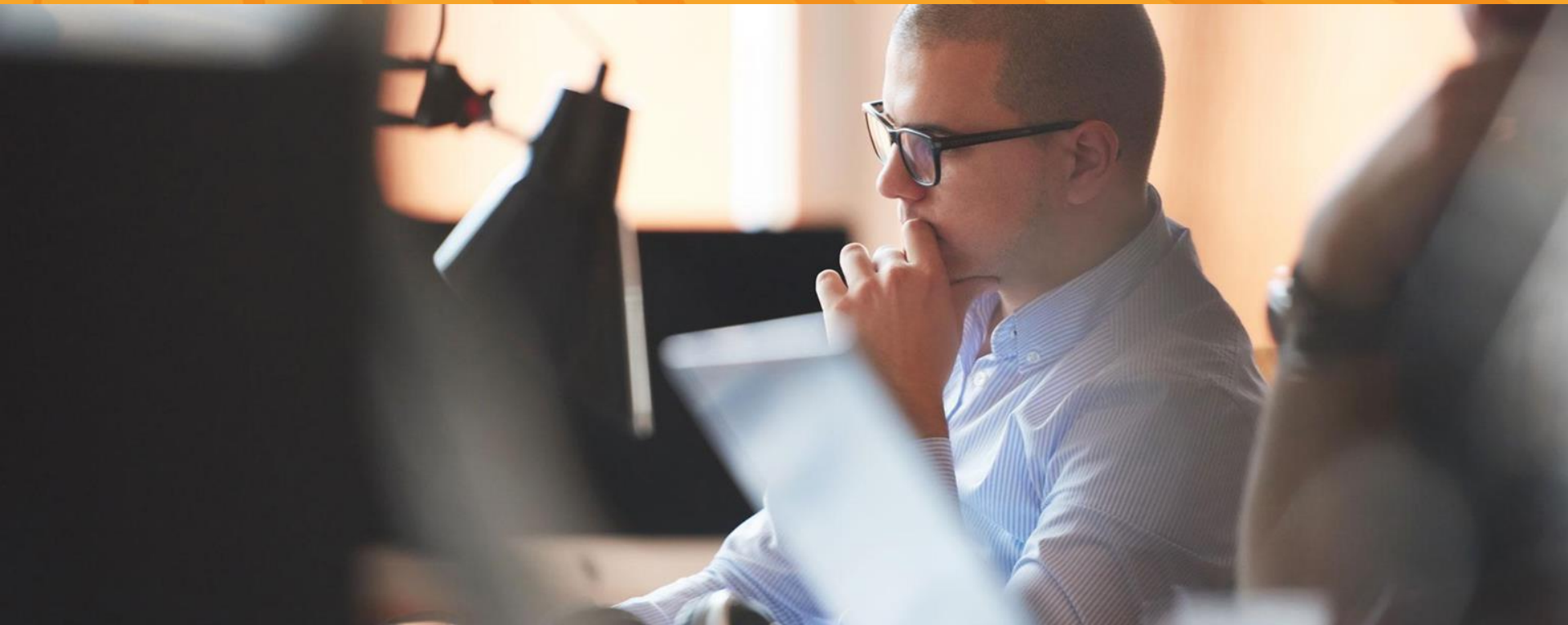
Java Arrays and Control Flow Demo



Java: Scanner Class

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Used to scan program input

- Popularly used to collect user information from the terminal
- Comes from java.utils package
- Use it with System.in to take in user input

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Java Scanner Demo

Trouble Shooting: Technical Problems

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- Bottom Up Approach
  - Start at the root of the problem
  - Go up the thread until issue is found
- Drill down
  - Look into specifications/configurations
  - Use those with the events to find the issue
- Look horizontally
  - Start internally, with configs/secrets/volumes
  - Something could be configured incorrectly

Troubleshooting: Java Documentation

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- First place to look is Oracle documentation
  - https://docs.oracle.com/en/java/javase/11/docs/api/index.html
- Other tutorial/documentation sites:
  - https://www.javatpoint.com/java-tutorial
  - https://www.w3schools.com/java/default.asp
  - https://www.geeksforgeeks.org/java/
  - https://www.baeldung.com/

Troubleshooting: Java Debugging

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- Main method testing
  - Call the methods you want to test in a main method
- Printing in methods
  - Document/print throughout the lifetime of your app
  - Remove the print statements before publishing your program!
- IDE debug feature
  - Create stopping points in your IDE
  - Allows you to run the code line by line
  - Allows you to jump into different methods

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IDE Debugging Demo