MINI PROJECT

Stream : JAVA **Tech Module : 1** **Project:1**

Given the following table containing information about employees of an organization, develop a small java application, which accepts employee id from the command prompt and displays the following details as output:

EmpNo EmpName Department Designation Salary

In your program, you must initialize an array with the following details.

Emp No	Emp Name	Join Date	Designation Code	Department	Basic	HRA	IT
1001	Ashish	01/04/2009	e	R&D	20000	8000	3000
1002	Sushma	23/08/2012	c	PM	30000	12000	9000
1003	Rahul	12/11/2008	k	Acct	10000	8000	1000
1004	Chahat	29/01/2013	r	Front Desk	12000	6000	2000
1005	Ranjan	16/07/2005	m	Engg	50000	20000	20000
1006	Suman	1/1/2000	e	Manufacturing	23000	9000	4400
1007	Tanmay	12/06/2006	c	PM	29000	12000	10000

DA (Dearness Allowance) details are given in the below "Designation" table.

Designation Code	Designation	DA
e	Engineer	20000
c	Consultant	32000
k	Clerk	12000
r	Receptionist	15000
m	Manager	40000

Note 1: Salary should be calculated as (Basic + HRA + DA – IT).
Note 2: Use switch-case to print Designation and to find the value of DA for a particular employee.

Expected Output format: (assuming that your class name is Project1)

- If you execute the command **java Project1 1003**, the output should be –

  Emp No. Emp Name Department Designation Salary
  1003 Rahul Acct Clerk 29000

- If you execute the command **java Project1 123**, the output should be –

  There is no employee with empid : 123

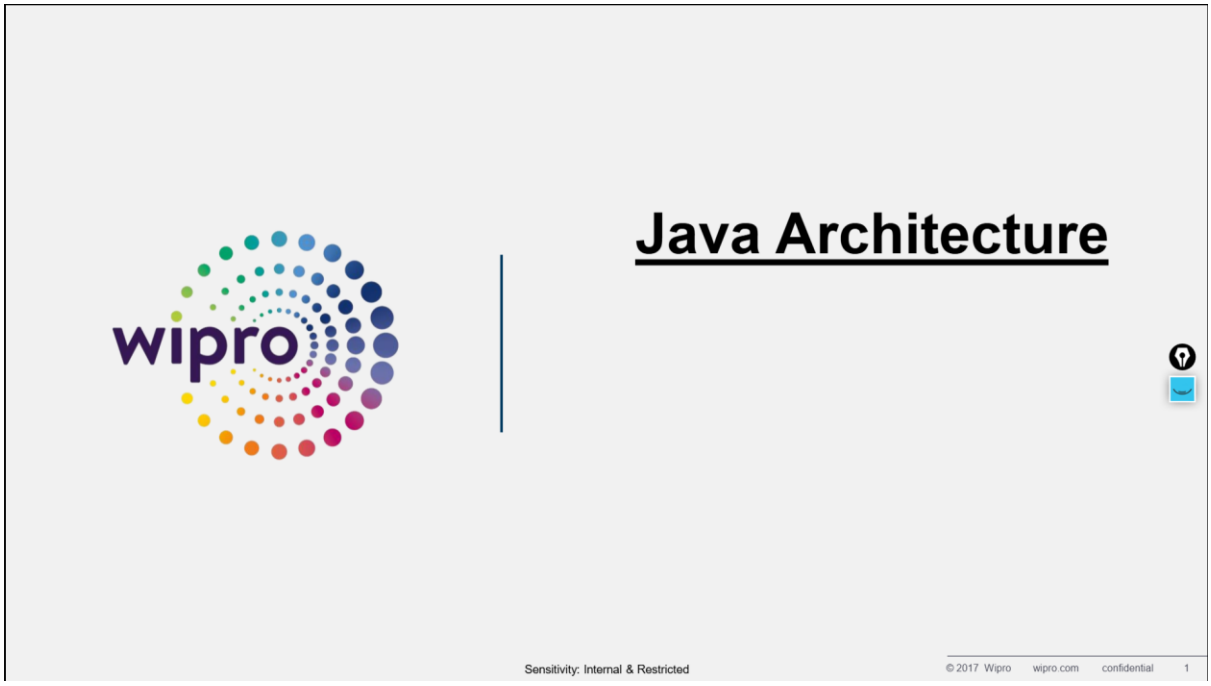
Topics to Learn

Topics to Learn

To complete the above project, you will need to learn the below technical topics-

- Java Architecture
- Language Basics
- Flow Control Statements
- Arrays
- ForEach
- Parrallel Array Sorting

Java architecture:



Agenda

1. Evolution of Java
2. Java Architecture

Evolution of Java

Key Founders

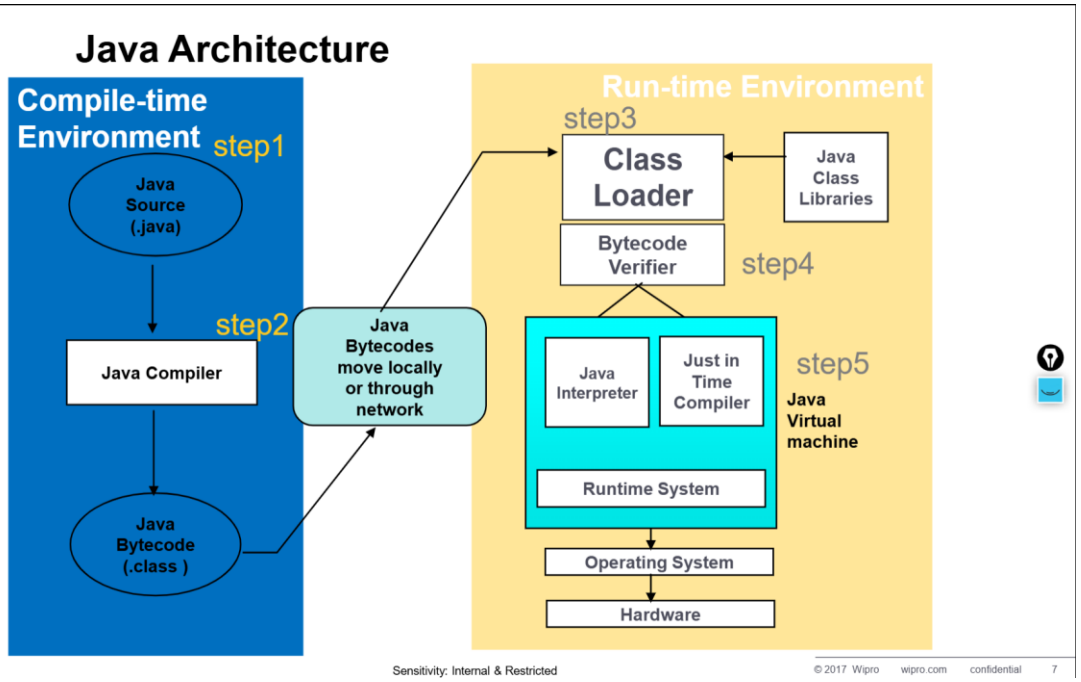
- Java was the brainchild of:
  - James Gosling
  - Patrick Naughton
  - Mike Sheridan
- The origin of Java can be traced back to the fall of 1991, and was initially called **Greentalk** later renamed to **Oak.**
- Oak was renamed as **Java** in **1995**

Design Goal

- Java was originally meant to be a platform-neutral language for embedded software in devices.
- The goal was to move away from platform and OS-specific compilers that would compile source for a particular target platform to a language that would be portable, and platform-independent.
- The language could be used to produce platform-neutral code.

Java Architecture

Java Architecture



Java Architecture (Contd.).

Step1:

Create a java source code with .java extension

Step2:

Compile the source code using java compiler, which will create bytecode file with .class extension

Step3:

Class loader reads both the user defined and library classes into the memory for execution

Java Architecture (Contd.).

Step4:

Bytecode verifier validates all the bytecodes are valid and do not violate Java's security restrictions

Step5:

JVM reads bytecodes and translates into machine code for execution. While execution of the program the code will interact to the operating system and hardware

The 5 phases of Java Programs

Java programs can typically be developed in five stages:

1. Edit

   Use an editor to type Java program (**Welcome.java**)

2. Compile

   - Use a compiler to translate Java program into an intermediate language called bytecodes, understood by Java interpreter **(javac Welcome.java)**
   - Use a compiler to create **.class** file, containing bytecodes (**Welcome.class**)

3. Loading

   Use a class loader to read bytecodes from **.class** file into memory

The 5 phases of Java Programs (Contd.).

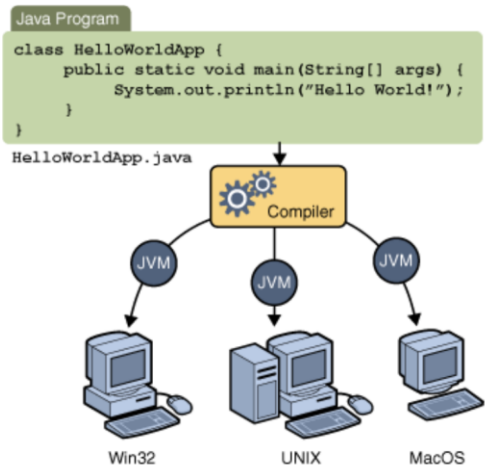
4. Verify

   Use a Bytecode verifier to make sure bytecodes are valid and do not violate security restrictions

5. Execute

   - Java Virtual Machine (JVM) uses a combination of interpretation and just-in-time compilation to translate bytecodes into machine language
   - Applications are run on user's machine, i.e. executed by interpreter with java command (java Welcome)

Java Virtual Machine



- The output of the compiler is bytecode
- The bytecodes are executed by JVM
- It is an interpreter which converts the byte code to machine specific instructions and executes
- JVM is platform specific

The Java Architecture – The JVM (Contd.).

- Most modern languages are designed to be compiled
- Compilation is a one-time exercise and executes faster
- Execution of compiled code over the Internet an impossibility
- Executable code always generated to a CPU-OS combination
- Interpreting a Java program into byte code facilitates its execution in a wide variety of environments

The Java Architecture – The JVM (Contd.).

- Only the Java Virtual Machine (JVM) needs to be implemented for each platform
- Once the Java runtime package exists for a given system, any Java program can run on it
- The JVM will differ from platform to platform, and is, platform-specific
- All versions of JVM interprets the Java byte codes.

The Java Architecture – The JVM (Contd.).

- Interpreted code runs much slower compared to executable code
- The use of bytecode enables the Java runtime system to execute programs much faster
- Java facilitates on-the-fly compilation of bytecode into native code

The Java Architecture – The Adaptive optimizer

- Another type of execution engine is an adaptive optimizer
- The virtual machine starts by interpreting bytecodes
- It also keeps a tab on the code that is running and identifies only the heavily used areas
- The JVM compiles these heavily used areas of code into native code
- The rest of the code, which is not heavily used continues to be interpreted and executed

The Java Architecture - The Class Loader

- The class loader is that part of the VM that is important from:
  - A security standpoint
  - Network mobility
- The class loader loads a compiled Java source file (**.class** files represented as bytecode) into the Java Virtual Machine (JVM)

- The bootstrap class loader is responsible for loading the classes, programmer defined classes as well as Java's API classes

The Java Architecture - The Java .class file

- The Java class file is designed for
  - platform independence
  - network mobility
- The class file is compiled to a target JVM, but independent of underlying host platforms
- **The Java class file is a binary file** that has the capability to run on any platform

Quiz

1. **Write the correct order of the Java program execution.**

A. Class Loader
B. Interpretation
C. Compilation
D. Byte Code Verification
E. Java Source Code
F. Execution

2. **Which of the following is used to load a .class file?**

A. Class Loader
B. Byte Code Verifier
C. JIT Compiler
D. Interpreter

Quiz(Contd.).

3. **When a java program is compiled, it creates a**

A. an obj file

B. an exe file

C. a .class file

D. a .sh file

4. **The JDK is a superset of the JRE, and contains everything that is in the JRE, plus tools such as the compilers and debuggers necessary for developing applets and applications.**

A. TRUE

B. FALSE

Thank You

Language Basics:

Learning Material for **Language Basics**

Below is the learning material that you are expected to read along with completion of the hands-on assignments. The material is mentioned in the order in which it should be read.

No	Material Title	Material Location	Type of Material	Classification
1	Language Basics	Language Basics.pdf	PDF	Mandatory
2	Environment setup	http://www.tutorialspoint.com/java/java_environment_setup.htm	Web	Suggestive
3	Creating First Java Program	http://spoken-tutorial.org/watch/Java/First+Java+Program/English/	Video	Suggestive
8	Variables, Data types and Assignment	http://spoken-tutorial.org/watch/Java/Numerical+Datatypes/English/	Video	Suggestive
9	Variables, Data types and Assignment	http://www.tutorialspoint.com/java/java_basic_datatypes.htm	Web	Suggestive
10	Environment setup	https://www.youtube.com/embed/r59xYe3Vyks	Video	Suggestive
11	Creating First Java Program	https://www.youtube.com/embed/I2wvhRUVNTM	Video	Suggestive
12	Variables, Data types	https://www.youtube.com/embed/4ekASokneGU	Video	Suggestive
13	Operators	https://www.youtube.com/embed/ss7BtLrbxp4	Video	Suggestive
14	Operators	https://www.youtube.com/embed/f5YdkIzNmfM	Video	Suggestive
15	Operators	https://www.youtube.com/embed/HBnB69yFf_4	Video	Suggestive

Hands-on Assignments for **Language Basics**

Complete the below hands-on assignments before proceeding with the next Topic

Update Completion Status

No.	Cat	Hands-on Assignment	Topics Covered	Status
1	M	Write a Program that accepts two Strings as command line arguments and generate the output in the required format. Example1) If the two command line arguments are Wipro and Bangalore then the output generated should be Wipro Technologies Bangalore. Example2) If the command line arguments are ABC and Mumbai then the output generated should be ABC Technologies Mumbai [Note: It is mandatory to pass two arguments in command line]	Command Line Argument	☐
2	S	Write a Program to accept a String as a command line argument and print a Welcome message as given below. Example1) C:\> java Sample John O/P Expected : Welcome John	Command Line Argument	☐
3	M	Write a Program to accept two integers as command line arguments and print the sum of the two numbers Example1) C:\>java Sample 10 20 O/P Expected : The sum of 10 and 20 is 30	Command Line Argument	☐

Flow control statements:

1	If Statement	https://www.tutorialspoint.com/java/if_statement_in_java.htm	Web	Mandatory
2	If-else Statement	https://www.tutorialspoint.com/java/if_else_statement_in_java.htm	Web	Mandatory
3	Nested - If Statement	https://www.tutorialspoint.com/java/nested_if_statements_in_java.htm	Web	Mandatory
4	Switch Statement	https://www.tutorialspoint.com/java/switch_statement_in_java.htm	Web	Mandatory
5	While Loop	https://www.tutorialspoint.com/java/java_while_loop.htm	Web	Mandatory
6	For Loop	https://www.tutorialspoint.com/java/java_for_loop.htm	Web	Mandatory
7	Enhanced For Loop	http://www.tutorialspoint.com/java/java_loop_control.htm	Web	Mandatory
8	Do While loop	https://www.tutorialspoint.com/java/java_do_while_loop.htm	Web	Mandatory
9	Break and Continue	http://www.w3schools.in/java-tutorial/difference-between-break-and-continue-statement/	Web	Mandatory
10	Flow Control Statements	FlowControlStatements.pdf	PDF	Suggestive
12	Flow Control Statements	https://www.youtube.com/embed/4y2iDb4xCBg	Video	Suggestive
13	If Statement	https://www.youtube.com/embed/WZXq5_9_JDs	Video	Suggestive
14	Switch Statement	https://www.youtube.com/embed/L5_7XQR0r0w	Video	Suggestive
15	While Loop	https://www.youtube.com/embed/apW3UWr_dhA	Video	Suggestive
16	Do While loop	https://www.youtube.com/embed/xwvdENKCkLg	Video	Suggestive
17	For Loop	https://www.youtube.com/embed/z-QgsXkYqjc	Video	Suggestive

Hands-on Assignments for **Flow Control Statements**

Complete the below hands-on assignments before proceeding with the next Topic

Update Completion Status

No.	Cat	Hands-on Assignment	Topics Covered	Status
1	M	A) Write a program to check if a given integer number is Positive, Negative, or Zero. B) Given two non-negative int values, print true if they have the same last digit, such as with 27 and 57. lastDigit(7, 17) → true lastDigit(6, 17) → false lastDigit(3, 113) → true	If Statement	☐
2	M	Write a program to check if a given integer number is odd or even.	If Statement	☐
3	S	Write a program to check if the program has received command line arguments or not. If the program has not received arguments then print "No Values", else print all the values in a single line separated by ,(comma) Example1) java Example O/P: No values Example2) java Example Mumbai Bangalore O/P: Mumbai,Bangalore [Hint: You can use length property of an array to check its length]	If Statement	☐
4	S	Initialize two character variables in a program and display the characters in alphabetical order. Example1) if the first character is 's' and second character is 'e' then the output should be e,s Example2) if the first character is 'a' and second character is 'e', then the output should be a,e	If Statement	☐

5	M	Initialize a character variable in a program and print 'Alphabhet' if the initialized value is an alphabhet, print 'Digit' if the initialized value is a number, and print 'Special Character', if the initialized value is anything else.	If Statement	☐
6	S	Write a program to accept gender ("Male" or "Female") and age from command line arguments and print the percentage of interest based on the given conditions. If the gender is 'Female' and age is between 1 and 58, the percentage of interest is 8.2%. If the gender is 'Female' and age is between 59 and 100, the percentage of interest is 9.2%. If the gender is 'Male' and age is between 1 and 58, the percentage of interest is 8.4%. If the gender is 'Male' and age is between 59 and 100, the percentage of interest is 10.5%.	If Statement	☐
7	S	Initialize a character variable with an alphabhet in a program. If the character value is in lowercase, the output should be displayed in uppercase in the following format. Example1) i/p:a o/p:a->A If the character value is in uppercase, the output should be displayed in lowercase in the following format. Example2) i/p:A o/p:A->a	If Statement	☐
8	M	Write a program to receive a color code from the user (an Alphabhet). The program should then print the color name, based on the color code given. The following are the color codes and their corresponding color names. R->Red, B->Blue, G->Green, O->Orange, Y->Yellow, W->White. If color code provided by the user is not valid then print "Invalid Code".	Switch Statement	☐
9	S	Write a program to receive a number and print the corresponding month name. Example1) C:\>java Sample 12 O/P Expected : December Example2) C:\>java Sample O/P Expected : Please enter the month in numbers Example3) C:\>java Sample 15 O/P Expected : Invalid month	Switch Statement	☐
10	S	Write a program to print numbers from 1 to 10 in a single row with one tab space.	For Loop	☐
11	M	Write a program to print even numbers between 23 and 57. Each number should be printed in a separate row.	For Loop	☐

12	M	Write a program to check if a given number is prime or not.	For Loop	☐
13	S	Write a program to print prime numbers between 10 and 99.	For Loop	☐
14	M	Write a program to print the sum of all the digits of a given number. Example1) I/P:1234 O/P:10	For Loop	☐
15	S	Write a program to print * in Floyds format (using for and while loop) * * * * * * Example1) C:\>java Sample O/P: Please enter an integer number Example2) C:\>java Sample 3 O/P : * * * * * *	For Loop	☐
16	M	Write a program to reverse a given number and print Example1) I/P: 1234 O/P:4321 Example2) I/P:1004 O/P:4001	While Loop	☐
17	S	Write a Java program to find if the given number is palindrome or not Example1) C:\>java Sample 110011 O/P: 110011 is a palindrome Example2) C:\>java Sample 1234 O/P: 1234 is not a palindrome	While Loop	☐

Arrays:

Learning Material for **Arrays**

Below is the learning material that you are expected to read along with completion of the hands-on assignments. The material is mentioned in the order in which it should be read.

No	Material Title	Material Location	Type of Material	Classification
1	One Dimensional Array	http://www.tutorialspoint.com/java/java_arrays.htm	Web	Mandatory
2	One Dimensional and Two dimensional Array	Arrays.pdf	PDF	Mandatory
5	Arrays	http://spoken-tutorial.org/watch/Java/Introduction%2Bto%2BArray/English/	Video	Suggestive
6	Arrays	https://www.youtube.com/embed/_NfwcH5zKpA	Video	Suggestive

Hands-on Assignments for **Arrays**

Complete the below hands-on assignments before proceeding with the next Topic

Update Completion Status

No.	Cat	Hands-on Assignment	Topics Covered	Status
1	S	Write a program to initialize an integer array and print the sum and average of the array.	One dimensional Array	☐
2	M	Write a program to initialize an integer array and find the maximum and minimum value of the array.	One dimensional Array	☐
3	M	Write a program to initialize an integer array with values and check if a given number is present in the array or not. If the number is not found, it will print -1 else it will print the index value of the given number in the array. Example 1) If the Array elements are {1,4,34,56,7} and the search element is 90, then the output expected is -1. Example 2)If the Array elements are {1,4,34,56,7} and the search element is 56, then the output expected is 3.	One dimensional Array	☐
4	S	Initialize an integer array with ascii values and print the corresponding character values in a single row.	One dimensional Array	☐
5	S	Write a program to find the largest 2 numbers and the smallest 2 numbers in the given array.	One dimensional Array	☐
6	S	Write a program to initialize an array and print them in a sorted order.	One dimensional Array	☐
7	M	Write a program to remove the duplicate elements in an array and print the same. Example) I/P:{12,34,12,45,67,89} O/P:{12,34,45,67,89}	One dimensional Array	☐
8	S	Write a program to print the sum of the elements of an array following the given below condition. If the array has 6 and 7 in succeeding orders, ignore the numbers between 6 and 7 and consider the other numbers for calculation of sum. Eg1) Array Elements - 10,3,6,1,2,7,9 O/P: 22 [i.e 10+3+9] Eg2) Array Elements - 7,1,2,3,6 O/P:19	One dimensional Array	☐
8	S	Write a program to print the sum of the elements of an array following the given below condition. If the array has 6 and 7 in succeeding orders, ignore the numbers between 6 and 7 and consider the other numbers for calculation of sum. Eg1) Array Elements - 10,3,6,1,2,7,9 O/P: 22 [i.e 10+3+9] Eg2) Array Elements - 7,1,2,3,6 O/P:19 Eg3) Array Elements - 1,6,4,7,9 O/P:10	One dimensional Array	☐
9	S	Print a version of the given array where all the 10's have been removed. The remaining elements should shift left towards the start of the array as needed, and the empty spaces at the end of the array should be 0. So {1, 10, 10, 2} yields {1, 2, 0, 0}. You may modify and display the given array or make a new array. withoutTen([1, 10, 10, 2]) → [1, 2, 0, 0] withoutTen([10, 2, 10]) → [2, 0, 0] withoutTen([1, 99, 10]) → [1, 99, 0]	One dimensional Array	☐

10	M	Print an array that contains the exact same numbers as the given array, but rearranged so that all the even numbers come before all the odd numbers. Other than that, the numbers can be in any order. You may modify and print the given array, or make a new array. evenOdd([1, 0, 1, 0, 0, 1, 1]) → [0, 0, 0, 1, 1, 1, 1] evenOdd([3, 3, 2]) → [2, 3, 3] evenOdd([2, 2, 2]) → [2, 2, 2]	One dimensional Array	☐
11	S	Given an array of type int, print true if every element is 1 or 4. only14([1, 4, 1, 4]) → true only14([1, 4, 2, 4]) → false only14([1, 1]) → true	One dimensional Array	☐
12	S	Given 2 int arrays, a and b, each length 3, form a new array of length 2, containing their middle elements. middleWay([1, 2, 3], [4, 5, 6]) → [2, 5] middleWay([7, 7, 7], [3, 8, 0]) → [7, 8] middleWay([5, 2, 9], [1, 4, 5]) → [2, 4]	One dimensional Array	☐
13	S	Write a program to reverse the elements of a given 2*2 array. Four integer numbers needs to be passed as Command Line arguments. Example1) C:\>java Sample 1 2 3 O/P: Please enter 4 integer numbers Example2) C:\>java Sample 1 2 3 4 O/P: The given array is : 1 2 3 4 The reverse of the array is : 4 3 2 1	Two Dimensional Array	☐
14	M	Write a program to find the biggest number in a 3*3 array. The program is supposed to receive 9 integer numbers as command line arguments. Example1: C:\>java Sample 1 2 3 O/P: Please enter 9 integer numbers Example2: C:\>java Sample 1 23 45 55 121 222 56 77 89 O/P: The given array is : 1 23 45 55 121 222 56 77 89 The biggest number in the given array is 222	Two Dimensional Array	☐

For Each:

Learning Material for **ForEach**

Below is the learning material that you are expected to read along with completion of the hands-on assignments. The material is mentioned in the order in which it should be read.

No	Material Title	Material Location	Type of Material	Classification

Hands-on Assignments for **ForEach**

Complete the below hands-on assignments before proceeding with the next Topic

Update Completion Status

No.	Cat	Hands-on Assignment	Topics Covered	Status

Parallel Array Sorting:

Learning Material for **Parrallel Array Sorting**

Below is the learning material that you are expected to read along with completion of the hands-on assignments. The material is mentioned in the order in which it should be read.

No	Material Title	Material Location	Type of Material	Classification

Hands-on Assignments for **Parrallel Array Sorting**

Complete the below hands-on assignments before proceeding with the next Topic

Update Completion Status

No.	Cat	Hands-on Assignment	Topics Covered	Status

Sample Questions:

Sample Questions

After gaining knowledge of the above module, below are the possible interview questions that you should be able to confidently answer.

No	Questions
1	What is JDK?
2	What is JRE?
3	What is JIT compiler?
4	What is Adaptive optimizer?
5	What is Class Loader?
6	What is Byte Code Verifier?
7	What is a Compiler?
8	What is an Interpreter?
9	What is the difference between a Compiler and Interpreter?
10	What are the components of JVM?
11	What is Platform Independent?
12	How does Java achieve Platform independence?
13	How to access command line arguments?
14	What are the data types in Java and what are their sizes?
15	How do you declare an array in Java?
16	How do you find the length of an array in Java?
17	What is the use of PATH variable?
18	What is the use of CLASSPATH variable?
19	How do you assign values for PATH and CLASSPATH Variable?
20	What are all the characteristic features of Java Programming language?
21	In which interface we can find the definition of forEach method?
22	When do we prefer parallel sort over serial sort?