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Data Structure

Lab Worksheet #1 – Data type

1. Most high level programming languages have primitive data types also called atomic data types. These data types are built into the language, e.g. in C++ and Java we have int, char, float, etc. Search the help in your C++ and Java compilers, as well as the Internet to get a list of all the data types you can find in C++ and Java. Also note the size of each data type and the range of values each can represent.

Ans:

|  |  |  |  |
| --- | --- | --- | --- |
| Language | Java | | |
|  | Data Type | Size | Range |
|  | Boolean | 1 bit | True or false |
|  | Byte | 8 bits | -128 to 127 |
|  | Char | 16 bits | 0 to 65,535 |
|  | Short | 16 bits | -32,768 to 32,767 |
|  | Int | 32 bits | -2,147,483,648 to 2,147,483, 647 |
|  | Long | 64 bits | -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 |
|  | Float | 32 bits | approximately ±3.40282347E+38F (6-7 significant decimal) |
|  | Double | 64 bits | approximately ±1.79769313486231570E+308 (15 significant decimal) |
|  | String |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Language | C++ | | |
|  | Data Type | Size | Range |
|  | Integer |  |  |
|  | Character |  |  |
|  | Boolean |  |  |
|  | Floating Point |  |  |
|  | Double Floating Point |  |  |
|  | Valueless or Void |  |  |
|  | Wide Character |  |  |

2. Create a new project, implement and test the code below.

Java Code

//Main.java

public static void main (String args[])

{

System.out.println(“the size of the integer data type in Java is ” + Integer.SIZE);

System.out.println(“the range of the integer data type in Java is from ” + Integer.MIN\_VALUE + “ to ”

+ Integer.MAX\_VALUE);

}

Ans:

The size of the integer data type in Java is 32

The range of the integer data type in Java is from -2147483648 to 2147483647

3. Using the above example as a guide, update your code to determine the size and ranges of all the atomic data types you can find in your compiler. NB. Some data types don’t have ranges; eg. Char

Ans:

boolean, char, int, and string tringer an error

The size of the Byte data type in Java is 8

The range of the Byte data type in Java is from -128 to 127

The size of the Short data type in Java is 16

The range of the Short data type in Java is from -32768 to 32767

The size of the Long data type in Java is 64

The range of the Long data type in Java is from -9223372036854775808 to 9223372036854775807

The size of the Float data type in Java is 32

The range of the Float data type in Java is from 1.4E-45 to 3.4028235E38

The size of the Double data type in Java is 64

The range of the Double data type in Java is from 4.9E-324 to 1.7976931348623157E308

4. The size of the STUDENT data type is the size of all the component data types inside the class. So, the size of student is the sum of the size of the Id Number, First Name, Last Name and GPA. See if you can calculate the size of STUDENT manually. What is your answer. Now let us write a program to compute the size of STUDENT.

5. Write a program which creates a LECTURER class, creates objects of this class, and computes and displays the size of that object.

**public** **class** LECTURER {

**private** **int** Num\_Of\_Teacher;

**private** **int** Num\_of\_Student;

**private** **int** Num\_of\_Desk;

**private** **int** Num\_of\_Chair;

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

}

}