

**Department of Computer Science and Engineering**  
**CS 301: Programming Languages**  
**Programming Assignments**

**1- Type Compatibility Rules**

One is often interested in the type-compatibility rules so as to understand how a program behaves. What kinds of primitive types can be mixed to go past the compilation and for what operations? What happens to the result of such an operation? Design a set of simple test programs to determine the type compatibility rules for the primitive data types in both C and Java. Write a report of you findings.

For C language consider the following data types: char, int, long int, float and double

For java language consider the following types: byte, short, int, long, float, and double

You need to submit the hard copy of the report in the class on date due. Also, have the soft copy of the report, your program and test data in a floppy disk. The typed report consists of the following:

1. Cover page
2. Table of contents
3. Introduction
4. Problem statement
5. The five steps of software life cycle (Requirements specifications, Analysis, Design, Implementation, and Testing)
6. Your program listing (with internal documentation)
7. Your test data, output and results
8. Analysis and Conclusion
9. References

**Plagiarism or copying assignment report or code is subject to serious academic penalty (F grade in the course and report to the University administration for a proper action).**

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**2- Arrays, dynamic Arrays, and Vectors**

Arrays are aggregates of homogeneous data elements in which an individual element is identified by its position in the aggregate, relative to the first element. There are four categories of arrays: static, fixed stack dynamic, stack dynamic and heap dynamic. Design a set of simple test programs to study array and dynamic arrays in C. Also, design a set of simple test programs to study the classes Array and Vector in java.

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### **3- Subprograms**

Among the design issues of subprograms are:

1. What parameter passing methods are provided?
2. Are parameter types checked?
3. Are parameter types in passed subprograms checked?
4. Can subprograms be overloaded?
5. Are subprograms allowed to be generic?
6. What types of return values are allowed?
7. Is separate or independent compilation supported?

Study the above design issues in both of C and Java.

### **4- Scope and Access Modifiers**

One of the most important factors having an effect on understanding of variables is scope. A variable is visible in a statement if it can be referenced in that statement. In the same time, one of the language requirement for data abstraction is information hiding. Design a set of simple test programs to determine the scope rules in C language and the access modifier rules for Java language. Write a report of you findings.

### **5- Functional and Logic Programming Languages (C, Lisp and Prolog)**

Write a program to append two lists in one list. Write this program in three languages: C, LISP, and PROLOG.

After writing these three programs evaluate them on the following aspects:

1. Writability
2. Readability
3. Cost (memory and execution time efficiency)

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