

## Programming Assignment 2

Each team/student may choose one of the tracks for the programming assignment 2.

### **Compiler Track:**

Augment your *T* parser with semantic actions for constructing parse trees, and write a C code generator for your *T* compiler.

- See an attached package for the reference files.
- You are requested to separate the C code, the Lex/Flex specification, the Yacc/Bison specification into distinct files.

### **Programming Languages Track:**

Practice on programming the exercises in 5 different programming languages: *COBOL*, *Java*, *ML*, *Prolog*, and *R*.

- **Programming Exercise #1:** Given the following facts:

**Fact #1:** Andy, Bob, Cecil, Dennis, Edward, Felix, Martin, Oscar, Quinn are male, and Gigi, Helen, Iris, Jane, Kate, Liz, Nancy, Pattie, Rebecca are female.

**Fact #2:** Bob and Helen are married, Dennis and Pattie are married, and Gigi and Martin are married.

**Fact #3:** Andy is Bob's parent, Bob is Cecil's parent, Cecil is Dennis' parent, Dennis is Edward's parent, Edward is Felix's parent, Gigi is Helen's parent, Helen is Iris' parent, Iris is Jane's parent, Jane is Kate's parent, Kate is Liz's parent, Martin is Nancy's parent, Nancy is Oscar's parent, Oscar is Pattie's parent, Pattie is Quinn's parent, and Quinn is Rebecca's parent.

Define the following relations in your program:

**Relation #1:** If X and Y are married, and X is Z's parent, then Y is also Z's parent.

**Relation #2:** If X is Y's parent, and X is Z's parent, then Y and Z are siblings.

**Relation #3:** If X and Y are siblings, X is male, and Y is male, then X and Y are brothers.

**Relation #4:** If X and Y are siblings, X is female, and Y is female, then X and Y are sisters.

**Relation #5:** If W and X are siblings, W is Y's parent, and X is Z's parent, then Y and Z are cousins.

**Requirement:** Your program needs to answer the relationship of any two persons correctly. For example: are Liz and Rebecca cousins?

- A) Write a *Java* program for this exercise.
- B) Write an *ML* program for this exercise.

C) Write a *Prolog* program for this exercise.

➤ **Programming Exercise #2:** There are 3 tables for this exercise:

**Table #1** Student-Main: the main table with Student ID, Name, and Payment Type.

**Table #2** Fees: the Amount of fees required for each Payment Type.

**Table #3** Student-Payment: the Amount paid by students before due.

**Requirement:** Your program needs to do the following computations correctly:

**Computation #1:** the total amount received from students before due.

**Computation #2:** list all the students that did not pay the required fees with the amount short.

A) Write a *COBOL* program to do the computations.

B) Write an *R* program to do the computations.

**Guideline:**

1. You have to demonstrate your program in person and have the report in paper with you.
2. You will get 10% bonus if you succeed in demonstrating your program on June 11<sup>th</sup>/13<sup>th</sup>. Official due for demonstrating program is June 18<sup>th</sup>/20<sup>th</sup>. After that, 40% penalty will be given for lateness. More precisely, if you get  $X$  in demonstration, and  $Y$  for the report:
  - (Bonus due) In-class demonstration =  $X * 70\% * 110\% + Y * 30\%$
  - (Official due) Your score =  $X * 70\% + Y * 30\%$
  - Late =  $(X * 70\% + Y * 30\%) * 60\%$
3. Your report has to include the following elements:
  - A cover page.
  - The problem description.
  - Highlight of the way you write the program.
  - The program listing.
  - Test run results.
  - Discussion.
4. For remote demonstration, you may choose to demonstrate in one of the two suggested ways:
  - A) Install all the software tools for programming assignment 2 on the same computer that you are going to use for connecting to the remote classroom.
  - B) Connect to the remote classroom with a mobile device with web cam, and demonstrate your programs with live video.