Extra Notes for Assignment 1 – Salary Tax

• Run the sample program
  – The program executable can only be executed on CSLINUX machines (linux platform only)
  – Download the program from the COMP1180 webpage and save it under your directory
  – Change to that directory (e.g. cd Documents)
  – Check the permission by typing “ls –l”
  – Change permission by typing “chmod 744 incometax”
  – Check the permission again by typing “ls –l”
  – Try running the program by typing “incometax”
  – Some good test cases are:
    • 0 0 0 0 0 0
    • 1 1 0 0 0 0
  – Can you see why the above are two good test cases?

Extra Notes for Assignment 1 – Salary Tax

• Your test plan
  – In each row, you specify a value for each of the following parameters for the program:
    • Is_married
    • Num_child
    • Is_single_parent
    • Spouse_disabled
    • Num_brother_sister
    • Num_parent_55_60
    • Num_parent_60plus
  – Specify 10 rows of input data and the input data set should be testing common cases as well as special cases.
  – The input data of 0 0 0 0 0 0 is a good example to test for a single person, with no child, not single parent, no spouse, no dependent brother and sister, and no parents or grand parent at 55 or over.
 Assignment 1 – Salary Tax

• Define the problem
  – Scope and generality of the solution needed
  – Input and Output

• Design a test plan
  – To verify your program is correct
  – Consist of a list of input data sets and correct program output
  – Consider all special cases

• Design a solution
  – Structured programming
  – Top down step refinement
  – Algorithm
  – Implementation
  – Testing and debugging

Assignment 1 – Salary Tax (continue)

• Define the problem
  – The specification is already listed in the Assignment1.doc
  – Goal:
    • Calculate the salary tax for the year 2005-2006 with the rate and allowance specified by the HK SAR Government.
    • Two methods are used: 1) tax based on the defined tax brackets; 2) tax based on standard tax rate; There should be an indication when tax calculated by Method 2 is less than by Method 1.
    • The amount of allowance should be printed out, together with 20 rows of output indicating how much tax should be paid according to the annual income starting from the Basic Allowance with an increment of $80,000.00
  – Input: User have to answer some questions interactively (refer to the sample program)
  – Output: A table listing out the allowances claimed and a table listing out the salary tax based on Method 1 and Method 2 (refer to sample program)
Assignment 1 – Salary Tax (continue)

• Design a test plan
  – An input data set consists of the following 7 variables:
    • Is_married
    • Num_child
    • Is_single_parent
    • Spouse_disabled
    • Num_brother_sister
    • Num_parent_55_60
    • Num_parent_60plus
  – What will be some of the representative ones?
  – Why?
  – What are the expected output?
  – Assumption: The input data set is internally consistent.
  – For example, one cannot be a single parent with 0 child!

Assignment 1 – Salary Tax (continue)

• Design a solution
  – Structured Programming – Top Down Step Refinement
  – Outline in Pseudo-code:
    1. Pre-Processor Commands
    2. Declaration and initialization of variables
    3. Enquiry (interactive inputs from user)
    4. Processing
    5. Printing results

• Program maintenance
  – Add in in-line comments
  – Add in blank lines for easier reading
  – Add in program and function headers
  – Programming style
Top Down Step Refinement

1. Pre-Processor Commands
   1.1 Include necessary library(ies)
   1.2 Define macros and constants
2. Declaration and initialization of variables
   2.1 Declare variables
   2.2 Initialize variables
3. Enquiry (interactive inputs from user)
   3.1 Interact with the user to type in the 7 input data
   3.2 Read input data and store them in the corresponding variables

More Step Refinement

4. Processing
   4.1 Calculate the following allowance
      4.1.1 basic_allowance
      4.1.2 child_allowance
      4.1.3 single_parent_allowance
      4.1.4 brother_sister_allowance
      4.1.5 parent_gparent_allowance
      4.1.6 spouse_disabled_allowance
   4.2 Calculate the total allowance
5. Printing results
   5.1 Print out the amount of each kind of allowance
   5.2 Print out the salary tax table
Yet Another Step Refinement

5.2 Print out the salary tax table
   5.2.1 Starting annual income = basic allowance
   5.2.2 For each annual income, calculate the salary tax by Method 1
   5.2.3 For each annual income, calculate the salary tax by Method 2
   5.2.4 In each row of output, print out the annual income, tax by Method 1, and tax by Method 2
   5.2.5 If Method 2 is less than Method 1, print an indicator
   5.2.6 Increment annual income by $80,000 and repeat Step 5.2.2 to Step 5.2.6 until 20 rows of output are printed.

Final Step Refinement & Implementation

5.2.2 Calculate the salary tax by Method 1
   5.2.2.1 Calculate net chargeable income
   5.2.2.2 According to the net chargeable income, calculate the tax with:
      a) 2% for the 1st $30,000;
      b) 8% for the next $30,000;
      c) 14% for the next $30,000;
      d) 20% for the rest of the balance;

Implementation
  • Replace the pseudo-code with C statements

Testing and debugging
  • Use the test plan for testing
  • Edit, Save, Compile, and Run until passing the acceptance test