Degree Programme Bachelor of Science (Computer Science)

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**Stepwise Refinement of a program to print a diamond using C language**

An assignment submitted to Ms. Ronge Christine A. in partial fulfillment for the requirements of the unit Programming and Problem Solving (CSC 121), School of Computing and Informatics, University of Nairobi.

**Stepwise Refinement of Diamond Program**

1. Determination of the variables to use in the program
   1. Define and declare **diamond\_symbol** as of char type.

1.1.1 Initialise the **diamond\_symbol**.

* 1. Define and declare **diamond\_width** as of integer type.
  2. Define and declare **diamond\_line\_counter** as of integer type.
  3. Define and declare **diamond\_print\_counter** as of integer type.
  4. Define and declare **diamond\_print\_counter** as of integer type.

1. Input of diamond symbol from the user
   1. Ask for symbol to print diamond from user using printf.
   2. Capture symbol from the user through scanf.
   3. Save the symbol as some variable **diamond\_symbol.**
2. Input of diamond width from the user
   1. Ask for width of the diamond from user.
   2. Capture symbol from the user through scanf
   3. Save the symbol as some variable **diamond\_width.**
3. Determination of whether the diamond width is odd or even
   1. Test for even or odd using modulus operator i.e. mod2 or %2
   2. For even numbers entered for **diamond\_width**,alert the user that the number will be reduced by 1 so as to make a true diamond.
   3. For odd numbers entered for **diamond\_width**, proceed to print the diamond.
4. Printing of the upper triangle
   1. Initialise **diamond\_space** to **diamond\_width** – 1
   2. Loop from line 1 to half the **diamond\_width**.
      1. Loop so as to print ((**diamond\_width**/2)- **diamond\_line\_counter**) spaces and **diamond\_line\_counter** (diamond\_symbol)
         1. Print spaces that are equal to the diamond\_width/2 less the diamond\_line\_counter
         2. Print **diamond\_symbol** that are equal to the
         3. (**diamond\_line\_counter**\*2)-1
      2. Decrement of the diamond space counter by 1 on each print instance
      3. Move to the next line (next loop)
5. Printing of the lower triangle
   1. Initialise diamond\_space to diamond\_width – 1
   2. Loop from line 1 to half the diamond\_width
      1. Loop so as to print spaces and diamond symbols
         1. Print diamond space that are equal to the (**diamond\_line\_counter**\*2)-1
         2. Print diamond symbols that are equal to 2\*(diamond\_width-diamond\_line)-1
      2. Increment of the diamond space counter by 1 on each print instance
      3. Move to the next line (next loop)