**CSCI 301 Moustafa Elsayed**

**Computer Science 2**

**Project 2: Prime Factorization**

**Introduction**

Prime factorization is taking a number and dividing it by prime numbers, starting with the smallest prime number to the largest prime number, until the largest prime number can only be divided by itself. This program uses a function that divides a number by its smallest prime number and a recursive function.

**Data Structures**

This program uses an integer “x” to hold the value of the user input. An integer “ divisor” that is initialized with the value of 2 in order to divide the input of the function “smallfact()”. A Boolean variable “flag” that is initialized with the value of false in order to stop the loop inside the function “smallfact()”. An integer “fact” that holds the returned value of the function “smallfact()” ,to divide the input of the function “primefact()” and is printed in the function “prime fact()” . An integer “divided” that holds the result of dividing the input of the function “primefact()” by the “fact” variable, and to become the input of the recurred function “primefact()”.

**Functions**

This program uses two functions, a function called “smallfact()” that has a loop that divides the input by a divisor of the initial value of 2, if the result is a decimal number then the divisor is incremented and the loop continues until the result is an integer, then re function returns the value of the divisor. The second function is called “primefact()” that calls the “smallfact()” function and holds the returned value to the “fact” variable, then divides the input by the “fact” variable and holds the result to the “divided” variable. The function compares the “fact” variable with the input and with the “divided” variable, if the “fact” variable is the same as either of them then the function prints the value of the “fact” variable. If the “fact” variable is not the same as either of them however, then the function prints the “fact” variable and calls for itself.

**The Main program**

The main program asks the user for the integer, then checks to see if that integer is larger than 0, if the integer is not larger than 0 then the program prints “Invalid input”, if the integer is larger than 0 then the program prints “ The prime factors of that integer are:” then calls for the function “primefact()”.