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Section 1

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Project 7

Project 7 - Design Document

Introduction:

This program explores the concept of array- based stacks in respect to determining the prime factorization of a number that is entered by the user. The client program takes in an integer value from the user and outputs the prime factorization of the number that the user outputs. The factorization of the number is outputted to the terminal in decreasing order by utilizing a function that finds the smallest factor of the number, which coincidently is the lowest prime factor of the integer that the user enters and then utilizes a stack to store the factors of the integer so that they can be displayed in the correct order. This program will continue to run until the user enters a 0 or a negative value.

Data Structures:

In this program, the abstract data type that is utilized is an array-based stack. This data type is utilized to allow the prime factorization of the number to displayed in descending order.

Functions:

Pop(); - This function pulls the value off of a stack so that the value can be accessed.

Push();- This function puts the value on a stack data type and updates the data member keeping

track of the number of values that are contained in the stack.

Size(); - This function returns the size of the stack.

Is\_empty(); - This function checks to see if the stack is empty and returns true if the stack is empty and false if it is not empty.

Peek(); - This function checks the value of the next value on the stack.

The Main program:

The main program in this project consists of a loop that allows the user to continue to enter positive integers so that the user can determine the prime factorization of the number that they input. The prime factorization of the integer is then displayed in descending order on the terminal. The loop for this part of the program will continue to run until the user enters a 0 or a negative value. Once the user enters one of these values the program will quit. The main program also has a couple of functions that help to determine the values that make up the prime factorization of the number that is entered by the user. The function prime() prints out the prime factorization to the terminal and the function smallest() is determines the smallest prime factor for the integer that the user enters.