Assignment 4   CISC 3325

Submit the source code as a .zip file containing the JAVA code, as well as a writeup explaining what you did. as a pdf document on blackboard. Include your full name at the writeup. Include your full name in the writeup. Name the .zip file as x-project4.zip and the writeup as x-project4.pdf, where x is your first and last name.

1. C++ program with a heap buffer overflow
   a. Download the following program that exploits a shortcoming of STL vectors (which uses the heap) and iterators. Compile and run the program. Try at least three different scenarios:
      - No command line argument.
      - A small command line argument larger than 10 but around 20 - 30.
      - A very large command line argument.
      4. Explain what happened in each case. Did you receive a memory fault in the last case? (Depends on the IDE or OS you use.)
      5. How could the problem be fixed?

   b. Write a program in Java that dynamically allocates a large integer array. Please include a copy of your code in what you hand in or e-mail to me.
      - Start with an array with at least 100 million elements. Increase the size (number of elements) of the array until an exception is generated. The operating system should generate a hardware interrupt when the amount of user addressable space has been exhausted. Java should pass this interrupt on as an exception.
      - How much memory was used before the exception was generated? You can calculate the number of bytes by multiplying the `sizeof(int)` times the total number of integers requested. You should print out this value each time the number of elments was increased.
      - Is naively running out of heap memory an exploitable vulnerability in Java?