Tennessee Tech. University

Design of Algorithms

CSC 2400-001

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Program 4

Due: April 12, 2024

Divide-and-Conquer Maximum Element

## The Maximum Element Problem

The maximum element problem ask to find the maximum element in an array. This assignment will focus on a decrease-and-conquer solution to the maximum element problem.

## Program Specifications

You will write a C++ program to find the maximum element in a list of numbers. For the purpose of this assignment, you may assume that all of the elements are integers and can be stored in an `int` type. Your solution must be a recursive, decrease-and-conquer algorithm. Your program will take in a command line argument specifying a file name. The associated file will contain a collection of numbers separated by whitespace (you may assume new lines). Your program must read in the numbers and print the maximum value found followed by a new line.

Make sure to include basic error checking in your program (i.e., command line arguments, file exists, correct file format, etc.). Do not hardcode any size limits on the collection of numbers or use VLAs — you may want to use a standard template library container to store the elements (e.g., `std::vector`). Do not use the `std::max_element` function in your solution. See the end of this handout for example output.

## Submission and Grading

Your source code should be contained in a single file and should be named after your TTU email address excluding the "@tntech.edu" (e.g., `jagraves21.cpp`). All submissions will be made on iLearn — please do not zip or compress your files. Make sure to follow best coding practices (proper naming conventions, useful comments, functions, etc.). Your program should compile without errors or warnings. Programs will be compiled using the following command:

```
g++ -Wall -pedantic -std=c++11 [source file]
```

# Sample Output

The following lines contain sample input and expected output to your programs. Please note that these examples are not exhaustive, and you should verify your programs with additional test cases.

```
$ ./a.out max-element-10.txt
68767

$ ./a.out max-element-100.txt
99649

$ ./a.out max-element-1000.txt
99983
```