NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

SC1007 Data Structures and Algorithms **2022/23 Semester 2**

Lab 5: Searching and Hash Tables

School of Computer Science and Engineering *Nanyang Technological University*

Q1 Given an array of n elements. Find two elements in the array such that their sum is equal to K. The two elements can be the same element. Once a pair of elements is found, the program can be terminated. The function prototype is given below:

```
void dualSearch(int A[], int size, int K, int dualIndex[])
```

Q2 Given a sorted array of n elements. Find two elements in the array such that their sum is equal to K. The two elements can be the same element. Once a pair of elements are found, the program can be terminated. The results may be different from the results of Question 1. The function prototype is given below:

```
void dualSearch(int A[], int size, int K, int dualIndex[])
```

Q3 Compare the performance between Q1 and Q2. Try to use a large input file to evaluate their running time. If you are using Code::Blocks, you may use *Configure Tools* under *tools* to create a User-defined tools shown in Figure 5.1. You can also try to run your programs in the command line or terminal directly using I/O redirection "<" for standard input and ">" for standard output. A 500k data and 1 million data file are attached. The first line is a search key and the second line is a data size. The rest are the data.

Q4 Implement a closed addressing hash table to perform insertion and key searching. The insertion may not have to insert at the end of the link-list. The function prototype is given below:

```
ListNode* HashSearch(HashTable *, int);
int HashInsert(HashTable *, int);
```

The default load factor is 3. The number of hash slots of the created hash table depends on the provided number of data.

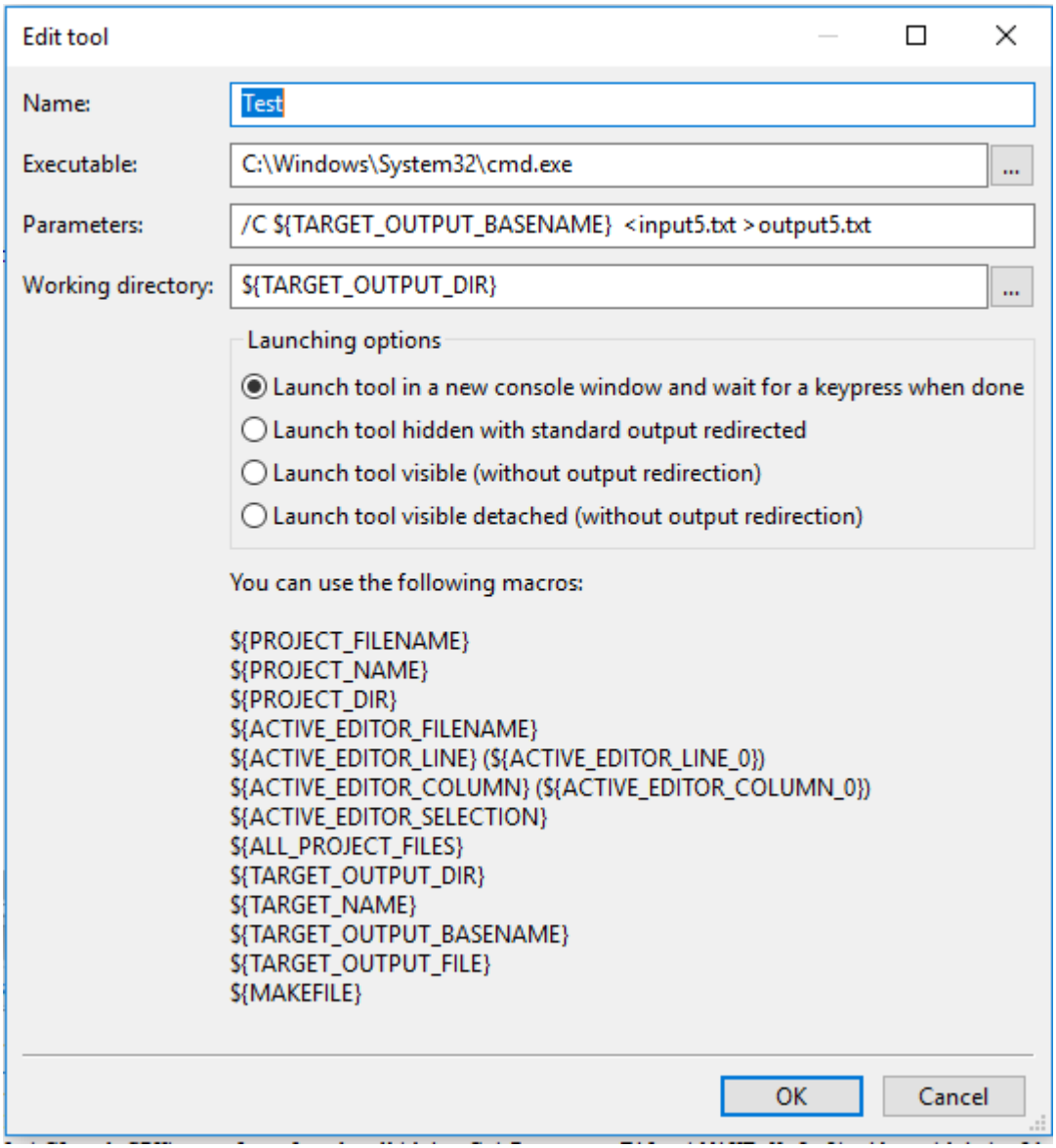

Figure 5.1: Name is not important. It can be anything. input5.txt is an input filename and output5.txt is an output filename.