ADS Homework 10

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1 Problem 10.1

1.1

For a hash table of size 5, the given sequence ¡3,10,2,4¿ can be inserted using given hash functions as:

Inserting 3:
$h_0(3) = 3 \ mod \ 5 = 3$
No collision occurs.

0	1	2	3	4
			3	

Inserting 10:
$h_0(10) = 10 \ mod \ 5 = 0$
No collision occurs.

0	1	2	3	4
10			3	

Inserting 2:
$h_0(2) = 2 \ mod \ 5 = 2$
No collision occurs.

0	1	2	3	4
10		2	3	

Inserting 4:
$h_0(4) = 4 \ mod \ 5 = 4$
No collision occurs.

0	1	2	3	4
10		2	3	4

1.2

Please see the attached files hash.h, hash.cpp and testhash.cpp.

2 Problem 9.2

2.1

Lets assume an activity list: (1,4),(1,2),(0,2),(6,8),(3,6)

For a greedy algorithm that selects activities with the shortest local run time, the selected activities are firstly, (1,2) and secondly. (6,8). This gives the total number of activities performed to be 2. However, we can observe that more compatible activities can be performed. Hence, the given greedy algorithm may fail at producing a globally optimal solution.

2.2 Bonus

The pseudo code below implements a greedy algorithm that selects activities with the latest starting time.

```
1
2  Activity_Sorting(A){
3      i=0;
4      //Sort run times from largest to smallest start time
5      for i = 1 to n-1{
6          for j = 0 to n-2{
7              if(A[j].start < A[j+1].start)
8              swap(A[j], A[j+1]);
9          }
10     }
11 }
12
13 //Select the first activity
14 Select A[0];
15
16 //Find next activity
17 i = 0;
18 for j=1 to n-1{
19     if (A[j].finish <= A[i].start)
20         Select A[j];
21     i=j
22 }
```