DO NOT OPEN THIS PACKET UNTIL INSTRUCTED TO DO SO

Instructions: You should have two packets. The other packet contains software for you to read. (Everything except main.cpp you have seen before.) This packet contains questions about the code. There are a total of 40 questions. Questions that begin with (*) are worth 3 points; all other questions are worth 2 points. Write your answers in this packet. This packet is what we will grade. You may choose to keep the code packet; otherwise it will be recycled.

Assume the code is compiled using the make file provided with the following command:

```
make
```

The code compiles without errors, and produces an executable called HashTable

You have until 10:45 to complete this exam (1:15 minutes, if you start on time). It is closed notes, closed books, closed internet, closed calculators, and most of all, closed classmates. If we see you use a cellphone or other potentially internet connected device, you will be assumed to be cheating and receive a score of -100.

When you are done with the test, bring it to the front of the room, show us your Student ID, and hand it in. (Obviously, your face has to match the Student ID, and the name on the test must match the name on the ID.)

Good luck.
Makefile Questions:

1. If `–Wall` was removed from CFLAGS, would the system still compile? [Y/N]: __________
2. If `–I.` was removed from CFLAGS, would the system still compile? [Y/N]: __________
3. If `–g` was removed from CFLAGS, would the system still compile? [Y/N]: __________
4. If `–c` was removed from CFLAGS, would the system still compile? [Y/N]: __________

Case 1: Executable invoked as ‘HashTable alpha’

5. (*) What is the first line of output? ______________________________
6. (*) What is the second line of output? ______________________________
7. (*) What is the third line of output? ______________________________
8. (*) Where in memory [stack/heap/other] is the variable ‘r’? ______________
9. (*) Where is memory [stack/heap/other] is r.ht? ______________________
10. (*) Where is memory [stack/heap/other] is r.ht.table? __________________
11. (*) How many string constructors are called within the HashTable constructor triggered by the Reader constructor? ________________________________
12. (*) How much memory (if any) does the program leak? (ignore any possible leak of the parameters passed to main; give amounts by data types, e.g. 3 Quaggas)

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13. (*) Assume that all pointers are 8 bytes and char is 1 byte. How many bytes of data on the heap can be accessed through the argv pointer? (remember, the command line was ‘HashTable alpha’) __________________________________________
Case 2: Executable invoked as ‘HashTable beta’

14. (*) What is the first (and only) line of output? ________________________________

15. How many HashTable constructors (of any type) are called? ___________________

16. More specifically, how many HashTable copy constructors are called? __________

17. How many HashTable destructors are called? _________________________________

18. How many string constructors are (indirectly) called? _________________________

19. How many string destructors are (indirectly) called? _________________________

20. (*) How much memory (if any) does the program leak? (ignore any possible leak of the parameters passed to main; give amounts by data types, e.g. 3 Quaggas)

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Case 3: Executable invoked as ‘HashTable gamma’

21. (*) What is the first line of output? ________________________________

22. (*) What is the second line of output? ________________________________

23. (*) What is the third line of output? ________________________________

Case 4: Executable invoked as ‘HashTable delta’

24. (*) What is the first line of output? ________________________________

25. (*) What is the second line of output? ________________________________

26. (*) What is the third line of output? ________________________________

27. How many HashTable constructors (of any type) are called? _________________

28. How many HashTable copy constructors are called? _________________

29. How many HashTable destructors are called? ______________________________
30. Where in memory [stack/heap/other] is the variable r1? ________________
31. Where in memory [stack/heap/other] is the variable r2? ________________
32. Where in memory [stack/heap/other] is r1->ht? ______________________
33. Where in memory [stack/heap/other] is r2.ht? ________________________
34. List the methods of Reader that have an argument that is pass by value: (only consider methods called by main in the context of this case in the switch statement)
   ___________________________________________________________________
35. List the methods of Reader that have an argument that is pass by constant reference: (only consider methods called by main in the context of this case in the switch statement)
   ___________________________________________________________________

General Questions

36. (*) Does the HashTable class define all the methods expected of a header class? If not, which one is missing? (Note: I did not ask if the implementations are correct; merely if the right methods have been defined.) ___________________________________________________________________
37. (*) Which method of HashTable was not declared an accessor, but could have and arguably should have been declared as an accessor? __________________________
38. If the line #define HASH_TABLE_H was removed from file HashTable.h, would the system still compile? [Y/N] ___________________________________________________________________
39. If the line #define READER_H was removed from file Reader.h, would the system still compile? [Y/N] ___________________________________________________________________
40. (*) Of the four cases in the switch statement in main (a, b, g & d), which ones (if any) crash? ___________________________________________________________________