Ryan Walters, Garrett Haynes

MP1 Report

Part 1

1. *"Do you notice any wastage of memory when items are deleted? If so, can we avoid such wastage and how?"*
   — When a node is deleted that is not at the end of the list, its memory is inaccessible because the *Insert* method inserts at the end of the linked list instead of filling in blanks in between.

2. *"Can you think of scenario, where there is space in the memory, but no insertion is possible?"*
   — There are multiple scenarios where this could be the case. For one, the maximum basic block size is always used as the width in bytes from the beginning of a node and the beginning of the next. Sometimes the node and payload do not take up this full amount of space. This leaves space, but it cannot be used. Another scenario this can occur in is when the memory pool for the linked list has free space, but not enough to fit another node+payload.

3. *"What is the maximum size of the value when the pointers are 8 bytes?"*
   — With a pointer size of 8 bytes, the maximum size would be: *basic block size* - 8 bytes(for the next pointer) - 4 bytes(for the key) - 4 bytes(for the value length).

Part 2

1. "*Derive the general expression for the range of numbers that go into the i-th tier:"*
   [(INT_MAX/t)*(i-1), (INT_MAX/t)*(i)), where t is the # of tiers and INT_MAX is 2^{31} - 1.