

## Hash Table Analysis

It is expected that the good hash function would have very little to no conflicts, with short probe chains and a low total number of probes. This is because the good hash considers every character in the key and multiplies the Unicode code of each character by a different, relatively prime number to spread out the values that are returned. On the other hand, it is expected that the bad hash function would have many more conflicts than the good hash with longer probe chains and a much larger total number of probes. This is because the bad hash only considers the first character of each key and returns its Unicode mod by the table size, resulting in many conflicts due to keys with the same first character being placed in the same positions.

The graphs below display the outputs of the statistics method after three different sets of keys are input into the hash functions. These results validate our predictions as it can be seen that the good hash function (left) consistently outperforms the bad hash function in all the measured criteria, only reaching a maximum of 2 conflicts, 2 total probes and a max probe chain of 1 for the third set of keys input, while the bad hash reached 10 conflicts, 55 total probes and a max probe chain of 10.

