Overall Organization:

I structured my experiment by using nested for loops. My outermost loop ran 5 times in order to accommodate the 5 trials, then the on inside of it would loop from 0.2 to 0.9, and would initialize the timer. The innermost loop would go from 0 to the load factor times the size of the hash table (600011). in which I would create a random number, check if there were copies, and then insert it into the table. I then repeated these loops to cover all 3 of the hash types.

Raw Data:

Open Hash with factor: 0.2

0.012321

0.011636

0.010466

0.012435

0.011358

Open Hash with factor: 0.3

0.018643

0.017956

0.019652

0.018769

0.017966

Open Hash with factor: 0.4

0.028254

0.029057

0.027664

0.027001

0.027564

Open Hash with factor: 0.5

0.036154

0.035826

0.036038

0.036533

0.035643

Open Hash with factor: 0.6

0.046693,

0.047676,

0.048915,

0.046751,

0.048055

Open Hash with factor: 0.7

0.059758,

0.05912,

0.057763,

0.06534,

0.070183

Open Hash with factor: 0.8

0.086863,

0.085398,

0.085993,

0.080164,

0.079878

Open Hash with factor: 0.9

0.105312,

0.100754,

0.095864,

0.094498,

0.094152

Quadratic Hash with factor: 0.2

0.001469,

0.001548,

0.001467,

0.001466,

0.001465

Quadratic Hash with factor: 0.3

0.002199,

0.002199,

0.002189,

0.002152,

0.00211

Quadratic Hash with factor: 0.4

0.002779,

0.002663,

0.002622,

0.002608,

0.002315

Quadratic Hash with factor: 0.5

0.002962,

0.003217,

0.003091,

0.002975,

0.003016

Quadratic Hash with factor: 0.6

0.003551,

0.003627,

0.003739,

0.003664,

0.00387

Quadratic Hash with factor: 0.7

0.004273,

0.004072,

0.004117,

0.004066,

0.004222

Quadratic Hash with factor: 0.8

0.005041,

0.004968,

0.004665,

0.004809,

0.004737

Quadratic Hash with factor: 0.9

0.005294,

0.005641,

0.005504,

0.005176,

0.005402

Double Hash with factor: 0.2

0.001197,

0.001254,

0.001197,

0.001183,

0.001212

Double Hash with factor: 0.3

0.001764,

0.00176,

0.001763,

0.002154,

0.001922

Double Hash with factor: 0.4

0.00255,

0.002713,

0.002355,

0.002495,

0.002313

Double Hash with factor: 0.5

0.002875,

0.002915,

0.002917,

0.00289,

0.002904

Double Hash with factor: 0.6

0.003737,

0.003569,

0.003791,

0.003441,

0.003456

Double Hash with factor: 0.7

0.004016,

0.00405,

0.004041,

0.004624,

0.004151

Double Hash with factor: 0.8

0.005027,

0.005022,

0.004808,

0.004961,

0.004927

Double Hash with factor: 0.9

0.00538,

0.005808,

0.005532,

0.005721,

0.005462

Summary of results:

The open hash had the highest average timing throughout the higher load factors, although the timings were pretty much all even throughout the earlier load factors. Double and Quadratic were pretty much even throughout all load factors.

Observation and conclusion:

Although the double and quadratic hash types were more complex in their calculations, they seemed to take up less time because they did not have to use a linked list in each array. Having to go through the array to find the index and then having to access the linked list took some efficiency off of the hashing, making it fall behind that of its peers.