**Question A:**

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Hashing Function: BURRIS

Probe type: LINEAR

Location: Question\_A

1 : NULL

2 : Egbe Original Location: 2 Probes: 1

3 : NULL

4 : NULL

5 : Carmona Original Location: 5 Probes: 1

6 : Daniels Original Location: 5 Probes: 2

7 : Constriction Original Location: 5 Probes: 3

8 : NULL

9 : NULL

10 : Fernando Original Location: 10 Probes: 1

11 : NULL

12 : NULL

13 : NULL

14 : NULL

15 : Scott Original Location: 15 Probes: 1

16 : Jordon Original Location: 15 Probes: 2

17 : Syncopate Original Location: 16 Probes: 2

18 : Clark Original Location: 18 Probes: 1

19 : NULL

20 : Paschal Original Location: 20 Probes: 1

21 : Akhila Original Location: 21 Probes: 1

22 : Bhandari Original Location: 22 Probes: 1

23 : Joel Original Location: 23 Probes: 1

24 : Cook Original Location: 24 Probes: 1

25 : Joseph Original Location: 24 Probes: 2

26 : Judy Original Location: 25 Probes: 2

27 : Charles Original Location: 27 Probes: 1

28 : Lisa Original Location: 28 Probes: 1

29 : Maiden Original Location: 28 Probes: 2

30 : NULL

31 : NULL

32 : Jeffrey Original Location: 32 Probes: 1

33 : NULL

34 : NULL

35 : NULL

36 : Aguirrie Original Location: 36 Probes: 1

37 : NULL

38 : Farral Original Location: 38 Probes: 1

39 : NULL

40 : NULL

41 : NULL

42 : NULL

43 : NULL

44 : NULL

45 : Misogamist Original Location: 45 Probes: 1

46 : NULL

47 : Gurung Original Location: 47 Probes: 1

48 : NULL

49 : NULL

50 : Nienberg Original Location: 50 Probes: 1

51 : Michael Original Location: 51 Probes: 1

52 : Red Original Location: 52 Probes: 1

53 : John Original Location: 53 Probes: 1

54 : NULL

55 : NULL

56 : NULL

57 : Ellington Original Location: 57 Probes: 1

58 : Kelly Original Location: 57 Probes: 2

59 : Zulfiqar Original Location: 59 Probes: 1

60 : Derek Original Location: 58 Probes: 3

61 : Todd Original Location: 60 Probes: 2

62 : James Original Location: 60 Probes: 3

63 : Eye Original Location: 60 Probes: 4

64 : NULL

65 : NULL

66 : NULL

67 : NULL

68 : NULL

69 : NULL

70 : NULL

71 : Garza Original Location: 71 Probes: 1

72 : NULL

73 : NULL

74 : NULL

75 : Necromancer Original Location: 75 Probes: 1

76 : Christopher Original Location: 76 Probes: 1

77 : Matthew Original Location: 77 Probes: 1

78 : Acevedo Original Location: 78 Probes: 1

79 : Robert Original Location: 78 Probes: 2

80 : NULL

81 : Arauza Original Location: 81 Probes: 1

82 : NULL

83 : NULL

84 : NULL

85 : NULL

86 : NULL

87 : NULL

88 : NULL

89 : Dustin Original Location: 89 Probes: 1

90 : Corey Original Location: 90 Probes: 1

91 : Fabulous Original Location: 90 Probes: 2

92 : NULL

93 : Chris Original Location: 93 Probes: 1

94 : NULL

95 : NULL

96 : NULL

97 : NULL

98 : Dugger Original Location: 98 Probes: 1

99 : NULL

100 : NULL

101 : NULL

102 : NULL

103 : Veronica Original Location: 103 Probes: 1

104 : NULL

105 : Qamruddin Original Location: 105 Probes: 1

106 : Clayton Original Location: 106 Probes: 1

107 : Alcantara Original Location: 107 Probes: 1

108 : 1234567890123456 Original Location: 108 Probes: 1

109 : NULL

110 : Kyle Original Location: 110 Probes: 1

111 : Ajose Original Location: 111 Probes: 1

112 : Davies Original Location: 111 Probes: 2

113 : Buck Original Location: 113 Probes: 1

114 : NULL

115 : NULL

116 : NULL

117 : NULL

118 : NULL

119 : Salkowski Original Location: 119 Probes: 1

120 : Casper Original Location: 120 Probes: 1

121 : Octavio Original Location: 121 Probes: 1

122 : Adam Original Location: 122 Probes: 1

123 : Crouch Original Location: 123 Probes: 1

124 : Vinnela Original Location: 124 Probes: 1

125 : Wade Original Location: 125 Probes: 1

126 : Batbold Original Location: 119 Probes: 8

127 : NULL

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 95

Maximum: 96

Average: 98.41

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Statistics for last 30 records inserted:

Minimum: 51

Maximum: 58

Average: 53.52

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 64

Load level: 50.00%

Expected average Probes: 1.50

**HASH ANALYSIS:**

This hash tables is to be 50% full, requiring 64 records to be inserted and uses linear probing for its collision handling. The expected average number of probes needed for a table with these conditions is 1.50.

this table shows evidence of primary clustering due to the usage of the linear probe even when the table is only halfway full.

It is shown here that the average number of probes needed to find a record in the first or last 30 records far exceed the theoretical number for a hash table of this size and load level.

Question B:

~~~~~~~~~~~~~

Hashing Function: BURRIS

Probe type: LINEAR

Location: Question\_B

1 : cauldron Original Location: 127 Probes: 3

2 : Egbe Original Location: 2 Probes: 1

3 : wince Original Location: 127 Probes: 5

4 : constrain Original Location: 122 Probes: 11

5 : Carmona Original Location: 5 Probes: 1

6 : Daniels Original Location: 5 Probes: 2

7 : Constriction Original Location: 5 Probes: 3

8 : Finagle Original Location: 5 Probes: 4

9 : prologue Original Location: 1 Probes: 9

10 : Fernando Original Location: 10 Probes: 1

11 : NULL

12 : NULL

13 : NULL

14 : parasympathetic Original Location: 14 Probes: 1

15 : Scott Original Location: 15 Probes: 1

16 : Jordon Original Location: 15 Probes: 2

17 : Syncopate Original Location: 16 Probes: 2

18 : Clark Original Location: 18 Probes: 1

19 : Person Original Location: 15 Probes: 5

20 : Paschal Original Location: 20 Probes: 1

21 : Akhila Original Location: 21 Probes: 1

22 : Bhandari Original Location: 22 Probes: 1

23 : Joel Original Location: 23 Probes: 1

24 : Cook Original Location: 24 Probes: 1

25 : Joseph Original Location: 24 Probes: 2

26 : Judy Original Location: 25 Probes: 2

27 : Charles Original Location: 27 Probes: 1

28 : Lisa Original Location: 28 Probes: 1

29 : Maiden Original Location: 28 Probes: 2

30 : Irreversible Original Location: 23 Probes: 8

31 : Jutty Original Location: 24 Probes: 8

32 : Jeffrey Original Location: 32 Probes: 1

33 : Afterwards Original Location: 32 Probes: 2

34 : magnetic Original Location: 29 Probes: 6

35 : rationalize Original Location: 27 Probes: 9

36 : Aguirrie Original Location: 36 Probes: 1

37 : Cook Original Location: 37 Probes: 1

38 : Farral Original Location: 38 Probes: 1

39 : privilege Original Location: 39 Probes: 1

40 : sponsor Original Location: 23 Probes: 18

41 : option Original Location: 41 Probes: 1

42 : toluene Original Location: 42 Probes: 1

43 : seal Original Location: 33 Probes: 11

44 : marsupial Original Location: 44 Probes: 1

45 : Misogamist Original Location: 45 Probes: 1

46 : ichthyosaur Original Location: 43 Probes: 4

47 : Gurung Original Location: 47 Probes: 1

48 : Yolk Original Location: 48 Probes: 1

49 : sparse Original Location: 48 Probes: 2

50 : Nienberg Original Location: 50 Probes: 1

51 : Michael Original Location: 51 Probes: 1

52 : Red Original Location: 52 Probes: 1

53 : John Original Location: 53 Probes: 1

54 : tiller Original Location: 52 Probes: 3

55 : NULL

56 : Perfect Original Location: 56 Probes: 1

57 : Ellington Original Location: 57 Probes: 1

58 : Kelly Original Location: 57 Probes: 2

59 : Zulfiqar Original Location: 59 Probes: 1

60 : Derek Original Location: 58 Probes: 3

61 : Todd Original Location: 60 Probes: 2

62 : James Original Location: 60 Probes: 3

63 : Eye Original Location: 60 Probes: 4

64 : poison Original Location: 125 Probes: 4

65 : ratiocination Original Location: 62 Probes: 4

66 : inlet Original Location: 62 Probes: 5

67 : scat Original Location: 59 Probes: 9

68 : brutalize Original Location: 68 Probes: 1

69 : Rush Original Location: 69 Probes: 1

70 : orthodontist Original Location: 69 Probes: 2

71 : Garza Original Location: 71 Probes: 1

72 : nosegay Original Location: 58 Probes: 15

73 : exhilarate Original Location: 68 Probes: 6

74 : wet Original Location: 74 Probes: 1

75 : Necromancer Original Location: 75 Probes: 1

76 : Christopher Original Location: 76 Probes: 1

77 : Matthew Original Location: 77 Probes: 1

78 : Acevedo Original Location: 78 Probes: 1

79 : Robert Original Location: 78 Probes: 2

80 : Fabricate Original Location: 79 Probes: 2

81 : Arauza Original Location: 81 Probes: 1

82 : seat Original Location: 65 Probes: 18

83 : NULL

84 : Screen Original Location: 84 Probes: 1

85 : noggin Original Location: 84 Probes: 2

86 : Staple Original Location: 86 Probes: 1

87 : NULL

88 : mole Original Location: 88 Probes: 1

89 : Dustin Original Location: 89 Probes: 1

90 : Corey Original Location: 90 Probes: 1

91 : Fabulous Original Location: 90 Probes: 2

92 : Northwest Original Location: 90 Probes: 3

93 : Chris Original Location: 93 Probes: 1

94 : prepossess Original Location: 94 Probes: 1

95 : dactyl Original Location: 88 Probes: 8

96 : NULL

97 : NULL

98 : Dugger Original Location: 98 Probes: 1

99 : NULL

100 : cap Original Location: 100 Probes: 1

101 : Wine Original Location: 101 Probes: 1

102 : live Original Location: 101 Probes: 2

103 : Veronica Original Location: 103 Probes: 1

104 : guard Original Location: 101 Probes: 4

105 : Qamruddin Original Location: 105 Probes: 1

106 : Clayton Original Location: 106 Probes: 1

107 : Alcantara Original Location: 107 Probes: 1

108 : 1234567890123456 Original Location: 108 Probes: 1

109 : quandary Original Location: 107 Probes: 3

110 : Kyle Original Location: 110 Probes: 1

111 : Ajose Original Location: 111 Probes: 1

112 : Davies Original Location: 111 Probes: 2

113 : Buck Original Location: 113 Probes: 1

114 : Honor Original Location: 112 Probes: 3

115 : forgetful Original Location: 115 Probes: 1

116 : NULL

117 : NULL

118 : NULL

119 : Salkowski Original Location: 119 Probes: 1

120 : Casper Original Location: 120 Probes: 1

121 : Octavio Original Location: 121 Probes: 1

122 : Adam Original Location: 122 Probes: 1

123 : Crouch Original Location: 123 Probes: 1

124 : Vinnela Original Location: 124 Probes: 1

125 : Wade Original Location: 125 Probes: 1

126 : Batbold Original Location: 119 Probes: 8

127 : Under Original Location: 119 Probes: 9

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 95

Maximum: 96

Average: 98.41

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Statistics for last 30 records inserted:

Minimum: 73

Maximum: 90

Average: 80.21

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 115

Load level: 89.84%

Expected average Probes: 5.42

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**HASH TABLE ANALYSIS:**

This hash tables is to be 90% full, requiring 115 records (= 89.84% full) to be inserted and uses linear probing for its collision handling. The expected average number of probes needed for a table with these conditions is 5.42.

Like the table previously shown, there is even more primary clustering due to the use of the linear probe which only increases as the load level does. The number of probes needed increase exponentially due to the probe only advancing to the next logic space resulting with a collision nearly every insert once the table is more than half way full.

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**Question C:**

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Hashing Function: BURRIS

Probe type: RANDOM

Location: Question\_C\_part1

1 : NULL

2 : Egbe Original Location: 2 Probes: 1

3 : NULL

4 : NULL

5 : Carmona Original Location: 5 Probes: 1

6 : NULL

7 : Daniels Original Location: 5 Probes: 2

8 : NULL

9 : NULL

10 : Fernando Original Location: 10 Probes: 1

11 : NULL

12 : Constriction Original Location: 5 Probes: 3

13 : NULL

14 : NULL

15 : Scott Original Location: 15 Probes: 1

16 : Syncopate Original Location: 16 Probes: 1

17 : Jordon Original Location: 15 Probes: 2

18 : Clark Original Location: 18 Probes: 1

19 : NULL

20 : Paschal Original Location: 20 Probes: 1

21 : Akhila Original Location: 21 Probes: 1

22 : Bhandari Original Location: 22 Probes: 1

23 : Joel Original Location: 23 Probes: 1

24 : Cook Original Location: 24 Probes: 1

25 : Judy Original Location: 25 Probes: 1

26 : Joseph Original Location: 24 Probes: 2

27 : Charles Original Location: 27 Probes: 1

28 : Lisa Original Location: 28 Probes: 1

29 : NULL

30 : Maiden Original Location: 28 Probes: 2

31 : NULL

32 : Jeffrey Original Location: 32 Probes: 1

33 : NULL

34 : NULL

35 : NULL

36 : Aguirrie Original Location: 36 Probes: 1

37 : NULL

38 : Farral Original Location: 38 Probes: 1

39 : NULL

40 : NULL

41 : NULL

42 : NULL

43 : NULL

44 : NULL

45 : Misogamist Original Location: 45 Probes: 1

46 : NULL

47 : Gurung Original Location: 47 Probes: 1

48 : NULL

49 : NULL

50 : Nienberg Original Location: 50 Probes: 1

51 : Michael Original Location: 51 Probes: 1

52 : Red Original Location: 52 Probes: 1

53 : John Original Location: 53 Probes: 1

54 : NULL

55 : NULL

56 : NULL

57 : Ellington Original Location: 57 Probes: 1

58 : Derek Original Location: 58 Probes: 1

59 : Zulfiqar Original Location: 59 Probes: 1

60 : Todd Original Location: 60 Probes: 1

61 : NULL

62 : James Original Location: 60 Probes: 2

63 : NULL

64 : Kelly Original Location: 57 Probes: 3

65 : NULL

66 : NULL

67 : Eye Original Location: 60 Probes: 3

68 : NULL

69 : NULL

70 : NULL

71 : Garza Original Location: 71 Probes: 1

72 : NULL

73 : NULL

74 : NULL

75 : Necromancer Original Location: 75 Probes: 1

76 : Christopher Original Location: 76 Probes: 1

77 : Matthew Original Location: 77 Probes: 1

78 : Acevedo Original Location: 78 Probes: 1

79 : NULL

80 : Robert Original Location: 78 Probes: 2

81 : Arauza Original Location: 81 Probes: 1

82 : NULL

83 : NULL

84 : NULL

85 : NULL

86 : NULL

87 : NULL

88 : NULL

89 : Dustin Original Location: 89 Probes: 1

90 : Corey Original Location: 90 Probes: 1

91 : NULL

92 : Fabulous Original Location: 90 Probes: 2

93 : Chris Original Location: 93 Probes: 1

94 : NULL

95 : NULL

96 : NULL

97 : NULL

98 : Dugger Original Location: 98 Probes: 1

99 : NULL

100 : NULL

101 : NULL

102 : NULL

103 : Veronica Original Location: 103 Probes: 1

104 : NULL

105 : Qamruddin Original Location: 105 Probes: 1

106 : Clayton Original Location: 106 Probes: 1

107 : Alcantara Original Location: 107 Probes: 1

108 : 1234567890123456 Original Location: 108 Probes: 1

109 : NULL

110 : Kyle Original Location: 110 Probes: 1

111 : Ajose Original Location: 111 Probes: 1

112 : NULL

113 : Buck Original Location: 113 Probes: 1

114 : NULL

115 : NULL

116 : NULL

117 : NULL

118 : Davies Original Location: 111 Probes: 3

119 : Salkowski Original Location: 119 Probes: 1

120 : Casper Original Location: 120 Probes: 1

121 : Octavio Original Location: 121 Probes: 1

122 : Adam Original Location: 122 Probes: 1

123 : Crouch Original Location: 123 Probes: 1

124 : Vinnela Original Location: 124 Probes: 1

125 : Wade Original Location: 125 Probes: 1

126 : Batbold Original Location: 119 Probes: 3

127 : NULL

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 61

Maximum: 118

Average: 114.69

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Statistics for last 30 records inserted:

Minimum: 18

Maximum: 128

Average: 39.48

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 64

Load level: 50.00%

Expected average Probes: 1.39

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**HASH ANALYSIS:**

This hash tables is to be 50% full, requiring 64 records to be inserted and uses random probing for its collision handling. The expected average number of probes needed for a table with these conditions is 1.39.

The random probe eliminates the need of many of the probes that the linear method must use, and spreads out the hashed address more uniformly throughout the table, but as the statistics show, the actual number of probes needed far exceed the number that is expected.

This table shows the secondary clustering that is a result of using the random probe method.

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**QUESTION C PART TWO:**

Hashing Function: BURRIS

Probe type: RANDOM

Location: Question\_C\_part2

1 : cauldron Original Location: 127 Probes: 2

2 : Egbe Original Location: 2 Probes: 1

3 : prologue Original Location: 1 Probes: 2

4 : NULL

5 : Carmona Original Location: 5 Probes: 1

6 : wince Original Location: 127 Probes: 3

7 : Daniels Original Location: 5 Probes: 2

8 : constrain Original Location: 122 Probes: 6

9 : NULL

10 : Fernando Original Location: 10 Probes: 1

11 : NULL

12 : Constriction Original Location: 5 Probes: 3

13 : NULL

14 : parasympathetic Original Location: 14 Probes: 1

15 : Scott Original Location: 15 Probes: 1

16 : Syncopate Original Location: 16 Probes: 1

17 : Jordon Original Location: 15 Probes: 2

18 : Clark Original Location: 18 Probes: 1

19 : ichthyosaur Original Location: 43 Probes: 28

20 : Paschal Original Location: 20 Probes: 1

21 : Akhila Original Location: 21 Probes: 1

22 : Bhandari Original Location: 22 Probes: 1

23 : Joel Original Location: 23 Probes: 1

24 : Cook Original Location: 24 Probes: 1

25 : Judy Original Location: 25 Probes: 1

26 : Joseph Original Location: 24 Probes: 2

27 : Charles Original Location: 27 Probes: 1

28 : Lisa Original Location: 28 Probes: 1

29 : magnetic Original Location: 29 Probes: 1

30 : Maiden Original Location: 28 Probes: 2

31 : Jutty Original Location: 24 Probes: 3

32 : Jeffrey Original Location: 32 Probes: 1

33 : seal Original Location: 33 Probes: 1

34 : Afterwards Original Location: 32 Probes: 2

35 : NULL

36 : Aguirrie Original Location: 36 Probes: 1

37 : Finagle Original Location: 5 Probes: 4

38 : Farral Original Location: 38 Probes: 1

39 : Cook Original Location: 37 Probes: 2

40 : guard Original Location: 101 Probes: 7

41 : rationalize Original Location: 27 Probes: 6

42 : toluene Original Location: 42 Probes: 1

43 : option Original Location: 41 Probes: 2

44 : Person Original Location: 15 Probes: 5

45 : Misogamist Original Location: 45 Probes: 1

46 : marsupial Original Location: 44 Probes: 2

47 : Gurung Original Location: 47 Probes: 1

48 : Yolk Original Location: 48 Probes: 1

49 : NULL

50 : Nienberg Original Location: 50 Probes: 1

51 : Michael Original Location: 51 Probes: 1

52 : Red Original Location: 52 Probes: 1

53 : John Original Location: 53 Probes: 1

54 : Under Original Location: 119 Probes: 11

55 : Irreversible Original Location: 23 Probes: 4

56 : Perfect Original Location: 56 Probes: 1

57 : Ellington Original Location: 57 Probes: 1

58 : Derek Original Location: 58 Probes: 1

59 : Zulfiqar Original Location: 59 Probes: 1

60 : Todd Original Location: 60 Probes: 1

61 : scat Original Location: 59 Probes: 2

62 : James Original Location: 60 Probes: 2

63 : NULL

64 : Kelly Original Location: 57 Probes: 3

65 : nosegay Original Location: 58 Probes: 3

66 : tiller Original Location: 52 Probes: 6

67 : Eye Original Location: 60 Probes: 3

68 : brutalize Original Location: 68 Probes: 1

69 : Rush Original Location: 69 Probes: 1

70 : exhilarate Original Location: 68 Probes: 2

71 : Garza Original Location: 71 Probes: 1

72 : seat Original Location: 65 Probes: 3

73 : NULL

74 : wet Original Location: 74 Probes: 1

75 : Necromancer Original Location: 75 Probes: 1

76 : Christopher Original Location: 76 Probes: 1

77 : Matthew Original Location: 77 Probes: 1

78 : Acevedo Original Location: 78 Probes: 1

79 : Fabricate Original Location: 79 Probes: 1

80 : Robert Original Location: 78 Probes: 2

81 : Arauza Original Location: 81 Probes: 1

82 : NULL

83 : orthodontist Original Location: 69 Probes: 6

84 : Screen Original Location: 84 Probes: 1

85 : NULL

86 : Staple Original Location: 86 Probes: 1

87 : NULL

88 : mole Original Location: 88 Probes: 1

89 : Dustin Original Location: 89 Probes: 1

90 : Corey Original Location: 90 Probes: 1

91 : inlet Original Location: 62 Probes: 5

92 : Fabulous Original Location: 90 Probes: 2

93 : Chris Original Location: 93 Probes: 1

94 : ratiocination Original Location: 62 Probes: 4

95 : dactyl Original Location: 88 Probes: 3

96 : prepossess Original Location: 94 Probes: 2

97 : Northwest Original Location: 90 Probes: 3

98 : Dugger Original Location: 98 Probes: 1

99 : sponsor Original Location: 23 Probes: 8

100 : cap Original Location: 100 Probes: 1

101 : Wine Original Location: 101 Probes: 1

102 : privilege Original Location: 39 Probes: 11

103 : Veronica Original Location: 103 Probes: 1

104 : sparse Original Location: 48 Probes: 12

105 : Qamruddin Original Location: 105 Probes: 1

106 : Clayton Original Location: 106 Probes: 1

107 : Alcantara Original Location: 107 Probes: 1

108 : 1234567890123456 Original Location: 108 Probes: 1

109 : quandary Original Location: 107 Probes: 2

110 : Kyle Original Location: 110 Probes: 1

111 : Ajose Original Location: 111 Probes: 1

112 : Honor Original Location: 112 Probes: 1

113 : Buck Original Location: 113 Probes: 1

114 : NULL

115 : live Original Location: 101 Probes: 6

116 : noggin Original Location: 84 Probes: 4

117 : forgetful Original Location: 115 Probes: 2

118 : Davies Original Location: 111 Probes: 3

119 : Salkowski Original Location: 119 Probes: 1

120 : Casper Original Location: 120 Probes: 1

121 : Octavio Original Location: 121 Probes: 1

122 : Adam Original Location: 122 Probes: 1

123 : Crouch Original Location: 123 Probes: 1

124 : Vinnela Original Location: 124 Probes: 1

125 : Wade Original Location: 125 Probes: 1

126 : Batbold Original Location: 119 Probes: 3

127 : poison Original Location: 125 Probes: 2

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 53

Maximum: 118

Average: 112.45

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Statistics for last 30 records inserted:

Minimum: 1

Maximum: 127

Average: 80.83

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 115

Load level: 89.84%

Expected average Probes: 2.55

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

**HASH ANALYSIS:**

This hash tables is to be 90% full, requiring 115 records (= 89.84% full) to be inserted and uses random probing for its collision handling. The expected average number of probes needed for a table with these conditions is 2.55.

As previously stated, this table shares characteristics of the table prior, but because the load level is up to 90%, these characteristics are more visible.

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**QUESTION D:**

**Calculating the theoretical number of probes:**

α = (number of keys in the table / size of the table)

50% full → (64 / 128) = 0.5

90% full → (115 / 128) = 0.8984375

E : is the expected number of probes

**Linear:E = (1 –** α / 2**) / (1 –** α**)**

→ 1.50 for 50%

→ 5.42 for 90%

**Random: E = -(1 –** α**) Ln(1 –** α**)**

→ 1.39 for 50%

→ 2.55 for 90%

**Comparison of the 50% full tables:**

****

**Comparison of the 90 % full tables:**

****

These tables show how much more efficient my hashing function is relative to the original because of the far fewer probes needed in finding a random hashed address.

**Question E:**

**~~~~~~~~~~~~~**

Hashing Function: JAKE

Probe type: LINEAR

Location: Question\_E\_part1

1 : Eye Original Location: 116 Probes: 14

2 : Farral Original Location: 2 Probes: 1

3 : Fernando Original Location: 3 Probes: 1

4 : Judy Original Location: 4 Probes: 1

5 : Fabulous Original Location: 5 Probes: 1

6 : Misogamist Original Location: 3 Probes: 4

7 : Lisa Original Location: 7 Probes: 1

8 : 1234567890123456 Original Location: 8 Probes: 1

9 : Constriction Original Location: 119 Probes: 19

10 : Zulfiqar Original Location: 10 Probes: 1

11 : NULL

12 : Ajose Original Location: 12 Probes: 1

13 : NULL

14 : Derek Original Location: 14 Probes: 1

15 : Akhila Original Location: 14 Probes: 2

16 : NULL

17 : NULL

18 : Kelly Original Location: 18 Probes: 1

19 : Todd Original Location: 19 Probes: 1

20 : Garza Original Location: 20 Probes: 1

21 : Wade Original Location: 21 Probes: 1

22 : Casper Original Location: 22 Probes: 1

23 : Necromancer Original Location: 18 Probes: 6

24 : NULL

25 : NULL

26 : Scott Original Location: 26 Probes: 1

27 : NULL

28 : NULL

29 : NULL

30 : NULL

31 : James Original Location: 31 Probes: 1

32 : NULL

33 : NULL

34 : NULL

35 : Bhandari Original Location: 35 Probes: 1

36 : Davies Original Location: 36 Probes: 1

37 : NULL

38 : Dustin Original Location: 38 Probes: 1

39 : NULL

40 : Clayton Original Location: 40 Probes: 1

41 : Egbe Original Location: 41 Probes: 1

42 : NULL

43 : NULL

44 : Nienberg Original Location: 44 Probes: 1

45 : NULL

46 : Syncopate Original Location: 46 Probes: 1

47 : Gurung Original Location: 47 Probes: 1

48 : Qamruddin Original Location: 48 Probes: 1

49 : Corey Original Location: 48 Probes: 2

50 : NULL

51 : NULL

52 : Acevedo Original Location: 52 Probes: 1

53 : NULL

54 : NULL

55 : NULL

56 : NULL

57 : NULL

58 : NULL

59 : Vinnela Original Location: 59 Probes: 1

60 : Jeffrey Original Location: 60 Probes: 1

61 : NULL

62 : NULL

63 : Batbold Original Location: 63 Probes: 1

64 : Maiden Original Location: 123 Probes: 6

65 : NULL

66 : NULL

67 : NULL

68 : Jordon Original Location: 68 Probes: 1

69 : Matthew Original Location: 69 Probes: 1

70 : John Original Location: 70 Probes: 1

71 : NULL

72 : NULL

73 : NULL

74 : Crouch Original Location: 74 Probes: 1

75 : NULL

76 : NULL

77 : Christopher Original Location: 77 Probes: 1

78 : NULL

79 : NULL

80 : NULL

81 : Charles Original Location: 81 Probes: 1

82 : Cook Original Location: 82 Probes: 1

83 : NULL

84 : NULL

85 : NULL

86 : NULL

87 : NULL

88 : NULL

89 : NULL

90 : NULL

91 : Alcantara Original Location: 91 Probes: 1

92 : Ellington Original Location: 92 Probes: 1

93 : NULL

94 : NULL

95 : Aguirrie Original Location: 95 Probes: 1

96 : Joel Original Location: 96 Probes: 1

97 : Clark Original Location: 97 Probes: 1

98 : NULL

99 : Joseph Original Location: 99 Probes: 1

100 : Dugger Original Location: 100 Probes: 1

101 : NULL

102 : NULL

103 : NULL

104 : NULL

105 : NULL

106 : Michael Original Location: 106 Probes: 1

107 : NULL

108 : NULL

109 : NULL

110 : NULL

111 : NULL

112 : NULL

113 : NULL

114 : Buck Original Location: 114 Probes: 1

115 : NULL

116 : Kyle Original Location: 116 Probes: 1

117 : Arauza Original Location: 117 Probes: 1

118 : Paschal Original Location: 118 Probes: 1

119 : Carmona Original Location: 119 Probes: 1

120 : Salkowski Original Location: 119 Probes: 2

121 : Robert Original Location: 118 Probes: 4

122 : Adam Original Location: 122 Probes: 1

123 : Octavio Original Location: 117 Probes: 7

124 : Daniels Original Location: 124 Probes: 1

125 : Veronica Original Location: 124 Probes: 2

126 : Red Original Location: 126 Probes: 1

127 : Chris Original Location: 116 Probes: 12

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 1

Maximum: 2

Average: 1.10

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Statistics for last 30 records inserted:

Minimum: 1

Maximum: 19

Average: 3.21

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 64

Load level: 50.00%

Expected average Probes: 1.50

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Hashing Function: JAKE

Probe type: LINEAR

Location: Question\_E\_part2

1 : Eye Original Location: 116 Probes: 14

2 : Farral Original Location: 2 Probes: 1

3 : Fernando Original Location: 3 Probes: 1

4 : Judy Original Location: 4 Probes: 1

5 : Fabulous Original Location: 5 Probes: 1

6 : Misogamist Original Location: 3 Probes: 4

7 : Lisa Original Location: 7 Probes: 1

8 : 1234567890123456 Original Location: 8 Probes: 1

9 : Constriction Original Location: 119 Probes: 19

10 : Zulfiqar Original Location: 10 Probes: 1

11 : Fabricate Original Location: 117 Probes: 23

12 : Ajose Original Location: 12 Probes: 1

13 : Finagle Original Location: 4 Probes: 10

14 : Derek Original Location: 14 Probes: 1

15 : Akhila Original Location: 14 Probes: 2

16 : cauldron Original Location: 5 Probes: 12

17 : orthodontist Original Location: 119 Probes: 27

18 : Kelly Original Location: 18 Probes: 1

19 : Todd Original Location: 19 Probes: 1

20 : Garza Original Location: 20 Probes: 1

21 : Wade Original Location: 21 Probes: 1

22 : Casper Original Location: 22 Probes: 1

23 : Necromancer Original Location: 18 Probes: 6

24 : Afterwards Original Location: 21 Probes: 4

25 : scat Original Location: 24 Probes: 2

26 : Scott Original Location: 26 Probes: 1

27 : dactyl Original Location: 25 Probes: 3

28 : nosegay Original Location: 12 Probes: 17

29 : privilege Original Location: 11 Probes: 19

30 : exhilarate Original Location: 116 Probes: 43

31 : James Original Location: 31 Probes: 1

32 : guard Original Location: 28 Probes: 5

33 : noggin Original Location: 5 Probes: 29

34 : seat Original Location: 24 Probes: 11

35 : Bhandari Original Location: 35 Probes: 1

36 : Davies Original Location: 36 Probes: 1

37 : tiller Original Location: 20 Probes: 18

38 : Dustin Original Location: 38 Probes: 1

39 : ratiocination Original Location: 39 Probes: 1

40 : Clayton Original Location: 40 Probes: 1

41 : Egbe Original Location: 41 Probes: 1

42 : wet Original Location: 38 Probes: 5

43 : sponsor Original Location: 42 Probes: 2

44 : Nienberg Original Location: 44 Probes: 1

45 : prologue Original Location: 42 Probes: 4

46 : Syncopate Original Location: 46 Probes: 1

47 : Gurung Original Location: 47 Probes: 1

48 : Qamruddin Original Location: 48 Probes: 1

49 : Corey Original Location: 48 Probes: 2

50 : Under Original Location: 47 Probes: 4

51 : Jutty Original Location: 49 Probes: 3

52 : Acevedo Original Location: 52 Probes: 1

53 : prepossess Original Location: 49 Probes: 5

54 : toluene Original Location: 46 Probes: 9

55 : ichthyosaur Original Location: 43 Probes: 13

56 : Irreversible Original Location: 56 Probes: 1

57 : NULL

58 : NULL

59 : Vinnela Original Location: 59 Probes: 1

60 : Jeffrey Original Location: 60 Probes: 1

61 : NULL

62 : NULL

63 : Batbold Original Location: 63 Probes: 1

64 : Maiden Original Location: 123 Probes: 6

65 : Yolk Original Location: 64 Probes: 2

66 : live Original Location: 64 Probes: 3

67 : sparse Original Location: 65 Probes: 3

68 : Jordon Original Location: 68 Probes: 1

69 : Matthew Original Location: 69 Probes: 1

70 : John Original Location: 70 Probes: 1

71 : Rush Original Location: 68 Probes: 4

72 : parasympathetic Original Location: 68 Probes: 5

73 : wince Original Location: 70 Probes: 4

74 : Crouch Original Location: 74 Probes: 1

75 : poison Original Location: 75 Probes: 1

76 : magnetic Original Location: 70 Probes: 7

77 : Christopher Original Location: 77 Probes: 1

78 : cap Original Location: 78 Probes: 1

79 : marsupial Original Location: 71 Probes: 9

80 : Perfect Original Location: 80 Probes: 1

81 : Charles Original Location: 81 Probes: 1

82 : Cook Original Location: 82 Probes: 1

83 : Cook Original Location: 82 Probes: 2

84 : Screen Original Location: 83 Probes: 2

85 : seal Original Location: 80 Probes: 6

86 : Honor Original Location: 86 Probes: 1

87 : NULL

88 : Staple Original Location: 88 Probes: 1

89 : Person Original Location: 89 Probes: 1

90 : brutalize Original Location: 89 Probes: 2

91 : Alcantara Original Location: 91 Probes: 1

92 : Ellington Original Location: 92 Probes: 1

93 : mole Original Location: 92 Probes: 2

94 : rationalize Original Location: 91 Probes: 4

95 : Aguirrie Original Location: 95 Probes: 1

96 : Joel Original Location: 96 Probes: 1

97 : Clark Original Location: 97 Probes: 1

98 : NULL

99 : Joseph Original Location: 99 Probes: 1

100 : Dugger Original Location: 100 Probes: 1

101 : Northwest Original Location: 99 Probes: 3

102 : forgetful Original Location: 102 Probes: 1

103 : NULL

104 : NULL

105 : NULL

106 : Michael Original Location: 106 Probes: 1

107 : inlet Original Location: 106 Probes: 2

108 : quandary Original Location: 106 Probes: 3

109 : NULL

110 : NULL

111 : NULL

112 : Wine Original Location: 112 Probes: 1

113 : constrain Original Location: 113 Probes: 1

114 : Buck Original Location: 114 Probes: 1

115 : option Original Location: 113 Probes: 3

116 : Kyle Original Location: 116 Probes: 1

117 : Arauza Original Location: 117 Probes: 1

118 : Paschal Original Location: 118 Probes: 1

119 : Carmona Original Location: 119 Probes: 1

120 : Salkowski Original Location: 119 Probes: 2

121 : Robert Original Location: 118 Probes: 4

122 : Adam Original Location: 122 Probes: 1

123 : Octavio Original Location: 117 Probes: 7

124 : Daniels Original Location: 124 Probes: 1

125 : Veronica Original Location: 124 Probes: 2

126 : Red Original Location: 126 Probes: 1

127 : Chris Original Location: 116 Probes: 12

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 1

Maximum: 2

Average: 1.10

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Statistics for last 30 records inserted:

Minimum: 1

Maximum: 43

Average: 9.34

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 115

Load level: 89.84%

Expected average Probes: 5.42

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**Hashing Function: JAKE**

**Probe type: RANDOM**

**Location: Question\_E\_part3**

1 : NULL

2 : Farral Original Location: 2 Probes: 1

3 : Veronica Original Location: 124 Probes: 3

4 : Judy Original Location: 4 Probes: 1

5 : Fernando Original Location: 3 Probes: 2

6 : NULL

7 : Lisa Original Location: 7 Probes: 1

8 : 1234567890123456 Original Location: 8 Probes: 1

9 : NULL

10 : Zulfiqar Original Location: 10 Probes: 1

11 : NULL

12 : Ajose Original Location: 12 Probes: 1

13 : NULL

14 : Derek Original Location: 14 Probes: 1

15 : NULL

16 : Akhila Original Location: 14 Probes: 2

17 : Eye Original Location: 116 Probes: 5

18 : Kelly Original Location: 18 Probes: 1

19 : Todd Original Location: 19 Probes: 1

20 : Garza Original Location: 20 Probes: 1

21 : Octavio Original Location: 117 Probes: 4

22 : Casper Original Location: 22 Probes: 1

23 : Wade Original Location: 21 Probes: 2

24 : NULL

25 : Necromancer Original Location: 18 Probes: 3

26 : Scott Original Location: 26 Probes: 1

27 : NULL

28 : NULL

29 : NULL

30 : NULL

31 : James Original Location: 31 Probes: 1

32 : Misogamist Original Location: 3 Probes: 5

33 : NULL

34 : NULL

35 : Bhandari Original Location: 35 Probes: 1

36 : Davies Original Location: 36 Probes: 1

37 : Fabulous Original Location: 5 Probes: 4

38 : Dustin Original Location: 38 Probes: 1

39 : NULL

40 : Clayton Original Location: 40 Probes: 1

41 : Egbe Original Location: 41 Probes: 1

42 : NULL

43 : NULL

44 : Nienberg Original Location: 44 Probes: 1

45 : NULL

46 : Syncopate Original Location: 46 Probes: 1

47 : Gurung Original Location: 47 Probes: 1

48 : Qamruddin Original Location: 48 Probes: 1

49 : NULL

50 : Corey Original Location: 48 Probes: 2

51 : NULL

52 : Acevedo Original Location: 52 Probes: 1

53 : NULL

54 : NULL

55 : NULL

56 : NULL

57 : NULL

58 : Constriction Original Location: 119 Probes: 7

59 : Vinnela Original Location: 59 Probes: 1

60 : Jeffrey Original Location: 60 Probes: 1

61 : NULL

62 : NULL

63 : Batbold Original Location: 63 Probes: 1

64 : NULL

65 : NULL

66 : NULL

67 : NULL

68 : Jordon Original Location: 68 Probes: 1

69 : Matthew Original Location: 69 Probes: 1

70 : John Original Location: 70 Probes: 1

71 : NULL

72 : NULL

73 : NULL

74 : Crouch Original Location: 74 Probes: 1

75 : NULL

76 : NULL

77 : Christopher Original Location: 77 Probes: 1

78 : NULL

79 : NULL

80 : NULL

81 : Charles Original Location: 81 Probes: 1

82 : Cook Original Location: 82 Probes: 1

83 : NULL

84 : NULL

85 : NULL

86 : NULL

87 : NULL

88 : NULL

89 : NULL

90 : NULL

91 : Alcantara Original Location: 91 Probes: 1

92 : Ellington Original Location: 92 Probes: 1

93 : NULL

94 : NULL

95 : Aguirrie Original Location: 95 Probes: 1

96 : Joel Original Location: 96 Probes: 1

97 : Clark Original Location: 97 Probes: 1

98 : NULL

99 : Joseph Original Location: 99 Probes: 1

100 : Dugger Original Location: 100 Probes: 1

101 : NULL

102 : NULL

103 : NULL

104 : NULL

105 : NULL

106 : Michael Original Location: 106 Probes: 1

107 : NULL

108 : NULL

109 : NULL

110 : NULL

111 : NULL

112 : NULL

113 : NULL

114 : Buck Original Location: 114 Probes: 1

115 : NULL

116 : Kyle Original Location: 116 Probes: 1

117 : Arauza Original Location: 117 Probes: 1

118 : Paschal Original Location: 118 Probes: 1

119 : Carmona Original Location: 119 Probes: 1

120 : Robert Original Location: 118 Probes: 2

121 : Salkowski Original Location: 119 Probes: 2

122 : Adam Original Location: 122 Probes: 1

123 : Chris Original Location: 116 Probes: 3

124 : Daniels Original Location: 124 Probes: 1

125 : Maiden Original Location: 123 Probes: 2

126 : Red Original Location: 126 Probes: 1

127 : NULL

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 1

Maximum: 2

Average: 1.10

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Statistics for last 30 records inserted:

Minimum: 1

Maximum: 7

Average: 2.07

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 64

Load level: 50.00%

Expected average Probes: 1.39

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**Hashing Function: JAKE**

**Probe type: RANDOM**

**Location: Question\_E\_part4**

1 : NULL

2 : Farral Original Location: 2 Probes: 1

3 : Veronica Original Location: 124 Probes: 3

4 : Judy Original Location: 4 Probes: 1

5 : Fernando Original Location: 3 Probes: 2

6 : Finagle Original Location: 4 Probes: 2

7 : Lisa Original Location: 7 Probes: 1

8 : 1234567890123456 Original Location: 8 Probes: 1

9 : seat Original Location: 24 Probes: 17

10 : Zulfiqar Original Location: 10 Probes: 1

11 : privilege Original Location: 11 Probes: 1

12 : Ajose Original Location: 12 Probes: 1

13 : tiller Original Location: 20 Probes: 9

14 : Derek Original Location: 14 Probes: 1

15 : NULL

16 : Akhila Original Location: 14 Probes: 2

17 : Eye Original Location: 116 Probes: 5

18 : Kelly Original Location: 18 Probes: 1

19 : Todd Original Location: 19 Probes: 1

20 : Garza Original Location: 20 Probes: 1

21 : Octavio Original Location: 117 Probes: 4

22 : Casper Original Location: 22 Probes: 1

23 : Wade Original Location: 21 Probes: 2

24 : scat Original Location: 24 Probes: 1

25 : Necromancer Original Location: 18 Probes: 3

26 : Scott Original Location: 26 Probes: 1

27 : dactyl Original Location: 25 Probes: 2

28 : Afterwards Original Location: 21 Probes: 3

29 : NULL

30 : guard Original Location: 28 Probes: 2

31 : James Original Location: 31 Probes: 1

32 : Misogamist Original Location: 3 Probes: 5

33 : nosegay Original Location: 12 Probes: 13

34 : cauldron Original Location: 5 Probes: 5

35 : Bhandari Original Location: 35 Probes: 1

36 : Davies Original Location: 36 Probes: 1

37 : Fabulous Original Location: 5 Probes: 4

38 : Dustin Original Location: 38 Probes: 1

39 : ratiocination Original Location: 39 Probes: 1

40 : Clayton Original Location: 40 Probes: 1

41 : Egbe Original Location: 41 Probes: 1

42 : prepossess Original Location: 49 Probes: 9

43 : ichthyosaur Original Location: 43 Probes: 1

44 : Nienberg Original Location: 44 Probes: 1

45 : wet Original Location: 38 Probes: 3

46 : Syncopate Original Location: 46 Probes: 1

47 : Gurung Original Location: 47 Probes: 1

48 : Qamruddin Original Location: 48 Probes: 1

49 : Under Original Location: 47 Probes: 2

50 : Corey Original Location: 48 Probes: 2

51 : Jutty Original Location: 49 Probes: 2

52 : Acevedo Original Location: 52 Probes: 1

53 : toluene Original Location: 46 Probes: 3

54 : quandary Original Location: 106 Probes: 8

55 : exhilarate Original Location: 116 Probes: 7

56 : Irreversible Original Location: 56 Probes: 1

57 : NULL

58 : Constriction Original Location: 119 Probes: 7

59 : Vinnela Original Location: 59 Probes: 1

60 : Jeffrey Original Location: 60 Probes: 1

61 : parasympathetic Original Location: 68 Probes: 9

62 : NULL

63 : Batbold Original Location: 63 Probes: 1

64 : Yolk Original Location: 64 Probes: 1

65 : Fabricate Original Location: 117 Probes: 8

66 : live Original Location: 64 Probes: 2

67 : orthodontist Original Location: 119 Probes: 8

68 : Jordon Original Location: 68 Probes: 1

69 : Matthew Original Location: 69 Probes: 1

70 : John Original Location: 70 Probes: 1

71 : marsupial Original Location: 71 Probes: 1

72 : wince Original Location: 70 Probes: 2

73 : NULL

74 : Crouch Original Location: 74 Probes: 1

75 : Rush Original Location: 68 Probes: 3

76 : NULL

77 : Christopher Original Location: 77 Probes: 1

78 : cap Original Location: 78 Probes: 1

79 : sparse Original Location: 65 Probes: 6

80 : Perfect Original Location: 80 Probes: 1

81 : Charles Original Location: 81 Probes: 1

82 : Cook Original Location: 82 Probes: 1

83 : Screen Original Location: 83 Probes: 1

84 : Cook Original Location: 82 Probes: 2

85 : NULL

86 : Honor Original Location: 86 Probes: 1

87 : seal Original Location: 80 Probes: 3

88 : Staple Original Location: 88 Probes: 1

89 : Person Original Location: 89 Probes: 1

90 : NULL

91 : Alcantara Original Location: 91 Probes: 1

92 : Ellington Original Location: 92 Probes: 1

93 : rationalize Original Location: 91 Probes: 2

94 : mole Original Location: 92 Probes: 2

95 : Aguirrie Original Location: 95 Probes: 1

96 : Joel Original Location: 96 Probes: 1

97 : Clark Original Location: 97 Probes: 1

98 : prologue Original Location: 42 Probes: 12

99 : Joseph Original Location: 99 Probes: 1

100 : Dugger Original Location: 100 Probes: 1

101 : Northwest Original Location: 99 Probes: 2

102 : magnetic Original Location: 70 Probes: 4

103 : brutalize Original Location: 89 Probes: 6

104 : forgetful Original Location: 102 Probes: 2

105 : noggin Original Location: 5 Probes: 16

106 : Michael Original Location: 106 Probes: 1

107 : poison Original Location: 75 Probes: 4

108 : inlet Original Location: 106 Probes: 2

109 : sponsor Original Location: 42 Probes: 7

110 : NULL

111 : NULL

112 : Wine Original Location: 112 Probes: 1

113 : constrain Original Location: 113 Probes: 1

114 : Buck Original Location: 114 Probes: 1

115 : option Original Location: 113 Probes: 2

116 : Kyle Original Location: 116 Probes: 1

117 : Arauza Original Location: 117 Probes: 1

118 : Paschal Original Location: 118 Probes: 1

119 : Carmona Original Location: 119 Probes: 1

120 : Robert Original Location: 118 Probes: 2

121 : Salkowski Original Location: 119 Probes: 2

122 : Adam Original Location: 122 Probes: 1

123 : Chris Original Location: 116 Probes: 3

124 : Daniels Original Location: 124 Probes: 1

125 : Maiden Original Location: 123 Probes: 2

126 : Red Original Location: 126 Probes: 1

127 : NULL

128 : NULL

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Statistics for first 30 records inserted:

Minimum: 1

Maximum: 2

Average: 1.10

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Statistics for last 30 records inserted:

Minimum: 1

Maximum: 17

Average: 5.24

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~~~~~~~~~~~~~~~~Theoretical~~~~~~~~~~~~~~~~~

Keys: 115

Load level: 89.84%

Expected average Probes: 2.55

End of hashing demonstration.

Terminating program.

**HASH FUNCTION COMPARISON:**

**BURRIS HASH →**

**HA = {abs[ slice(4..5) ] + abs[slice(13..14) ] } / 65,535 + abs[slice(10..10)]**

The table size would have to be much larger in order for this hash function to become some what efficient, although it most likely would never raise to this challenge because this function employs the usage of *simple codes*.

Part of the simple code that is used is the slice from the 13th to the 14th character of the item that is to be hashed which is highly ineffective because there is no guarantee that there will even be characters in this spot. This also goes for the addition of the 10th character at the end of the function.

The integer that is being is acting as the divisor helps this function a lot because it is a large prime number, but to make this specific function more viable, the integer that it is dividing should also be guaranteed to be a unique number which this fails to do.

**JAKE HASH → HA := ((KEY(Item(1..8)) \* KEY(Item(9..16))) / 2\*\*12) mod (TS – 1)**

This is the hash function that I created which employs the method of square and extract n bits and division remainder.

This is a more effective function because each part of this function is guarantied to have a value. By splitting up the 16 digit hash item into equal 8 bit parts, and multiplying them together, a 64 bit long integer is produced. From this large integer I then shift to the right and discard all other bits to prevent from collecting bits in which repetition is most common (this is done with the 2\*\*12). In my program I then convert back to an integer then modulus this integer by the table size -1 (127) which produced a function that dispersed address throughout the hash table in a more uniform manner resulting in less collisions and more efficiency.

This is generally a better method because it still uses simple arithmetic in calculating address, but it also accounts for keys that are unknown, and therefore if more flexible and hopefully applicable in more potential situations.