Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	
1	
2	
3	

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Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

- Initially, *splitindex* $= 0$.

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Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	20
1	
2	
3	

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	20
1	
2	
3	15

- Initially, $splitindex = 0$.
- $h_i(20) = 0 \geq splitindex$. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.

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Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	20
1	5
2	
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- Initially, $splitindex = 0$.
- $h_i(20) = 0 \geq splitindex$. Insert 20 to $h_i(20) = 0$.
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0	20
1	5 9
2	
3	15

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	
1	5 9
2	
3	15
4	20

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16
1	5 9
2	
3	15
4	20

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.

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Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	5 9
2	
3	15
4	20

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	15
4	20
5	5

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	15
4	20
5	5 13

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.
- $h_i(13) = 1 <$ *splitindex*. Insert 13 to $h_{i+1}(13) = 5$. The third collision and split.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	15
4	20
5	5 13
6	

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.
- $h_i(13) = 1 <$ *splitindex*. Insert 13 to $h_{i+1}(13) = 5$. The third collision and split.
- Entry 2 is split, but it is empty. *splitindex* $= 3$.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	15
4	20 4
5	5 13
6	

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.
- $h_i(13) = 1 <$ *splitindex*. Insert 13 to $h_{i+1}(13) = 5$. The third collision and split.
- Entry 2 is split, but it is empty. *splitindex* $= 3$.
- $h_i(4) = 0 <$ *splitindex*. Insert 4 to $h_{i+1}(4) = 4$. The fourth collision and split.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	
4	20 4
5	5 13
6	
7	15

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.
- $h_i(13) = 1 <$ *splitindex*. Insert 13 to $h_{i+1}(13) = 5$. The third collision and split.
- Entry 2 is split, but it is empty. *splitindex* $= 3$.
- $h_i(4) = 0 <$ *splitindex*. Insert 4 to $h_{i+1}(4) = 4$. The fourth collision and split.
- Entry 3 is split, and 15 moves to $h_{i+1}(15) = 7$. *splitindex* $= 0$.

Example 9

Insert 20, 15, 5, 9, 16, 8, 13, 4 into an initially empty hash table of 4 entries. Use the linear hashing scheme and hash functions $h_i(K) = K \bmod 2^i$ for $i \geq 2$.

0	16 8
1	9
2	
3	
4	20 4
5	5 13
6	
7	15

- Initially, *splitindex* $= 0$.
- $h_i(20) = 0 \geq$ *splitindex*. Insert 20 to $h_i(20) = 0$.
- Insert 15 and 5 to $h_i(15) = 3$ and $h_i(5) = 1$, respectively.
- $h_i(9) = 1 \geq$ *splitindex*. It causes the first collision and split.
- Entry 0 is split, and 20 moves to $h_{i+1}(20) = 4$. *splitindex* $= 1$.
- $h_i(16) = 0 <$ *splitindex*. Insert 16 to $h_{i+1}(16) = 0$.
- $h_i(8) = 0 <$ *splitindex*. Insert 8 to $h_{i+1}(8) = 0$. The second collision and split.
- Entry 1 is split, and 5 moves to $h_{i+1}(5) = 5$. *splitindex* $= 2$.
- $h_i(13) = 1 <$ *splitindex*. Insert 13 to $h_{i+1}(13) = 5$. The third collision and split.
- Entry 2 is split, but it is empty. *splitindex* $= 3$.
- $h_i(4) = 0 <$ *splitindex*. Insert 4 to $h_{i+1}(4) = 4$. The fourth collision and split.
- Entry 3 is split, and 15 moves to $h_{i+1}(15) = 7$. *splitindex* $= 0$.
- Ready for the next round.