Hashing

example

- Suppose you use open hashing (chaining) and the following keys are inserted:
- 5, 28, 19, 15, 20, 33, 12, 17, 10
- and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.

example

- Suppose you use separate chaining and the following keys are inserted: 5, 28, 19, 15, 20, 33, 12, 17, 10 and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.
- H(5) = 5 mod 9 = 5
- H(28) = 28 mod 9 = 1
- H(19) = 19 mod 9 = 1
- H(15) = 15 mod 9 = 6
- H(20) = 20 mod 9 = 2
- H(33) = 33 mod 9 = 6
- H(12) = 12 mod 9 = 3
- H(17) = 17 mod 9 = 8
- H(10) = 10 mod 9 = 1

example

- Suppose you use linear open addressing and the following keys are inserted: 5, 28, 19, 15, 20, 33, 12, 17, 10 and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.
- H(5) = 5 mod 9 = 5
- H(28) = 28 mod 9 = 1
- H(19) = 19 mod 9 = 1
- H(15) = 15 mod 9 = 6
- H(20) = 20 mod 9 = 2
- H(33) = 33 mod 9 = 6
- H(12) = 12 mod 9 = 3
- H(17) = 17 mod 9 = 8
- H(10) = 10 mod 9 = 1

example

- Suppose you use linear open addressing and the following keys are inserted: 5, 28, 19, 15, 20, 33, 12, 17, 10 and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.
- H(5) = 5 mod 9 = 5 at 5
- H(28) = 28 mod 9 = 1 at 1
- H(19) = 19 mod 9 = 1 at 2
- H(15) = 15 mod 9 = 6 at 6
- H(20) = 20 mod 9 = 2 at 3
- H(33) = 33 mod 9 = 6 at 7
- H(12) = 12 mod 9 = 3 at 4
- H(17) = 17 mod 9 = 8 at 8
- H(10) = 10 mod 9 = 1 at 0

example

- Suppose you use linear open addressing and the following keys are inserted: 5, 28, 19, 15, 20, 33, 12, 17, 10 and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.
- H(5) = 5 mod 9 = 5 at 5
- H(28) = 28 mod 9 = 1 at 1
- H(19) = 19 mod 9 = 1 at 2
- H(15) = 15 mod 9 = 6 at 6
- H(20) = 20 mod 9 = 2 at 3 Now rehash to table size 19

example

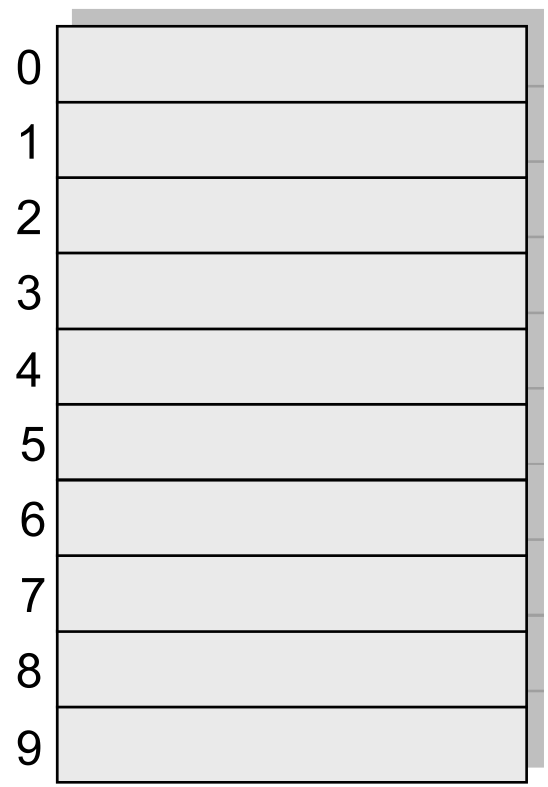
- Suppose you use linear open addressing and the following keys are inserted: 5, 28, 19, 15, 20, 33, 12, 17, 10 and m = 9.
- For simplicity, here we do not distinguish a key from its hashcode, so we assume h(key)=key.
- H(5) = 5 mod 19 = 5 at 5
- H(28) = 28 mod 19 = 9 at 9
- H(19) = 19 mod 19 = 0 at 0
- H(15) = 15 mod 19 = 15 at 15
- H(20) = 20 mod 19 = 1 at 1
- H(33) = 33 mod 19 = 14 at 14
- H(12) = 12 mod 19 12 at 12
- H(17) = 17 mod 19 = 17 at 17
- H(10) = 10 mod 19 = 10 at 10

Exercises

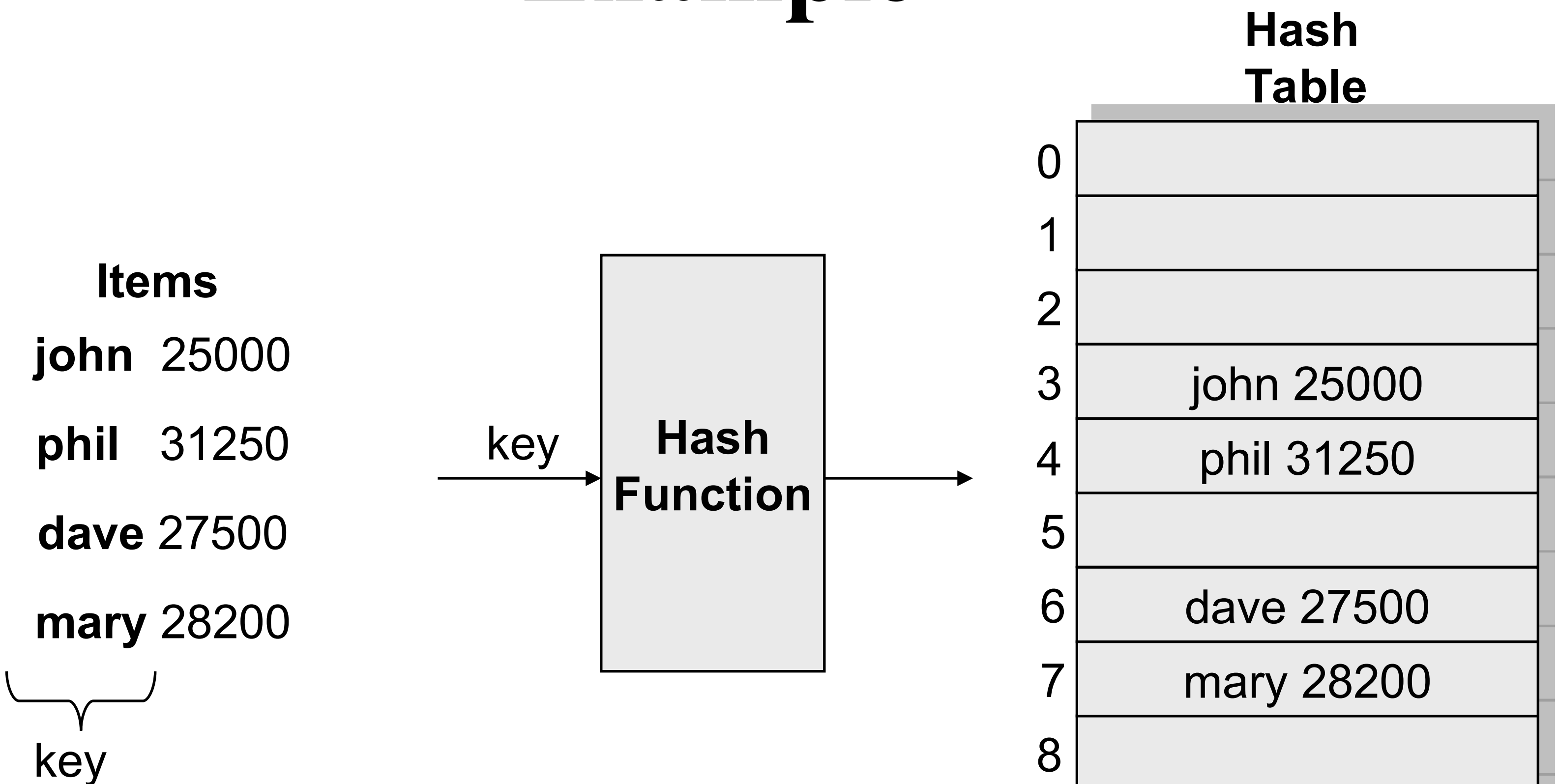
- Table Size 15
- Hash(k) = k
- Insert 16, 7, 28, 31, 67, 38, 29, 73, 99, 43, 218

1) Linear Probe
2) Quadratic Probe
3) Chaining
4) Double hash – %13 + 1

General Idea



Example


Hash
Table
Items
john 25000
phil 31250
dave 27500
mary 28200
key
key
Hash
Function
0
1
2
3
4
5
6
7
8
9
john 25000
phil 31250
dave 27500
mary 28200