

**QUADRATIC PROBING**

- Probing is the process of getting next available hash table array cell.
- In linear probing,  $F(i)$  is a linear function of  $i$ . That means alternative locations are searched in a sequential manner. Thus,

$$F(i) = i^2$$

**Example:**

Insert the keys {89, 18, 49, 58, 69} into the hash table.

	Empty Table	After 89	After 18	After 49	After 58	After 69
0				49	49	49
1						
2					58	58
3						69
4						
5						
6						
7						
8			18	18	18	18
9		89	89	89	89	89

$$\text{Hash}(89) = 89 \bmod 10 = 9 \text{ (No collision)}$$

$$\text{Hash}(18) = 18 \bmod 10 = 8 \text{ (No collision)}$$

$$\text{Hash}(49) = 49 \bmod 10 = 9 \text{ (Collision Occurred)}$$

$$\begin{aligned} h_i(49) &= (\text{Hash}(49) + F(1)) \bmod 10 & F(1) &= 1^2 \\ &= (9 + 1) \bmod 10 = 10 \bmod 10 = 0 \text{ (No collision)} \end{aligned}$$

Hash (58) =  $58 \bmod 10 = 8$  (Collision Occurred)

$$\begin{aligned} h_i(58) &= (\text{Hash}(58) + F(1)) \bmod 10 & F(1) &= 1^2 \\ &= (8 + 1) \bmod 10 = 9 \bmod 10 = 9 & & \text{(Collision Occurred)} \end{aligned}$$

$$\begin{aligned} h_i(58) &= (\text{Hash}(58) + F(2)) \bmod 10 & F(2) &= 2^2 = 4 \\ &= (8 + 4) \bmod 10 = 12 \bmod 10 = 2 & & \text{(No Collision)} \end{aligned}$$

Hash (69) =  $69 \bmod 10 = 9$  (Collision Occurred)

$$\begin{aligned} h_i(69) &= (\text{Hash}(69) + F(1)) \bmod 10 & F(1) &= 1^2 \\ &= (9 + 1) \bmod 10 = 10 \bmod 10 = 0 & & \text{(Collision Occurred)} \end{aligned}$$

$$\begin{aligned} h_i(69) &= (\text{Hash}(69) + F(2)) \bmod 10 & F(2) &= 2^2 = 4 \\ &= (9 + 4) \bmod 10 = 13 \bmod 10 = 3 & & \text{(No Collision)} \end{aligned}$$

