Data Structures in Python
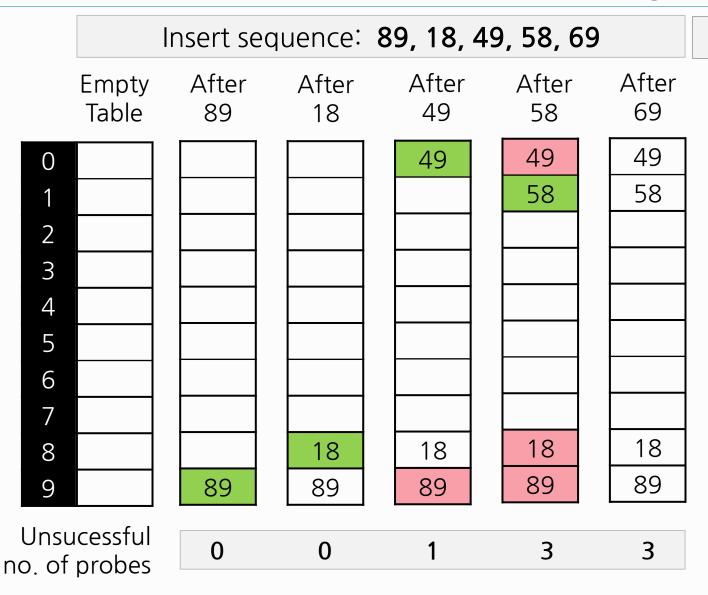# Chapter 6

- Collision Resolutions Exercises
- Rehashing Exercises

Collision Resolution Exercise - Linear Probing

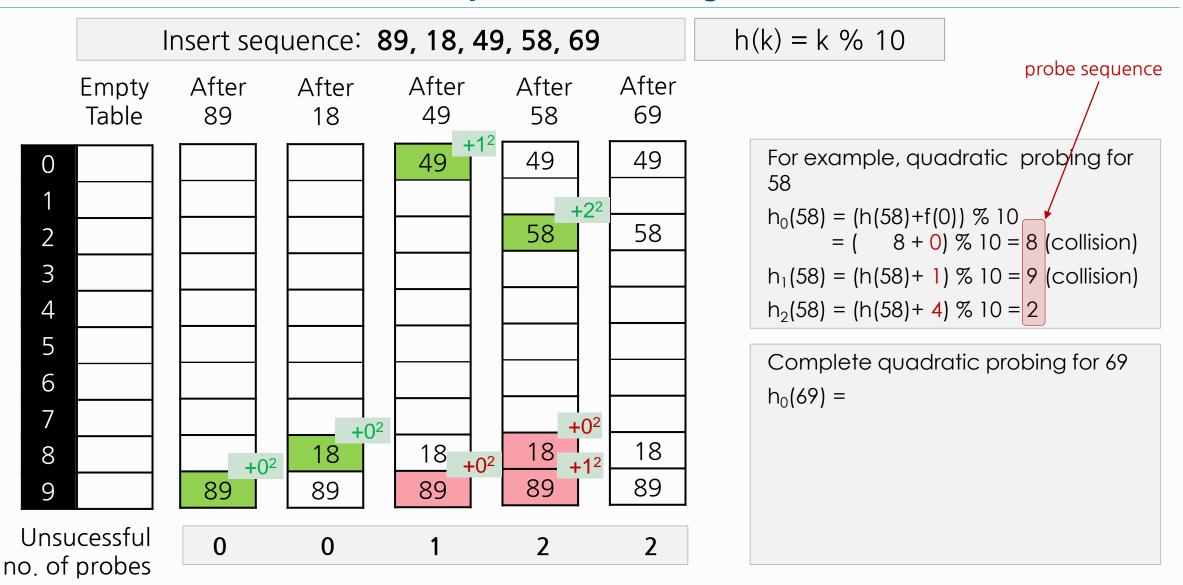| Insert sequence: **89, 18, 49, 58, 69** | | h(k) = k % 10 |

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

| Unsuccessful no. of probes | 0 | 0 | 1 | 3 | 3 |

probe sequence

For example, linear probing for 58

$h_0(58) = (h(58)+f(0)) \% 10$
$\qquad = (\quad 8 + 0) \% 10 = 8$ (collision)
$h_1(58) = (h(58)+ 1) \% 10 = 9$ (collision)
$h_2(58) = (h(58)+ 2) \% 10 = 0$ (collision)
$h_3(58) = (h(58)+ 3) \% 10 = 1$

Complete the linear probing for 69

$h_0(69) =$

Collision Resolution Exercise - Quadratic Probing^{이차조사법}

Insert sequence: **89, 18, 49, 58, 69**

$h(k) = k \% 10$

	Empty Table	After 89	After 18	After 49	After 58	After 69
0				49 $+1^2$	49	49
1						
2					58 $+2^2$	58
3						
4						
5						
6						
7						
8			18 $+0^2$	18	18 $+0^2$	18
9		89 $+0^2$	89	89 $+0^2$	89 $+1^2$	89
Unsuccessful no. of probes		0	0	1	2	2

probe sequence

For example, quadratic probing for 58

$h_0(58) = (h(58)+f(0)) \% 10$
$\quad\quad = (\quad 8 + 0) \% 10 = 8$ (collision)
$h_1(58) = (h(58)+ 1) \% 10 = 9$ (collision)
$h_2(58) = (h(58)+ 4) \% 10 = 2$

Complete quadratic probing for 69

$h_0(69) =$

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Collision Resolution Exercise - Double Hashing이중해싱법

Insert sequence: **89, 18, 49, 58, 69, 23**	h(x) = x % 10

	Empty Table	After 89	After 18	After 49	After 58	After 69	After 23	h'(x) = R - (x % R) R is prime number less than TableSize
0								$h_0(49) = (h(49)+f(0))$ % 10 = 9 (collision)
1								$h_1(49) = (h(49)+1*(7 - 49 \% 7))$ % 10 = 6
2								$h_0(58) =$
3								$h_1(58) =$
4								$h_0(69) =$
5								$h_1(69) =$
6				49	49	49	49	
7								$h_0(23) =$
8			18	18	18	18	18	$h_1(23) =$
9		89	89	89	89	89	89	:

Unsucessful no. of probes	0	0	1	1	1	

Rehashing - Exercise

Rehash the following table into a new hash table below using the hash function:
- Use hash(key) = key % 13 and **quadratic probing** to resolve the collisions.
- Show your computation, collision and resolution.
- Compute the load factors before and after rehashing.

0	1	2	3	4	5	6
56	43	30	None	None	26	13

0	1	2	3	4	5	6	7	8	9	10	11	12