

Homework 8 Problem 2

Problem 2A

Insert 15:

$$h(15) = 15 \% 7 = 1$$

	15					
--	----	--	--	--	--	--

Insert 22:

$$h(22) = 22 \% 7 = 1$$

$$h(22, 1) = h(22) + 1 \% 7 = 2 \% 7 = 2$$

	15	22				
--	----	----	--	--	--	--

Insert 36:

$$h(36) = 36 \% 7 = 1$$

$$h(36, 1) = h(36) + 4 \% 7 = 5 \% 7 = 5$$

	15	22			36	
--	----	----	--	--	----	--

Remove 22:

$$h(22) = 22 \% 7 = 1 \rightarrow 15$$

$$h(22, 1) = h(22) + 1 \% 7 = 2 \% 7 = 2$$

	15	---			36	
--	----	-----	--	--	----	--

Find 36:

$$h(36) = 36 \% 7 = 1 \rightarrow 15$$

$$15 \neq 36$$

$$h(36, 1) = h(36) + 1 \% 7 = 2 \% 7 = 2 \rightarrow \text{EMPTY}$$

$$h(36, 1) = h(36) + 4 \% 7 = 5 \% 7 = 5 \rightarrow 36$$

36 found so return true

	15	---			36	
--	----	-----	--	--	----	--

Insert 10:

$h(10) = 10 \% 7 = 3 \rightarrow$ need to resize because over half of space is taken

	15	---	10		36	
--	----	-----	----	--	----	--

Resize & Rehash:

A) $15 \% 11 = 4$

B) $10 \% 11 = 10$

C) $16 \% 11 = 3$

		36	15							10
--	--	----	----	--	--	--	--	--	--	----

Problem 2B

Insert 15:

$h(15) = 15 \% 7 = 1$

	15					
--	----	--	--	--	--	--

Insert 22:

$h(22) = 22 \% 7 = 1 \rightarrow$ collision

$h_2(22) = 3 - (22 \% 3) = 3 - 1 = 2$

$h(22, 1) = 1 + 1 * 2 \% 7 = 3 \% 7 = 3$

	15		22			
--	----	--	----	--	--	--

Insert 36:

$h(36) = 36 \% 7 = 1 \rightarrow$ collision

$h_2(36) = 3 - (36 \% 3) = 3$

$h(36, 1) = 1 + 3 \% 7 = 4 \% 7 = 4$

	15		22	36		
--	----	--	----	----	--	--

Remove 22:

$h(22) = 22 \% 7 = 1 \rightarrow 15$

$h_2(22) = 3 - (22 \% 3) = 3 - 1 = 2$

$h(22, 1) = 1 + 1 * 2 \% 7 = 3 \% 7 = 3 \rightarrow 22$

	15		---			
--	----	--	-----	--	--	--

Find 36:

$$h(36) = 36 \% 7 = 1 \rightarrow 15$$

$$15 \neq 36$$

$$h_2(36) = 3 - (36 \% 3) = 3$$

$$h(36, 1) = 1 + 3 \% 7 = 4 \% 7 = 4$$

36 found so return true

	15		---	36		
--	----	--	-----	----	--	--

Insert 10:

$$h(10) = 10 \% 7 = 3$$

$$h_2(10) = 3 - (10 \% 3) = 2$$

$$h(10, 1) = 5 \% 7 = 5$$

	15		---	36	10	
--	----	--	-----	----	----	--

Resize & Rehash:

A) $h(15) = 15 \% 11 = 4$

B) $h(36) = 36 \% 11 = 3$

C) $h(10) = 10 \% 11 = 10$

		36	15							10
--	--	----	----	--	--	--	--	--	--	----

Problem 2C

$$P(h, k) = \frac{2}{3} * \frac{2}{3} * \frac{2}{3} * \frac{2}{3} * 27 = 8$$

Homework 8 Cache Analysis

Test: Hamlet 10

L rotation: 79831

R rotation: 72921

Total rotation: 152752

Test: Hamlet 100

L rotation: 86457

R rotation: 79911

Total rotation: 166368

Test: Problem3 Description 1000

L rotation: 2173

R rotation: 2177

Total rotation: 4350

Test: Random Text 1000

L rotation: 2734

R rotation: 2813

Total rotation: 5547

Test: Hamlet 100000

L rotation: 190826

R rotation: 189792

Total rotation: 380618