CS 351 DATA ORGANIZATION & MANAGEMENT

FALL 2010

QUIZ 3/ SECTION-1 ***(Date given: November 1, 2010)***

1- Given that bv = 5 and h = 3

a. How many pages?

b. How many pages at level h?

c. How many pages at level h+1?

Solution:

a. n: number of pages

$bv = n - 2^h \quad \Rightarrow \quad n = bv + 2^h = 5 + 2^3 = 13$

b. The last page at level h is 111 ($2^h - 1 = 2^3 - 1 = 7$)

Therefore, there are 3 pages at level h (i.e., 101, 110, 111)

c. The number of pages at level h + 1 is calculated as follows:

f(bv) = 2 * bv = 2 * 5 = 10 (or as an another way, you can calculate as 13 – 3 = 10).

2- bv = 0 →

16	52
57	
42	

h = 2

Desired Lf = 1/2

Blocking factor = 2

42: 0101010

57: 0111001

16: 0010000

52: 0110100

33: 0100001

78: 1001110 *Add these records*

13: 0001101

22: 0010110

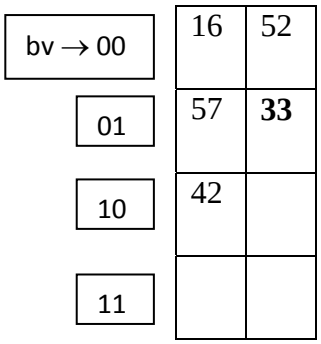
Solution:

At each time after reaching the target load factor, insert (Lf*Bkfr) record(s) and update the file.

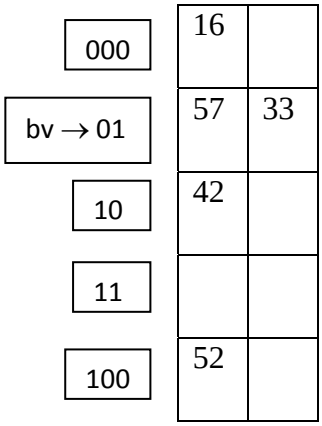
Target Load Factor = 1/2
Bkfr = 2

Lf*Bkfr = 1/2 * 2 = 1
Add 1 record and update the file

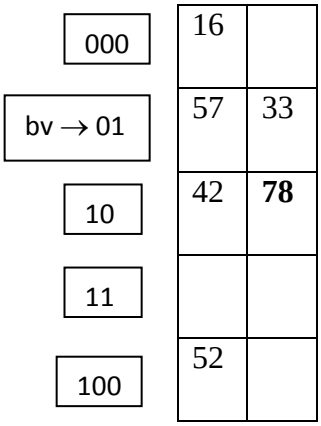
Add 33



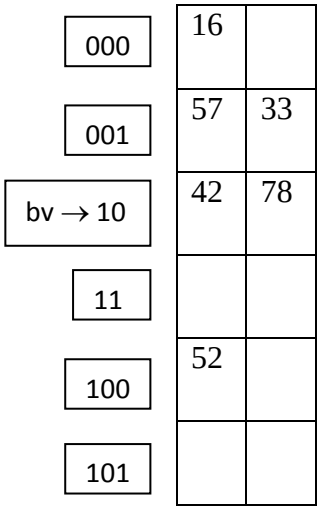
Update:



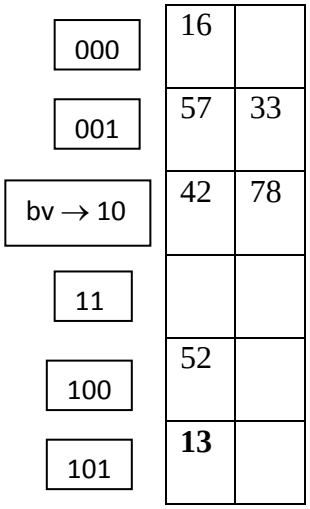
Add 78



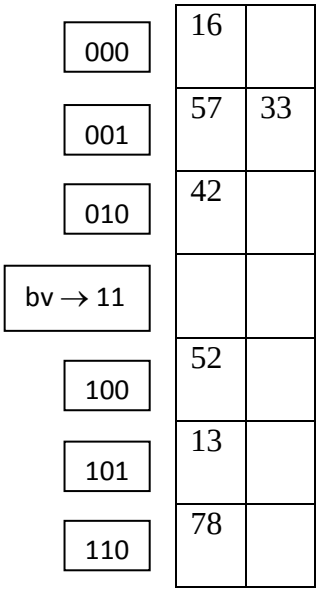
Update:



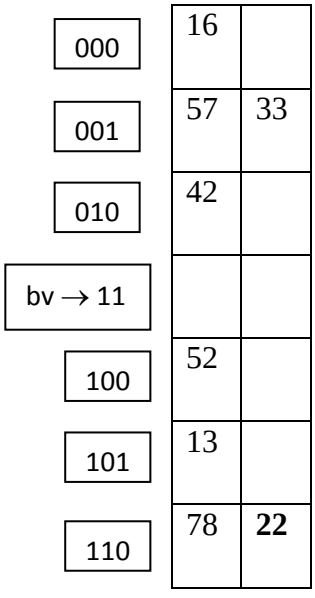
Add 13



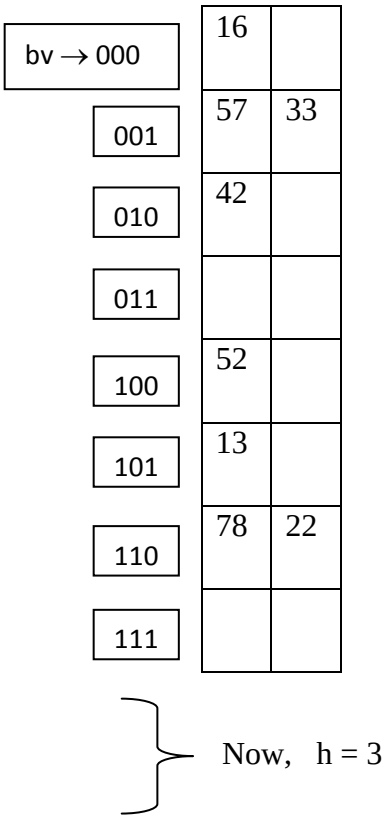
Update:



Add 22



Update:



Now, h = 3

QUIZ 3/ SECTION-2 *(Date given: October 25, 2010)*

1- Linear Hashing

n = 14

- What is bv and h?
- What is the number of pages at level h? Also give the page numbers.
- What is the number of pages at level h + 1? Also give the page numbers.

Solution:

$h = \lfloor \lg n \rfloor = \lfloor \lg 14 \rfloor = \lfloor \lg 2^{3,\cdots} \rfloor = 3$

$bv = n - 2^h = 14 - 2^3 = 6$

The last page at level h $\Rightarrow 2^3 - 1 = 7$

$\Rightarrow$ Therefore, there are 2 pages at level h (i.e., 110 and 111)

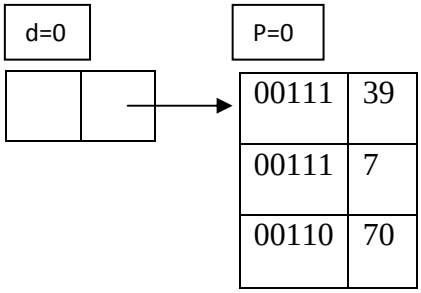
The number of pages at level h + 1 is calculated as follows:
f(bv) = 2 * bv = 2 * 6 = 12 (or as an another way, you can calculate as 14 – 2 = 12).
Page numbers at level h+1 are between 0000-0101, and 1000-1101.

2- Extendible Hashing,

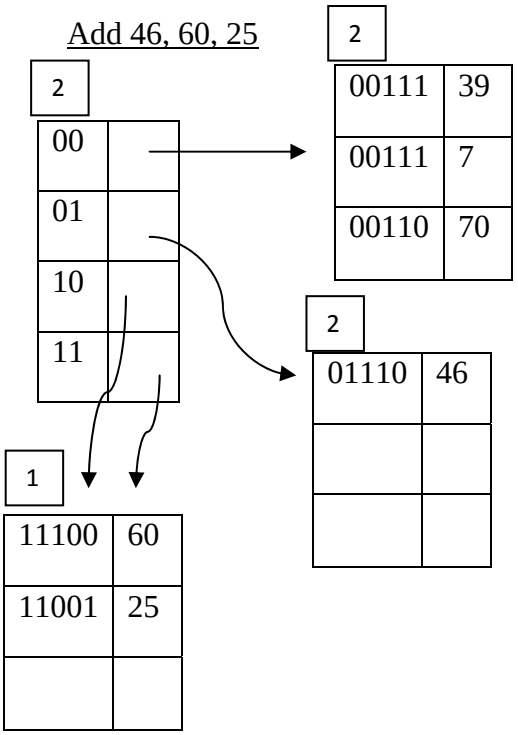
Block size = 3

Key	Mod(key, 32)	Binary Pseudo key
39	7	00111
7	7	00111
70	6	00110
46	14	01110
60	28	11100
25	25	11001

Add 39, 7, 70



Add 46, 60, 25



Rules:

- If a bucket whose local depth is equal to the global depth is split, the directory must be doubled.
- Whenever a bucket is split, increment the local depth of the split bucket and its split image by 1.

QUIZ 3/ SECTION-3 *(Date given: October 26, 2010)*

1- Linear Hashing

n = 13

- What is bv and h?
- What is the number of pages at level h? Also give the page numbers.
- What is the number of pages at level h + 1? Also give the page numbers.

Solution:

$h = \lfloor \lg n \rfloor = \lfloor \lg 13 \rfloor = \lfloor \lg 2^{3,\cdots} \rfloor = 3$

$bv = n - 2^h = 13 - 2^3 = 5$

The last page at level h $\Rightarrow 2^3 - 1 = 7$

$\Rightarrow$ Therefore, there are 3 pages at level h (i.e., 101, 110 and 111)

The number of pages at level h + 1 is calculated as follows:

f(bv) = 2 * bv = 2 * 5 = 12 (or as an another way, you can calculate as 13 – 3 = 10).

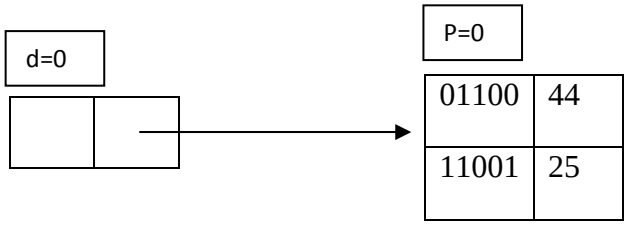
Page numbers at level h+1 are between 0000-0100, and 1000-1100.

2- Extendible Hashing

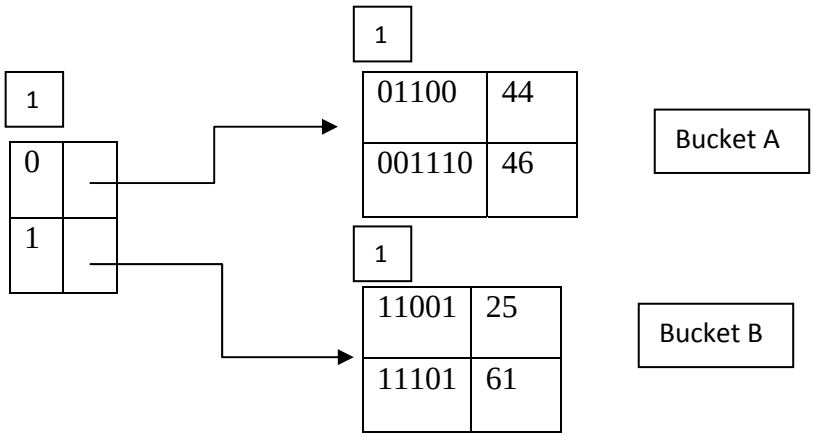
Block Size = 2

Key	Mod(key, 32)	Binary Pseudo key
44	**12**	**01100**
25	**25**	**11001**
61	**29**	**11101**
46	**14**	**01110**
34	**2**	**00010**
24	**24**	**11000**

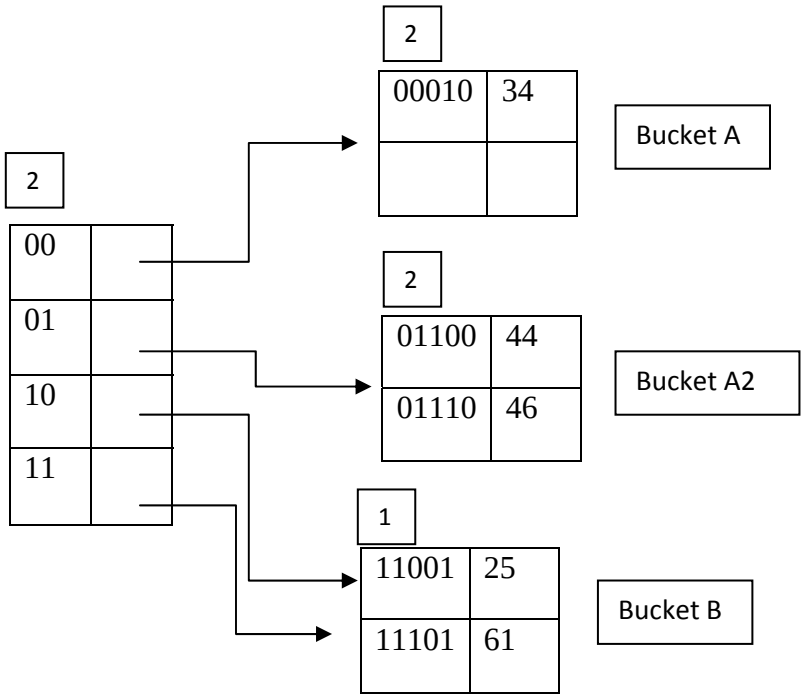
Add 44, 25



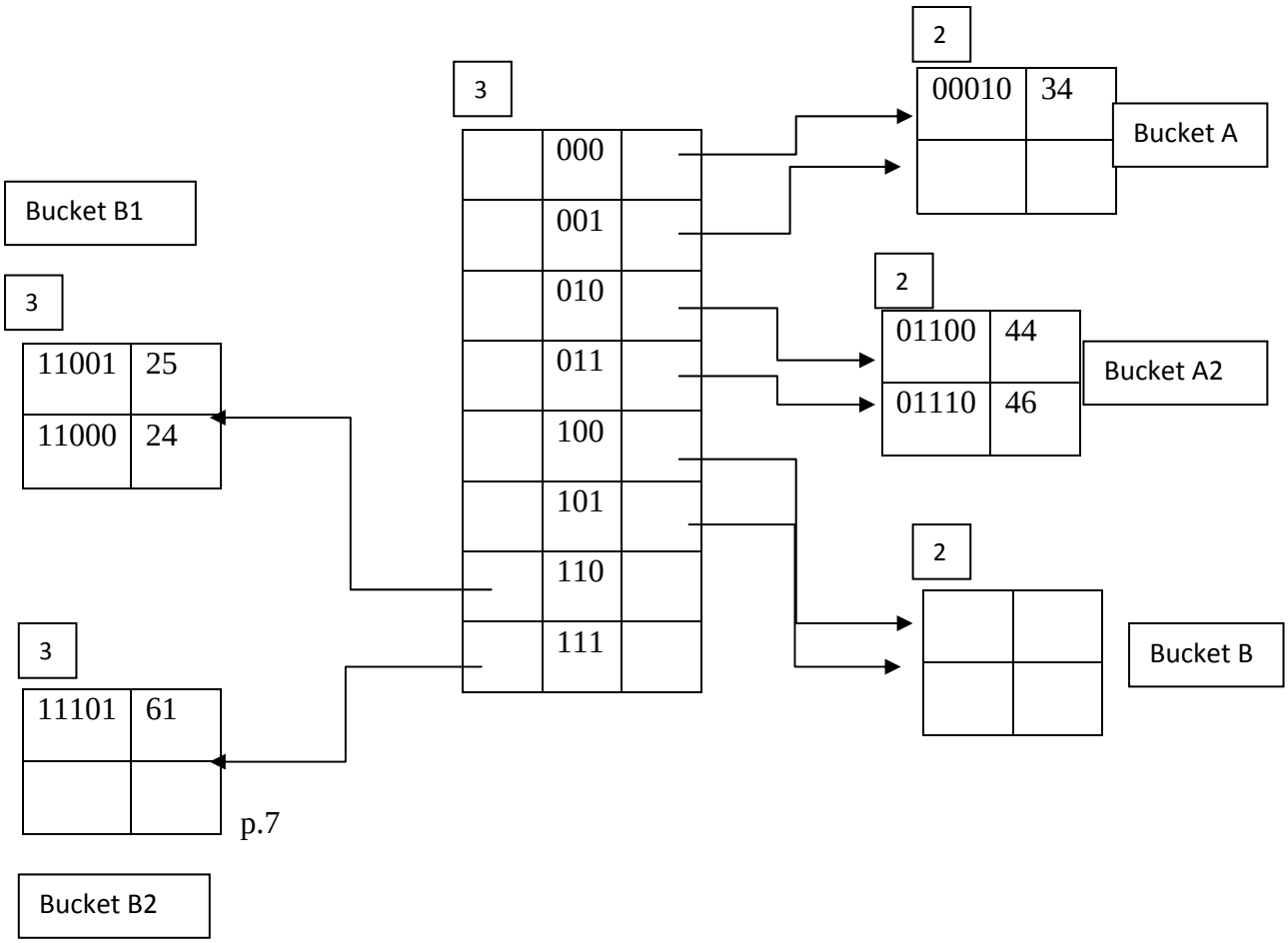
Add 61,46



Add 34


2
00010
34
Bucket A
2
00
01
10
11
2
01100
44
01110
46
Bucket A2
1
11001
25
11101
61
Bucket B

Add 24


2
00010
34
Bucket A
3
000
001
010
011
100
101
110
111
Bucket B1
3
11001
25
11000
24
2
01100
44
01110
46
Bucket A2
2
Bucket B
3
11101
61
Bucket B2