Solution

NDBI007: Practical class 4

Exercise 4.4 (Solution)

- $h(24_{10}) = 11000_2$

- $h(32_{10}) = 100000_2$

- The second insert splits the page pointed by entry 0 (i.e., $d_L < d_G$) into two pages pointed by entries 00, 01 respectively, and the incrementation $d_L = 2$ occurs

- Nevertheless, all the keys 8, 20, 24, and 32 belong to the page pointed by entry 00, therefore additional split is needed

  - $d_L = d_G = 2$, forcing the directory to be expanded to eight entries, i.e., global depth is incremented $d_G = 3$

  - Subsequently, the page 00 is split to 000 and 1000 and respective local depth is incremented to $d_L = 3$

  - Finally, the records from split page are reinserted:

    - Records with keys 8, 24, and 32 go into page 000

    - Record with key 20 is accommodated in the page 100
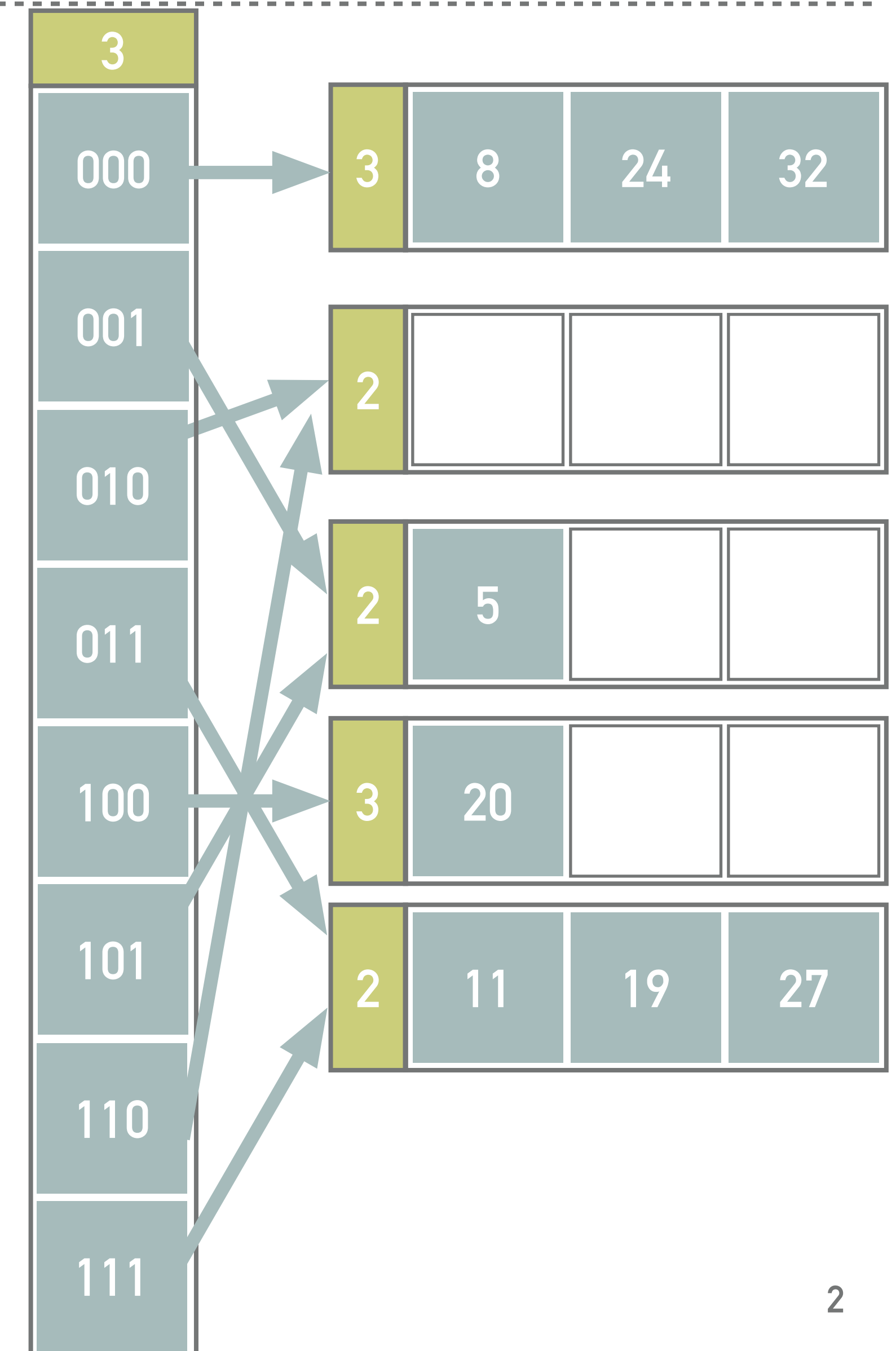
Exercise 4.7 (Solution)

- The records with keys 27, and 19 are inserted into page 11

  - $h(27_{10}) = 11011_2$

  - $h(19_{10}) = 10011_2$

- We have already inserted 2 records in the stage $d = 2$, therefore page $p_0 = 00$ is split into pages $p_0 = 000$, $p_1 = 100$ and the records are redistributed into the new pages, $p = 1$

  - $h(20_{10}) = 10100_2$

  - $h(8_{10}) = 1000_2$

  - $h(24_{10}) = 11000_2$
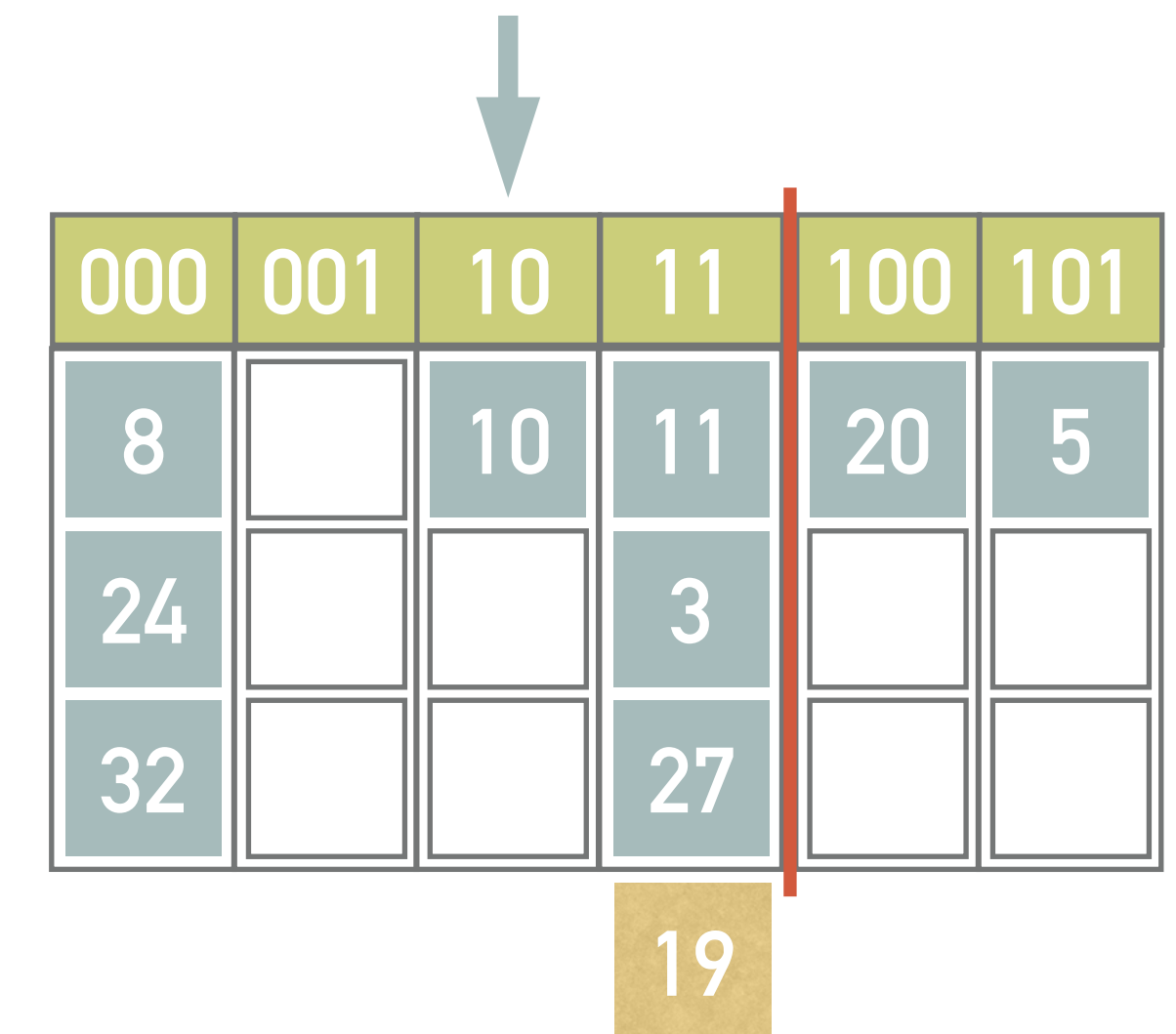
  - $h(32_{10}) = 100000_2$

- Next, we insert records with keys 10 (into the page 10) and 5 (into the page 01)

  - $h(10_{10}) = 1010_2$

  - $h(5_{10}) = 101_2$

- Having inserted additional 2 records, we split the page 01 into pages $p_0 = 001, p = 1, 101$, redistribute the record 5 from page 01, and we set $p = 2$

000	001	10	11	100	101
8		10	11	20	5
24			3		
32			27		

19

Exercise 4.9 (Solution)

* The has function $h_0(37) = 37 \mod 4 = 1$ sends the record with key 37 into page 1

  * That has already been split, therefore the $h1$ must be used

* $h_1(37) = 37 \mod 3 = 1$ sends the key 37 into page 3

  * This page has already been split in this stage as well

* Finally, $h_2(37) = (37 \div 3) \mod 3 = 0$ sends the record to the page 0

A						
0	37		3	13		6	43
				49			

B				
1	9		4	80
	21			

C				
2	52		5	17
	70			35
	40			5