



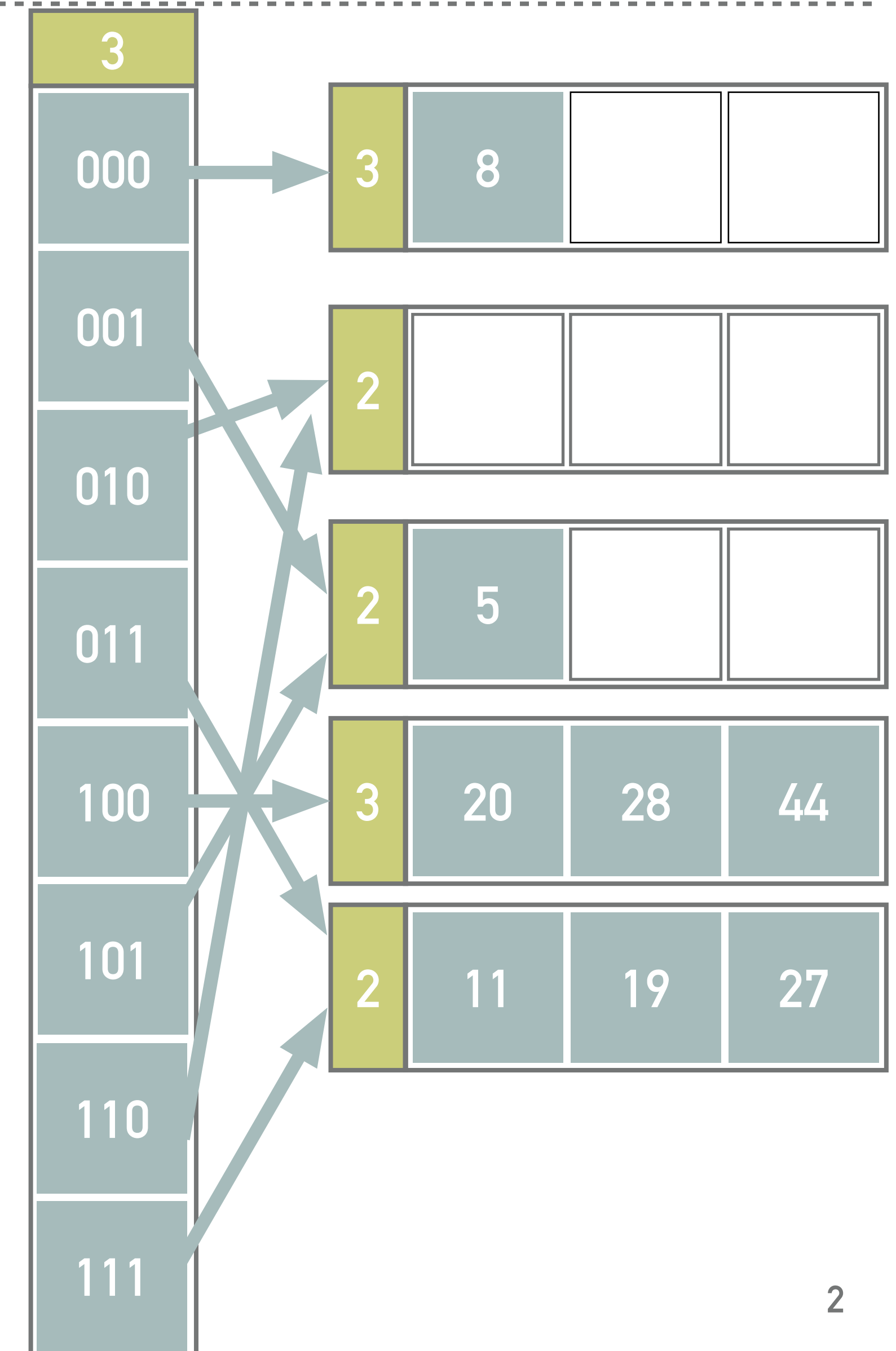
Solution

NDBI007: Practical class 4



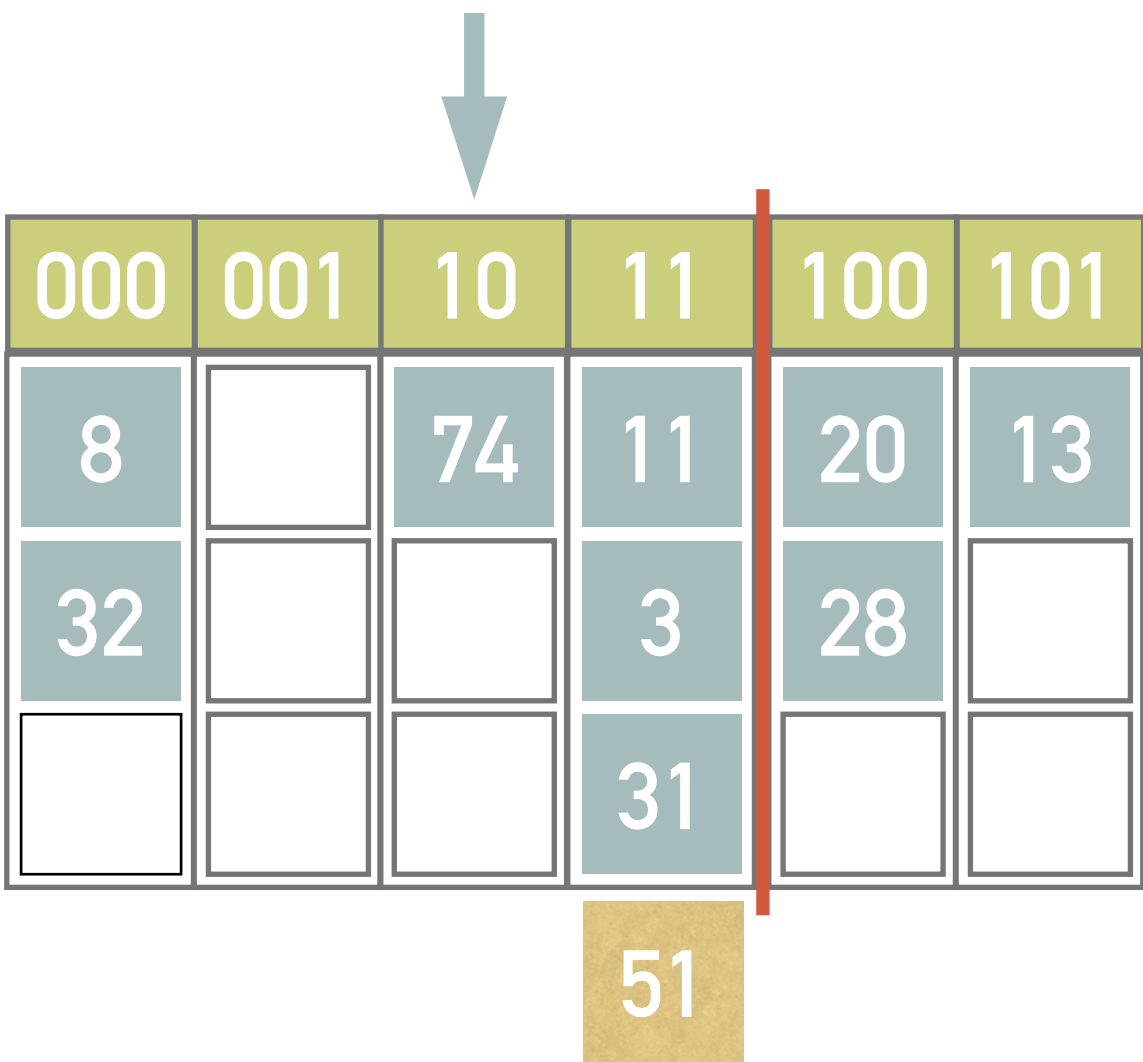
Exercise 4.4 (Solution)

- ❖ $h(28_{10}) = 00011100_2$
- ❖ $h(44_{10}) = 00101100_2$
- ❖ 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, 28, and 44 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 100 and respective local depth is incremented to $d_L = 3$
 - ❖ Finally, the records from split page are reinserted:
 - ❖ Record with key 8 goes into page 000
 - ❖ Records with keys 20, 28, and 44 are accommodated in the page 100



Exercise 4.7 (Solution)

- ❖ The records with keys 31, and 51 are inserted into page 11
 - ❖ $h(31_{10}) = 00011111_2$
 - ❖ $h(51_{10}) = 00110011_2$
- ❖ 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, $p = 1$
 - ❖ $h(20_{10}) = 00010100_2$
 - ❖ $h(8_{10}) = 00001000_2$
 - ❖ $h(28_{10}) = 00011100_2$
 - ❖ $h(32_{10}) = 00100000_2$
- ❖ Next, we insert records with keys 74 (into the page 10) and 13 (into the page 01)
 - ❖ $h(74_{10}) = 01001010_2$
 - ❖ $h(13_{10}) = 00001101_2$
- ❖ Having inserted additional 2 records, we split the page 01 into pages $p_0 = 001$, $p_1 = 101$, redistribute the record 13 from page 01, and we set $p = 2$



Exercise 4.9 (Solution)

- ❖ The hash function $h_0(73) = 73 \bmod 4 = 1$ sends the record with key 73 into page 1
- ❖ That has already been split, therefore the h_1 must be used
- ❖ $h_1(73) = 73 \bmod 3 = 1$ sends the key 73 into page 3
- ❖ This page has already been split in this stage as well
- ❖ Finally, $h_2(73) = \lfloor 73 \div 3 \rfloor \bmod 3 = 0$ sends the record to the page 0

A

0	73

3	13
	49

6	43

B

1	9
	21

4	80

C

2	52
	70
	40

5	17
	35
	5