Deletion Rules Explained with Figures

Example Prime Area Bucket Number: 5, Example Overflow Area Bucket Number: 5

Example Hash File:

Bucket No	Student ID	Student Name	Student Dept	Overflow Area Link
0 (Prime)				
1 (Prime)	200001	Gizem	CS	0
2 (Prime)	200002	Ali	CS	5
3 (Prime)	200003	Ayse	EE	6
4 (Prime)	200004	Emre	EE	0
5 (Overf)	200007	Arda	IE	0
6 (Overf)	200008	Zeynep	CS	7
7 (Overf)	200013	CEyhun	IE	8
8 (Overf)	200018	Ebru	EE	0
9 (Overf)	-1			0

Overflow Pointer = 9*20 = 180

a) "D 200001" => if the record to be deleted is in the prime area and Overflow Area Link field is "0" of that bucket. Then you will just delete (empty) bucket and Overflow Area Link field will remain "0".

Hash File after Deletion:

Bucket No	Student ID	Student Name	Student Dept	Overflow Area Link
0 (Prime)	-1			0
1 (Prime)	-1			0
2 (Prime)	200002	Ali	CS	5
3 (Prime)	200003	Ayse	EE	6
4 (Prime)	200004	Emre	EE	0
5 (Overf)	200007	Arda	IE	0
6 (Overf)	200008	Zeynep	CS	7
7 (Overf)	200013	CEyhun	IE	8
8 (Overf	200018	Ebru	EE	0
9 (Overf	-1			0

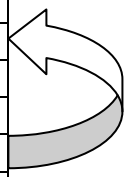
Overflow Pointer = 180

b) "D 200002" => if the record to be deleted is in the prime area and Overflow Area Link field is not "0", which indicates there is some bucket in overflow area linked to this bucket. First, delete (empty) the record from the bucket in prime area, and then you will carry (copy) the record in the first bucket of the overflow linked list to emptied bucket. And the bucket where its record is carried to the emptied bucket will be the first empty element of the overflow linked list. The overflow pointer will point this

bucket and this bucket's Overflow Area Link field will be the bucket number of bucket pointed by the overflow pointer previously.

Hash File after Deletion:

Bucket No	Student ID	Student Name	Student Dept	Overflow Area Link
0 (Prime)	-1			0
1 (Prime)	-1			0
2 (Prime)	200007	Arda	IE	0
3 (Prime)	200003	Ayse	EE	6
4 (Prime)	200004	Emre	EE	0
5 (Overf)	-1			9
6 (Overf)	200008	Zeynep	CS	7
7 (Overf)	200013	CEyhun	IE	8
8 (Overf)	200018	Ebru	EE	0
9(Overf)	-1			0



Overflow Pointer = 5*20 = 100

c) "D 200018" => if the record to be deleted is in the overflow area instead of prime area, and its OverflowAreaLink field is "0", which indicates the bucket consists of this record will be the last bucket in the linked list. Then you will delete this bucket by writing "-1" for StudentID field and leaving StudentName and StudentDept fields empty. Then you will modify the overflow area link field of the predecessor bucket (Notice that the predecessor bucket would be either in a bucket of overflow area or in a bucket of prime area). For example, in the example hash file, if we delete the 8^{th} bucket, we will modify the overflow area link field of predecessor bucket, which is 7^{th} bucket. Overflow area link field of 7^{th} bucket becomes 0. Then you will insert this emptied bucket into the overflow linked list as its first (head) node. Now, the overflow pointer will point this bucket and Overflow Area Link field of this bucket will be the bucket number of bucket pointed previously by the overflow pointer.

Hash File after Deletion:

Bucket No	Student ID	Student Name	Student Dept	Overflow Area Link
0 (Prime)	-1			0
1 (Prime)	-1			0
2 (Prime)	200007	Arda	IE	0
3 (Prime)	200003	Ayse	EE	6
4 (Prime)	200004	Emre	EE	0
5 (Overf)	-1			9
6 (Overf)	200008	Zeynep	CS	7
7 (Overf)	200013	CEyhun	IE	0
8 (Overf)	-1			5
9(Overf)	-1			0

Overflow Pointer = 8*20 = 160

d) "D 200008" => If record to be deleted is in overflow area and Overflow Area Link is not "0", which indicates that bucket is somewhere in the middle of the linked list. You will repeat steps in part c; but this time the only difference is, you will have to find the previous bucket comes before the bucket to be deleted in the linked list and next bucket comes after the bucket to be deleted in the linked list. You will update Overflow Area Link field of previous bucket with bucket number of next bucket, so they will be linked to each other. For example, in the example hash file, if we delete 6^{th} bucket, predecessor bucket of 6^{th} bucket is 3th bucket and successor bucket of 6^{th} bucket is 7^{th} bucket. We modify the overflow area link field of 3th bucket and we write 7. And the emptied bucket will be inserted to the overflow linked list from the head.

Hash File after Deletion:

Bucket No	Student ID	Student Name	Student Dept	Overflow Area Link
0 (Prime)	-1			0
1 (Prime)	-1			0
2 (Prime)	200007	Arda	IE	0
3 (Prime)	200003	Ayse	EE	7
4 (Prime)	200004	Emre	EE	0
5 (Overf)	-1			9
6 (Overf)	-1			8
7 (Overf)	200013	CEyhun	IE	0
8 (Overf)	-1			5
9(Overf)	-1			0

Overflow Pointer = 6*20 = 120