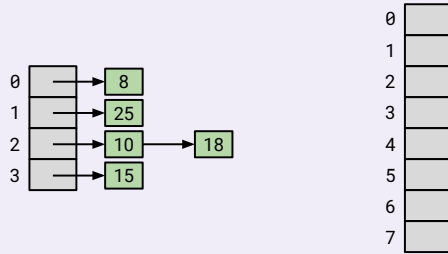


Q Inserting and Resizing

Draw the hash table after inserting 5. As part of this insertion, resize to M=8 buckets.

The default hashCode for integers returns the value of the integer.



Q1: Draw the hash table after inserting 5. As part of this insertion, resize to M=8 buckets.

Q Does this hash function always, sometimes, or never work?

```
public int hashCode() {  
    return 17;  
}
```

Q1: Does this hash function always, sometimes, or never work?

Q What is the most significant problem with the Circle class?

```
public class Circle {
    private HashSet<Member> members;
    private String teamName;
    public int hashCode() {
        return Objects.hash(members, teamName);
    }
    public boolean equals(Object o) {
        Circle other = (Circle) o;
        return this.members.equals(other.members)
            && this.teamName.equals(other.teamName);
    }
    public void addMember(Member newMember) {
        members.add(newMember);
    }
}
```

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Q1: What is the most significant problem with the Circle class?

Q Bucket Data Structure

Suppose we represent hash table buckets with **LLRB trees** instead of linked lists.

Give a tight asymptotic runtime bound in terms of N, the total size of the hash set, for:

add

contains

remove

8

?: What are the asymptotic runtime bounds for these operations in a regular hash set?

Q1: Give a tight asymptotic runtime bound in terms of N, the total size of the hash set, for:

add

contains

remove