Ethan Wong
11/4/21
305319001

CS143 HW5 Integrity Constraints

1. CHECK (weight > 0 AND weight <= 5)

2. a)
```
CREATE TABLE Employee (
  eid INT NOT NULL PRIMARY KEY, name CHAR(50), salary INT
);
CREATE TABLE LeavingTime(
  eid INT NOT NULL, date DATE NOT NULL, time TIME,
  PRIMARY KEY(eid, date),
  FOREIGN KEY(eid) REFERENCES Employee(eid)
);
```

b)
```
INSERT INTO LeavingTime(143, '2015-04-01', '16:00')
```

c) The second insertion is rejected. The 'date' attribute is a primary key and thus should be unique. Swiping twice in the same day would try to insert two of the same date, violating this constraint.

d)
```
DELETE FROM LeavingTime
WHERE EXISTS (SELECT *
              FROM LeavingTime L
              WHERE LeavingTime.eid = L.eid AND
                    LeavingTime.date = L.date AND
                    LeavingTime.time > L.time);
```

Disk and Files

1. Access Time = (seek time) + (rotational delay) + (transfer time)

Seek time = 10ms

Rotational Delay:

60 sec 6000 RPM

1 sec 100 RPS

$\frac{1}{100}$ = 10ms

Full rotation: 10ms, AVG = 5ms

Transfer Time:

6000 RPM 500 sectors/track

$\frac{10ms}{500 sectors}$ = 0.02ms

10 ms + 5ms + 0.02 ms = **15.02 ms**

2. 2 + 4 + 4 + 4 + 4 + 4 + 30 + 20 = 72 bytes per tuple

$\frac{1024 \frac{bytes}{block}}{72 \frac{bytes}{tuple}} = \frac{1024 bytes}{block} \cdot \frac{tuple}{72 bytes} = \frac{14 tuples}{block}$

$\frac{\frac{1000 tuples}{table}}{\frac{14 tuples}{block}} = \frac{1000 tuples}{table} \cdot \frac{block}{14 tuples} = \frac{72 blocks}{table}$

Need 72 blocks

3. Access Time = (seek time) + (rotational delay) + (transfer time)

seek time = 10ms Rotational Delay (avg) = 5ms

Transfer time = 0.02ms for one sector

= 0.02ms × 72 for 72 sectors (blocks)

= 1.44ms

10ms + 5ms + 1.44ms = **16.44ms**

4. 24 (seek time + rotational delay + transfer time)

transfer time = 0.02ms for one sector

= 0.02ms × 3 for 3 sectors (blocks)

= 0.06 ms

24 (10 ms + 5ms + 0.06 ms) = **361.44ms**