

# NULLs in SQL

# NULL Values

- Tuples in relations can have NULL as a value for one or more components.
- Meaning depends on context. Two common cases:
  - **Missing value**: e.g., we know the **length** has some value, but we don't know what it is.
  - **Inapplicable**: e.g., the value of attribute *spouse* for an unmarried person.

# Comparing NULL's to Values

- The logic of conditions in SQL is really 3-valued logic: **TRUE**, **FALSE**, **UNKNOWN**.
- When any value is compared to **NULL**, the truth value is **UNKNOWN**.
- But a query only produces a tuple in the answer if its truth value for the WHERE clause is **TRUE** (not **FALSE** or **UNKNOWN**).

# Three-Valued Logic

- To understand how AND, OR, and NOT work in 3-valued logic, think of
  - TRUE = 1, FALSE = 0, and UNKNOWN =  $\frac{1}{2}$ .
  - AND = MIN
  - OR = MAX
  - NOT( $x$ ) =  $1-x$

Example:

$$\begin{aligned} \text{TRUE AND (FALSE OR NOT(UNKNOWN))} &= \\ \text{MIN(1, MAX(0, (1 - } \tfrac{1}{2} \text{)))} &= \\ \text{MIN(1, MAX(0, } \tfrac{1}{2} \text{))} &= \text{MIN(1, } \tfrac{1}{2} \text{)} = \tfrac{1}{2}. \end{aligned}$$

# Surprising Example

```
SELECT *  
FROM Movies  
WHERE length <=120 OR length > 120;
```

- Suppose that we have some NULL values in the length.
- What's the result?

We will get all the movies with a known length. Those with a length of NULL will not be in the result.

# Checking for NULLs

- Can't meaningfully use = or <>
- Should use:

IS NULL

IS NOT NULL

E.g.

```
SELECT *
```

```
FROM Movies
```

```
WHERE length IS NOT NULL;
```

# NULL's Ignored in Aggregation

- **NULL** never contributes to a sum, average, or count, and can never be the minimum or maximum of a column.


```
SELECT SUM(length)  
FROM Movies;
```

- But if there are **no non-NULL** values in a column, then the result of the aggregation is NULL.

# Example: Effect of NULL's

```
SELECT count(*)  
FROM Movies  
WHERE studioName = 'Disney';
```

The number of movies  
from Disney.



```
SELECT count(length)  
FROM Movies  
WHERE studioName = 'Disney';
```

The number of movies  
from Disney with a  
known length.

