CSC343 Worksheet 12 Solution

June 30, 2020

1.
   - Keys
     - {id of molecule}
     - {x position, y position, z position}
   - Functional Dependencies
     1. id of molecule → x position, y position, z position, x velocity, y velocity, z velocity
     2. x position, y position, z position → id of molecule, x velocity, y velocity, z velocity

Notes:

- Function Dependencies
  - *Functional Dependency* is a relationship between two attributes typically between the key and other non-key attributes within a table.

    Example:

    SIN → Name, Address, Birthdate

    Example 2:

    ISBN → Title

- Key of Relations
  - One or more attributes $\{A_1, A_2, ..., A_n\}$ is a key for a relation R if
    1. Those attributes functionally determine all other attributes of the relation
    2. No proper subset of $\{A_1, A_2, ...A_n\}$ functionally determines all other attributes of R

    Example:

    Given relation

    $R = $ Movies1(title, year, length, genre, studioName, starName)
    i. {title, year, starName } form a key for the relation **Movies1**

      ii. { year, starName } is not a key. Same star can be in multiple movies per year

- Superkeys
  - ∗ Means a a set of attributes that contains a key
  - ∗ Don't need to be minimal

  Example:
  Given relation

  $R = $ Movies1(title, year, length, genre, studioName, starName)
  - · { title, year, starName } is a key and superkey
  - · { title, year, starName, title, year, length} is a superkey

References:

1) OpenTextBC, Chapter 11 Functional Dependencies, link

2. a) **Notes:**

- The Splitting / Combining Rule
  - Combining Rule
    - ∗ $A_1, A_2, \cdots, A_n \rightarrow B_i$ for $i = 1, 2, ..., m$
      to
      $A_1, A_2, \cdots A_n \rightarrow B_1, B_2, \cdots B_m$

  Example:

  Given

  title year $\rightarrow$ length
  title year $\rightarrow$ genre
  title year $\rightarrow$ studioName

  it's combined form is

  title year $\rightarrow$ length genre studioName

  - Splitting Rule
    - ∗
    - ∗ $A_1, A_2, \cdots A_n \rightarrow B_1, B_2, \cdots B_m$
      to
      $A_1, A_2, \cdots, A_n \rightarrow B_i$ for $i = 1, 2, ..., m$

Example:

Given

title year $\rightarrow$ length

It's splitted form is

title $\rightarrow$ length
year $\rightarrow$ length

- Trivial Functional Dependencies

  - A functional dependency $FD : X \rightarrow Y$ is **trivial** if Y is a subset of X

  Exmaple:

  title year $\rightarrow$ title