N-ary relations:

Note Title 2/27/2015

Relation $R \subseteq A_1 \times A_2 \times A_3 \times \cdots \times A_n$.

elements of R n-tuples $(a_1, a_2, \ldots, a_n)$ $a_i \in A_i$

(a, b) pairs.
(a, b, c) triples or triplets.
(a, b, c, d) 4-tuples
⋮
$(a_1, \ldots, a_n)$ n-tuples

$R \subseteq \mathbb{Z} \times \mathbb{Z} \times \mathbb{Z}$

$R = \{ (x, y, z) \mid x + y = z \}$.

$(2, 3, 5) \in R$
$(2, 4, 5) \notin R$. $2 + 4 \neq 5$.

Relational Databases store information as a set of n-tuples.

Example A doctors office stores records of patient appointments.
Each appointment ↔ one 7-tuple.

(Patient ID, Patient Name, Doctor, Time, Duration, No-Show?)
Each of these is called an attribute.
each has its own domain.

Query: a request for a particular kind of data.

Key: Set of attributes that uniquely identifies a record (7-tuple).

(Patient name, date) is not a key
Chang has two appointments on 11/11

(Patient, doctor, date)
(Patient, date, time)
(Doctor, date, time)
} assuming no double-booking.

For UCI Student database Student ID should work.

Two common operations: SELECT
PROJECT

⇒ SELECT [Some set of conditions]

SELECT [Patient = Chang ∧ Doctor = Spencer]

(—, Chang, Spencer, 11/4/13, 8AM, 23, N)
(—, Chang, Spencer, 11/11/13, 11:15, 22, N).

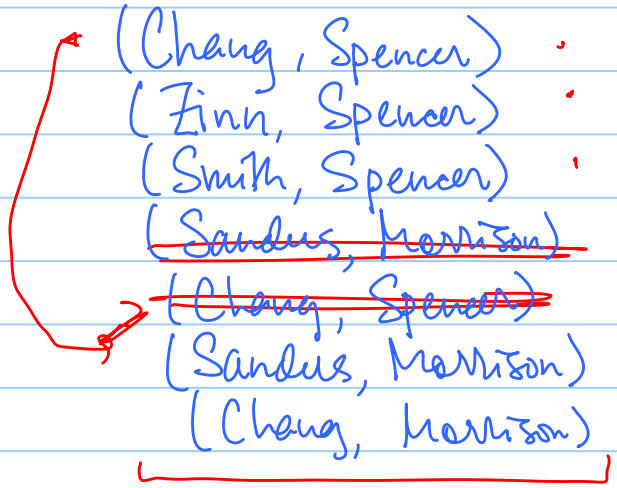
SELECT [Date ≤ 11/7/13 ∧ Date ≥ 11/5/13]

Return Row # 2, 4, 6.

PROJECT [subset of attributes]

↳ deletes all other attributes and then eliminates doubles.

PROJECT [doctor, patient name]



- Which doctors had a "no-show" during the month of November?

⇒ SELECT [No-show = "Y" ∧ Date ≤ 11/30/13 ∧ Date ≥ 11/1/13]
PROJECT [doctor].

(—, Zinn, (Spencer), 11/5/13, —, —) Row 2

(—, Sanders, (Morrison), —, —, —) Row 4

Which patients did Morrison see on 11/5/13?

Select [doctor = Morrison ∧ No-show = N ∧ date = 11/5/13]
Project [Patient Name]

Next example: What is a key for this DB?

(Order #, Item #)

How much money did Customer X spend in December?

Select [date ≤ 12/31/13 ∧ date ≥ 12/1/13 ∧ Customer = X].

Project [Total Price].

How many tables were sold in the last month?