Малко теория. Релационна алгебра

Калин Георгиев

11 август 2015 г.

Релационен модел на данните

Какво е релация?

- Задава "отношения" между елементите на две множества

$\mathcal{D}_1 = \{cat, dog, crab\}$
$\mathcal{N} = \{0, 1, 2, ...\}$

$legs = \{(cat, 2), (dog, 2), (crab, 8)\} \subseteq \mathcal{D}_1 \times \mathcal{N}$

$eyes = \{(cat, 2), (dog, 2), (crab, 2)\} \subseteq \mathcal{D}_1 \times \mathcal{N}$

$eyesANDlegs = \{(cat, 2, 2), (dog, 2, 2), (crab, 2, 8)\} \subseteq \mathcal{D}_1 \times \mathcal{N} \times \mathcal{N}$

Какво е релация?

Коя е тази релация?

$$\{(x, y) | x \in \mathcal{N}, y \in \mathcal{N}, \exists z \in \mathcal{N} - \{0\} : y = x + z\} \subseteq \mathcal{N} \times \mathcal{N}$$

$$\leq \subseteq \mathcal{N} \times \mathcal{N}$$

Какво е релация?

Коя е тази релация?

$$\{(x, y) | x \in \mathcal{N}, y \in \mathcal{N}, \exists z \in \mathcal{N} - \{0\} : y = x + z\} \subseteq \mathcal{N} \times \mathcal{N}$$

$$\leq \subseteq \mathcal{N} \times \mathcal{N}$$

Релационен модел

$$eyesANDlegs = \{(cat, 2, 2), (dog, 2, 2), (crab, 2, 8)\} \subseteq \mathcal{D}_1 \times \mathcal{N} \times \mathcal{N}$$

- "Човешки четимо" задаване на релация
- Атрибути на елемент

$$eyesANDlegs = (animal : \mathcal{D}_1, eyes : \mathcal{N}, legs : \mathcal{N})$$

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

Релационен модел

$$eyesANDlegs = \{(cat, 2, 2), (dog, 2, 2), (crab, 2, 8)\} \subseteq \mathcal{D}_1 \times \mathcal{N} \times \mathcal{N}$$

- "Човешки четимо" задаване на релация
- Атрибути на елемент

$$eyesANDlegs = (animal : \mathcal{D}_1, eyes : \mathcal{N}, legs : \mathcal{N})$$

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

Някои операции в релационната алгебра

Селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\sigma_p(r) = \{t | t \in r, p(r)\}$$

$$twolegs(r) : legs = 2$$
$$\sigma_{twolegs}(eyesANDlegs) = \{t | t \in eyesANDlegs, twolegs(r)\}$$

animal	eyes	legs
cat	2	2
dog	2	2

Селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\sigma_p(r) = \{t | t \in r, p(r)\}$$

$$twolegs(r) : legs = 2$$
$$\sigma_{twolegs}(eyesANDlegs) = \{t | t \in eyesANDlegs, twolegs(r)\}$$

animal	eyes	legs
cat	2	2
dog	2	2

Селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\sigma_p(r) = \{t | t \in r, p(r)\}$$

$$twolegs(r) : legs = 2$$
$$\sigma_{twolegs}(eyesANDlegs) = \{t | t \in eyesANDlegs, twolegs(r)\}$$

animal	eyes	legs
cat	2	2
dog	2	2

Проекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{A_1,A_2,\ldots,A_k}(r)$$

$$\pi_{animal,eyes}(eyesANDlegs)$$

animal	eyes
cat	2
dog	2
crab	2

Проекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{A_1,A_2,\ldots,A_k}(r)$$

$$\pi_{animal,eyes}(eyesANDlegs)$$

animal	eyes
cat	2
dog	2
crab	2

Проекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{A_1,A_2,\ldots,A_k}(r)$$

$$\pi_{animal,eyes}(eyesANDlegs)$$

animal	eyes
cat	2
dog	2
crab	2

Проекция по селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{animal,eyes}(\sigma_{twolegs}(eyesANDlegs))$$

animal	eyes
cat	2
dog	2

Проекция по селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{animal,eyes}(\sigma_{twolegs}(eyesANDlegs))$$

animal	eyes
cat	2
dog	2

Проекция по селекция

animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

$$\pi_{animal,eyes}(\sigma_{twolegs}(eyesANDlegs))$$

animal	eyes
cat	2
dog	2

Natural join, $\bowtie$

legs	
animal	legs
cat	2
dog	2
crab	8

eyes	
animal	eyes
cat	2
dog	2
crab	2

eyes $\bowtie$ *legs*		
animal	eyes	legs
cat	2	2
dog	2	2
crab	2	8

Благодаря за вниманието!