

S7.432

example in "object-oriented" modeling style:
 $\hat{=}$ RDF style

- continent/1
- country/1
- organization/1
- name/2
- encapsulates/2
- ismember/2

$F(o) \Rightarrow$ organization (o) \wedge

$\forall x : (\text{continent}(x) \rightarrow$
 $\exists y : (\text{country}(y) \wedge$
 $\text{ismember}(y, o) \wedge$
 $\text{encapsulated}(y, x) \quad))$

Apr 22-10:11

Rewrite for SQL: no \forall quantifier

1) $\forall x P(x) \equiv \neg \exists x (\neg P(x))$

organization (o) \wedge 2) $\neg (P \rightarrow Q)$

$\neg \forall x : (\text{continent}(x) \wedge \dots) \equiv \neg (\neg (P \vee Q))$
 $\equiv P \wedge \neg Q$

$\neg \exists y : (\text{country}(y) \wedge$
 $\text{ismember}(y, o) \wedge$
 $\text{encapsulated}(y, x) \quad))$

\rightarrow SQL: "EXISTS"
 select name
 from organization o
 where not exists (select *
 from continent cont
 where not exists (
 select *
 from country c,
 ismember i,
 encapsulates e
 where
 i.country = c.name
 and i.organization =
 o.organization
 and e.country = c.name
 and e.continent = cont.name))

Apr 22-10:47

Slide 434

Algebra expression

R

$$F(x,y) \equiv R(x,y)$$

\Rightarrow answers are all
tuples in R

$$\sigma_{[A=4]}(R)$$

$$F(x,y) \equiv R(x,y) \wedge x=4$$

$$\pi(B)(\sigma_{[A=4]}(R))$$

or

$$F(y) \equiv R(4,y)$$

Apr 22-11:07

SL 434 ... negation:

Consider $\begin{matrix} \nearrow & \text{positive, overestimate of result} \\ \searrow & \text{remove these} \end{matrix}$
 $R(x,y) \wedge \neg (T(x) \wedge Y=b)$

Consider second subformula alone

$$F(x,y) \equiv \neg (T(x) \wedge Y=b)$$

legal query in FOL

evaluate it:

some structure $\mathcal{D} = (I, \sigma)$

for which $\beta(x), \beta(y)$ does

$$\mathcal{D} \models \neg (T(x) \wedge Y=b)$$

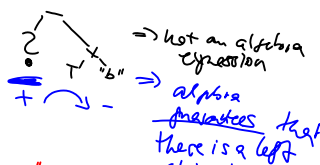
\Rightarrow "answers" w/ht being β
that are not mentioned in \mathcal{D}
 \Rightarrow open world

Why did this problem \Rightarrow in a DB this is a
not exist in SQL/Algebra? problem!

algebraic equivalent would in id be

$$\neg (T \times \{b\})$$

as a tree:

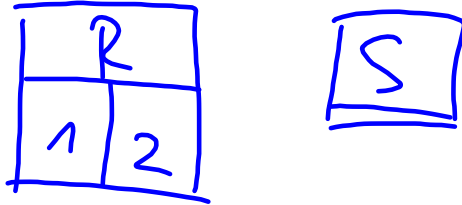


\Rightarrow forbid such "only negative" child!
"SAFETY" formulas in the following!

Apr 22-11:13

Sl. 435

2nd item, disjunction



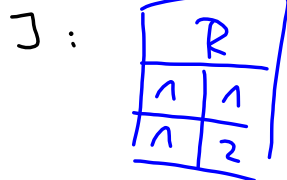
$$F(X, Z) \equiv \exists Y: R(X, Y) \vee S(Y, Z)$$

answers:

1, 2 ∈ R
↓
answer with X/1 with what Z?
⇒ nonsense

Apr 22-11:30

3rd item



$$F(x) \equiv \forall y: R(x, y)$$

↑
What "all"?

$$\varphi(\exists, \{1, 2, 3\})$$

$$J(R) \supseteq \{(1, 1), (1, 2)\} \Rightarrow \forall \checkmark$$

$$\{("a", 1), ("a", 2)\} \Rightarrow \forall \checkmark$$

$$\varphi(\exists, \{1, 2, 3\})$$

$$\{(1, 1), (1, 2), (1, 3)\} \not\subseteq R$$

⇒ \forall_1 is Not an answer

allowed formulas:

$$\dots \forall x (\text{constant}(x) \rightarrow \dots)$$

Apr 22-11:35