Ex 1.2.d: $\bowtie$ of SPARQL:

$\Omega_1 \bowtie \Omega_2 =$

$\Omega_1 \bowtie \Omega_2 \cup$

$\Omega_1 \setminus_s (\Omega_1 \setminus_s (\Omega_1 \bowtie \Omega_2))$

left semijoin from RelAlg.

results in Ω_1 that have a match in Ω_2

$\hat{=}$ τ_0 from Rel.Alg. S(.DB97

Jun 5-10:10

Ex 1.4

Consider (A OPT B):

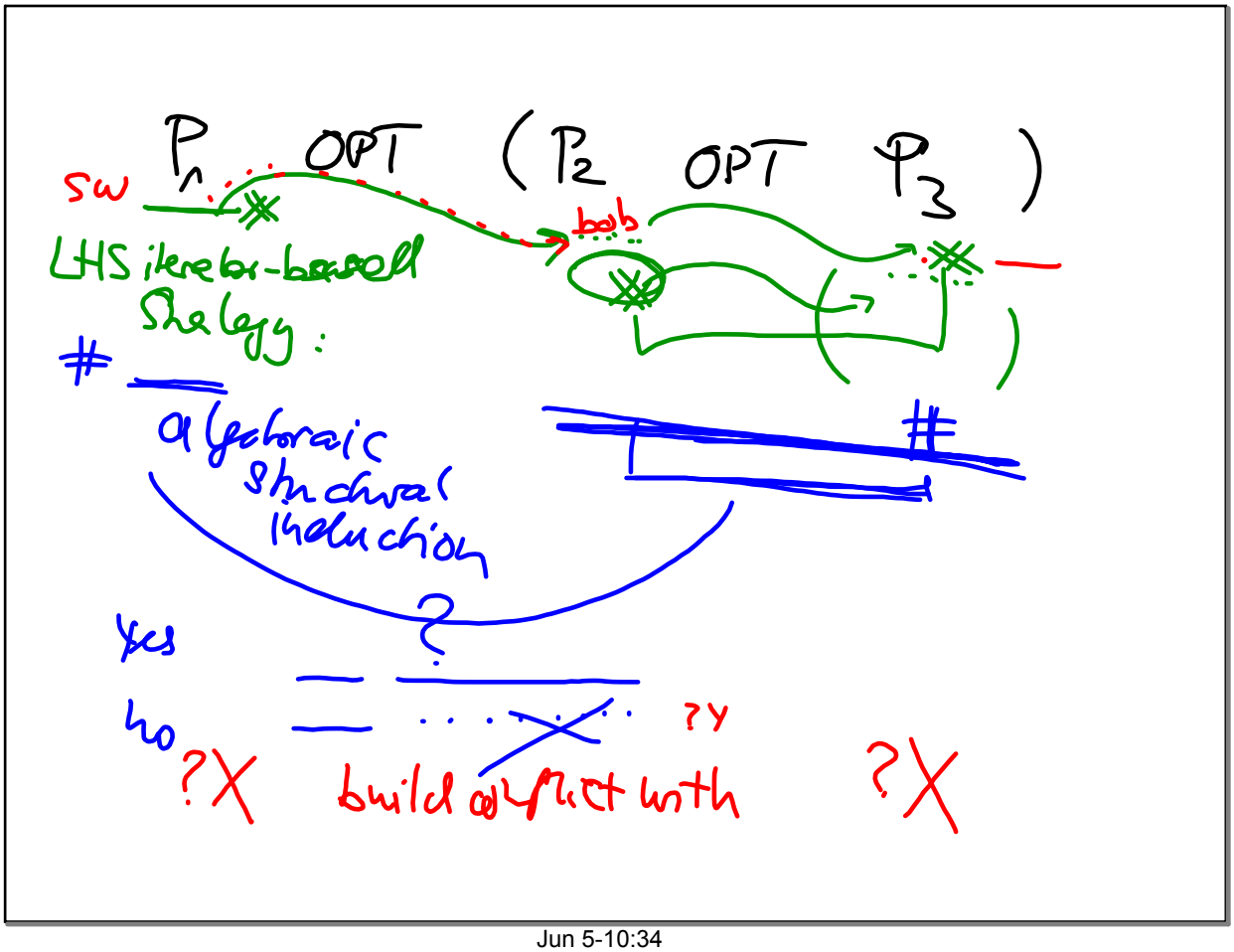
Solutions of (A OPT B) are

- solutions of both A and B $= A \bowtie B$
  $\cup$
- solutions of A that are not solutions of B

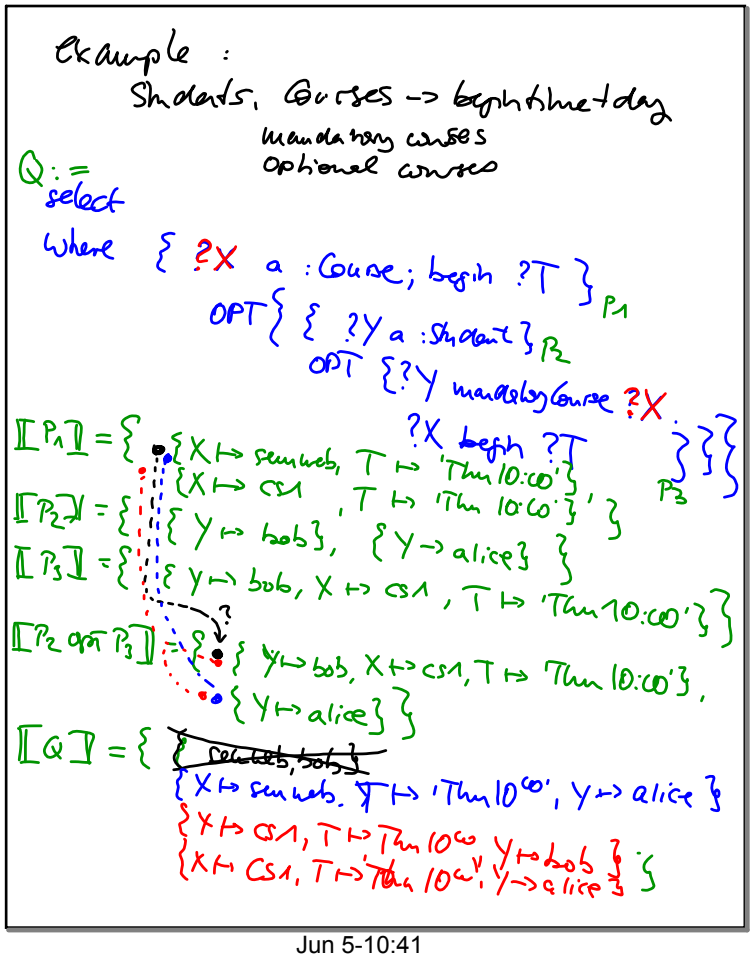
how to compute?

- not efficient -> no bottom-up computation
- idea: iterator-based computation from left-to-right:
  1) compute solutions to A
  2) for each of them, try to extend
  ~> seems to be computable with B
  .....

Jun 5-10:26



Jun 5-10:34



Jun 5-10:41

bob a Student.
alice a Student.

seminar a Course; begin = 'Thu 10:00'.
cs1 a Course; begin = 'Thu 10:00'.
bob mandatory Course cs1.

Jun 5-10:45

Consider the following 'answer'

$\mu := \{ X \mapsto$ seminar,
$Y \mapsto$ bob
$T \mapsto$ Thu 10:00 $\}$?

- is not an answer with $[\![\cdot]\!]$,
  application: is not an intended/possible answer
- 2006-Definition:
  μ is a solution to Q if:
  (μ is a solution to P_1 ✓ and
  μ is a solution to (P_2 OPT P_3)) or ....
  $\Leftrightarrow$ ✓ and
  μ is a solution to P_2 ✓ and ~~P_3~~,
  $\Leftrightarrow$ true or μ is a solution to P_2 ✓ and not to $P_2 \wedge P_3$ ✓

Jun 5-10:56

Sl. 159

OneChildParent ≡ $=1\,\text{child}.\top$

e.g. John a OneChildParent. ("OCP")

Parent ≡ $\exists\,\text{child}.\top$

AtLeastTwoChildren ≡ $\geq 2\,\text{child}.\top$

AtLeastTwoSons ≡ $\geq 2\,\text{child}.\text{Male}$

$$OCP(\text{John}) \wedge \forall x\,(OCP(x) \leftrightarrow \forall y,z: \text{child}(x,y) \wedge \text{child}(x,z) \rightarrow y=z)$$

Jun 5-11:10

Material implication

$$A \rightarrow B \equiv \neg A \vee B$$

This (inconsistent) ontology $\mathcal{O}$ has no models!

$\Leftrightarrow$ in all its models, false evaluates to true

$\Rightarrow$ Tableau

$\mathcal{O}$ ⋮ □

$\mathcal{O}$, $\neg\varphi$ ⋮ □ ⇝ yes!

$\Leftrightarrow \mathcal{O} \not\models \varphi$

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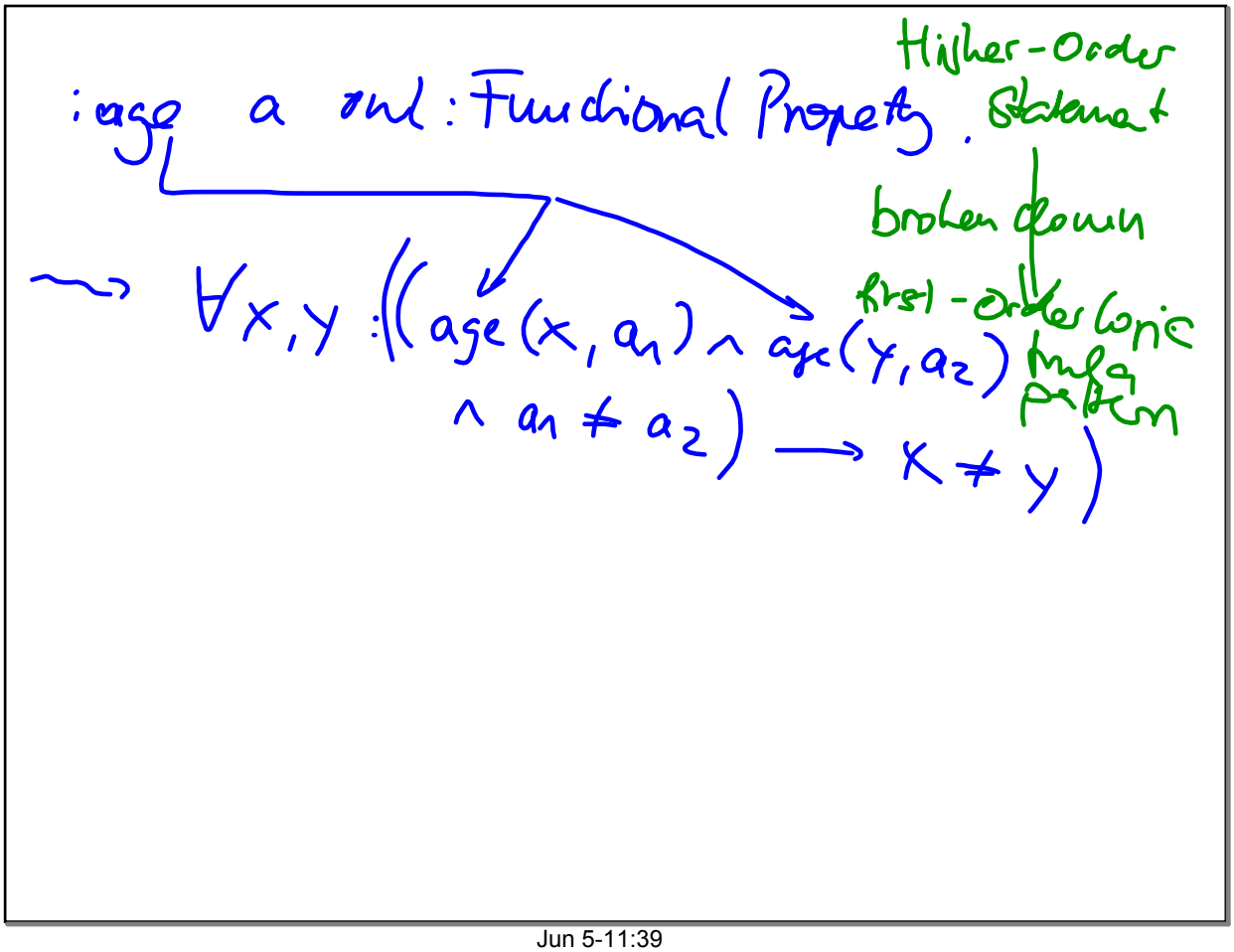
Higher-Order
broken down
first-order logic
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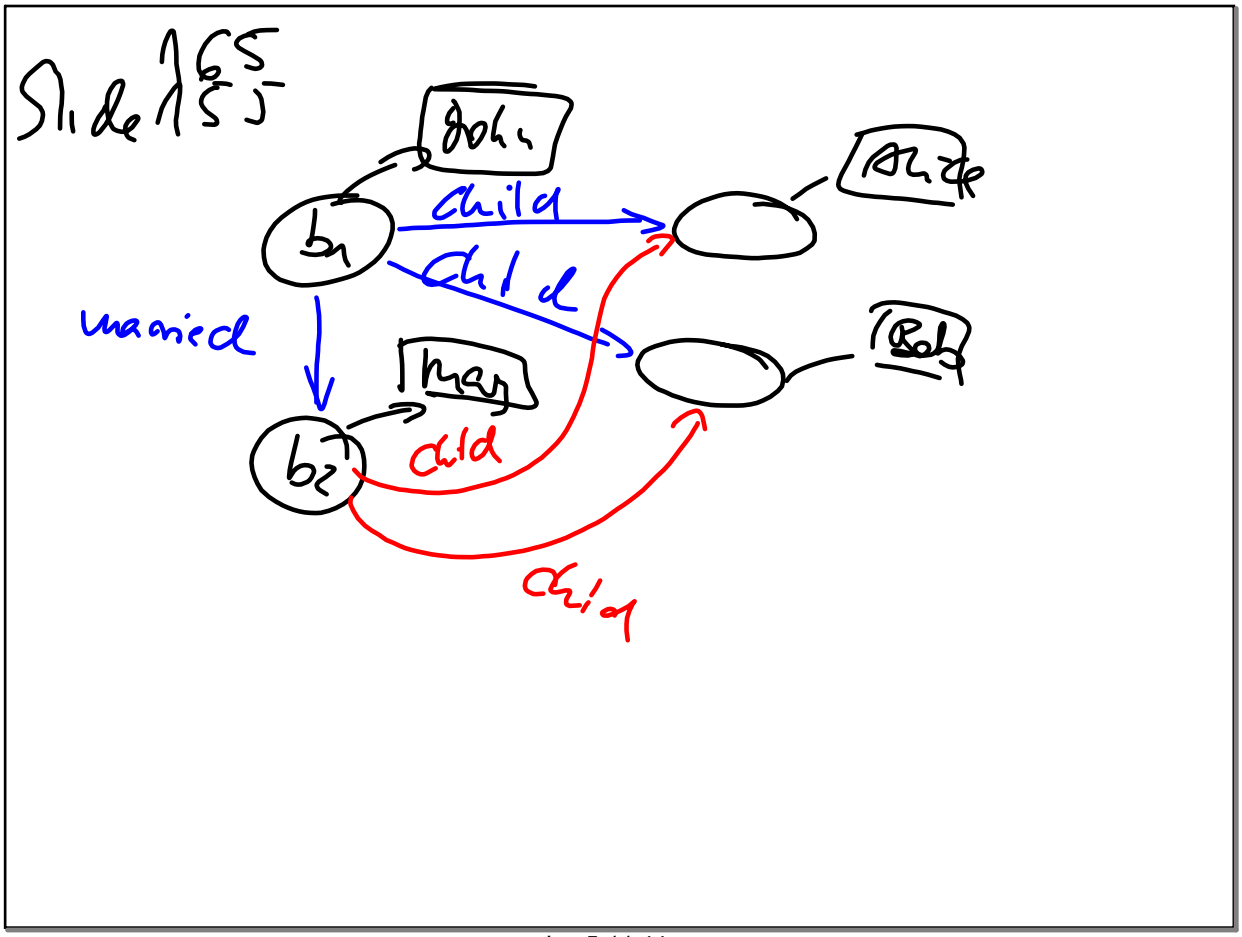
John
Alice
child
child
married
Mary
Bob
child
child
Jun 5-11:44