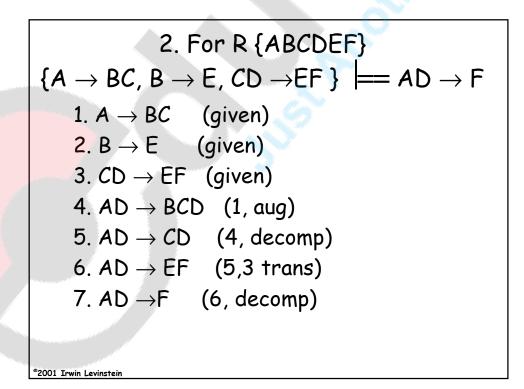
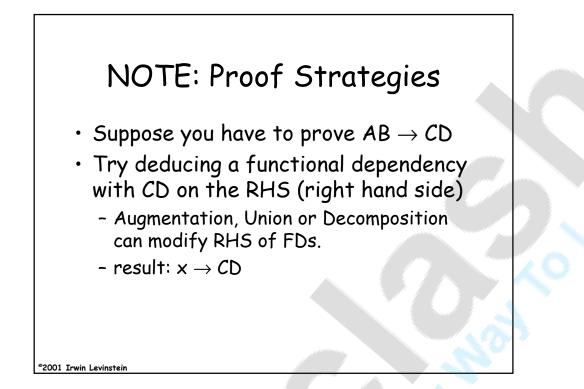
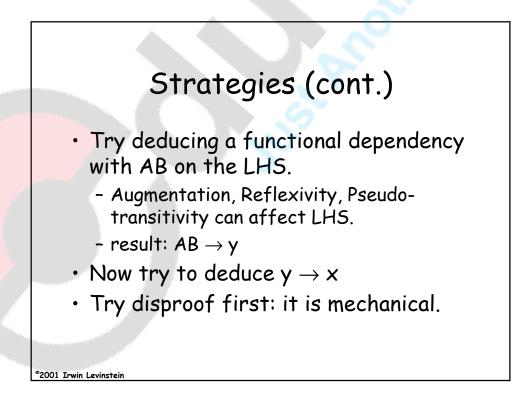


1. For relation R{A,B,C,D,E,F,G}  $\{ A \rightarrow B, BC \rightarrow DE, AEF \rightarrow G \} \models ACF \rightarrow DG$ 1.  $A \rightarrow B$  (given) 7.  $ACF \rightarrow ACDEF$  (6, aug.) 2. BC  $\rightarrow$  DE (given) 8. ACF  $\rightarrow$  AEF (7, decomp) 3. AEF  $\rightarrow$ G (given) 9. ACF  $\rightarrow$  G (8,3 trans) 4.  $AC \rightarrow BC$  (1, aug.) 10.  $ACF \rightarrow D$  (6, decomp) 5.  $AC \rightarrow DE$  (4,2 trans) 11.  $ACF \rightarrow DG$  (9,10 union) 6. ACF  $\rightarrow$  DEF (5, aug.)



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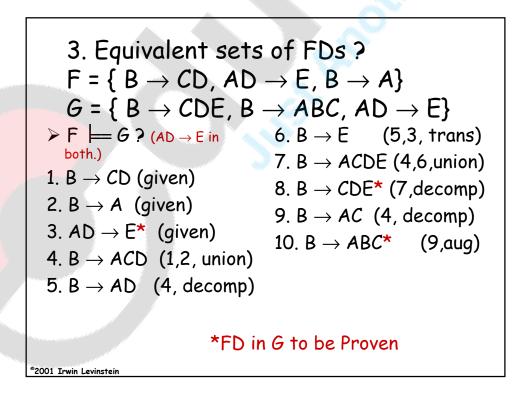


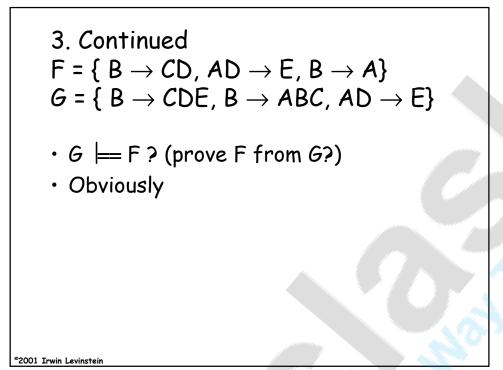
## [Vipin Dubey]

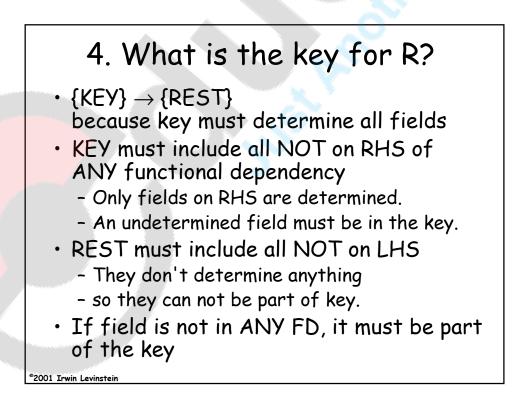
## Are 2 sets of FDs Equivalent?

- First method:
  - Compute the closure of F
  - Compute the closure of G
  - See if they are equal
- Second method
  - Show every FD in F can be proven from G
  - Show every FD in G can be proven from F

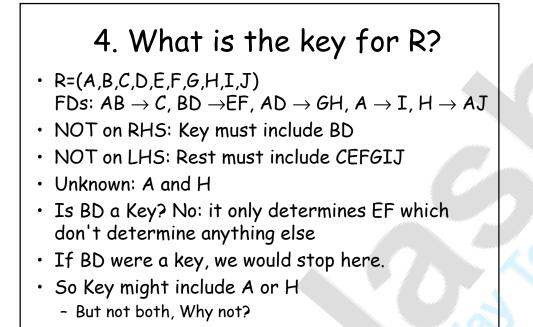
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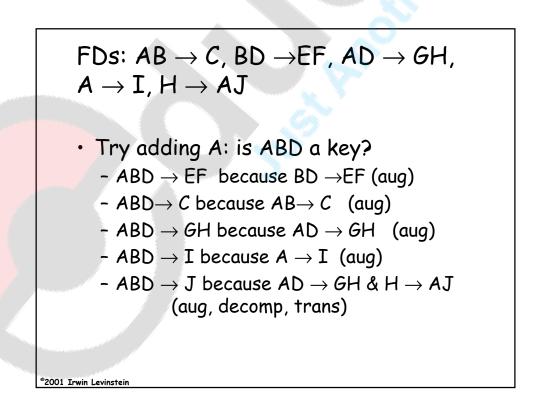




## [Vipin Dubey]



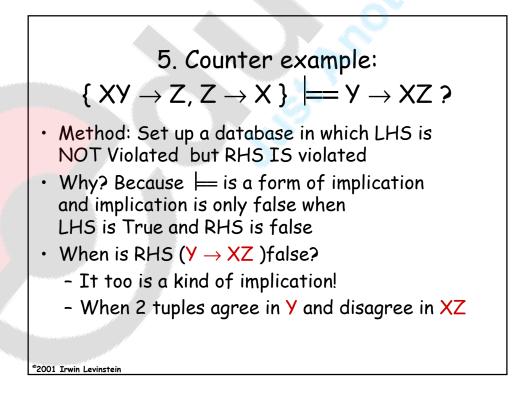
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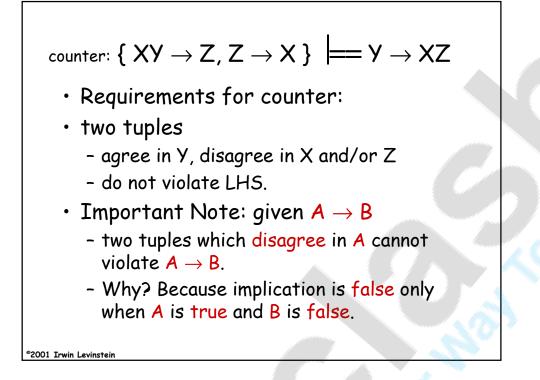


## $\begin{array}{c} \mathsf{FDs:} \ \mathsf{AB} \to \mathsf{C}, \ \mathsf{BD} \to \mathsf{EF}, \ \mathsf{AD} \to \mathsf{GH}, \\ \mathsf{A} \to \mathsf{I}, \ \mathsf{H} \to \mathsf{AJ} \end{array}$

- Try adding H: is BDH a key?
- Since  $H \rightarrow AJ$ ,  $H \rightarrow A$ .
- So BDH  $\rightarrow$  BDA, which is a key.
  - So BDH determines all that ABD determines.
- BDH is another key
- 2 overlapping keys: ABD and BDH.

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	counter: { XY $\rightarrow$ Z, Z $\rightarrow$ X } = Y $\rightarrow$ XZ
	• X Y Z (attributes)
	a b c (first tuple) ? b ? (y must be the same)
	• What about X? If X is the same:
	x y z a b c
	ab?
	• Problem: Cannot violate LHS (xy $\rightarrow$ z )
	<ul> <li>so Z must be the same</li> </ul>
	<ul> <li>but cannot have 2 identical tuples.</li> </ul>
~	<ul> <li>Therefore, make X different</li> </ul>
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