



Q3

a)

$R1 = \text{Authoring} * \text{Paper}$

$R2 = \text{SELECT}_{\text{Name} = \text{"Jeffrey Ullman"}}(R1)$

$\text{Solution} = \text{PROJECT}_{\text{Title}} R2$

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b)

$2011_Papers = \text{Authoring} \bowtie_{\text{Year}=2011} \text{Paper}$

$\text{Relevant_Papers} = \text{PROJECT}_{\text{DOI}, \text{Name}} (2011_Papers)$

$\text{DOI_Jeff_Papers} = \text{PROJECT}_{\text{DOI}} (\text{SELECT}_{\text{Name} = \text{"Jeffrey Ullman"}} (\text{Relevant_Papers}))$

$\text{Coauthors} = \text{SELECT}_{\text{Name} \neq \text{"Jeffrey Ullman"}} (\text{Relevant_Paper} \div \text{DOI_Jeff_Papers})$

$\text{Area} = \text{PROJECT}_{\text{Area}} (\text{Coauthors} * \text{Researcher})$

c)

$2011_Papers = \text{Authoring} \bowtie_{\text{Year}=2011} \text{Paper}$

$\text{Relevant_Papers} = \text{PROJECT}_{\text{DOI}, \text{Name}} (2011_Papers)$

$\text{DOI_Jeff_Papers} = \text{PROJECT}_{\text{DOI}} (\text{SELECT}_{\text{Name} = \text{"Jeffrey Ullman"}} (\text{Relevant_Papers}))$

$\text{All_Possible} = (\text{PROJECT}_{\text{Name}} \text{Relevant_Papers}) \times (\text{Relevant_DOI})$

$\text{Not_Correct} = (\text{All_Possible}) - (\text{Relevant_Papers})$

$\text{Result} = \text{PROJECT}_{\text{Name}} (\text{Relevant_Papers}) - \text{PROJECT}_{\text{Name}} (\text{Not_Correct})$