

# Exercises on Relational Algebra

**BOOKS**

(ISBN, Title, Edition, Year, PublisherID, Pages, Price, Language)

**WRITERS**

(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)

**AUTHORS**

(ISBN, WriterID)

**PUBLISHERS**

(PublisherID, Name, Place, Nationality)

**Query: books [Title, Year, Price] by “Woody Allen”**

## Different queries give the same result

1.

2.

3.

4.

5.

24.09.06

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**Query: books [Title, Year, Price] by a foreign author  
(language is different from the author's nationality)**

## Different queries ... are they correct?

$\Pi_{\text{Title, Year, Price}}(\text{BOOKS} \bowtie \text{AUTHORS} \bowtie \sigma_{\text{Language} \neq \text{Nationality}} \text{WRITERS})$

$\Pi_{\text{Title, Year, Price}}(\sigma_{\text{Language} \neq \text{Nationality}}(\text{BOOKS} \bowtie \text{AUTHORS} \bowtie \Pi_{\text{WriterID, Nationality}} \text{WRITERS}))$

$\Pi_{\text{Title, Year, Price}}(\sigma_{\text{Language} \neq \text{Nationality}}(\text{BOOKS} \bowtie \Pi_{\text{ISBN}}(\text{AUTHORS} \bowtie \Pi_{\text{WriterID, Nationality}} \text{WRITERS})))$

$\Pi_{\text{Title, Year, Price}}(\sigma_{\text{Language} \neq \text{Nationality}}(\text{BOOKS} \bowtie \Pi_{\text{ISBN, Nationality}}(\text{AUTHORS} \bowtie \Pi_{\text{WriterID, Nationality}} \text{WRITERS}))))$

$\Pi_{\text{Title, Year, Price}}(\sigma_{\text{Language} \neq \text{Nationality}}(\Pi_{\text{Title, Year, Price, ISBN}}(\text{BOOKS} \bowtie \Pi_{\text{ISBN, Nationality}}(\text{AUTHORS} \bowtie \Pi_{\text{WriterID, Nationality}} \text{WRITERS}))))$

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Databases

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### BOOKS

(ISBN, Title, Edition, Year, PublisherID, Pages, Price, Language)

### WRITERS

(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)

### AUTHORS

(ISBN, WriterID)

### PUBLISHERS

(PublisherID, Name, Place, Nationality)

**Q1: books [Title, Year, Price] published after the death of one of the authors (compare only years  $\Rightarrow$  same year is not after)**

**Q2: books [Title, Year, Price] published before the death of one of the authors (compare only years  $\Rightarrow$  same year is before)**

**BOOKS****(ISBN, Title, Edition, Year, PublisherID, Pages, Price, Language)****WRITERS****(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)****AUTHORS****(ISBN, WriterID)****PUBLISHERS****(PublisherID, Name, Place, Nationality)****Q1: books [Title, Year, Price] without author (anonymous)****Q2: books with author's name  
[Title, Year, Price, Name, Surname]****BOOKS****(ISBN, Title, Edition, Year, PublisherID, Pages, Price, Language)****WRITERS****(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)****AUTHORS****(ISBN, WriterID)****PUBLISHERS****(PublisherID, Name, Place, Nationality)****Query:  
authors [Name, Surname] who published a book with a  
publisher with their same name  
(e.g. a book by Luigi Einaudi published by Einaudi)**

**Query: italian publishers [Name, Place]**

**Query: publishers [Name, Place] of books in Italian**

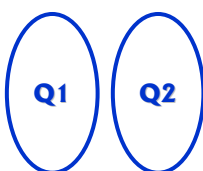
**Query: publishers [Name, Place] of italian writers**

**Query: publishers [Name,Place] of foreign writers  
(i.e. publishers and writers come from different countries)**

**Q1: publishers [Name, Place] of italian writers**

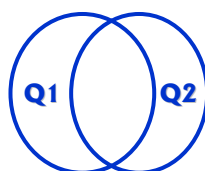
**Q2: publishers [Name, Place] of non-italian writers**

**How these two sets are related?**



Empty  
intersection

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Non-empty  
intersection

Databases



$Q1 \subseteq Q2$



$Q2 \subseteq Q1$

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**Q1: publishers [Name, Place] of italian writers**

**Q2: publishers [Name, Place] of non-italian writers**

**Q3: publishers [Name, Place] who never printed a book by any italian writer**

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Databases

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**WRITERS**

(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)

**AUTHORS**

(ISBN, WriterID)

**PUBLISHERS**

(PublisherID, Name, Place, Nationality)

**Q1: books [Title, Year, Price] with two or more authors**

**Q2: writers [Name, Surname] who published at least one book with "Paolo Rossi"**

**BOOKS**

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**WRITERS**

(WriterID, Name, Surname, BirthPlace, BirthYear, DeathYear, Nationality)

**AUTHORS**

(ISBN, WriterID)

**PUBLISHERS**

(PublisherID, Name, Place, Nationality)

**Q1: writers [Name, Surname] who wrote books in two (or more) different languages**