

# Modeling Relational Data

## Many to Many

Andy Catlin

Springer Series in Statistics

Trevor Hastie  
Robert Tibshirani  
Jerome Friedman

# The Elements of Statistical Learning

Data Mining, Inference, and Prediction

Second Edition

 Springer

Springer Texts in Statistics

Gareth James  
Daniela Witten  
Trevor Hastie  
Robert Tibshirani

# An Introduction to Statistical Learning

with Applications in R

 Springer

	<b>title</b> character varying(100)	<b>lastname</b> character varying(30)	<b>firstname</b> character varying(30)
1	Elements of Statistical Learning	Friedman	Jerome
2	Elements of Statistical Learning	Hastie	Trevor
3	Elements of Statistical Learning	Tibshiraini	Robert
4	Introduction to Statistical Learning	Hastie	Trevor
5	Introduction to Statistical Learning	James	Gareth
6	Introduction to Statistical Learning	Tibshiraini	Robert
7	Introduction to Statistical Learning	Witten	Daniela

	lastname character varying(30)	firstname character varying(30)	title character varying(100)
1	Friedman	Jerome	Elements of Statistical Learning
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6	Tibshiraini	Robert	Introduction to Statistical Learning
7	Witten	Daniela	Introduction to Statistical Learning

### **titles**

title_id
title

### **title\_authors**

title_id (FK)
author_id (FK)

### **authors**

author_id
author

```
CREATE TABLE titles
(
    title_id int PRIMARY KEY,
    title varchar(100) NOT NULL UNIQUE
);
```

```
CREATE TABLE authors
(
    author_id int PRIMARY KEY,
    lastname varchar(30) NOT NULL,
    firstname varchar(30) NULL
);
```

```
CREATE TABLE title_authors
(
    title_id int NOT NULL REFERENCES titles(title_id),
    author_id int NOT NULL REFERENCES authors(author_id),
    CONSTRAINT pk_title_authors PRIMARY KEY(title_id, author_id)
);
```



```
SELECT t.title, a.lastname, a.firstname  
FROM titles t  
LEFT JOIN title_authors ta ON t.title_id = ta.title_id  
LEFT JOIN authors a ON ta.author_id = a.author_id  
ORDER BY t.title, a.lastname, a.firstname;
```



# Use “Toy Databases” as a Design Tool



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