

INFS 7901 Database Principle

Project Report

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Aim and Background

For this project, I propose to build an online bookstore for people, which acts as a central database that contains various courses books in stock along with their titles, creators and selling prices. The system should manage information about books in the bookstore, registered users and books in their shopping basket. The database stores various book related details and customer information.

The background to this topic was chosen because many students find textbooks too expensive to buy at school bookstores and many courses only use the required textbooks a few days in a semester. This becomes very wasteful and frustrating for students & others people. This online bookstore system provides a solution to this. It will provide a service in which students can buy books online without any trouble.

The system has the following main components:

1. Implement of new user registration and old user login.
2. Allow users to change their own passwords and system administrators to modify book information, such as prices.
3. Implement the user to add books to the shopping basket.
4. Implement to search the author and publisher of the book by the ISBN of the book.
5. Implement to get publisher information by publisher name.

Query Demonstration

1. Join Operation

- Query and Explanation

```
SELECT * FROM PUBLISHER NATURAL JOIN PUB_PHONE;
```

PUBLISHER table and PUB_PHONE table are connected by pairs of identically named columns (PName) in them.

● Result

Before the join:

服务器: localhost » 数据库: 7901Project » 表: PUBLISHER

正在显示第 0 - 4 行 (共 5 行, 查询花费 0.0006 秒。)

SELECT * FROM `PUBLISHER`

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	PName	URL	PAddress
<input type="checkbox"/>	Franklin, Beedle & Associates Inc	https://fbeedle.com/	Franklin, Beedle & Associates Inc.10350 N Vancouve...
<input type="checkbox"/>	O'Reilly Media	https://www.oreilly.com/	1005 Gravenstein Highway North Sebastopol, CA 9547...
<input type="checkbox"/>	Pearson	https://www.pearson.com/	1001/151 Castlereagh St, Sydney NSW 2000, Australi...
<input type="checkbox"/>	Relx	https://www.relx.com/	230 Park Avenue New York NY 10169 USA
<input type="checkbox"/>	Thomson Reuters	https://www.thomsonreuters.com/en.html	19 Harris Street Pyrmont Sydney 2009 Australia

PUBLISHER table

服务器: localhost » 数据库: 7901Project » 表: PUB_PHONE

正在显示第 0 - 4 行 (共 5 行, 查询花费 0.0004 秒。)

SELECT * FROM `PUB_PHONE`

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	PName	Phone
<input type="checkbox"/>	Franklin, Beedle & Associates Inc	800 322 2665
<input type="checkbox"/>	O'Reilly Media	827 7000
<input type="checkbox"/>	Pearson	1800 882 385
<input type="checkbox"/>	Relx	212 309 8100
<input type="checkbox"/>	Thomson Reuters	2 9171 7100

PUB_PHONE table

After the join:

phpMyAdmin

服务器: localhost » 数据库: 7901Project » 表: PUBLISHER

显示查询框

当前所选内容没有包含唯一字段。单元格编辑、复选框、编辑、复制和删除无法正常使用。

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SELECT * FROM PUBLISHER NATURAL JOIN PUB_PHONE;

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显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

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	O'Reilly Media	https://www.oreilly.com/	1005 Gravenstein Highway North Sebastopol, CA 9547...	827 7000
	Pearson	https://www.pearson.com/	1001/151 Castlereagh St, Sydney NSW 2000, Australi...	1800 882 385
	Relx	https://www.relx.com/	230 Park Avenue New York NY 10169 USA	212 309 8100
	Thomson Reuters	https://www.thomsonreuters.com/en.html	19 Harris Street Pyrmont Sydney 2009 Australia	2 9171 7100

The Phone in PUB_PHONE has been connected to PUBLISHER table

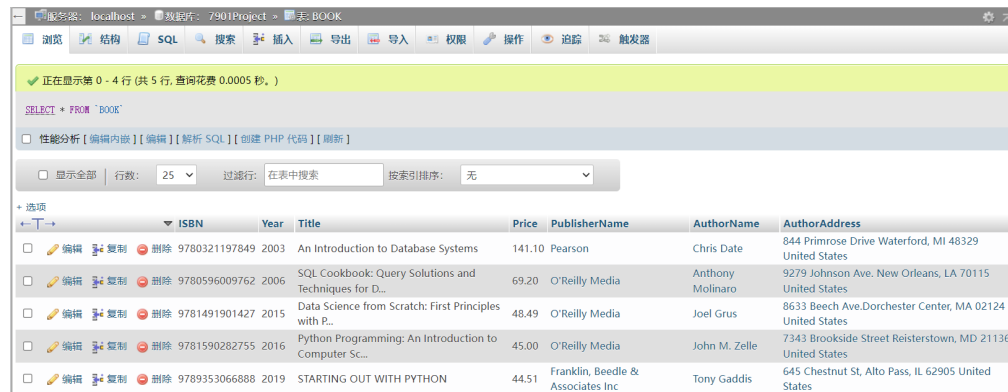
2. Aggregation Query

- Query and Explanation

```
SELECT COUNT(*) FROM BOOK WHERE Year > 2012;
```

Counts the number of books which published after 2012

- Result



	ISBN	Year	Title	Price	PublisherName	AuthorName	AuthorAddress
<input type="checkbox"/>	9780321197849	2003	An Introduction to Database Systems	141.10	Pearson	Chris Date	844 Primrose Drive Waterford, MI 48329 United States
<input type="checkbox"/>	9780596009762	2006	SQL Cookbook: Query Solutions and Techniques for D...	69.20	O'Reilly Media	Anthony Molinaro	9279 Johnson Ave. New Orleans, LA 70115 United States
<input type="checkbox"/>	9781491901427	2015	Data Science from Scratch: First Principles with P...	48.49	O'Reilly Media	Joel Grus	8633 Beech Ave.Dorchester Center, MA 02124 United States
<input type="checkbox"/>	9781590282755	2016	Python Programming: An Introduction to Computer Sc...	45.00	O'Reilly Media	John M. Zelle	7343 Brookside Street Reisterstown, MD 21136 United States
<input type="checkbox"/>	9789353066888	2019	STARTING OUT WITH PYTHON	44.51	Franklin, Beedle & Associates Inc	Tony Gaddis	645 Chestnut St, Alto Pass, IL 62905 United States

BOOK table



	ISBN	Year	Title	Price	PublisherName	AuthorName	AuthorAddress
<input type="checkbox"/>	9780321197849	2003	An Introduction to Database Systems	141.10	Pearson	Chris Date	844 Primrose Drive Waterford, MI 48329 United States
<input type="checkbox"/>	9780596009762	2006	SQL Cookbook: Query Solutions and Techniques for D...	69.20	O'Reilly Media	Anthony Molinaro	9279 Johnson Ave. New Orleans, LA 70115 United States
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<input type="checkbox"/>	9789353066888	2019	STARTING OUT WITH PYTHON	44.51	Franklin, Beedle & Associates Inc	Tony Gaddis	645 Chestnut St, Alto Pass, IL 62905 United States

There are 3 books published later than 2012

3. Aggregation with Group-By

- Query and Explanation

```
SELECT PublisherName, SUM(Price) FROM BOOK GROUP BY PublisherName;
```

Calculate the total price of books published by each publisher recorded in the system (If there are no books in BOOK table published by this publisher, his name will not be displayed)

● Result

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SQL: `SELECT * FROM 'BOOK'`

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	ISBN	Year	Title	Price	PublisherName	AuthorName	AuthorAddress
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	9780321197849	2003	An Introduction to Database Systems	141.10	Pearson	Chris Date	844 Primrose Drive Waterford, MI 48329 United States
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<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	9789353066888	2019	STARTING OUT WITH PYTHON	44.51	Franklin, Beedle & Associates Inc	Tony Gaddis	645 Chestnut St, Alto Pass, IL 62905 United States

BOOK table

正在显示第 0 - 4 行 (共 5 行, 查询花费 0.0005 秒。)

SQL: `SELECT * FROM 'PUBLISHER'`

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

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<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Pearson	https://www.pearson.com/	1001/151 Castlereagh St, Sydney NSW 2000, Australi...
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<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Thomson Reuters	https://www.thomsonreuters.com/en.html	19 Harris Street Pyrmont Sydney 2009 Australia

The books in the BOOK Table are published by only three publishers

4. Delete Operation with Cascade

● Query and Explanation

`DELETE FROM PUBLISHER WHERE PName='Relx'`

Delete the “Relx” publisher with cascade, which means the record in PUB_PHONE would be delete as well.

● Result

Before the deletion:

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SQL: `SELECT * FROM 'PUBLISHER'`

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	PName	URL	PAddress
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Franklin, Beedle & Associates Inc	https://lbeedle.com/	Franklin, Beedle & Associates Inc.10350 N Vancouve...
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	O'Reilly Media	https://www.oreilly.com/	1005 Gravenstein Highway North Sebastopol, CA 9547...
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Pearson	https://www.pearson.com/	1001/151 Castlereagh St, Sydney NSW 2000, Australi...
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Relx	https://www.relx.com/	230 Park Avenue New York NY 10169 USA
<input type="checkbox"/> 编辑 <input type="checkbox"/> 复制 <input type="checkbox"/> 删除	Thomson Reuters	https://www.thomsonreuters.com/en.html	19 Harris Street Pyrmont Sydney 2009 Australia

PUBLISHER table

服务器: localhost » 数据库: 7901Project » 表: PUB_PHONE

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```
SELECT * FROM `PUB_PHONE`
```

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	PName	Phone
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<input type="checkbox"/> 编辑 复制 删除	Relx	212 309 8100
<input type="checkbox"/> 编辑 复制 删除	Thomson Reuters	2 9171 7100

PUB_PHONE table

After the deletion:

服务器: localhost » 数据库: 7901Project » 表: PUBLISHER

正在显示第 0 - 4 行 (共 5 行, 查询花费 0.0003 秒。)

```
SELECT * FROM `PUBLISHER`
```

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

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<input type="checkbox"/> 编辑 复制 删除	Thomson Reuters	https://www.thomsonreuters.com/en.html	19 Harris Street Pyrmont Sydney 2009 Australia

服务器: localhost » 数据库: 7901Project » 表: PUB_PHONE

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```
SELECT * FROM `PUB_PHONE`
```

性能分析 [编辑内嵌] [编辑] [解析 SQL] [创建 PHP 代码] [刷新]

显示全部 | 行数: 25 | 过滤行: 在表中搜索 | 按索引排序: 无

	Pub_Name	Phone
<input type="checkbox"/> 编辑 复制 删除	Franklin, Beedle & Associates Inc	800-322-2665
<input type="checkbox"/> 编辑 复制 删除	O'Reilly Media	827-7000
<input type="checkbox"/> 编辑 复制 删除	Pearson	1800 882 385
<input type="checkbox"/> 编辑 复制 删除	Thomson Reuters	2 9171 7100

The "Relx" publisher has been delete from both table

5. Update Operation

● Query and Explanation

```
UPDATE BOOK SET Price = Price + 4.99 WHERE Price < 46.00
```

Increase the book price of all books by 4.99 (should not be more than 46.00).

● Result

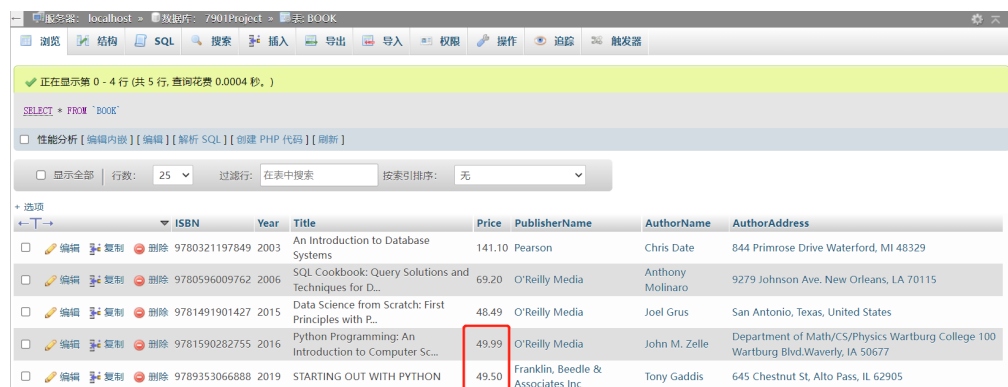
Before the update:



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<input type="checkbox"/>	9780321197849	2003	An Introduction to Database Systems	141.10	Pearson	Chris Date	844 Primrose Drive Waterford, MI 48329
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<input type="checkbox"/>	9781590282755	2016	Python Programming: An Introduction to Computer Sc...	45.00	O'Reilly Media	John M. Zelle	Department of Math/CS/Physics Wartburg College 100 Wartburg Blvd.Waverly, IA 50677
<input type="checkbox"/>	9789353066888	2019	STARTING OUT WITH PYTHON	44.51	Franklin, Beedle & Associates Inc	Tony Gaddis	645 Chestnut St, Alto Pass, IL 62905

BOOK table

After the update:



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<input type="checkbox"/>	9789353066888	2019	STARTING OUT WITH PYTHON	49.50	Franklin, Beedle & Associates Inc	Tony Gaddis	645 Chestnut St, Alto Pass, IL 62905

Books cost less than 46.00 have been markup

Conclusion

I spent about 40 hours on this project, most of the time was spent on designing E/R diagram and completing SQL Dump, other parts like schema, functional dependencies, normalized schema spent no more than 3 hours each, and the remaining sporadic time was spent on completing the report.

My favorite part was designing the E/R diagram, I think it was a very meaningful process to do to get my ideas off the ground step by step, although the process of using “draw.io” to draw the diagram was a bit torturous, but these hours also helped me to get familiar with it, and I believe this will help me in the future. My least favorite part is SQL Dump, because it's relatively a repetitive process that can be tedious but can't be wrong, and it's a necessary step for us to do meaningful query, good thing is that Phpmyadmin is quite convenient and powerful, which saves a lot of trouble overall.

I think the process of completing this project helped me the most is the professor's course wares, which are very detailed and most of the time I can find the knowledge points I need in them, I basically did not use the search engine like google when doing this project; in addition, the tutor also helped me a lot, when I felt confused about what to do, he opened a separate chat room to answer my questions patiently, which relieved my anxiety and also gave me a direction.

My advice to beginners is to strictly follow the steps of database design, do not create the whole database at once. It is important to solve problems as they are encountered and not to take them to the next step or they will lead to a chain reaction. I recommend the following database design steps.

- Determining the purpose of your database
- Finding and organizing the required information
- Dividing the information into tables
- Turning information items into columns
- Specifying primary keys
- Creating the table relationship
- Refining the design
- Applying the normalization rules