Fundamentals of Data Management

Pass Task 9.1: Transactions and Concurrency

Overview

You'll learn how to implement transactions in practice and how to investigate the concurrency behaviour of your database.

Purpose

Gain practical experience of the effects of concurrency in different isolation levels using MySQL. You are free to use any other relational database management system.

Task

Download the Ubuntu virtual machine from Canvas and open it in the VMWare Player. Follow the instructions to open two connections to the MySQL server from the MySQL Workbench. Work through the tasks below.

Time

This task should be completed in your lab class and submitted for feedback in lab 9 or at the beginning of lab 10.

Resources

- Online module (from Canvas)
- Book Chapters, e.g.
  - Database Systems, Connolly & Begg (http://goo.gl/cQ9vJr), chapter 22
  - Fundamentals of Database Systems, Elmasri & Navathe, chapters 21, 22
- MySQL (on FDM virtual machine) and MySQL Workbench (or other RDBMS and suitable client).

Feedback

Discuss your solutions with the tutorial instructor.

Next

Get started on module 10.

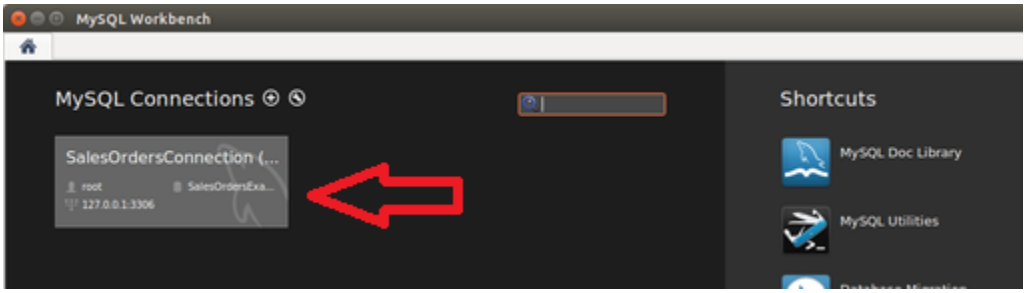
Pass Tasks 9.1 — Submission Details and Assessment Criteria

Document your solutions to the tasks using a Word processor. Upload the Pass level work to Doubtfire. The tutors will discuss them with you in the lab.

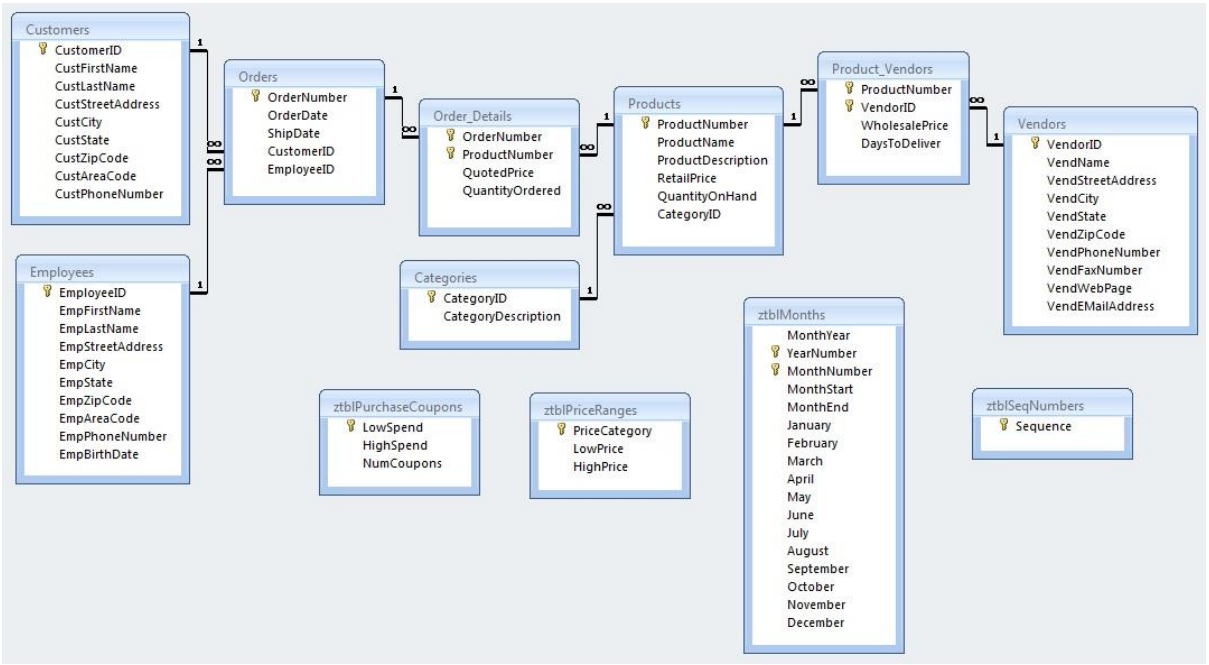
Getting Started

Open the VMWare Player and start the virtual machine. The password for fdm is admin. Click on the application icon (the uppermost icon on the left. Find MySQL Workbench (type the name into the search field if it isn't among the icons).

Open the MySQL Workbench. Click on the SalesOrdersConnection that shows in the connections list. The password is root. In the right upper corner, there are three buttons that let you minimise the left, lower and right subwindow. Use them to get more space for the SQL editor in the middle.



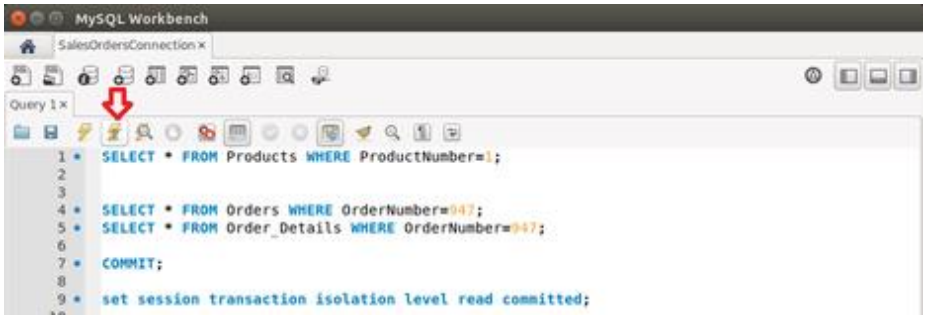
This is the schema of the SalesOrdersExample database:



Arrange two MySQL Workbench windows on your screen such that you can easily switch from one to the other (one to the left and one to the right).

The windows represent different connections to the database. Think of them as one internet user in New Delhi placing an order for a product, and another user in Melbourne reading orders from the database.

To run a single query in the editor, put the cursor in the line of the query and press the second lightening-shaped button (shown in the picture).



Use either window and run a simple query:

SELECT * FROM Products;

If it returns results, you are ready to start the tutorial.

Subtask 9.1.1

Use the following statements for your two query tabs in MySQL Workbench. You can copy them from the text files in the Documents/week10 directory on Ubuntu.

Transaction T1	Transaction T2

`SELECT * FROM Products WHERE ProductNumber=1;`
`SELECT * FROM Orders WHERE OrderNumber=945;`
`SELECT * FROM Order_Details WHERE OrderNumber=945;`
	`UPDATE Products SET QuantityOnHand= QuantityOnHand-2 WHERE ProductNumber=1;`
	
	`INSERT INTO Orders (OrderNumber, OrderDate, ShipDate, CustomerID, EmployeeID) VALUES (945, '2015-09-04', '2015-09-05', 1004, 701);`
	
	`INSERT INTO Order_Details (OrderNumber, ProductNumber, QuotedPrice, QuantityOrdered) VALUES (945, 1, 1200.00, 2);`

Study Transaction T2 first. It records a new order for the product with ProductNumber=1 and updates the QuantityOnHand of the product with ProductNumber=1. The order quantity is 2, so the QuantityOnHand is reduced by 2.

(T1 just reads the rows affected by T2.)

Having studied T2, make an argument why T2 is in its entirety (all three statements) have to be combined into a transaction. Document the argument and upload.