

Lecture #4

NEWM N510: Web-Database Concepts

MySQL (3)

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Review Last Lecture

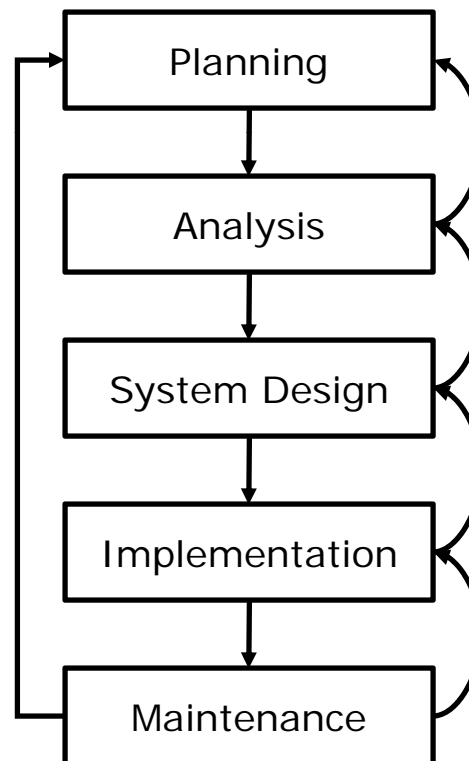
- SQL: CREATE (Database, Table, and Index)
- SQL: TRUNCATE (Table)
- SQL: DROP (Database, Table, and Index)
- SQL: ALTER (Database, Table, and Index)
- SQL: INSERT
- SQL: UPDATE
- SQL: DELETE
- SQL: Joining and Keys (Inner/Left/Right Join)
- SQL: GROUP BY & HAVING
- SQL: Functions

Lecture in a Nutshell

1. Database Design Process
2. Entity Relationship Diagram
3. MySQL Workbench
4. MySQL Installation
5. MySQL Administration
6. MySQL Migration

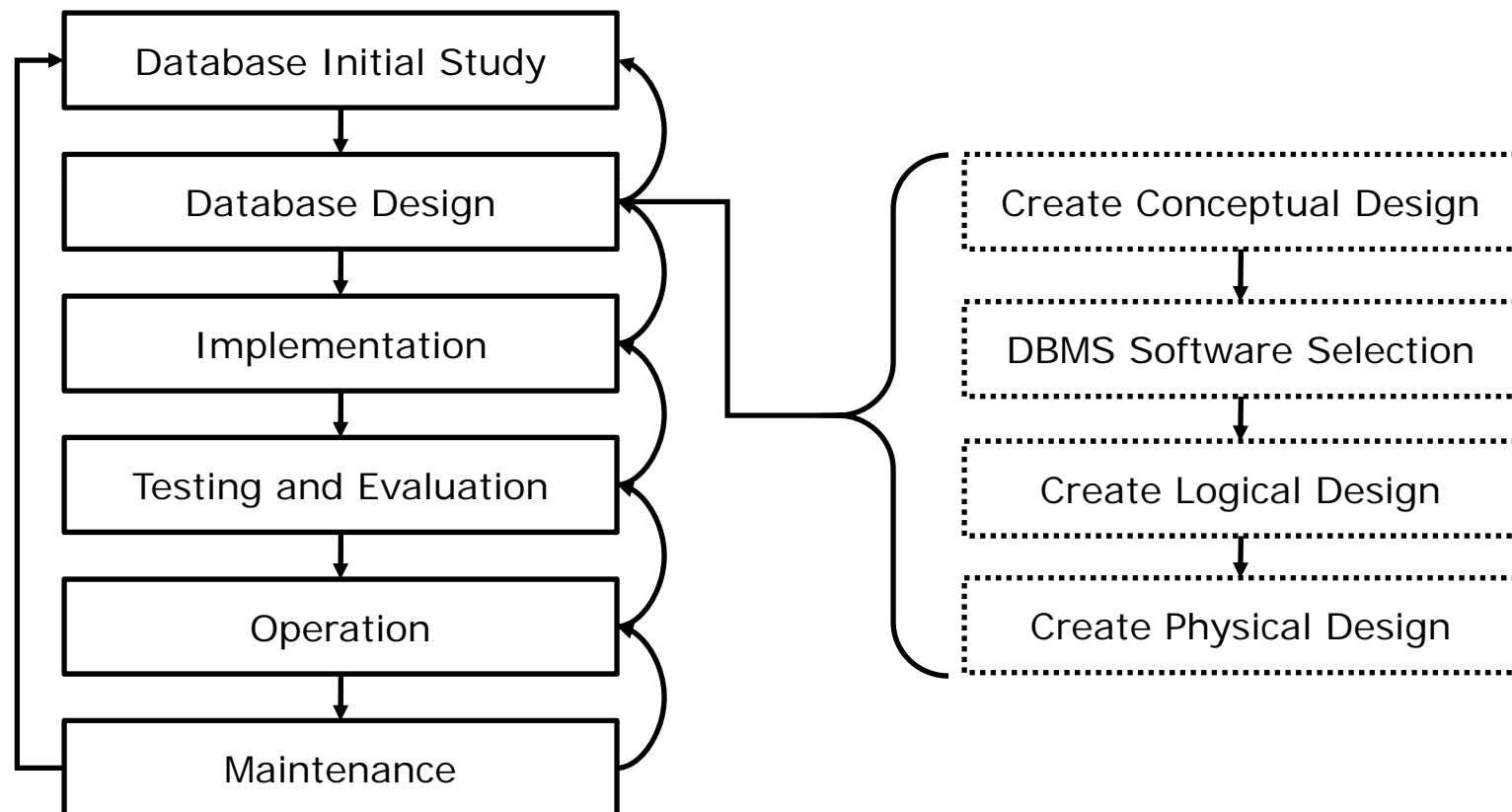
1. Database Design Process

- Information systems undergo evaluation and revision within a framework known as the **Systems Development Life Cycle (SDLC)**



Database Design Process (cont.)

- Databases also undergo evaluation and revision within a framework known as the **Database Life Cycle (DBLC)**



Database Design Process (cont.)

- Database Initial Study → Analyze company environment & organizational structure; Define constraints, objectives and scope
- Database Design →
 - Create Conceptual → Data analysis and requirements; **Entity relationship modeling** and normalization; Data model verification
 - DBMS Software Selection → DBMS features and tools, Underlying model, Portability, DBMS hardware requirements
 - Create Logical Design → Translates conceptual design into internal model; Maps objects in model to specific DBMS constructs
 - Create Physical Design → Selection of data storage
- Implementation → Creation of special storage-related constructs; Loading data; Performance; Security; Backup and recovery
- Testing and Evaluation → Performance, integrity, security constraints
- Operation → System evaluation; New problems
- Maintenance → Preventative-, corrective-, adaptive-maintenance; Generation of database access statistics; Periodic security audits

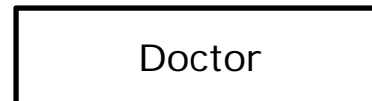
2. Entity Relationship Diagram (ERD)

- In software engineering, an **Entity-Relationship Model** (ERM) is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion.
- There are a number of conventions for entity-relationship diagrams (ERDs). The classical notation mainly relates to **conceptual modeling**. There are a range of notations employed in logical and physical database design, such as IDEF1X.
- Data is described as
 - Entities
 - Relationships
 - Attributes:
 - ✓ properties of entities
 - ✓ have values

Entity Relationship Diagram (cont.)

□ **Entity**

- An entity may be defined as a thing which is recognized as being capable of an independent existence and which can be uniquely identified.
- An entity may be a physical object such as a house or a car, an event such as a house sale or a car service, or a concept such as a customer transaction or order.
- Entities can be thought of as nouns. Examples: a computer, an employee, a song, a mathematical theorem. Entities are represented as rectangles.



Entity Relationship Diagram (cont.)

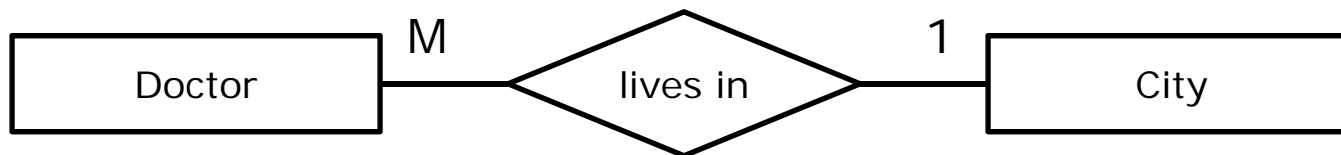
□ Relationships

- A relationship captures how two or more entities are related to one another.
- Relationships can be thought of as verbs, linking two or more nouns. Examples: an owns relationship between a company and a computer, a supervises relationship between an employee and a department, a performs relationship between an artist and a song, a proved relationship between a mathematician and a theorem.
- Relationships are represented as diamonds, connected by lines to each of the entities in the relationship.



Entity Relationship Diagram (cont.)

- Type of relationships should be identified by proper notations such as one to many (1-M) or many to many (M-M) relationships.

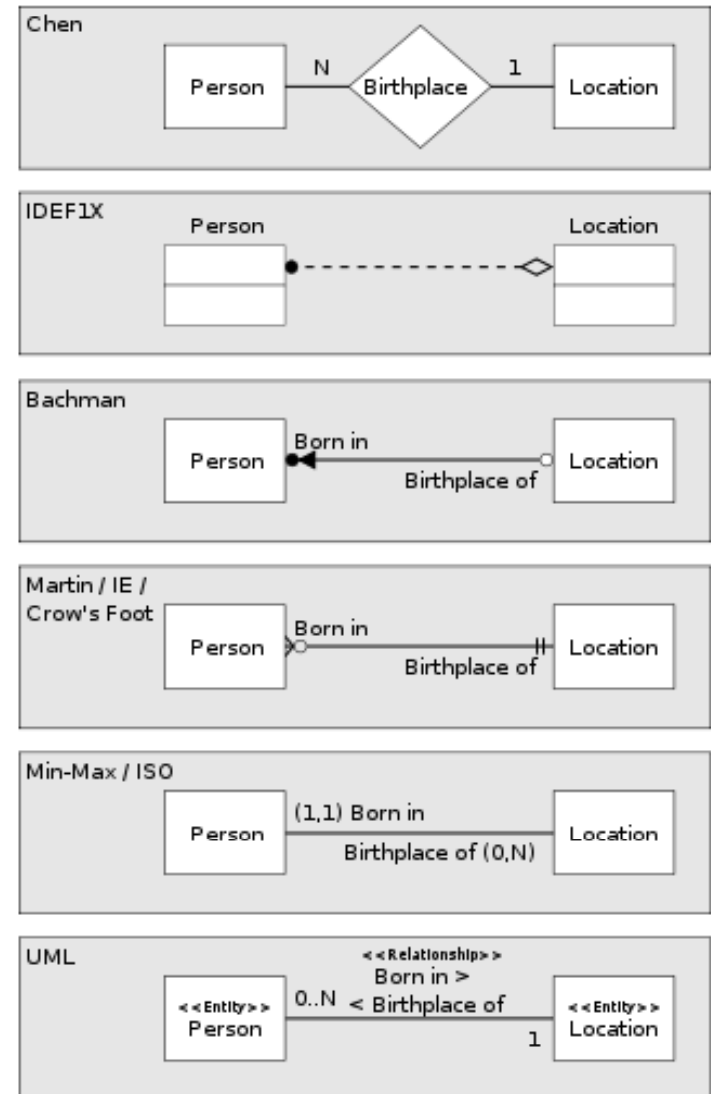


- Total participation: double line (all patients are associated with a doctor)
- Partial participation: single line (only some doctors [not always all of them] are associated with a patient)



Entity Relationship Diagram (cont.)

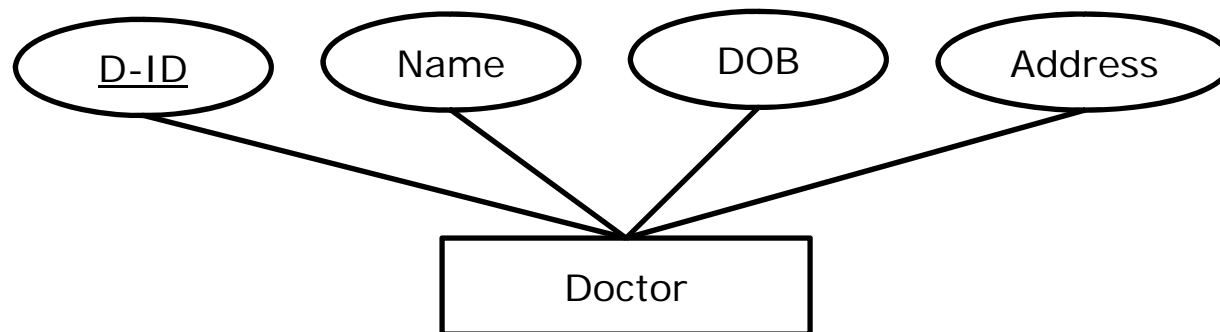
- Several styles are available to choose from: Chen, IDEF1X, Bachman, Martin (Crow's Foot), Min-Max ISO, and UML .



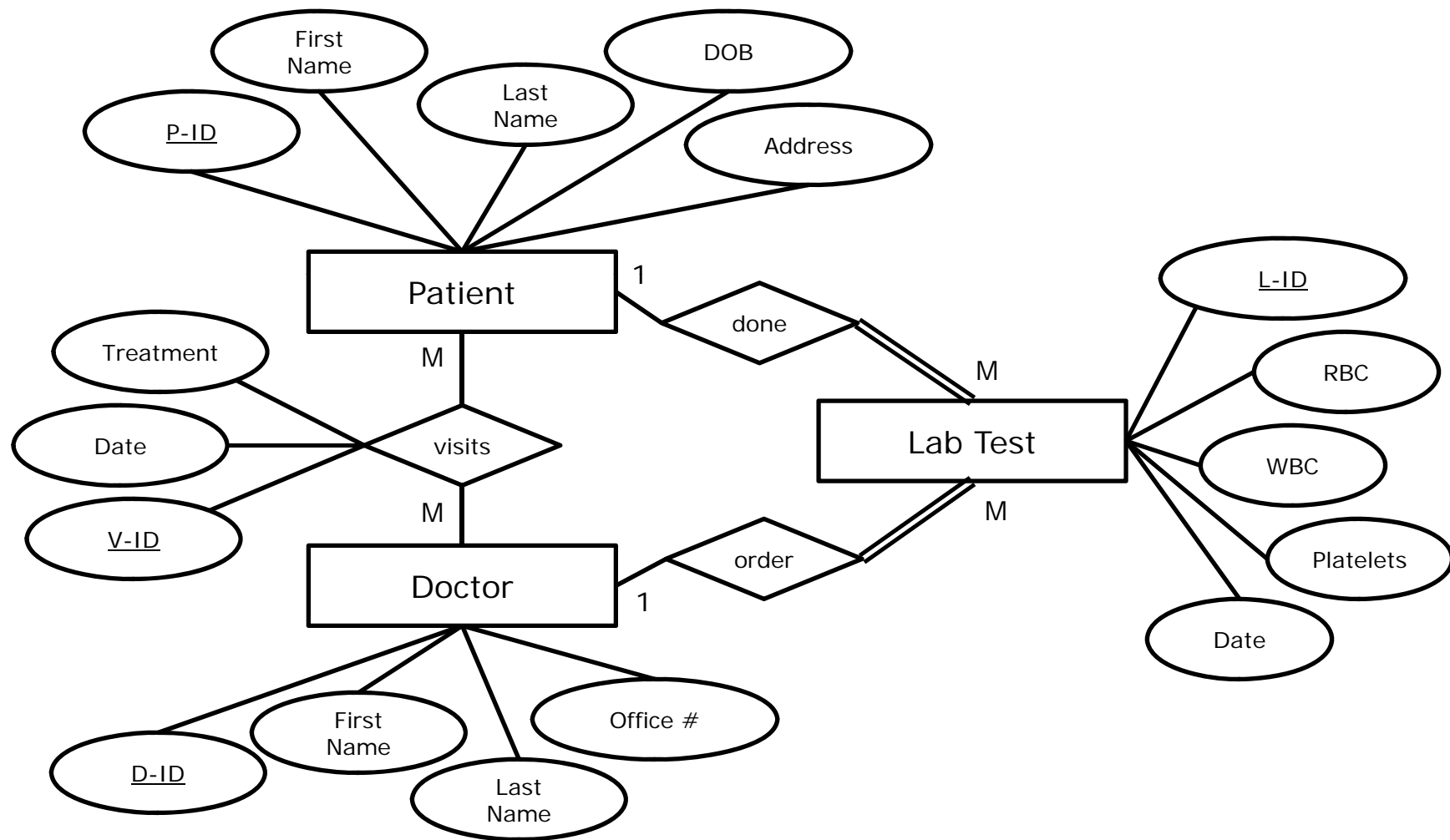
Entity Relationship Diagram (cont.)

□ Attributes

- Entities and relationships can both have attributes. Examples: an employee entity might have a Social Security Number (SSN) attribute; the proved relationship may have a date attribute.
- Every entity (unless it is a weak entity) must have a minimal set of uniquely identifying attributes, which is called the entity's primary key.
- Attributes are represented as ellipses connected to their owning entity sets by a line.



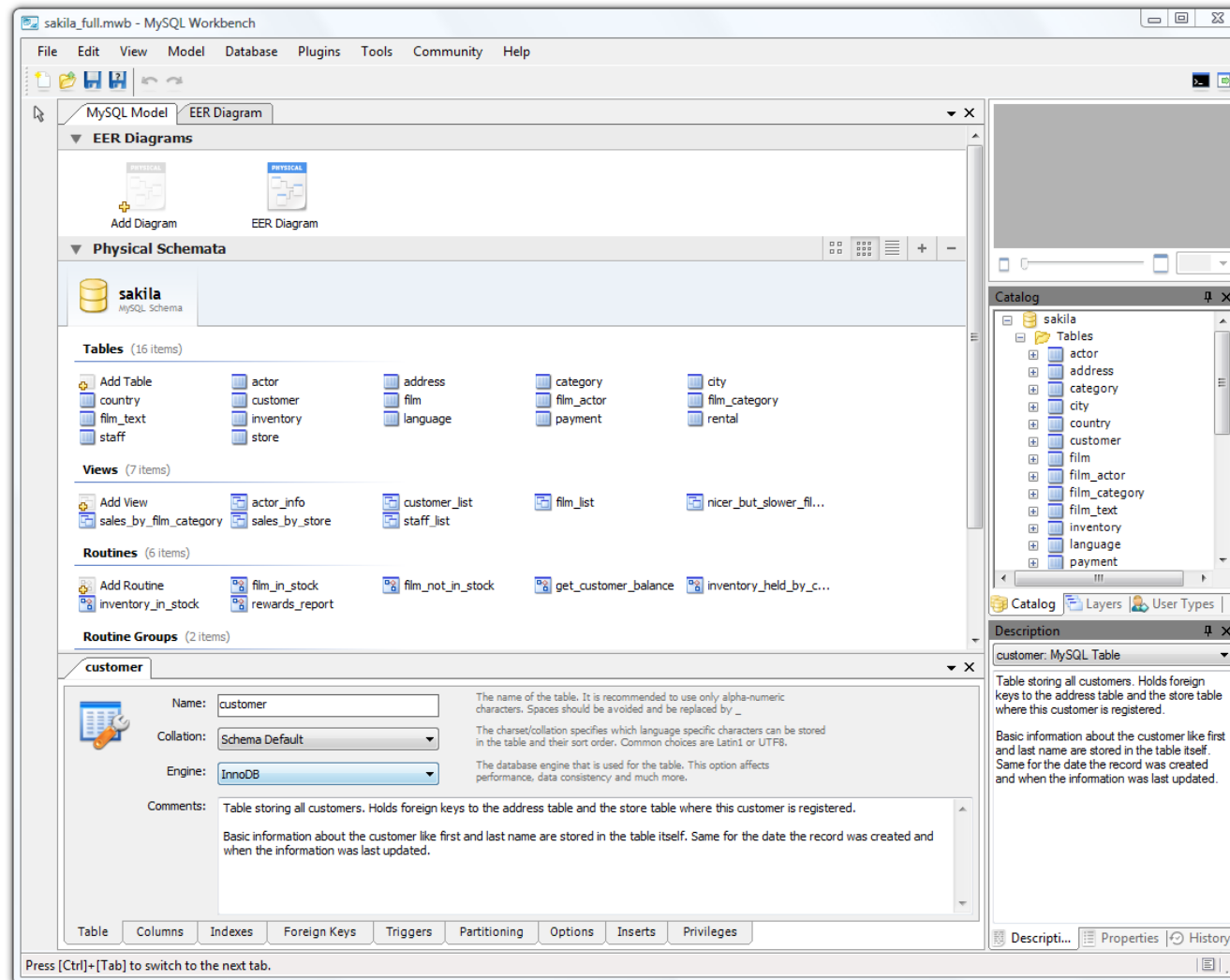
Entity Relationship Diagram (cont.)



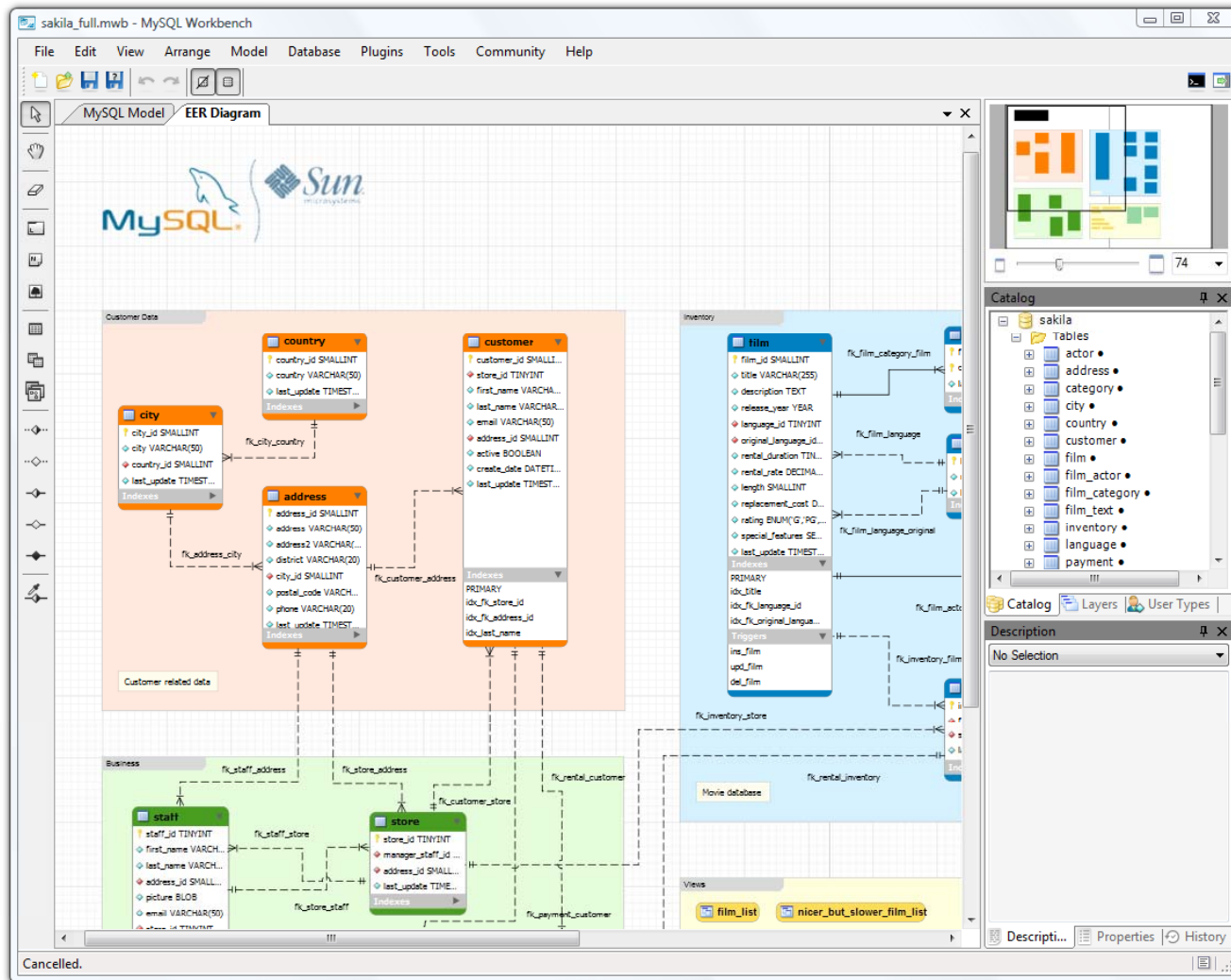
3. MySQL Workbench

- There are many ER diagramming tools:
 - Proprietary ER diagramming tools: ARIS, Avolution, dbForge Studio for MySQL, DeZign for Databases, ConceptDraw, ER/Studio, Devgems Data Modeler, ERwin, MEGA International, Metastorm ProVision, OmniGraffle, Oracle Designer, PowerDesigner, Rational Rose, SmartDraw, Sparx Enterprise Architect, SQLyog, System Architect, Toad Data Modeler, SQL Maestro, Microsoft Visio, and Visual Paradigm.
 - Free software ER diagramming tools:
 - Can interpret and generate ER models, SQL and do database analysis: StarUML, **MySQL Workbench**, Mogwai, and Schema Spy, and Schema Crawler.
 - Just draw the shapes without having any knowledge of what they mean, nor do they generate SQL: Kivio and Dia.

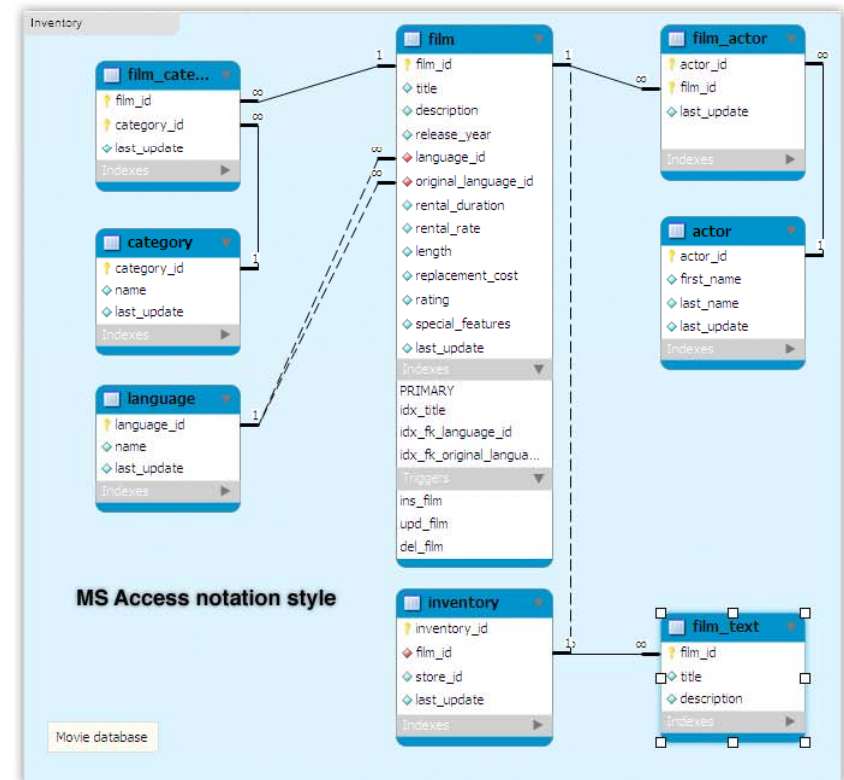
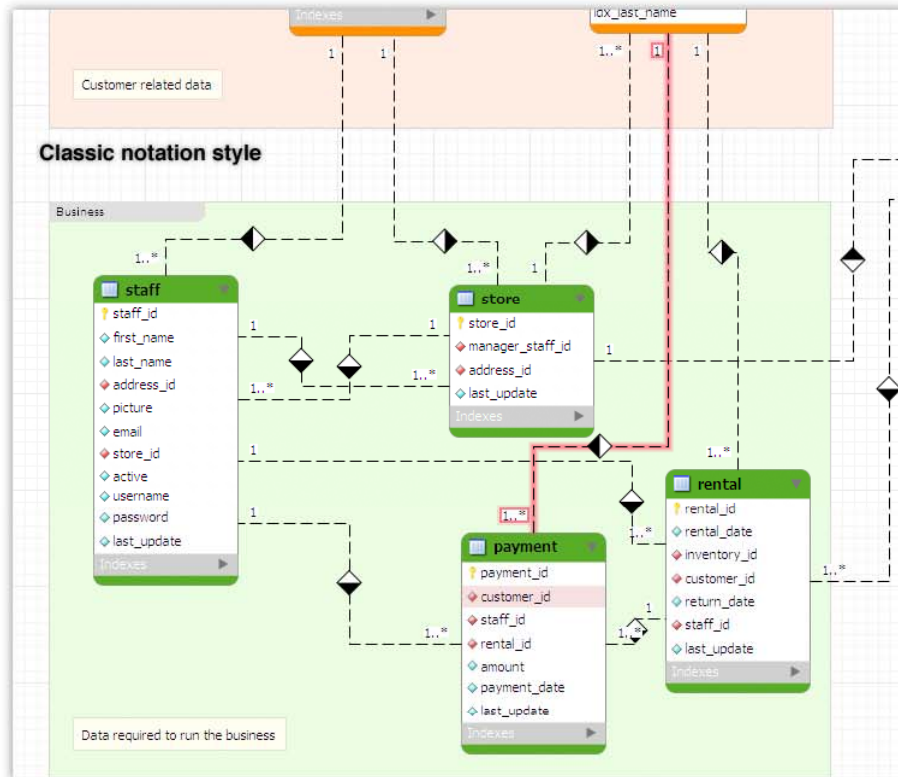
MySQL Workbench (cont.)



MySQL Workbench (cont.)



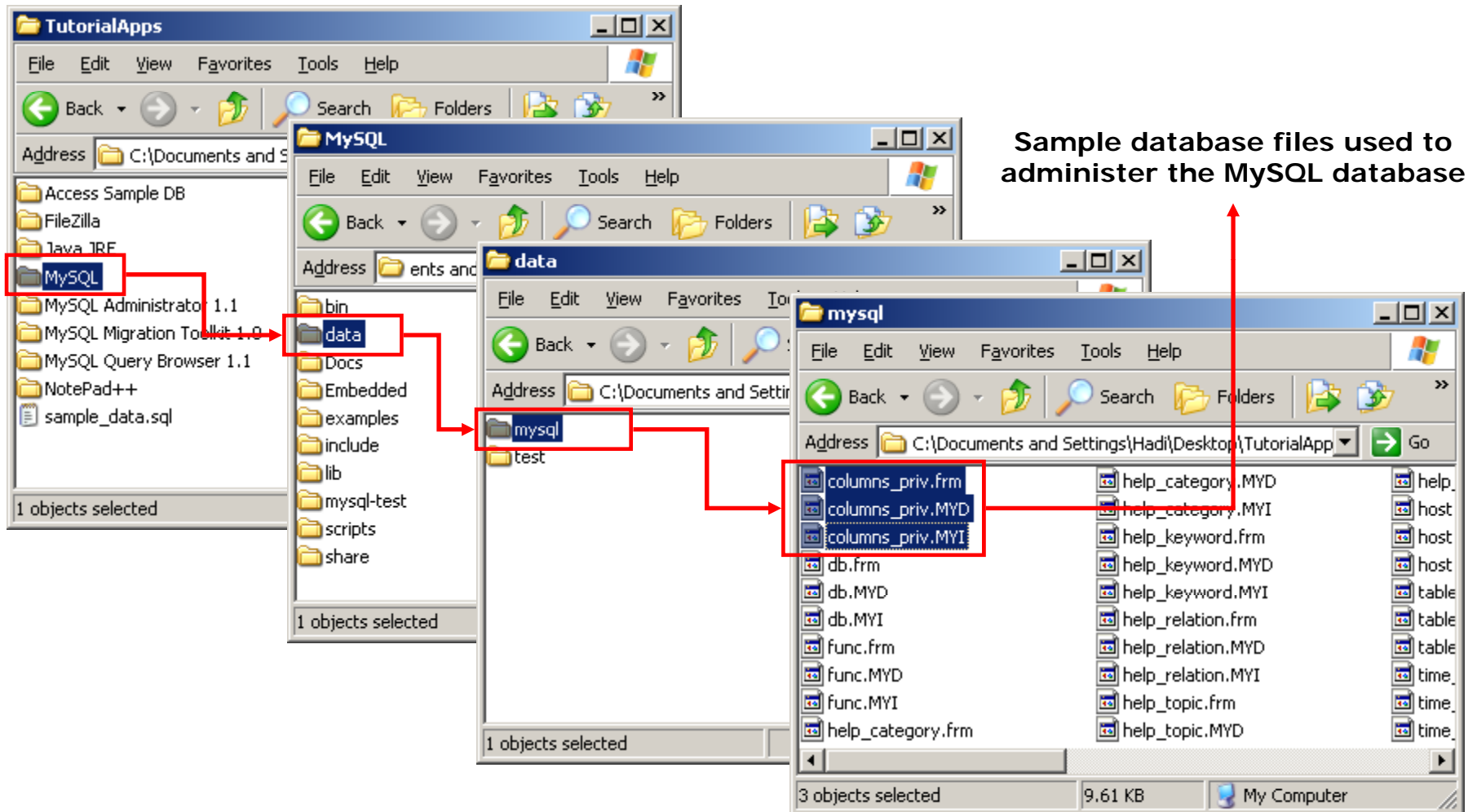
MySQL Workbench (cont.)



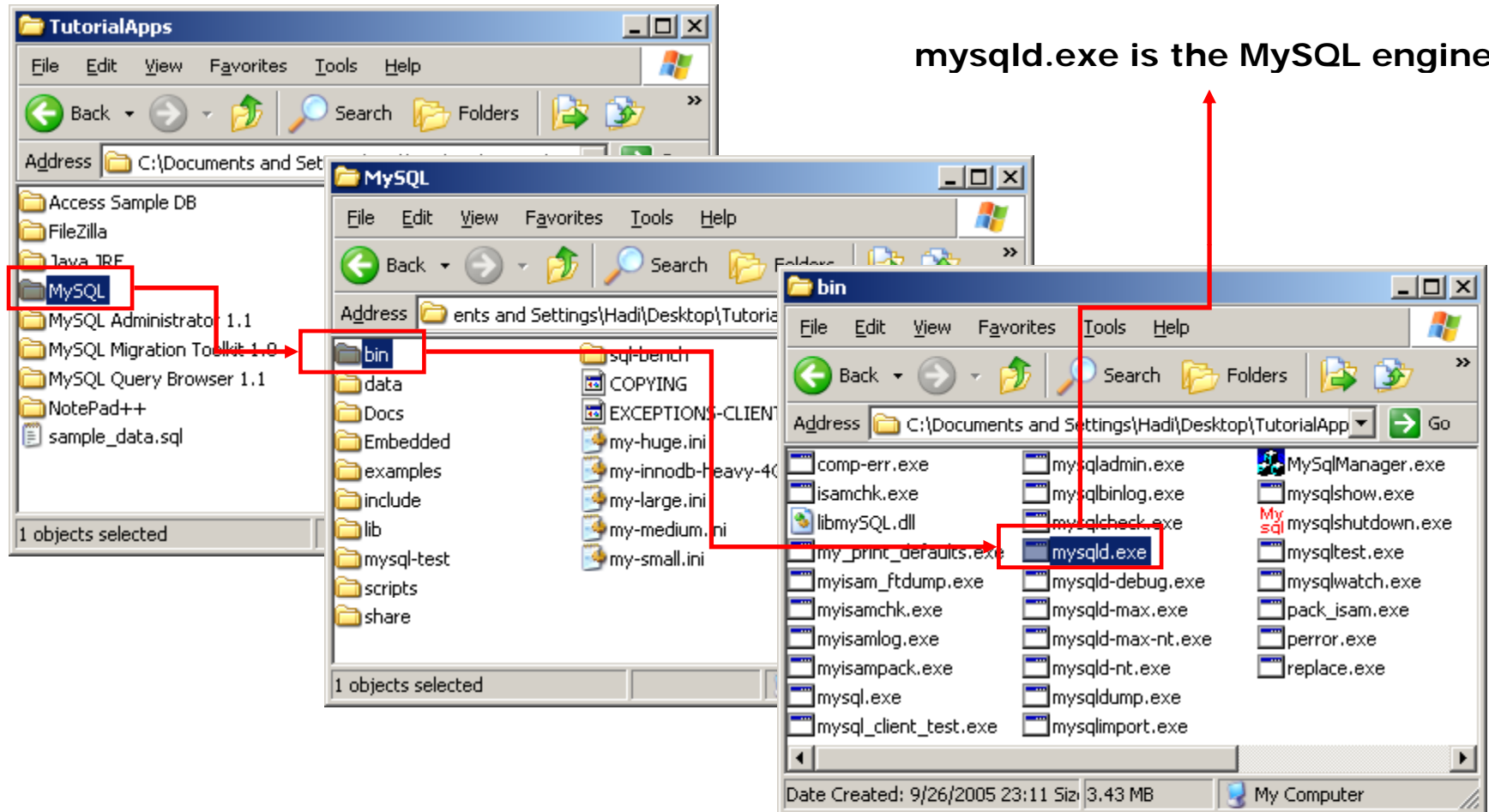
4. MySQL Installation

- MySQL server could be deployed under Windows operating system in 2 different ways:
 - **Installation**: which needs lots of configurations
 - **Unzip**: which does not need any special installation process and it is a turnkey solution. We will use this option in this tutorial.

MySQL Installation (cont.)



MySQL Installation (cont.)



MySQL Installation (cont.)

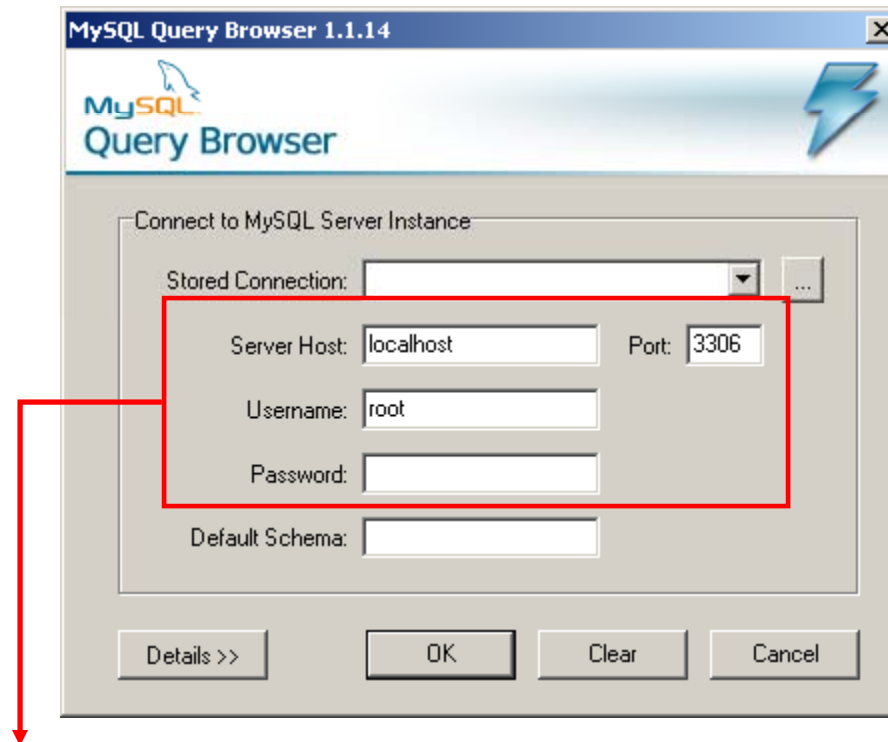
mysql.exe is running as a process (service) in the background listening to port 3306

You can turn off (shut down) the mysql.exe process by ending the process

Image Name	User Name	CPU	Mem Usage
ezSP_Px.exe	Hadi	00	1,988 K
firefox.exe	Hadi	00	3,308 K
FrameworkService.exe	SYSTEM	00	6,944 K
GhostStartService.exe	SYSTEM	00	2,020 K
GhostStartTrayApp.exe	Hadi	00	1,532 K
hkcmd.exe	Hadi	00	5,544 K
lsass.exe	SYSTEM	00	1,548 K
Mcshield.exe	SYSTEM	00	27,220 K
MpfAgent.exe	Hadi	00	3,012 K
MpfService.exe	SYSTEM	00	4,060 K
MpfTray.exe	Hadi	00	7,272 K
mysql.exe	Hadi	00	9,596 K
naPrdMgr.exe	SYSTEM	00	868 K
OUTLOOK.EXE	Hadi	00	7,948 K
PmProxy.exe	Hadi	00	1,036 K
POWERPNT.EXE	Hadi	00	1,788 K
qttask.exe	Hadi	00	1,688 K
services.exe	SYSTEM	00	4,404 K
shstat.exe	Hadi	00	444 K

Processes: 49 CPU Usage: 1% Commit Charge: 332M / 1157M

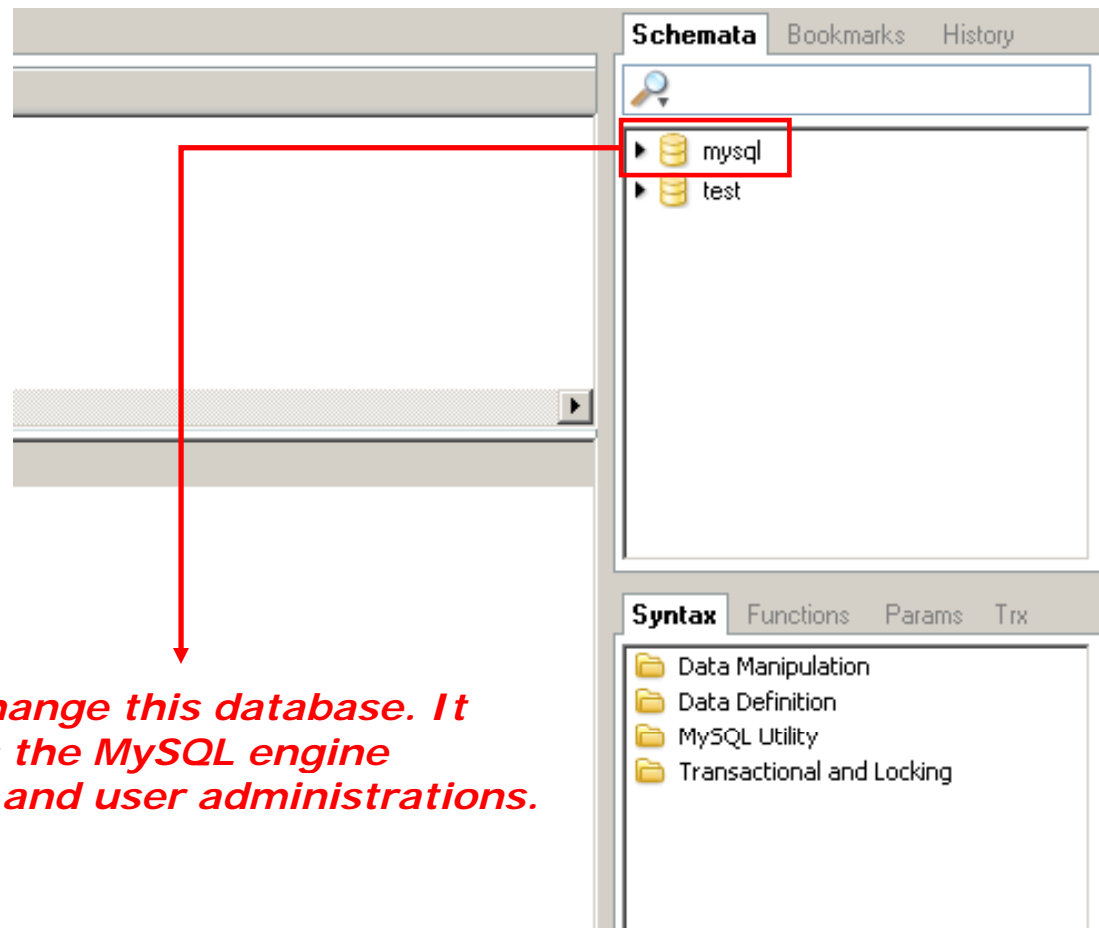
MySQL Installation (cont.)



localhost means the local server because `mysqld.exe` is running on your local machine and you are trying to connect to local machine not the CS server (only in this tutorial).

Default User: root / Default Pass: Leave Blank

MySQL Installation (cont.)



Never change this database. It contains the MySQL engine settings and user administrations.

MySQL Installation (cont.)

The image shows a sequence of three screenshots from MySQL Workbench illustrating the process of creating a new database:

- Top Screenshot:** The SQL Query Area contains the command `create database your_name;`. A red box highlights this command, with a red arrow pointing down to the text below.
- Middle Screenshot:** The Schemata pane shows the 'mysql' and 'test' databases. A context menu is open over the 'mysql' database, with the 'Refresh' option highlighted by a red box. A red arrow points from the 'Refresh' box to the 'your_name' database in the next screenshot.
- Bottom Screenshot:** The Schemata pane now shows the 'mysql', 'test', and 'your_name' databases. A red box highlights the 'your_name' database, with a red arrow pointing up from the 'Refresh' box in the middle screenshot.

As the root admin you have the privileges to create new databases

MySQL Installation (cont.)

Restore the sample database in the new database

MySQL Query Browser - root@localhost:3306 / your_name

File Edit View Query Script Tools Window Help

Script 1 x

```

1 #####
2 #
3 # Dalhousie University
4 # HINF 6220 - Tutorials
5 # Ceated by: Hadi Kharrazi
6 # Email: kharrazi@dal.ca
7 #
8 # This is a useful sample database
9 # which could help you doing your
10 # course project.
11 #
12 # In order to restore this tables in
13 # your database (MYSQL) please change
14 # 'your_database_name' in the first
15 # line to your database name.
16 #
17 #####
18
19
20 • USE `your_name`;
21
22 • DROP TABLE IF EXISTS admin_info;
23 • DROP TABLE IF EXISTS city_info;
24 • DROP TABLE IF EXISTS client_info;
25 • DROP TABLE IF EXISTS doc_info;
26 • DROP TABLE IF EXISTS kin_info;
27 • DROP TABLE IF EXISTS lab_info;
28 • DROP TABLE IF EXISTS pat_doc_relate;
29 • DROP TABLE IF EXISTS pat_info;
30 • DROP TABLE IF EXISTS phone_info;
31
32 • CREATE TABLE `admin_info` (
33   `admin_id` int(4) unsigned not null auto_increment primary key,
34   `name` varchar(20) not null,
35   `password` varchar(20) not null,
36   `email` varchar(20) not null,
37   `phone` varchar(20) not null,
38   `city` varchar(20) not null,
39   `client` varchar(20) not null,
40   `doc` varchar(20) not null,
41   `kin` varchar(20) not null,
42   `lab` varchar(20) not null,
43   `pat_doc_relate` varchar(20) not null,
44   `pat` varchar(20) not null,
45   `phone` varchar(20) not null,
46 )
47
48 #####
49
50 #####
51 #####
52 #####
53 #####
54 #####
55 #####
56 #####
57 #####
58 #####
59 #####
60: 49

```

Schemata

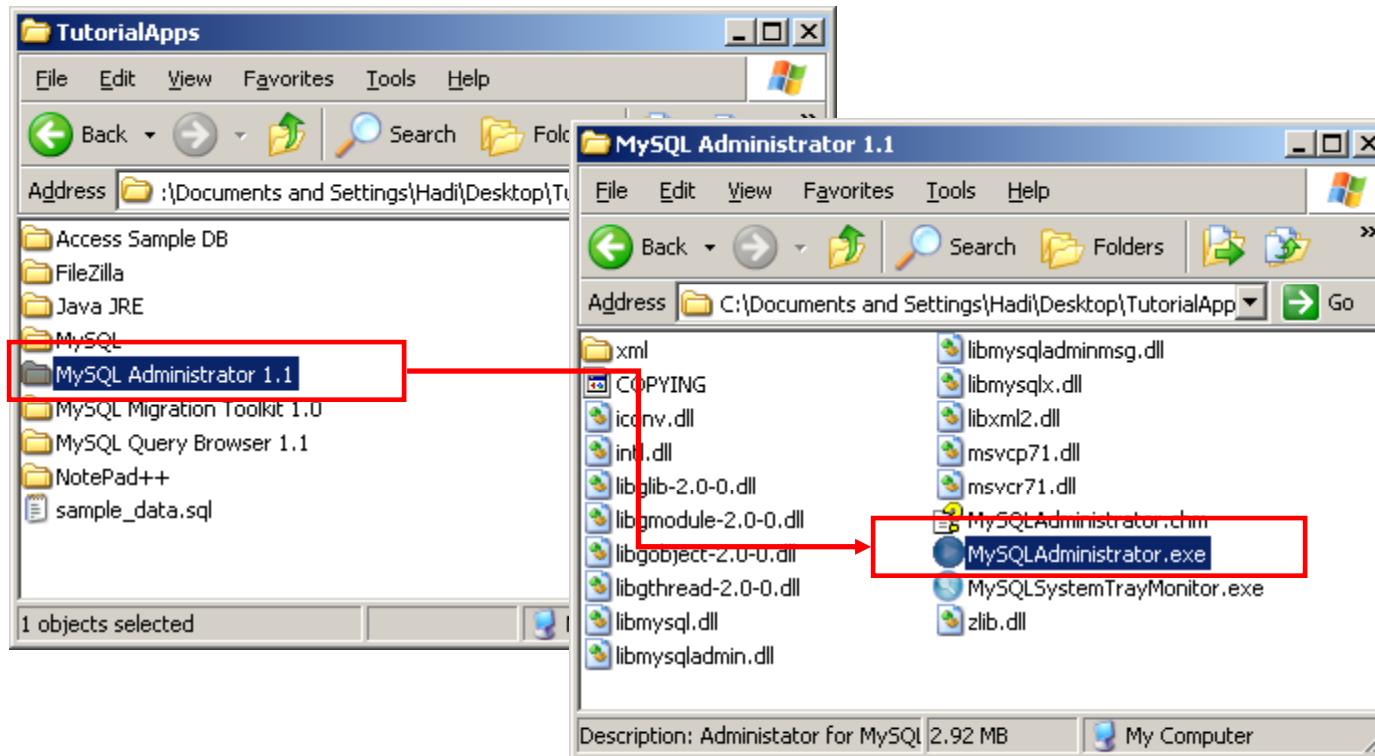
- mysql
- test
- your_name**
 - admin_info
 - city_info
 - client_info
 - doc_info
 - kin_info
 - lab_info
 - pat_doc_relate
 - nat_info

Syntax

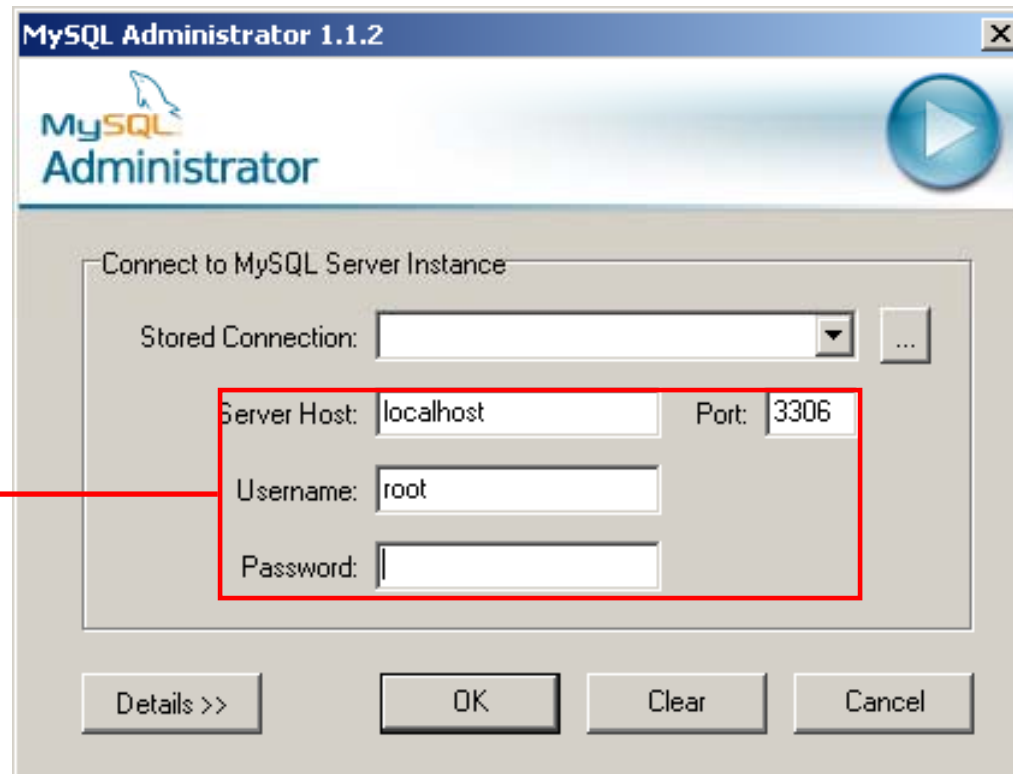
- Data Manipulation
- Data Definition
- MySQL Utility
- Transactional and Locking

5. MySQL Administration Tool

- Basically MySQL administration is based on command line scripts but the **MySQL Administrator Tool** would help us to do the same administrative tasks through an UI.



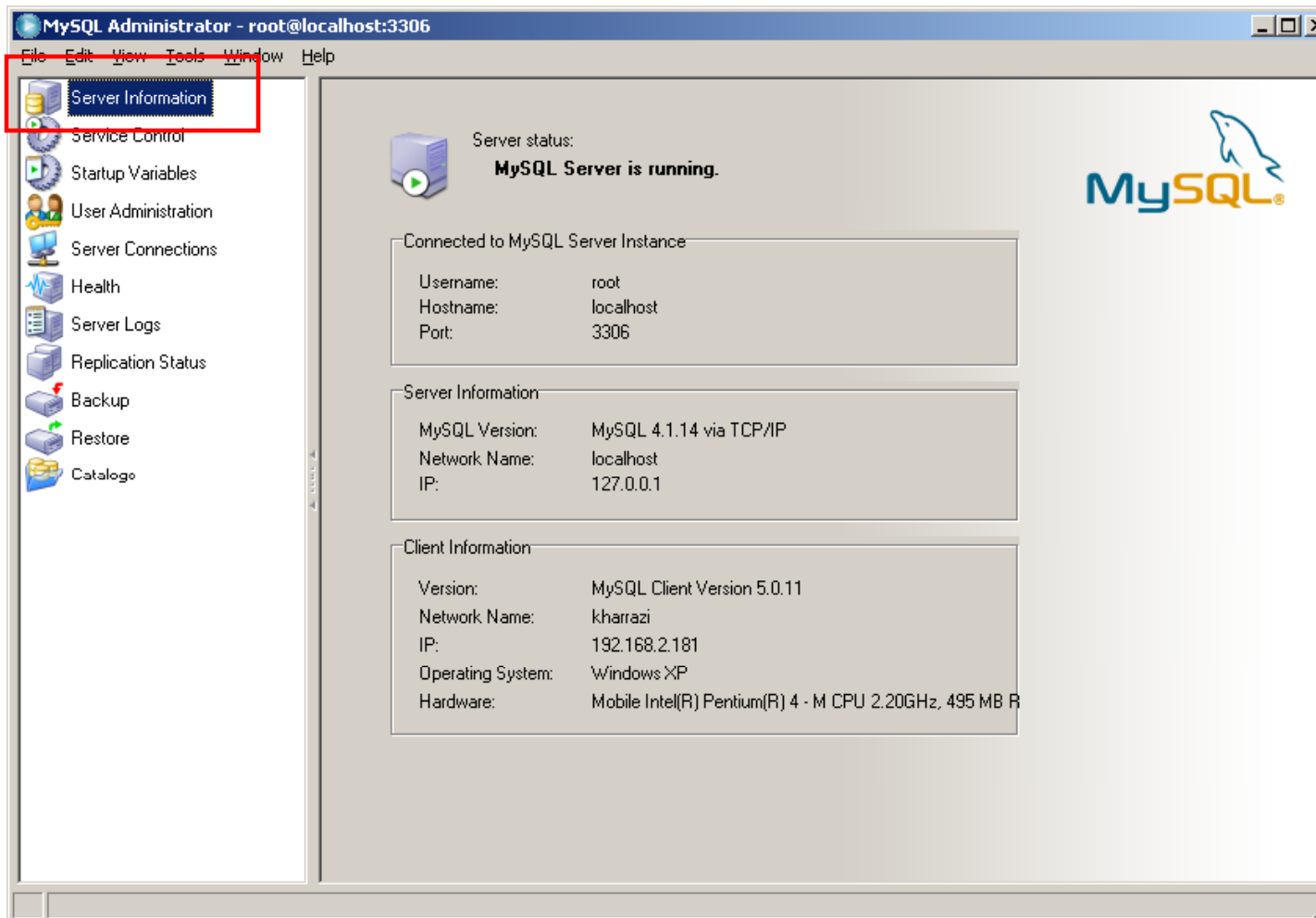
MySQL Administration (cont.)



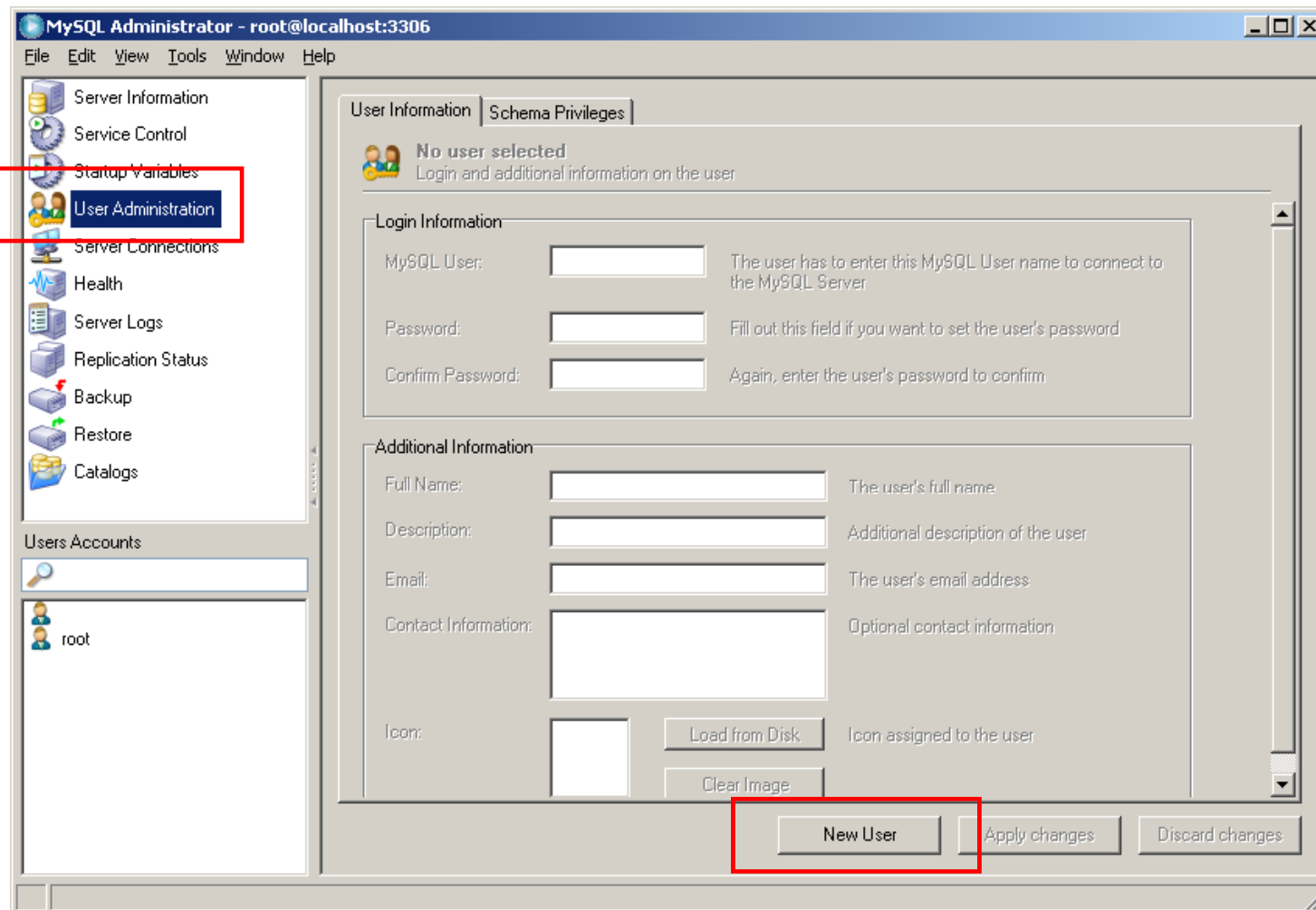
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Default User: root / Default Pass: Leave Blank

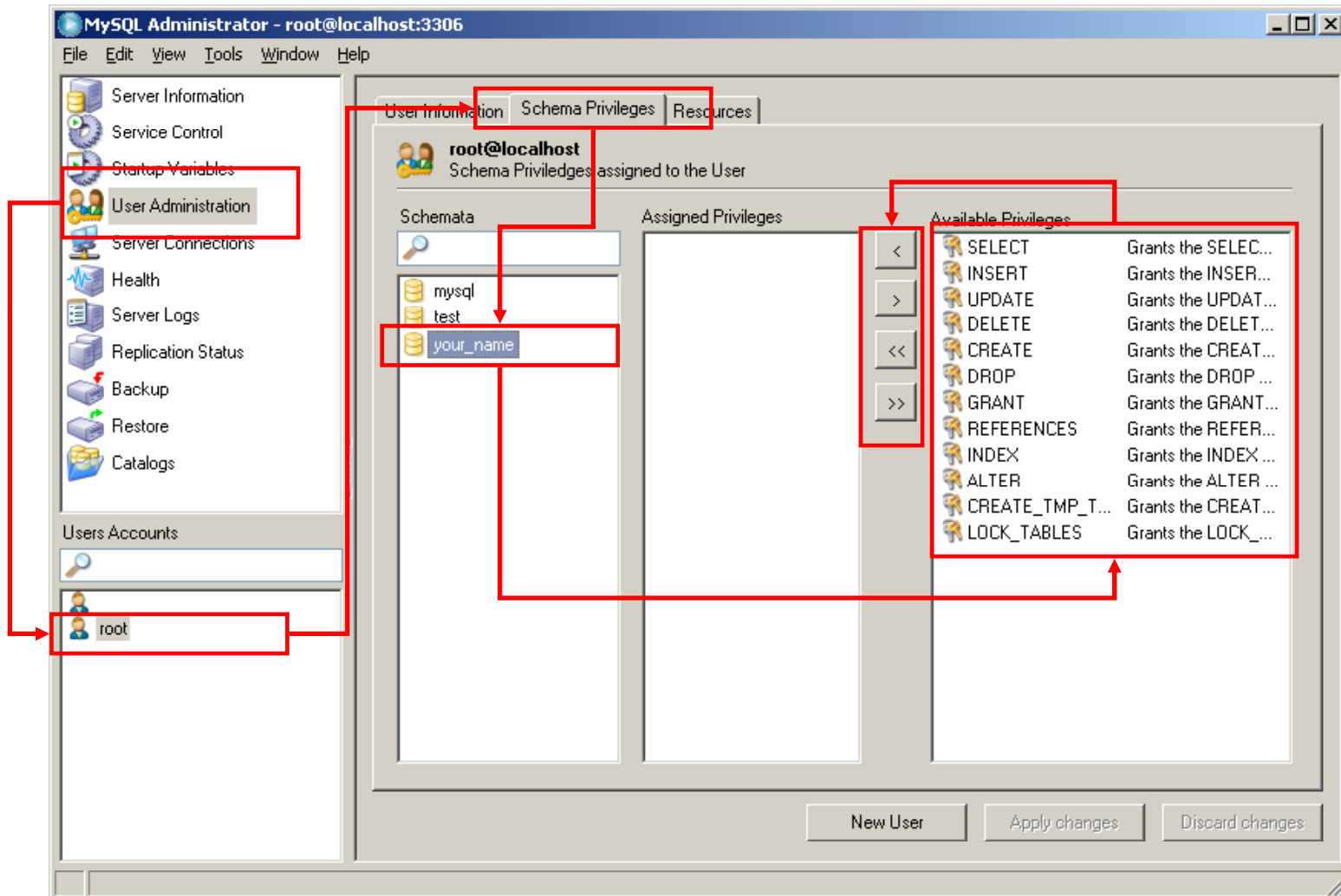
MySQL Administration (cont.)



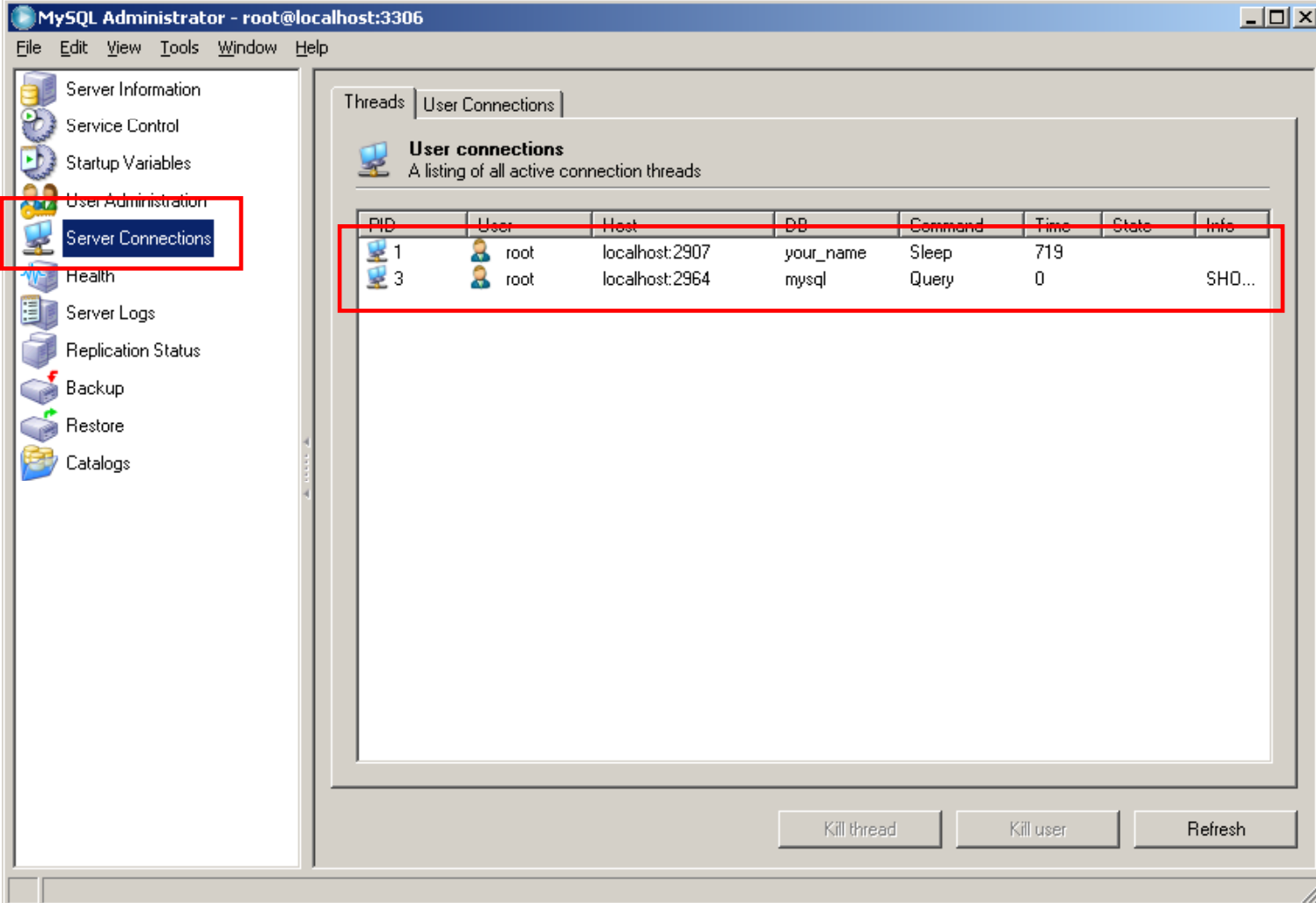
MySQL Administration (cont.)



MySQL Administration (cont.)



MySQL Administration (cont.)



The screenshot shows the MySQL Administrator interface. The left sidebar contains various management options, with 'User Administration' and 'Server Connections' highlighted by a red box. The main window displays the 'User Connections' tab, which shows a table of active connection threads. A red box highlights the table content.

User connections
A listing of all active connection threads

PID	User	Host	DB	Command	Time	State	Info
1	root	localhost:2907	your_name	Sleep	719		
3	root	localhost:2964	mysql	Query	0		SHO...

Buttons at the bottom: Kill thread, Kill user, Refresh

MySQL Administration (cont.)

The screenshot displays the MySQL Administrator interface for a server at localhost:3306. The left sidebar contains a tree view of administration tasks, with 'Health' highlighted in a red box. The main window shows the 'Connection Health' tab, which provides a summary of client connection information. A red box highlights the 'Connection Usage', 'Traffic', and 'Number of SQL Queries' sections.

Connection Health
Client connection information.

Connection Usage

Usage 3%	Current: 3	Min: 0	Max: 3	Avg:
----------	------------	--------	--------	------

Traffic

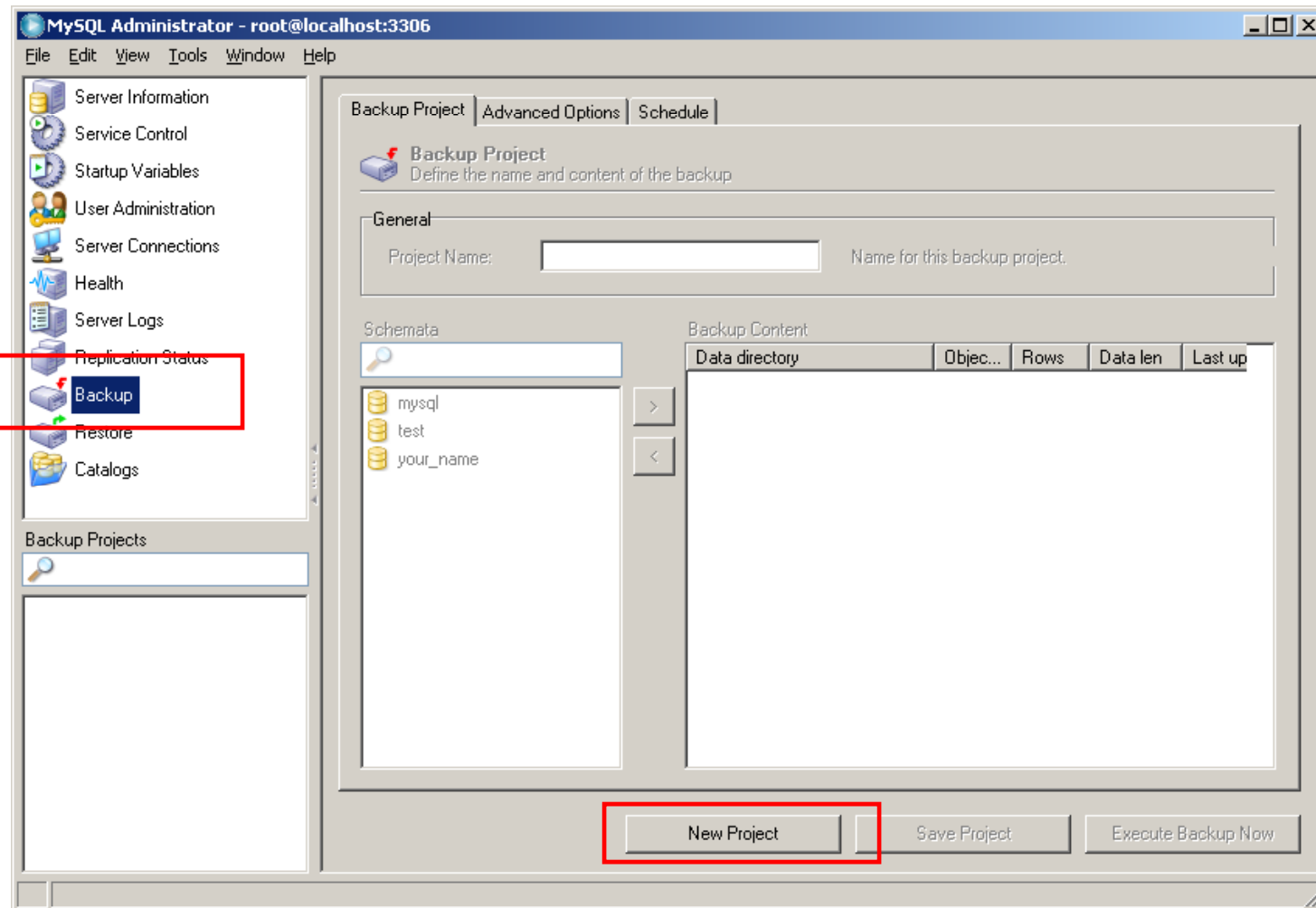
6.3 kB	Current: 6,429	Min: 0	Max: 6,429	Avg:
--------	----------------	--------	------------	------

Number of SQL Queries

0	Current: 0	Min: 0	Max: 0	Avg:
---	------------	--------	--------	------

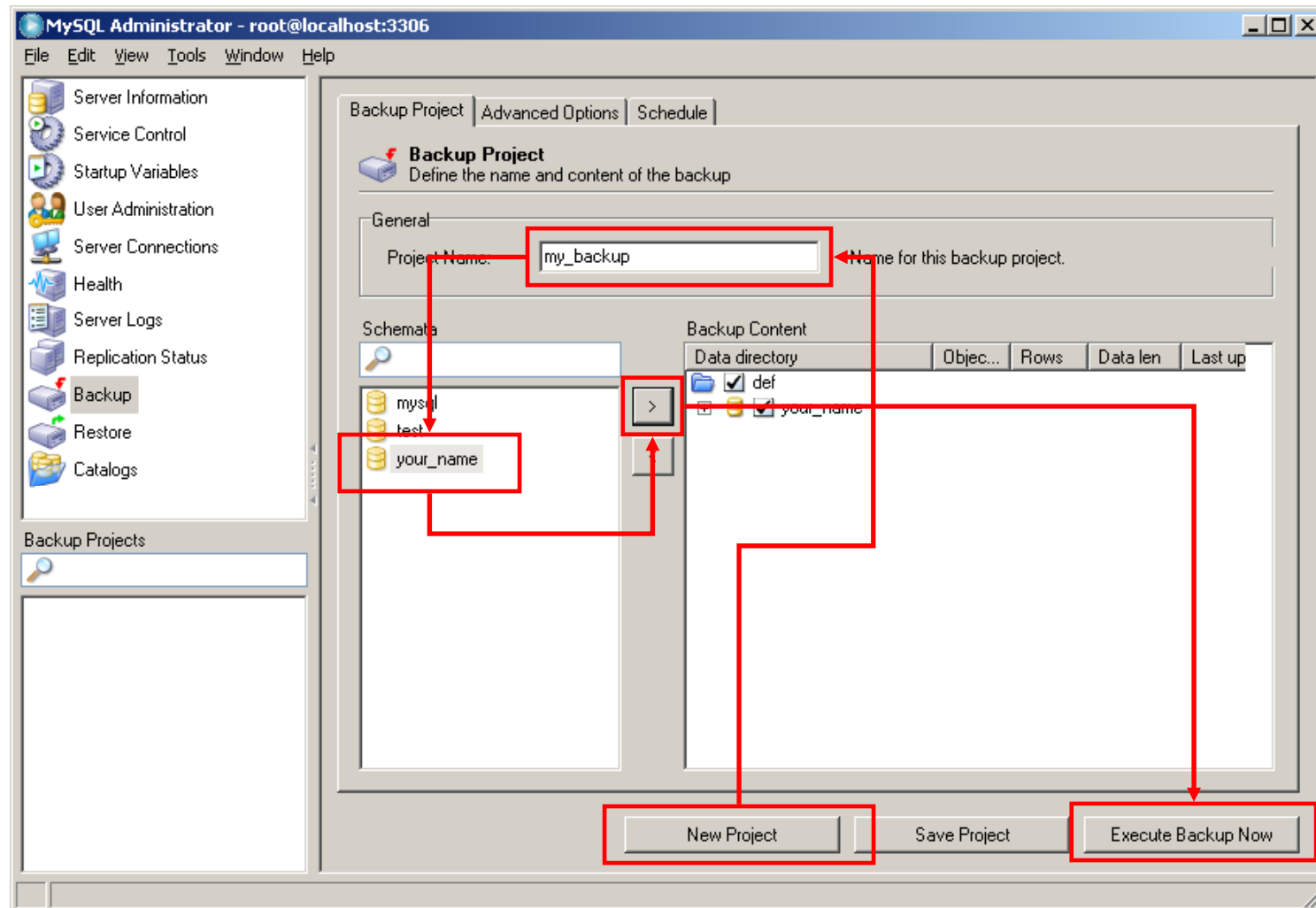
MySQL Administration (cont.)

Dumping MySQL



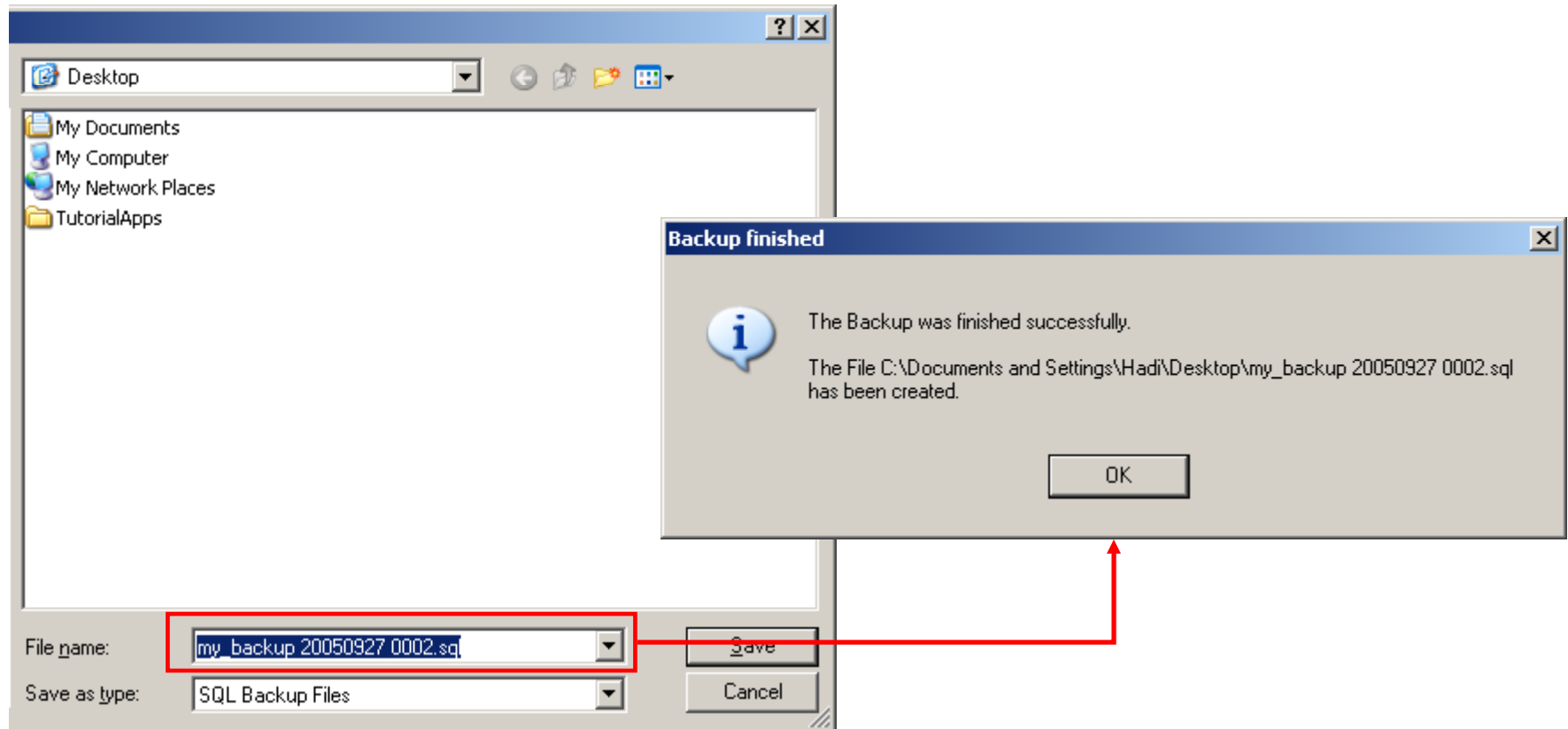
MySQL Administration (cont.)

Dumping MySQL



MySQL Administration (cont.)

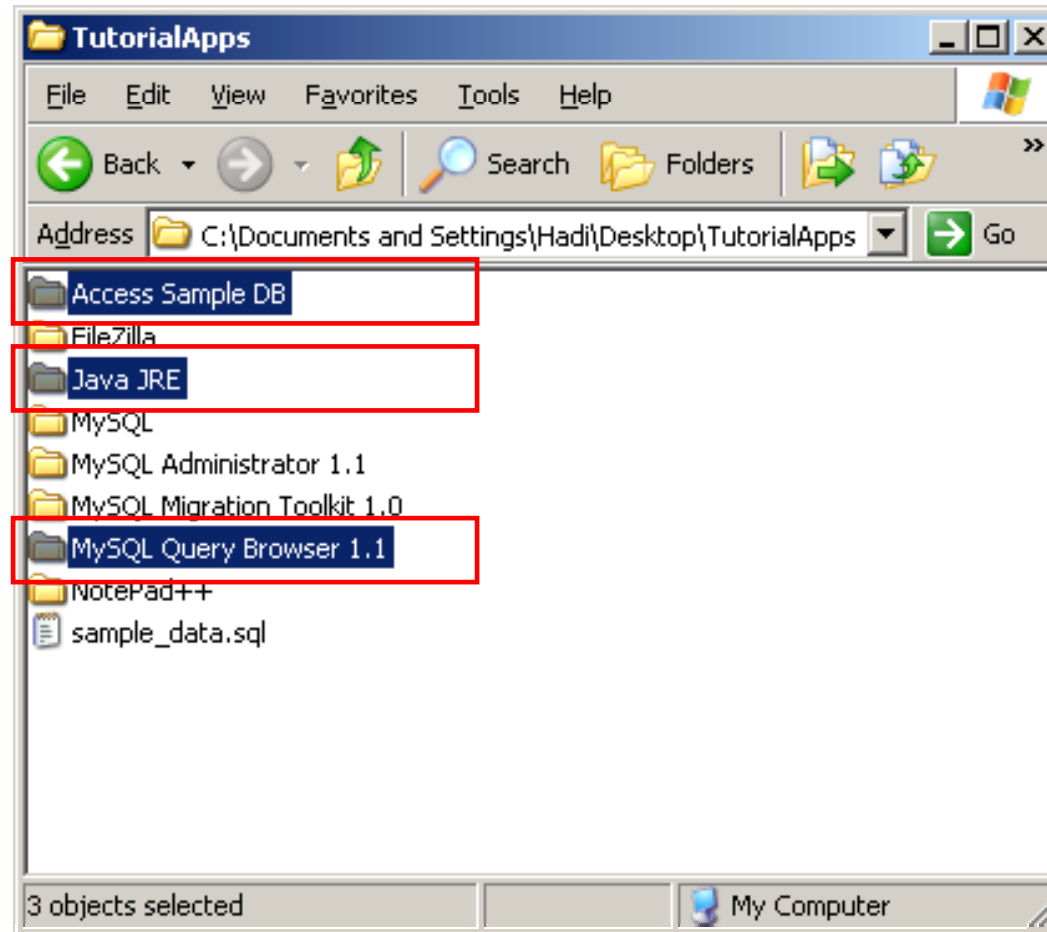
Dumping MySQL



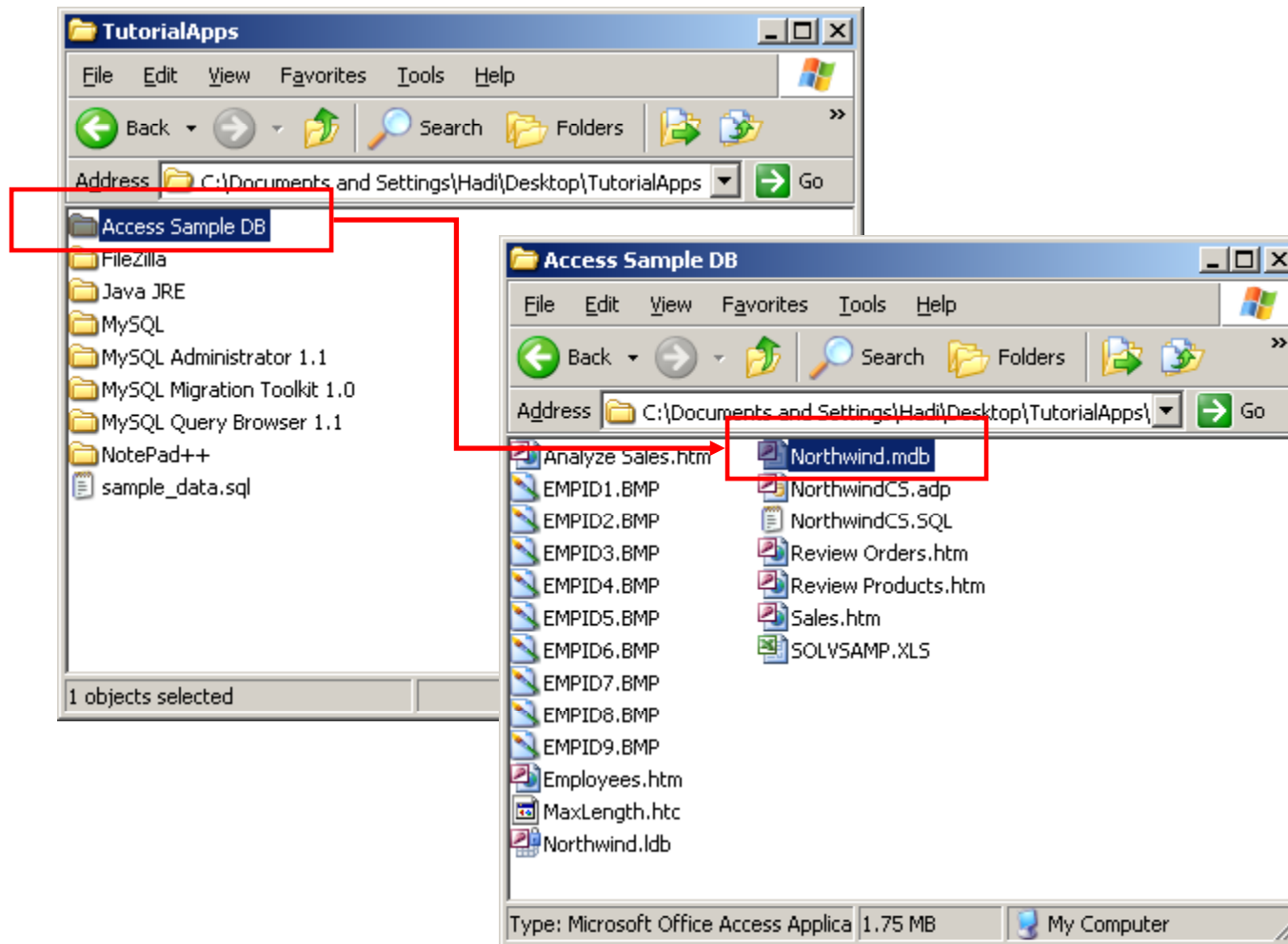
6. MySQL Migration Tool

- Migrating (transferring) data between different databases is a hard work and usually takes a lot of time. **MySQL Migration Tool** would help you to do the migration automatically from various database engines to MySQL.
- In order to work with MySQL Migration Tool, **JRE (JAVA Runtime Environment)** should be installed on your PC. Your PCs in the CS lab probably have the JRE installed already.
- We also need an Microsoft Access database to show the conversion (migration) from **Access database (.mdb)** to MySQL database format.

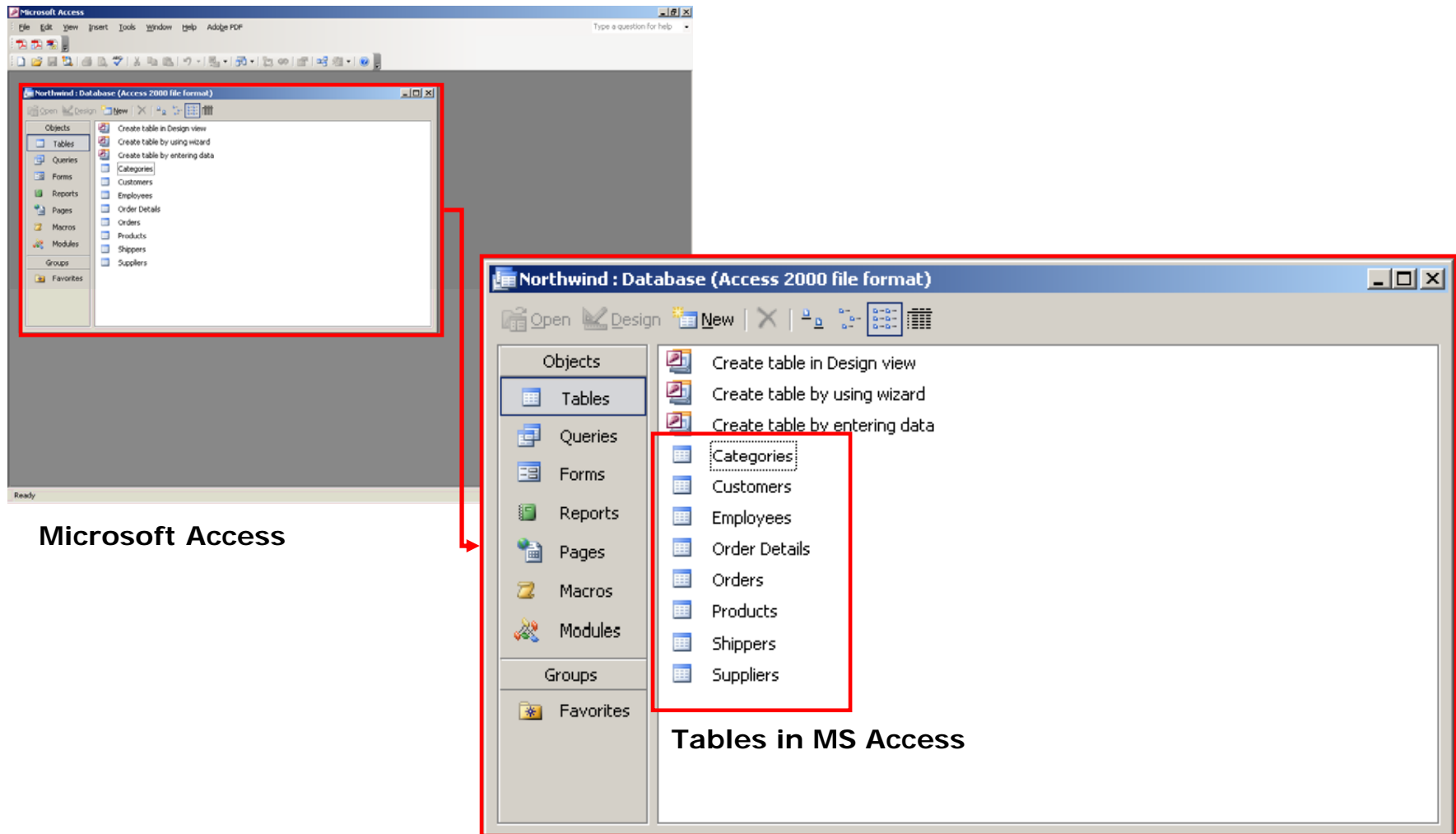
MySQL Migration Tool (cont.)



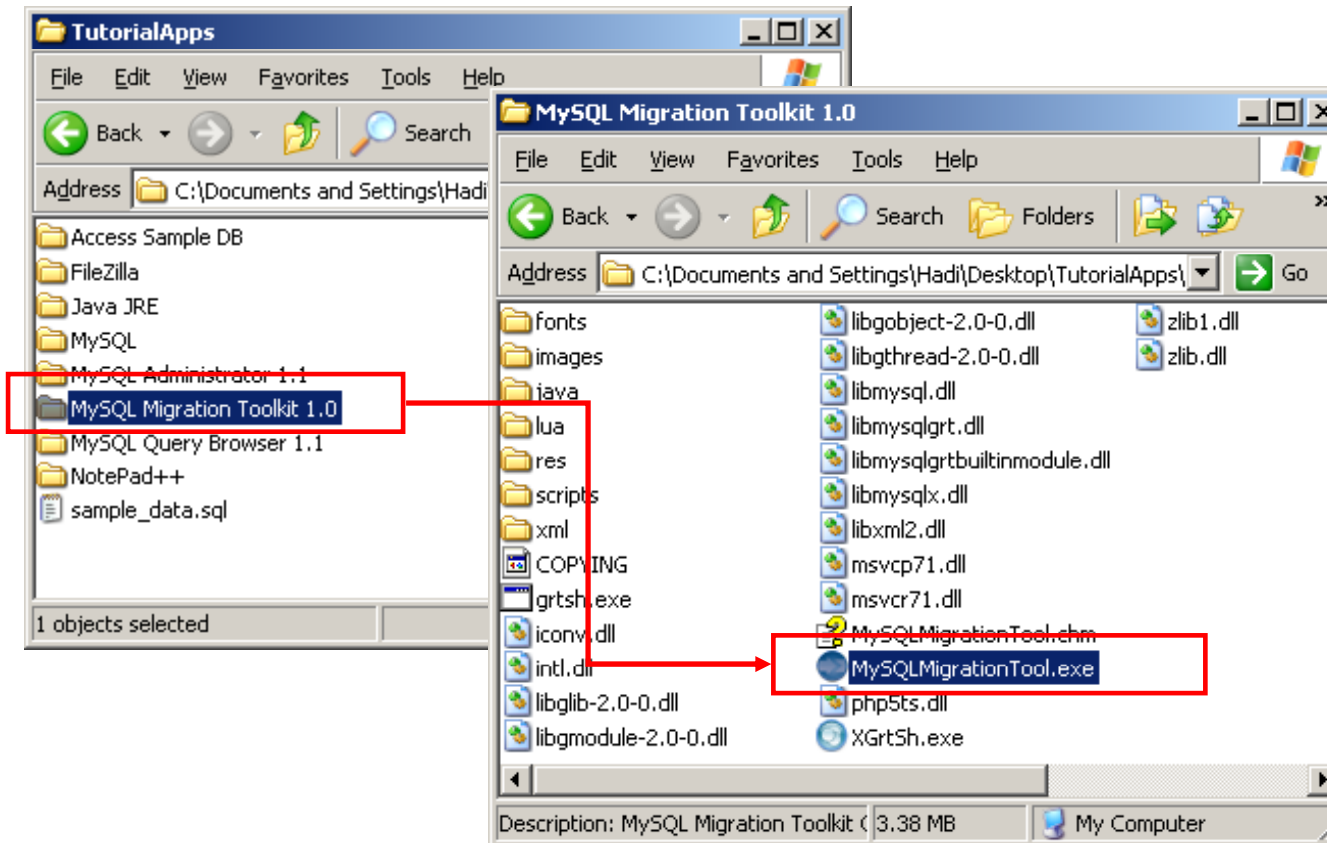
MySQL Migration Tool (cont.)



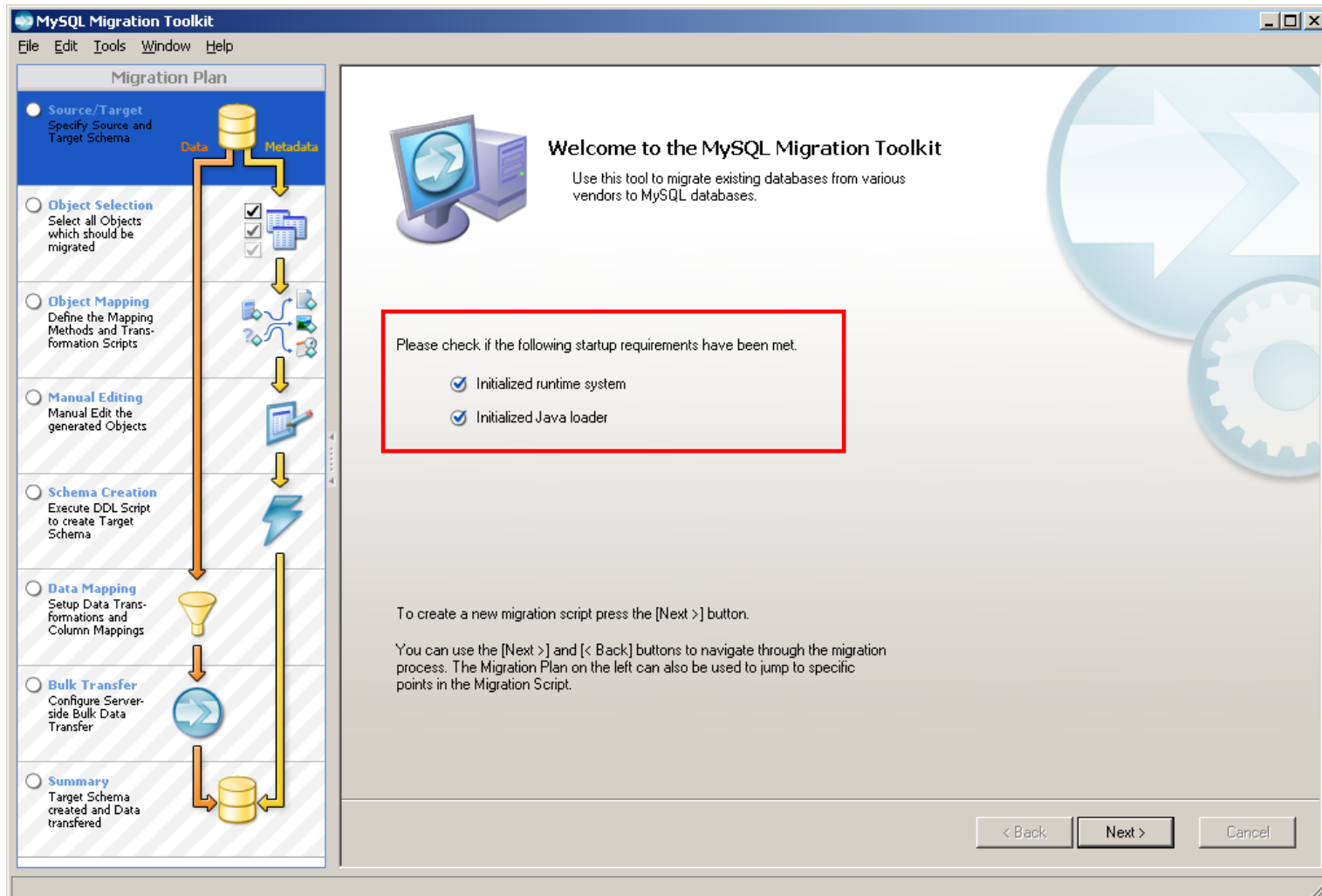
MySQL Migration Tool (cont.)



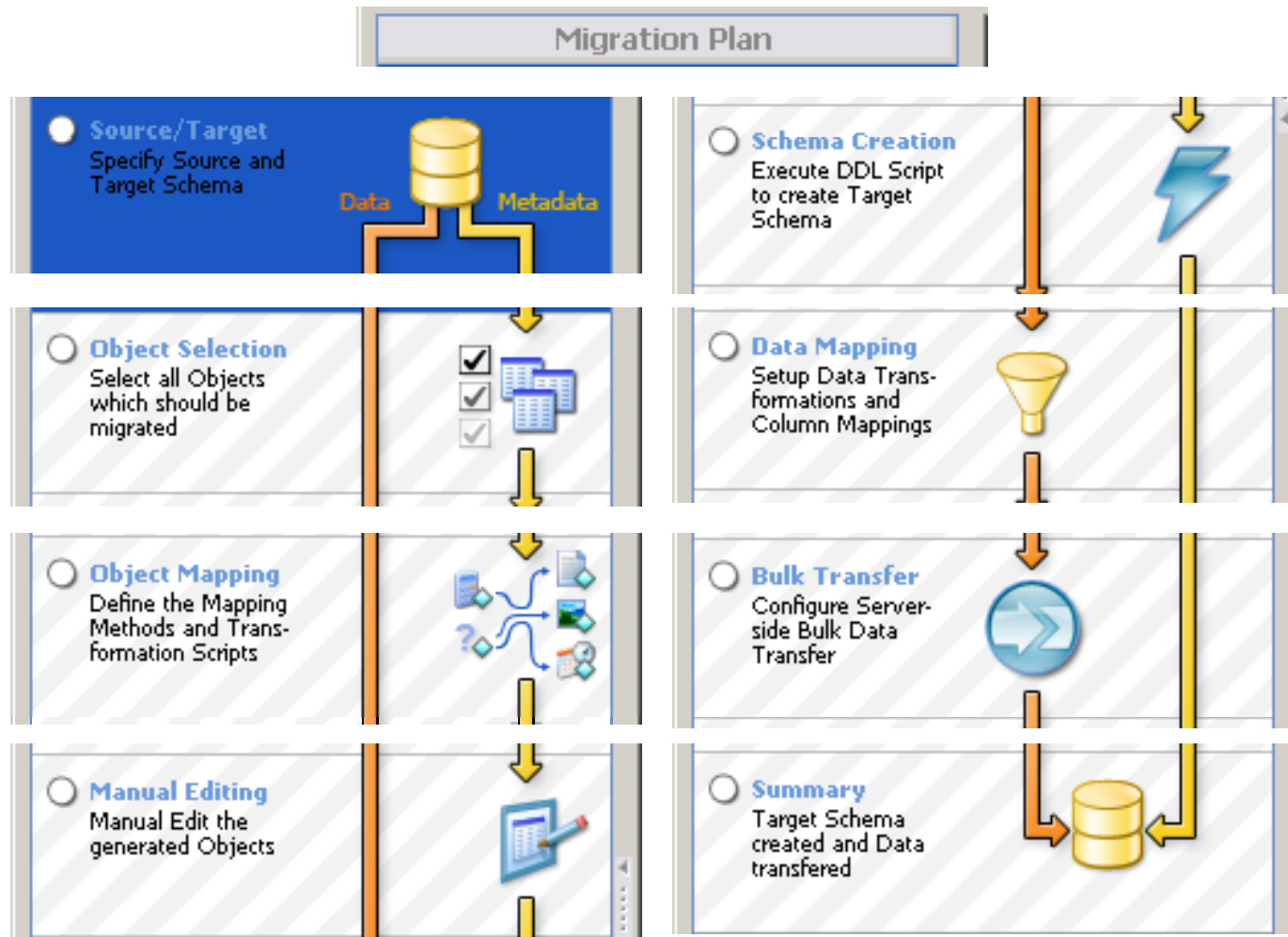
MySQL Migration Tool (cont.)



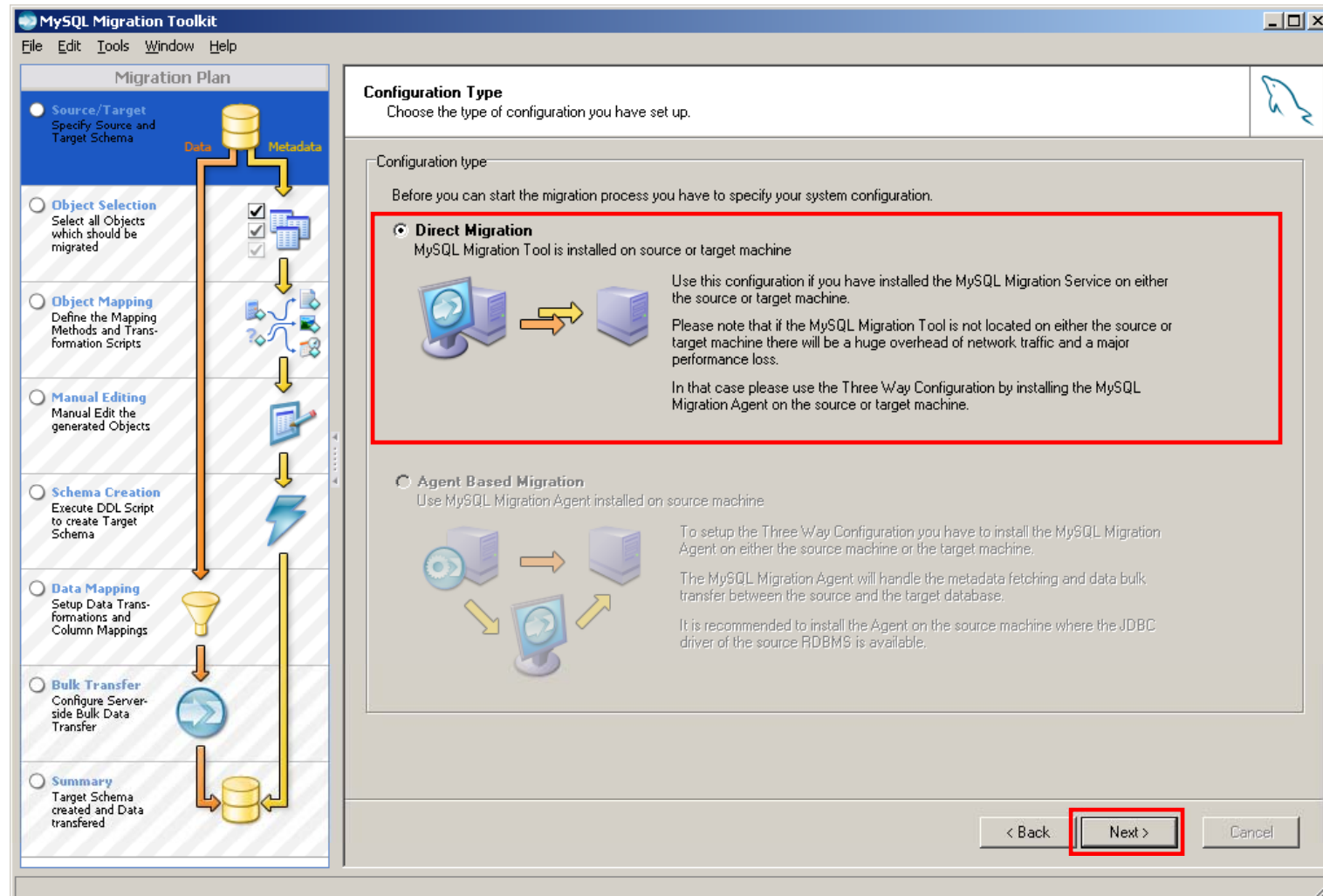
MySQL Migration Tool (cont.)



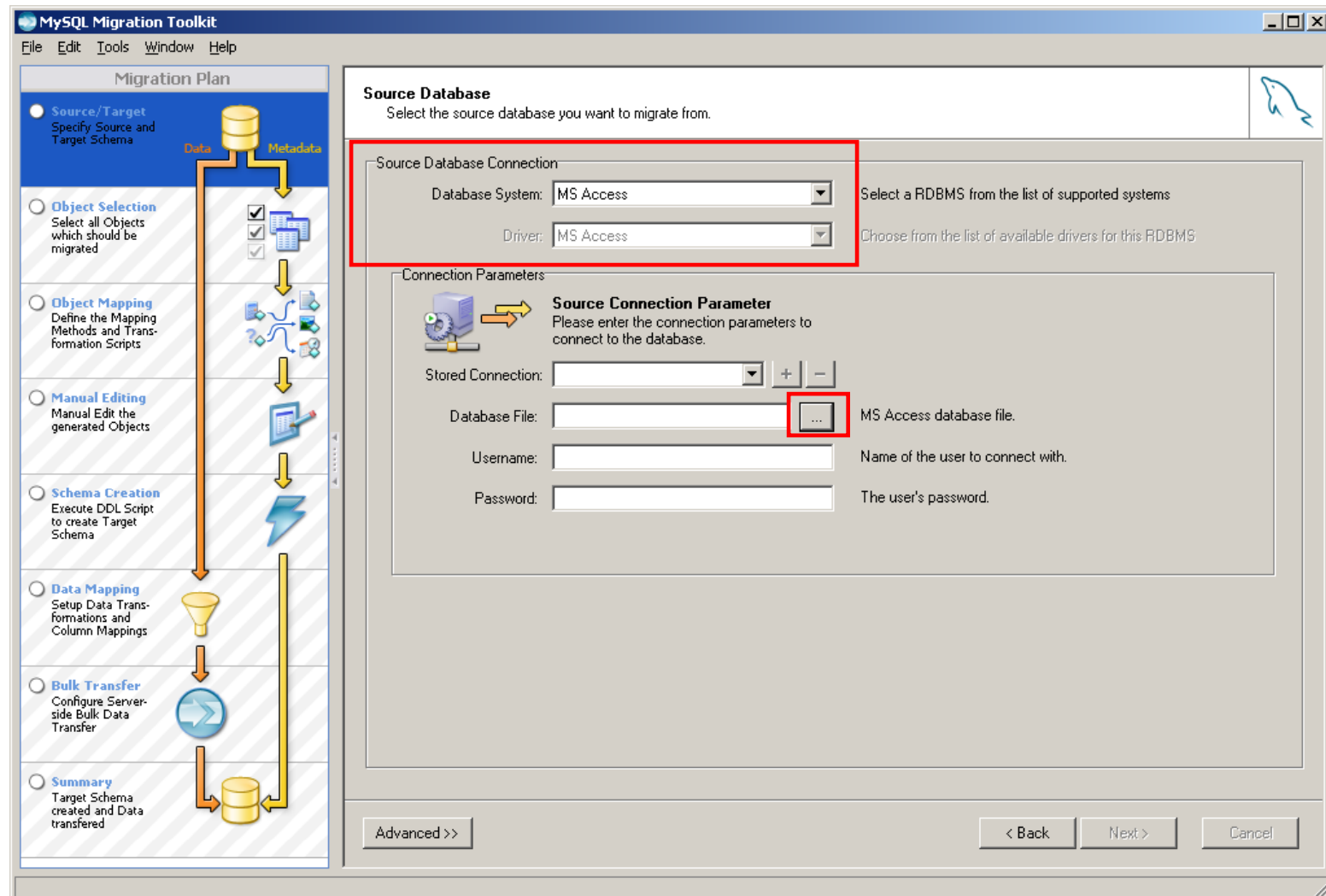
MySQL Migration Tool (cont.)



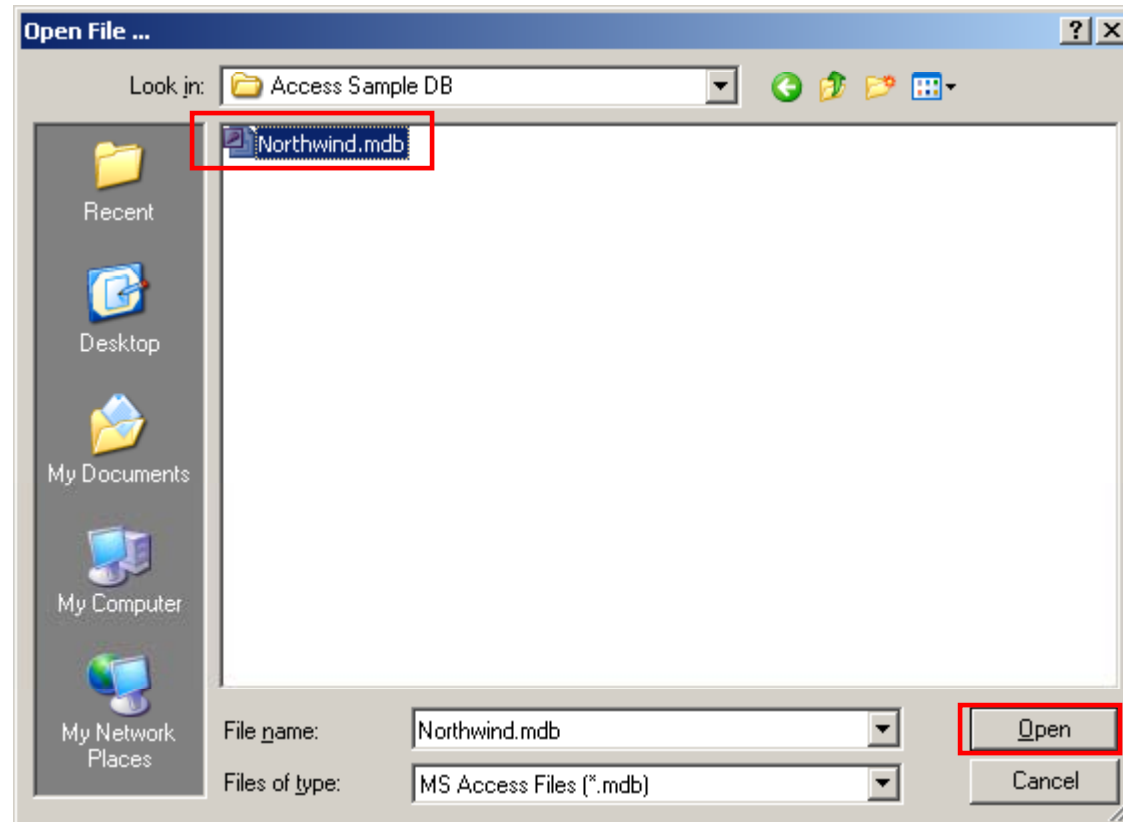
MySQL Migration Tool (cont.)



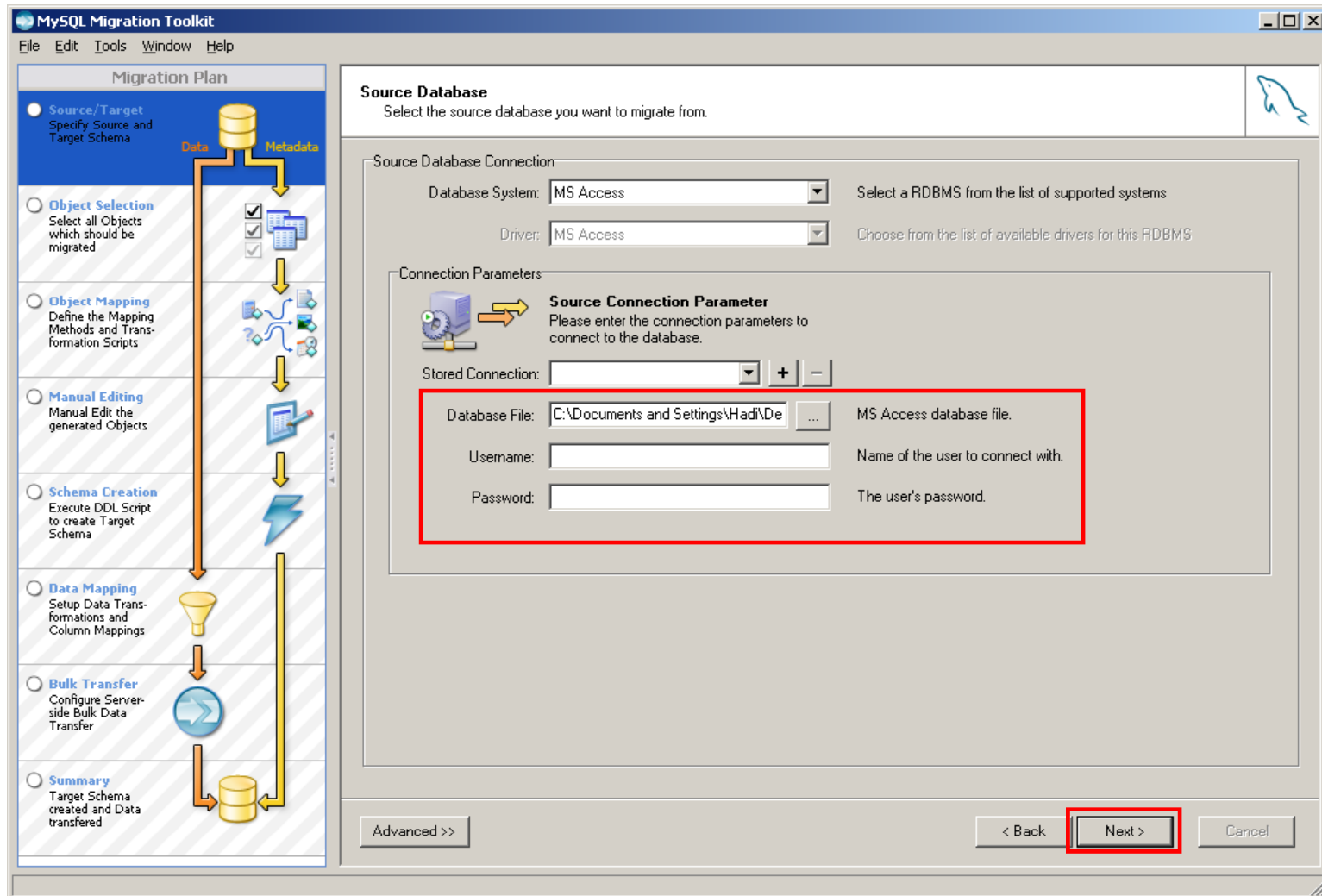
MySQL Migration Tool (cont.)



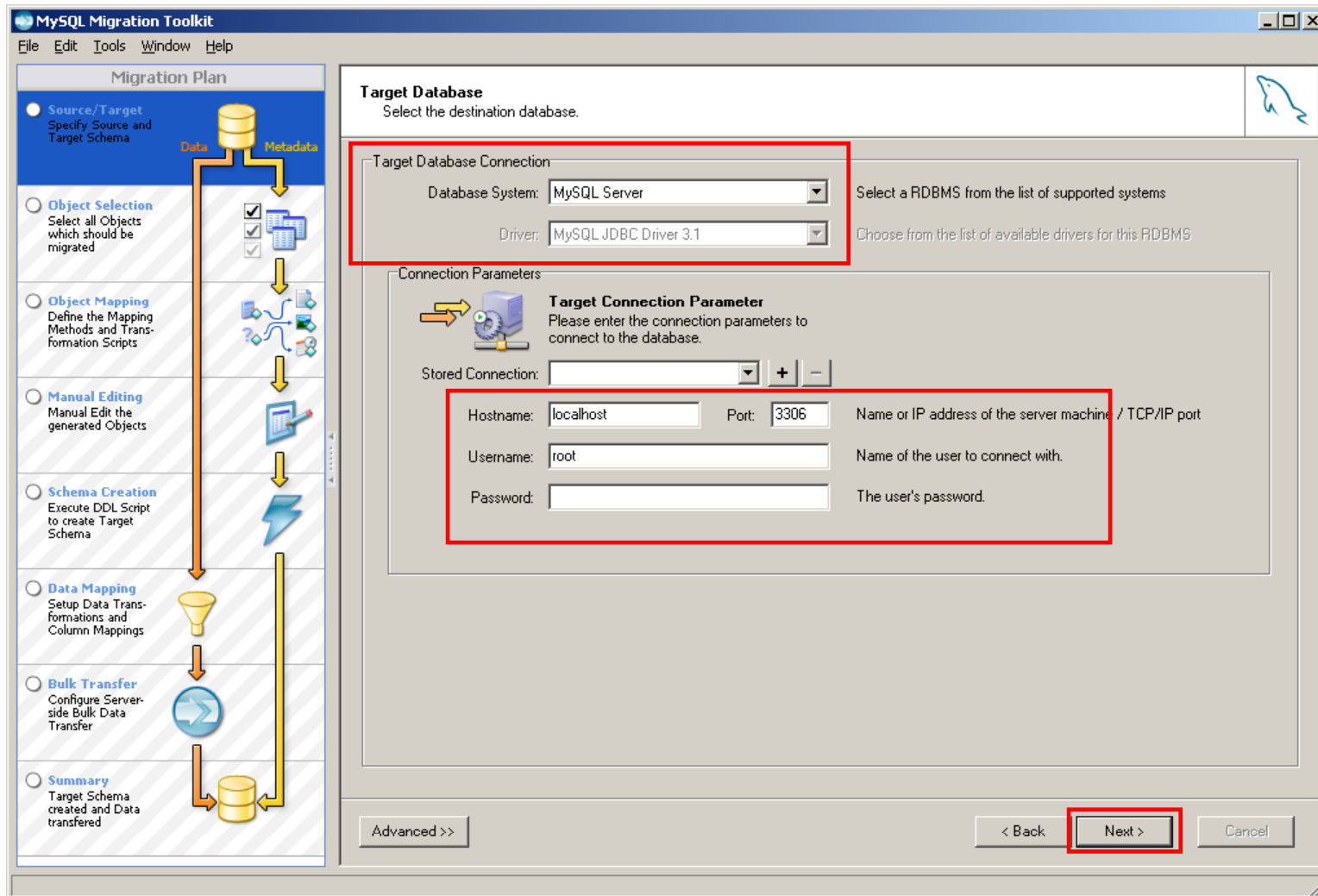
MySQL Migration Tool (cont.)



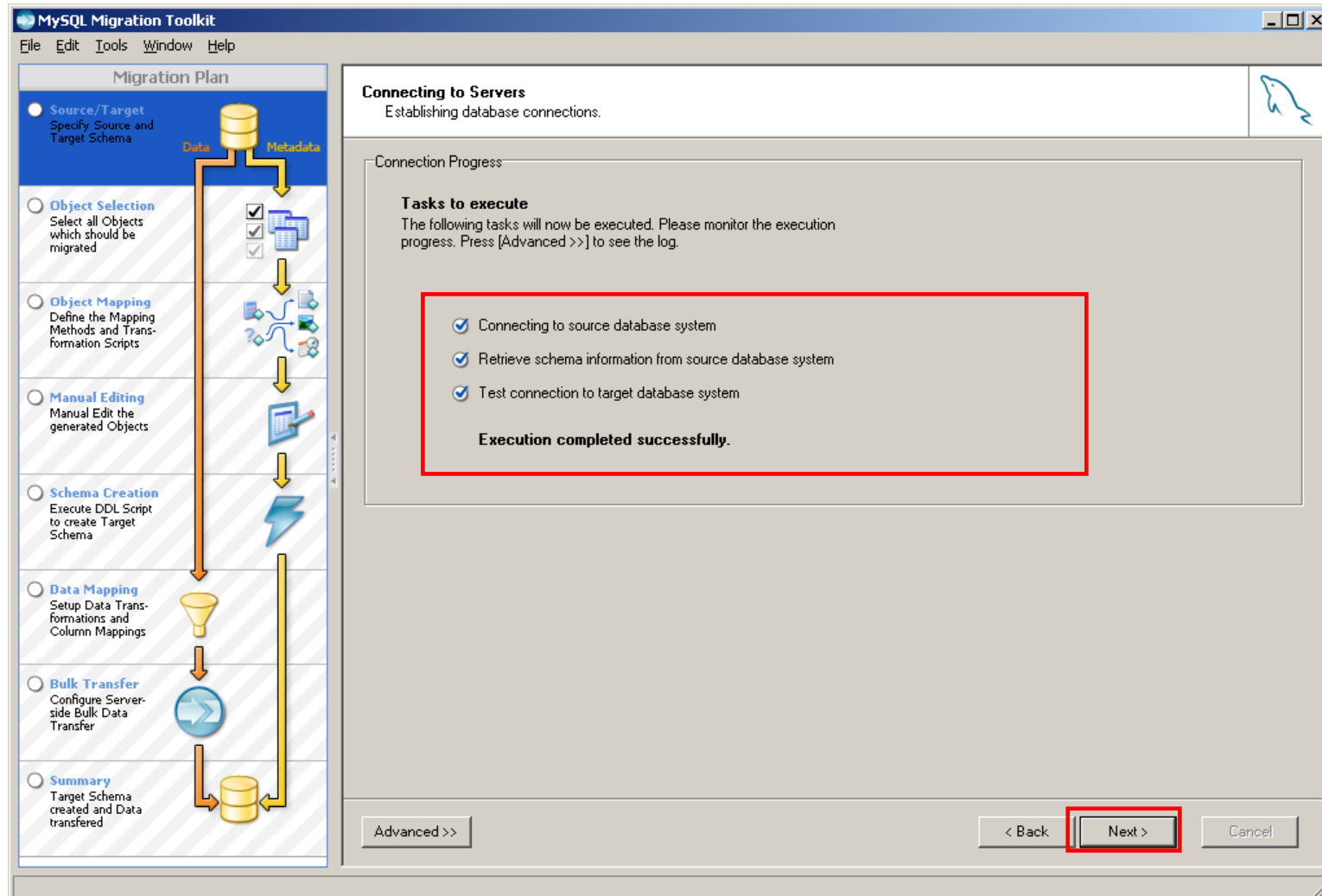
MySQL Migration Tool (cont.)



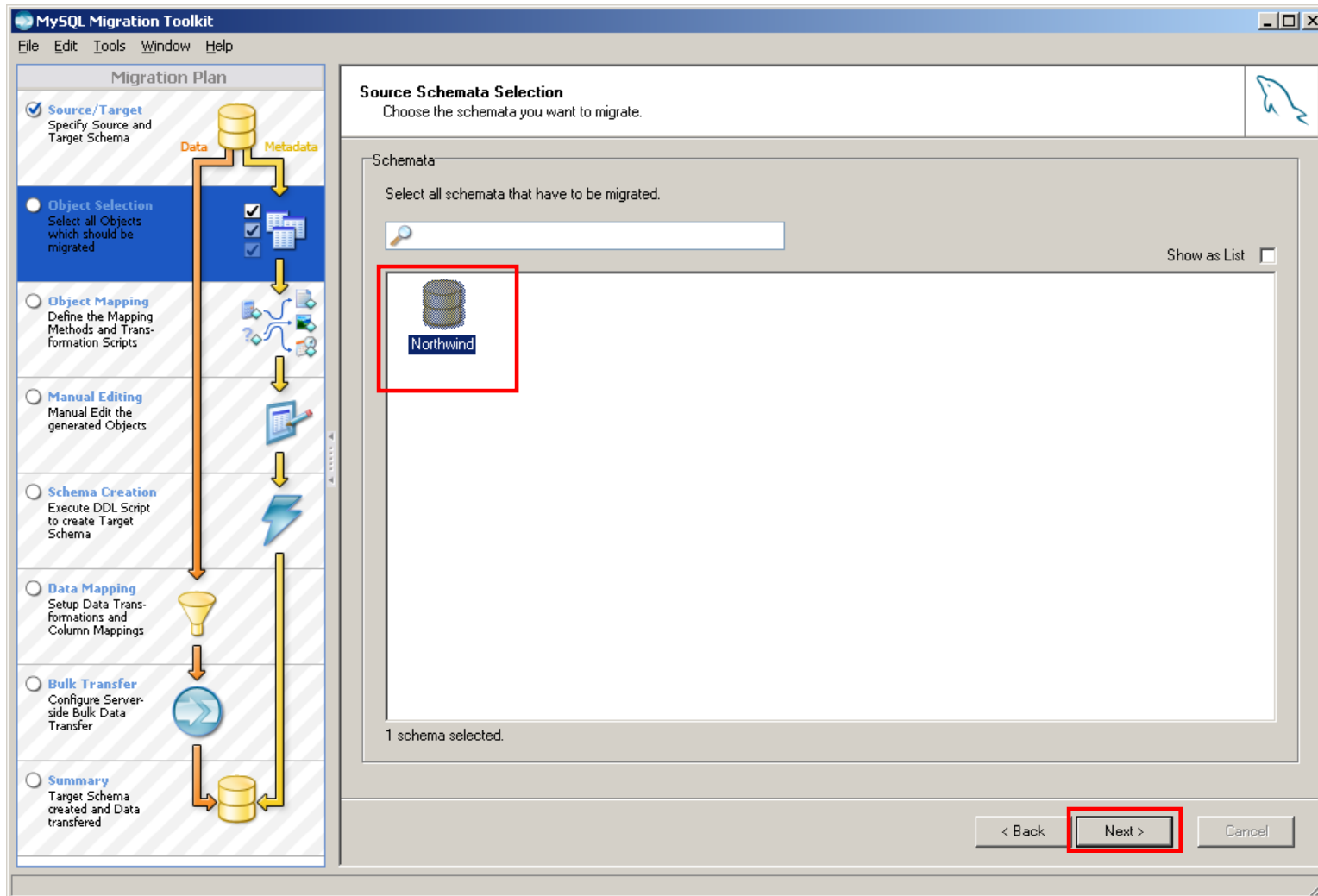
MySQL Migration Tool (cont.)



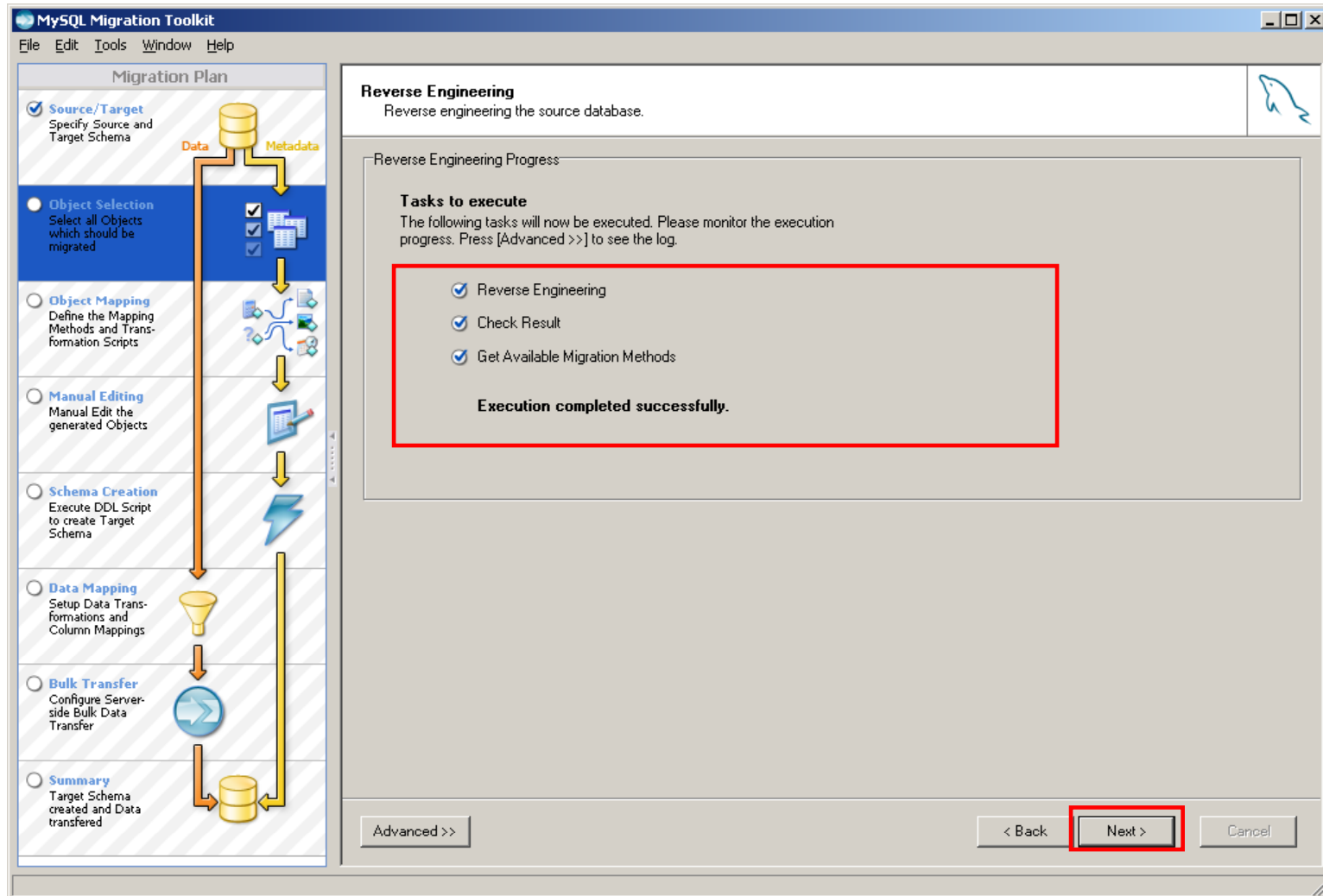
MySQL Migration Tool (cont.)



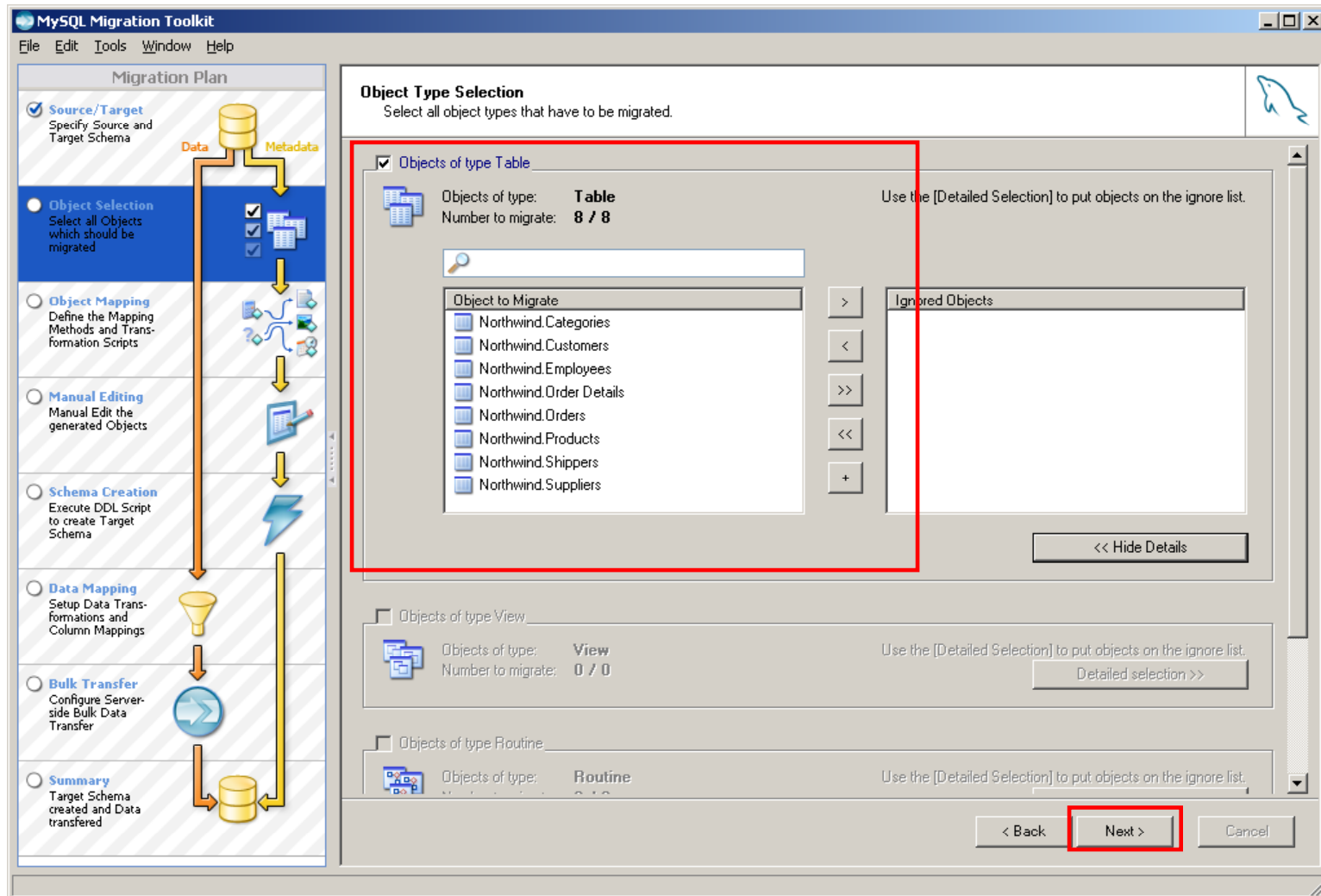
MySQL Migration Tool (cont.)



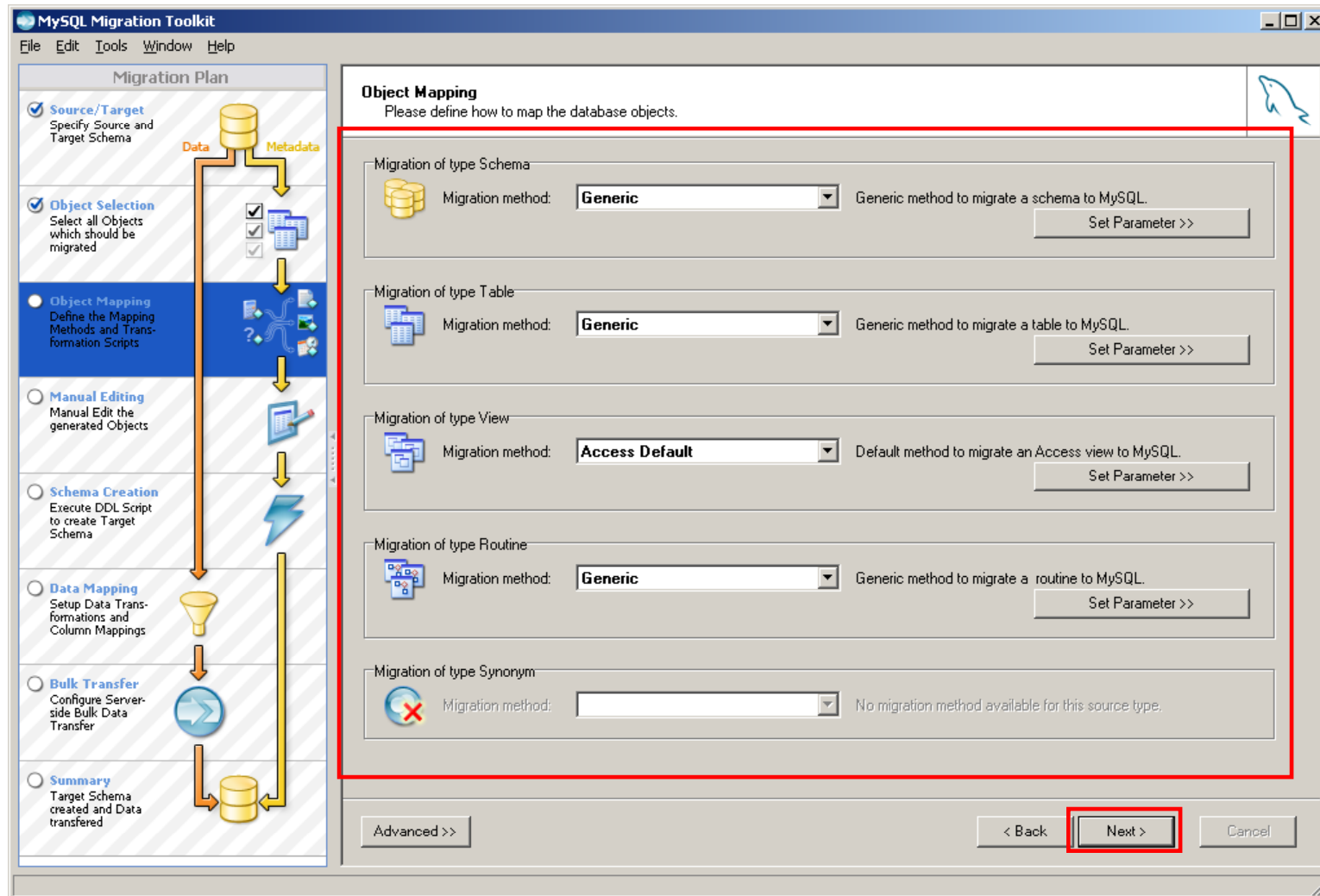
MySQL Migration Tool (cont.)



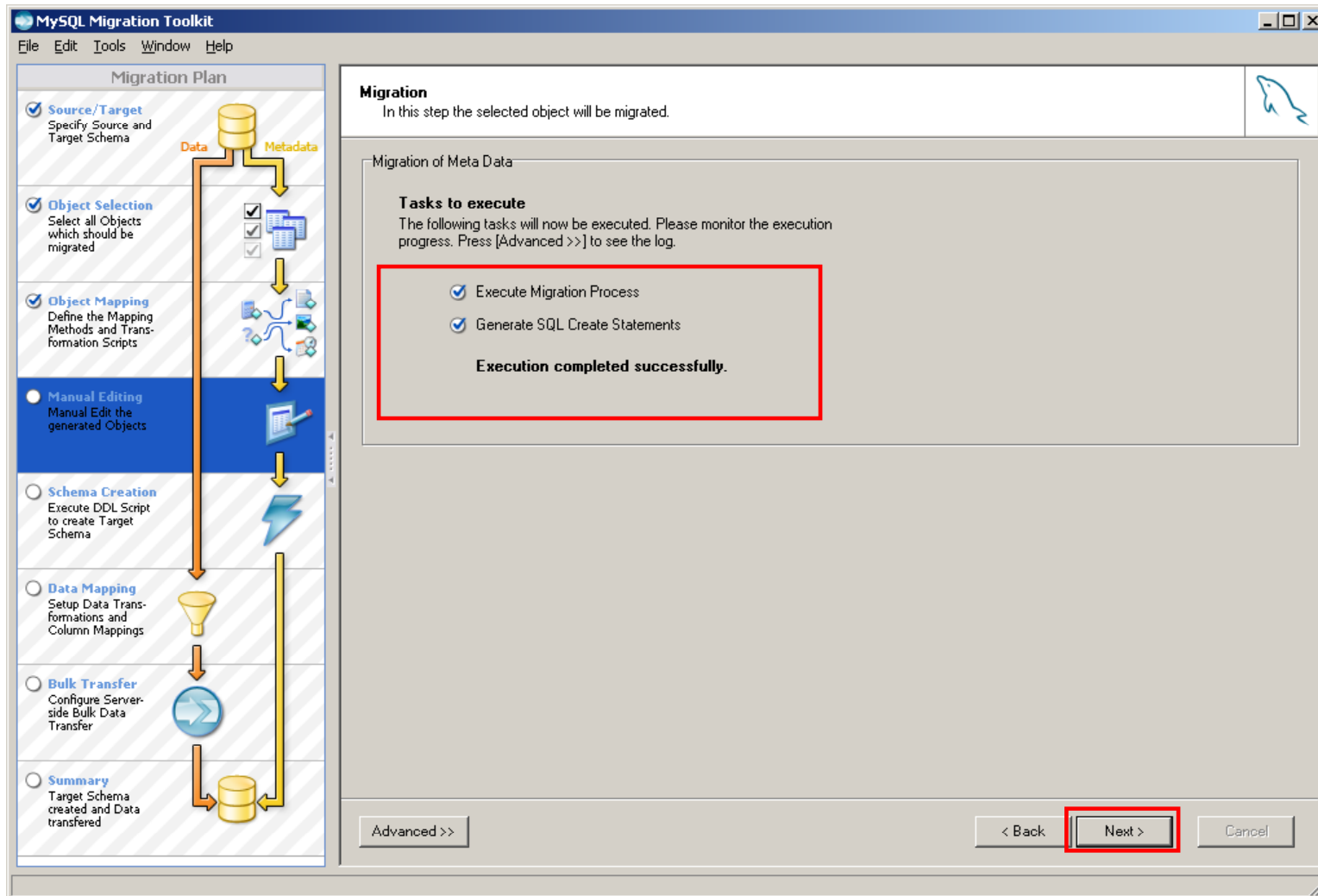
MySQL Migration Tool (cont.)



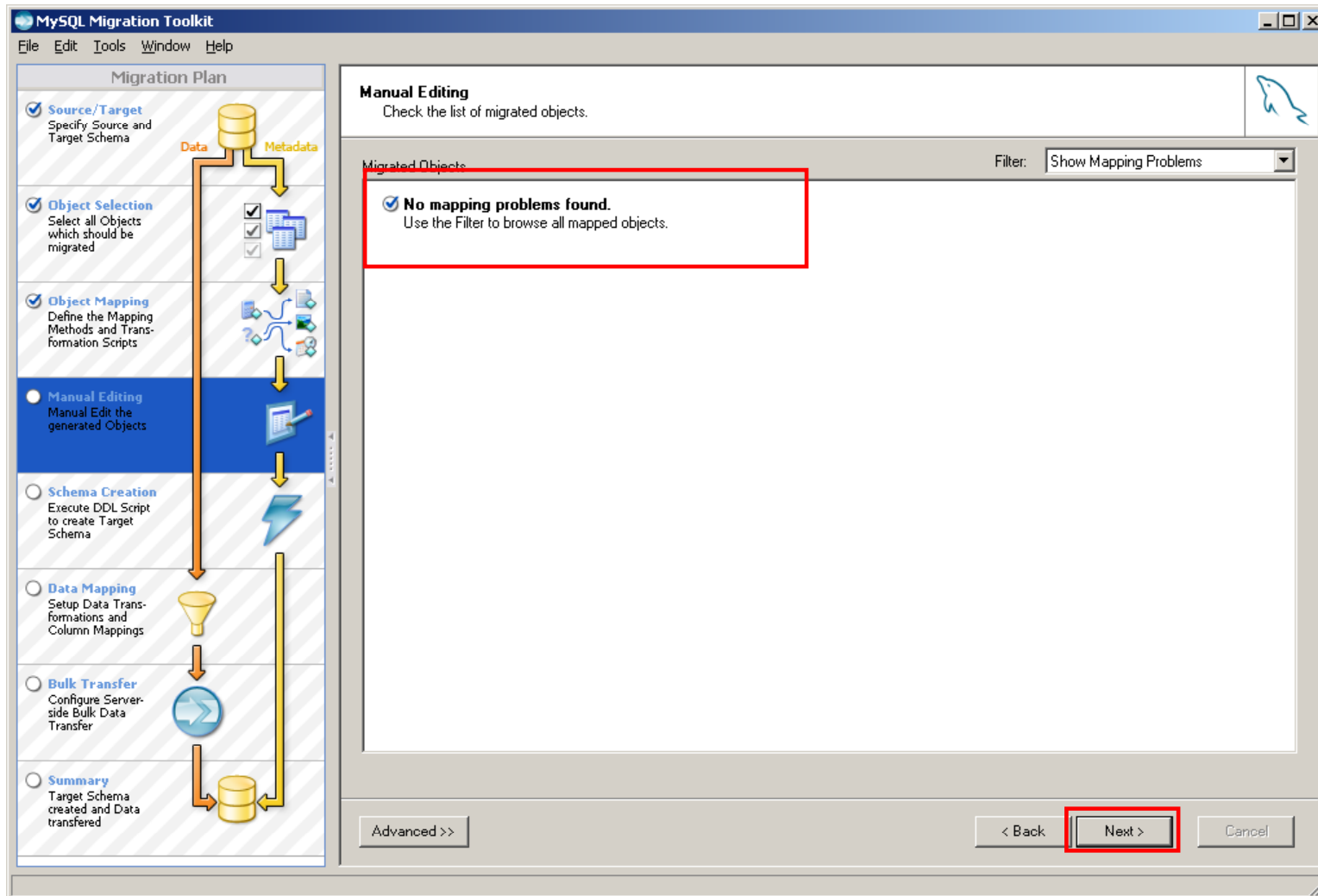
MySQL Migration Tool (cont.)



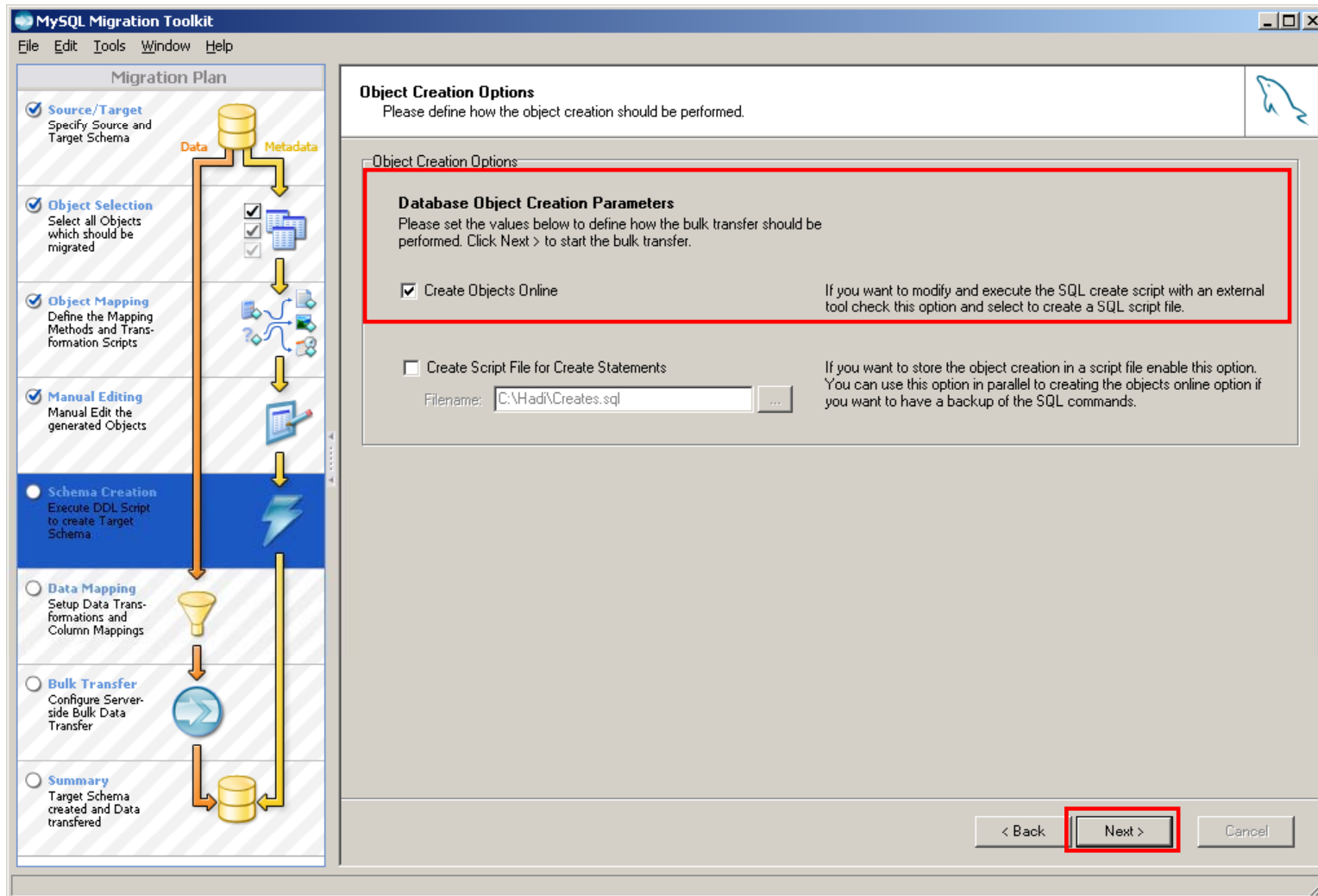
MySQL Migration Tool (cont.)



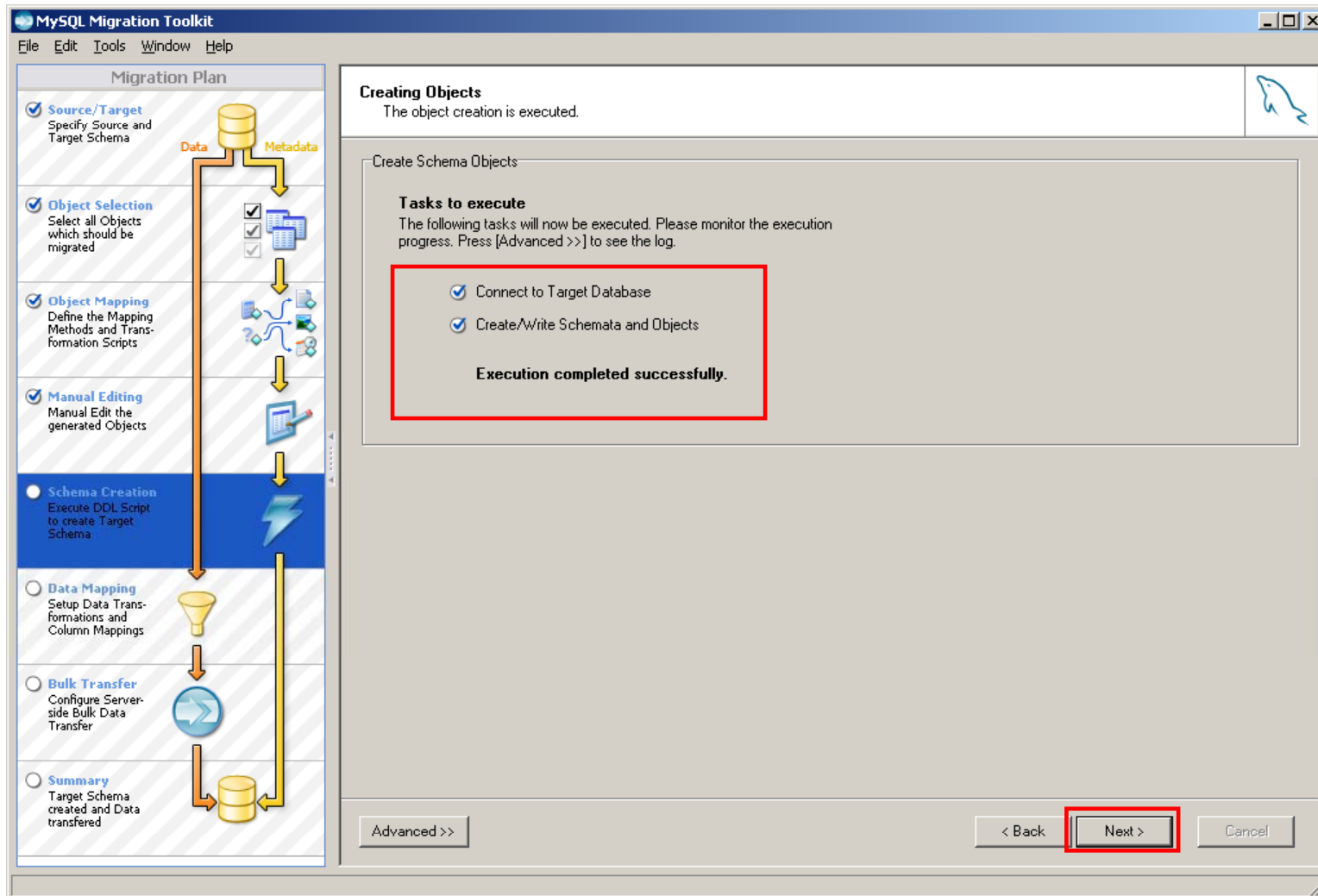
MySQL Migration Tool (cont.)



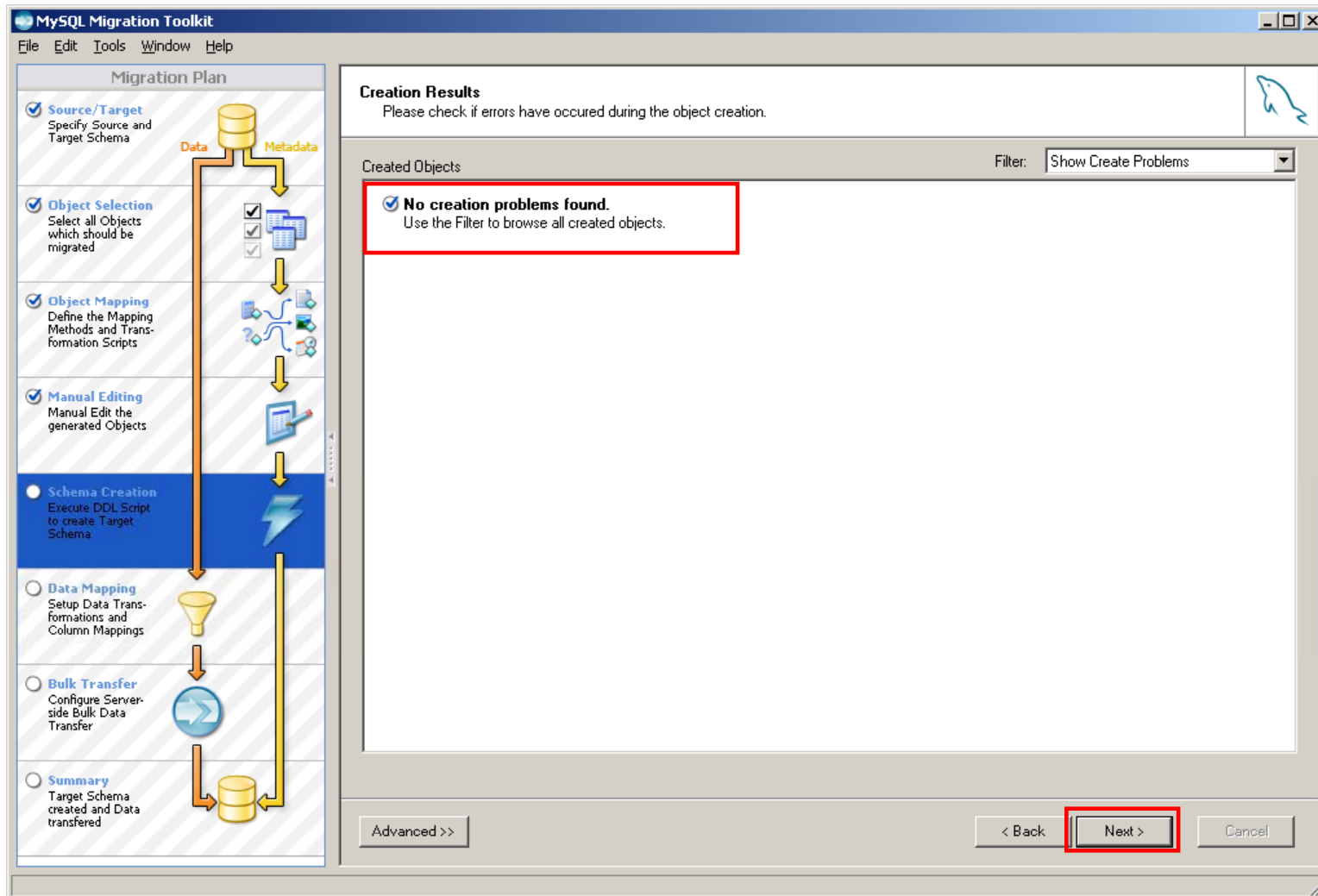
MySQL Migration Tool (cont.)



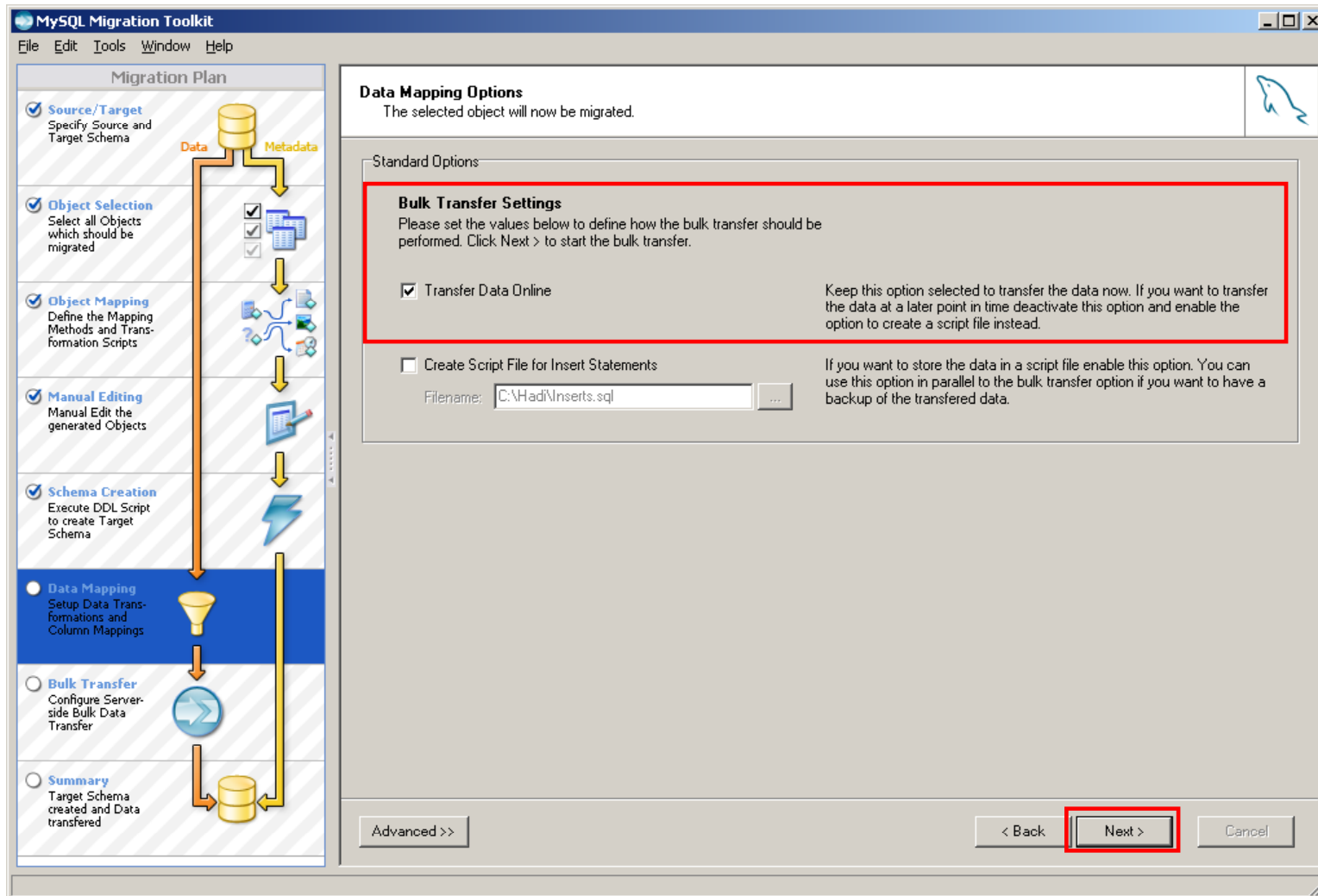
MySQL Migration Tool (cont.)



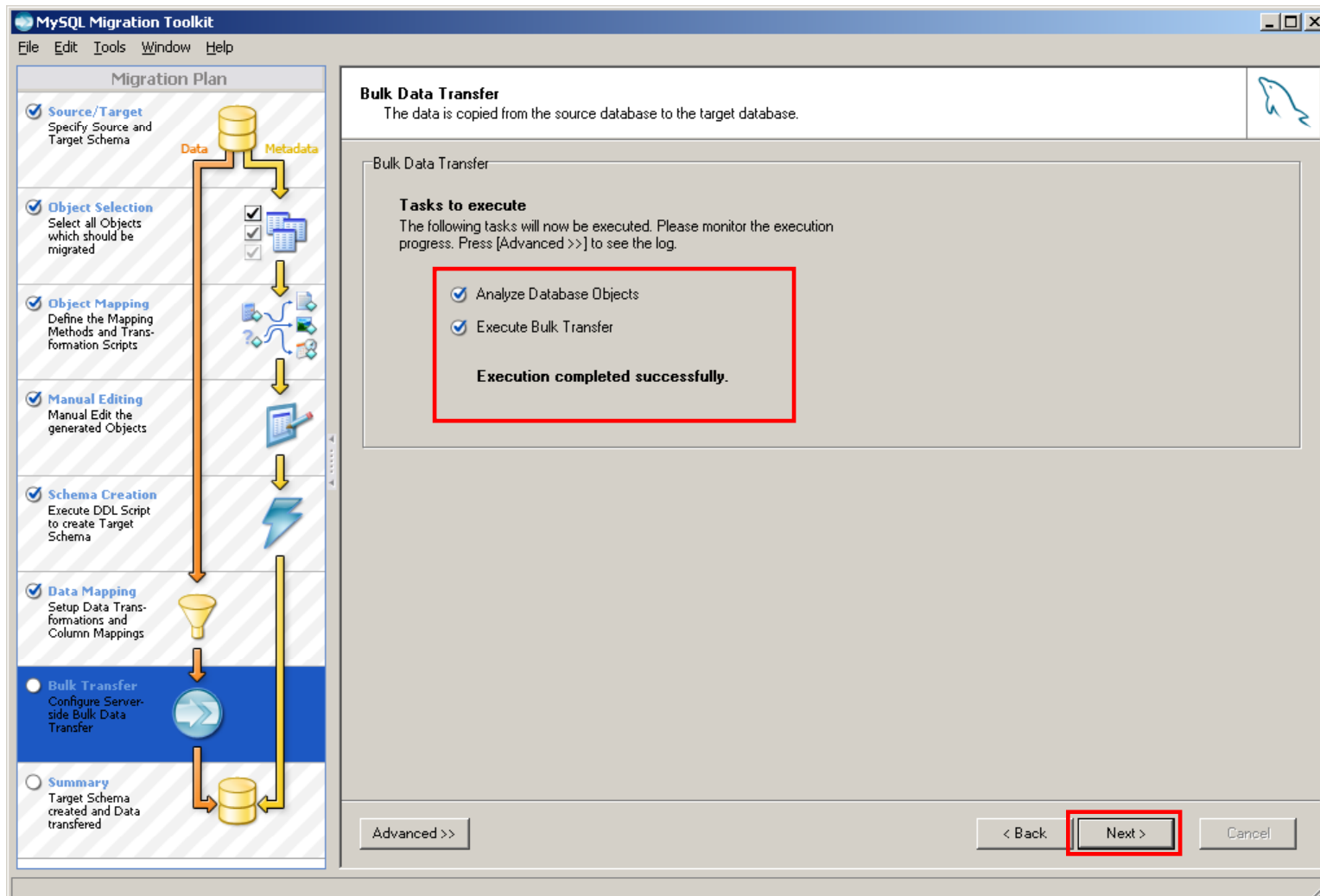
MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)

MySQL Migration Toolkit

File Edit Tools Window Help

Migration Plan

- Source/Target**
Specify Source and Target Schema
- Object Selection**
Select all Objects which should be migrated
- Object Mapping**
Define the Mapping Methods and Transformation Scripts
- Manual Editing**
Manual Edit the generated Objects
- Schema Creation**
Execute DDL Script to create Target Schema
- Data Mapping**
Setup Data Transformations and Column Mappings
- Bulk Transfer**
Configure Server-side Bulk Data Transfer
- Summary**
Target Schema created and Data transferred

Summary
Please verify the migration report.

Report

Migration Completed
The migration process has been completed. Please see the following report for details. Click Finish to close the application.

```

-----
-- MySQL Migration Toolkit Report
--
-- Title: Summary Of The Migration Process
-- Date: 2005-09-27 00:40
-----

1. Schema Migration
-----

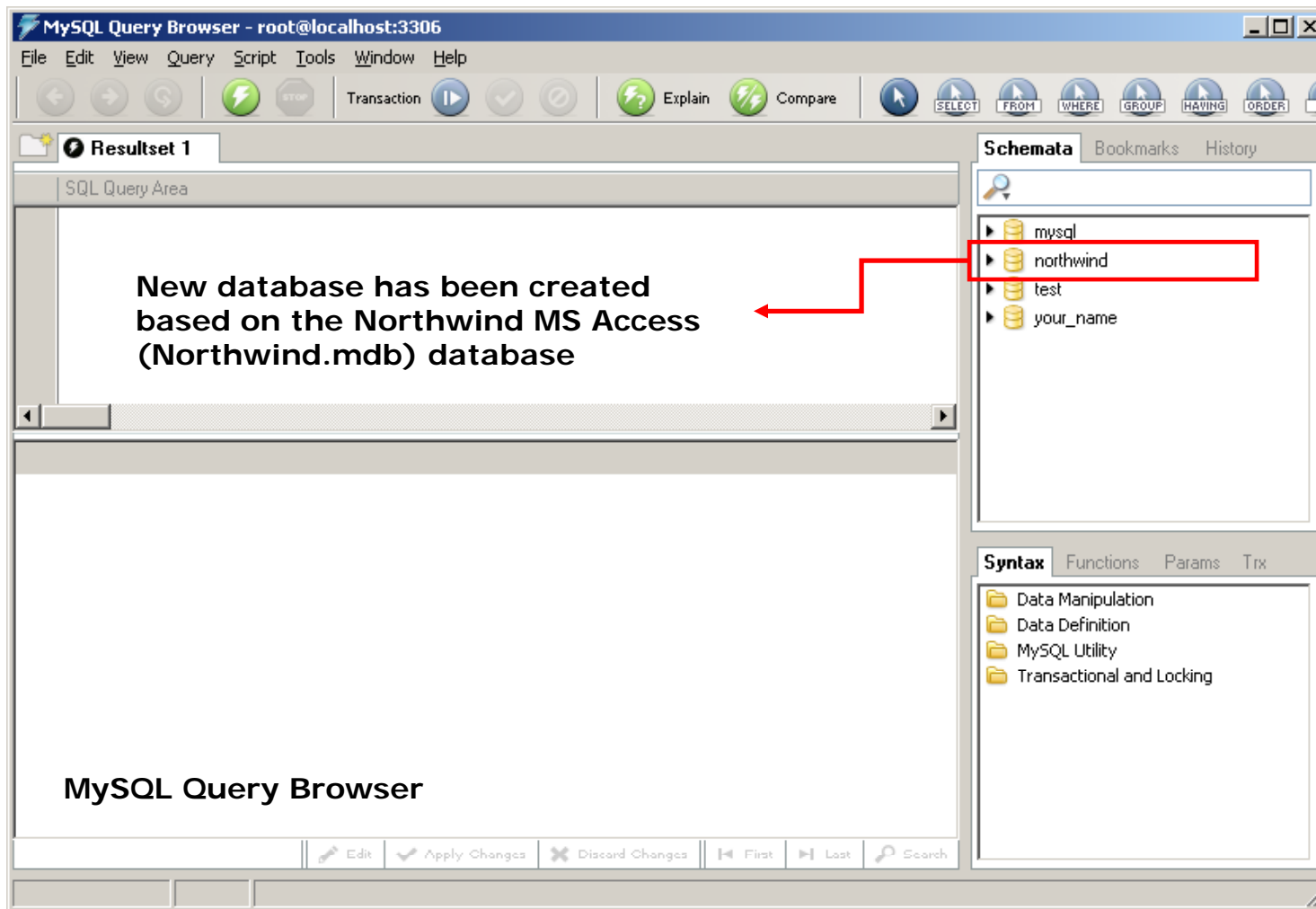
Number of migrated schemata: 1

Schema Name: Northwind
- Tables: 8
- Views: 0
- Routines: 0
- Synonyms: 0
- Structured Types: 0
  
```

Generate Migration Script Save Report to Disk

< Back **Finish** Cancel

MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)

The screenshot shows the MySQL Query Browser interface. The SQL Query Area contains the query: `SELECT * FROM `northwind`.`categories``. The result set is displayed as a table with the following data:

Cate...	CategoryName	Description	Picture
1	Beverages	Soft drinks, coffees, teas, beers, and ales	NULL
2	Condiments	Sweet and savory sauces, relishes, spreads, and se...	NULL
3	Confections	Desserts, candies, and sweet breads	NULL
4	Dairy Products	Cheeses	NULL
5	Grains/Cereals	Breads, crackers, pasta, and cereal	NULL
6	Meat/Poultry	Prepared meats	NULL
7	Produce	Dried fruit and bean curd	NULL
8	Seafood	Seaweed and fish	NULL

The interface also shows the Schemata tree on the right, with the 'northwind' database expanded to show the 'categories' table. The Syntax pane at the bottom right lists categories like Data Manipulation, Data Definition, MySQL Utility, and Transactional and Locking.

Summary

- Database Design Process
- MySQL Installation
- MySQL Workbench
- MySQL Administration
- MySQL Migration

Next Session

- Web Server Overview
- HTML Editor, FTP Client
- HTML: Introduction
- HTML: Elements
- HTML: 4.0 Specs
- HTML: Head
- HTML: Meta
- HTML: Document Type Definition
- HTML: Basic Tags
- HTML: Formatting
- HTML: Entities
- HTML: Links (URLs)
- HTML: Fonts

Exercise

- Please refer to the available text file in the slides section for this session on the course website:
- http://info510.com/core/public_page.php?page_name=slides