Lecture #4

NEWM N510: Web-Database Concepts

MySQL (3)

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Review Last Lecture

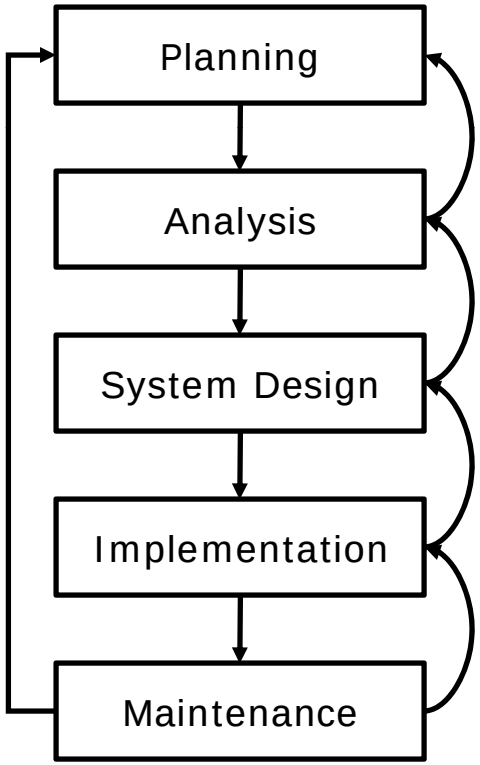
- SQL: CREATE (Database, Table, and Index)
- SQL: TRUNCATE (Table)
- SQL: DROP (Database, Table, and Index)
- SQL: ALTER (Database, Table, and Index)
- SQL: INSERT
- SQL: UPDATE
- SQL: DELETE
- SQL: Joining and Keys (Inner/Left/Right Join)
- SQL: GROUP BY & HAVING
- SQL: Functions

Lecture in a Nutshell

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

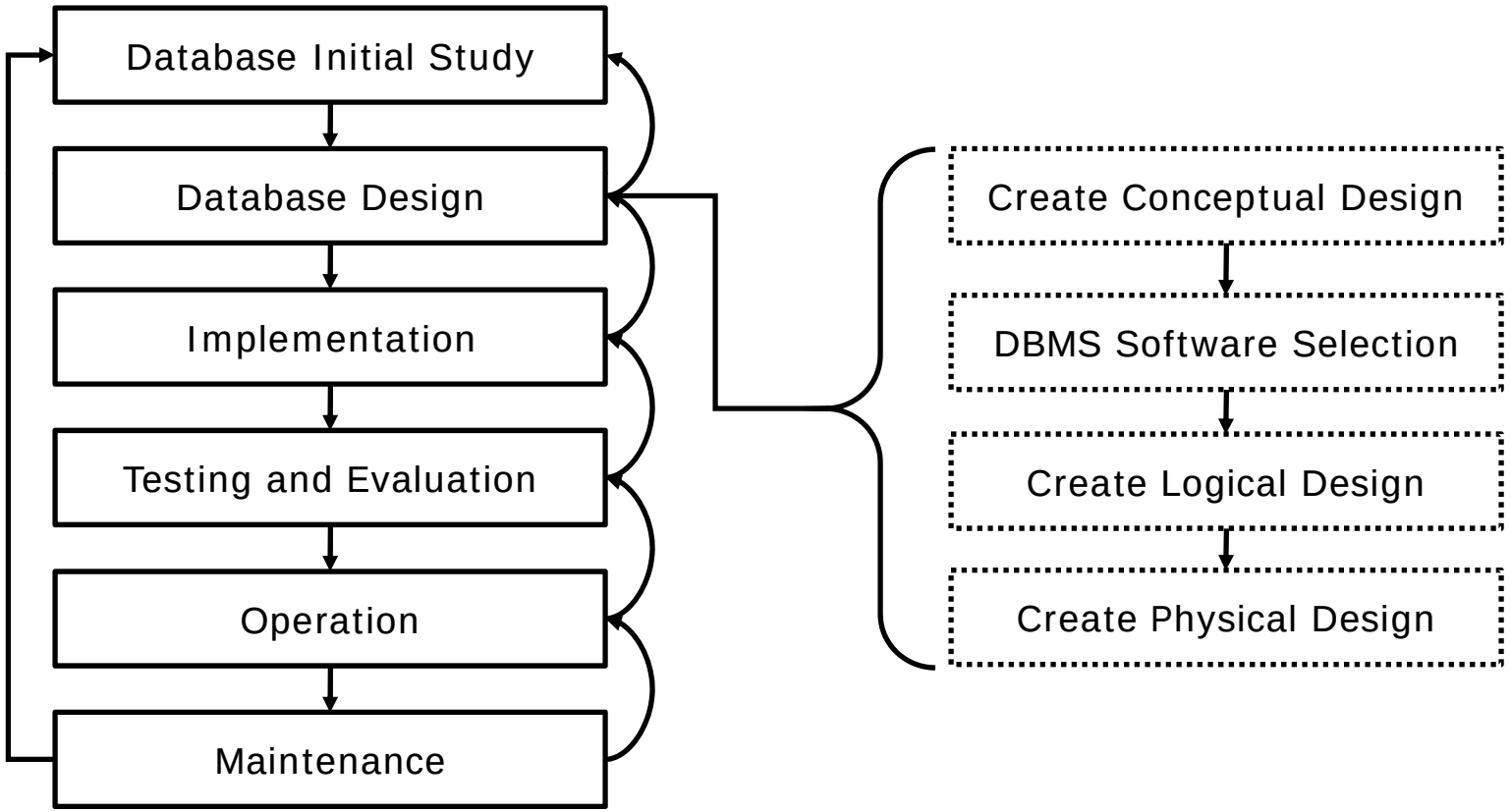
1. Database Design Process

- 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

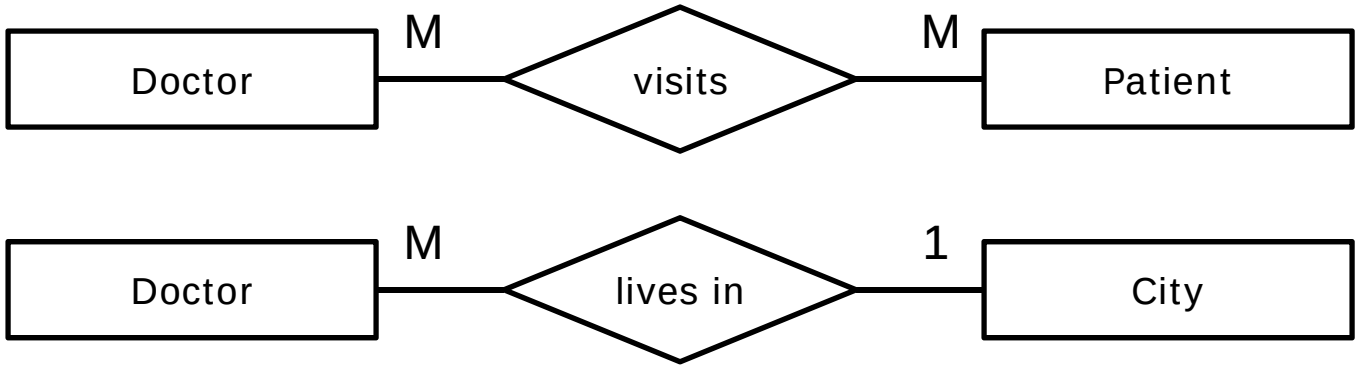
- A relationship captures how two or more entities are related to one another.

- 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.)

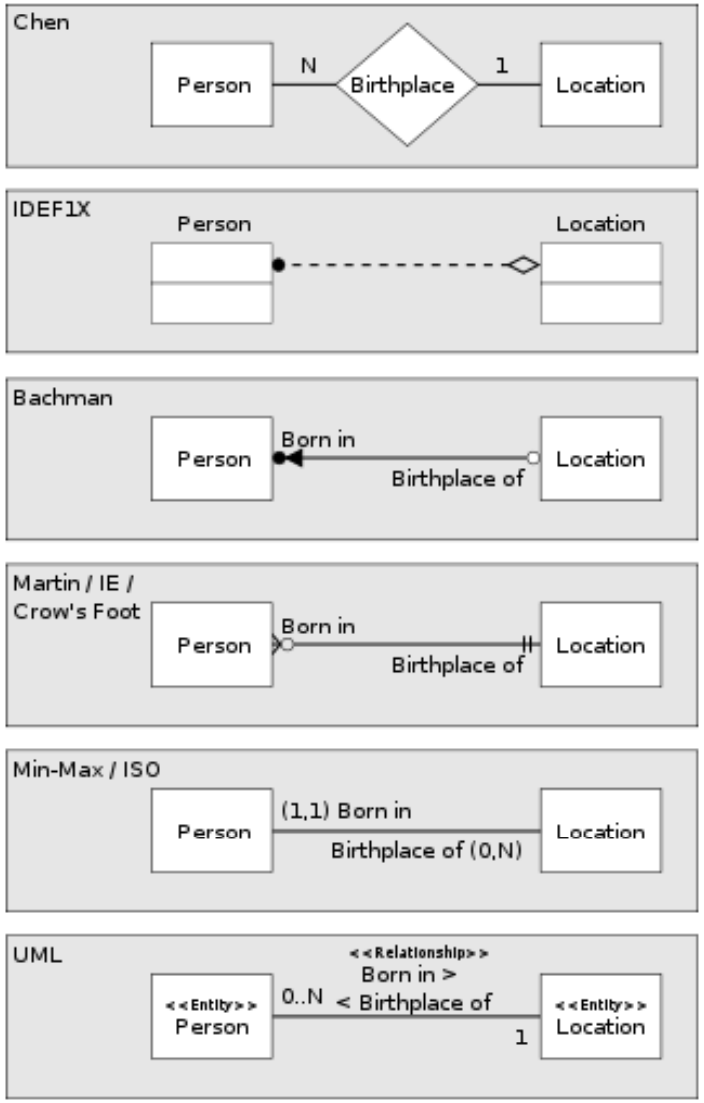
- Type of relationships should be identified by proper notations such as one to many (1-M) or many to many (M-M) relationships.



- 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.)

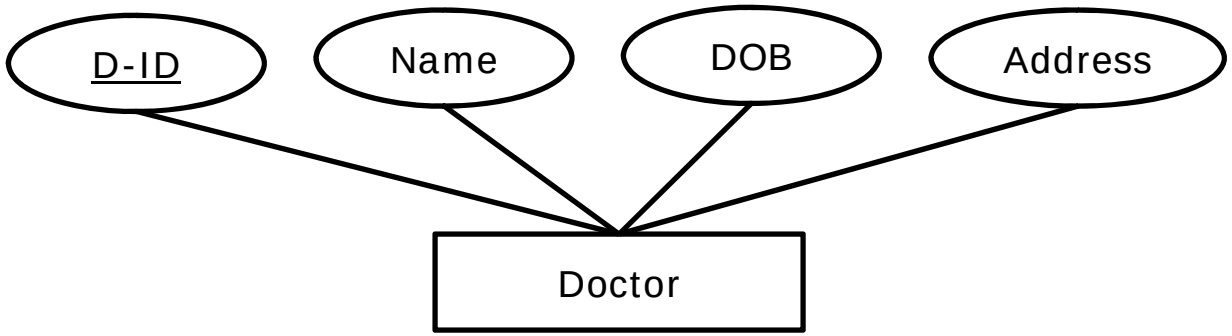
- Several styles are available to choose from: Chen, IDEF1X, Bachman, Martin (Crow's Foot), Min-Max ISO, and UML .



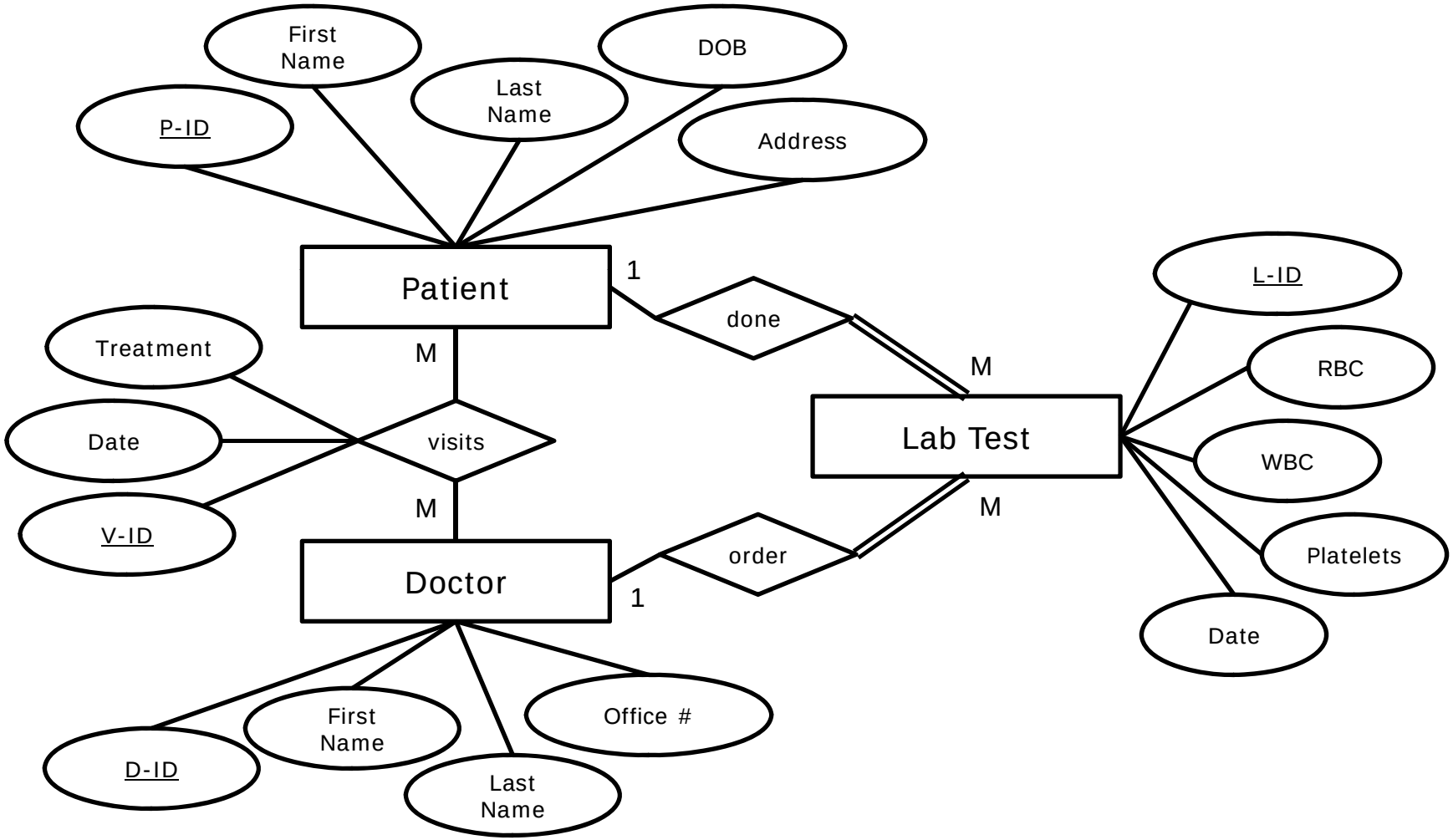
Entity Relationship Diagram (cont.)

❑ 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.



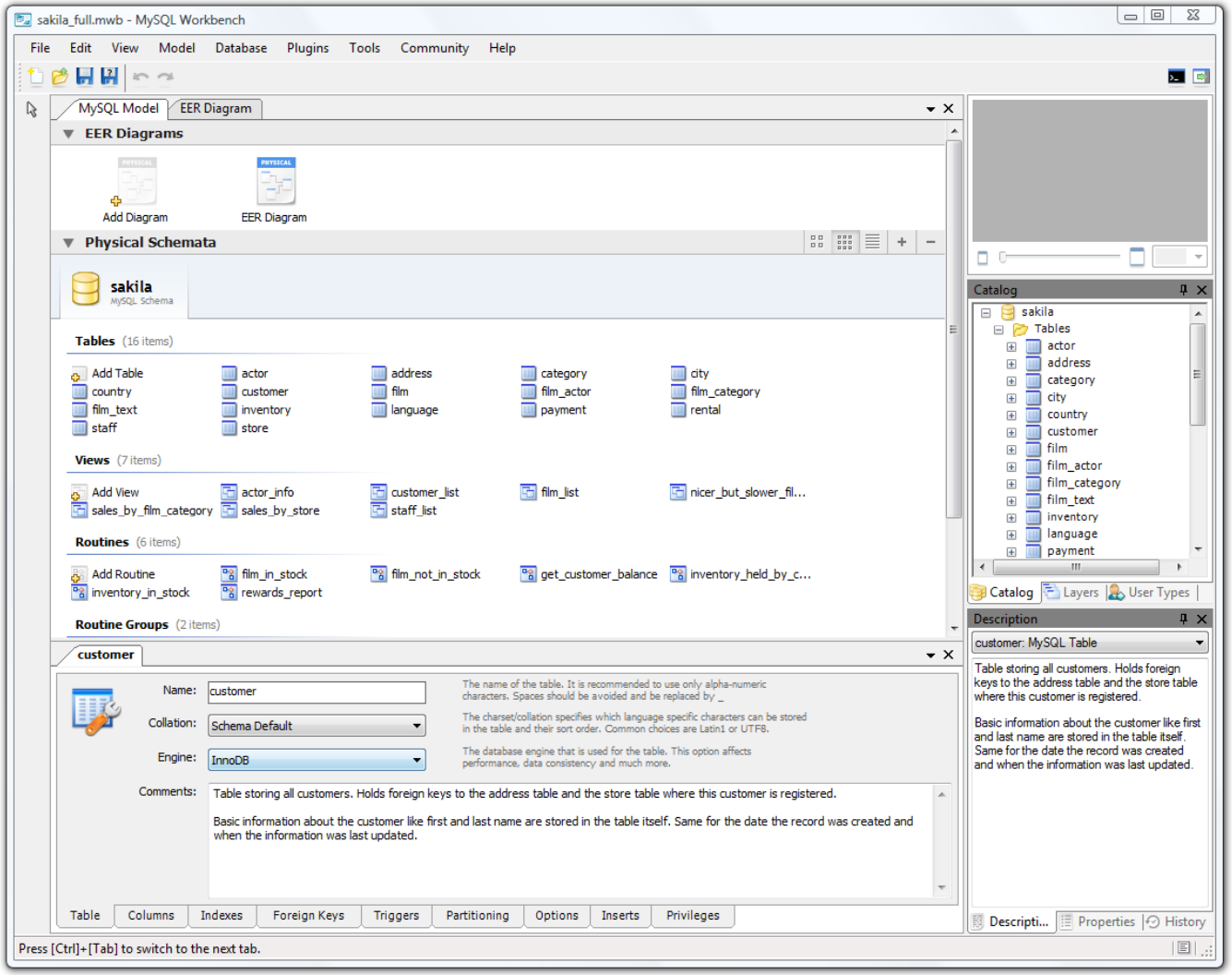
Entity Relationship Diagram (cont.)



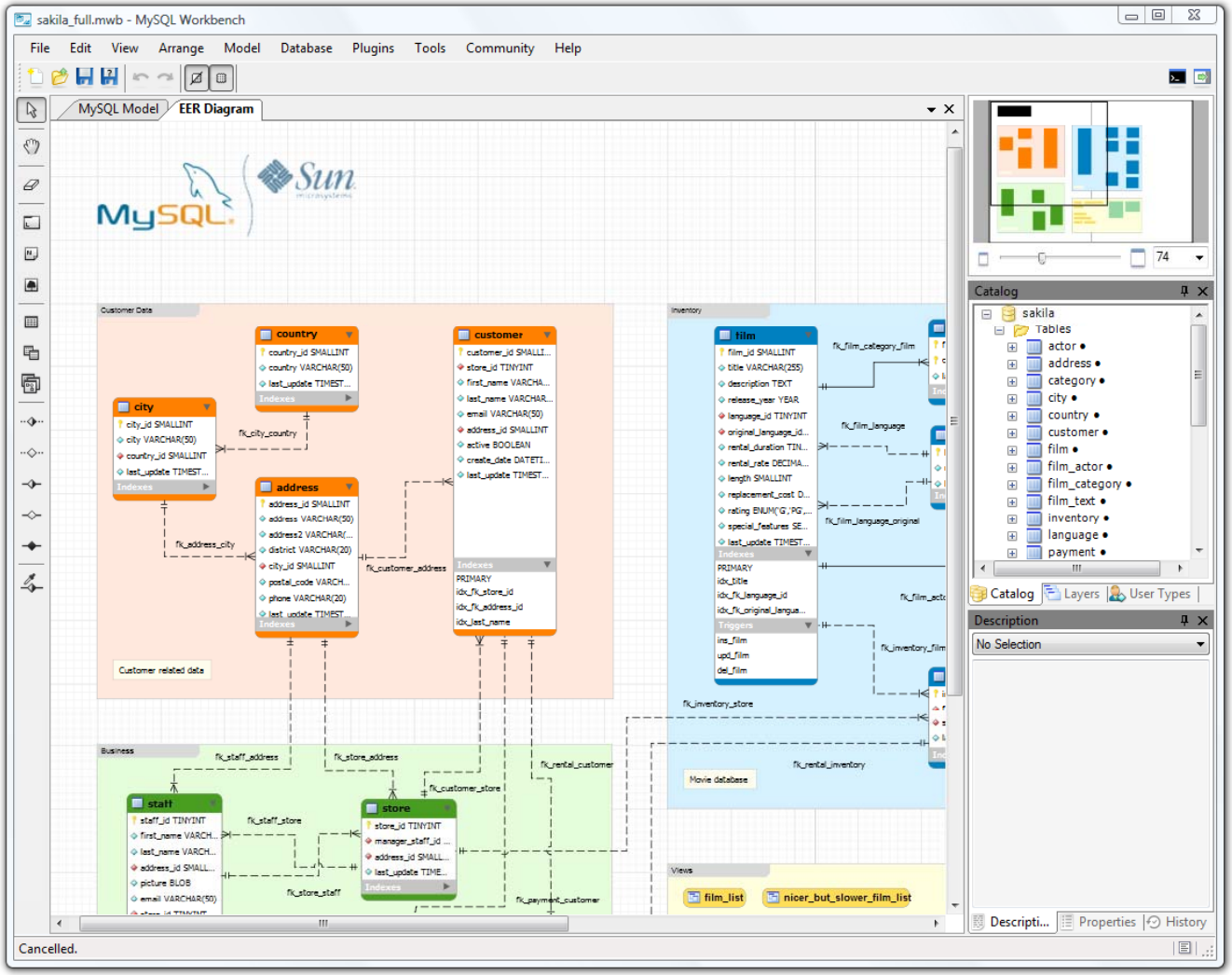
3. MySQL Workbench

- 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.

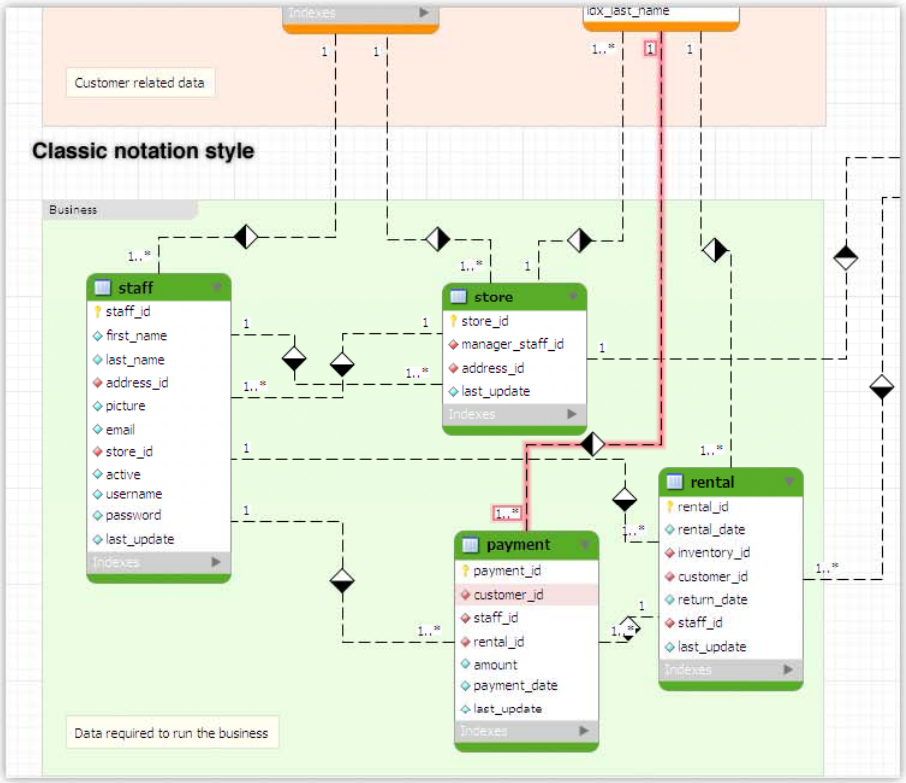
MySQL Workbench (cont.)

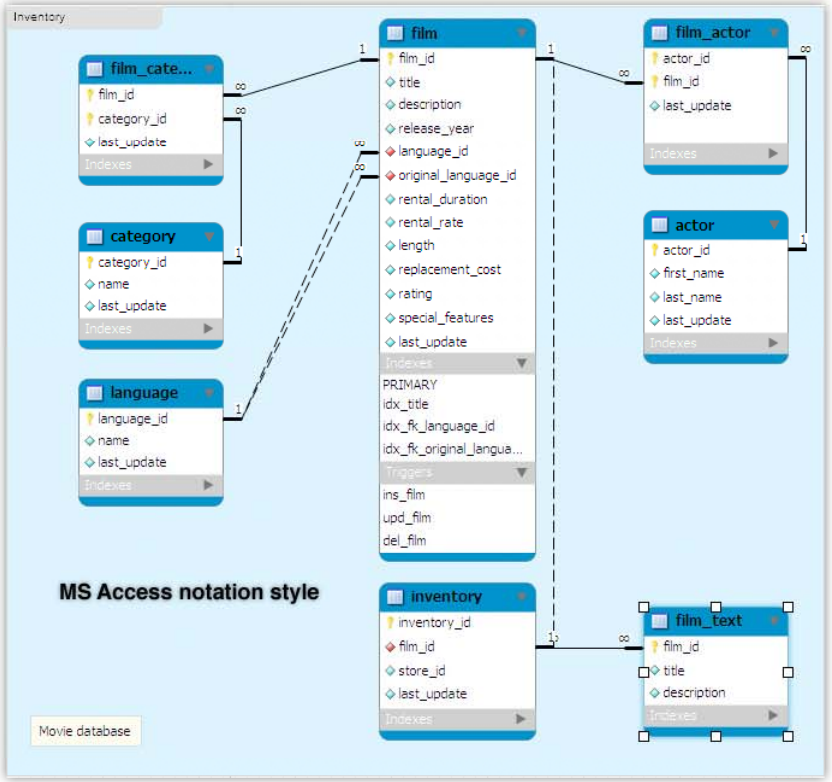


MySQL Workbench (cont.)



MySQL Workbench (cont.)

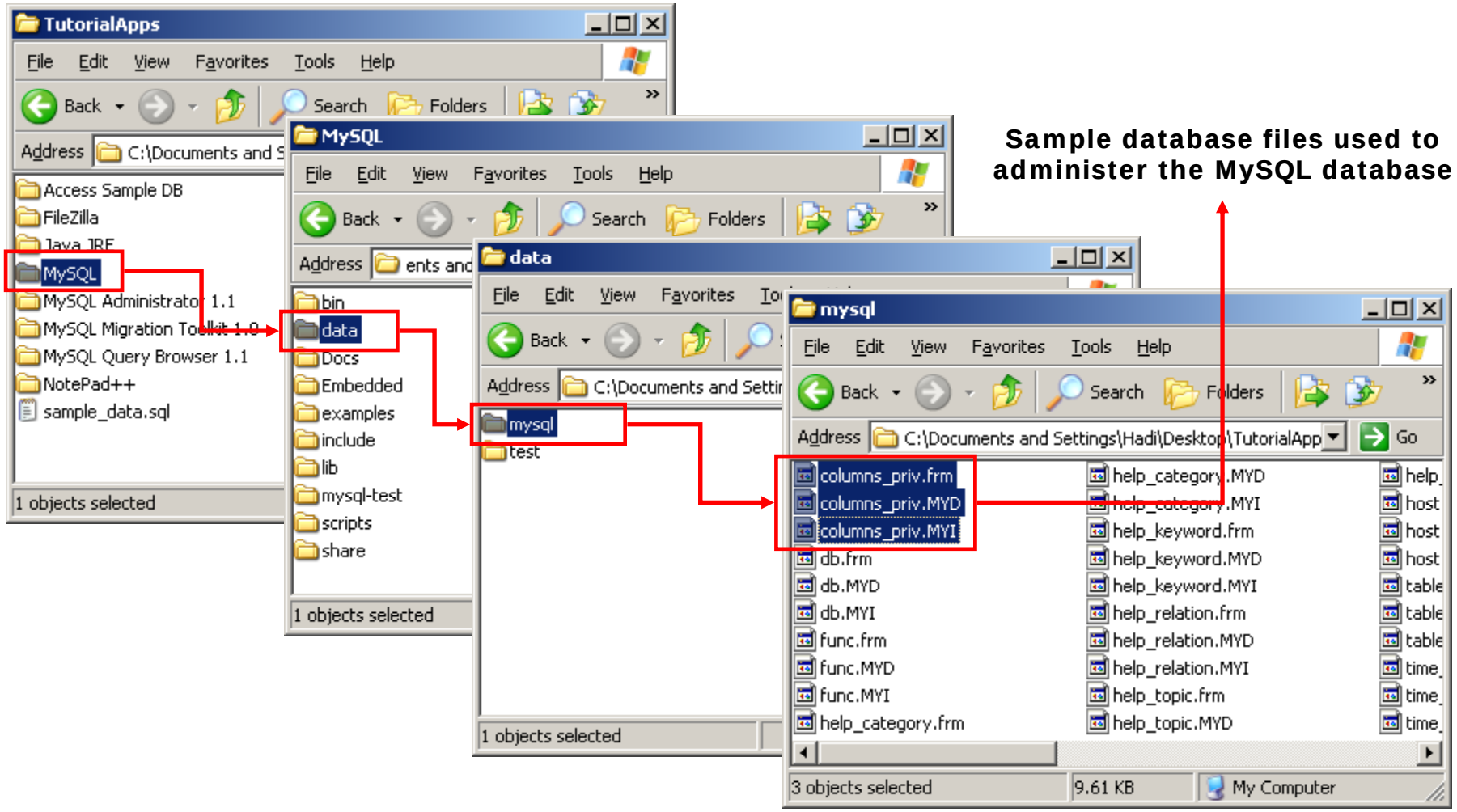




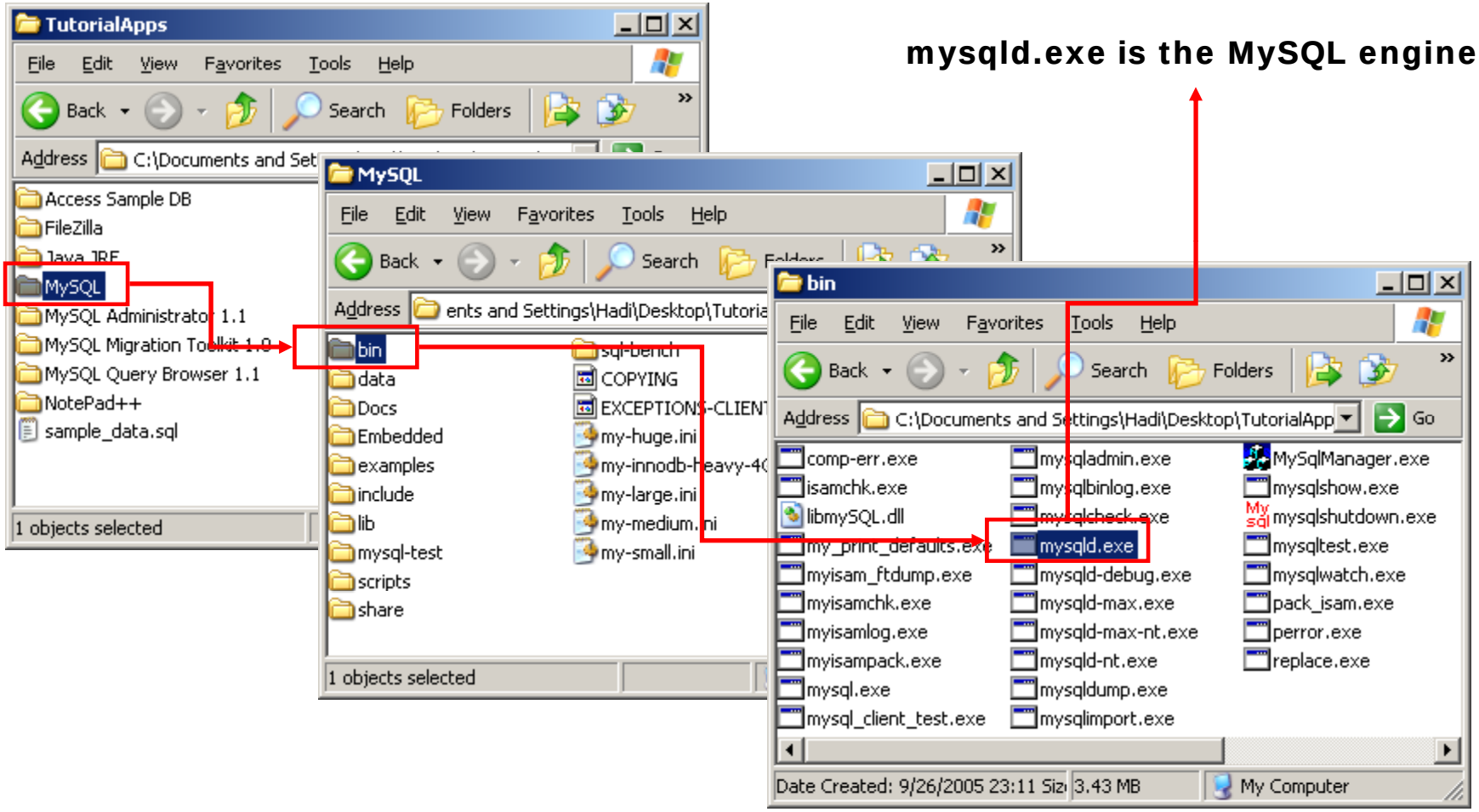
4. MySQL Installation

- 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.

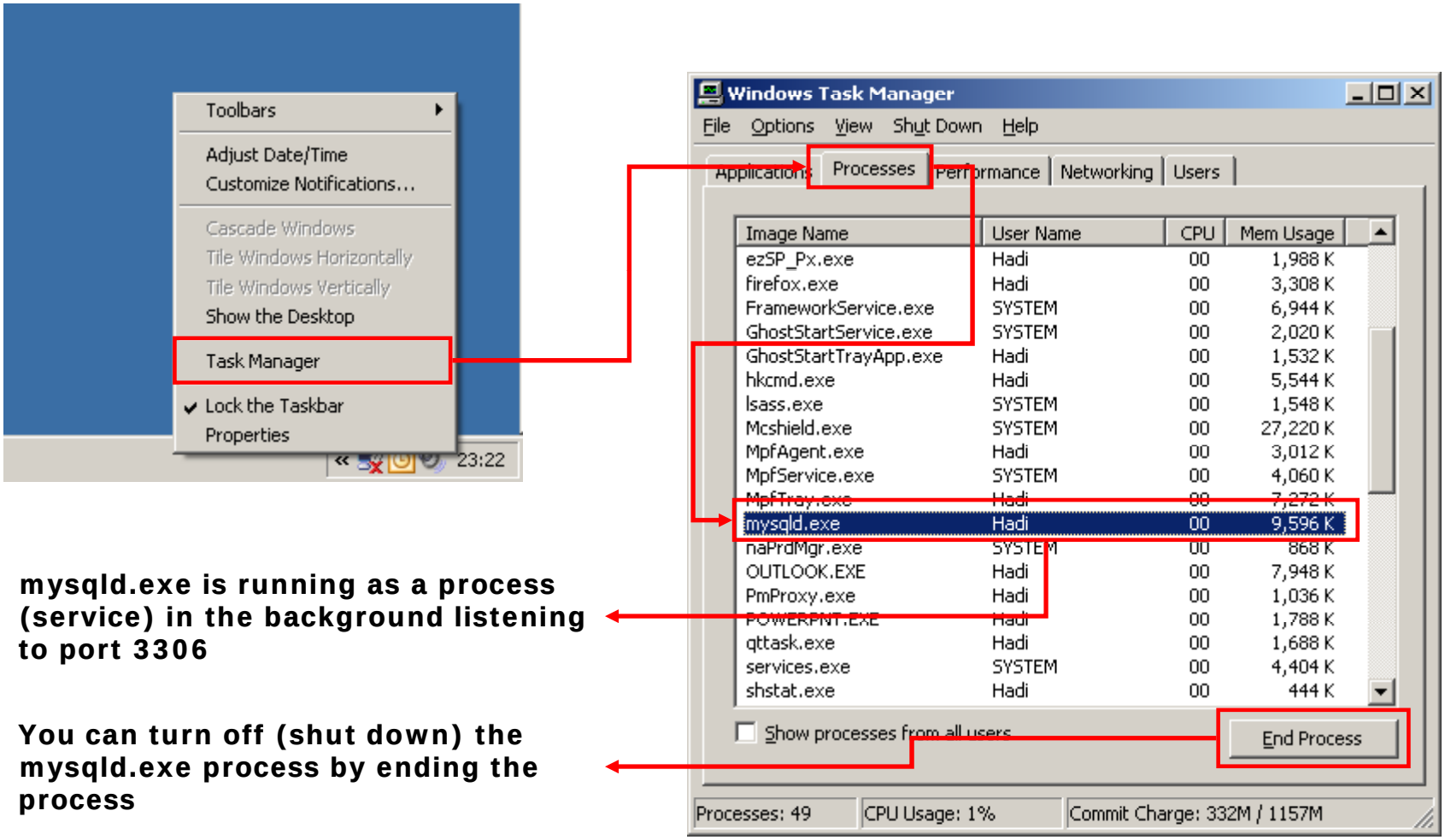
MySQL Installation (cont.)



MySQL Installation (cont.)



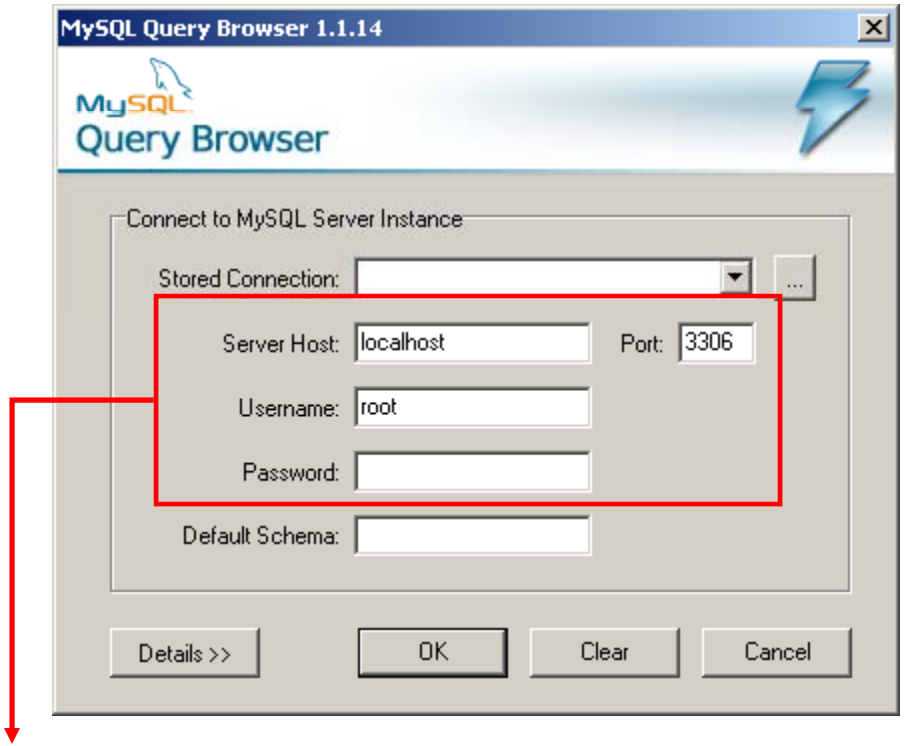
MySQL Installation (cont.)



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

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

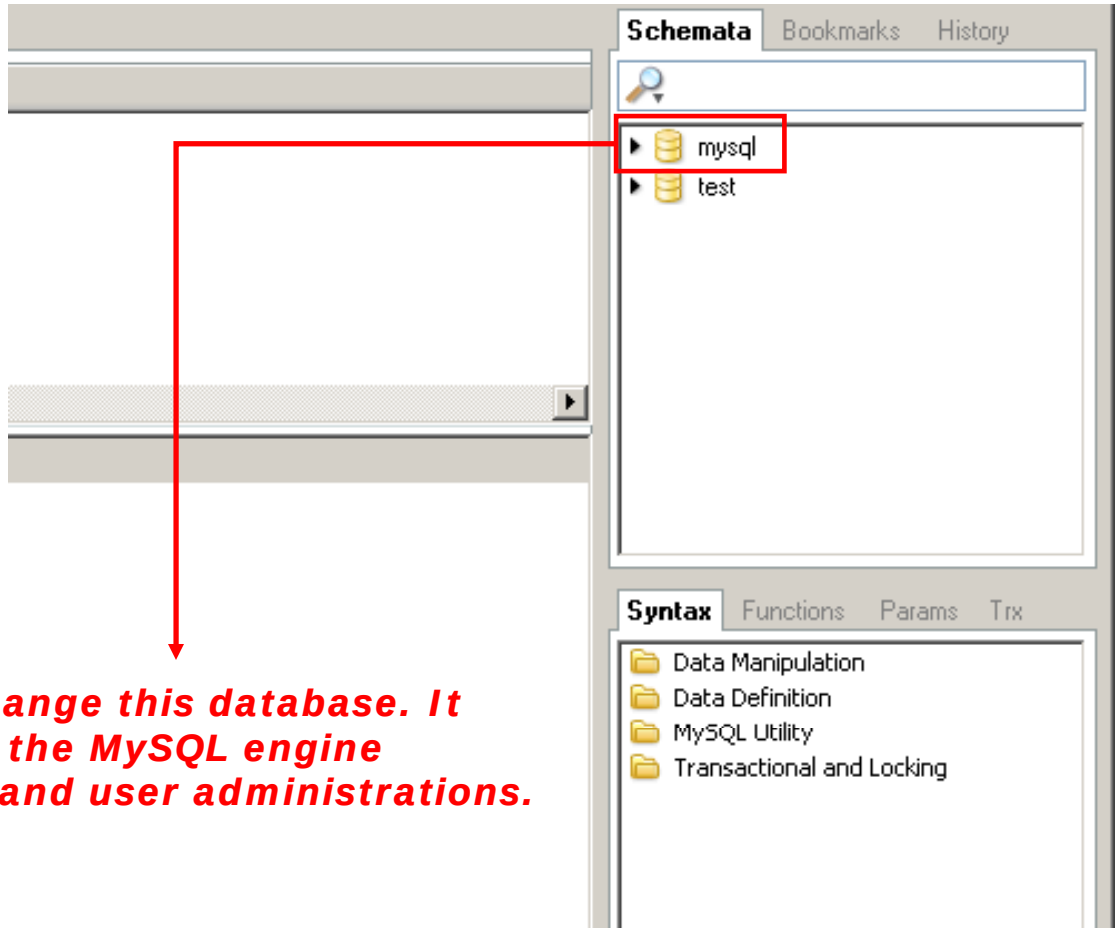
MySQL Installation (cont.)



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).**

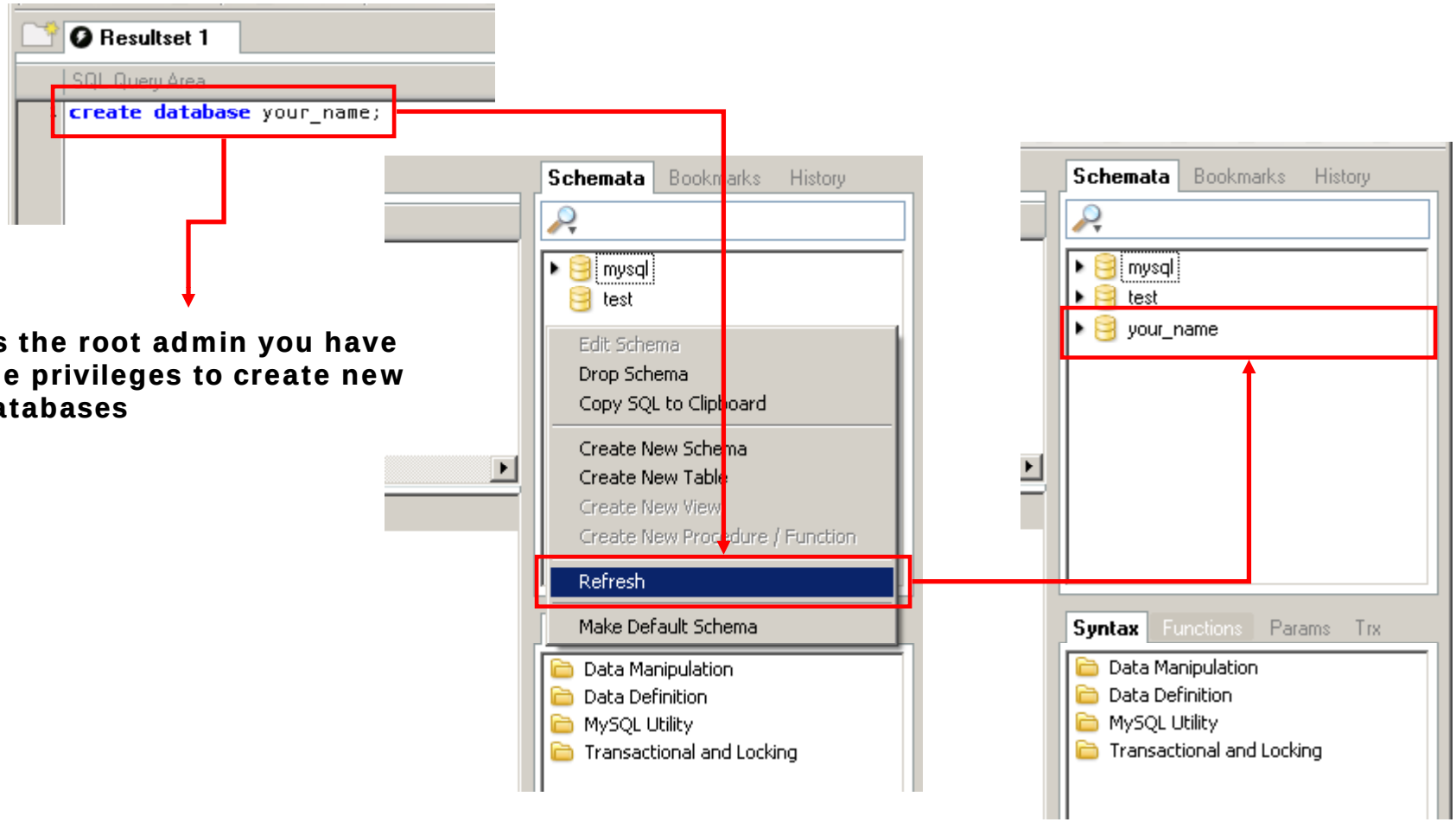
Default User: root / Default Pass: Leave Blank

MySQL Installation (cont.)



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

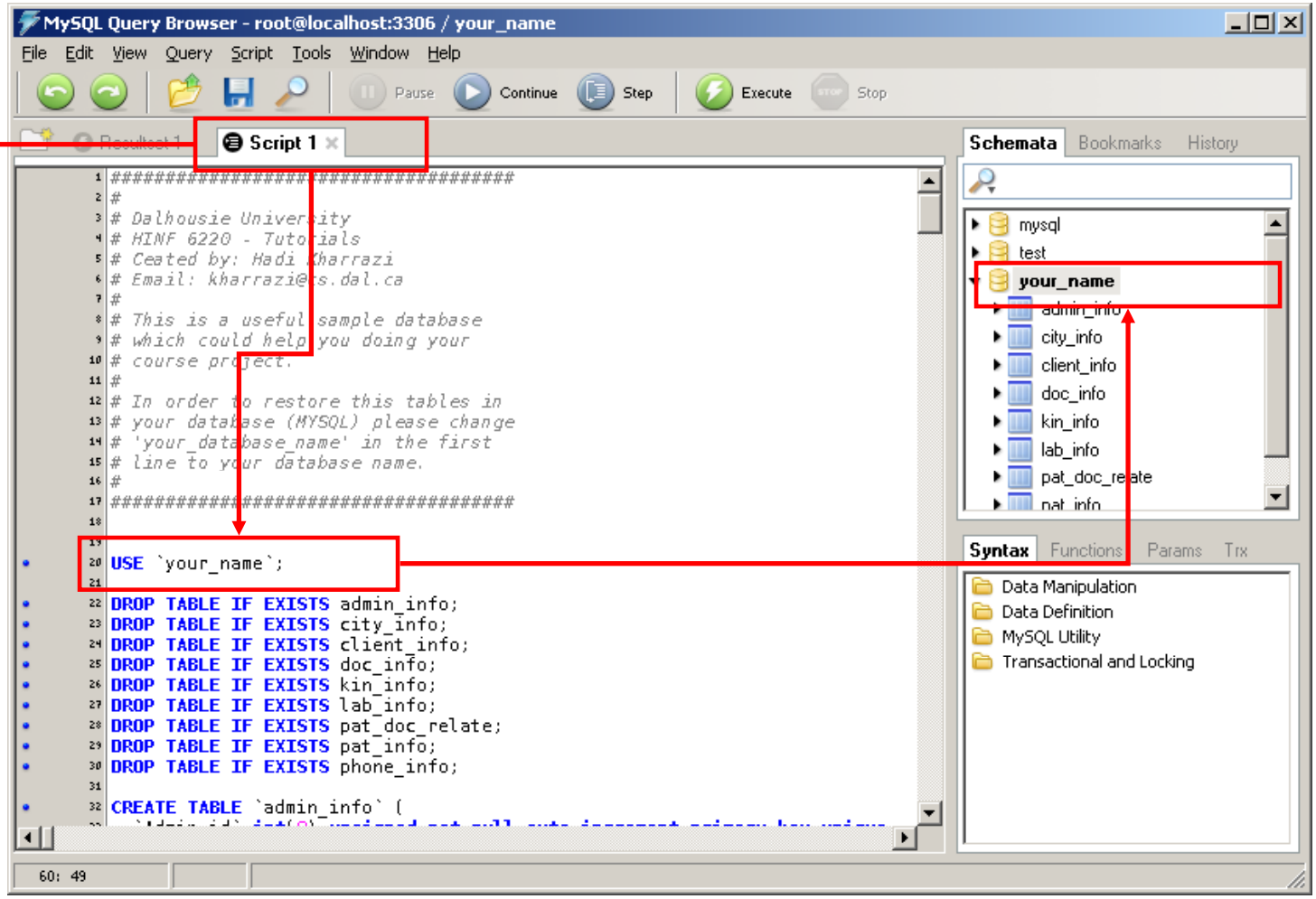
MySQL Installation (cont.)



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

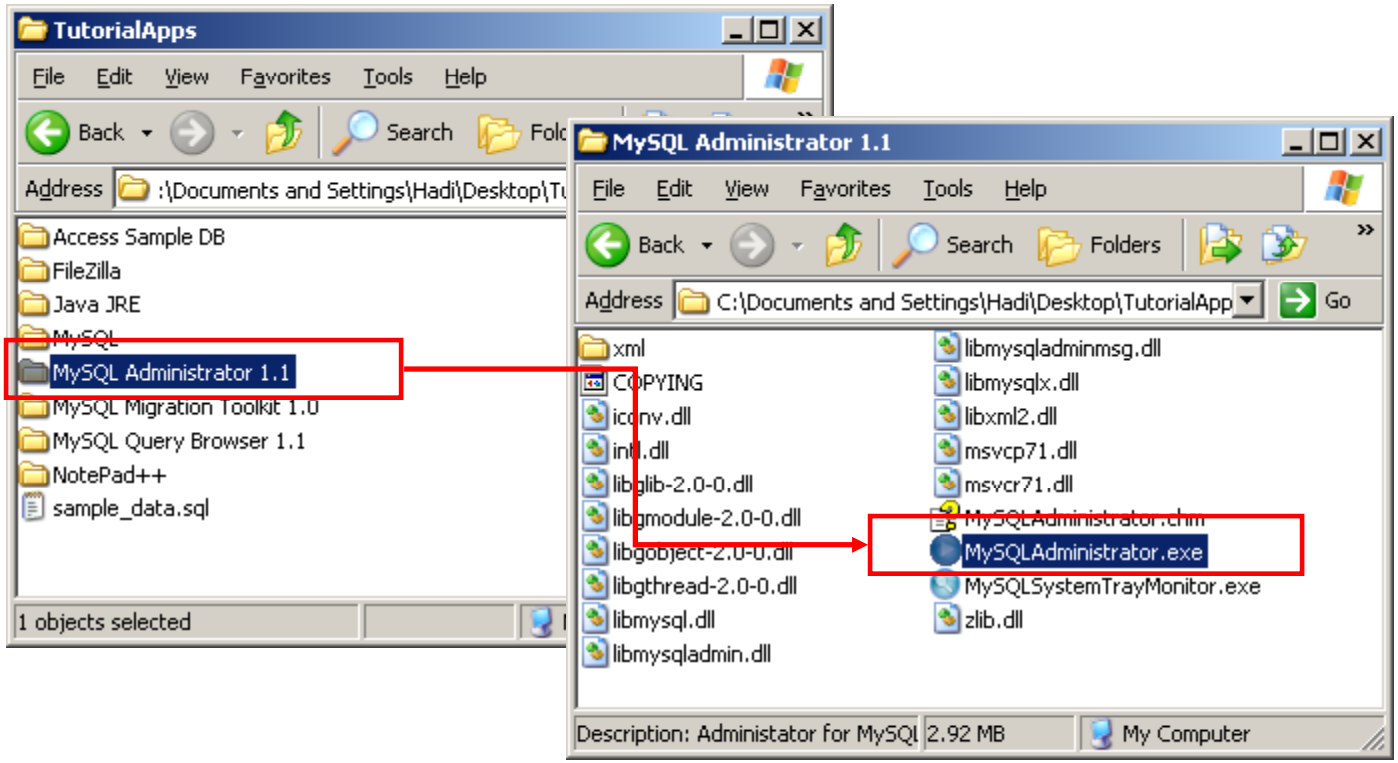
MySQL Installation (cont.)

Restore the sample database in the new database

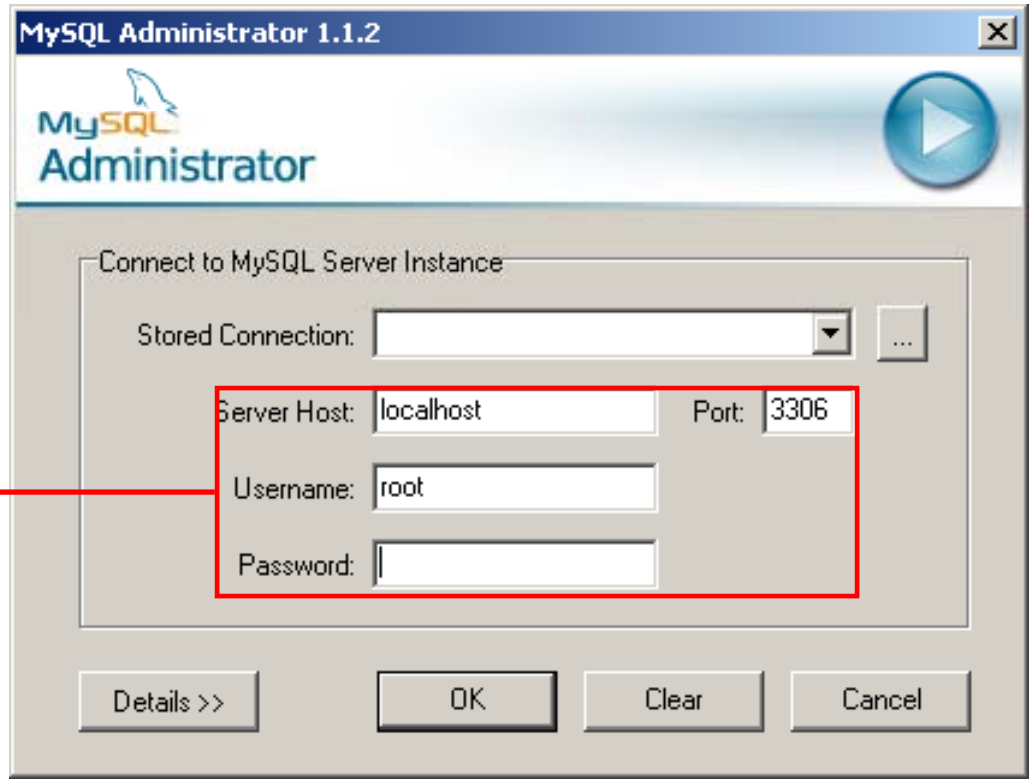


5. MySQL Administration Tool

- 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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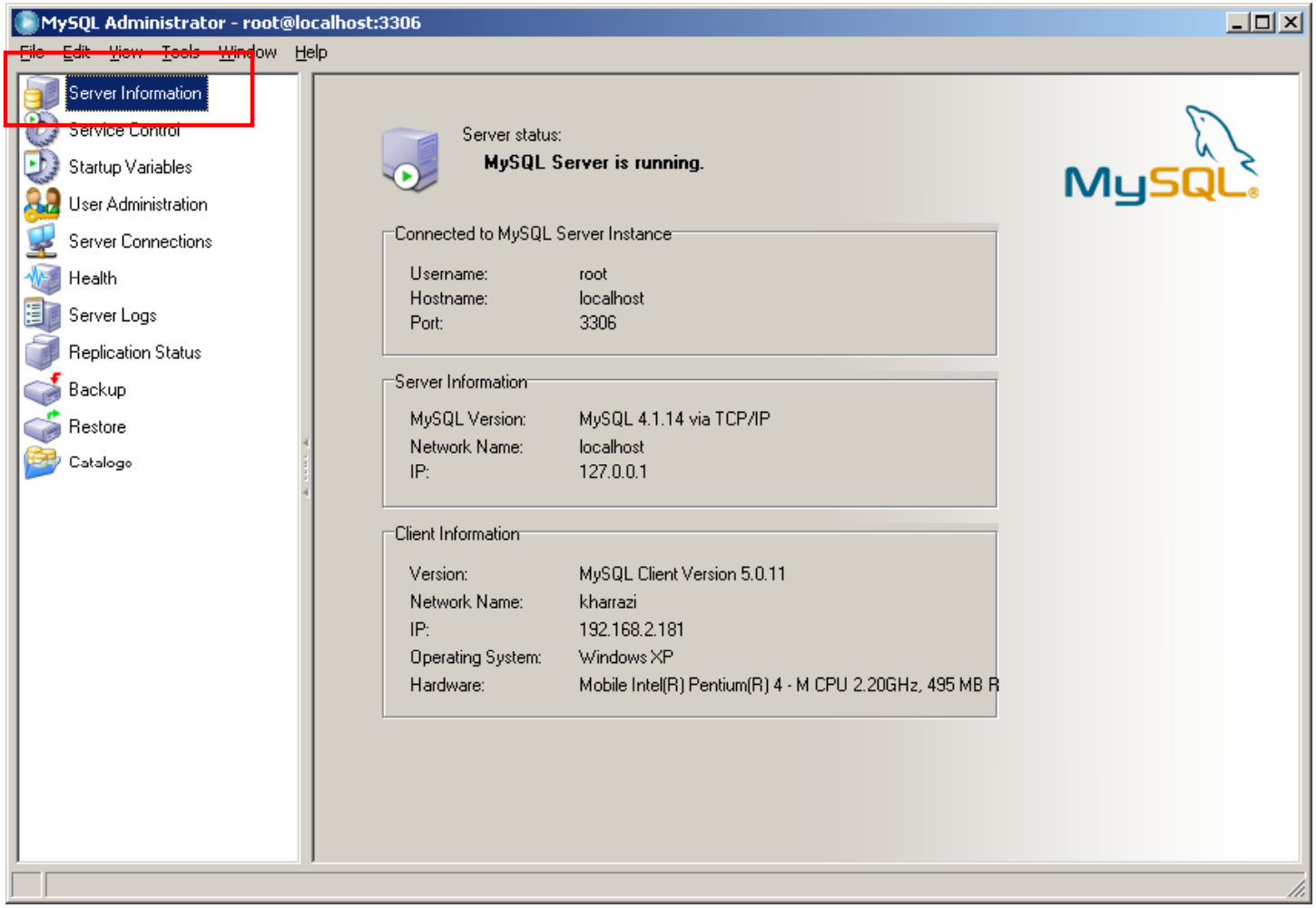
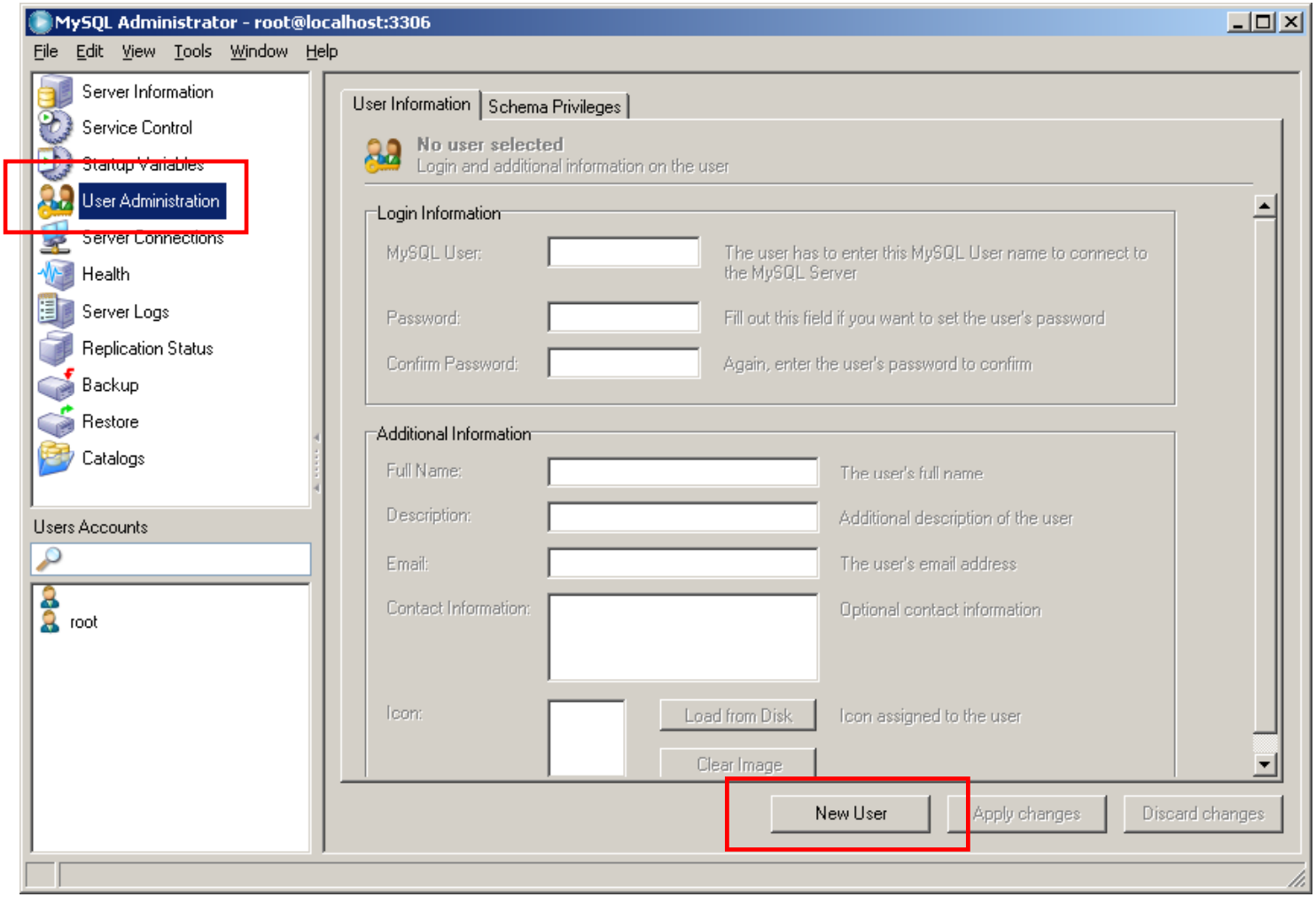
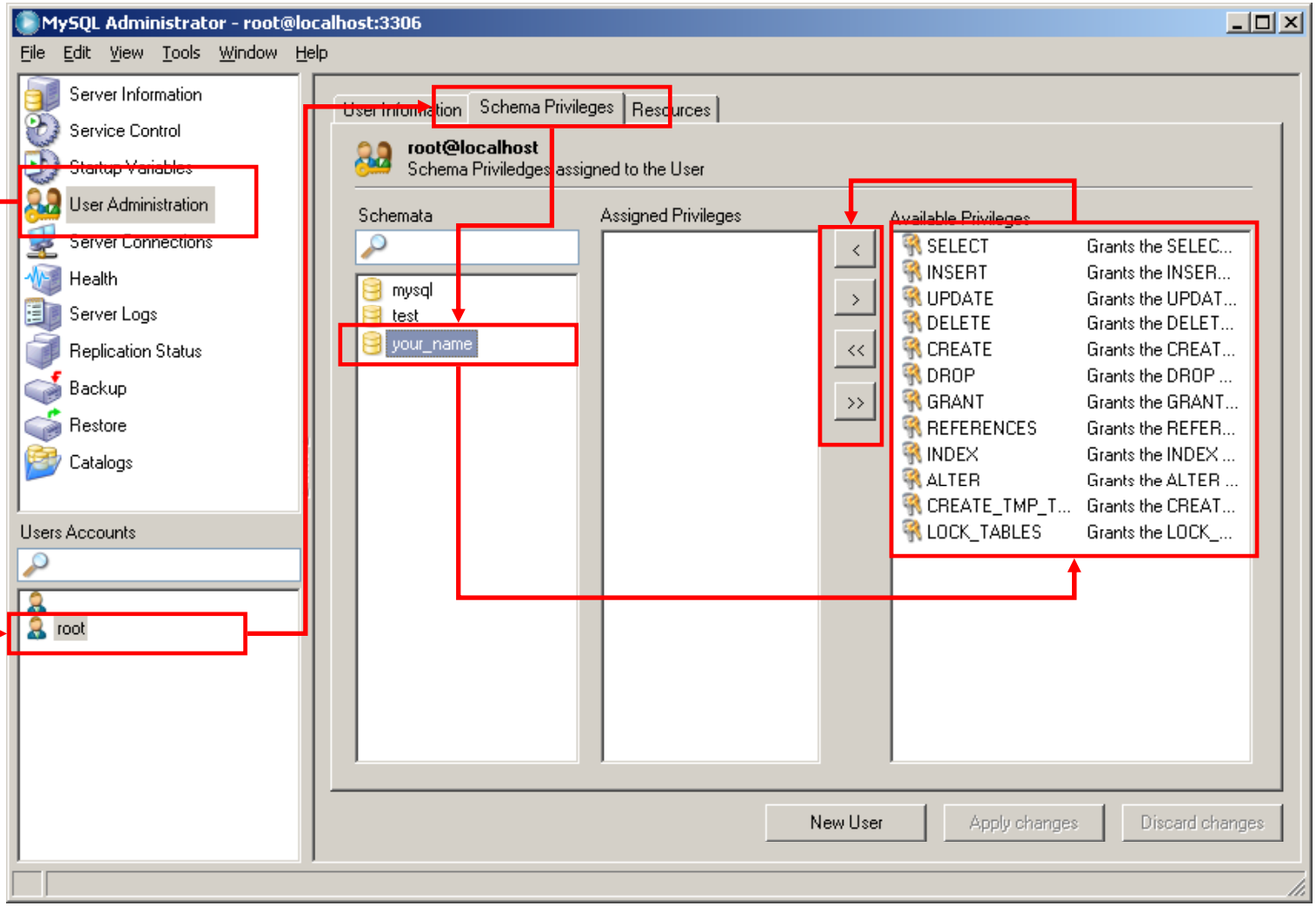
MySQL Administration (cont.)



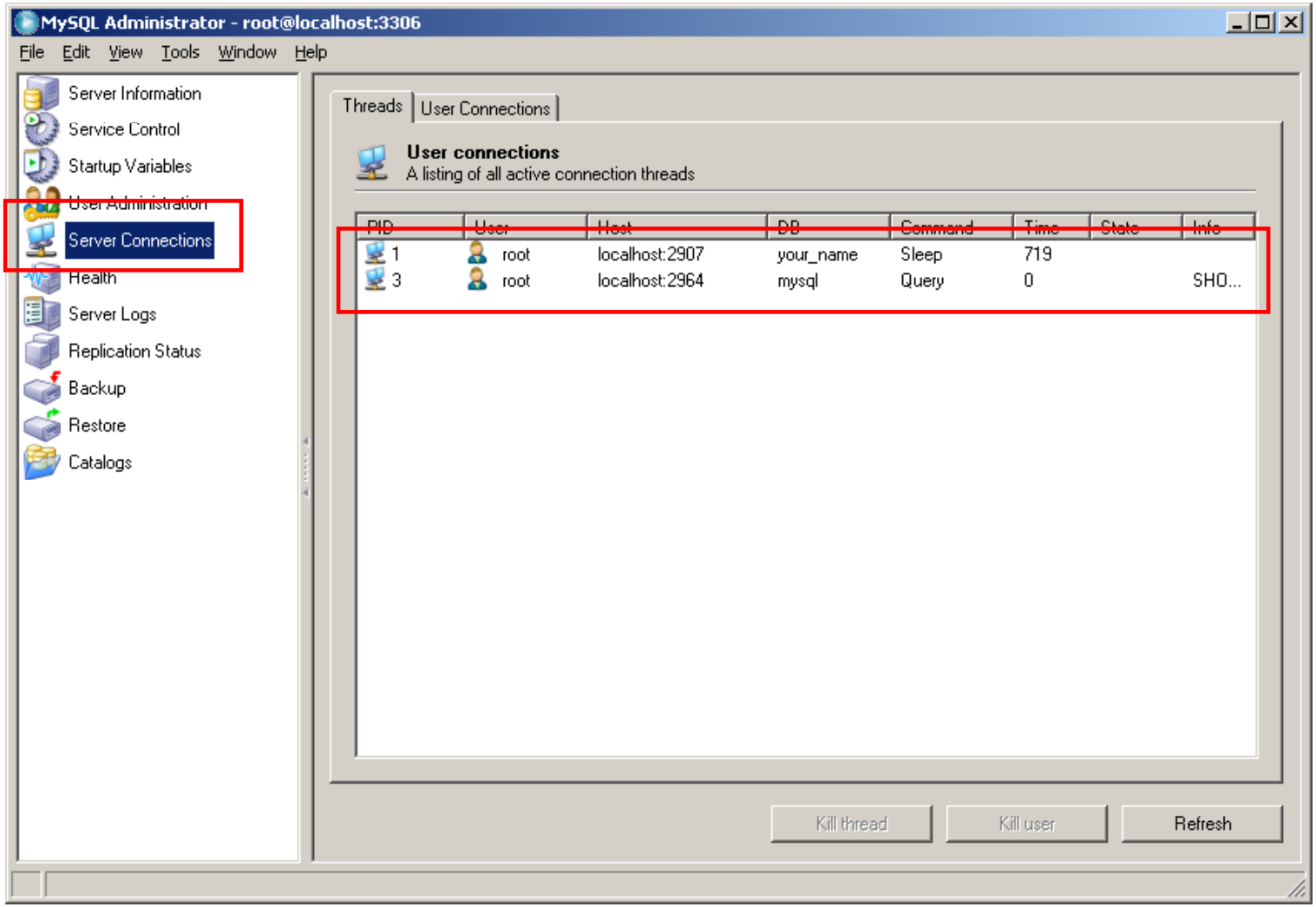
MySQL Administration (cont.)



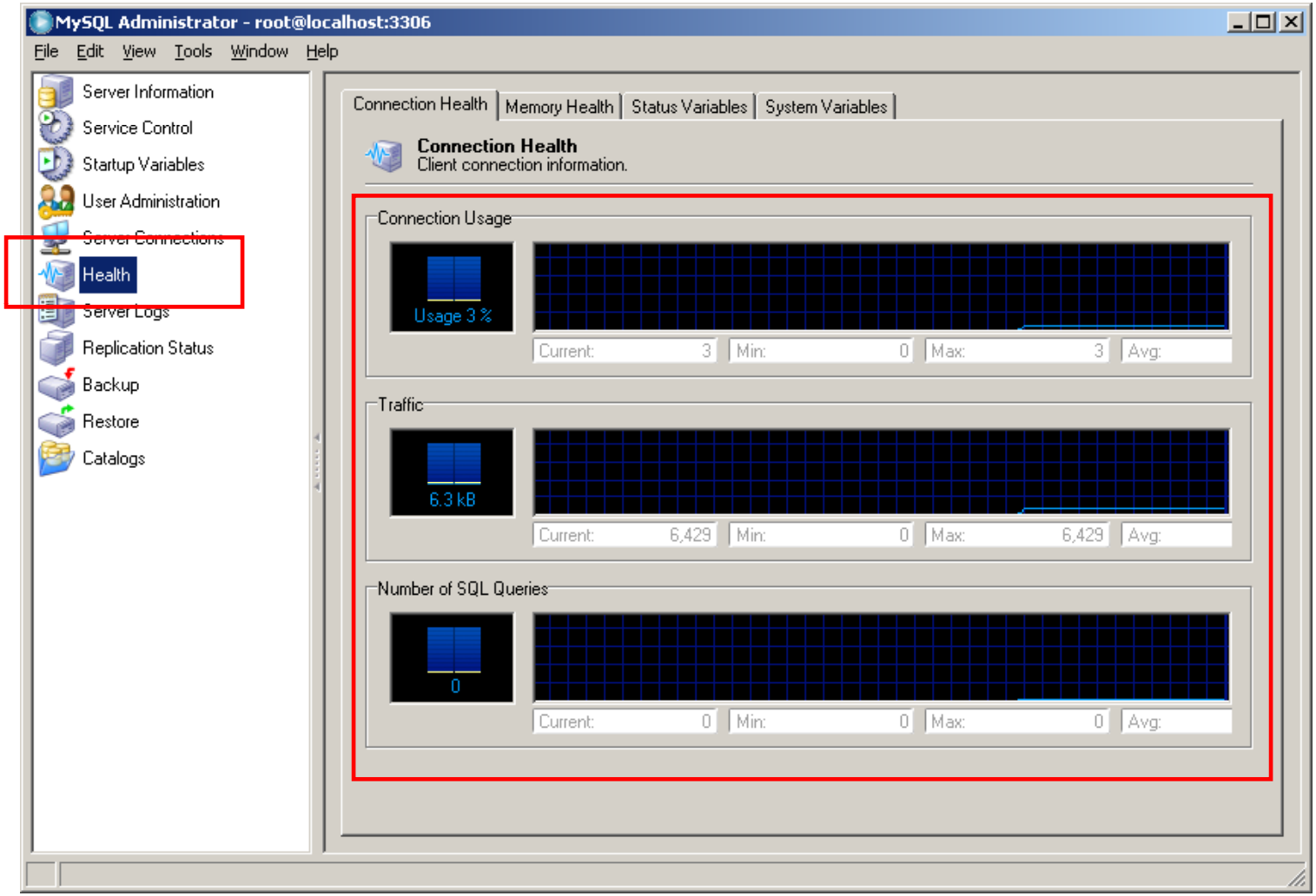
MySQL Administration (cont.)



MySQL Administration (cont.)

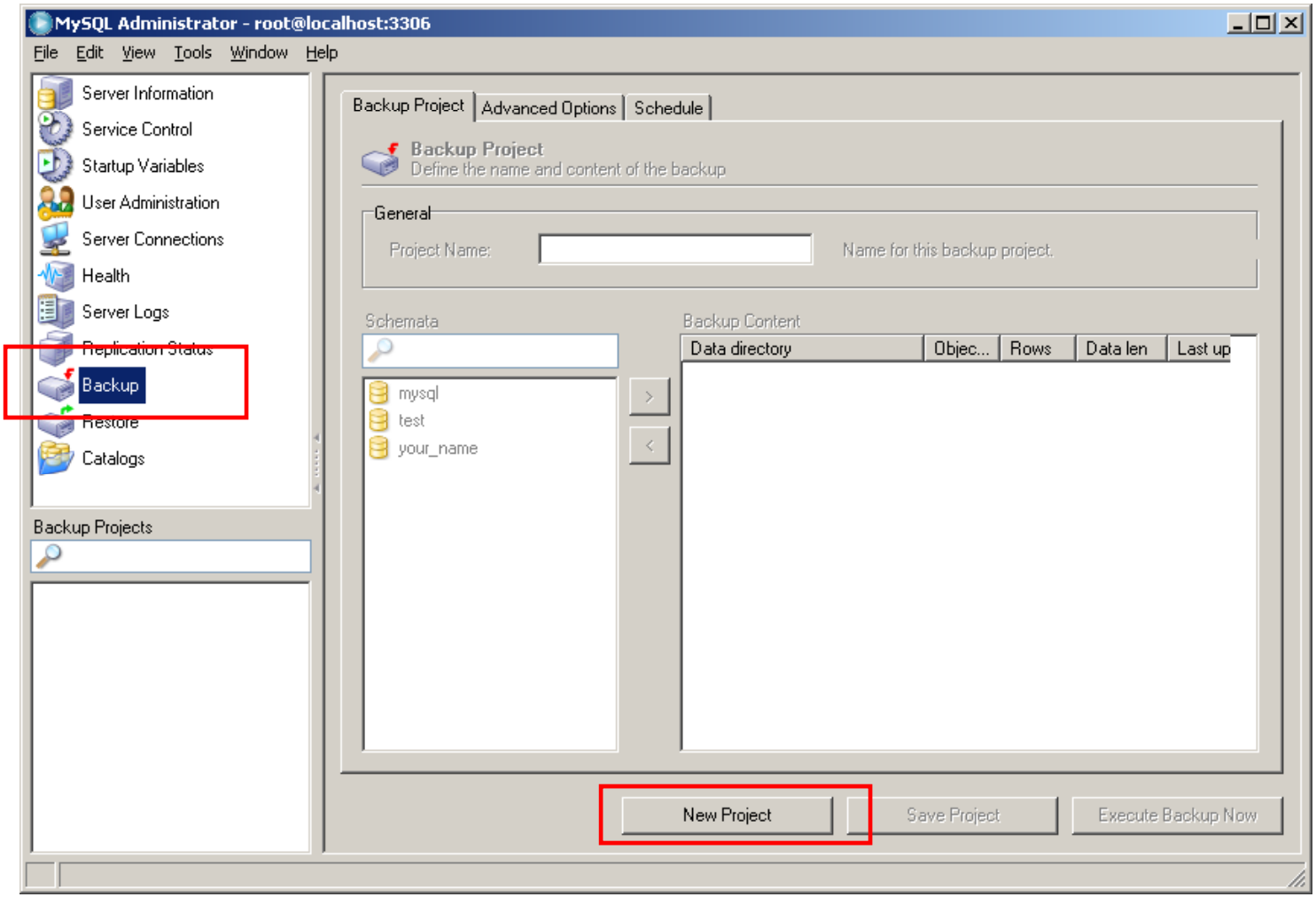


MySQL Administration (cont.)



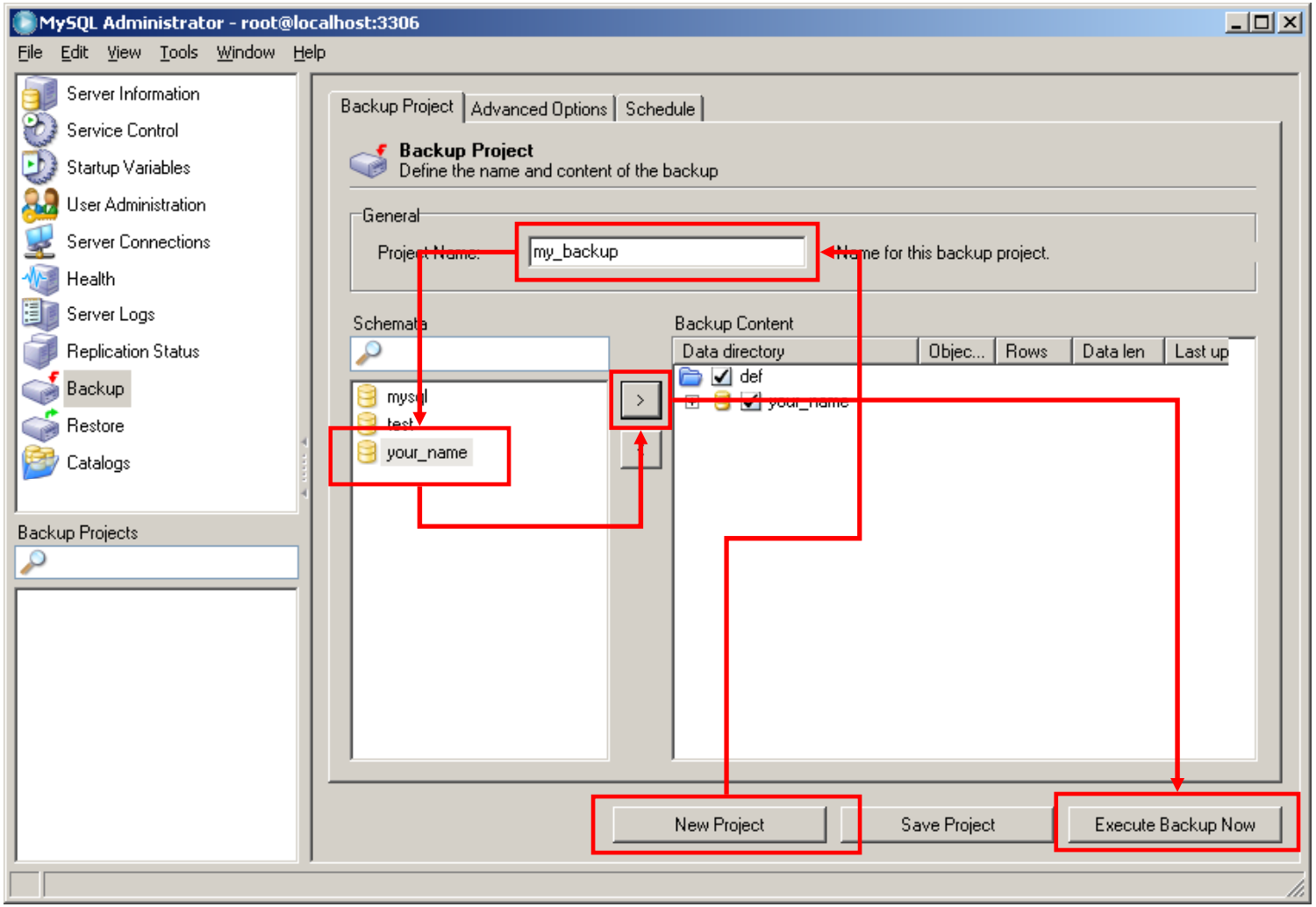
MySQL Administration (cont.)

Dumping MySQL



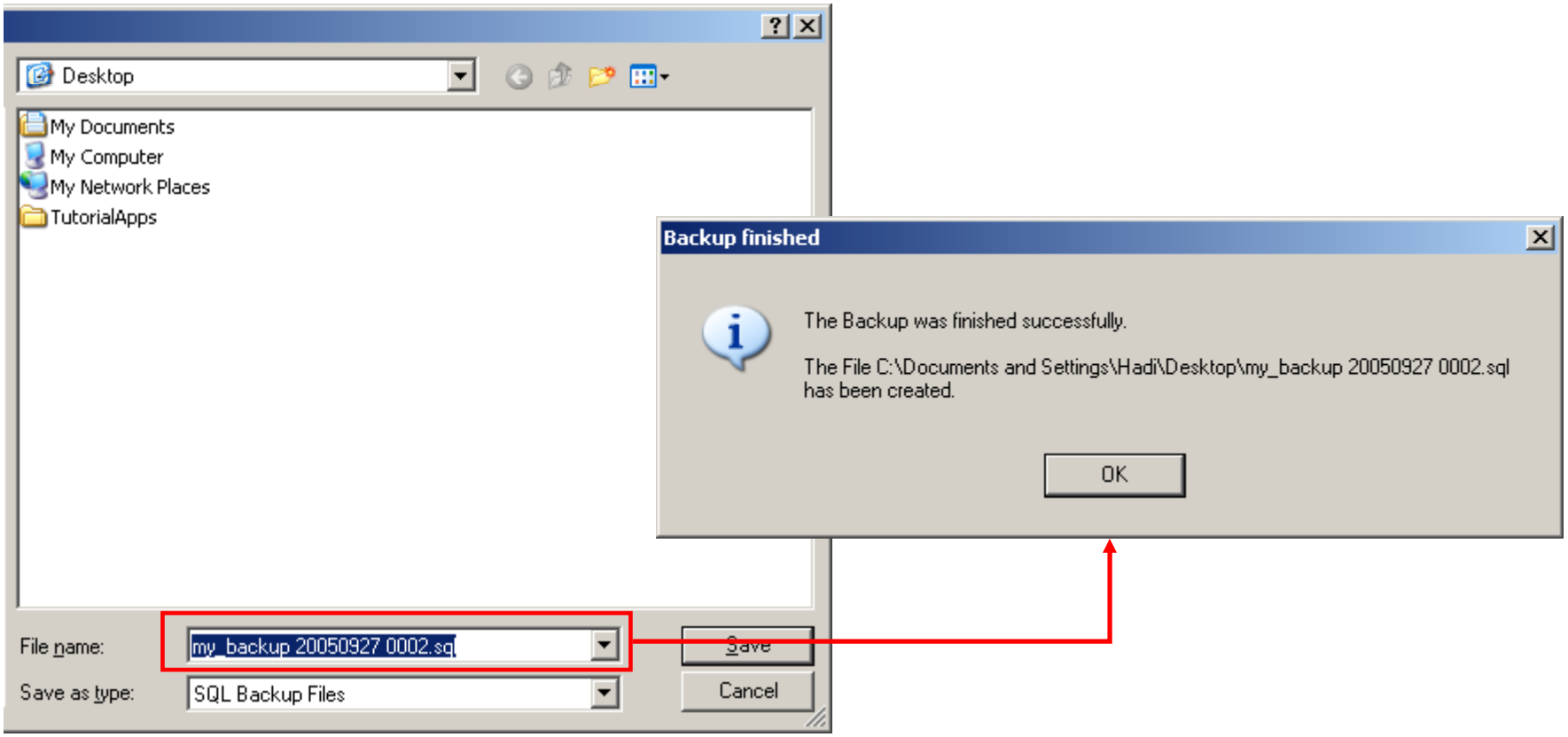
MySQL Administration (cont.)

Dumping MySQL



MySQL Administration (cont.)

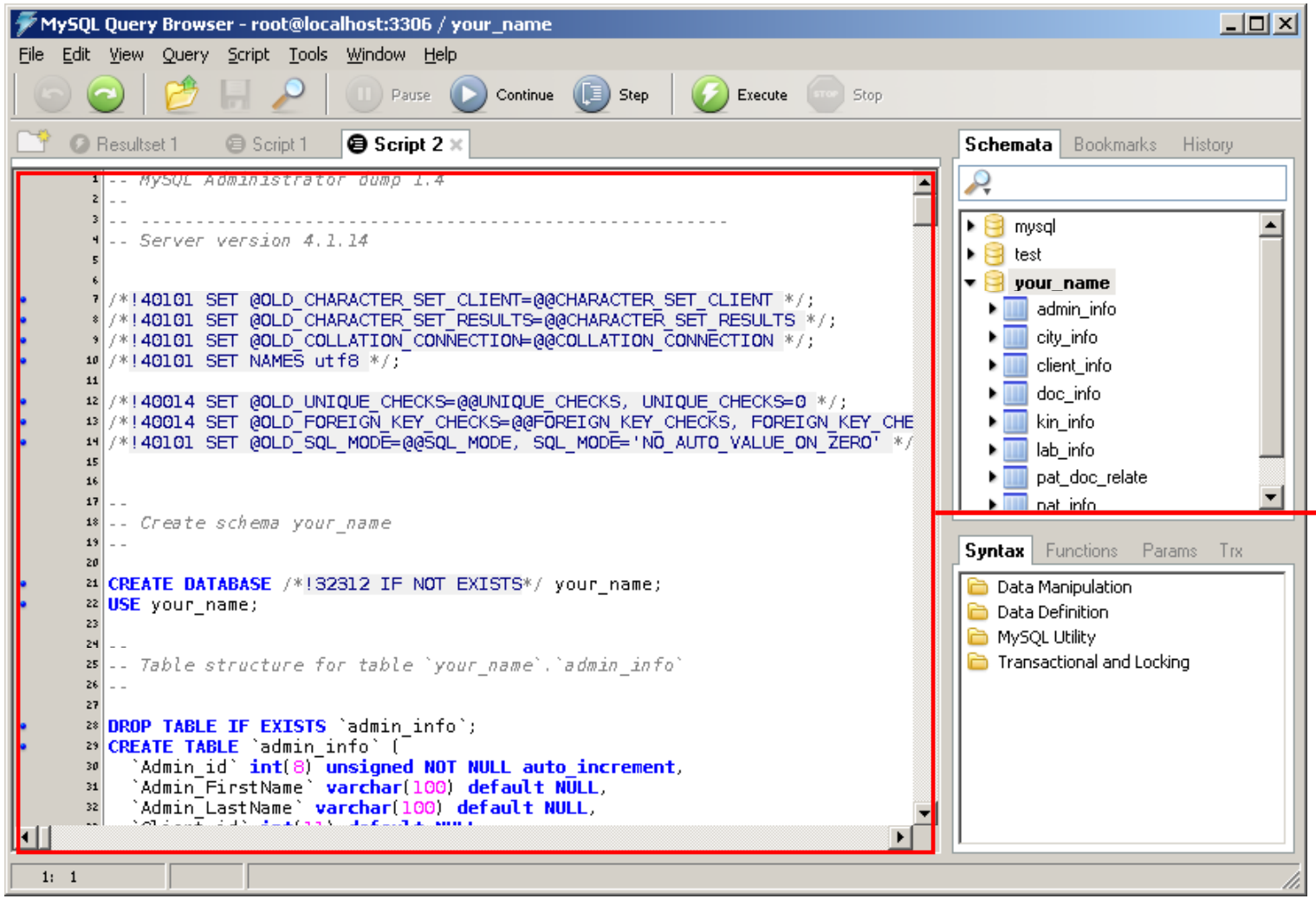
Dumping MySQL



MySQL Administration (cont.)

Dumping MySQL

Load your dump file in your MySQL browser to see its content



Dump File

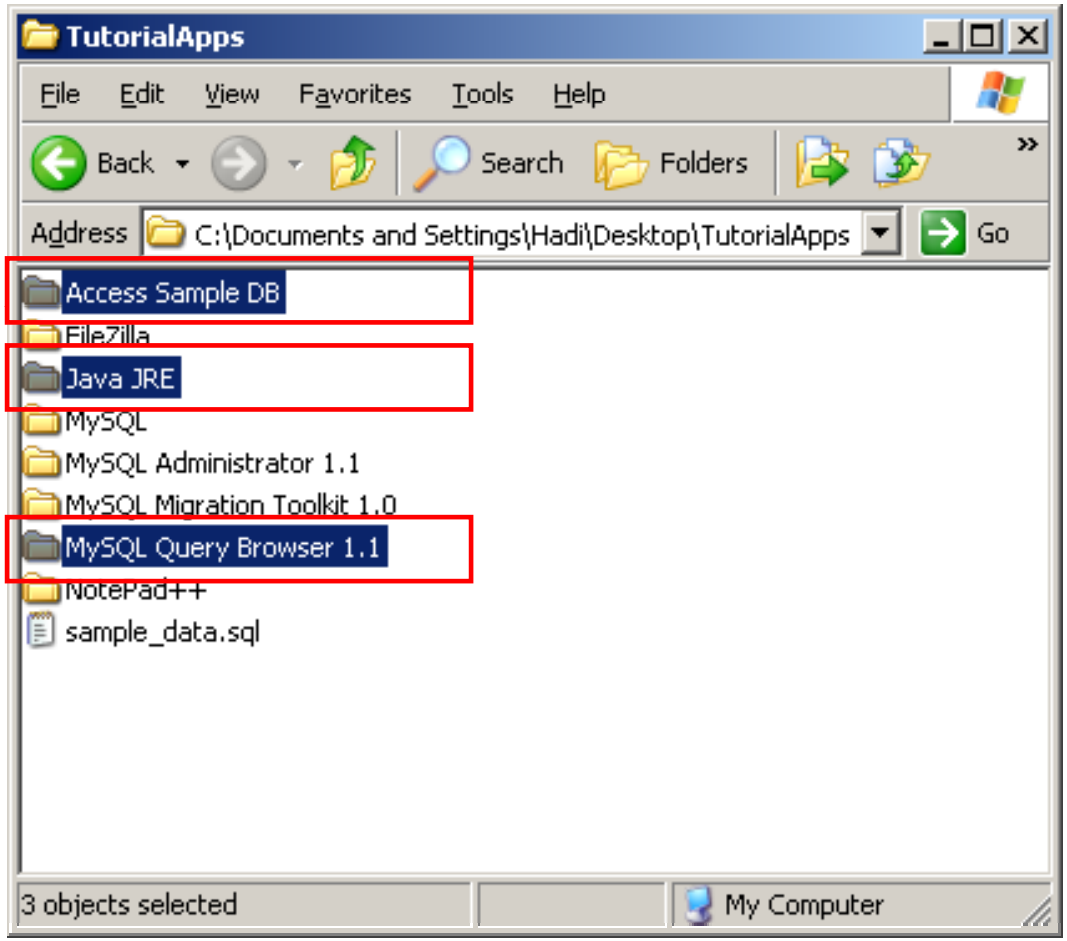
6. MySQL Migration Tool

- 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.

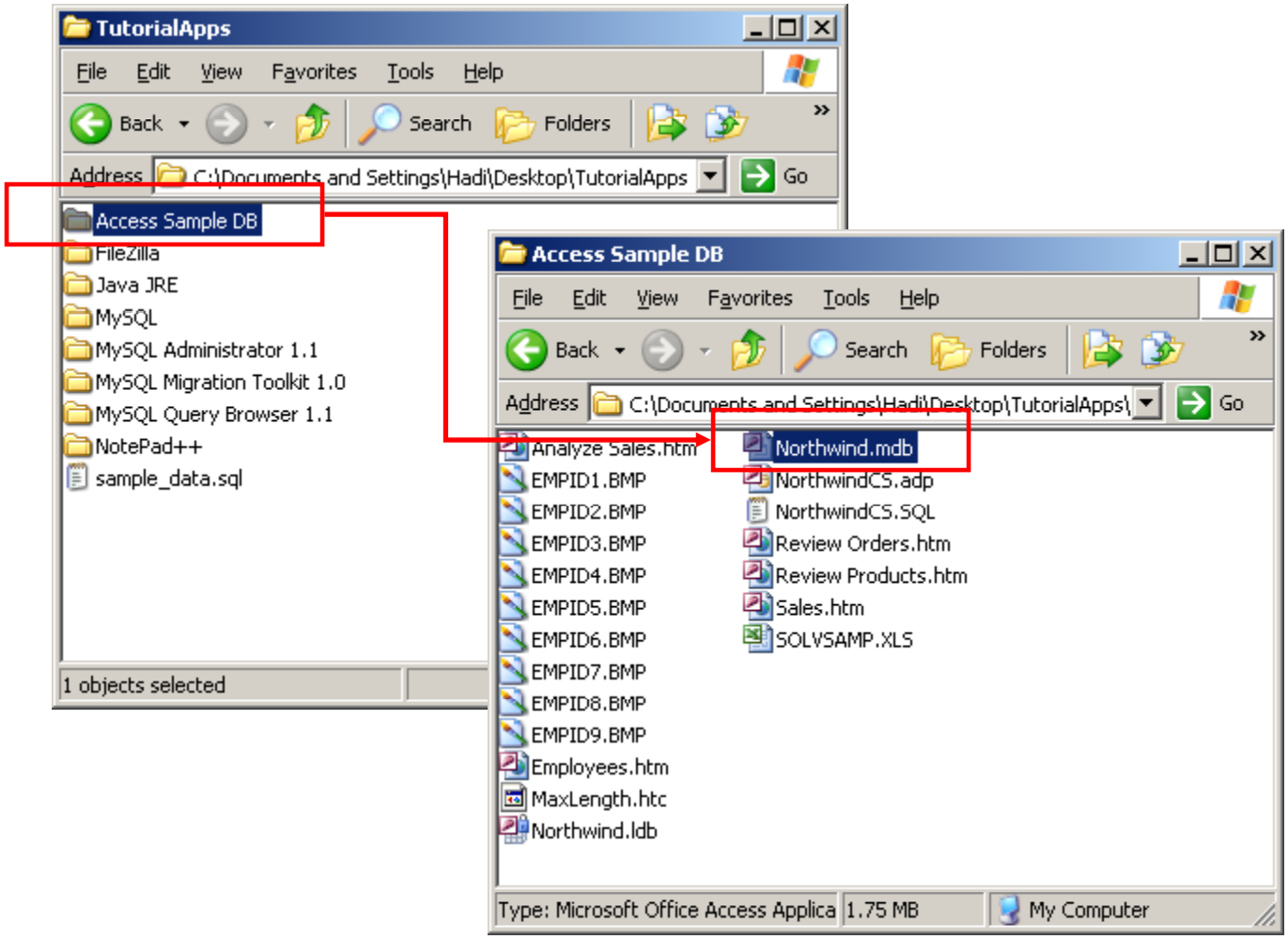
- In order to work with MySQL Migration Tool, JRE (JAVA Runtime Environment) should be installed on your PC. Your PCs in the CS lab probably have the JRE installed already.

- We also need an Microsoft Access database to show the conversion (migration) from Access database (.mdb) to MySQL database format.

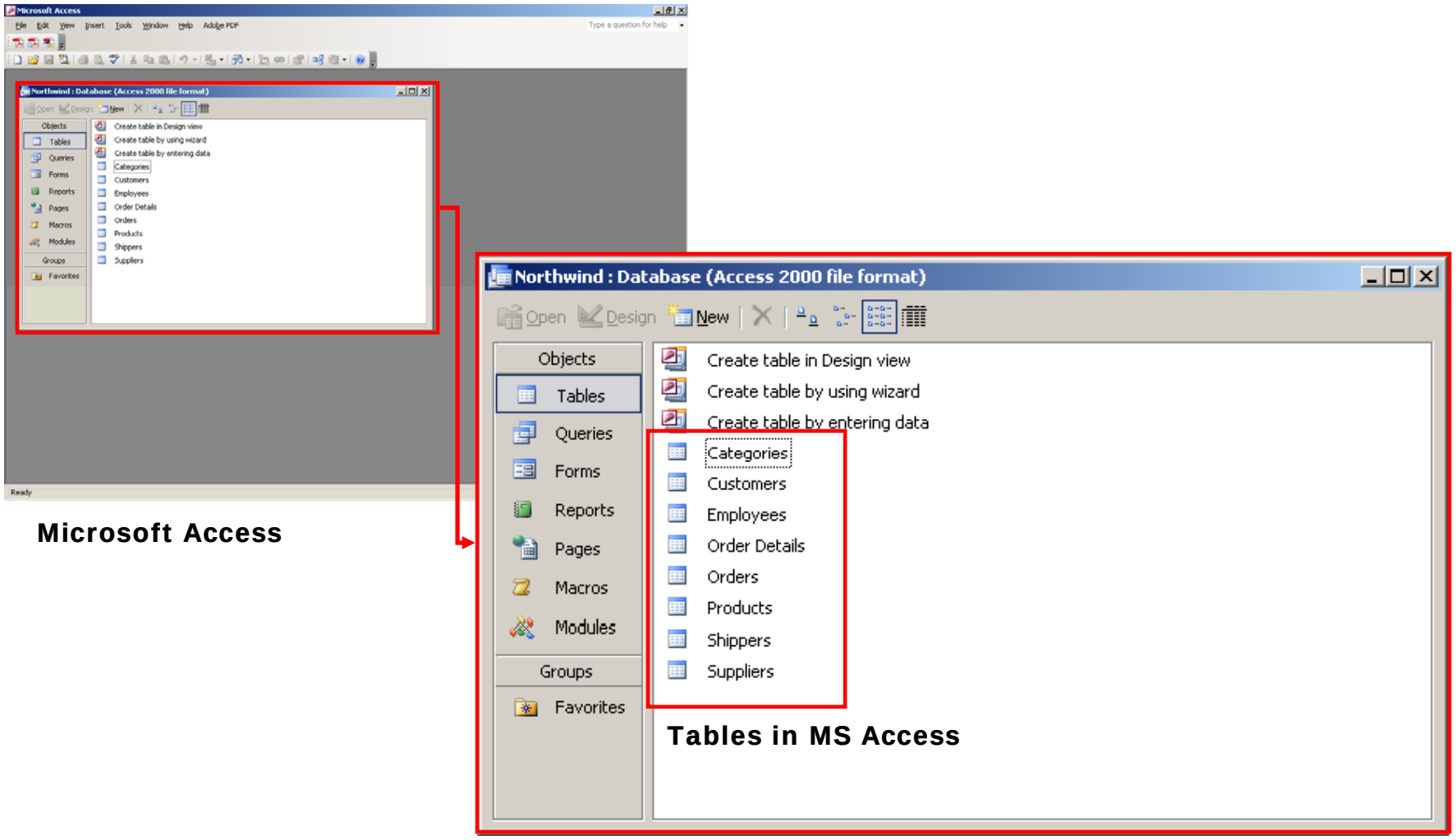
MySQL Migration Tool (cont.)



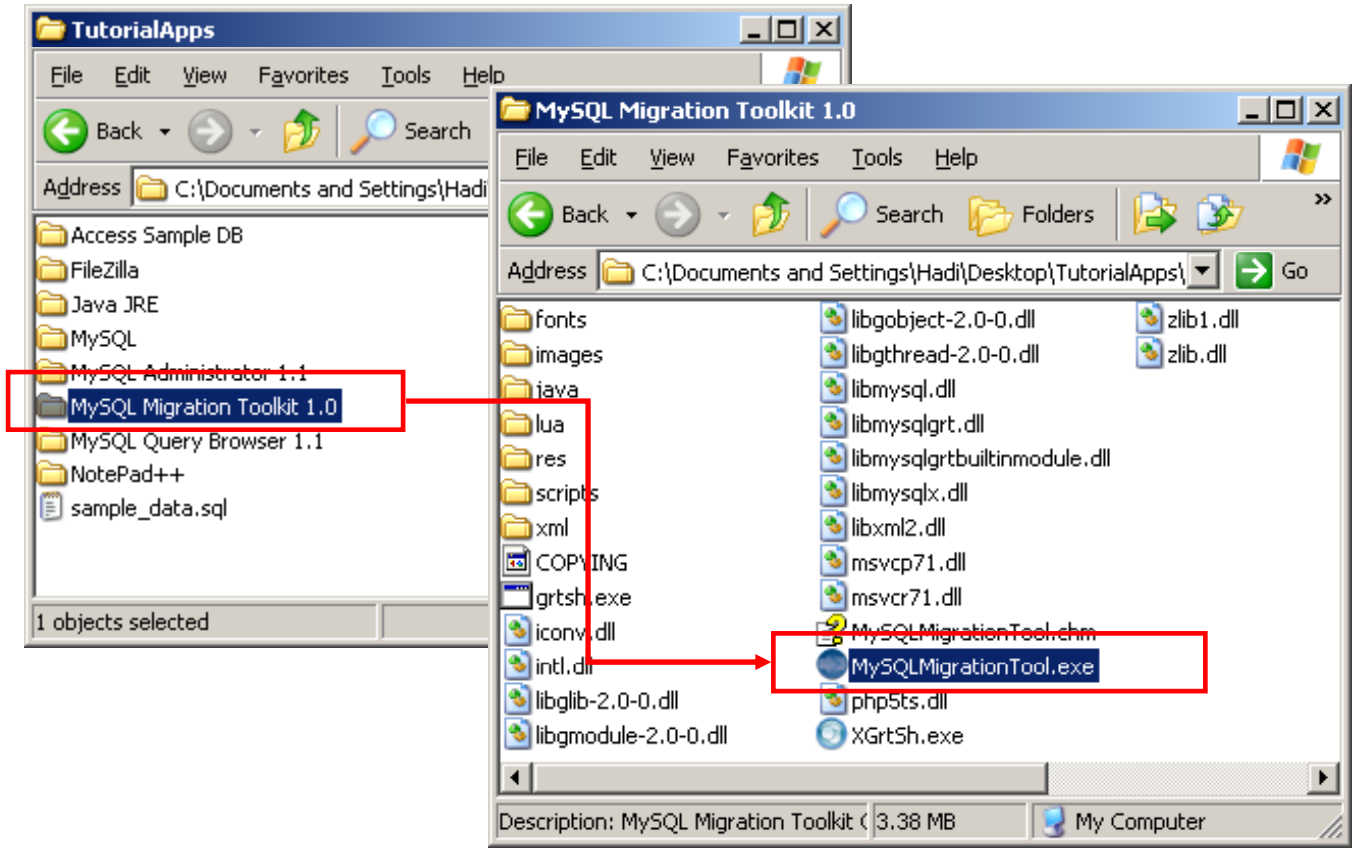
MySQL Migration Tool (cont.)



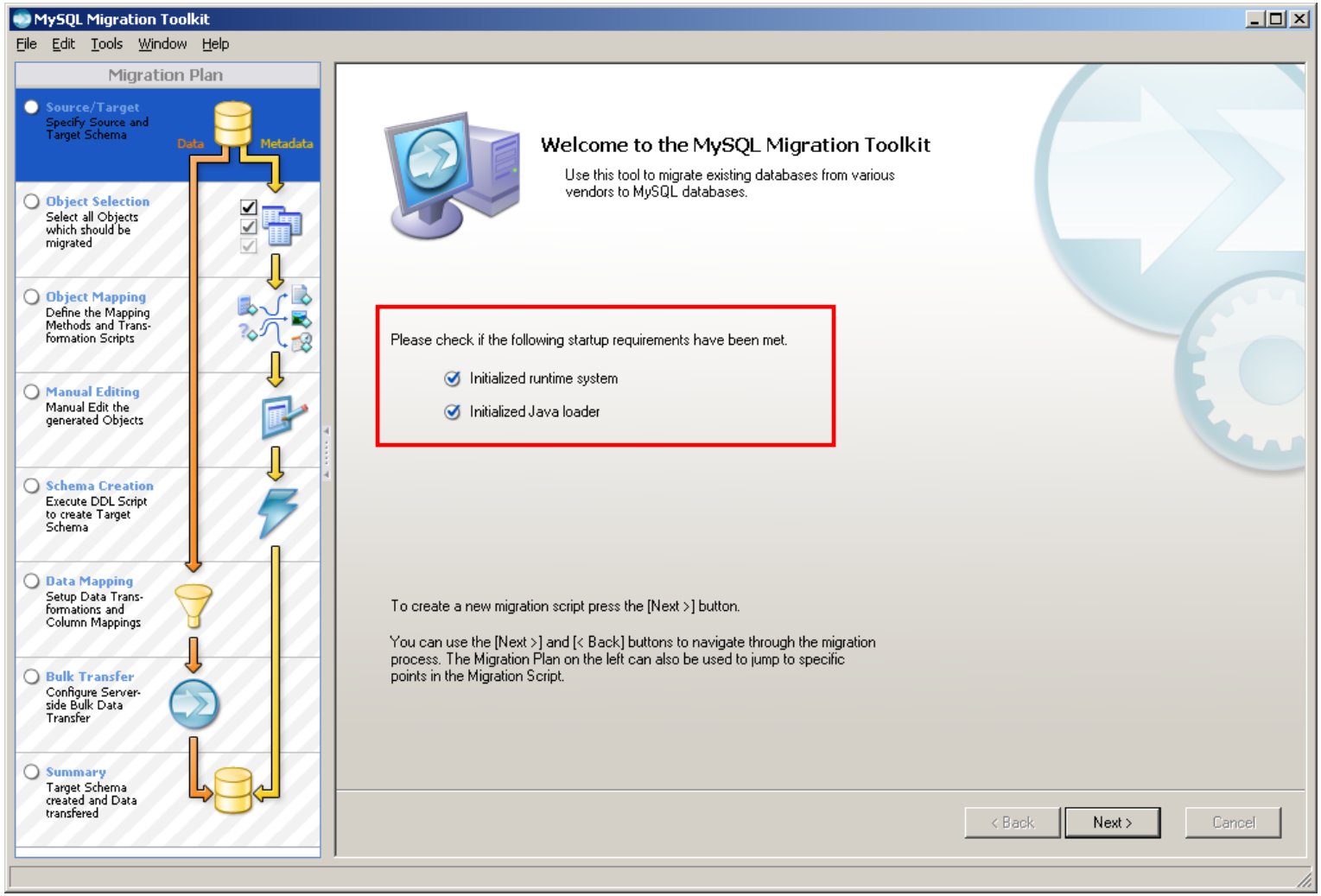
MySQL Migration Tool (cont.)



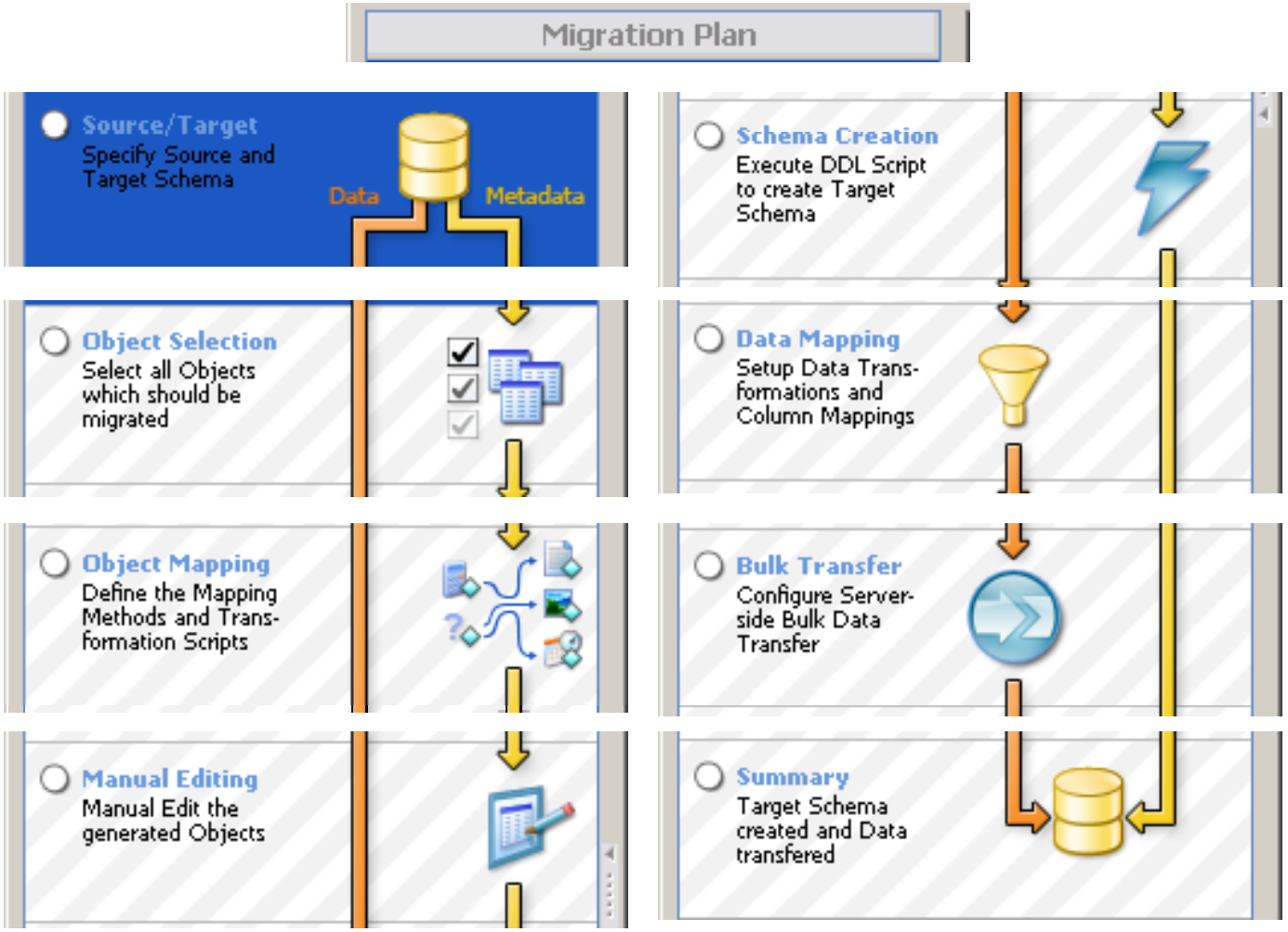
MySQL Migration Tool (cont.)



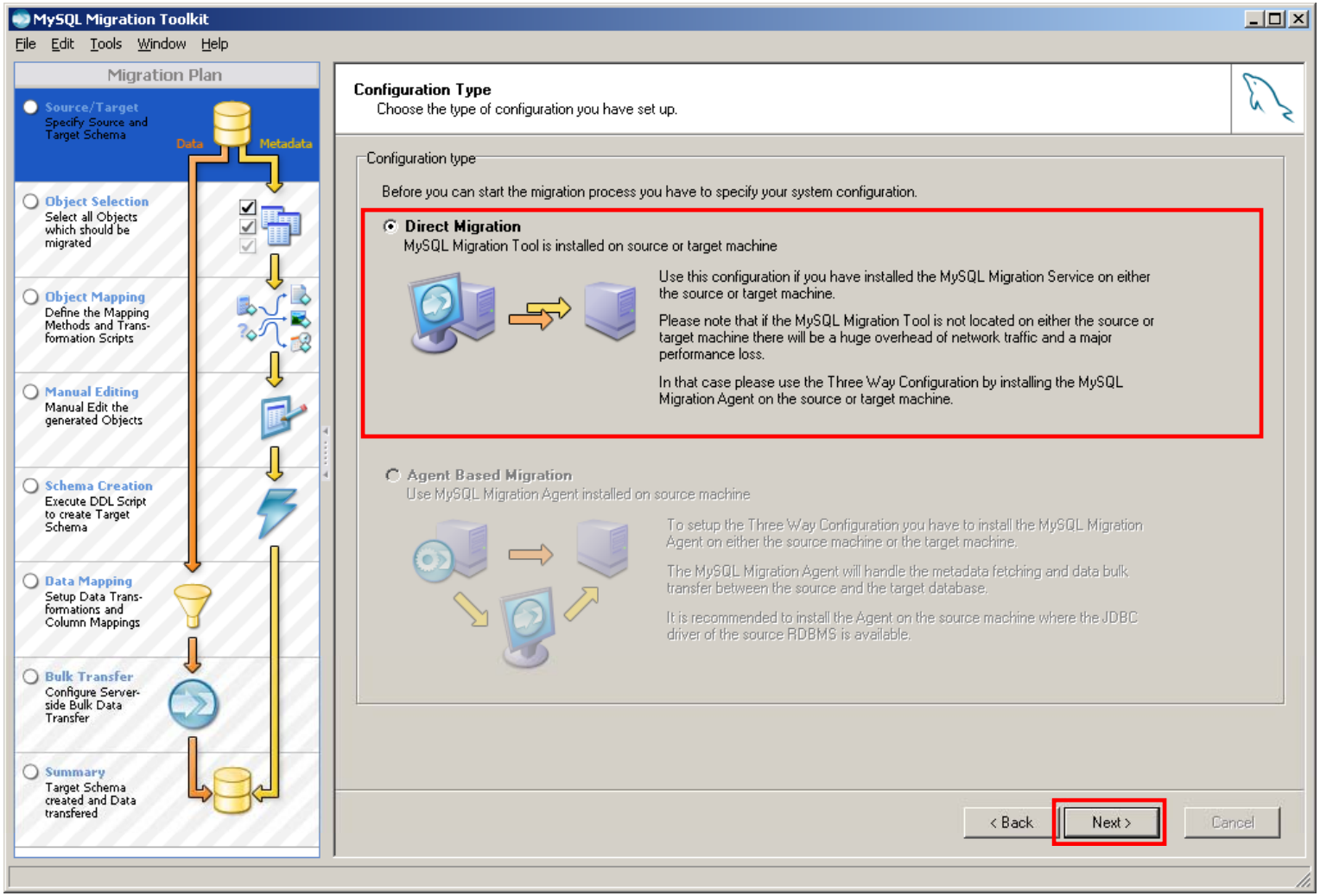
MySQL Migration Tool (cont.)



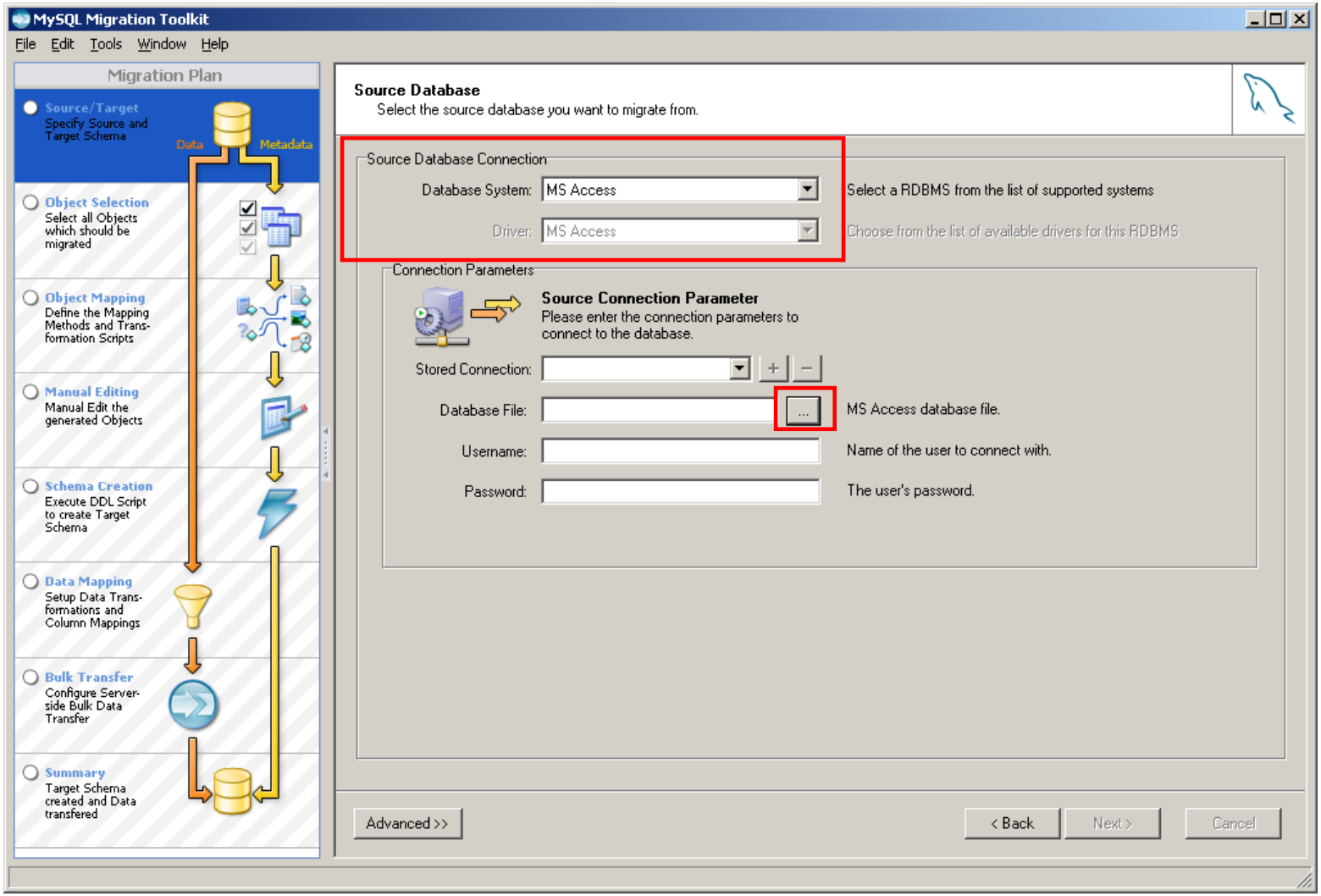
MySQL Migration Tool (cont.)



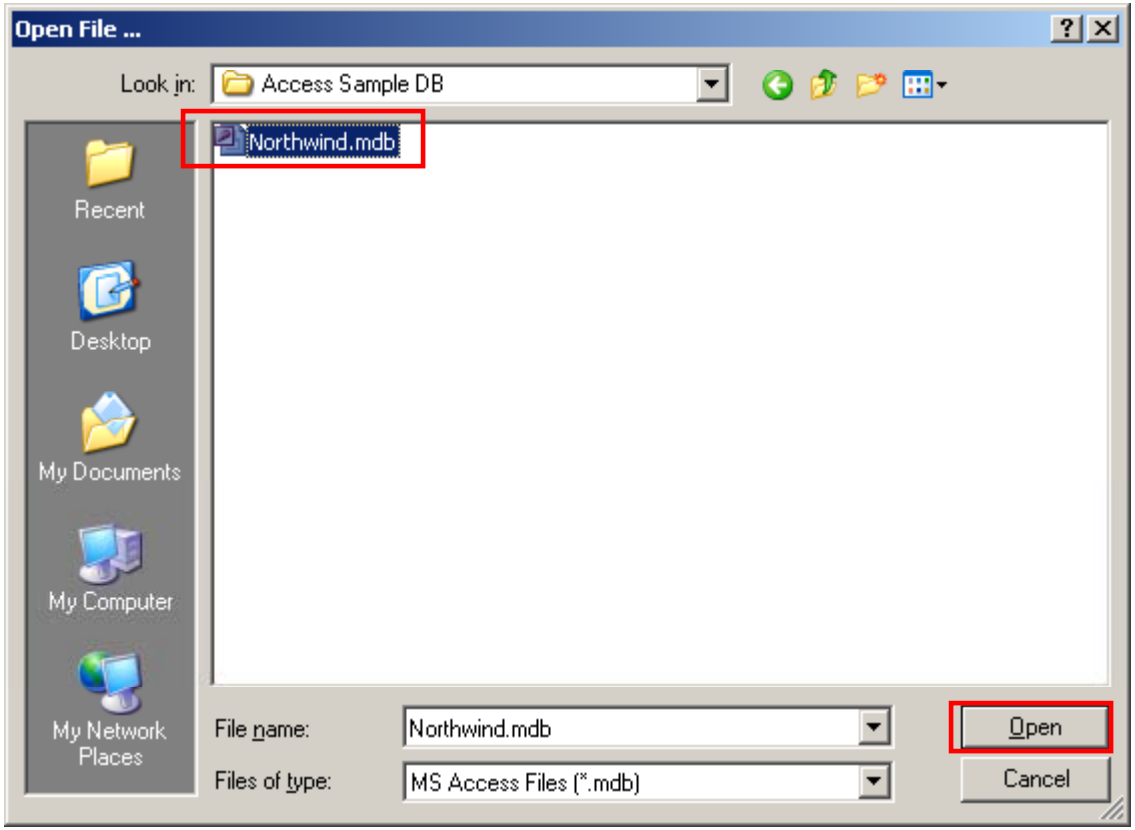
MySQL Migration Tool (cont.)



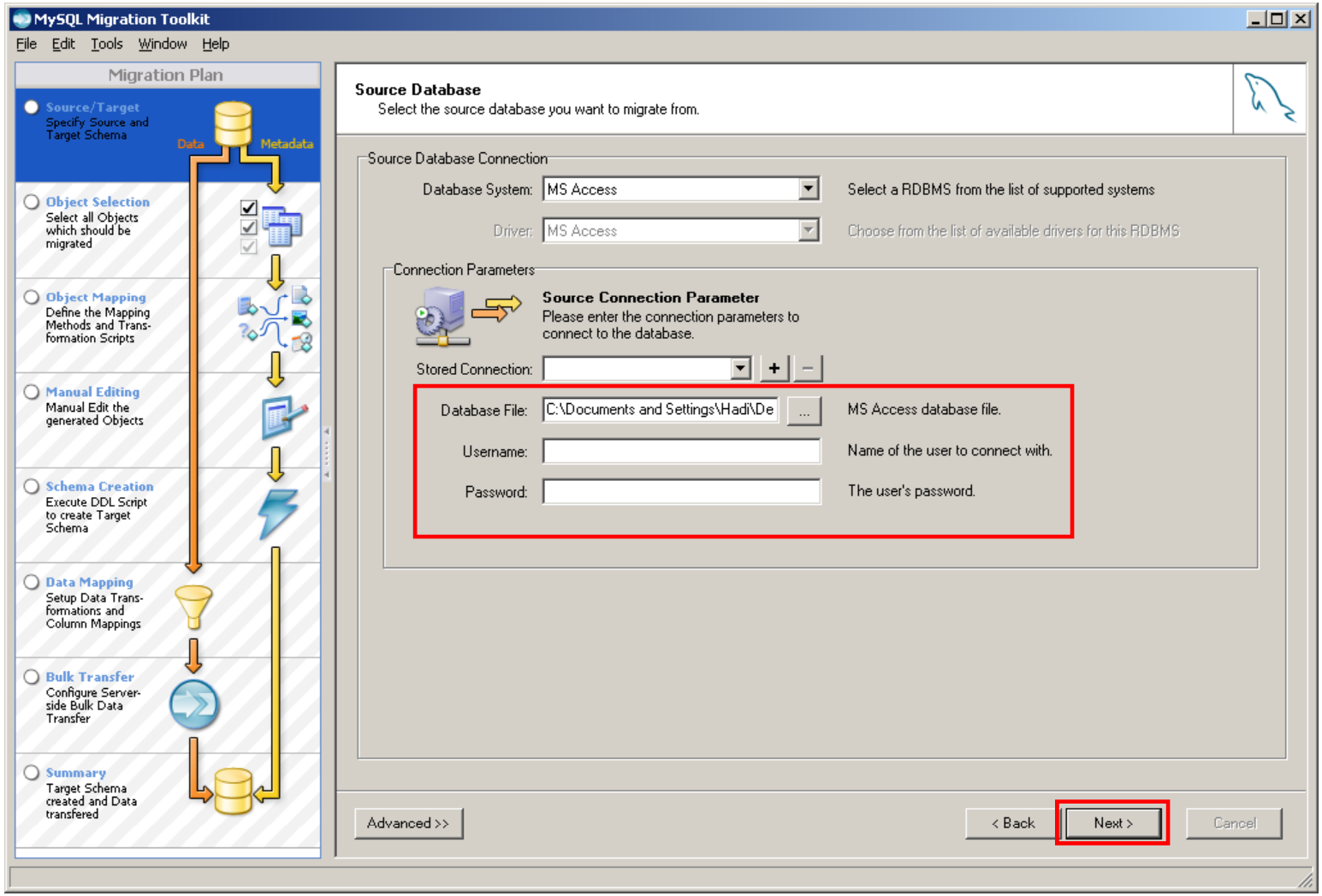
MySQL Migration Tool (cont.)



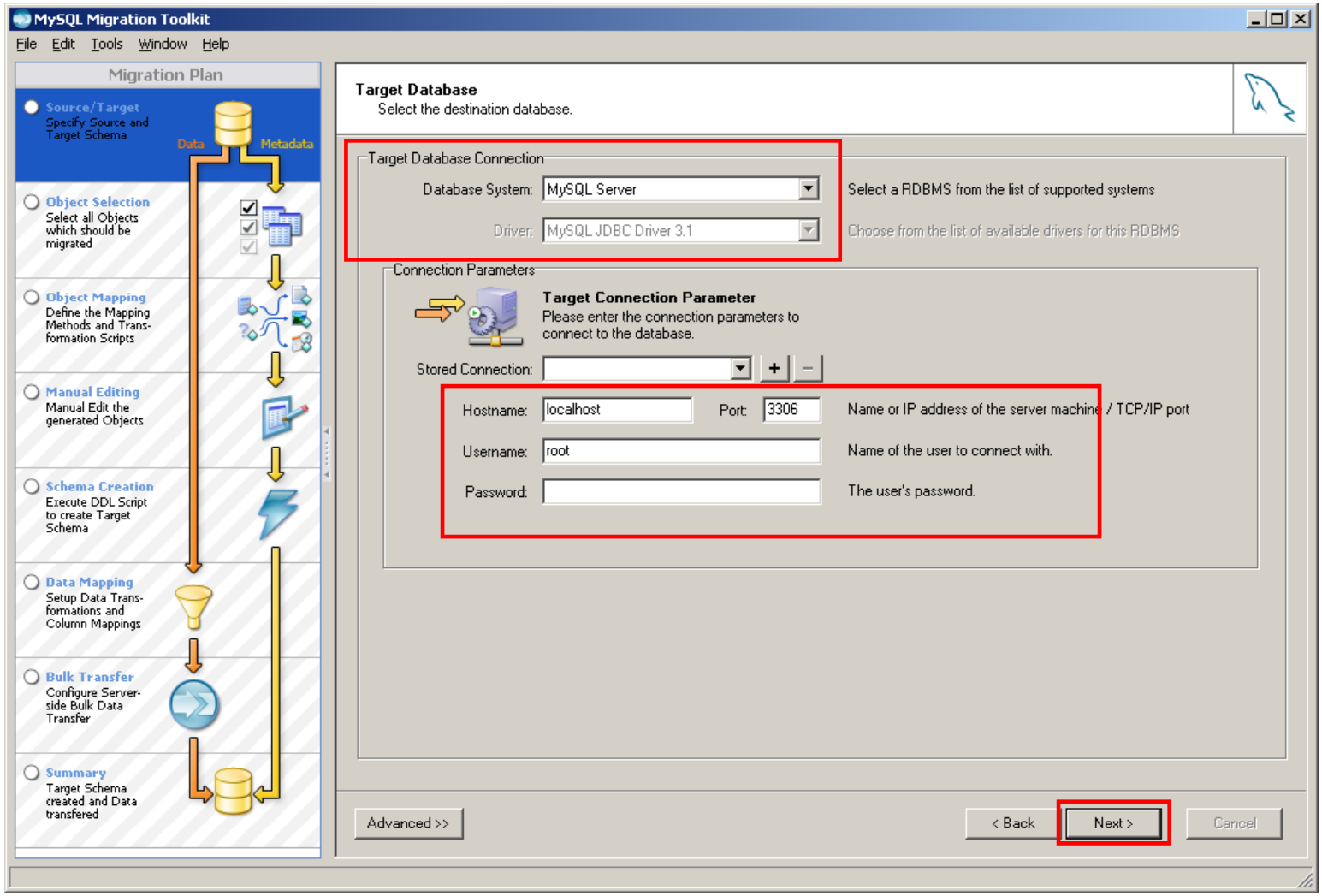
MySQL Migration Tool (cont.)



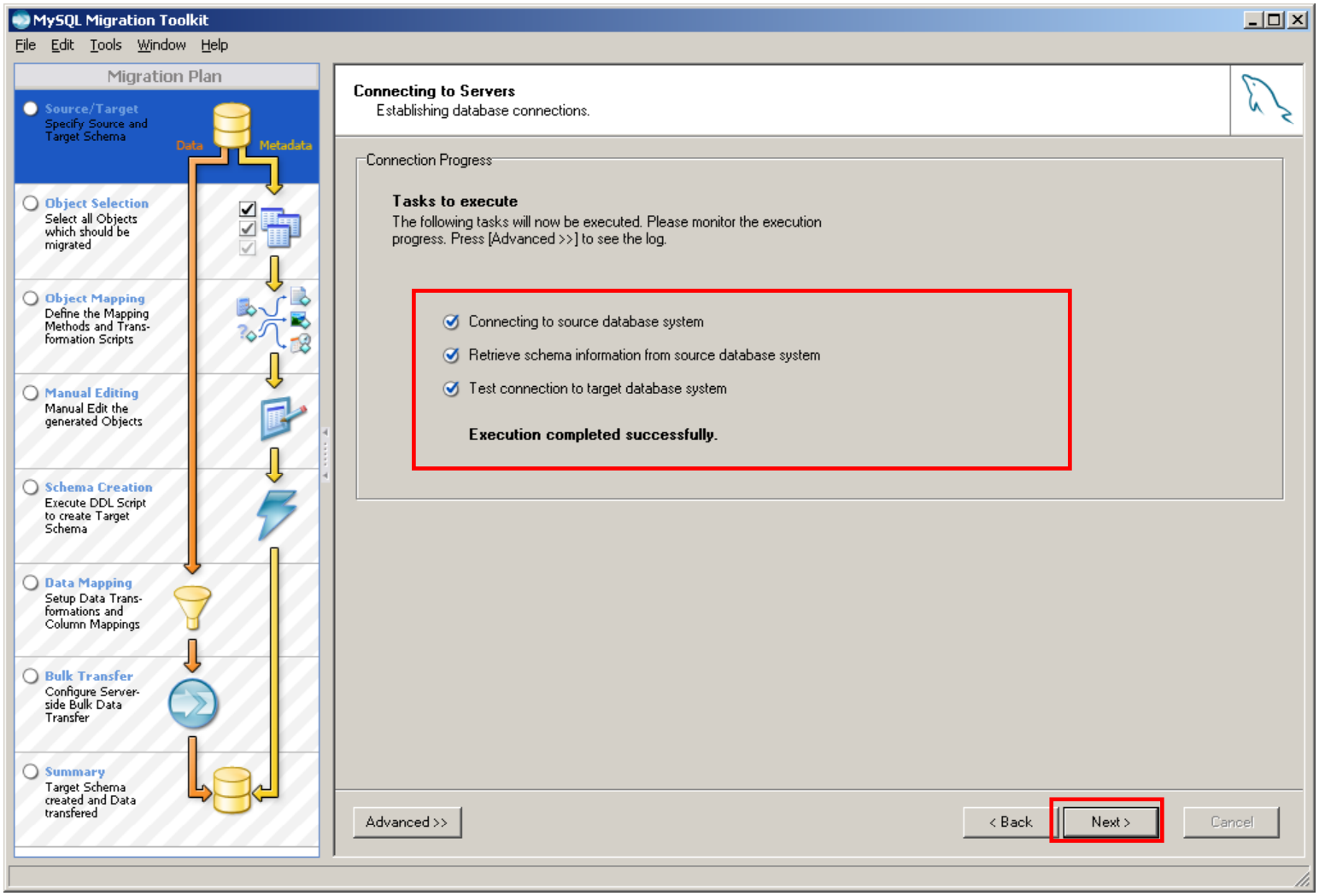
MySQL Migration Tool (cont.)



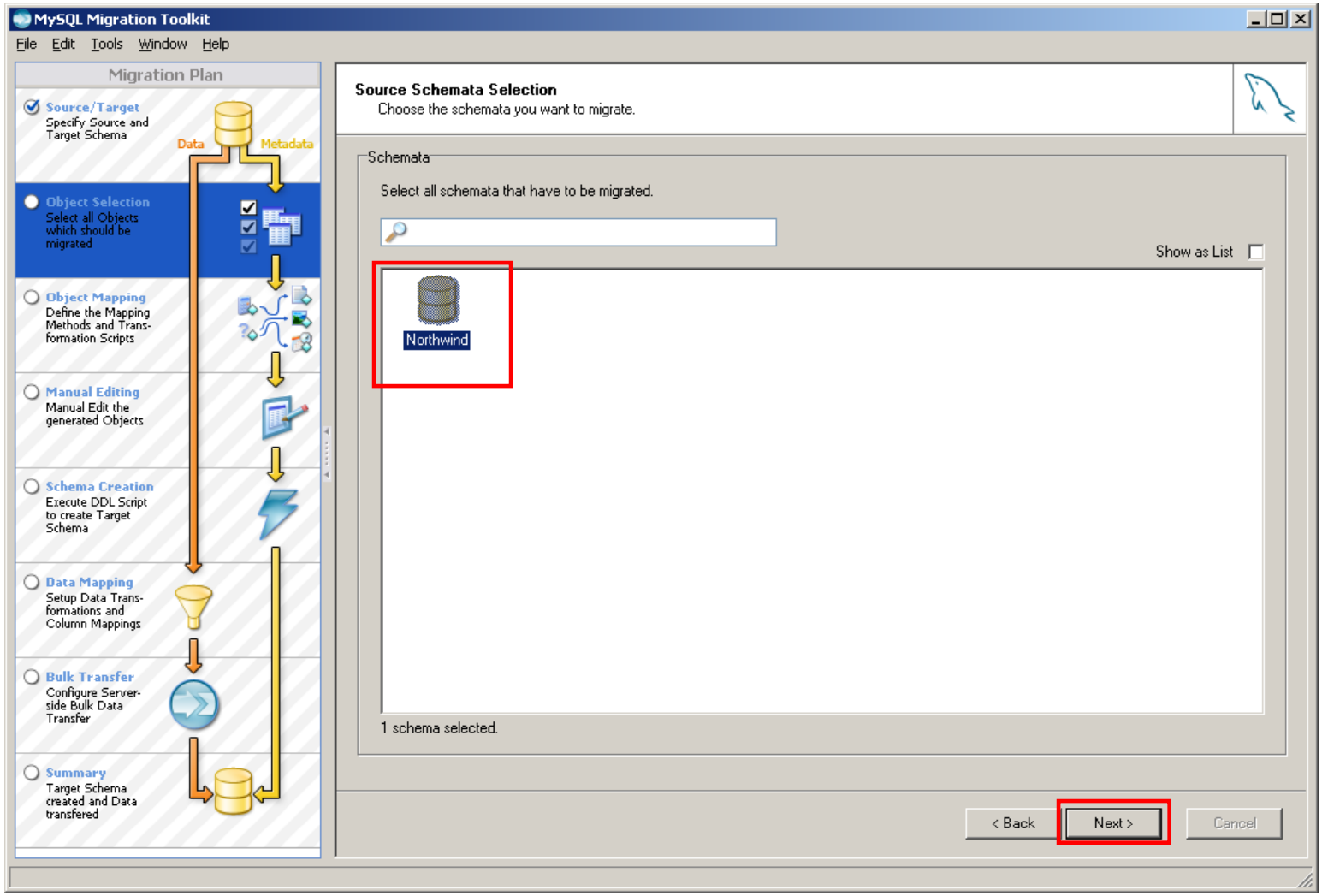
MySQL Migration Tool (cont.)



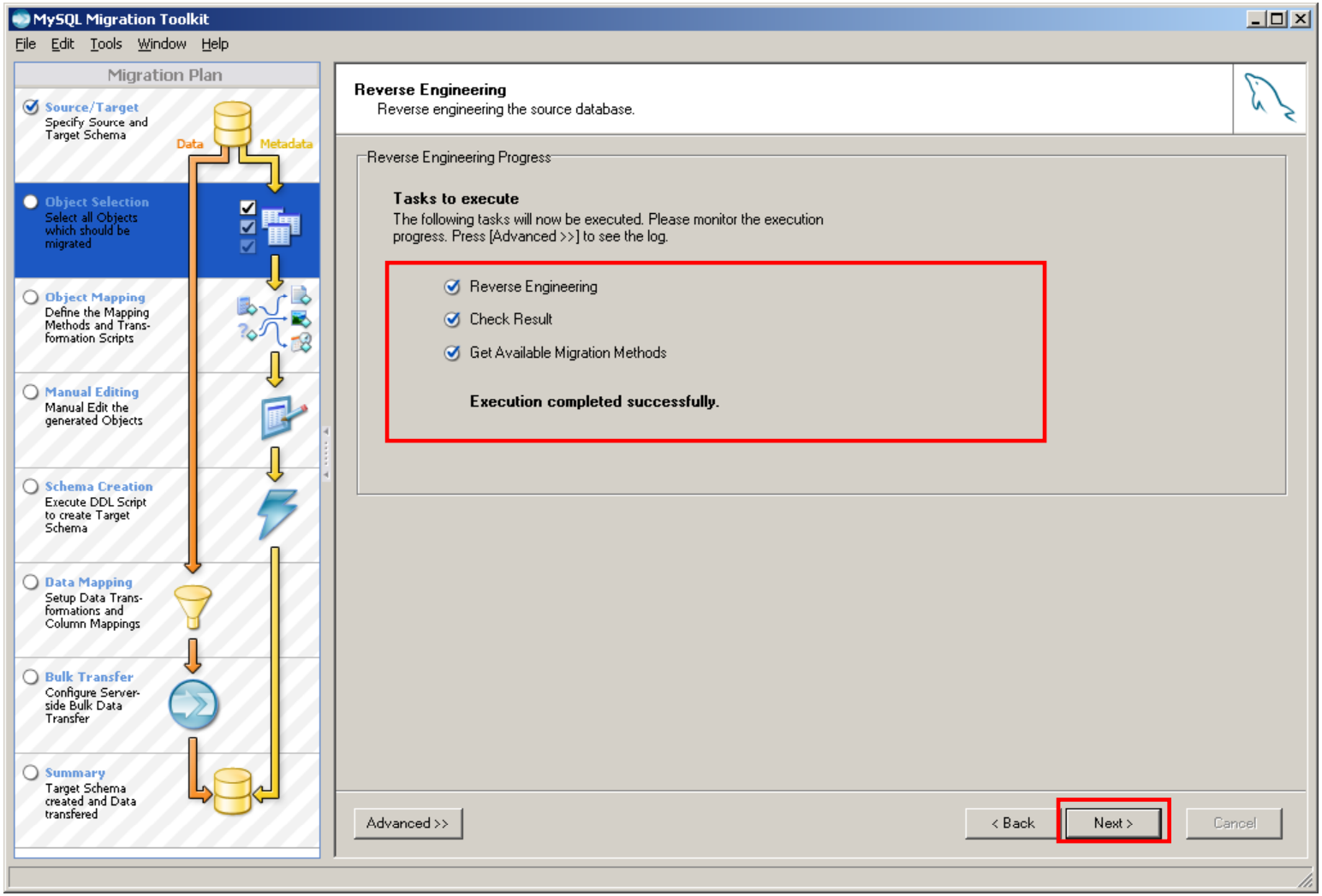
MySQL Migration Tool (cont.)



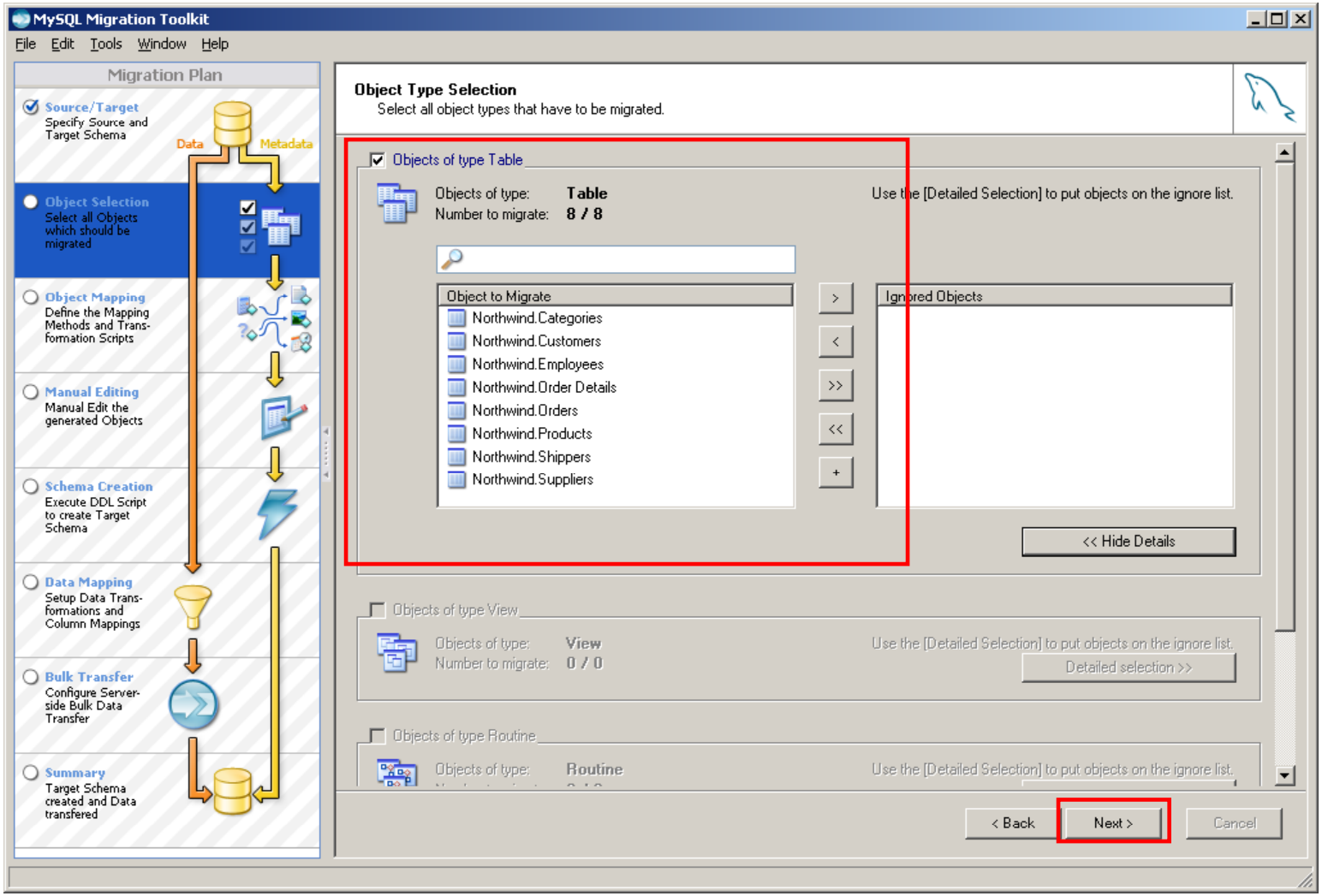
MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



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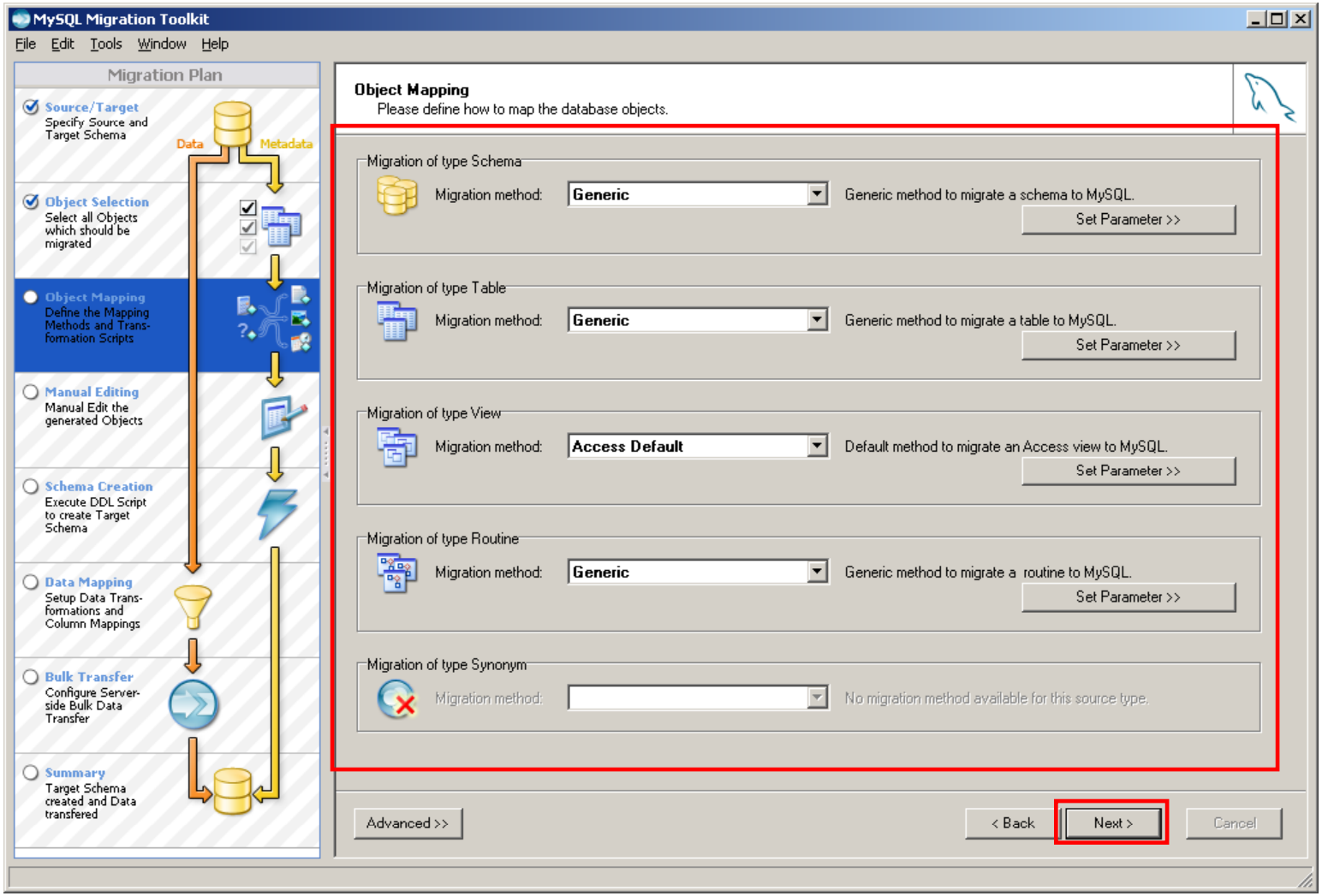
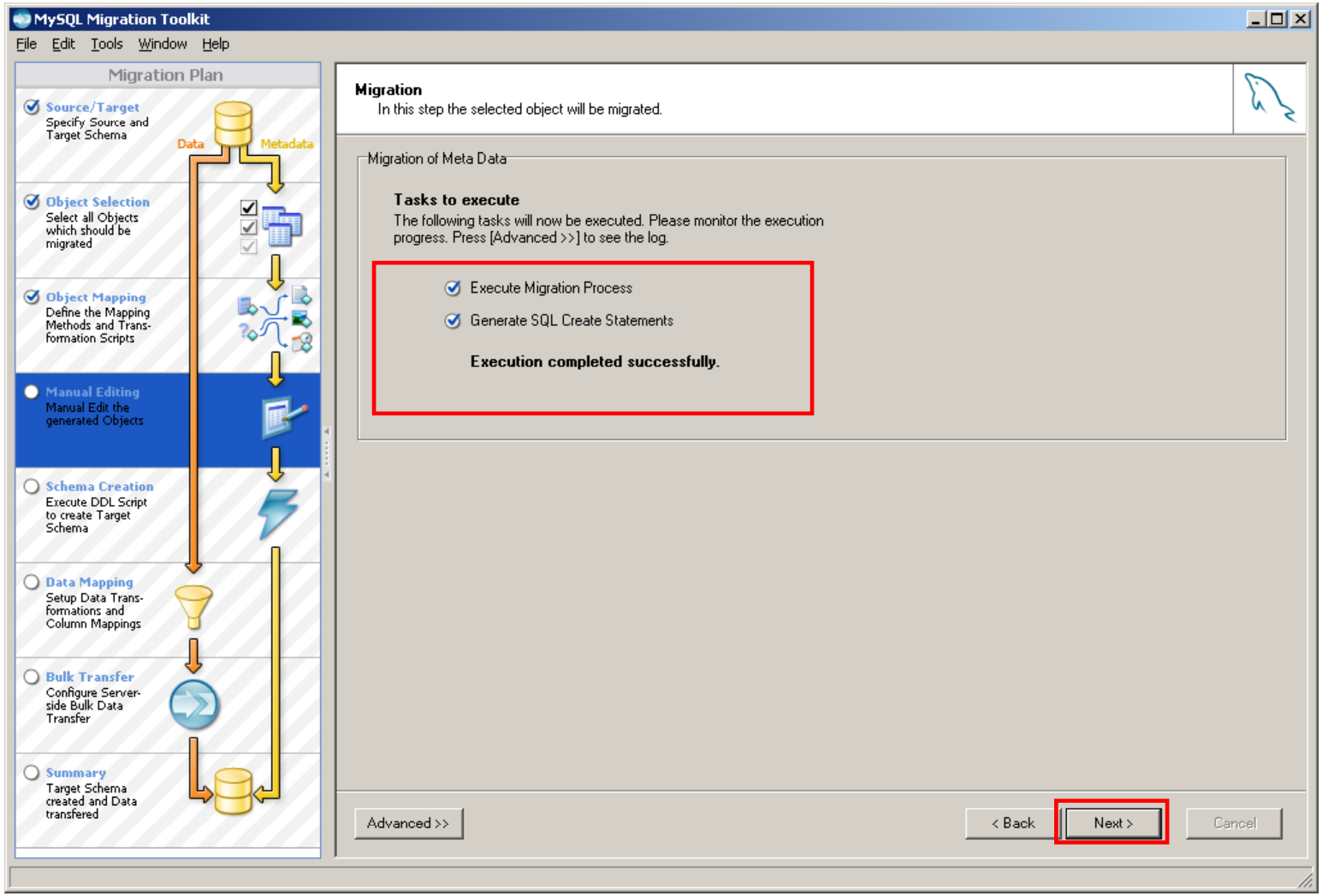
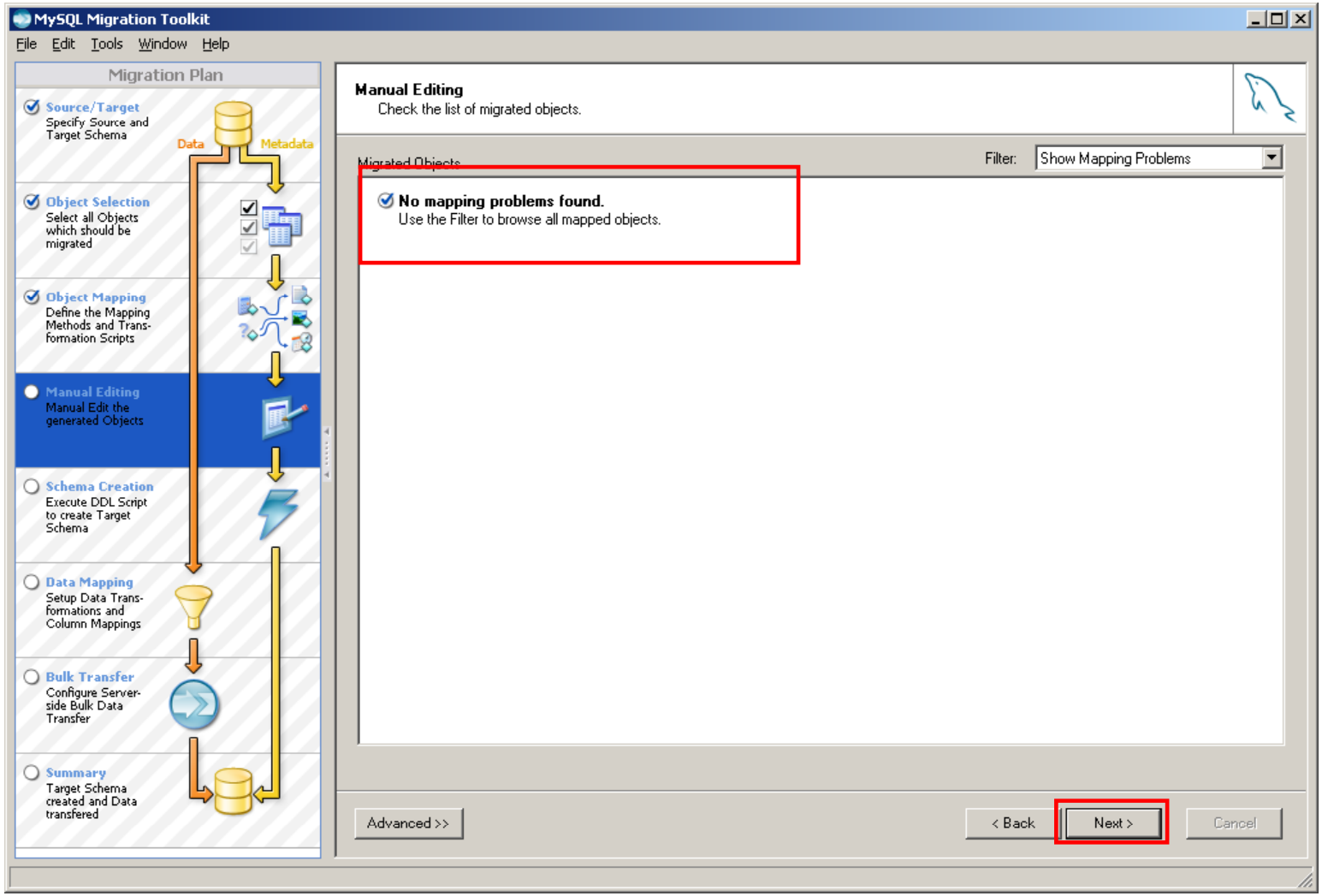


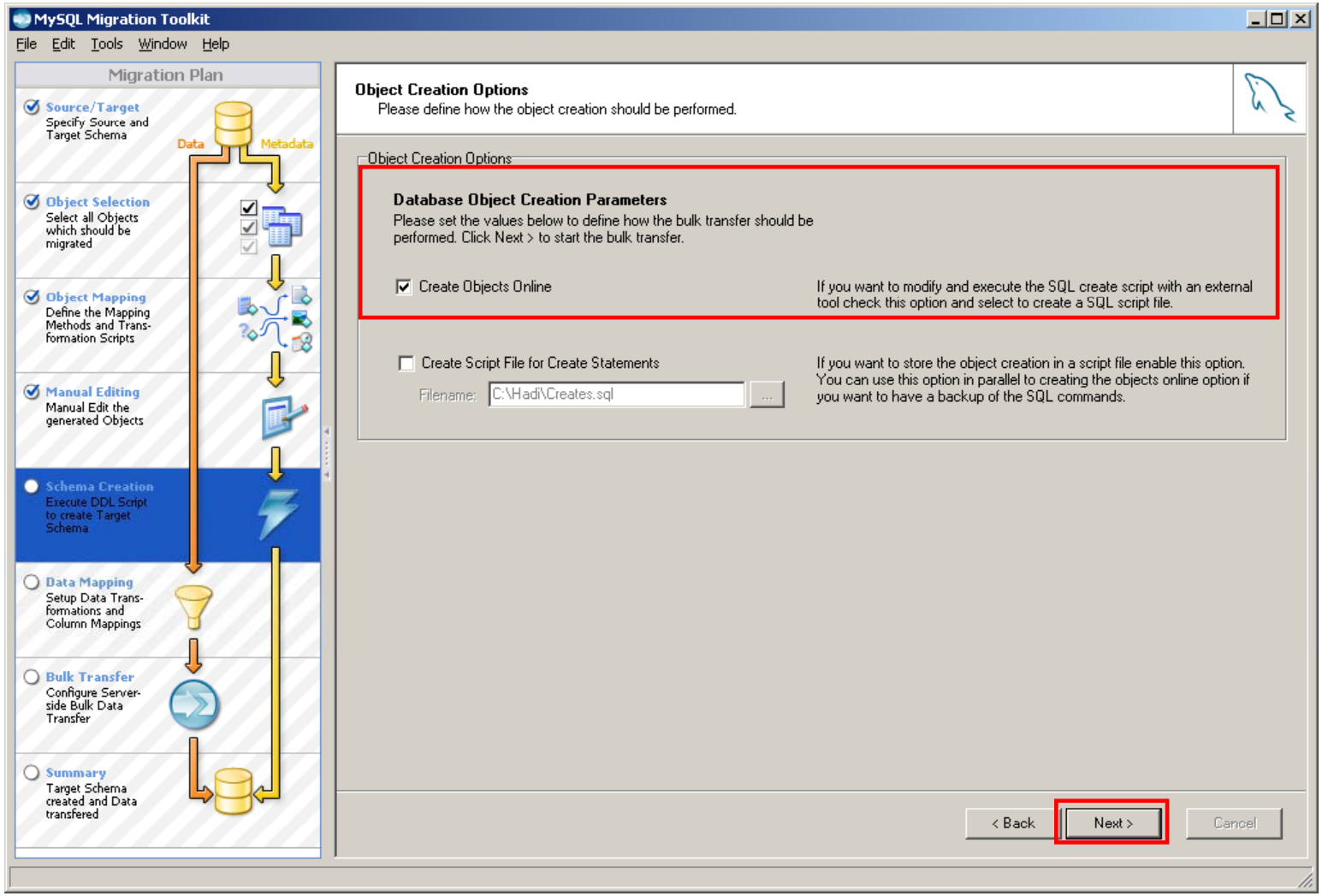
MySQL Migration Tool (cont.)



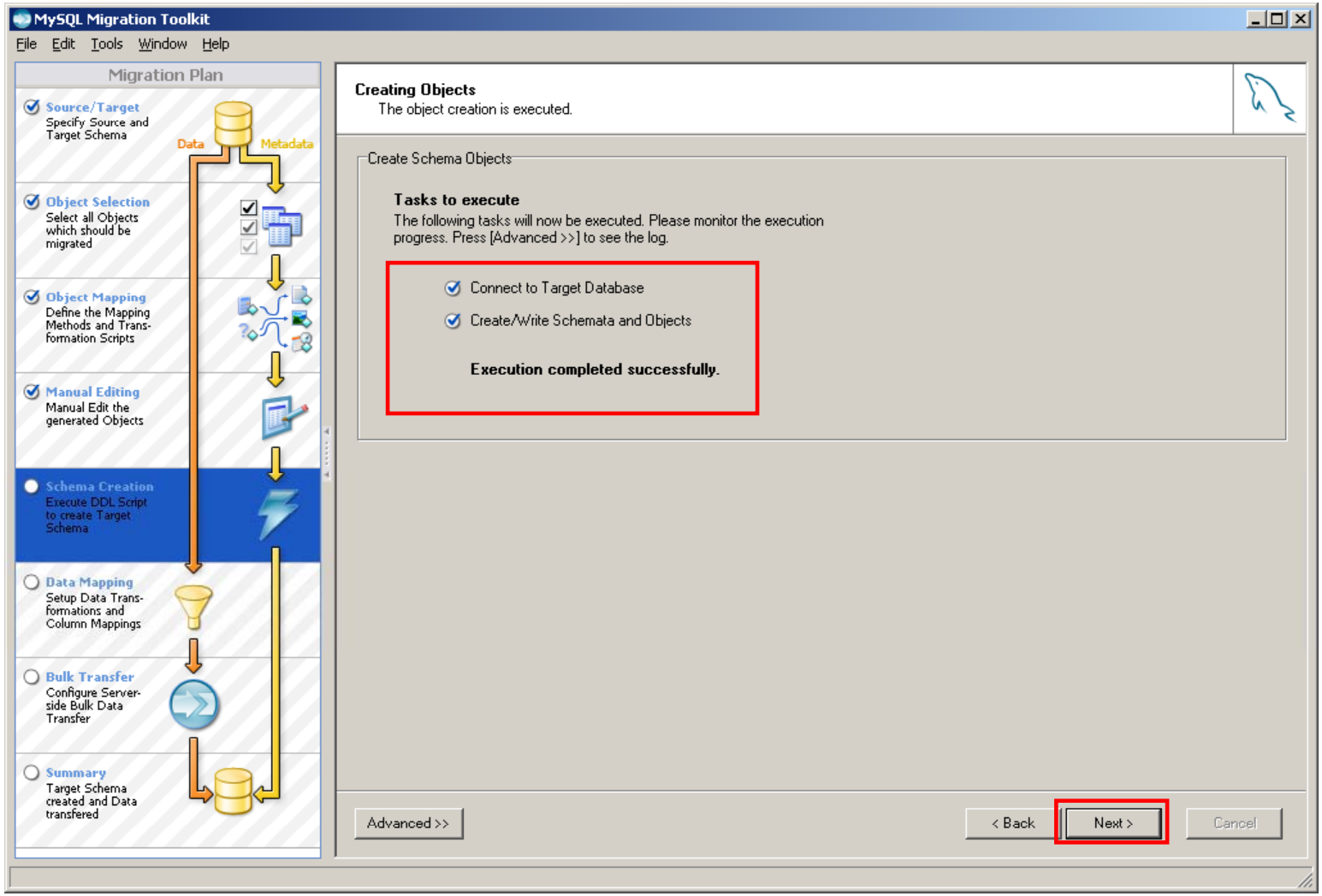
MySQL Migration Tool (cont.)



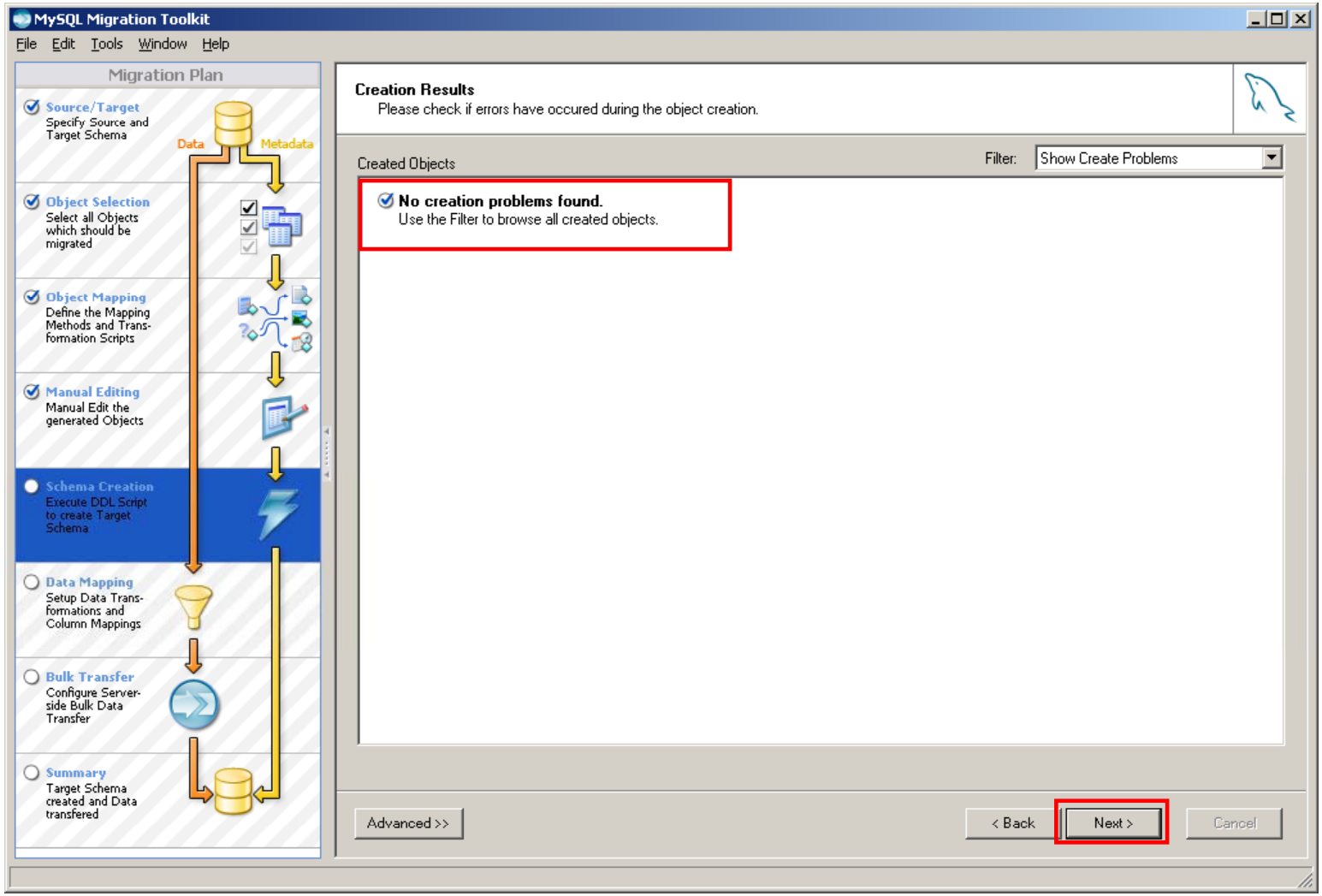
MySQL Migration Tool (cont.)



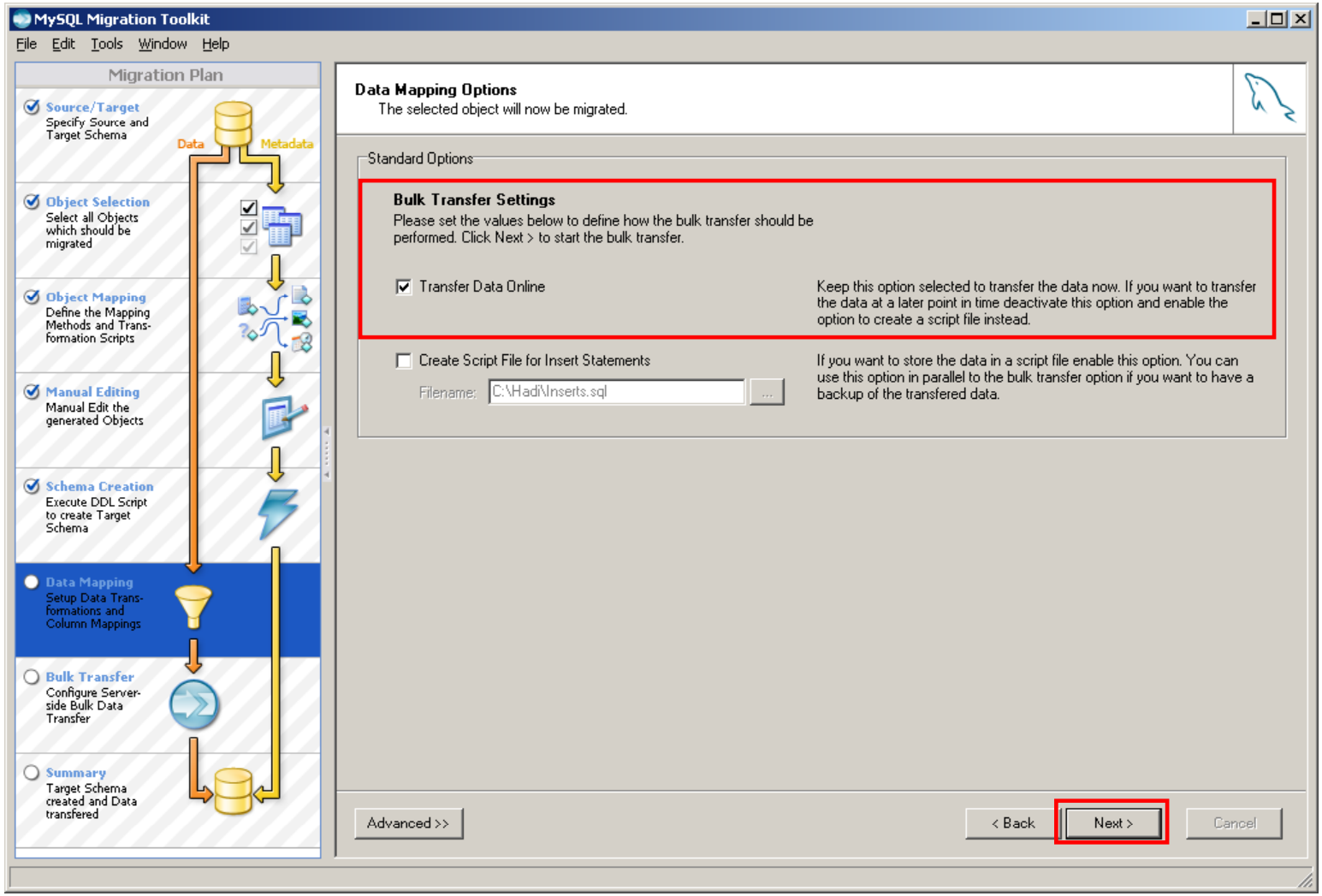
MySQL Migration Tool (cont.)



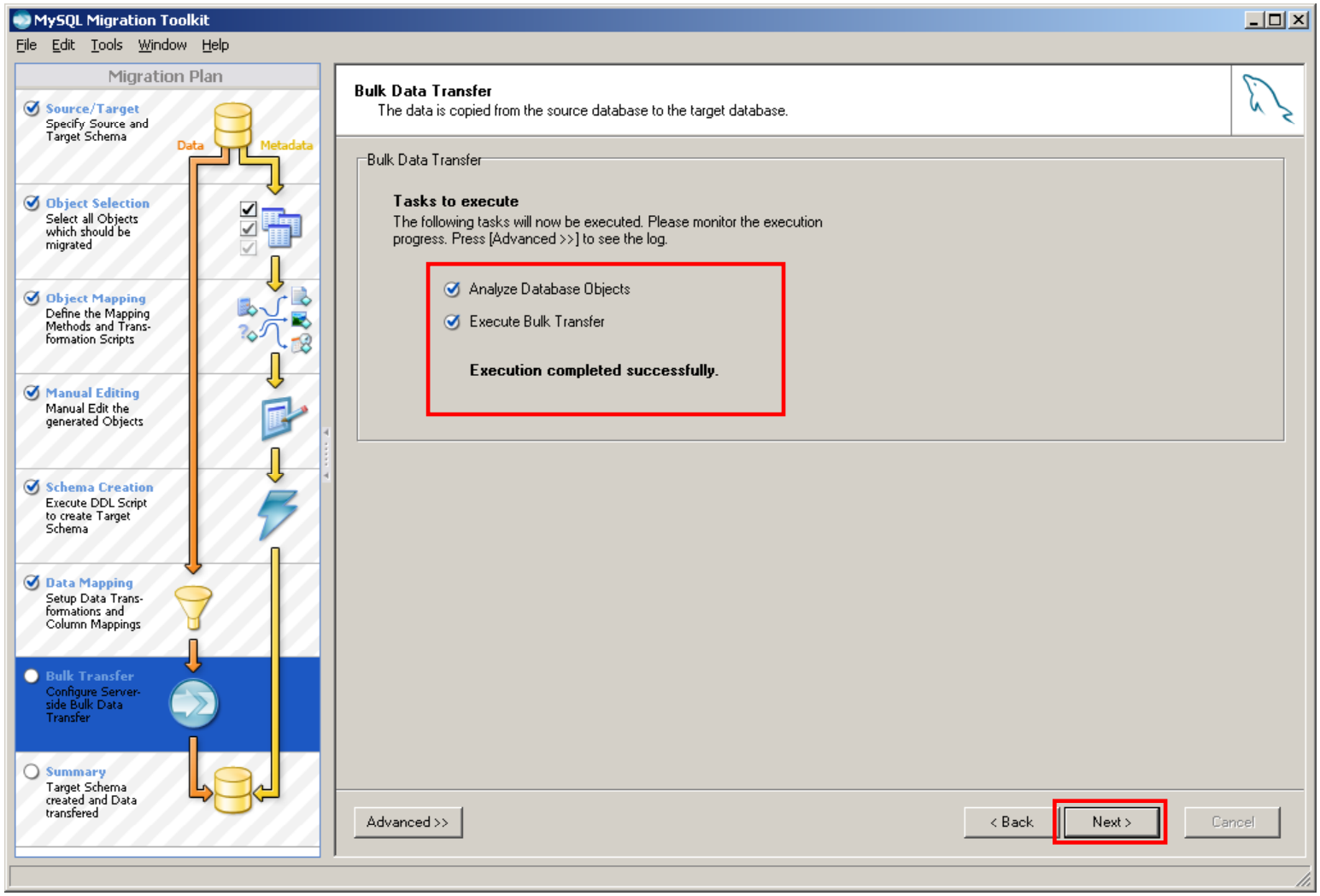
MySQL Migration Tool (cont.)



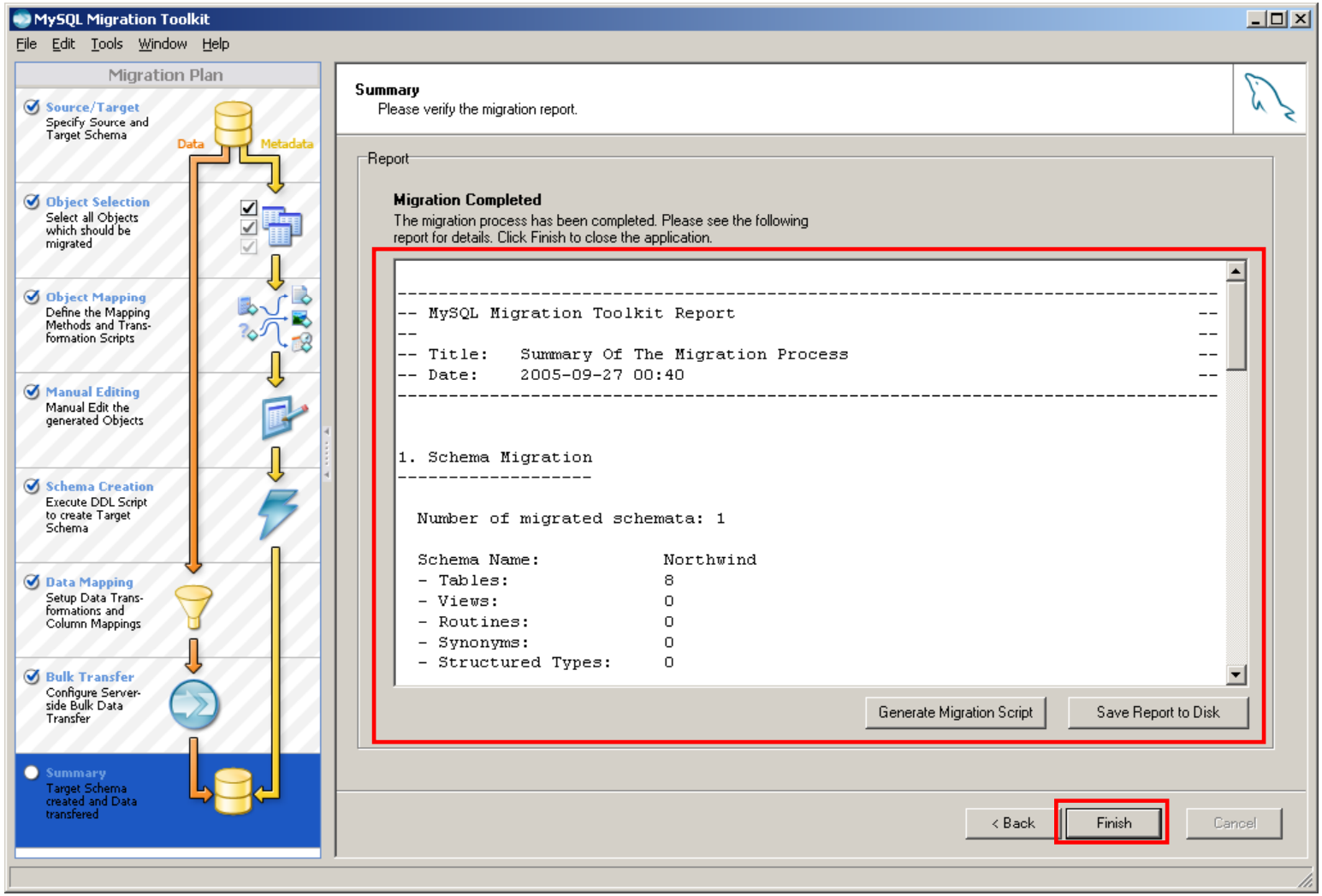
MySQL Migration Tool (cont.)



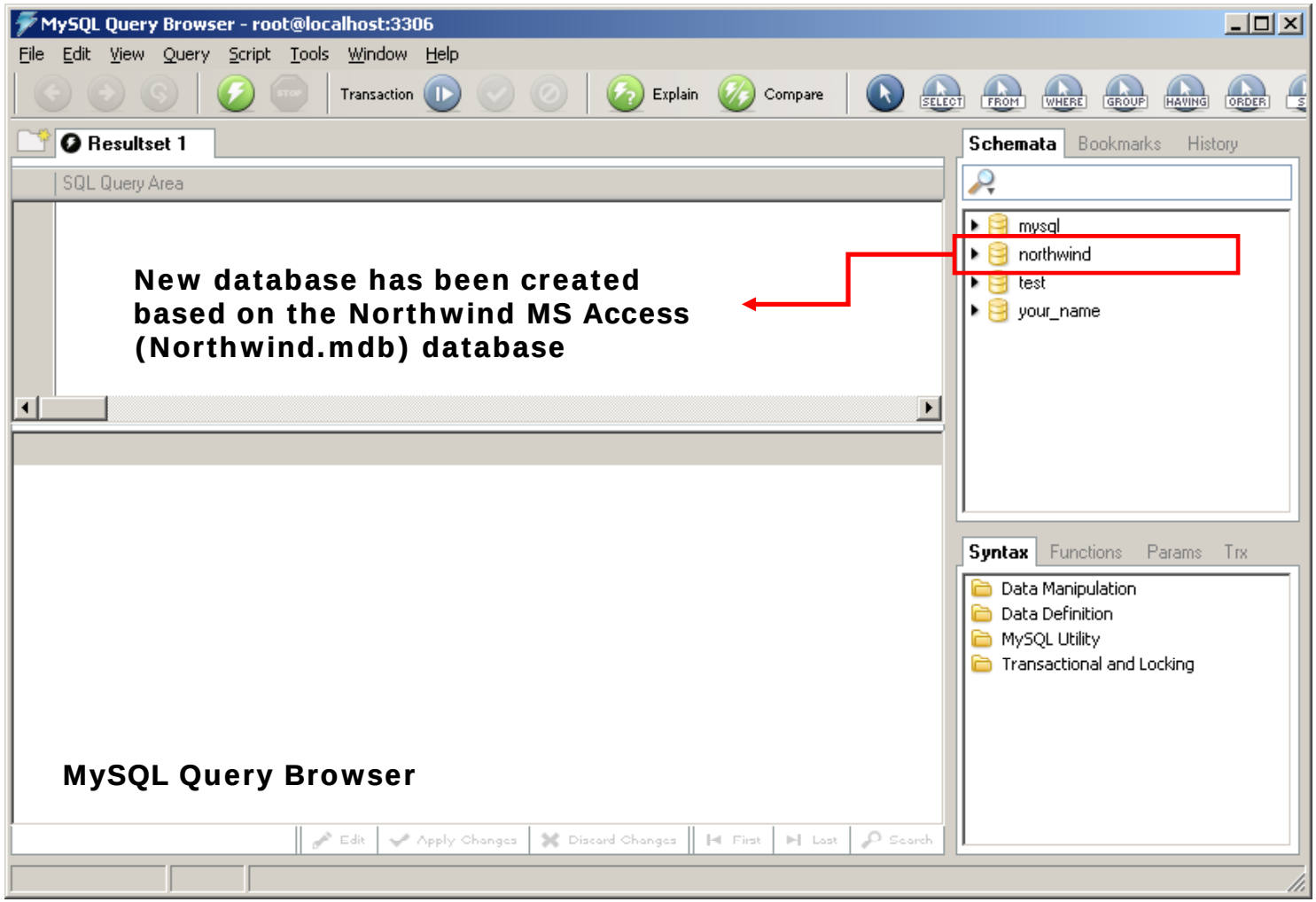
MySQL Migration Tool (cont.)



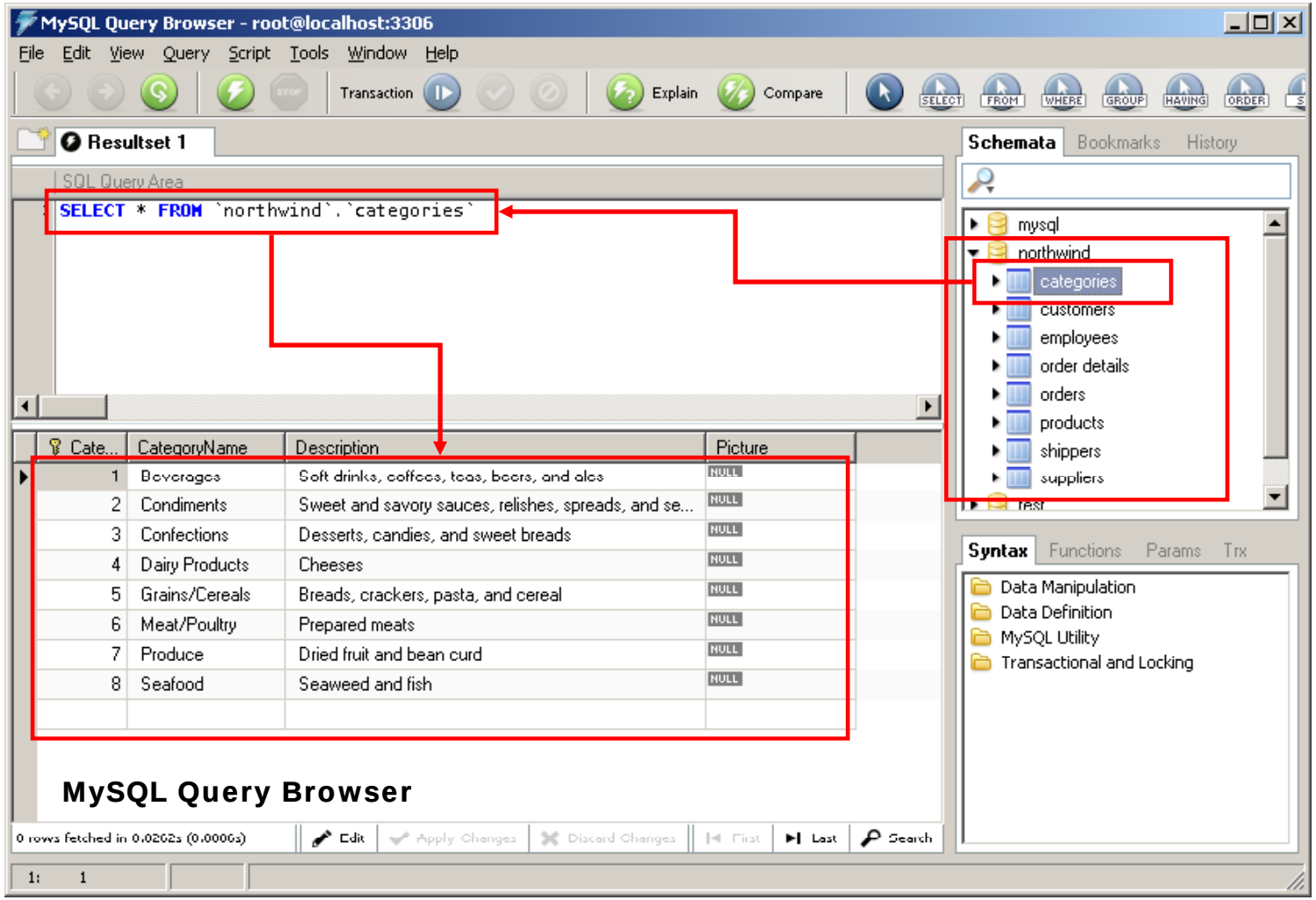
MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



MySQL Migration Tool (cont.)



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