MySQL Migration Toolkit

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Abstract

This is the MySQL Migration Toolkit Manual.

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Chapter 1. Introduction to the MySQL Migration Toolkit

The MySQL Migration Toolkit is a graphical tool provided by MySQL AB for migrating schema and data from various relational database systems to MySQL.

MySQL Migration Toolkit is designed to work with MySQL versions 5.0 and higher.

The MySQL Migration Toolkit is alpha software. While every effort has been made to ensure it is free of bugs, it should not be used in a production environment. Always back up your data before using the MySQL Migration Toolkit. If you find it's lacking some feature important to you, or if you discover a bug, please use our MySQL Bug System [http://bugs.mysql.com] to request features or report problems.

Chapter 2. Features of the MySQL Migration Toolkit

The following are some of the key features of the MySQL Migration Toolkit:

- The MySQL Migration Toolkit supports a variety of source database systems, including the following:
 - Oracle
 - Microsoft SQL Server
 - Microsoft Access
- The MySQL Migration Toolkit is fully customizable through its Java runtime interface. Advanced users can use Java to perform custom data and schema transformations.
- The MySQL Migration Toolkit supports agent-based data migrations, with the MySQL Migration Toolkit residing on a separate machine than the source and target database servers, through the use of a special migration agent. The agent-based data migration improves migration performance by allowing data to be transferred directly from the source machine to the target machine without being router through the MySQL Migration Toolkit.

Chapter 3. Installing MySQL Migration Toolkit

3.1. Introduction

The MySQL Migration Toolkit is available for all recent 32-bit Windows platforms, in source and binary forms. MySQL Migration Toolkit can be downloaded from The MySQL web site. [http://dev.mysql.com/downloads/migration-toolkit/]

The MySQL Migration Toolkit requires the Java Runtime Environment (JRE) to run. The JRE can be downloaded from the Sun Microsystems web site [http://java.sun.com/j2se/1.5.0/download.jsp] (look for the JRE 5.0 section of the download page).

3.2. Installing Under Windows

MySQL Migration Toolkit runs on recent 32-bit Windows NT based operating systems, including Windows 2000, XP, and 2003. It doesn't run on Windows NT 4 and below.

MySQL Migration Toolkit is installed through the use of a Windows Installer (.msi) installation package, which can be used on all recent Windows operating systems. The MSI package in contained within an archive named mysql-migration-toolkit-version-al-pha-win32.msi, where version indicates the MySQL Migration Toolkit version.

The Windows Installer system was updated with the release of Windows XP; those using an older version of Windows can reference this Microsoft Knowledge Base article [http://support.microsoft.com/default.aspx?scid=kb;EN-US;292539] for information on upgrading to the latest version.

To install MySQL Migration Toolkit, right-click on the MSI file and select Install. The installation will begin automatically after the installer prompts you for your installation preferences. During installation, you can choose whether you want the installer to place a shortcut in the Start menu and an icon on the desktop.

If you are having problems running the installer, you can download a ZIP file without an installer as an alternative. That file is called mysql-migration-toolkit-noinstall-versionalpha-win32.zip. Using a ZIP program, unpack it to a directory of your choice. You may want to create shortcuts to MySQLMigrationTool.exe for your desktop or quick launch bar.

installed Unless choose otherwise, **MySQL** Migration Toolkit is in vou C:\%PROGRAMFILES%\MySOL\MySOL Migration Toolkit 1.0\MySOLMigrationTool.exe, where %PROGRAMFILES% is the default directory for programs on your machine. For example, this directory might be C:\Program Files or C:\Programme.

Chapter 4. Starting MySQL Migration Toolkit

Start MySQL Migration Toolkit by double-clicking its desktop icon, or by selecting its entry from the Start menu (typically the MySQL Migration Toolkit entry of the MySQL section of the Start menu). Alternatively, you can open a DOS window and start the MySQL Migration Toolkit from the command line:

C:\%PROGRAMFILES%\MySQL\MySQL Migration Toolkit 1.0\MySQLMigrationTool.exe

%PROGRAMFILES% is the default directory for programs on your machine. For example, C:\program files or C:\Programme. If your path contains spaces, you should enclose the command within double quotes. For example:

C:\> "C:\Program Files\MySQL\MySQL Migration Toolkit 1.0\MySQLMigrationTool.exe

Chapter 5. An Overview of the Migration Process

The MySQL Migration Toolkit uses an eight-step process to migrate data from an external RDBMS to MySQL:

Figure 5.1. The MySQL Migration Toolkit Migration Plan



- Source/Target Selection: In the first step you specify the connection parameters for the source and target database servers.
- Object Selection: In the second step you select the objects (tables, views, stored proced-

ures) that will be migrated.

- Object Mapping: In the third step you choose the method used for mapping and transforming the objects.
- Manual Editing: In the fourth step you can manually edit the new objects to ensure a proper transformation.
- Schema Creation: In the fifth step the MySQL Migration Toolkit creates the transformed object on the target MySQL server.
- Data Mapping: In the sixth step you specify any changes that need to be made to the data as it is migrated.
- Bulk Transfer: In the seventh step the MySQL Migration Toolkit transfers the data from the source server to the target server.
- Summary: In the eighth and final step the MySQL Migration Toolkit creates a summary report of the migration process for you to review.

Each of these sections will be covered in more detail in the coming chapters.

Chapter 6. The Migration Process In-Depth

6.1. Introduction

In this chapter we will cover the different steps of the MySQL Migration Toolkit in depth. The different steps will be covered in the order that they appear in the MySQL Migration Toolkit.

6.2. The Welcome Screen

The first screen of the MySQL Migration Toolkit is the Welcome Screen:

Figure 6.1. The MySQL Migration Toolkit welcome screen

Welcome to the MySQL Migration Toolkit Use this tool to migrate existing databases from various vendors to MySQL databases.	
Disco starli čita Gilanija statu se učena ta kon statu	
Please check if the following startup requirements have been met.	
Initialized runtime system	
To create a new migration script press the [Next >] button.	
You can use the [Next >] and [< Back] buttons to navigate through the migration process. The Migration Plan on the left can also be used to jump to specific points in the Migration Script.	
	< Back Next > Cancel

The welcome screen indicates the progress of loading the various components of the MySQL Migration Toolkit. If you encounter any errors on the welcome screen you should close the MySQL Migration Toolkit and confirm that you have properly installed the Java Runtime Environment. See Section 3.1, "Introduction" for information on downloading and installing the Java Runtime Environment.

6.3. The Configuration Type Screen

The Configuration Type screen allows you to choose between a Direct Migration and a Agent-Based Migration:



Configuration Type Choose the type of configuration you have	set up.	En Z
Configuration type Before you can start the migration process	you have to specify your system configuration.	
 Direct Migration MySQL Migration Tool is installed on s 	ource or target machine	
	Use this configuration if you have installed the MySQL Migration Service on either the source or target machine.	
	Please note that if the MySQL Migration Tool is not located on either the source or target machine there will be a huge overhead of network traffic and a major performance loss.	
	In that case please use the Three Way Configuration by installing the MySQL Migration Agent on the source or target machine.	
O Agent Based Migration Use MySQL Migration Agent installed	on source machine	
	To setup the Three Way Configuration you have to install the MySQL Migration Agent on either the source machine or the target machine.	
	The MySQL Migration Agent will handle the metadata fetching and data bulk transfer between the source and the target database.	
	It is recommended to install the Agent on the source machine where the JDBC driver of the source RDBMS is available.	
	< Back Next >	Cancel

Use the Direct Migration if the MySQL Migration Toolkit is installed on either the source or target machine. The Direct Migration should not be used when the MySQL Migration Toolkit is not located on either the source or target machine, as it will create a large amount of network traffic and will result in decreased performance.

Use the Agent-Based Migration when migrating between two server machines that do not support the use of the MySQL Migration Toolkit. The MySQL Migration agent should be installed on the source machine before using the Agent-Based Migration.

6.4. The Source Database Screen

Use the Source Database screen to select the source RDBMS used in the migration and to specify the connection parameters.

The Source Database screen's appearance will vary depending on the type of source database selected.

All Data Source screens will feature a Details button that can be used to expose the Advanced Settings panel. The Advanced Settings panel can be used to manually specify a JDBC driver and JDBC connection string for your migration session.

6.4.1. Microsoft Access

The Source Database screen appears as follows when you select Microsoft Access as the source database:

Source Database Select the source datab	pase you want to migrate from.		En Ze
Source Database Conne	ction		
Database System:	MS Access Server	Select the target RDBMS you want to migrate from.	
Connection Paramete	ers		
	MS Access Server MS Access over JDBC-0DBC bridge		
Connection:	• •	Select a stored connection or use [+] to store or [-] to remove.	
Database File:		MS Access database file.	
Username:		Name of the user to connect with.	
Password:		The user's password.	
Details >>		< Back Next > C	ancel

Specify the path to the .mdb database file in the Database File field and specify the database username and password information if applicable.

You must make special modifications to your Access database file before it can be used with MySQL Migration Toolkit. Please see Appendix A, Preparing a Microsoft Access Database for Migration for further information.

6.4.2. Microsoft SQL Server

The Source Database screen appears as follows when you select MS $\,$ SQL $\,$ Server as the source database:

Figure 6.4. Source database - Microsoft SQL Server

ection	
MS SQL Server	Select the target RDBMS you want to migrate from.
ers	
MS SQL Server JDBC driver to connect to MS SQL Server 2000.	
+ .	Select a stored connection or use [+] to store or [-] to remove.
localhost Port: 1433	Name or IP address of the server machine / TCP/IP port
sa	Name of the user to connect with.
	The user's password.
	ction MS SQL Server JDBC driver to connect to MS SQL Server 2000.

Specify the hostname, username, and password to connect to the source Microsoft SQL Server to connect and click Next.

6.4.3. Oracle

The Source Database screen appears as follows when you select Oracle as the source database:

Figure 6.5. Source database - Oracle

ource Database Conne	ction	
Database System:	Oracle Database Server	Select the target RDBMS you want to migrate from.
Connection Parameter	ers	
₽ =>>	Oracle Database Server Oracle Thin JDBC driver to connect to Oracle 9i and Oracle 10g servers.	
Connection:	• •	Select a stored connection or use [+] to store or [-] to remove.
SID:		Oracle system identifier.
Hostname:	Port:	Name or IP address of the server machine / TCP/IP port
Username:		Name of the user to connect with.
Password:		The user's password.

If you encounter the following database selection screen, it means that you do not have the appropriate JDBC driver for Oracle installed:

Figure 6.6. Oracle JDBC driver not attached

Source Database Select the source datab	oase you want to migrate from.			E N
Source Database Conne	ction			
Database System:	Oracle Database Server	~	Select the target RDBMS you want to migrate from.	
Connection Paramete	ers			
<u>a</u> -	The selected JDBC driver is not attached to the application yet.			
Connection:	Locate JDBC Driver on Harddisk	Select	a stored connection or use [+] to store or [-] to remove.	
	To download the driver from the internet press the button below.			
	Download JDBC Driver from the Web			
Details >>			< Back Next > Ca	ncel

If the Oracle JDBC driver is present on your system, click the Locate JDBC Driver on Harddisk button to attach the driver.

If the Oracle JDBC driver is not present on your system, click the Download JDBC Driver from the Web button to download it. Download the ojdbc14.jar file and then attach it by clicking on the Locate JDBC Driver on Harddisk button.

After attaching the Oracle JDBC driver you need to restart the MySQL Migration Toolkit.

6.4.4. MySQL

The Source Database screen appears as follows when you select MySQL as the source database:

Figure 6.7. Source database - MySQL

Source Database Conne	ction		
Database System:	MySQL Server	Select the target RDBMS you want to migrate from.	
-Connection Paramete	ers		
<u>₽</u> =>	MySQL Server MySQL JDBC driver to connect to MySQL 4.0, 4.1 and 5.0 servers.		
Connection:	• •	Select a stored connection or use [+] to store or [-] to remove.	
Hostname:	Port	Name or IP address of the server machine / TCP/IP port	
Username:		Name of the user to connect with.	
Password:		The user's password.	

6.4.5. Saving Connection Information

After entering the connection information for the source database, click the + button to save the connection information.

When prompted, enter a name for the connection information and click the Ok button to save the connection information for later re-use.

You can discard saved connection information by selecting the saved connection from the Connection drop-down list and clicking the - button.

6.5. The Target Database Screen

Use the Target Database screen to select the target RDBMS used in the migration and to specify the connection parameters.

The target Database screen uses an interface that is identical to that of the Source Database screen:

Figure 6.8. Target Database - MySQL

get Database Connec	stion	
Database System:	MySQL Server	Select the target RDBMS you want to migrate to.
-Connection Paramet	ers	
⇒₂	MySQL Server MySQL JDBC driver to connect to MySQL 4.0, 4.1 and 5.0 servers.	
Connection:	LOCALHOST 💌 + 🕒	Select a stored connection or use [+] to store or [-] to remove.
Hostname:	127.0.0.1 Port: 3306	Name or IP address of the server machine / TCP/IP port
Username:	root	Name of the user to connect with.
Password:	******	The user's password.

Target database support for the MySQL Migration Toolkit is currently limited to MySQL 4.1 and MySQL 5.0.

6.6. The Connect to Server Screen

After you specify your source and target database servers, the MySQL Migration Toolkit will connect to each server and retrieve the schema information from the source server:

Figure 6.9. The Connect to Servers screen

Connecting to S Establishing d	Servers Itabase connections.	E. J.
Connection Pro Tasks to The followin progress. Pr	ress sxecute g tasks will now be executed. Please monitor the execution ess [Details >>] to see the log.	
ଏ ଏ ଏ	Connecting to source database system Retrieve schema information from source database system Test connection to target database system Execution completed successfully	
Details >>	< Back Next > Car	ncel

Click the Details button to see a more detailed log of the connection process.

6.7. The Source Schema Selection Screen

Use the Source Schema Selection screen to choose which databases from the source server you would like to migrate.

If there are a large number of databases to choose from, you can search for a specific database by entering the database na,e in the

Figure 6.10. The Source Schema Selection screen

Source Schemata Selection Choose the schemata you want to migrate.		E.S.
Schemata Select all schemata that have to be migrated.		
	Show as List	
Northwind		
1 schema selected.		
	< Back Next > Car	ncel

6.8. The Reverse Engineering Screen

Once you select the databases you wish to migrate, the MySQL Migration Toolkit begins the process of reverse engineering the source database:

Figure 6.11. The Reverse Engineering screen

Reverse Engin Reverse engin	eering ieering the source database.	E. J
-Reverse Engine	ering Progress	
Tasks to o The followin progress. Pr	e xecute ig tasks will now be executed. Please monitor the execution ess [Details >>] to see the log.	
۷	Reverse Engineering	
3	Check Result	
3	Get Available Migration Methods	
	Execution completed successfully.	
Details >>	< Back Next > Car	ncel

The MySQL Migration Toolkit collects column and index information for each table in the source database, along with information on stored procedures and views.

Click the Details button to see a detailed log of the reverse engineering process.

6.9. The Object Type Selection Screen

Use the Object Type Selection screen to choose which objects you wish to migrate:

Figure 6.12. The Object Type Selection screen

Migra	te objects of type Tab	le	
þ	Objects of type: Number to migrate:	Table 8 / 8	If you do not want to migrate all objects use the [Detailed Selection] button. Detailed selection >>
Migra	te objects of type Viev	ν	
3	Objects of type: Number to migrate:	View 21 / 21	If you do not want to migrate all objects use the [Detailed Selection] button. Detailed selection >>
Migra	te objects of type Stor	ed Procedure	
÷	Objects of type: Number to migrate:	Stored Procedure 0 / 0	If you do not want to migrate all objects use the [Detailed Selection] button. Detailed selection >>

Check the box next to the objects types (Tables, Views, Stored Procedures) that you wish to migrate.

6.9.1. Migrating a Sub-Set of an Object Type

If you only wish to a sub-set of the available object types, click the Detailed Selection button next to the object type:

Figure 6.13. The detail view of the Object Type Selection screen

> < +	Ignored Objects
	> <

The objects in the left window will be migrated. To ignore an object, select it and click the > button. To move an object out of the ignore list, select it and click the < button.

To exclude objects based on pattern matching, click the + button:

Figure 6.14. The Add Ignore Pattern dialog

Add Ignore	Pattern		X
Ę	Please er would like	nter the pattern to ignore. You can use * and ? to match the objects you a to ignore. Please note that the string is matched case sensitive Order*	
	- dicin	OK Cancel	

Patterns can include the * and ? characters, with * representing multiple characters (including no characters at all) and ? representing a single character.

6.10. The Object Mapping Screen

Use the Object Mapping screen to configure the methods used to migrate the database objects to MySQL. The MySQL Migration Toolkit comes with multiple migration methods that can be used to convert the database objects of an external RDBMS to MySQL.

In most cases the default settings will be adequate.

There are four areas of migration to be addressed: GRT Object, Table, View, and Stored Procedures:

Figure 6.15. The Object Mapping screen

Object Ma Please (apping define how to map the	database objects.		E. N
Migration	of type GRT Object			
9	Migration method:	Generic 🗸	Generic method to migrate a schema to MySQL. Set Parameter >>	
Migration	of type Table			
	Migration method:	Generic 🗸	Generic method to migrate a table to MySQL. Set Parameter >>	
-Migration	of type View			
P	Migration method:	Access Standard	Standard method to migrate an Access view to MySQL. Set Parameter >>	
	- (1 1 D 1			
	or type Stored Proced Migration method:		No migration method available for this source type.	
Details >	>		< Back Next > C	ancel

6.10.1. GRT Object

The GRT Object section of the Object Mapping screen dictates the properties of the database itself. By default a generic profile is used, with a Latin1 character set.

To modify the character set used on the database level, click the Set Parameter button. Choose from Latin1, Multilanguage, or User defined.

6.10.2. Table Objects

The Table section of the Object Mapping screen dictates the properties of the individual tables. By default a generic profile is used, with an InnoDB storage engine.

To modify the storage engine used with the migrated tables, click the Set Parameter button. Choose the Data consistency option to use the InnoDB storage engine for transactional and foreign key support. Choose the Statistical data option to use the MyISAM storage engine with increased performance but no transaction safety. Choose the Data consistency / multil-anguage option to use the InnoDB storage engine with UTF8 as the default charset. If none of the provided options meet your needs, choose the User defined option and provide your own settings.

6.11. The Meta Migration Screen

After you configure data object mapping, the MySQL Migration Toolkit performs the conversion of the database objects and generates SQL CREATE statements.

Figure 6.16. The Meta Migration screen

Migration In this step the	e selected object will be migrated.	E. L
-Migration of Met	a Data	
Tasks to The followin progress. Pr	e xecute ig tasks will now be executed. Please monitor the execution ess [Details >>] to see the log.	
3	Execute Migration Process	
۲	Generate SQL Create Statements	
	Execution completed successfully.	
Details >>	< Back Next > Ca	ncel

The SQL CREATE statements are not executed on the target server at this stage of the migration, but will be executed later.

Click the Details button to view a detailed log of this stage of the migration process.

6.12. The Manual Editing Screen

Use the Manual Editing screen to review the SQL CREATE statements generated by the MySQL Migration Toolkit:

Figure 6.17. The Manual Editing screen

igrated Objects		Filter:	Show Mapping Problems
Source Objects	Migration message		Target Objects
B Northwind			3 Northwind
 Views 			Views
🛃 Alphabetical List of Prod	The migration of MS Access views is not implemented yet.		🖳 Alphabetical List of Products
📆 Category Sales for 1997	The migration of MS Access views is not implemented yet.		📆 Category Sales for 1997
📆 Current Product List	The migration of MS Access views is not implemented yet.		📆 Current Product List
式 Customers and Suppliers	The migration of MS Access views is not implemented yet.		📆 Customers and Suppliers b
📆 Employee Sales by Country	The migration of MS Access views is not implemented yet.		📆 Employee Sales by Country
🛃 Invoices	The migration of MS Access views is not implemented yet.		🖳 Invoices
🛃 Invoices Filter	The migration of MS Access views is not implemented yet.		📆 Invoices Filter
🛃 Order Details Extended	The migration of MS Access views is not implemented yet.		📆 Order Details Extended
🛃 Order Subtotals	The migration of MS Access views is not implemented yet.		📆 Order Subtotals
🛃 Orders Qry	The migration of MS Access views is not implemented yet.		📆 Orders Qry
🛃 Product Sales for 1997	The migration of MS Access views is not implemented yet.		📆 Product Sales for 1997
🛃 Products Above Average	The migration of MS Access views is not implemented yet.		📆 Products Above Average
🛃 Products by Category	The migration of MS Access views is not implemented yet.		Roducts by Category
🛃 Quarterly Orders	The migration of MS Access views is not implemented yet.		📆 Quarterly Orders
🛃 Quarterly Orders by Prod	The migration of MS Access views is not implemented yet.		📆 Quarterly Orders by Product
🛃 Sales by Category	The migration of MS Access views is not implemented yet.		📆 Sales by Category
📆 Sales by Year	The migration of MS Access views is not implemented yet.		📆 Sales by Year
📆 Sales Totals by Amount	The migration of MS Access views is not implemented yet.		📆 Sales Totals by Amount
🔜 Summary of Sales by Qu	The migration of MS Access views is not implemented yet.		📆 Summary of Sales by Quarter
📆 Summary of Sales by Year	The migration of MS Access views is not implemented yet.		📆 Summary of Sales by Year
📆 Ten Most Expensive Pro	The migration of MS Access views is not implemented yet.		📆 Ten Most Expensive Prod

By default only objects that were not successfully converted are displayed in the Manual Editing screen. To view all objects select the Show All Objects entry of the Filter drop-down list. Choose the Show All Objects with Messages entry of the Filter drop-down list to view all object with status messages.

To edit the SQL CREATE statements created by the MySQL Migration Toolkit, select the object and click the Details button:

Figure 6.18. The Manual Editing screen - detailed view

anual Editing Check the list of migrated ob	jects.	8	2
igrated Objects		Filter: Show All Objects with Messages	~
Source Objects	Migration message	Target Objects	_
r 🤤 Northwind		📑 Northwind	^
🔻 🔳 Tables		Tables	=
🕨 🛄 Categories		Categories	
Customers			
Employees		Employees	
Order Details		Urder Details	
Orders			
Products		Products	
Shippers			
SELECT Categories.C FROM Categories INW WHERE (((Products.D	ategoryName, Products.* ER JOIN Products ON Categories.Cat iscontinued)=No));*/	egoryID = Products.CategoryID	
<< Details		< Back Next > Cancel	

Make changes to the CREATE statement and click the Apply Changes button. If you make a mistake while editing, click the Discard Changes button to revert the CREATE statement.

6.13. The Object Creation Options Screen

After performing manual object editing the MySQL Migration Toolkit is ready to create the database objects on the target server. You have the option of either creating the database objects directly on the target server or to create a script file of the CREATE statements for later execution:

Figure 6.19. The Object Creation Options screen

Please define how the object creation should be performed.	
Object Creation Options	
Bulk Transfer Settings Please set the values below to define how the bulk transfer s performed. Click Next > to start the bulk transfer.	hould be
Create Objects Online	If you want to modify and execute the SQL create script with an external tool check this option and select to create a SQL script file.
Create Script File for Create Statements Filename: H:\Creates.sql	If you want to store the object creation in a script file enable this option. You can use this option in parallel to creating the objects online option if you want to have a backup of the SQL commands.
	Cancel Next > Cancel

Select both options to create the target database objects and preserve a backup copy of the CREATE statements for later use.

6.14. The Creating Objects Screen

Once you choose object creation objects, the MySQL Migration Toolkit connects to the target server and creates the database objects (assuming you chose to have the MySQL Migration Toolkit connect to the target server to create the database objects). If you chose to have a copy of the CREATE statements saved to disk this will be performed at this time.

Figure 6.20. The Creating Objects screen

Creating Object The object cre	i s ation is executed.	E. J
Create Schema	Objects	
Tasks to o The followin progress. Pr	execute g tasks will now be executed. Please monitor the execution ess [Details >>] to see the log.	
۷	Connect to Target Database	
۷	Create/Write Schemata and Objects	
	Execution completed successfully.	
Details >>	< Back Next > Car	ncel

Click the Details button to view a detailed log of this stage of the migration process.

6.15. The Data Mapping Options Screen

After the database objects are created on the target database server the MySQL Migration Toolkit is ready to move the server data to the target server. You have the option of either inserting the data directly on the target server or to create a script file of the INSERT statements for later execution:

Figure 6.21. The Data Mapping Options screen

Data Mapping Options The selected object will now be migrated.		E.
Standard Options Bulk Transfer Settings Please set the values below to define how the bulk transfer should performed. Click. Next > to start the bulk transfer.	be	
🗹 Transfer Data Online	Keep this option selected to transfer the data now. If you want to tran the data at a later point in time deactivate this option and enable the option to create a script file instead.	nsfer
Create Script File for Insert Statements	If you want to store the data in a script file enable this option. You ca use this option in parallel to the bulk transfer option if you want to hav	n /ea
Filename: H:\Inserts.sql	backup of the transfered data.	
Details >>	< Back Next > Ca	incel

Select both options to move the data and preserve a backup copy of the INSERT statements for later use.

You can access additional options by clicking the Details button. If you do not wish to move BLOB data to the target server, check the box next to the Exclude BLOB values option. The BLOB data will not be moved to the target server and will not be written to the script file. If you do not wish to move BLOB data to the target server, but wish to have the BLOB data written to the script file, also check the box next to the Write BLOBs to Insert Script option.

If you wish to limit the number of rows transferred to the target server, check the box next to the Maximum Numbers of Rows to Transfer for a Table option and enter the desired number of rows. This option can be useful when generating test data.

6.16. The Bulk Data Transfer Screen

Once the data mapping options are set, the MySQL Migration Toolkit will begin the bulk data transfer process. Data will be converted to a MySQL compatible format and inserted into the target database server using bulk INSERT statements. Data is typically inserted in batches of 15,000 rows at a time to maximize insertion speed.

Figure 6.22. The Bulk Data Transfer screen

Bulk Data Transfer The data is copied from the source database to the target database.	En 2
Bulk Data Transfer	
Tasks to execute The following tasks will now be executed. Please monitor the execution progress. Press [Details >>] to see the log.	
Execution completed successfully.	
Details >> CBack	Next > Cancel

Click the Details button to view a detailed log of this stage of the migration process.

6.17. The Summary Screen

Once the bulk data transfer is complete, a summary report of the migration will be displayed:

Figure 6.23. The Summary screen

Migration Completed		
The migration process has been complet report for details. Click Finish to close the	ted. Please see the following application.	
	rit Benort	
	110 1.29020	
Title: Summary Of	The Migration Process	 ≡
Date: 2005-04-13	23:16	
1. Schema Migration		
1. Schema Migration		
1. Schema Migration		
1. Schema Migration Number of migrated sci	hemata: 1	
1. Schema Migration Number of migrated sci Schema Name:	hemata: 1 Northwind	
1. Schema Migration Number of migrated sc: Schema Name: Tables:	hemata: 1 Northwind 8	
1. Schema Migration Number of migrated sc Schema Name: Tables: Views:	hemata: 1 Northwind 8 21	
1. Schema Migration Number of migrated sc Schema Name: Tables: Views: Procedures:	hemata: 1 Northwind 8 21 0	
1. Schema Migration Number of migrated sc Schema Name: Tables: Views: Procedures: Triggers:	hemata: 1 Northwind 8 21 0 0	
1. Schema Migration 	hemata: 1 Northwind 8 21 0 0 0	
 Schema Migration Number of migrated sci Schema Name: Tables: Views: Procedures: Triggers: Structured Types: Details: 	hemata: 1 Northwind 8 21 0 0 0	
1. Schema Migration Number of migrated sc: Schema Name: Tables: Views: Procedures: Triggers: Structured Types: Details:	hemata: 1 Northwind 8 21 0 0 0	

Click the Finish button to exit the MySQL Migration Toolkit.

6.18. Saving the Current Application State

If you need to close the MySQL Migration Toolkit part way through the migration process, you can save the state of the MySQL Migration Toolkit to disk and continue later.

To save the current state of the MySQL Migration Toolkit, choose the Store current application state option of the File menu.

To later retrieve the application state and resume configuring the migration, choose the Reload stored application state option of the File menu.

Chapter 7. Extending The MySQL Migration Toolkit

7.1. Introduction

One of the key features of the MySQL Migration Toolkit is that it can be easily extended and customized to support new data sources. Through the use of its Generic RunTime Environment (GRT), the MySQL Migration Toolkit can support new behaviour and data sources using code written in languages such as Java, PHP, and C.

Extending the MySQL Migration Toolkit to support a new RDBMS requires the creation of two new modules: one module that reverse engineers (ie., retrieves schema information) the source database objects and converts them into GRT objects, and one module that migrates the source GRT objects into MySQL GRT objects. The MySQL Migration Toolkit then converts the GRT MySQL objects into SQL statements that create the the target MySQL server objects.

Existing modules can be easily expanded and customzed to achieve the perfect migration for individual requirements. New migration "methods" that define how the migration is performed can be added easily. The new methods are listed and can be selected by the end user in the Wizard interface or used in migration scripts.

7.2. Architecture of the MySQL Migration Toolkit

The MySQL Migration Toolkit is written on top of the Generic Runtime Environment (GRT): a thin C layer, inspired by Objective C, which allows for dynamic typing and dynamic data objects. The GRT supports the creation of new modules written in C, Java, PHP, and Lua, with support for Python and Mono forthcoming.

The MySQL Migration Toolkit is built on three primary modules: reverse engineer modules, migration modules, and transformation modules.

Reverse engineering modules retreive the schema information from the source database and return GRT objects that describe the schema. Reverse engineering modules will have a name similar to ReverseEngineeringAccess.

Migration modules convert the source database GRT objects to MySQL GRT objects and then handle the bulk data transfer between the source and MySQL databases. Migration modules will have a name similar to MigrationAccess.

Transformation modules convert the MySQL GRT objects into the actual SQL statements used to create objects such as tables and views on the target MySQL server. Transformation modules will have a name similar to TransformationMySQL. Transformation modules are supplied by the MySQL GUI team and need not be created to add support for a new source database.

All modules are derived from base classes whose methods can be re-written to match the new source database.

7.3. The Modular Migration Process

From a module developer point of view, the migration process is as follows:

1. The MySQL Migration Toolkit prompts the user for a source database and connection parameters. The user selection determines which modules will be used for the source database.

- 2. The MySQL Migration Toolkit calls the testConnection method of the reverse engineering module. The testConnection method returns success or failure to the MySQL Migration Toolkit.
- 3. The MySQL Migration Toolkit calls the getSchemata method of the reverse engineering module. The getSchemata method returns a list of the schemas available on the source RD-BMS for the user to choose from.
- 4. Once the user has selected one or more schema to migrate, the MySQL Migration Toolkit calls the reverseEngineer method of the reverse engineering module. The reverseEngineer method converts all objects in the source RDBMS (tables, views, procedures) into a collection of GRT objects.
- 5. After the source database has been reverse engineered, the MySQL Migration Toolkit calls the migrationMethods method of the migrationMethods method generates a list of available methods than can be selected by the user in the Object Mapping Screen.
- 6. Once the user has selected the migration methods, the MySQL Migration Toolkit calls the migrate method of the migration module. The migrate method converts the source RDBMS GRT objects into MySQL GRT objects by calling the selected migration method for each source schema object. If no explicit method is assigned, the default migration method for the object type will be used.
- 7. After the MySQL GRT objects have been created, the MySQL Migration Toolkit calls the transformation moldule to convert the MySQL GRT objects into SQL statements that will create the objects on the target MySQL server. The MySQL Migration Toolkit then either executes the SQL statements on the target MySQL server or writes them to a script file.
- 8. In the final step, the MySQL Migration Toolkit calls the dataBulkTransfer method of the migration module. The dataBulkTransfer method loops through the selected tables in the selected schema and migrates the rows of the tables to the target MySQL database or loads them into a script file, depending on the user preference.

7.4. Tools Required to Extend the MySQL Migration Toolkit

The MySQL AB GUI Team uses Eclipse for development of the MySQL Migration Toolkit modules and recommends Elcipse for use when developing modules for the MySQL Migration Toolkit. See http://www.eclipse.org/ for more information.

Appendix A. Preparing a Microsoft Access Database for Migration

The MySQL Migration Toolkit requires access to the system tables of a Microsoft Access database for the purpose of reverse-engineering. By default, read access to the system tables of an Access database is restricted for external applications.

To enable access to the system tables by the MySQL Migration Toolkit, open the database in Microsoft Access and choose the Options entry of the Tools menu. Within the Options dialog, select the View tab and look for the Show section:

Figure A.1. The show section

Show	
🔽 Status bar	Hidden objects
🔽 Startup dialog box	System objects
Vew object shortcuts	🔽 Windows in Taskbar

Check the box next to the System objects option and close the options dialog. System tables for the database should now be present:

Figure A.2. The system objects

💼 Northwind : D	atab	ase			_ 🗆 🗙
🛱 Open 🔛 Design	י 🏪	<u>N</u> ew X D			
Objects	2	Create table in Design view		MSysObjects	
III Tables	2	Create table by using wizard		MSysQueries	
Cueries	2	Create table by entering data		MSysRelationships	
		Categories	₩	Order Details	
EB Forms		Customers	₩	Orders	
🔳 Reports		Employees	₩	Products	
🖀 Pages		MSysAccessObjects	₩	Shippers	
7 Macros		MSysACEs	₩	Suppliers	
A Hacros		MSysCmdbars			
K Modules		MSysIMEXColumns			
Groups		MSysIMEXSpecs			
Favorites					

Note the presence of the various MSys tables.

After you expose the system objects to the MySQL Migration Toolkit, you must also grant permission to access the objects. Choose the User and Group Permissions entry from the Security section of the Tools menu:

User and Group Permissions		? 🗙
Permissions Change Owner		
User/Group Name:	Object Name:	
Admin	MSysACEs MSysCmdbars MSysIMEXColumns MSysIMEXSpecs MSysObjects MSysQueries MSysRelationships Order Details	
List: 💽 Users 🔘 Groups	Object Type: Table	•
	Read Data	
Read Design	Update Data	
Modify Design	Insert Data	
Administer	🗍 Delete Data	
Current User: Admin		
	Cancel	Apply

i igui e met Grunning access to the system objects
--

Enable the Administer permission for both the MSysObjects and MSysQueries tables. You will need to click the Apply button after enabling each table and before moving to the next table.

After completing these steps, you can reverse-engineer the schema in your Access database using the MySQL Migration Toolkit.