

# MySQL for Oracle DBAs

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Implementation Differences

SQL Differences

MySQL Database Administration

Using the 'mysql' Command-line Utility

Installation

MySQL Enterprise Monitor

# Implementation Differences

- MySQL Users

- Defined by a username and hostname.

- `create user 'scott'@'ws1.company.com';`
- Use '%' to allow user to login from any host
- 'scott'@'ws1.company.com' and 'scott'@'%' are two different users, with different access rights.

- Do not own any database objects.

- Example:

- `create user 'scott'@'%' identified by 'tiger';`
- `create database scotts_db;`
- `grant all on scotts_db.* to 'scott'@'%';`

# Implementation Differences

- No roles
- No tablespace management. One 'system' tablespace. System parameter `'innodb_file_per_table'` will make each table be in a separate (tablespace) file.
- No undo/redo segments.
- No ASM.
- Replication is much easier to setup, but not as robust.

# Implementation Differences

- Only one (multi-threaded) process per server instance.
- Listens on port 3306 (default) for connections. No separate listener process.
- Supports triggers, stored procedures and functions, but not packages.
- Local connections use a socket file. (Oracle uses the bequeath protocol)

# Implementation Differences

- Query Cache (new in Oracle 11)
- No check constraints
- No synonyms
- No flashback
- Database (schema) and/or table specific character sets can be specified.

# SQL Differences

- No 'rownum' pseudo column. Use the 'limit' clause:
  - `select * from emp limit 5;`
- No sequences, but there is an 'auto\_increment' attribute that can be set for a column.
  - `create table x (id integer not null auto_increment, value varchar(30), primary key (id));`
- MySQL tries to make inserts work even with values that would cause errors in Oracle.
  - `insert into mytable (mydate) values ('0000-00-00');`

# SQL Differences

- Multiple storage engines available

```
create table x (  
  id integer not null,  
  value varchar(30),  
  primary key (id)  
) engine myisam;
```

- TIME, DATE and DATETIME datatypes
- DROP TABLE IF EXISTS emp;
- ALTER table emp ADD COLUMN column\_x  
varchar(20) AFTER column\_3;
- Dates
  - Functions: curdate(), now()
  - Default format: YYYY-MM-DD

# Administration

- Many useful 'show' commands:

```
mysql> show create table x\G
***** 1. row *****
      Table: x
Create Table: CREATE TABLE "x" (
  "id" int(11) NOT NULL,
  "value" varchar(30) DEFAULT NULL,
  PRIMARY KEY ("id")
)
1 row in set (0.00 sec)
-----
show create database <db_name>
show create function <func_name>
show create procedure <proc name>
...
show tables
show databases
show processlist
show status
show slave status
show variables [like ...]
show table status [like ...]
show engine innodb status\G
(more)
```

# Administration

- Multiple Storage Engines

- MyISAM

- Innodb

- CSV

- `mysql> create table test (id int not null, value char(10) not null) engine = csv;`

- Creates file '`test.frm`' in the database directory.

- Memory

- Archive

- Federated

- (more)

# Administration

## ■ Database Startup

- `cd $MYSQL_HOME`  
`bin/mysqld_safe --defaults-file=``</path/to/my.cnf>` `&`
- `/etc/init.d/mysql start`

## ■ Database Shutdown

- `cd $MYSQL_HOME`  
`bin/mysqladmin --defaults-file=``</path/to/my.cnf>`  
`-u root -p shutdown`
- `/etc/init.d/mysql stop`

# Administration

## ■ Default Filesystem Layout

- Pre-packaged installation put files in many places.
  - `/etc` – configuration and startup files
  - `/usr/bin` – server and client utilities
  - `/usr/lib` or `/usr/lib64` – support libraries
  - `/usr/sbin` – Main server
  - `/usr/share` – Docs and other info
  - `/var/lib/mysql` – **Database data files**
- Some installs use `/opt/mysql/<server-version>/`

# Administration

- Why Not Use the Default Install?
  - Multiple versions can't co-exist.
  - Can't administer without superuser privileges.
  - Server is configured so that the **install** succeeds. It is tuned to use a minimal amount of memory and resources.
  - The database data files will not be on the 'best disk'.
  - A standard DBA cannot manage the installation.

# Administration

- Recommended Filesystem Layout
  - `$MYSQL_BASE (/u01/mysql/prod)`
  - `$MYSQL_HOME ($MYSQL_BASE/$MYSQL_VERSION)`
  - `$MYSQL_DATA_LOC = $MYSQL_BASE/<dbid>` (or dedicated data disk)
    - `binlogs/`
    - `data/`
    - `logs/`
      - `<dbid>.err`
    - `run/`
      - `<dbid>.pid`
      - `<dbid>.sock`
      - `my.cnf`

# Administration

- Backup Methods
  - **Cold:** shutdown the database and copy the data files to a backup location.
  - **Warm:** `mysqldump` – Dumps the data to a text file containing all of the DDL and DML needed to restore the database.
  - **Hot:**
    - `mysqldump` – may not work in all cases.
    - MySQL Enterprise Backup

# Administration

- Does MySQL have anything like Oracle's "V\$" and "DBA\_" views?
  - `information_schema` database
    - Object definitions
    - Statistics
    - System parameters and variables
  - `mysql` database
    - Users and privileges
    - Online help
  - `performance_schema` database
    - New in 5.5
    - Performance data

# Administration

- Tuning

- Database parameters in my.cnf

- Examine status/statistics

- `mysql> show status [like ...]`

- Change parameters dynamically

- `mysql> set global query_cache_size = 33554432;`

- `mysql> show global variables [like ...]`

- General query log.

- The server writes information to this log when clients connect or disconnect, and it logs each SQL statement received from clients.
  - Controlled by parameters `general_log` and `general_log_file`
  - Not enabled by default

# Administration

- Tuning

- Slow query log.

- The slow query log consists of all SQL statements that took more than `long_query_time` seconds to execute and required at least `min_examined_row_limit` rows to be examined.
    - Controlled by parameters: `slow_query_log` and `slow_query_log_file`
    - Not enabled by default

- MySQL Enterprise Monitor

- Performance Graphs
    - Query Analyzer
      - Query capture must be configured on each server's MEM agent, possibly on each client.
    - Notifications

# Administration

- Utilities

- mysql - similar to SQL\*Plus
- mysqladmin – Perform admin operations
- mysqldump – A database backup program
- mysqlcheck – A table maintenance program
- mysqlbinlog – Display contents of binary log files
- mysql\_upgrade – Version upgrade utility
- (more)

# Administration

- Workstation tools

- MySQL Workbench
  - Similar to Toad and SQL Developer.
  - Allows some administration via the GUI.
- Toad
- SQL Developer with MySQL plugin.
- TORA
- MySQL command line utility
  - Connect to a remote host:  

```
$ mysql -h <hostname> -P <port> -u<username> -p
```
  - Default port is 3306, default username is your login username.

# Using the `mysql` Utility

- Generally more robust than SQL\*Plus
- Connect to a local or remote database.
- Default database username is your login name
- Common command line arguments:
  - `-u<username>`
  - `-p`
  - `-h <hostname>` If not specified, connect to server on localhost via the socket file defined in `my.cnf`
  - `-P <port>`
  - `--defaults-file=<filename>`  
Looks for `my.cnf` in the following locations:
    - `/etc/my.cnf` `/etc/mysql/my.cnf` `/usr/etc/my.cnf`
    - `$MYSQL_HOME/my.cnf` `$HOME/.my.cnf`
  - `-B` Batch mode. Disables interactive behavior and history file.
  - `<database>` Specify the initial database to use.
- Run scripts by redirecting standard input:

```
mysql -uscott -p <build_schema.sql
```

# Using the `mysql` Utility

- Vertical Output Display with `"\G"`

```
mysql> select * from mysql.user where user = 'bruce'\G
```

- Explain execution plans by simply prefixing a query with the word 'explain'. No plan table needed.
- Autocommit is on by default. Turn off with:

```
set autocommit = 0;
```

- Easily create a table dump or report:

```
select into <outfile> ...  
columns terminated by ','  
optionally enclosed by '"';
```

- Default column separator is a tab.

# Using the `mysql` Utility

- Load data from a file:

```
mysql> load data infile 'filename' into table <table_name>
> columns terminated by ','
> optionally enclosed by '"';
```

- DUAL is not required, but provided for compatibility

```
mysql> select 1+1;
+-----+
| 1+1 |
+-----+
| 2 |
+-----+
1 row in set (0.00 sec)
```

- The `sql_mode` variable controls behaviour of many compatibility options such as the behavior of pipe and quote characters.
  - `||` could mean concat, or it could be an 'or' operator.
  - `”` could be an identifier quote or a string quote.

# Using the `mysql` Utility

- Line editing and history are built-in features.
- Can use an external pager (like 'less') to view query results.
- Common command line controls:

Command	Shortcut	Description
<code>?</code>	<code>\?</code>	Help – show all these commands
<code>clear</code>	<code>\c</code>	Clear the current input statement
<code>connect</code>	<code>\r</code>	reconnect
<code>edit</code>	<code>\e</code>	Edit command with <code>\$EDITOR</code>
<code>ego</code>	<code>\G</code>	Display output vertically
<code>exit</code>	<code>\q</code>	Exit. 'quit' also works.
<code>status</code>	<code>\s</code>	Show server and session status
<code>system</code>	<code>\!</code>	Execute a system shell command
<code>tee</code>	<code>\T</code>	Append everything to output file specified with 'set outfile <filename>'
<code>use</code>	<code>\u</code>	Use the specified database

# Using the `mysql` Utility

- Built-in Help

- Help on specific commands

- Help on SQL statements

- `mysql> help contents`

- For more information, type 'help<item>', where <item> is one of the following categories:

- You asked for help about help category: "Contents"

- Account Management

- Administration

- Compound Statements

- Data Definition

- Data Manipulation

- Data Types

- Functions

- Functions and Modifiers for Use with GROUP BY

- Geographic Features

- Help Metadata

- Language Structure

- Plugins

- Table Maintenance

- Transactions

- User-Defined Functions

- Utility

# Installation

- Install from .tar.gz file. Do not install from an .rpm .deb or other package file.
  - Why?
    - Centrally Manageable
    - Upgradable
    - Multiple versions can be installed on a server
    - Easier to tune/configure
    - A DBA can administer the database without needing root privileges.
  - Problems with distribution-specific packages:
    - The install is mainly designed so that the install succeeds.
    - Datafiles placed in /var, rather than on your SAN or best disk.
    - Have to wait for package maintainers to release updates.
    - Uses minimal amount of memory, not tuned to your specific server.
    - Only 1 MySQL server can be installed on the machine

# MySQL Enterprise Monitor

- Browser based (like Grid Control)
- Requires an agent to be installed on the database server.
- May require separate licensing.
- Can send event notifications.
- Keeps performance history.

# MySQL

Resources:

<http://dev.mysql.com>

<http://mysql.com>

Google: mysql <help topic>

Thank you.