

DBMS: MySQL & Hibernate

CORSO DI BASI DI DATI 2015/2016

Indice dei contenuti

- **MySQL:** come configurare il Database
- **MySQL Workbench:** Progettare il database relazionale in modo visuale
- **Hibernate:** Persistency Framework per qualsiasi RDMBS (modulare tramite drivers). Effettua “Object-Relational Mapping”.

1) MySQL

The screenshot shows the MySQL download page for version 5.6.22. The browser address bar shows 'dev.mysql.com/downloads/mysql/'. The page has a sidebar on the left with contact information and related pages. The main content area has tabs for 'Generally Available (GA) Releases' and 'Development Releases'. Below the tabs, the version 'MySQL Community Server 5.6.22' is displayed. A 'Select Platform:' dropdown menu is set to 'Mac OS X'. To the right, there is a link 'Looking for previous GA versions?'. Below this, there is a table of download links for Mac OS X 10.9 and 10.8, including compressed TAR archives and DMG archives, with their respective sizes and MD5 checksums.

Contact Sales

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for the MySQL 5.5 Generally Available (GA) Release

Please report any bugs or inconsistencies you observe to our [Bugs Database](#).
Thank you for your support!

Generally Available (GA) Releases **Development Releases**

MySQL Community Server 5.6.22

Select Platform: [Looking for previous GA versions?](#)

Mac OS X 10.9 (x86, 64-bit), Compressed TAR Archive (mysql-5.6.22-osx10.9-x86_64.tar.gz)	5.6.22	167.0M	Download
	MD5: 76ea793fb231d18f0b4f7341a5c2e2c8 Signature		
Mac OS X 10.9 (x86, 64-bit), DMG Archive (mysql-5.6.22-osx10.9-x86_64.dmg)	5.6.22	167.2M	Download
	MD5: 16edb8077d7a03416b273a0c6bb7cb2a Signature		
Mac OS X 10.8 (x86, 64-bit), Compressed TAR Archive (mysql-5.6.22-osx10.8-x86_64.tar.gz)	5.6.22	168.4M	Download
	MD5: 66407334872ffba1a320ccdfaaae037f Signature		
Mac OS X 10.8 (x86, 64-bit), DMG Archive (mysql-5.6.22-osx10.8-x86_64.dmg)	5.6.22	167.2M	Download
	MD5: 16edb8077d7a03416b273a0c6bb7cb2a Signature		

MySQL: configurazione

- In MacOS, dopo l'installazione il PATH potrebbe non essere aggiornato per accedere al client MySQL.

```
export PATH=${PATH}:/usr/local/mysql/bin
```

- Quindi accedete al client con il seguente comando, accedendo con la password di default.

```
mysql -u root -p
```

- A questo punto dovrete cambiare la password come prima operazione:

```
SET PASSWORD = PASSWORD('pwd');
```

Accesso e Creazione DB

- **show databases;**

Visualizza l'intero set di database memorizzati.

- **create database test;**

Crea un nuovo database nuovo di nome test

- **use test;**

Accede al database di nome test

- **show tables;**

Mostra l'elenco delle tabelle del database corrente

Interrogazione tabella – Sintassi Completa

SELECT

[ALL | DISTINCT | DISTINCTROW]

[HIGH_PRIORITY]

[STRAIGHT_JOIN]

[SQL_SMALL_RESULT] [SQL_BIG_RESULT] [SQL_BUFFER_RESULT]

[SQL_CACHE | SQL_NO_CACHE] [SQL_CALC_FOUND_ROWS]

select_expr [, ***select_expr*** ...]

[FROM ***table_references***

[WHERE ***where_condition***]

[GROUP BY {***col_name*** | ***expr*** | ***position***}

[ASC | DESC], ... [WITH ROLLUP]]

[HAVING ***where_condition***]

[ORDER BY {***col_name*** | ***expr*** | ***position***}

[ASC | DESC], ...]

[LIMIT {[***offset***,] ***row_count*** | ***row_count*** OFFSET ***offset***}]

[PROCEDURE ***procedure_name***(***argument_list***)]

[INTO OUTFILE '***file_name***' ***export_options***

| INTO DUMPFILE '***file_name***'

| INTO ***var_name*** [, ***var_name***]]

[FOR UPDATE | LOCK IN SHARE MODE]]

Creazione Indice - Sintassi

```
CREATE [UNIQUE | FULLTEXT | SPATIAL] INDEX index_name  
    [index_type]  
    ON tbl_name (index_col_name,...)  
    [index_type]
```

index_col_name:

col_name [(*length*)] [ASC | DESC]

index_type:

USING {BTREE | HASH}

Creazione Indice

```
CREATE INDEX indexprezzo  
ON negozio (prezzo)
```


I permessi

Permesso	Istruzioni
ALL	tutte esclusa GRANT
ALTER	ALTER TABLE
CREATE	CREATE TABLE
CREATE TEMPORARY TABLES	CREATE TEMPORARY TABLE
CREATE VIEW	CREATE VIEW
DELETE	DELETE
DROP	DROP TABLE
INDEX	CREATE INDEX, DROP INDEX
INSERT	INSERT
LOCK TABLES	LOCK TABLES
SELECT	SELECT
SHOW VIEW	SHOW CREATE VIEW
UPDATE	UPDATE
USAGE	nessuna
GRANT OPTION	GRANT, REVOKE

Creazione utente

```
create user 'pippo'@'localhost' identified by 'password_in_chiaro';
```

```
grant all privileges on negozio.* to pippo@localhost;
```

```
show grant for pippo@localhost;
```

```
revoke all privileges on negozio.* FROM pippo@localhost
```

2) MySQL Workbench

The screenshot shows the MySQL Workbench download page. The browser address bar displays `dev.mysql.com/downloads/workbench/`. The page header includes the MySQL logo and navigation tabs for Downloads, Documentation, and Developer Zone. A secondary navigation bar lists Enterprise, Community (selected), Yum Repository, APT Repository, Windows, and Archives. The main heading is "Download MySQL Workbench". The content area describes the tool's purpose and lists supported features: Database Design & Modeling, SQL Development, Database Administration, and Database Migration. It also mentions the availability of the Community (OSS) Edition under the GPL license. A sidebar on the left provides links to various MySQL products and utilities, with "MySQL Workbench" highlighted. A "Contact Sales" section at the bottom left provides phone numbers for the USA and Canada. A right-hand sidebar contains information about the GPL license and commercial licensing options for OEMs, ISVs, and VARs. A bottom section lists prerequisites for installation, including Microsoft .NET Framework 4 Client Profile and Visual C++ Redistributable for Visual Studio 2013.

dev.mysql.com/downloads/workbench/

The world's most popular open source database

MySQL.com Downloads Documentation Developer Zone

Enterprise **Community** Yum Repository APT Repository Windows Archives

Download MySQL Workbench

MySQL Workbench provides DBAs and developers an integrated tools environment for:

- Database Design & Modeling
- SQL Development
- Database Administration
- Database Migration

The Community (OSS) Edition is available from this page under the GPL.

Download source packages of LGPL libraries: [+]

MySQL Workbench Prerequisites:

To be able to install and run MySQL Workbench your System needs to have libraries listed below installed. The listed items are provided as links to the corresponding download pages where you can fetch the necessary files.

- Microsoft .NET Framework 4 Client Profile
- Visual C++ Redistributable for Visual Studio 2013

MySQL open source software is provided under the [GPL License](#).

OEMs, ISVs and VARs can purchase commercial licenses.

MySQL on Windows

[MySQL Yum Repository](#)

[MySQL APT Repository](#)

[MySQL Community Server](#)

[MySQL Cluster](#)

[MySQL Fabric](#)

[MySQL Utilities](#)

MySQL Workbench

[MySQL Proxy](#)

[MySQL Connectors](#)

[Other Downloads](#)

Contact Sales

USA: +1-866-221-0634
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FOREIGN Keys in MySQL WB

The diagram shows two tables: **Prodotti** and **Fornitore**.

- Prodotti** table:
 - primary key: `prodotto INT`
 - field: `prezzo DOUBLE`
 - foreign key: `Fornitore_idFornitore INT`
- Fornitore** table:
 - primary key: `idFornitore INT`
 - fields: `Nome VARCHAR(45)`, `Tel VARCHAR(11)`

A foreign key relationship is established from `Fornitore_idFornitore` in the **Prodotti** table to `idFornitore` in the **Fornitore** table. The relationship is one-to-one (1:1).

Foreign Key details 'fk_Prodotti_Fornitore'

Column	Referenced Column	On Update:	On Delete:
<input type="checkbox"/> prezzo		NO ACTION	NO ACTION
<input checked="" type="checkbox"/> Fornitore_idFornitc	idFornitore	NO ACTION	NO ACTION

Comment:

Forward Engineering in MySQL WB

Forward Engineer to Database

● Connection Options

● Options


● **Select Objects**

● Review SQL Script

● Commit Progress


Select Objects to Forward Engineer

To exclude objects of a specific type from the SQL Export, disable the corresponding checkbox. Press Show Filter and add objects or patterns to the ignore list to exclude them from the export.




☒ Export MySQL Table Objects
2 Total Objects, 2 Selected

Show Filter



☐ Export MySQL View Objects
0 Total Objects, 0 Selected

Show Filter



☐ Export MySQL Routine Objects
0 Total Objects, 0 Selected

Show Filter

☐ Export MySQL Trigger Objects
0 Total Objects, 0 Selected

Show Filter

☐ Export User Objects
0 Total Objects, 0 Selected

Show Filter

Go Back

Continue

3) Hibernate

- Un *framework per la gestione della persistenza* consente di mappare direttamente una tabella in un oggetto, istanza di una classe (**O-R mapping service**).
- Non è necessario scandire il database. Il risultato popolerà direttamente una collezione di oggetti.
- Suggerimento: utilizzare “**Hibernate**” per velocizzare il processo di programmazione (che non è l’obiettivo principale del progetto)
- Java: l’IDE consigliato è **IntelliJ IDEA 15**
[<https://www.jetbrains.com/student/>]
- Il progetto d’esempio è su GitHub
(<https://github.com/jackbergus/javahibernateexample>)

Java: Maven (pom.xml)

- **Apache Maven** è un software per la gestione di progetti Java e *build automation*.
- **Apache Maven** usa un costrutto conosciuto come *Project Object Model* (POM); un file XML (pom.xml) che descrive le dipendenze fra il progetto e le varie versioni di librerie necessarie nonché le dipendenze fra di esse.
 - In questo caso si inseriscono le dipendenze per Hibernate, per il driver di accesso al server MySQL, e la libreria esterna per la gestione delle *transactions*.

```
<dependencies>

  <!-- Adding the hibernate Dependencies -->
  <dependency>
    <groupId>org.hibernate</groupId>
    <artifactId>hibernate</artifactId>
    <version>3.2.6.ga</version>
  </dependency>
  <dependency>
    <groupId>org.hibernate</groupId>
    <artifactId>hibernate-annotations</artifactId>
    <version>3.3.1.GA</version>
  </dependency>

  <!-- Adding the mysql driver for hibernate -->
  <dependency>
    <groupId>mysql</groupId>
    <artifactId>mysql-connector-java</artifactId>
    <version>5.1.6</version>
  </dependency>

  <!-- java.lang.NoClassDefFoundError: javax/transaction/Synchronization -->
  <dependency>
    <groupId>javax.transaction</groupId>
    <artifactId>jta</artifactId>
    <version>1.1</version>
  </dependency>

</dependencies>
```

Java: Hibernate

(/src/resources/hibernate.cfg.xml)

Il file di configurazione principale va inserito tra le risorse.

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE hibernate-configuration SYSTEM
    "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">

<hibernate-configuration>
<session-factory>
    <!-- Using the MySQL database -->
    <property name="hibernate.dialect">org.hibernate.dialect.MySQLDialect</property>
    <!-- Specifying the MySQL Driver, imported from pom.xml -->
    <property name="hibernate.connection.driver_class">com.mysql.jdbc.Driver</property>

    <!-- Updates and creates the tables -->
    <property name="hibernate.hbm2ddl.auto">update</property>

    <!-- Assume test is the database name, connect to it -->
    <property name="hibernate.connection.url">jdbc:mysql://localhost/test</property>
    <property name="hibernate.connection.username">root</property>
    <property name="hibernate.connection.password">pwd</property>

    <!-- List of XML mapping files (Employee class)
    The xml configuration for the class should be stored in the resources path in the same configuration path
    of the class -->
    <mapping resource="it/db/bergaminiacomo/mysql/Employee.hbm.xml"/>

</session-factory>
</hibernate-configuration>
```

Da rimuovere se non si vogliono creare le tabelle automaticamente.

Java: Hibernate

(Employee.java)

- Ad una tabella nel database può corrispondere una classe java **POJO**: i field privati verranno inizializzati da Hibernate e, per ciascuno di questi, dev'essere implementato un getter ed un setter.
- Ad ogni classe java corrisponde un file di configurazione xml (segue)

```
package it.db.bergamigiacomomysql;  
  
public class Employee {  
    private int id;  
    private String firstName;  
    private String lastName;  
    private int salary;  
  
    public Employee() {}  
  
    public Employee(String fname, String lname, int salary) {  
        this.firstName = fname;  
        this.lastName = lname;  
        this.salary = salary;  
    }  
  
    public int getId() { return id; }  
    public void setId( int id ) { this.id = id; }  
    public String getFirstName() { return firstName; }  
    public void setFirstName( String first_name ) { this.firstName = first_name; }  
    public String getLastName() { return lastName; }  
    public void setLastName( String last_name ) { this.lastName = last_name; }  
    public int getSalary() { return salary; }  
    public void setSalary( int salary ) { this.salary = salary; }  
}
```

Java: Hibernate

Classe di riferimento

(Employee.hbm.xml)

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE hibernate-mapping PUBLIC
    "-//Hibernate/Hibernate Mapping DTD//EN"
    "http://www.hibernate.org/dtd/hibernate-mapping-3.0.dtd">

<hibernate-mapping>
  <class name="it.db.bergamigiacomo.mysql.Employee" table="EMPLOYEE">
    <meta attribute="class-description">
      This class contains the employee detail.
    </meta>
    <id name="id" type="int" column="id">
      <generator class="native"/>
    </id>
    <property name="firstName" column="first_name" type="string"/>
    <property name="lastName" column="last_name" type="string"/>
    <property name="salary" column="salary" type="int"/>
  </class>
</hibernate-mapping>
```

Tabella DB

Field della classe

Attributo della tabella

Java: Hibernate

Popolare una tabella (I)

- Lo scopo principale di queste librerie è quello di evitare SQL injection: conseguentemente la maggior parte delle operazioni utilizza o processori di query o di metodi appositi all'interno di una determinata sessione per eseguire le operazioni sensibili (creazione, eliminazione, aggiornamento)
- Il **singleton** per l'accesso al database è:

```
SessionFactory factory = new Configuration().configure().buildSessionFactory();
```

Java: Hibernate

Popolare una tabella (II)

- Ogni *factory* consente di aprire una *sessione*, all'interno della quale possono essere eseguite delle *transazioni tx*, che consentono di eseguire delle operazioni sul database.
- La creazione di una nuova riga corrisponde alla creazione di un nuovo oggetto e del salvataggio dello stesso (**save**)

```
/* Method to CREATE an employee in the database */
public Integer addEmployee(String fname, String lname, int salary){
    Session session = factory.openSession();
    Transaction tx = null;
    Integer employeeID = null;
    try{
        tx = session.beginTransaction();
        Employee employee = new Employee(fname, lname, salary);
        employeeID = (Integer) session.save(employee);
        tx.commit();
    }catch (HibernateException e) {
        if (tx!=null) tx.rollback();
        e.printStackTrace();
    }finally {
        session.close();
    }
    return employeeID;
}
```

Java: Hibernate

Altre operazioni utili

- **`session.get(clazz,id);`**
Ottiene l'entry con identificativo **id** dalla classe **clazz** (es. `Employee.class`).
- **`session.update(obj);`**
Aggiorna un oggetto **obj** ottenuto tramite la libreria.
- **`session.delete(obj);`**
Rimuove un oggetto **obj** ottenuto tramite la libreria.
- **`session.createQuery(string);`**
Crea una query che può essere eseguita. Restituisce una lista di oggetti.

Java: Hibernate Query SQL

```
public List<Employee> filterBySalary(int salary) {  
    List<Employee> elist = new LinkedList<Employee>();  
    Session session = factory.openSession();  
    Transaction tx = null;  
    try{  
        tx = session.beginTransaction();  
        Query query = session  
            .createSQLQuery( "select * from EMPLOYEE e where e.salary > :value")  
            .addEntity(Employee.class)  
            .setParameter("value", salary);  
        elist = query.list();  
        tx.commit();  
    }catch (HibernateException e) {  
        if (tx!=null) tx.rollback();  
        e.printStackTrace();  
    }finally {  
        session.close();  
    }  
    return elist;  
}
```

Parametrizzazione della query

Definizione della classe restituita

Link

- La distribuzione corrente è scaricabile dal sito:
<http://dev.mysql.com/downloads/mysql/>
- Una documentazione completa è reperibile all'URL:
<http://dev.mysql.com/doc/refman/5.7/en/index.html>
- Libro on-line sull'utilizzo di Hibernate:
<https://www.safaribooksonline.com/library/view/just-hibernate/9781449334369/>