

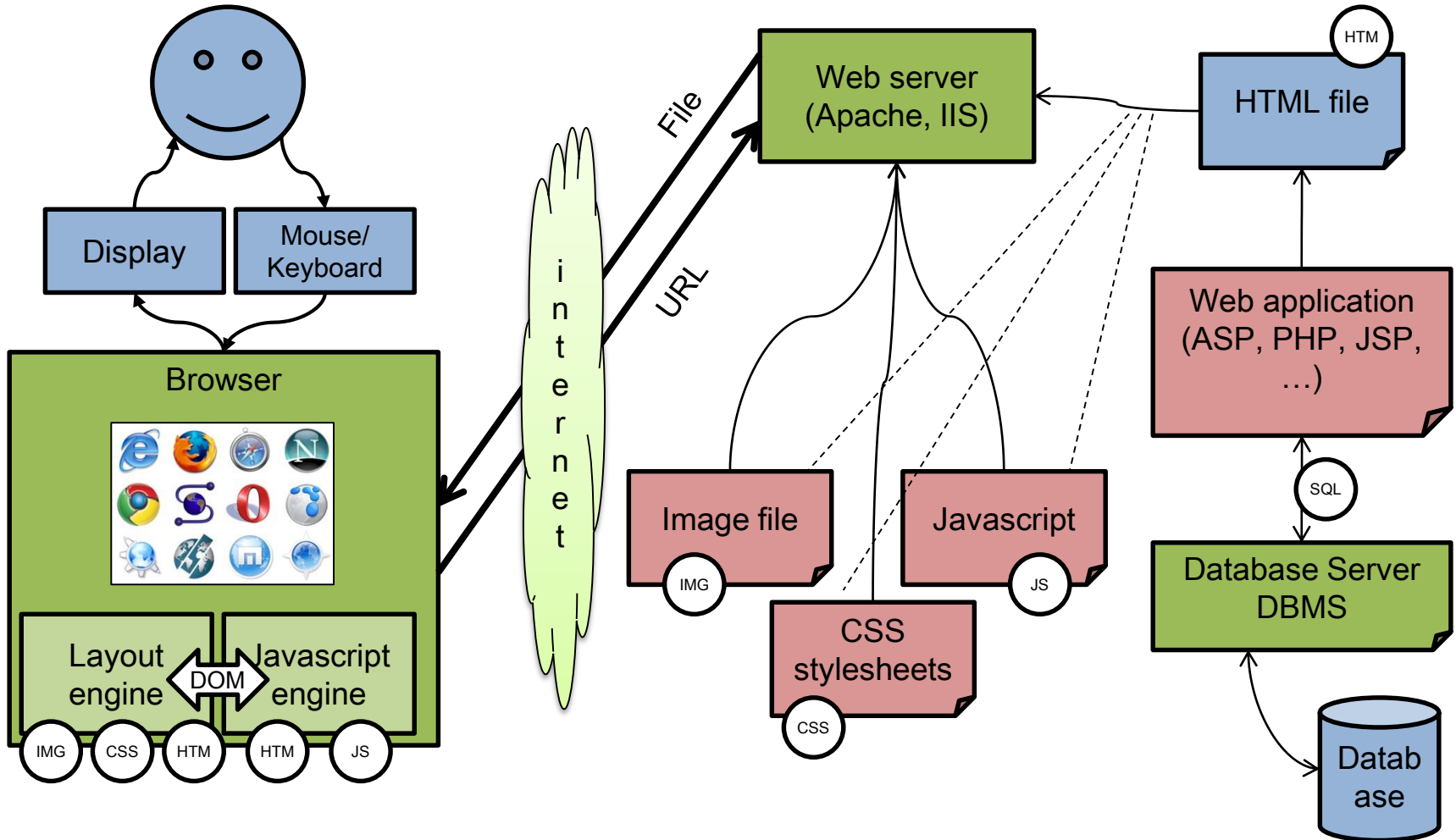
Server-side programming and data base interaction



POLITECNICO
DI TORINO



Rich-client asynchronous transactions



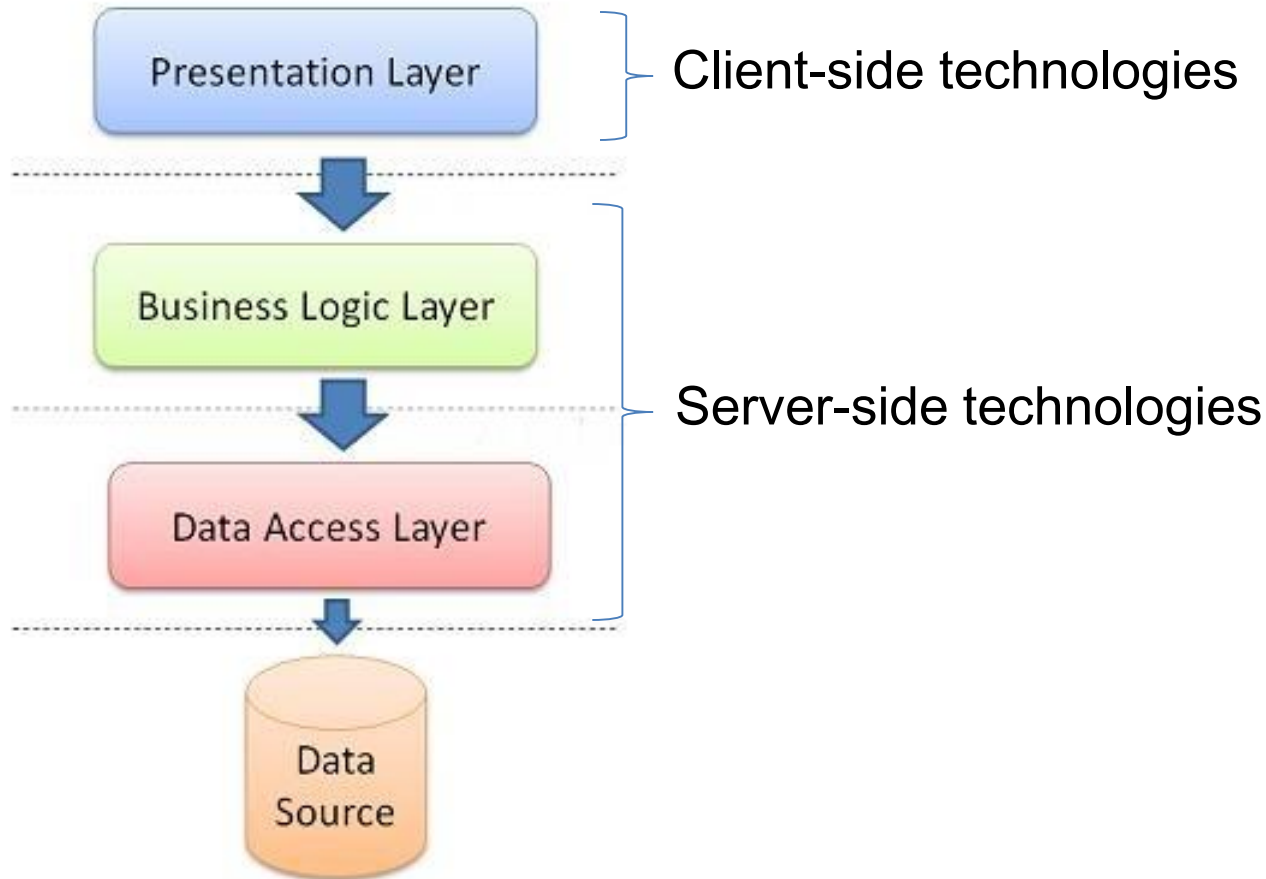
Application server

- A server program in distributed network that provides the business logic for an application program
- Dynamic page generation and content generation
- It's the middle tier between the client browser and the data residing on a database
- Implements the session mechanisms
- Different technologies and architectures are available
 - Java servlets, ASP (active server pages), JSP, PHP, PERL, Python, Ruby, ...

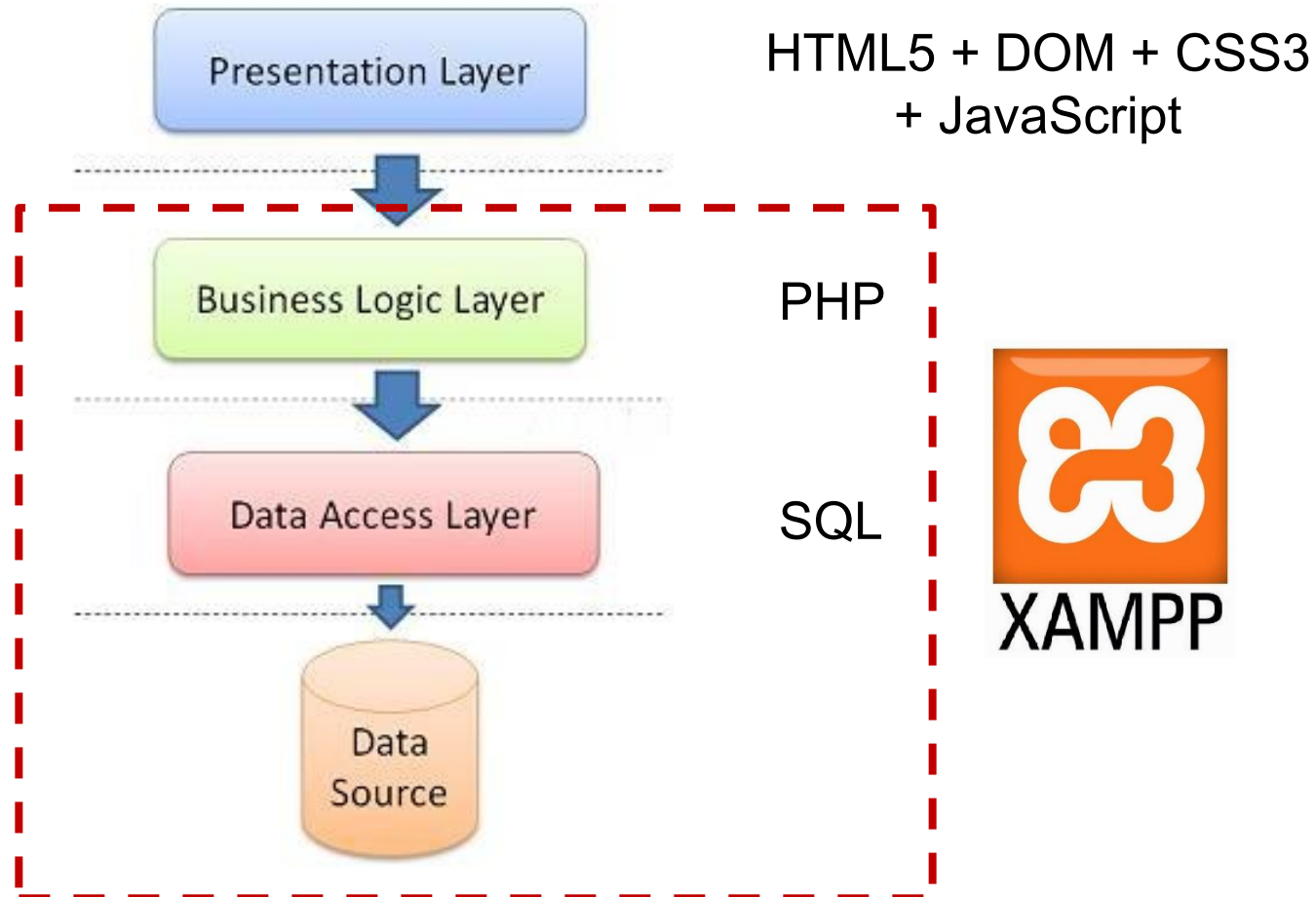
Database server

- Stores the data on which the application server works
- Executes the queries issued by the application server
 - Updates the stored data
 - Inserts new data
 - Provides query results back
- The most frequent/complex queries can be implemented internally as stored procedures (pre-compiled queries with parameters)
- Standards
 - SQL (structured query language), ODBC (open database connectivity) to access data bases

Web technologies and languages



Web technologies and languages



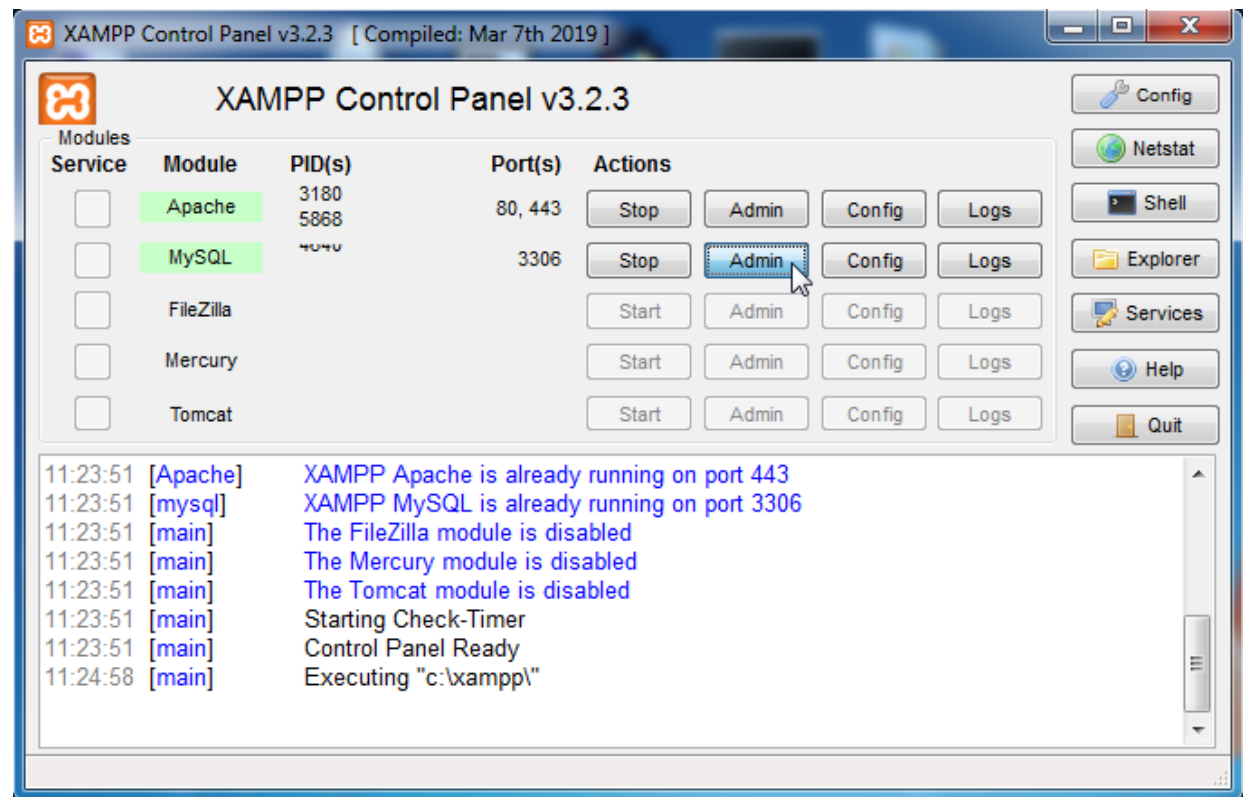
XAMPP



- Free, easy to install Apache distribution containing MariaDB, PHP, and Perl.
 - <https://www.apachefriends.org/it/index.html>
 - The user interface is the same as EasyPHP, but the tool is more stable
- Includes
 - A web server (Apache)
 - A database management system (MySQL)
 - A PHP script interpreter
 - A graphic DB administrator (phpMyAdmin)

phpMyAdmin

- Data Base management
 - Graphic user interface



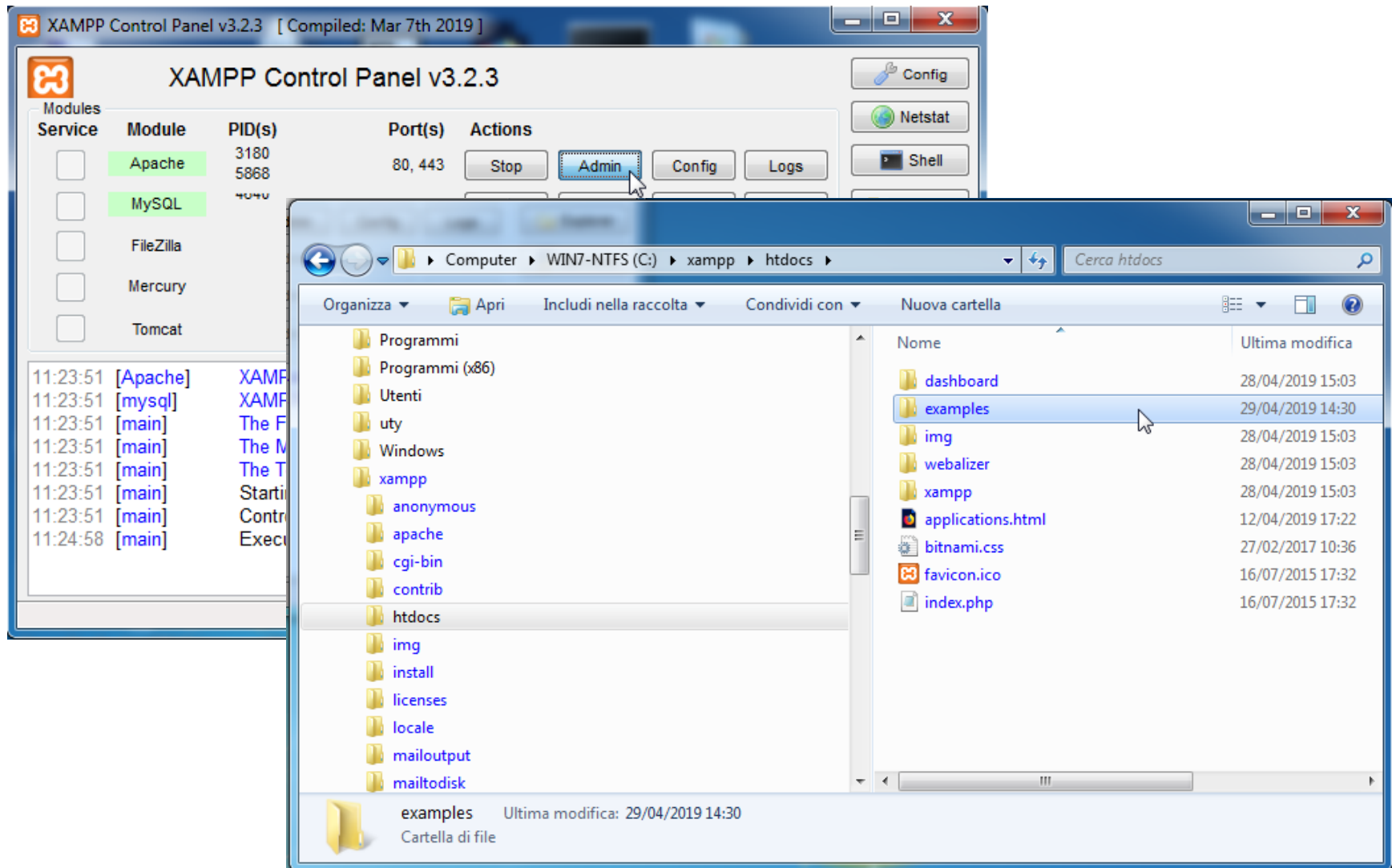
phpMyAdmin

The screenshot displays the phpMyAdmin web interface in a browser window. The browser's address bar shows the URL `localhost/phpmyadmin/`. The interface includes a top navigation bar with tabs for `Database`, `SQL`, `Stato`, `Account utenti`, `Esporta`, `Importa`, `Impostazioni`, and `Replicazione`. The main content area is divided into several panels:

- Impostazioni generali**: Shows the server connection collation set to `utf8mb4_unicode_ci`.
- Impostazioni di presentazione**: Shows the language set to `Italiano - Italian`, the theme set to `pmahomme`, and the font size set to `82%`. A link for `Ulteriori impostazioni` is also present.
- Server del Database**: Lists server details such as `Server: 127.0.0.1 via TCP/IP`, `Tipo di server: MariaDB`, `Connessione Server: SSL inattivo`, `Versione del server: 10.1.38-MariaDB - mariadb.org binary distribution`, `Versione protocollo: 10`, `Utente: root@localhost`, and `Codifica caratteri del server: UTF-8 Unicode (utf8)`.
- Web server**: Lists software versions including `Apache/2.4.39 (Win64) OpenSSL/1.1.1b PHP/7.3.4`, `Versione del client del database: libmysql - mysqlnd 5.0.12-dev - 20150407 - $Id: 7cc7cc96e675f6d72e5cf0f267f48e167c2abb23 $`, `Estensione PHP: mysqli curl mbstring`, and `Versione PHP: 7.3.4`.
- phpMyAdmin**: Provides information about the version (`4.8.5`) and links to `Documentazione`, `Home page ufficiale di phpMyAdmin`, `Contribuisci`, `Ricevi aiuto`, `Lista dei cambiamenti`, and `Licenza`.

A sidebar on the left shows a tree view of databases, including `information_schema`, `mysql`, `performance_schema`, `phpmyadmin`, and `test`. The browser's console is visible at the bottom left.

Local web server



Objective

- Create an application that query a database and return results
- Components
 - User interface (HTML5, CSS, JavaScript)
 - Server-side application (web server, PHP)
 - DBMS (MySQL)
- Review
 - Slides on PHP and on PHP+MySQL (see course web site)

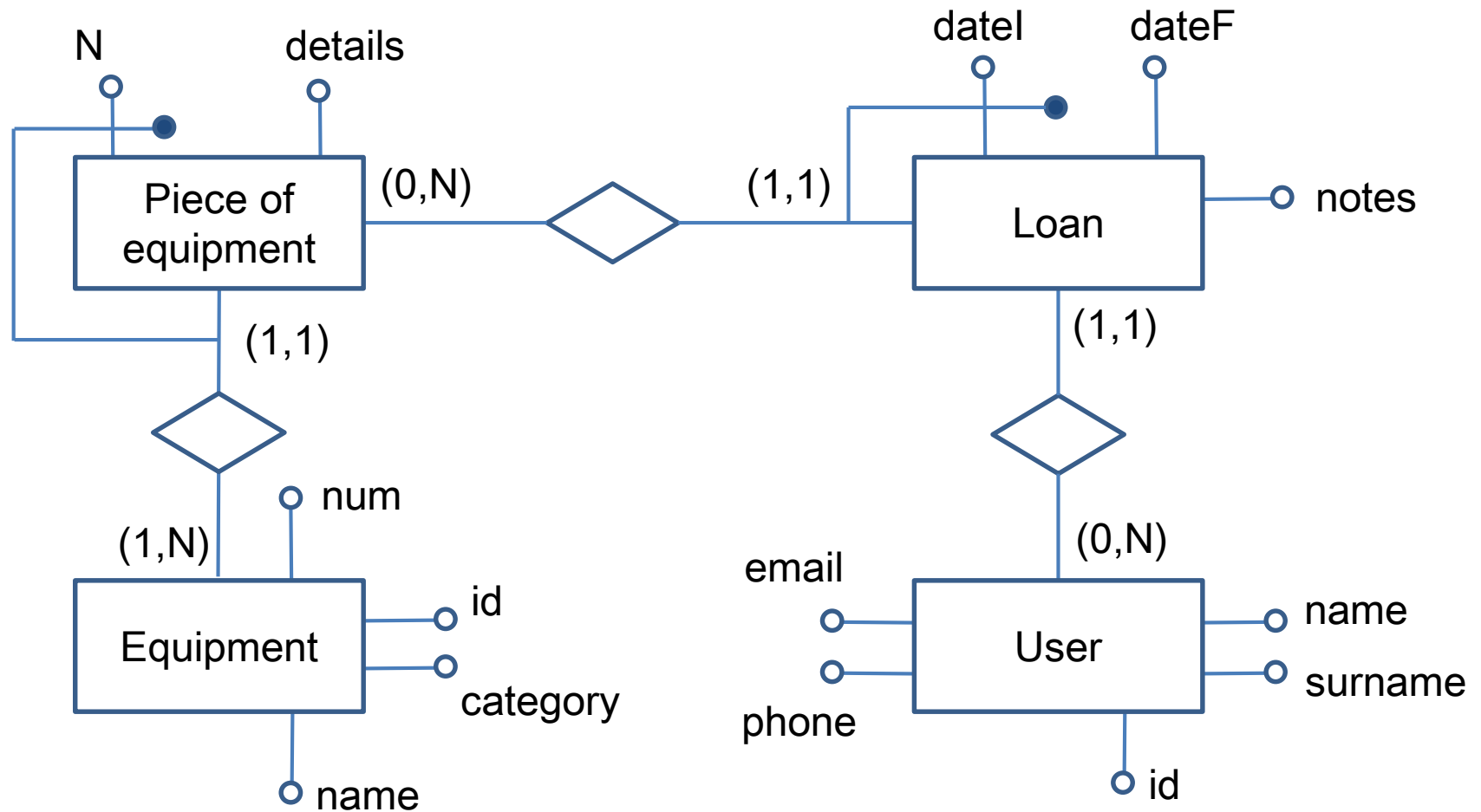
Steps

- Design the database
 - E-R diagram (conceptual design)
 - E-R to tables (logical design)
- Implement the database
 - phpMyAdmin user interface (or SQL)
- Populate the database
 - phpMyAdmin user interface (or SQL)
- Write and test the query
 - phpMyAdmin user interface and SQL
- Write the user interface
 - HTML5 form, CSS, JavaScript, PHP(?)
- Write the result page
 - HTML5, CSS, JavaScript, PHP

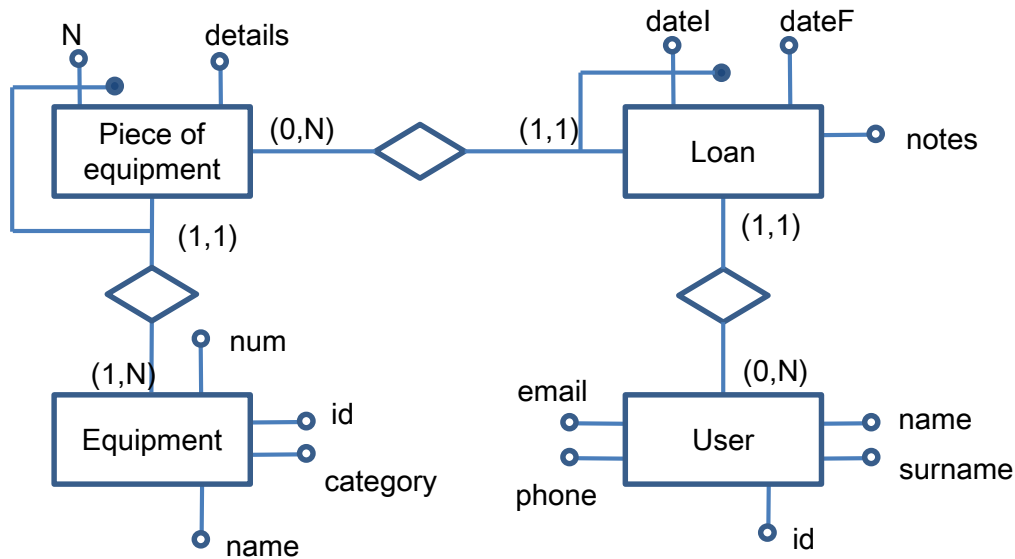
Example

- Design and implement a loan service for video equipment (customer: Visionary Lab)
- User interface
 - For loaners: register, show equipment, show available equipment on a given date, search for a specific equipment, ask for a loan, ...
 - For owners: update equipment list, show list of owners, show owners that are late, ...

E-R diagram



Tables



User (idU, name, surname, email, phone)
Equipment (idEq, name, category, num)
PieceOfEquipment (N, idEq, details)
Loan (N, idEq, datel, idU, dateF, notes)

Tables

```
CREATE TABLE IF NOT EXISTS USER (  
    idU VARCHAR(10) PRIMARY KEY,  
    name VARCHAR(30) NOT NULL,  
    surname VARCHAR(30) NOT NULL,  
    email VARCHAR(50) NOT NULL,  
    phone VARCHAR(30) NOT NULL  
);  
  
CREATE TABLE IF NOT EXISTS EQUIPMENT (  
    idEq VARCHAR(10) PRIMARY KEY,  
    name VARCHAR(255) NOT NULL,  
    category VARCHAR(50),  
    num INTEGER  
);  
  
CREATE TABLE IF NOT EXISTS PIECEOFEQUIPMENT (  
    N INTEGER,  
    idEq VARCHAR(10),  
    details VARCHAR(255),  
    PRIMARY KEY (N, idEq),  
    FOREIGN KEY (idEq)  
        REFERENCES EQUIPMENT (idEq)  
        ON UPDATE CASCADE  
        ON DELETE CASCADE  
);
```


Instances

```
SET autocommit=0;

START TRANSACTION;

INSERT INTO USER (idU, name, surname, email, phone)
VALUES ('98143', 'Mario', 'Rossi', 'mario.rossi@me.com', '+39 333
3457865');

INSERT INTO USER (idU, name, surname, email, phone)
VALUES ('91432', 'Giada', 'Verdi', 'giada.verdi@hotmail.com', '+39 323
4554673');

...

INSERT INTO EQUIPMENT (idEq, name, category, num)
VALUES ('AV01', 'Casse audio', 'Audio/video', 3);
...

INSERT INTO PIECEOFEQUIPMENT (N, idEq, details)
VALUES (1, 'AV01', 'No cables');

INSERT INTO PIECEOFEQUIPMENT (N, idEq, details)
VALUES (2, 'AV01', 'Cables included');
...

INSERT INTO LOAN (N, idEq, dateI, dateF, idU, notes)
VALUES (2, 'AD01', '2019-04-10', '2019-04-14', '91432', '');
...

COMMIT;
```

Web pages

- Input (dynamic select menu content)

Equipment Loan Request

Equipment:

From:

To:

Equipment Loan Request

Equipment:

From:

To:

Web pages

- Result

Loan Request Result

Matrox_TripleHead2Go_SE is available for loan on 2019-05-14

N	idEq	name
1	AD01	Matrox_TripleHead2Go_SE
2	AD01	Matrox_TripleHead2Go_SE

Web pages

- Result

Loan Request Result

Visore_GEAR_VR_con_controller is not available for loan on 2019-03-04.

Available equipment on 2019-03-04

N	idEq	name
1	AD01	Matrox_TripleHead2Go_SE
1	AV01	Casse_audio
2	AV01	Casse_audio
3	AV01	Casse_audio

Queries

- All equipment

```
SELECT name
FROM equipment
ORDER BY name
```
- Equipment on loan on a specific date

```
SELECT N, PE.idEq, name
FROM equipment AS E, pieceofequipment AS PE
WHERE E.idEq = PE.idEq
AND (N, PE.idEq) NOT IN (SELECT N, idEq
                        FROM loan
                        WHERE dateI="2019-03-24")
```
- Specific equipment on loan on a specific date

```
SELECT N, PE.idEq, name
FROM equipment AS E, pieceofequipment AS PE
WHERE E.idEq = PE.idEq
AND name="Casse_audio"
AND (N, PE.idEq) NOT IN (SELECT N, idEq
                        FROM loan
                        WHERE dateI="2019-03-24")
```

References

- PHP
 - <https://www.w3schools.com/php/default.asp>
- PHP + MySQL
 - https://www.w3schools.com/php/php_mysql_intro.asp
- XAMPP
 - <https://www.apachefriends.org/it/index.html>

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