



Amirkabir University of Technology
(Tehran Polytechnic)

Database Systems Fundamentals

Using PHP Language

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Chapter 2- MySQL & PDO

Roadmap :

- MySQL, Apache, PHP: a Team!
- SQL Commands: Select, Insert, Delete, Update, Create Table
- PHP Data Object



MySQL: Just Another RDBMS

- MySQL is a database management system.
- Uses very fast **B-tree** disk tables (MyISAM) with index compression.
- MySQL software is Open Source.
- The MySQL Database Server is very fast, reliable, scalable, and easy to use.
- Written in C and C++.





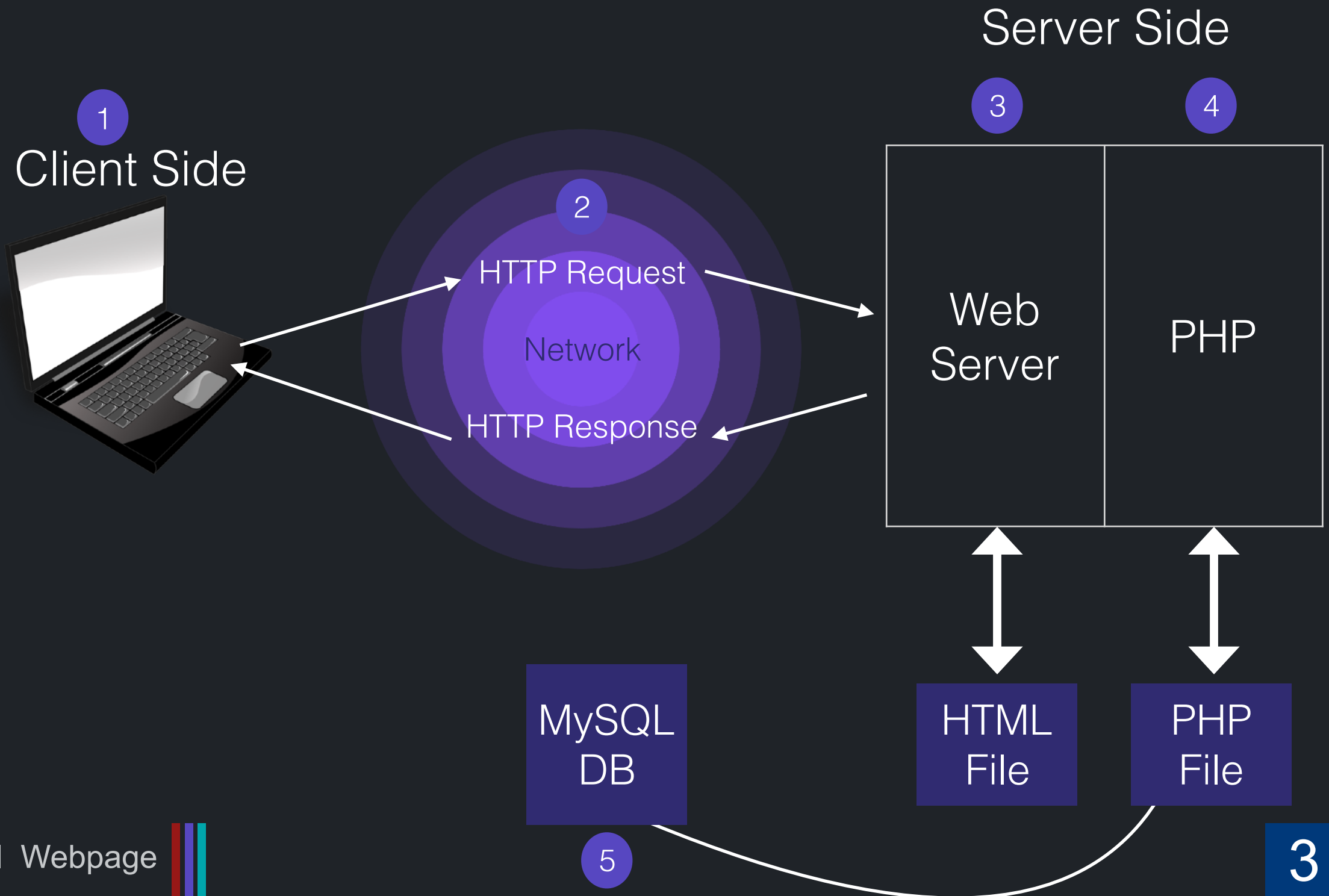
Apache: a Web Server

- Web Server: Basically, The software that receives your request to access a web page.
- Runs a few security checks on your HTTP request and takes you to the web page.
- Depending on the page you have requested, the page may ask the server to run a few extra modules while generating the document to serve you.
- It then serves you the document you requested.





The Life Cycle of a Web Page





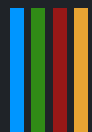
SQL Commands: Create Table

- General Pattern :

```
CREATE TABLE table_name(  
    column1 datatype,  
    column2 datatype,  
    column3 datatype,  
    ....  
    columnN datatype,  
    PRIMARY KEY( one or more columns )  
);
```

```
CREATE TABLE CUSTOMERS(  
    ID INT NOT NULL,  
    NAME VARCHAR (20) NOT NULL,  
    AGE INT NOT NULL,  
    ADDRESS CHAR (25) ,  
    SALARY DECIMAL (18, 2),  
    CITY VARCHAR (30),  
    PRIMARY KEY (ID),  
    FOREIGN KEY (CITY)  
);
```

Decimal(x, y): Totally X integers in the decimal, Y of them are decimal places





SQL Commands: Insert, Update, Delete

- INSERT :

INSERT INTO table_name (F_1,...,F_n) VALUES (V_1,...,V_n)

Ex: INSERT INTO student (name, picture) VALUES ('John','http://tinypic.com/1.jpeg')

- UPDATE :

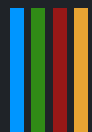
UPDATE table_name SET F_1=V_1,...,F_n=V_n WHERE C1,...,C_m

Ex: UPDATE students SET Credits_Passed=Credits_Passed+3 WHERE Name='John'

- DELETE :

DELETE table_name WHERE C1,...,C_m

Ex: DELETE students WHERE Name='John'





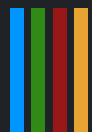
SQL Commands: Select

“Students” Table

ID	name	picture	birthdate
1	Zara	http://...	2009-05-18 00:00:00
2	Sarah	http://...	2007-04-10 15:00:12
3	John	http://...	2008-01-02 12:20:48
4	Erik	http://...	2010-05-18 03:42:30



```
SELECT * FROM STUDENTS
```





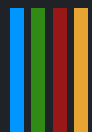
SQL Commands: Select

```
SELECT * FROM STUDENTS WHERE NAME='Zara'
```

ID	name	picture	birthdate
1	Zara	http://...	2009-05-18 00:00:00

```
SELECT COUNT(*) FROM STUDENTS
```

COUNT(*)
4





SQL Commands: Select

name	picture
Zara	http://...

SELECT name, picture FROM STUDENTS HAVING NAME='Zara'

SELECT name, picture FROM STUDENTS WHERE NAME='Zara'

SELECT name, picture as esm, aks FROM STUDENTS WHERE esm='Zara'

SELECT name, picture as esm, aks FROM STUDENTS WHERE esm='Zara' OR 1=1

Alias





SQL Commands: Select

“Lecturers” Table

ID	name	faculty	phone
1	Demaine	CS	...
2	Korman	CS	...
4	Einstein	Math	...
5	Nobel	Physics	...
6	Hilbert	Math	...

Auto-Increment

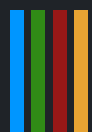




SQL Commands: Select

SELECT * FROM Lecturers Group By faculty

ID	name	faculty	phone
1	Demaine	CS	...
2	Korman	CS	...
4	Einstein	Math	...
6	Hilbert	Math	...
5	Nobel	Physics	...





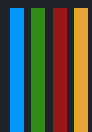
SQL Commands: Select

```
SELECT * FROM Lecturers WHERE name LIKE '%n'
```

ID	name	faculty	phone
2	Korman	CS	...
4	Einstein	Math	...

```
SELECT * FROM Lecturers WHERE name LIKE '%n%'
```

ID	name	faculty	phone
1	Demaine	CS	...
2	Korman	CS	...
4	Einstein	Math	...





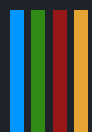
SQL Commands: Select

```
SELECT * FROM Lecturers WHERE faculty IN ('Math','Physics')
```

ID	name	faculty	phone
4	Einstein	Math	...
5	Nobel	Physics	...
6	Hilbert	Math	...

```
SELECT DISTINCT faculty FROM Lecturers
```

faculty
CS
CS
Math

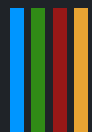




SQL Commands: Select

```
SELECT * FROM Lecturers ORDER BY name
```

ID	name	faculty	phone
1	Demaine	CS	...
4	Einstein	Math	...
6	Hilbert	Math	...
2	Korman	CS	...
5	Nobel	Physics	...

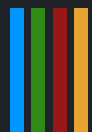




SQL Commands: Select

- Create a backup copy of Lecturers(a New Table)
`SELECT * INTO LecturersBackup FROM Lecturers`
- The Union Operator
`SELECT * FROM Lecturers UNION SELECT * FROM Students`
- Select Top
~~`SELECT TOP 2 * FROM Lecturers`~~ → Not for MySQL
`SELECT * FROM Lecturers LIMIT 2`

ID	name	faculty	phone
1	Demaine	CS	...
2	Korman	CS	...



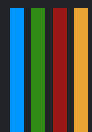


SQL Commands: Select

Sometimes, just one table is not enough...See the example below!

“Courses” Table

Code	Name	Lecturer	DateTime
CS550	Automata	Turing	Fall 2014
CS212	CG	Demaine	Winter 2013
CS325	CG	Korman	Spring 2010
CS400	OS	Lynch	Summer 2010
CS541	Database	Silberschatz	Fall 2011
CS780	OS	Silberschatz	Spring 2012





SQL Commands: Select

“Lecturers” Table

ID	Name	Birthdate
1	Turing	Apr 02, 1891
2	Demaine	Feb 26, 1902
4	Korman	Jan 26, 1899
7	Lynch	Mar 26, 1910
8	Silberschatz	Aug 26, 1897

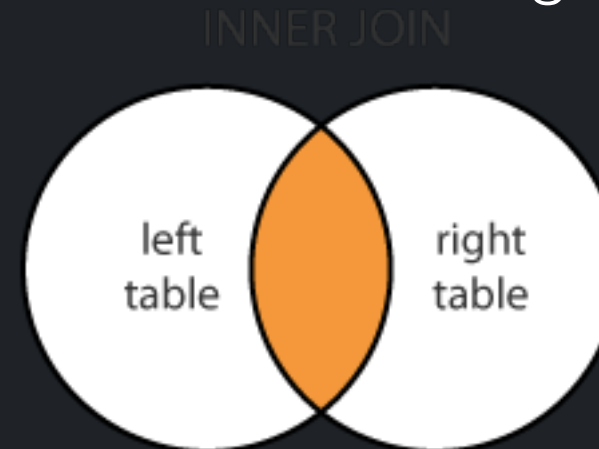




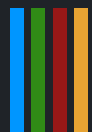
SQL Commands: Select

- Goal : Finding the birthdate of all of the lecturers who taught a course in spring

Name	Birthdate
Korman	Jan 26, 1899
Silberschatz	Aug 26, 1897



- * `SELECT DISTINCT Lecturers.Name FROM Lecturers JOIN Courses ON Courses.Lecturer=Lecturers.Name AND Courses.DateTime LIKE 'Spring%'`
- * `SELECT DISTINCT Lecturers.Name FROM Lecturers, Courses WHERE Courses.Lecturer=Lecturers.Name AND Courses.DateTime LIKE 'Spring%'`
- * `SELECT DISTINCT Lecturers.Name FROM Lecturers INNER JOIN Courses ON Courses.Lecturer=Lecturers.Name AND Courses.DateTime LIKE 'Spring%'`





SQL Commands: Select

(INNER) JOIN : Select records that
have matching values in both tables.

LEFT (OUTER) JOIN: Select records from the first (left-most) table
with matching right table records.

RIGHT (OUTER) JOIN: Select records from the second (right-most) table
with matching left table records.

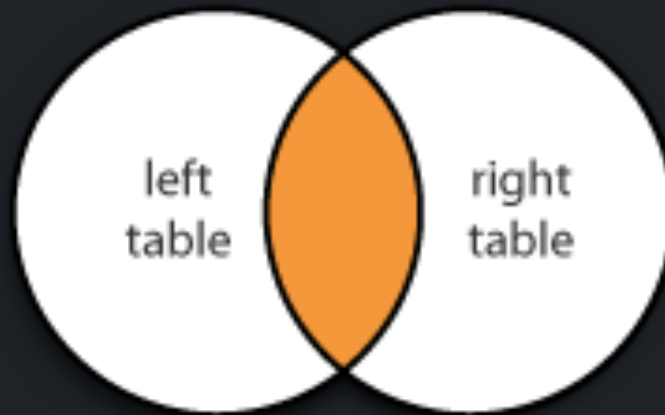
FULL (OUTER) JOIN: Selects all records that
match either left or right table records.



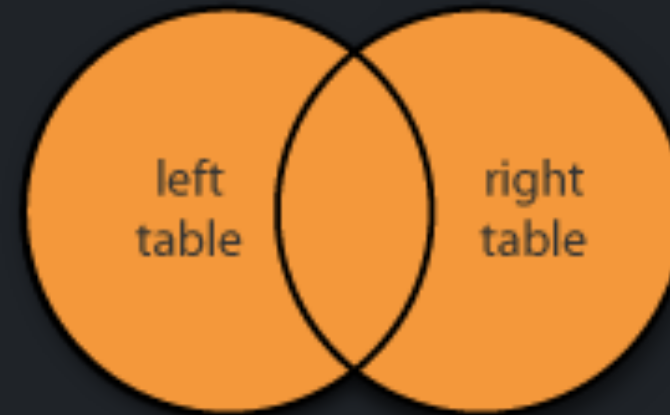


SQL Commands: Select

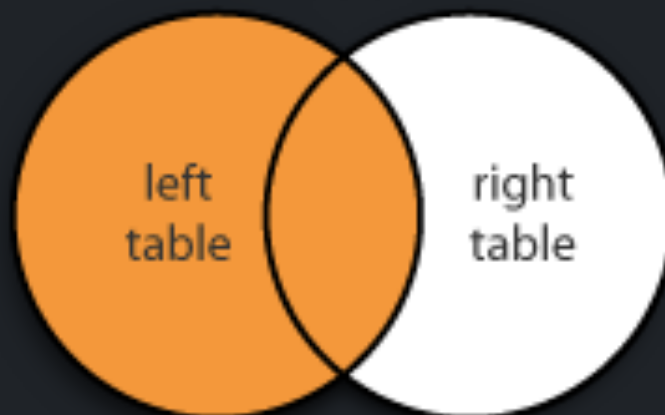
INNER JOIN



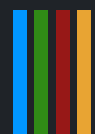
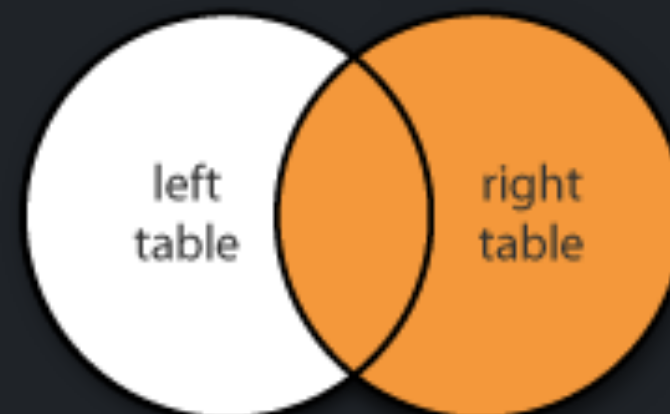
FULL JOIN



LEFT JOIN



RIGHT JOIN





SQL Commands: Select

- INNER JOIN :

SELECT * FROM tableX INNER JOIN tableY on tableX.X = tableY.Y

X	Y
C	C
D	D

tableX	tableY
X	Y
A	C
B	D
C	E
D	F

- LEFT OUTER JOIN :

SELECT * FROM tableX LEFT OUTER JOIN tableY ON tableX.X= tableY.Y

X	Y
A	NULL
B	NULL
C	C
D	D

- RIGHT OUTER JOIN :

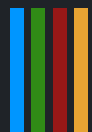
SELECT * FROM tableX RIGHT OUTER JOIN tableY ON tableX.X= tableY.Y

X	Y
C	C
D	D
NULL	E
NULL	F

- FULL OUTER JOIN :

SELECT * FROM tableX RIGHT FULL JOIN tableY ON tableX.X= tableY.Y

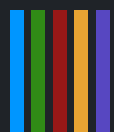
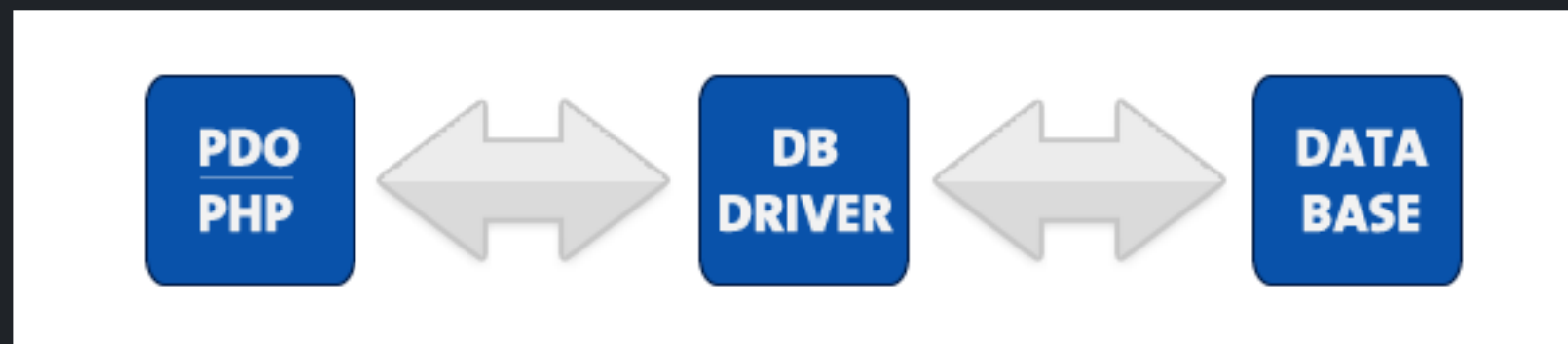
X	Y
A	NULL
B	NULL
C	C
D	D
NULL	E
NULL	F





PHP Data Object

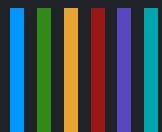
- PDO - is a database access layer providing a uniform method of access to multiple databases.
- PDO provides a data-access abstraction layer which means that, regardless of which database you're using, you use the same functions to issue queries and fetch data.
- PHP Data Objects (PDO) provide methods for **prepared statements**.





References

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References

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- [8] What is MySQL? - Retrieved Feb 9, 2017 from <https://dev.mysql.com/doc/refman/5.7/en/what-is-mysql.html>
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