Trường Đại học Công nghệ Thông tin – Đại học Quốc gia Hồ Chí Minh
Bộ môn An toàn thông tin

Database

Ths. Trần Tuấn Dũng – dungtran@uit.edu.vn

Relational vs Non – Relational

	Relational Database	Non-Relational Database
Data Integrity	Enforces data integrity through relationships and constraints	Flexible schema allows for easy data updates
Structured Queries	Supports complex queries using SQL	May offer simpler, faster query performance
Scalability	May not scale as well for large datasets	Highly scalable and can handle big data and high traffic
ACID Transactions	Provides ACID (Atomicity, Consistency, Isolation, Durability) transactions	May sacrifice ACID properties for improved performance or scalability
Consistency	Ensures strong data consistency	May offer eventual consistency or tunable consistency
Schema Evolution	Schema changes can be complex and time-consuming	Allows for easy schema changes and flexibility in data model
Examples	MySQL, PostgreSQL, Oracle	MongoDB, Cassandra, Redis, DynamoDB

Relational Database

This lecture assume you already pass IT004 and have knowledge of SQL Queries

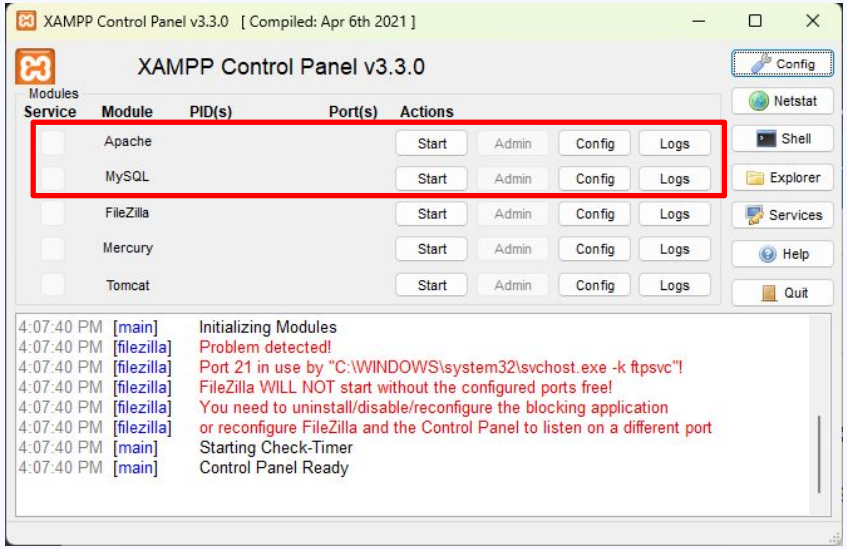
See SQL Tutorial (w3schools.com) if you need revision

MySQL

This course will use MySQL as Database Server and PHPMyadmin as DBMS

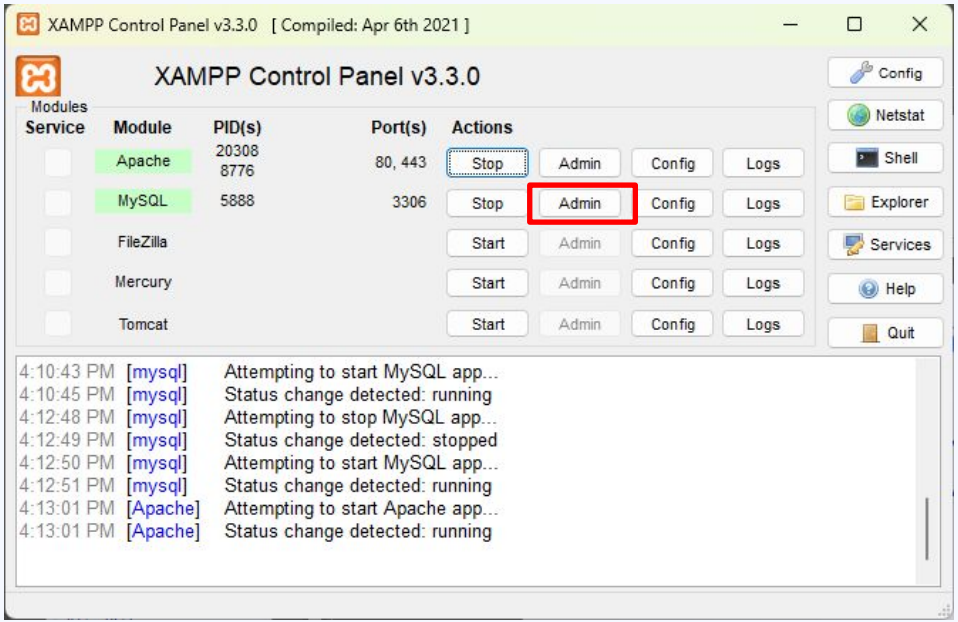
Install Xampp: XAMPP Installers and Downloads for Apache Friends

Start both PHP and MySQL Server and you're ready to go

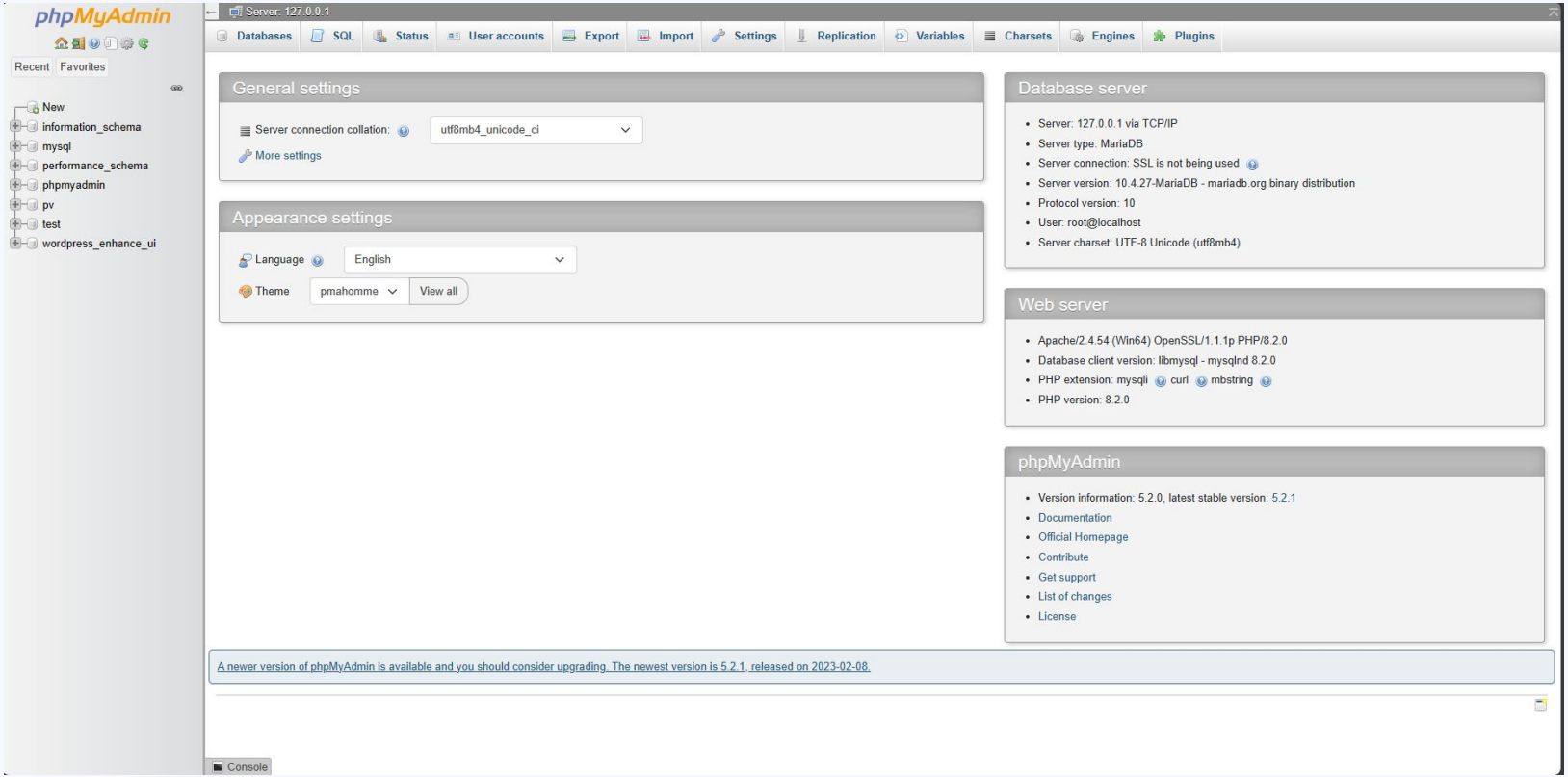


MySQL

Click on Admin to open phpMyAdmin DBMS site on your local machine

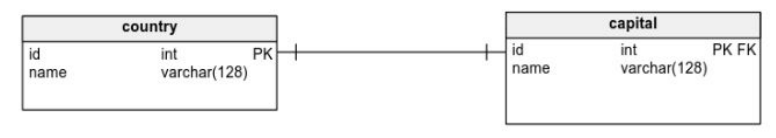


MySQL


phpMyAdmin
Recent
Favorites
New
information_schema
mysql
performance_schema
phpmyadmin
pv
test
wordpress_enhance_ui
Server: 127.0.0.1
Databases
SQL
Status
User accounts
Export
Import
Settings
Replication
Variables
Charsets
Engines
Plugins
General settings
Server connection collation:
utf8mb4_unicode_ci
More settings
Appearance settings
Language
English
Theme
pmahomme
View all
Database server
Server: 127.0.0.1 via TCP/IP
Server type: MariaDB
Server connection: SSL is not being used
Server version: 10.4.27-MariaDB - mariadb.org binary distribution
Protocol version: 10
User: root@localhost
Server charset: UTF-8 Unicode (utf8mb4)
Web server
Apache/2.4.54 (Win64) OpenSSL/1.1.1p PHP/8.2.0
Database client version: libmysql - mysqlnd 8.2.0
PHP extension: mysqli curl mbstring
PHP version: 8.2.0
phpMyAdmin
Version information: 5.2.0, latest stable version: 5.2.1
Documentation
Official Homepage
Contribute
Get support
List of changes
License
A newer version of phpMyAdmin is available and you should consider upgrading. The newest version is 5.2.1, released on 2023-02-08.
Console

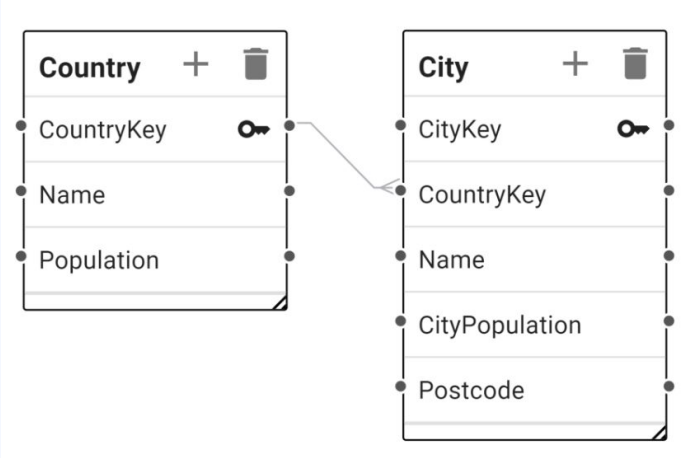
1 – 1, 1 – n, n –n Relationship

Primary key ref Primary key



1 – 1 relationship

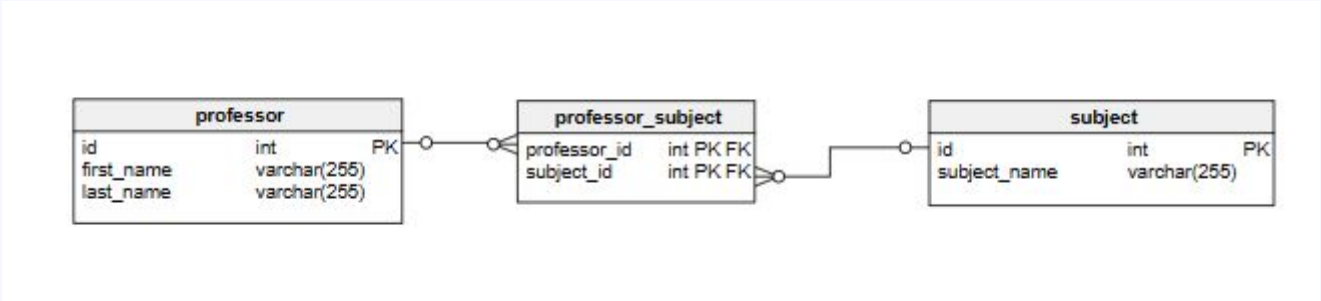
Foreign key ref Primary key



1 – n relationship

1 – 1, 1 – n, n –n Relationship

Use intermediate table



n – n relationship

Object Relational Mapping (ORM)

Instead of writing raw queries, we can map a **table** with a **model**

Most frameworks now support ORM, allow we to interact with database via Object

ORM provide simpler syntax, more readable then raw queries

Example: PHP Laravel

```
class User extends Model {

protected $table = 'my_users';

}
```

Laravel already cover all the setup we need in the **Model** class

Now we can interact with `my_users` table via **User** class

Eloquent ORM - Laravel 5.0 - The PHP Framework For Web Artisans

Example: PHP Laravel

```
$users = User::all(); // get all records
$user = User::find(1); //find record with primary
key value is 1
$model = User::where('votes', '>',
100)->firstOrFail(); // complex queries
$user->save(); // update
```

Overview of Entity Framework Core - EF Core | Microsoft Learn

Sequelize | Feature-rich ORM for modern TypeScript & JavaScript

Eloquent ORM - Laravel 5.0 - The PHP Framework For Web Artisans

Non – Relational Database (NoSQL Database)

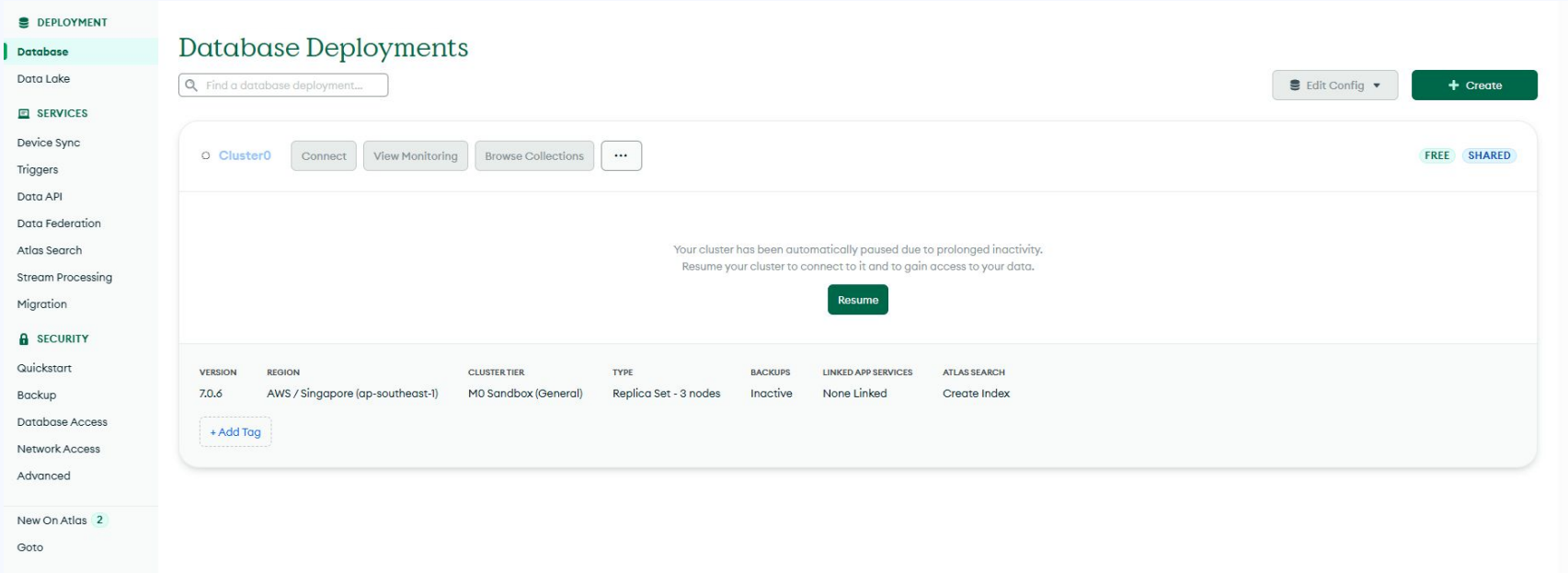
Storing data as **Collections** and **Documents** (just like **tables** and **records**)

More Flexible Schema than Relational Database

Syntax similar to ORM

MongoDB

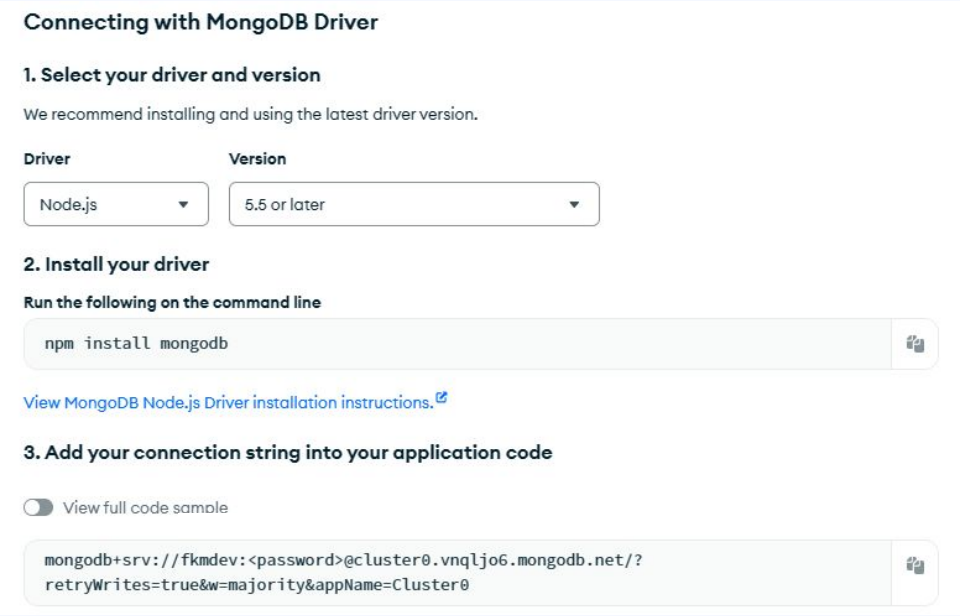
Use Free Service to get start MongoDB Atlas | MongoDB



MongoDB

Get Connection string and connect with nodejs

Node.js MongoDB Create Database (w3schools.com)



Firestore

Get started with Cloud Firestore | Firebase (google.com)