

Lab report no: 06

Name of the report: Eloquent ORM

Objectives:

Understand the relationship among object and how to mapping them. Also understand the different types of relation. Learn the basics of tinkler.

Theory:

One of the most important feature of the laravel framework is that, it comes with built in ORM (Object Relation Mapping) called Eloquent ORM. Eloquent ORM refer to an advanced implementation of the PHP Active Record Pattern, which makes it very easy to interact with application database. Eloquent ORM is the very powerful yet very expressive ORM, which allow us to work with the database objects and relationships using much eloquent and expressive syntax. In Laravel, each database table is mapped into corresponding eloquent model and each of the eloquent model object include various methods for retrieving and updating the database.

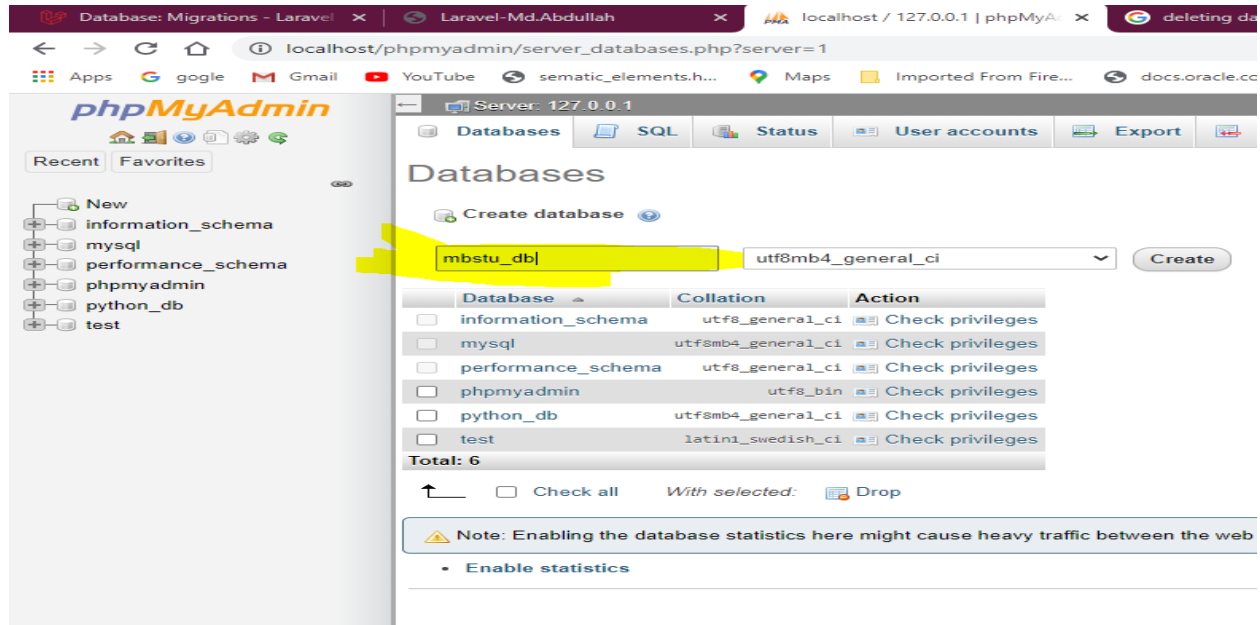
Eloquent relationships are defined as methods on your Eloquent model classes. Since, like Eloquent models themselves, relationships also serve as powerful query builders defining relationships as methods provides powerful method chaining and querying capabilities. ORM stands for Object relation mapping.

different types of relationships:

- One To One
- One To Many
- Many To Many
- Has One Through
- Has Many Through
- One To One (Polymorphic)
- One To Many (Polymorphic)
- Many To Many (Polymorphic)

Creating database:

Here I create a database name mbstu_db.



Settingup the .env file: to connect with database that I created above I need to setup the .env file with databases name and many things:

APP_NAME=MBSTU

APP_ENV=local

APP_KEY=base64:zAlNrQ3yLqjyVWpBPWyyTZthjrvOe3zu90IP/uHusAE=

APP_DEBUG=true

APP_URL=http://localhost

LOG_CHANNEL=stack

DB_CONNECTION=mysql

DB_HOST=127.0.0.1

DB_PORT=3306

DB_DATABASE=mbstu_db

DB_USERNAME=root

DB_PASSWORD=

Define table properties:

I want to create a three table name teacher, courses and student. So the properties of the table are given below:

Teacher table:

```
database > migrations > 2020_07_14_112321_create_teachers_table.php > CreateTeachersTable > up
7   class CreateTeachersTable extends Migration
8   {
9       /**
10        * Run the migrations.
11        *
12        * @return void
13        */
14       public function up()
15       {
16           Schema::create('teachers', function (Blueprint $table) {
17               $table->id();
18               $table->string('name');
19               $table->string('email') ->unique();
20               $table->string('Designation');
21               $table->timestamps();
22           });
23       }
24
25       /**
26        * Reverse the migrations.
27        *
28        * @return void
29        */
30       public function down()
31       {
32           Schema::dropIfExists('teachers');
33       }
34   }
```

Courses table:

```
base > migrations > 2020_08_14_111056_create_courses_table.php > CreateCoursesTable > up
7   /**
8    * Run the migrations.
9    *
10   * @return void
11   */
12   public function up()
13   {
14       Schema::create('courses', function (Blueprint $table) {
15           $table->id();
16           $table->string('code') ->unique();
17           $table->string('title') ->unique();
18           $table->float('credit') ->nullable();
19           $table->unsignedBigInteger('teacher_id');
20           $table->foreign('teacher_id')->references('id')->on('teachers');
21           $table->timestamps();
22       });
23   }
24
25   /**
26    * Reverse the migrations.
27    *
28    * @return void
29    */
30   public function down()
31   {
32       Schema::dropIfExists('courses');
33   }
34 }
```

Student table:

```
2020_08_14_101851_create_students_table.php X
database > migrations > 2020_08_14_101851_create_students_table.php > CreateStudentsTable > up
9      /**
10       * Run the migrations.
11       *
12       * @return void
13       */
14     public function up()
15     {
16         Schema::create('students', function (Blueprint $table) {
17             $table->id();
18             $table->string('name');
19             $table->float('age') ->nullable();
20             $table->string('contact') ->nullable();
21             $table->timestamps();
22         });
23     }
24
25     /**
26     * Reverse the migrations.
27     *
28     * @return void
29     */
30     public function down()
31     {
32         Schema::dropIfExists('students');
33     }
34 }
35
```

Adding fillables:

Course table:

```
Course.php X
app > Course.php > ...
1  <?php
2
3  namespace App;
4
5  use Illuminate\Database\Eloquent\Model;
6
7  class Course extends Model
8  {
9      //
10     protected $fillable=[
11         'code','title','credit','teacher_id'
12     ];
13 }
14
```

Teacher table:

```
Teacher.php X
app > Teacher.php > ...
1  <?php
2
3  namespace App;
4
5  use Illuminate\Database\Eloquent\Model;
6
7  class Teacher extends Model
8  {
9      //
10     protected $fillable=[
11         'name','email','Designation'
12     ];
13 }
14 |
```

Student table:

```
Student.php X
app > Student.php > ...
1  <?php
2
3  namespace App;
4
5  use Illuminate\Database\Eloquent\Model;
6
7  class Student extends Model
8  {
9      //
10     protected $fillable=[
11         'name','age','contact'
12     ];
13 }
14 |
```

Now the following commands need to execute inorder to create tables:

php artisan migrate

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: powershell
PS C:\Users\ABDULLAH\Desktop\App\mbstu> php artisan migrate:fresh
Dropped all tables successfully.
Migration table created successfully.
Migrating: 2014_10_12_000000_create_users_table
Migrated: 2014_10_12_000000_create_users_table (0.39 seconds)
Migrating: 2019_08_19_000000_create_failed_jobs_table
Migrated: 2019_08_19_000000_create_failed_jobs_table (0.34 seconds)
Migrating: 2020_07_14_112321_create_teachers_table
Migrated: 2020_07_14_112321_create_teachers_table (0.67 seconds)
Migrating: 2020_08_14_101851_create_students_table
Migrated: 2020_08_14_101851_create_students_table (0.28 seconds)
Migrating: 2020_08_14_111056_create_courses_table
Migrated: 2020_08_14_111056_create_courses_table (2.97 seconds)
PS C:\Users\ABDULLAH\Desktop\App\mbstu>
```

After the execution of the above command my mbstu_db database has all of the above tables look like the following figures:

localhost/phpmyadmin/db_structure.php?server=1&db=mbstu_db

phpMyAdmin

Server: 127.0.0.1 » Database: mbstu_db

Structure SQL Search Query Export Import Operations Privileges Routines Events

Filters

Containing the word:

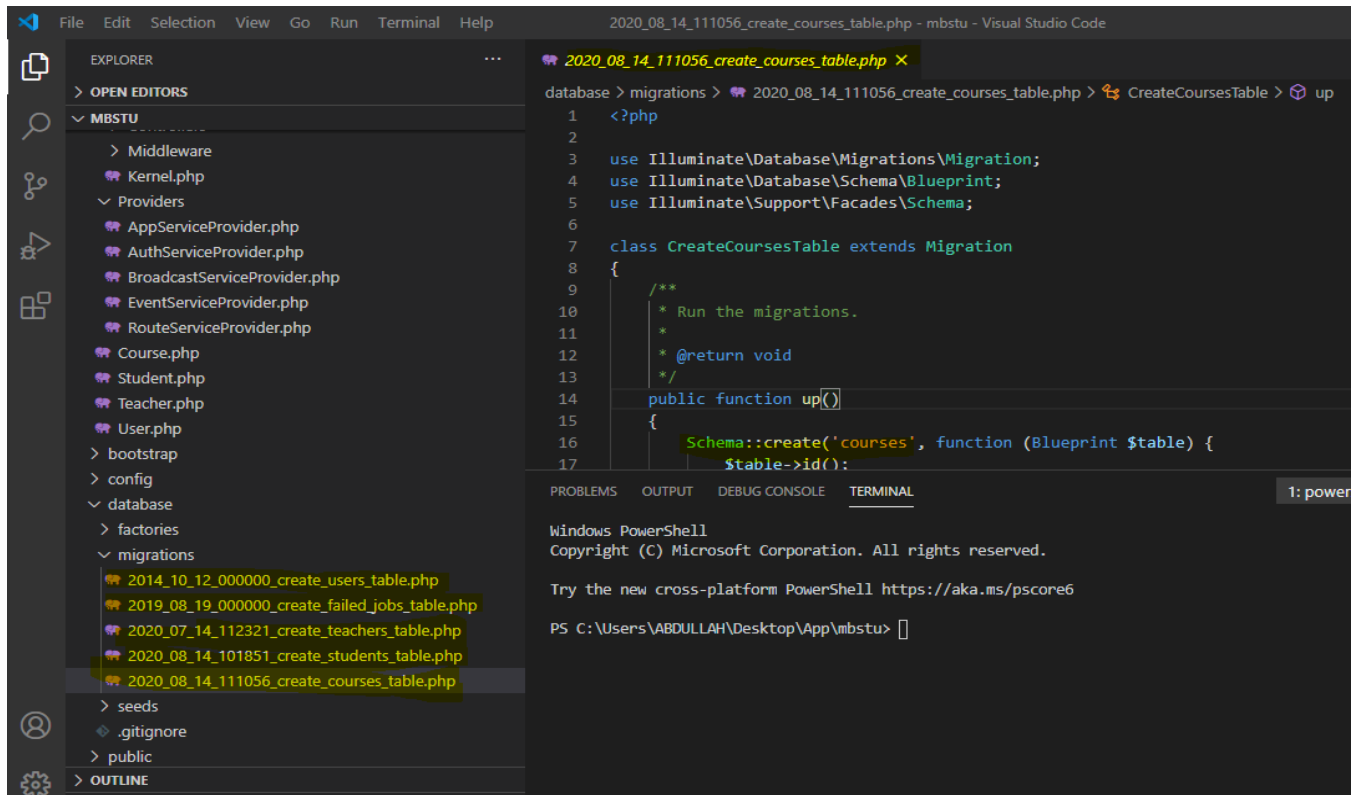
Table	Action	Rows	Type	Collation	Size	Overhead
<input type="checkbox"/> courses		0	InnoDB	utf8mb4_unicode_ci	64.0 K1B	-
<input type="checkbox"/> failed_jobs		0	InnoDB	utf8mb4_unicode_ci	16.0 K1B	-
<input type="checkbox"/> migrations		5	InnoDB	utf8mb4_unicode_ci	16.0 K1B	-
<input type="checkbox"/> students		0	InnoDB	utf8mb4_unicode_ci	16.0 K1B	-
<input type="checkbox"/> teachers		0	InnoDB	utf8mb4_unicode_ci	32.0 K1B	-
<input type="checkbox"/> users		0	InnoDB	utf8mb4_unicode_ci	32.0 K1B	-
6 tables	Sum	5	InnoDB	utf8mb4_general_ci	176.0 K1B	0 B

☐ Check all With selected:

Print Data dictionary

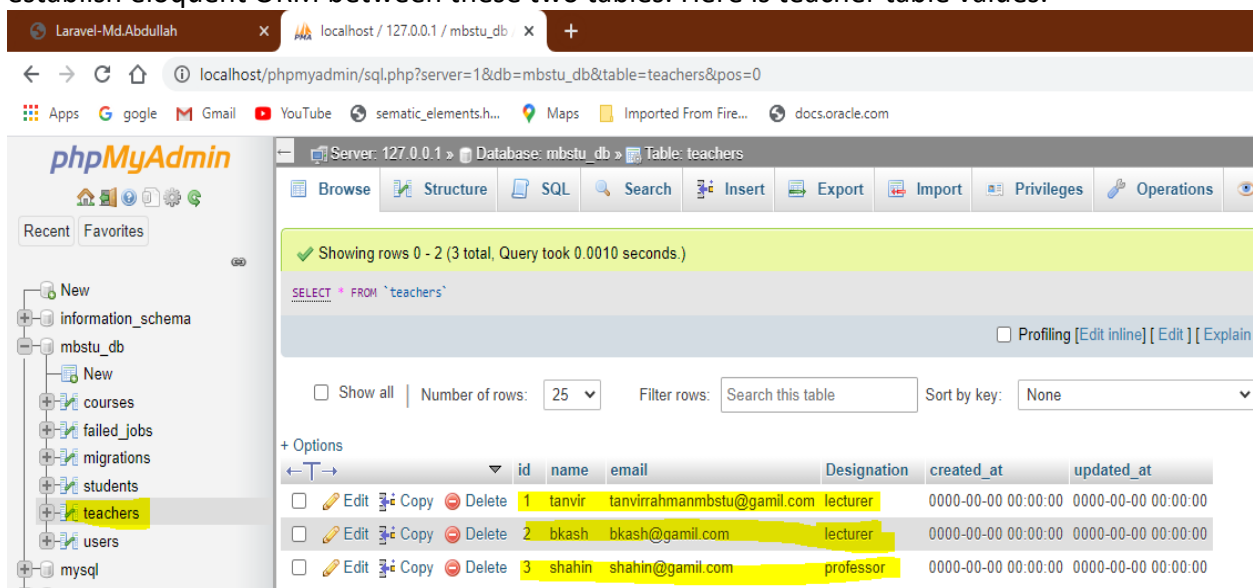
Create table

The tables are also created in the migrations file:



Inserting a value:

I manually insert the following values in courses table and teacher table because I want to establish eloquent ORM between these two tables. Here is teacher table values.



Course table values:

Showing rows 0 - 5 (6 total, Query took 0.0010 seconds.)

SELECT * FROM `courses`

Profiling [Edit inline] [Edit]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

	id	code	title	credit	teacher_id	created_at	updated_at
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	1	ict-3207	software engineering	3.00	1	NULL	NULL
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	2	ict-3208	software engineering lab	1.00	1	NULL	NULL
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	3	ict-3205	computer network	3.00	2	NULL	NULL
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	4	ict-3206	computer networks lab	1.00	1	NULL	NULL
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	5	ict-3203	computer fundamentals	3.00	3	NULL	NULL
<input type="checkbox"/> Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete	6	ict-3202	algorithms lab	1.00	1	NULL	NULL

Establishing relationship:

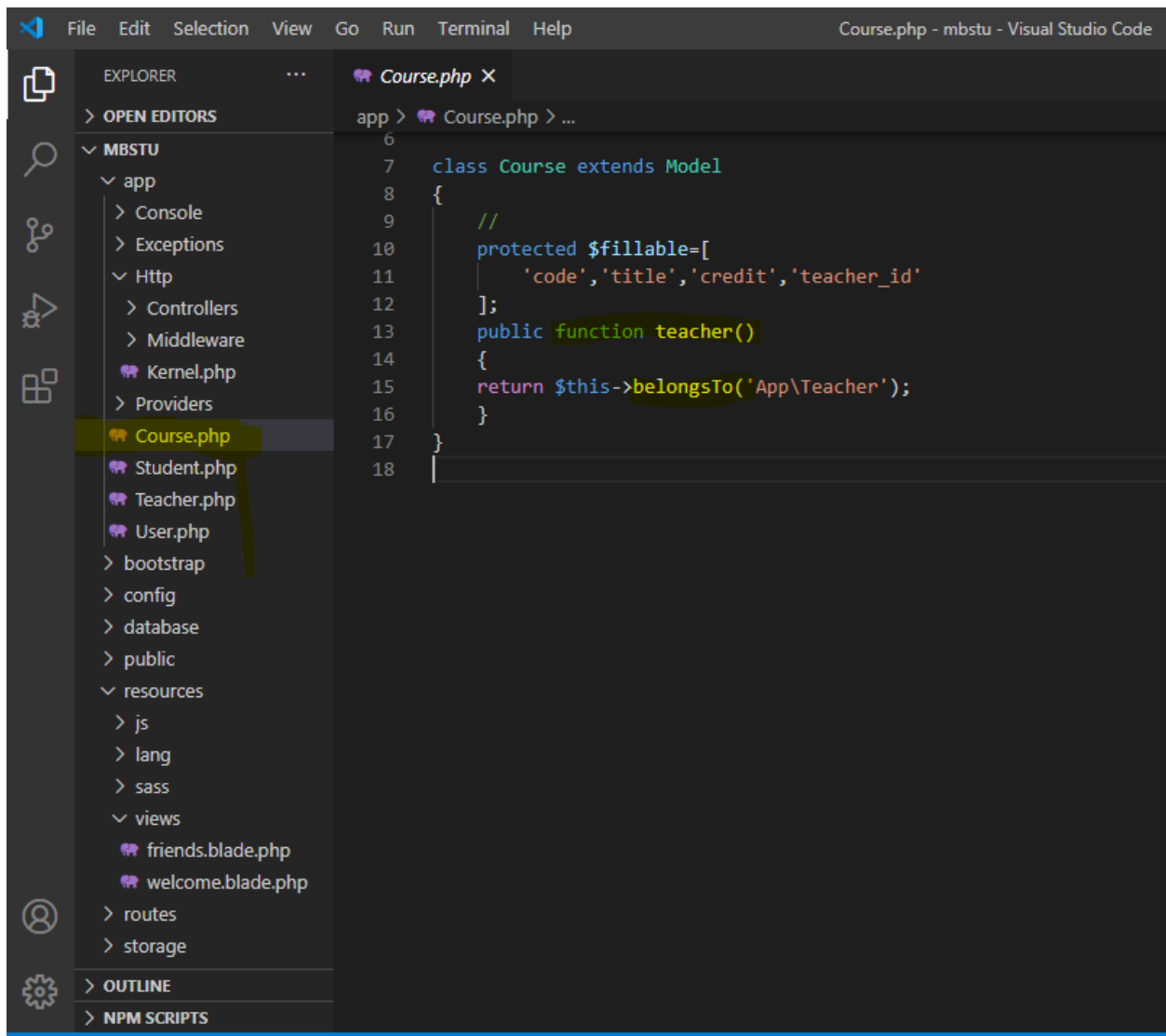
We create a teacher table and course table. We want to build a relationship with teacher table and course table. A teacher can take multiple courses so we can say that a teacher has one to many relationships with course but on the other hand a course can be taught by only one teacher, one course one teacher, so we can say that a course has one to one relationship with teacher.

So the relationships are:

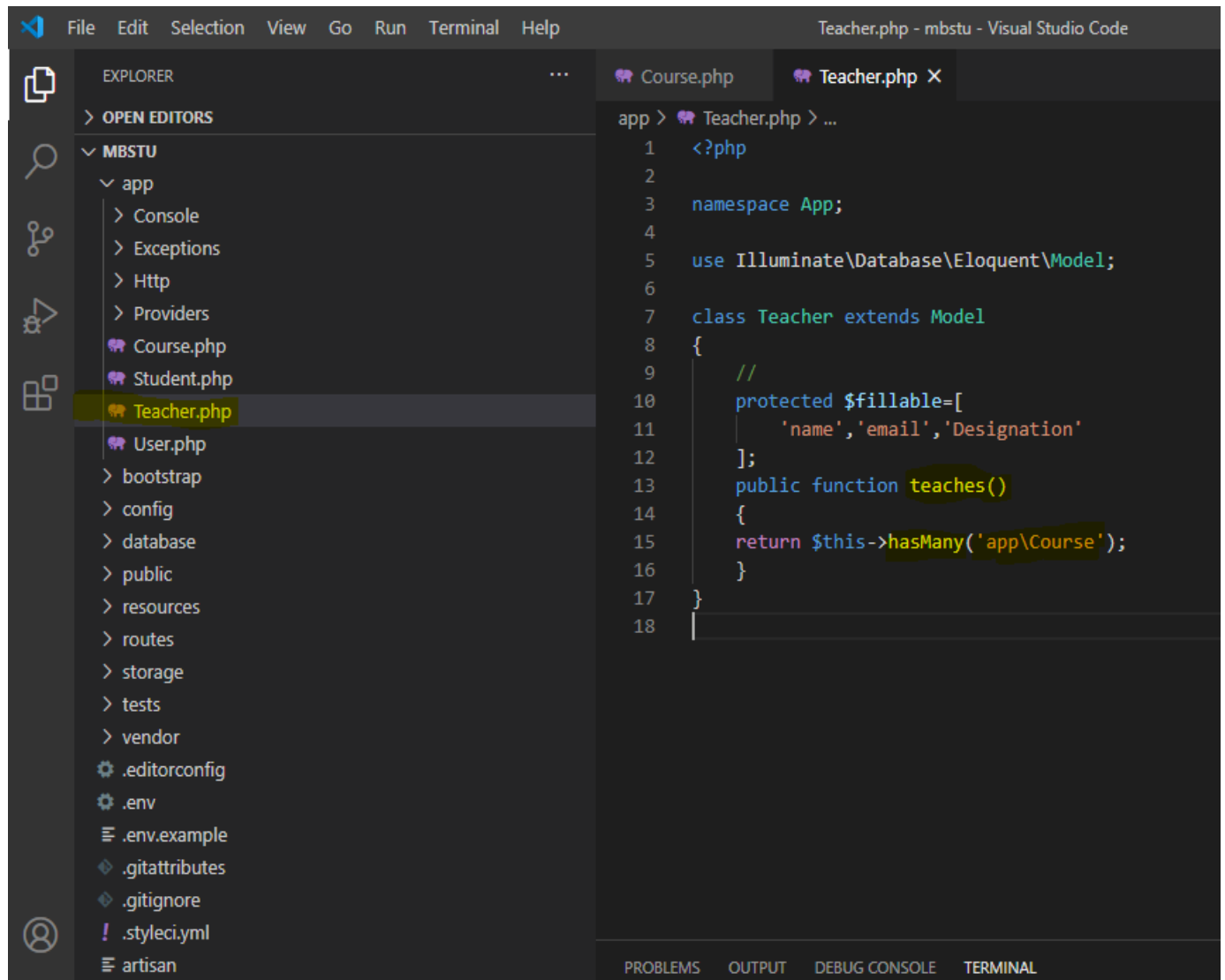
- ❖ One to many – teacher with course
- ❖ One to one – course with teacher

Eloquent ORM:

One to one: course with teacher

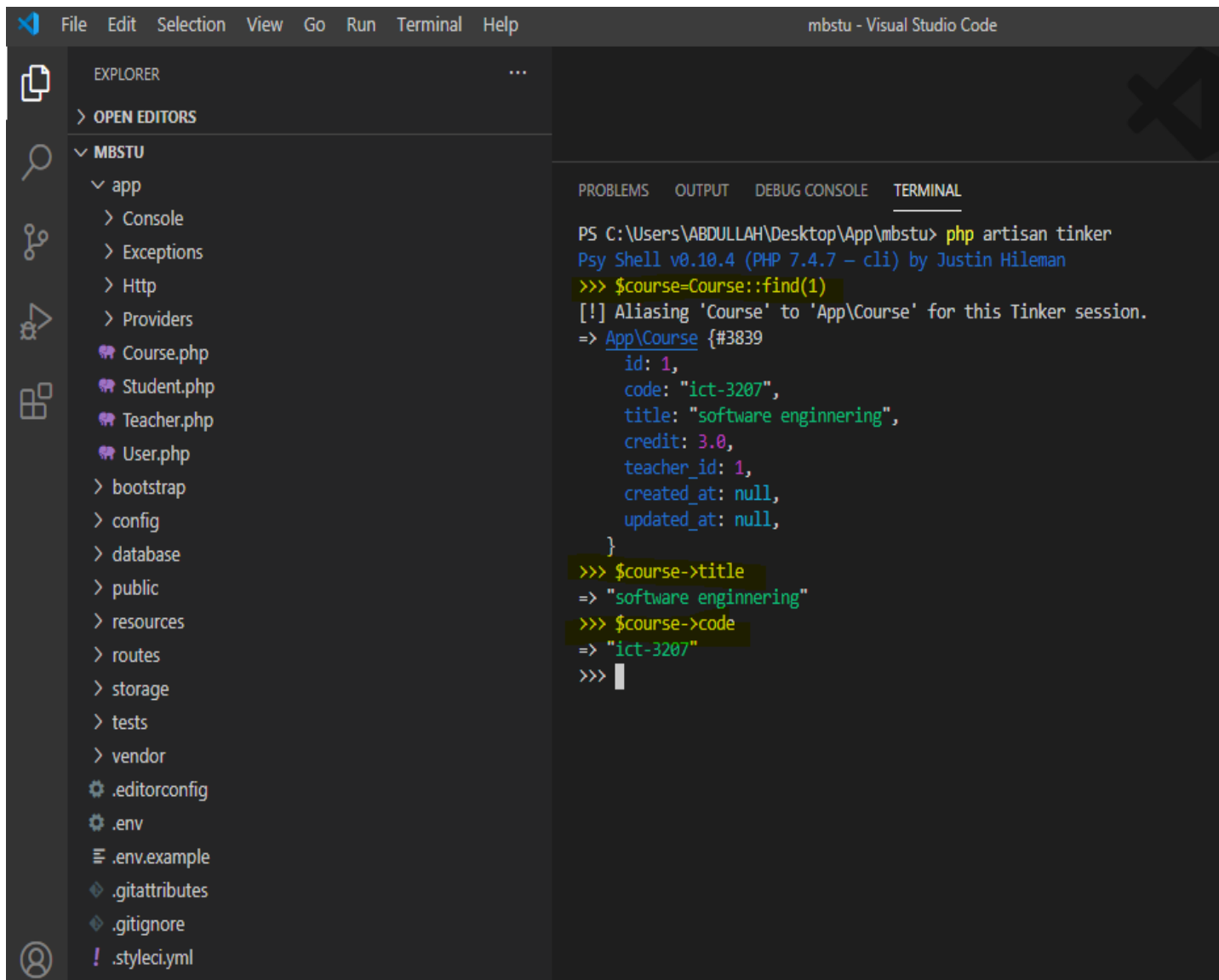


One to one: teacher with courses



Finding the value:

Searching from course with specific id.



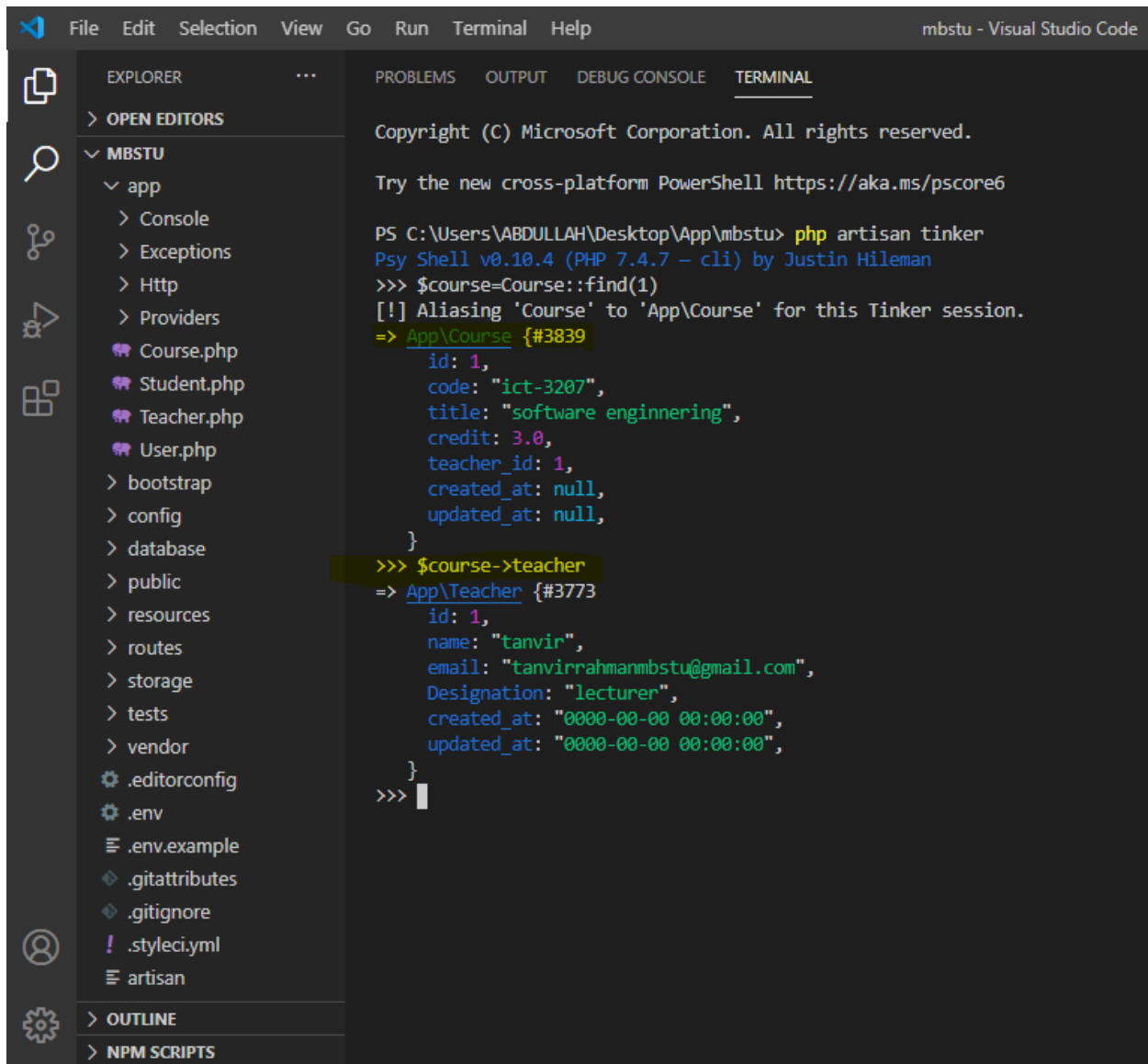
The screenshot shows the Visual Studio Code interface with the Explorer sidebar on the left and the Terminal panel on the right. The Explorer sidebar shows the project structure for 'mbstu', including folders like 'app', 'bootstrap', 'config', 'database', 'public', 'resources', 'routes', 'storage', 'tests', and 'vendor', and files like 'Course.php', 'Student.php', 'Teacher.php', 'User.php', '.editorconfig', '.env', '.env.example', '.gitattributes', '.gitignore', and '.styleci.yml'. The Terminal panel shows a PS prompt at 'C:\Users\ABDULLAH\Desktop\App\mbstu' where the command 'php artisan tinker' has been executed. The terminal output shows the Psy Shell version and the aliasing of 'Course' to 'App\Course'. The user has entered the command '>>> \$course=Course::find(1)' and the output shows the details of the course with id 1, code 'ict-3207', title 'software engineering', credit 3.0, teacher_id 1, and created_at and updated_at as null. The user has then entered the command '>>> \$course->title' and the output shows 'software engineering'. Finally, the user has entered the command '>>> \$course->code' and the output shows 'ict-3207'.

```
File Edit Selection View Go Run Terminal Help mbstu - Visual Studio Code

EXPLORER
> OPEN EDITORS
MBSTU
  app
    Console
    Exceptions
    Http
    Providers
    Course.php
    Student.php
    Teacher.php
    User.php
  bootstrap
  config
  database
  public
  resources
  routes
  storage
  tests
  vendor
  .editorconfig
  .env
  .env.example
  .gitattributes
  .gitignore
  .styleci.yml

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\ABDULLAH\Desktop\App\mbstu> php artisan tinker
Psy Shell v0.10.4 (PHP 7.4.7 - cli) by Justin Hileman
>>> $course=Course::find(1)
[!] Aliasing 'Course' to 'App\Course' for this Tinker session.
=> App\Course {#3839
    id: 1,
    code: "ict-3207",
    title: "software engineering",
    credit: 3.0,
    teacher_id: 1,
    created_at: null,
    updated_at: null,
}
>>> $course->title
=> "software engineering"
>>> $course->code
=> "ict-3207"
>>>
```

Has one relationship:



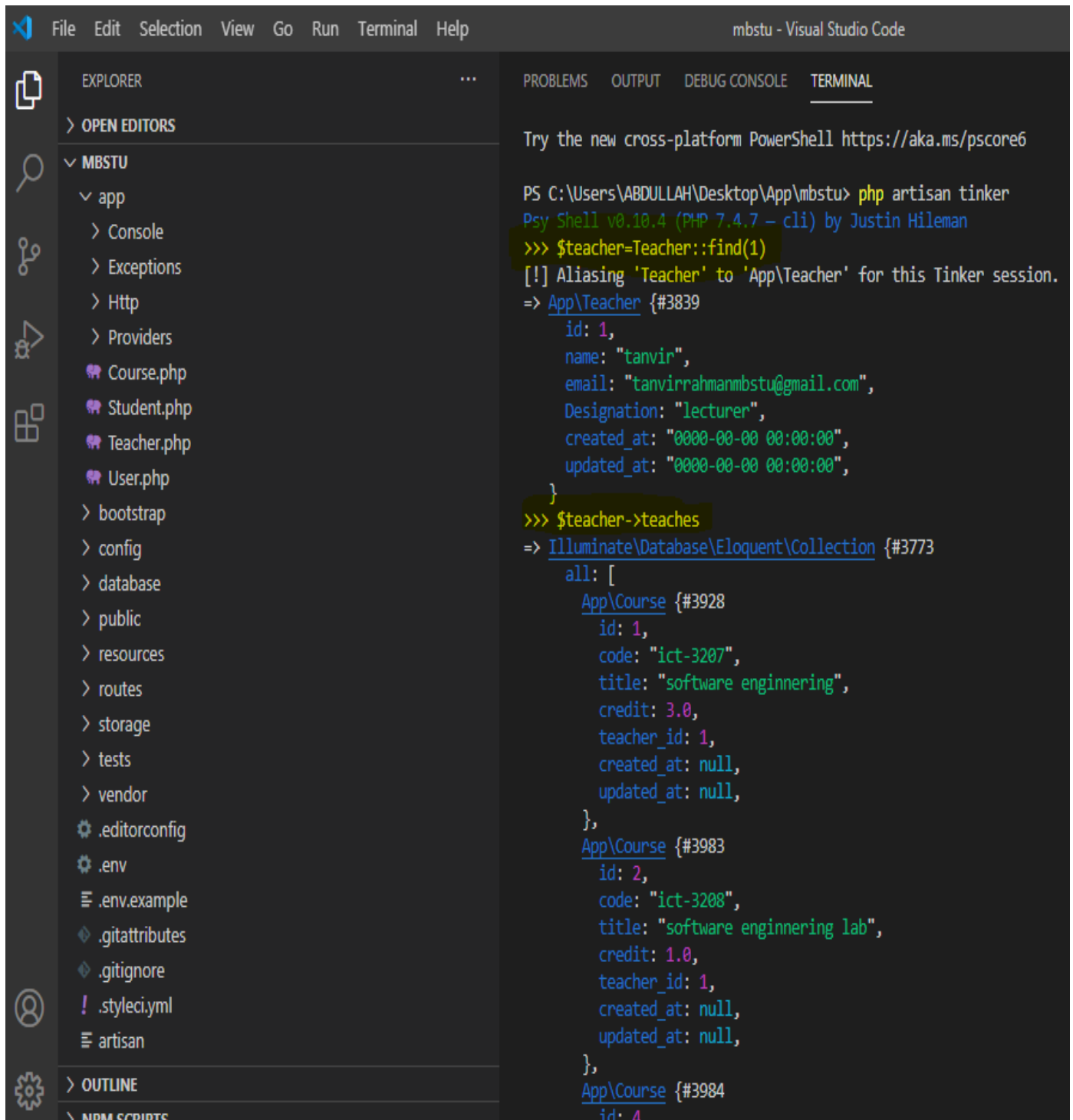
The screenshot shows the Visual Studio Code interface with the 'TERMINAL' tab active. The terminal displays the output of a PHP artisan command. The Explorer sidebar on the left shows the project structure, including files like Course.php, Student.php, Teacher.php, and User.php. The terminal output shows the following:

```
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\ABDULLAH\Desktop\App\mbstu> php artisan tinker
Psy Shell v0.10.4 (PHP 7.4.7 - cli) by Justin Hileman
>>> $course=Course::find(1)
[!] Aliasing 'Course' to 'App\Course' for this Tinker session.
=> App\Course {#3839
  id: 1,
  code: "ict-3207",
  title: "software enginnering",
  credit: 3.0,
  teacher_id: 1,
  created_at: null,
  updated_at: null,
}
>>> $course->teacher
=> App\Teacher {#3773
  id: 1,
  name: "tanvir",
  email: "tanvirrahmanmbstu@gmail.com",
  Designation: "lecturer",
  created_at: "0000-00-00 00:00:00",
  updated_at: "0000-00-00 00:00:00",
}
>>>
```

Searching from teacher:



The screenshot shows the Visual Studio Code interface with the Explorer, Search, and Run and Debug views on the left. The Explorer view shows the project structure for 'mbstu', including folders like 'app', 'bootstrap', 'config', 'database', 'public', 'resources', 'routes', 'storage', 'tests', 'vendor', and files like 'Course.php', 'Student.php', 'Teacher.php', 'User.php', '.editorconfig', '.env', '.env.example', '.gitattributes', '.gitignore', '.styleci.yml', and 'artisan'. The Search view shows the results of a search for 'Teacher' in the 'app' folder, listing 'Course.php', 'Student.php', 'Teacher.php', and 'User.php'. The Run and Debug view shows the terminal output of the command 'php artisan tinker'. The terminal output includes the following commands and results:

```
PS C:\Users\ABDULLAH\Desktop\App\mbstu> php artisan tinker
Psy Shell v0.10.4 (PHP 7.4.7 - cli) by Justin Hileman
>>> $teacher=Teacher::find(1)
[!] Aliasing 'Teacher' to 'App\Teacher' for this Tinker session.
=> App\Teacher {#3839
    id: 1,
    name: "tanvir",
    email: "tanvirrahmanmbstu@gmail.com",
    Designation: "lecturer",
    created_at: "0000-00-00 00:00:00",
    updated_at: "0000-00-00 00:00:00",
}
>>> $teacher->teaches
=> Illuminate\Database\Eloquent\Collection {#3773
    all: [
        App\Course {#3928
            id: 1,
            code: "ict-3207",
            title: "software enginnering",
            credit: 3.0,
            teacher_id: 1,
            created_at: null,
            updated_at: null,
        },
        App\Course {#3983
            id: 2,
            code: "ict-3208",
            title: "software enginnering lab",
            credit: 1.0,
            teacher_id: 1,
            created_at: null,
            updated_at: null,
        },
        App\Course {#3984
            id: 4,
```

File Edit Selection View Go Run Terminal Helpmbstu - Visual Studio Code

EXPLORER

> OPEN EDITORS

MBSTU

app

Console

Exceptions

Http

Providers

Course.php

Student.php

Teacher.php

User.php

bootstrap

config

database

public

resources

routes

storage

tests

vendor

.editorconfig

.env

.env.example

.gitattributes

.gitignore

.styleci.yml

artisan

OUTLINE

NPM SCRIPTS

PROBLEMS

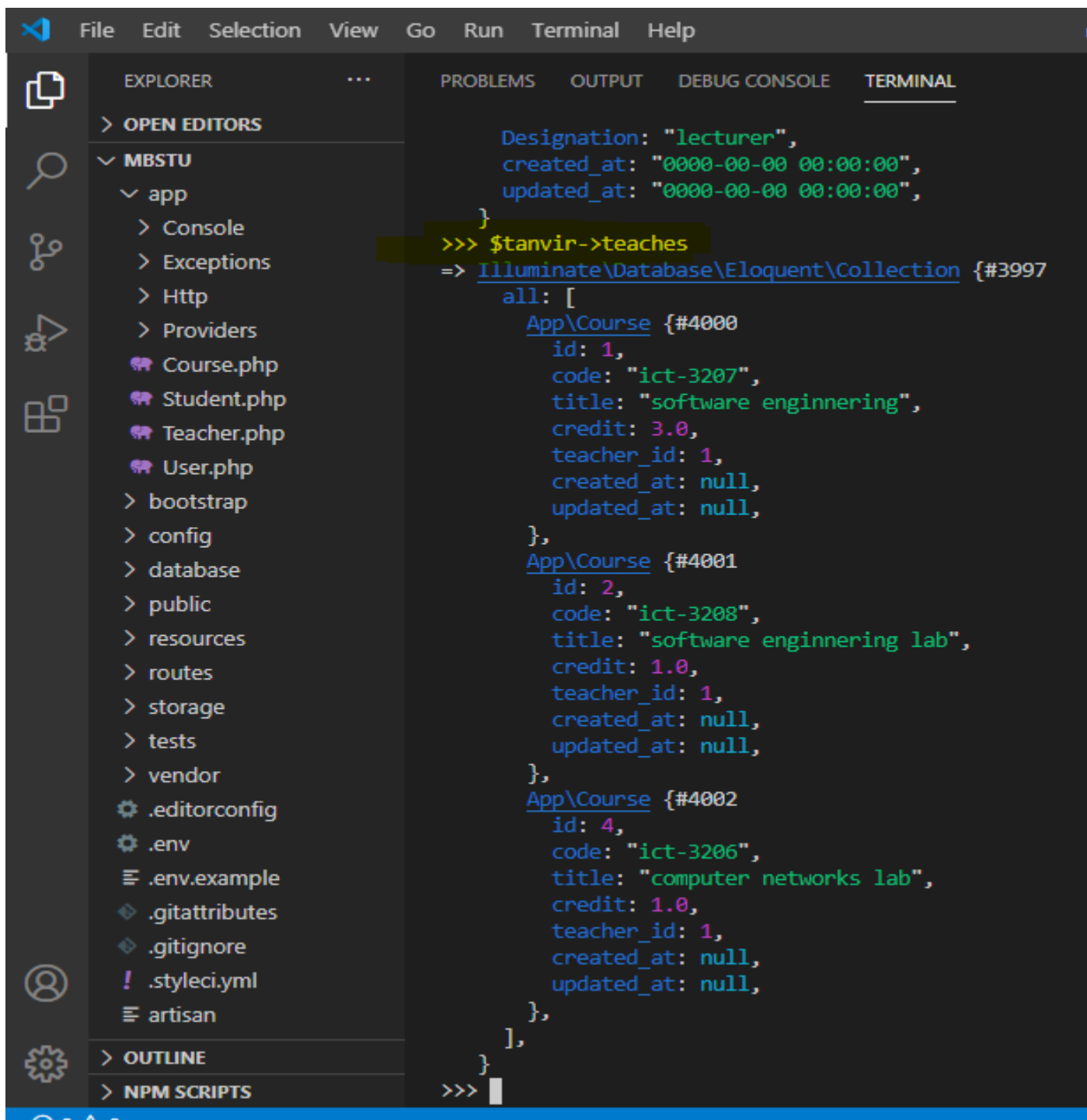
OUTPUT

DEBUG CONSOLE

TERMINAL

Designation: "lecturer",
created_at: "0000-00-00 00:00:00",
updated_at: "0000-00-00 00:00:00",
}
>>> \$teacher->teaches
=> Illuminate\Database\Eloquent\Collection {#3773
all: [
App\Course {#3928
id: 1,
code: "ict-3207",
title: "software engineering",
credit: 3.0,
teacher_id: 1,
created_at: null,
updated_at: null,
},
App\Course {#3983
id: 2,
code: "ict-3208",
title: "software engineering lab",
credit: 1.0,
teacher_id: 1,
created_at: null,
updated_at: null,
},
App\Course {#3984
id: 4,
code: "ict-3206",
title: "computer networks lab",
credit: 1.0,
teacher_id: 1,
created_at: null,
updated_at: null,
},
],
}
>>>

Find all the courses that teacher tanvir take.



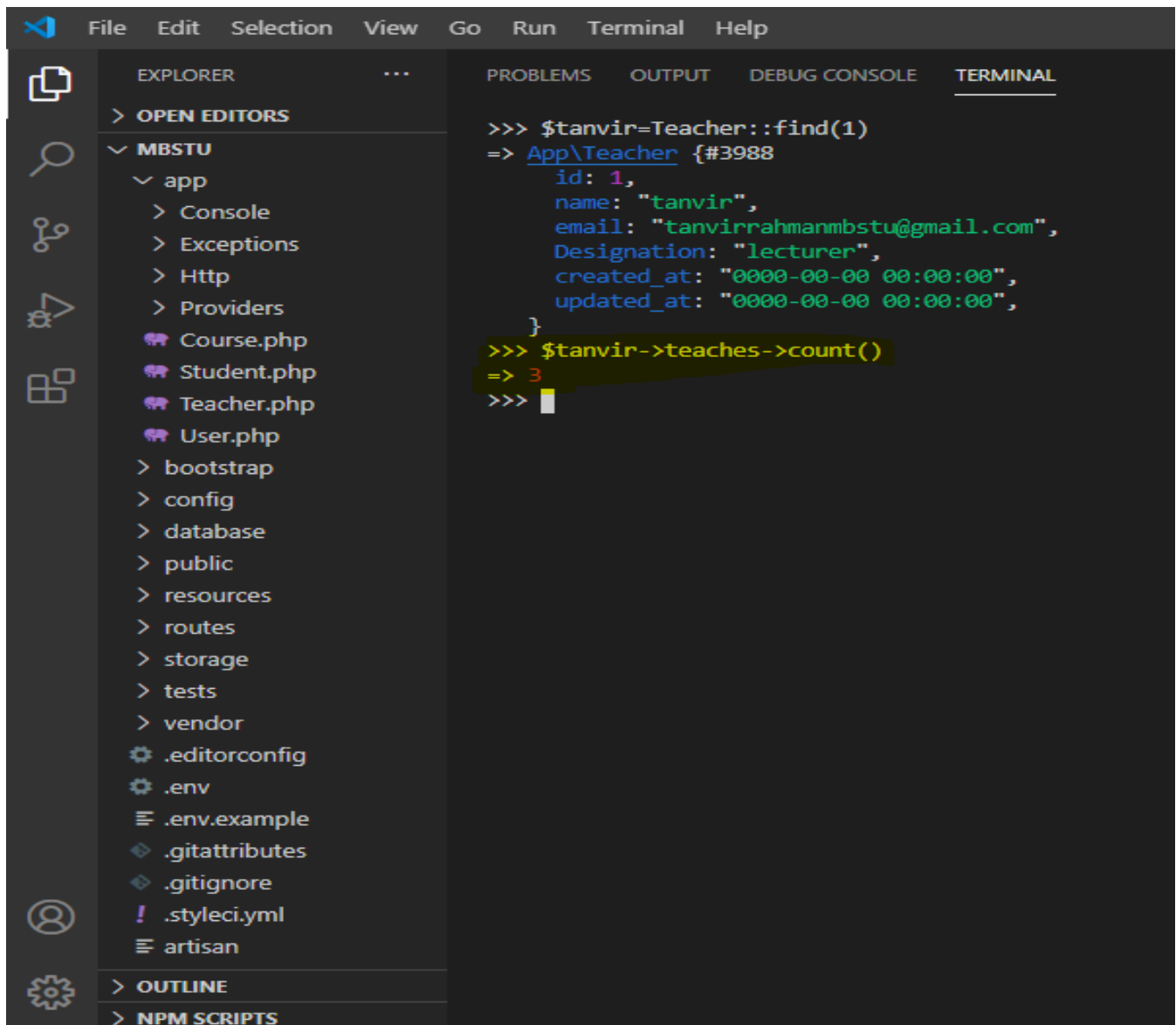
The screenshot shows the Visual Studio Code interface. The Explorer sidebar on the left displays the project structure for 'MBSTU', including folders like 'app', 'bootstrap', 'config', 'database', 'public', 'resources', 'routes', 'storage', 'tests', and 'vendor', as well as configuration files like '.editorconfig', '.env', '.gitattributes', '.gitignore', and '.styleci.yml'. The main editor area shows a terminal window with the following content:

```
Designation: "lecturer",
created_at: "0000-00-00 00:00:00",
updated_at: "0000-00-00 00:00:00",
}
>>> $tanvir->teaches
=> Illuminate\Database\Eloquent\Collection {#3997
  all: [
    App\Course {#4000
      id: 1,
      code: "ict-3207",
      title: "software engineering",
      credit: 3.0,
      teacher_id: 1,
      created_at: null,
      updated_at: null,
    },
    App\Course {#4001
      id: 2,
      code: "ict-3208",
      title: "software engineering lab",
      credit: 1.0,
      teacher_id: 1,
      created_at: null,
      updated_at: null,
    },
    App\Course {#4002
      id: 4,
      code: "ict-3206",
      title: "computer networks lab",
      credit: 1.0,
      teacher_id: 1,
      created_at: null,
      updated_at: null,
    },
  ],
}
```

The terminal prompt is now '>>>'.

Counting the number of courses that a teacher take:

Here I count the number of courses that tanvir take.



The screenshot shows the Visual Studio Code interface. On the left, the Explorer sidebar displays a file tree for a project named 'MBSTU'. The tree includes a folder 'app' with subfolders 'Console', 'Exceptions', 'Http', and 'Providers', and several PHP files: 'Course.php', 'Student.php', 'Teacher.php', and 'User.php'. Below these are various configuration files like '.editorconfig', '.env', and '.gitattributes'. The main editor area on the right shows a terminal window with the following code and output:

```
>>> $tanvir=Teacher::find(1)
=> App\Teacher {#3988
    id: 1,
    name: "tanvir",
    email: "tanvirrahmanmbstu@gmail.com",
    Designation: "lecturer",
    created_at: "0000-00-00 00:00:00",
    updated_at: "0000-00-00 00:00:00",
}
>>> $tanvir->teaches->count()
=> 3
>>>
```

Discussion:

I understand the basics of eloquent ORM or object mapping relationships. I also learn the basic of different types of relationship such as hasOne, one to many, many to many, one to one etc. This lab also helps me to understand the basic of tinkler, how to access data using tinkler