COURSE MANAGEET SYSTEM

Team 4
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Project Overview

This is a prototype of a course management system that is similar to that used in colleges. It is a database application that displays course schedules, allows students to enroll in classes, and allows students to view their course history and transcripts.

Project Description

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Goals

The purpose of this application is to facilitate administration and student interactions for course enrollment and management. The goal is to make it easier for administrators to create, modify, and display course schedules just as how courses are displayed in a course schedule or catalog. Another goal is to simplify course viewing, course enrollment, and account history for students. Administrators will be able to create courses offered by their institution and then with those courses, create a course schedule offered during the current term. Students will be able to view the current and past schedules and register for courses offered in the current term. Simply, the goal is to create a simple, user-friendly course management system that allows administrators to host classes and students to register.

Motivation

Currently, course management systems are cluttered with unnecessary features and can sometimes become overwhelming. They are often hard to learn and adapt and look ugly. They often are buggy and are not user-friendly. An ideal course management system performs the basic task of displaying courses and allows students to register for these courses. Nowadays, course management systems have lost their focus and make the user experience extremely unpleasant when registering for courses. This system will solve these problems and will make it easier for administrators to host courses and students to add courses without much hassle. The system will make the user experience pleasant and will be robust and secure. Institutions need quality course management systems and there aren't many good ones. Another motivation for the development of this system is to create a simple course management system that can accommodate development for smaller institutions, businesses, non-profits, recreation centers, and community centers that offer courses but do not have a proper course management system that displays courses and allows students to register for their courses online. The motivation is to develop a product that is accessible and convenient for smaller public and private organizations that are in need of such a system like this.

Stakeholders

The stakeholders of this system include the project drivers and designers, Abdurrahman Mohammad, Susmita Goswami, and Anudeep Gogineni. All future employees hired, such as web developers and Java software engineers, will also serve as stakeholders. The clients using this system are also stakeholders as well as their users, instructors, administrators - such as the school bursar -, employees, and students. Anyone responsible for the development, maintenance, and use of this system are stakeholders.

Application Domain

The system will be used in the academic, the education industry, and private sector that offer courses and consequently have a need of such product. The system will be hosted on a web server. Interaction with this application will take place on a server which can be accessed via public or private URL. The system will contain an interface or GUI contacting the application and visualizing data and transactions. Data will be securely stored in a database on the server. The middleman between the database and the GUI will be the actual application responsible for conducting the tasks which lies between the interface and the database.

Benefits to Users

This course management system will be fast, secure, reliable, clutter-free, easy to update, and simple to use which is not the case for most course management systems today. It will be simple to learn and will make it easier for administrators and students to conduct important course management activities. Additional benefit in the future may include students being able to view available classes and filter based on prerequisites and instructors being able to specify prerequisites and control enrollment with fewer manual overrides.

System Environment

Structure of the system (graph based on client-server/3-tiered architecture)

This is the 3-tiered architecture diagram of the system we plan to build:

Hardware/Software Used

- For the initial release, the listed hardware will be used:
- Macbook Air 2013 and Macbook Air 2017
- IdeaPad Flex

For the initial release, the listed software will be used:

- Apache Tomcat - For hosting the server
- MySQL and MySQL Workbench - For database portion

For the initial release, the listed software tools will be used:

- MacOS Catalina (Version 10.15.5)
- Windows 10
- Eclipse

RDBMS Used

- MySQL Community Server 8.0.20

Application languages

- HTML
- CSS
- Java
- SQL

Project Requirements

Functional Requirements (based on database manipulating activities)

Admin can control the whole system. Instructors and students need to be able to access the system. Courses need to be added and students should be able to add/drop a course. The application should track when a course is full. Wait listing of students on a course should be allowed. The system should be able to calculate student dues to pass it on to the bursar fee payment system.

A list of detailed descriptions of users and how users interact with this application

All users will enter the URL in their browser which will lead them to the server where the system is running. The users then log into their respective accounts using the sign-in page. New students can create an account by clicking on a link which will redirect them to create a new account page. After logging in, students, instructors, and administrators will have their own pages which allow different functions. Users can perform functions and make desired changes through the portal and the portal will contact the application which will contact the database and store the changes. Administrators can control the courses, schedules, students, and instructors in the system, can modify system information and can call specific system functions such as suspend. Instructors may manage their course rosters by removing or adding students. Students can add, drop, and waitlist courses as well as view course history and financial transactions.

There are four categories of users for this application:

1. Visitors
    - People who are not registered with the system. They can register with the system by entering their information and an admin will email them their account credentials.
2. Administrative users
    - Administrators are responsible for the creation, deletion, and update of courses, course configurations, members, students, instructors, and other admins.
3. Instructor users
    - Instructors are responsible for managing registered and waitlist students for courses taught. They can override the system and manually add students from the waitlist or using the student's ID. They can drop students from the registration and waitlist for courses taught.
4. Student users
    - Students can register for courses or waitlist if class is filled, drop courses, view course history and transcript, view offered course and, view financial transactions.

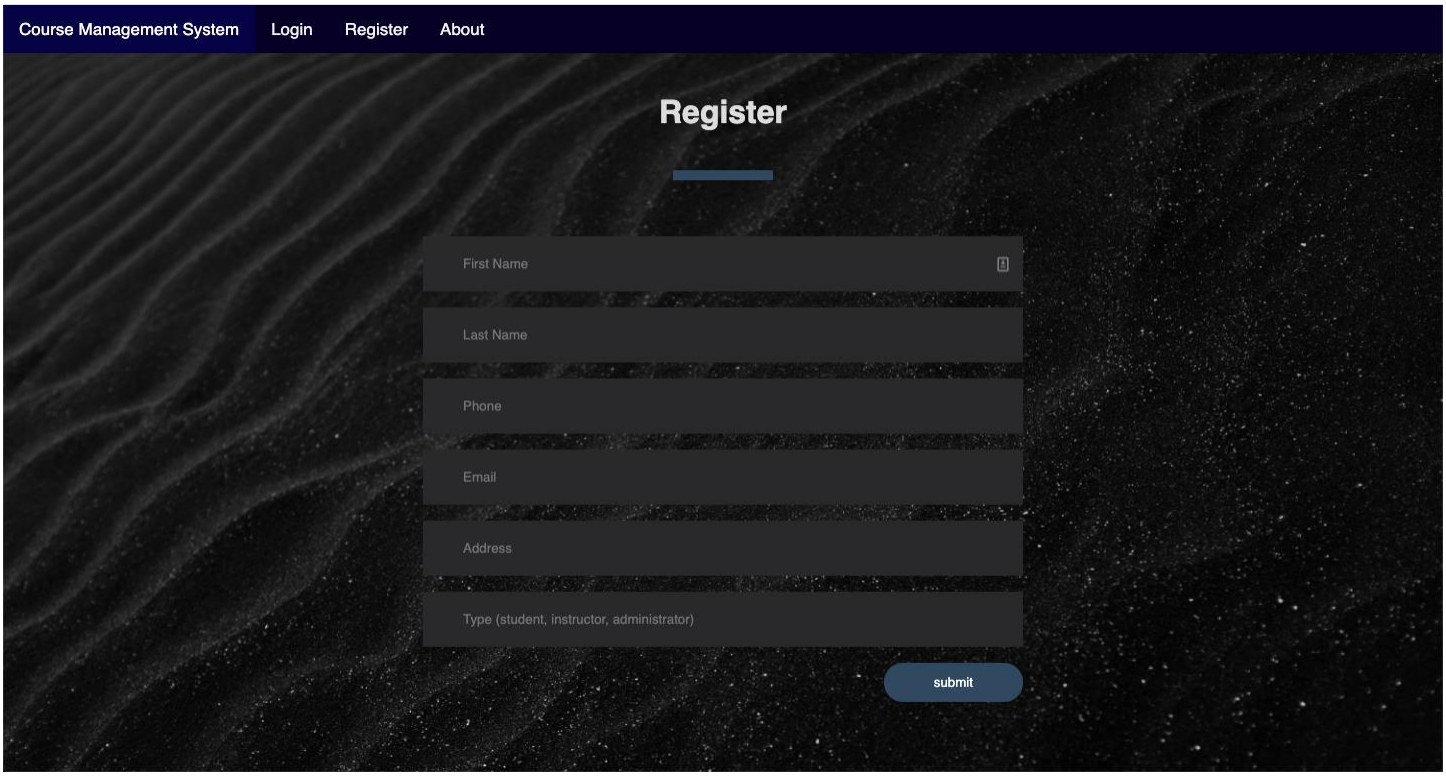
Description of each individual function/feature, functional process, and I/O.

Visitors

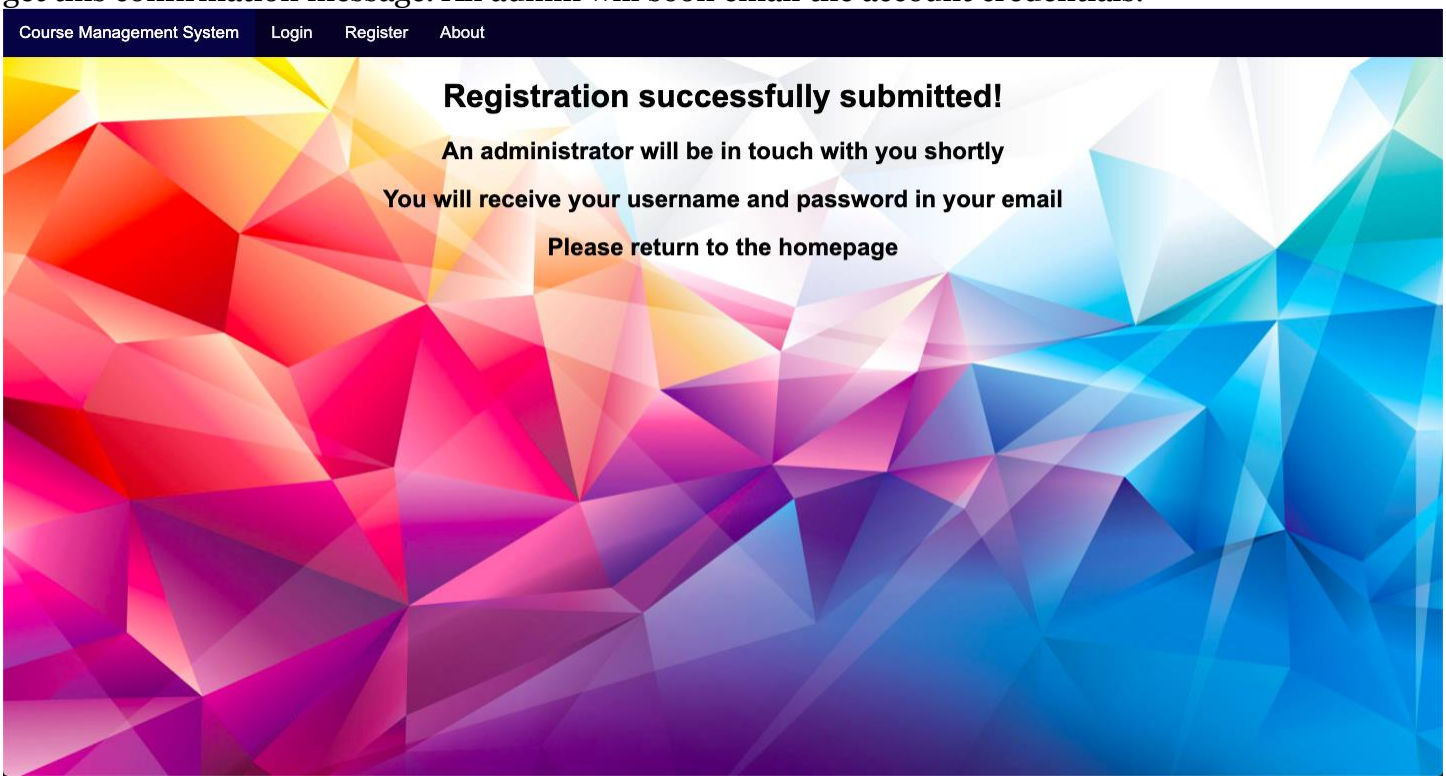
Register in the system

Visitors go to the homepage. They click the “Register” button in the navigation bar.

They will then be directed to a form. The form will only submit if the fields are not null and if the account type is either ‘student’, ‘instructor’, or ‘administrator’.



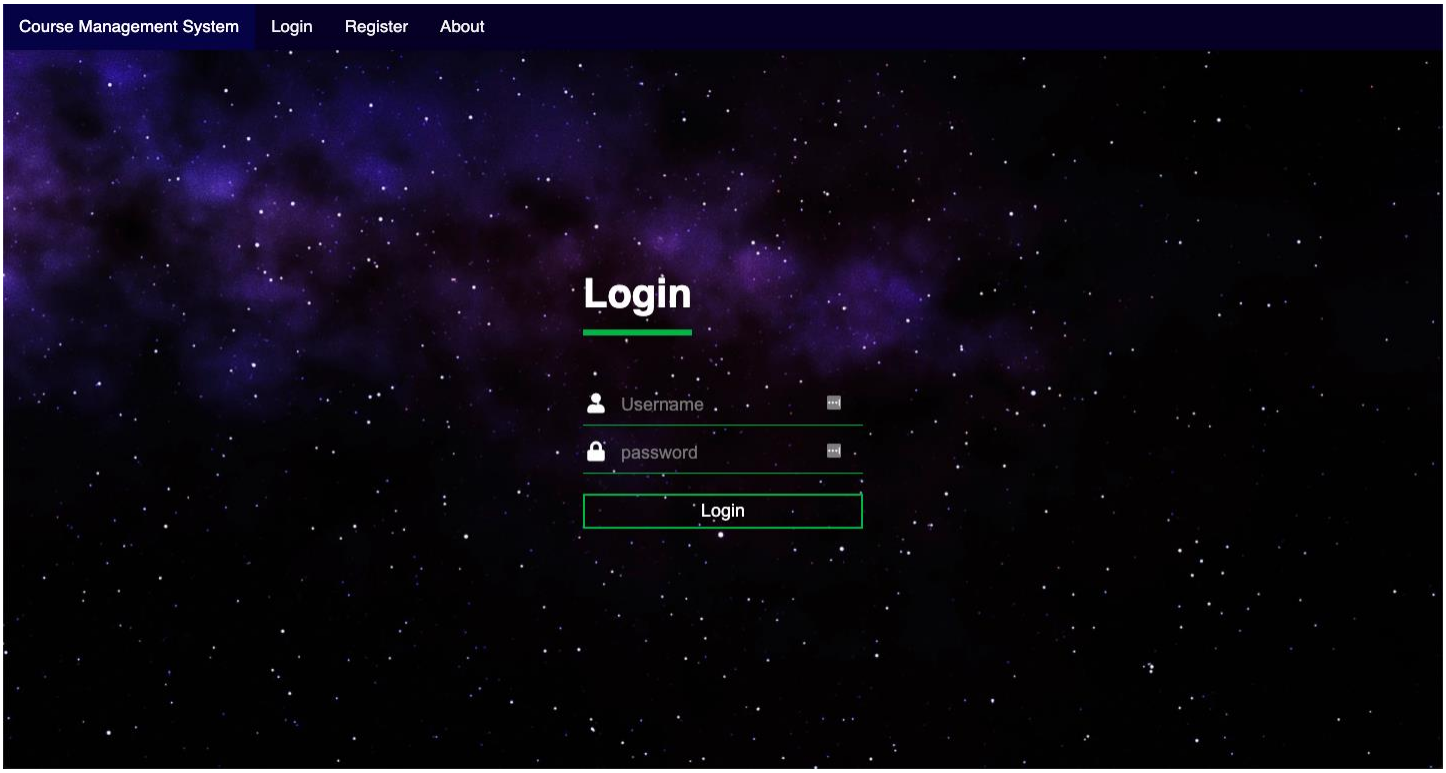
If wrong information is entered, they will get back to the form. If the requirements were met, they will get this confirmation message. An admin will soon email the account credentials.



The visitor can now get back to the homepage or leave.

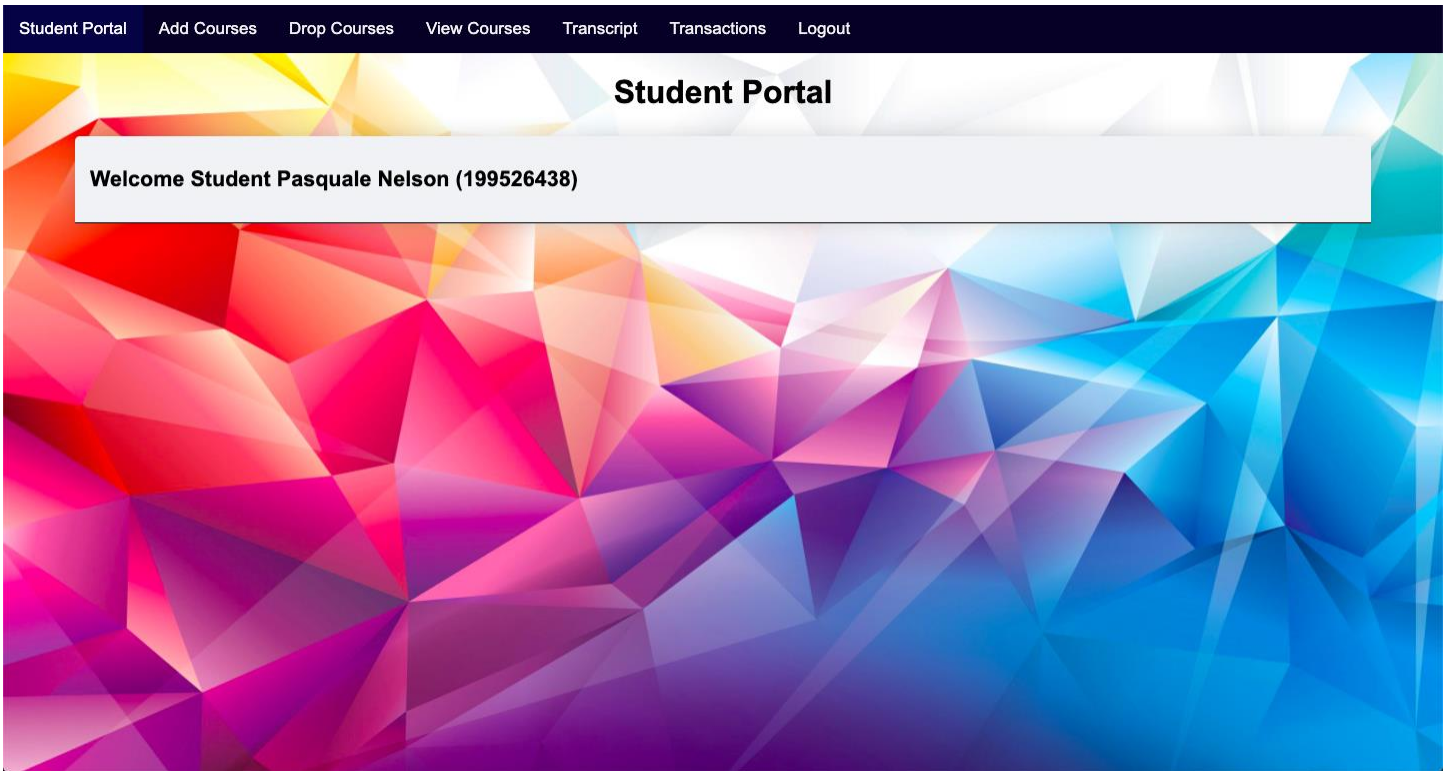
Log in

Visitors go to the homepage and then click the ‘Login’ button in the navigation bar. They will be redirected to this page.

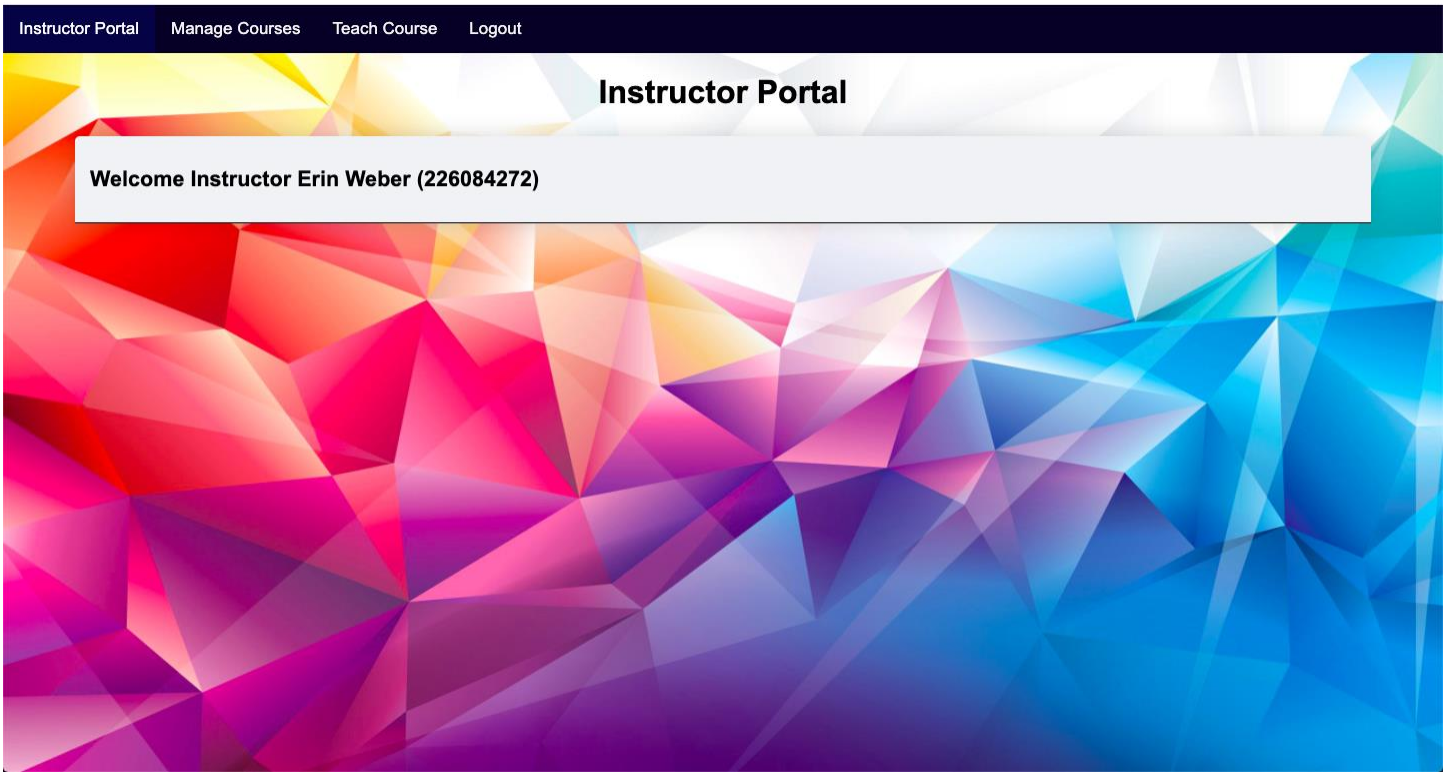


Then they enter credentials and be redirected to a custom portal depending on their uer type.

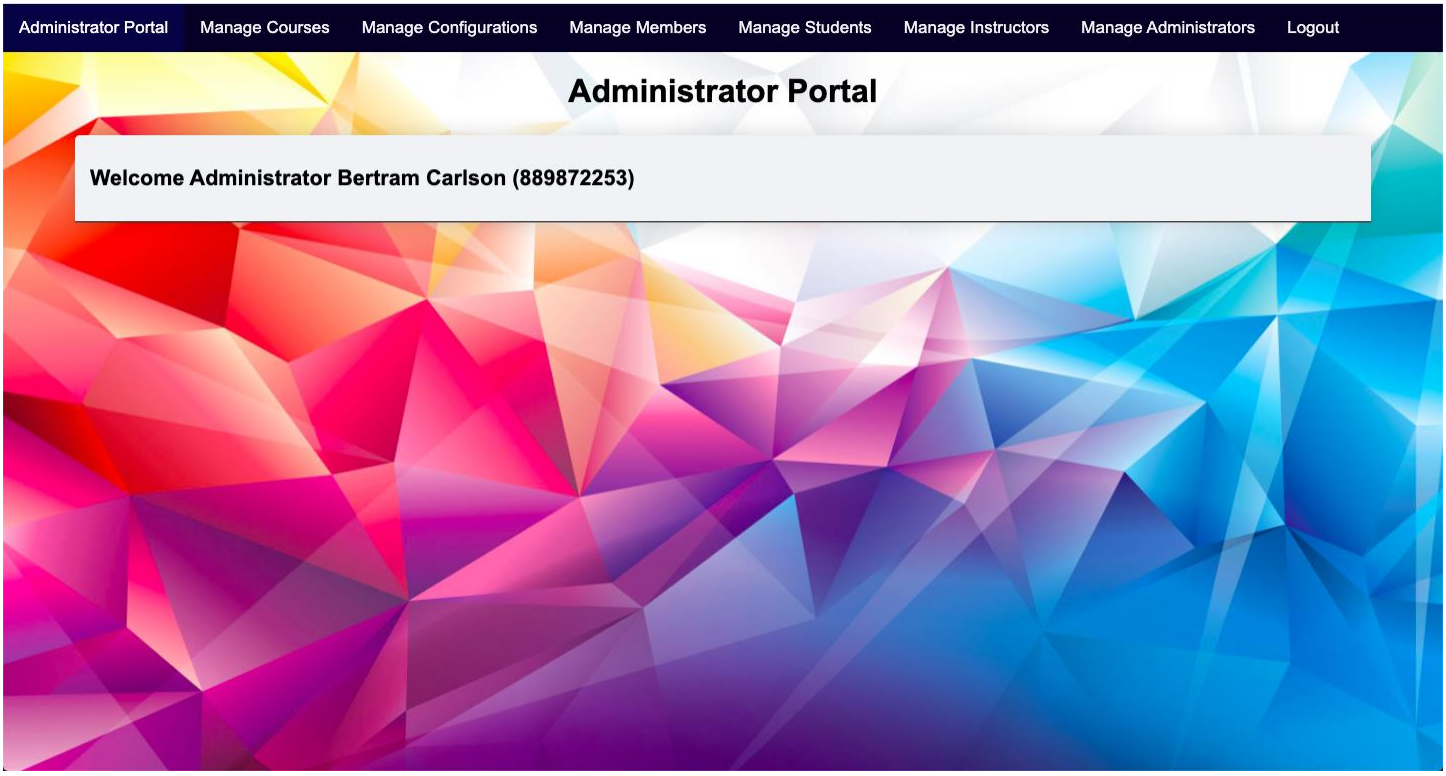
Student Portal



Instructor Portal:



Administrator Portal:



Administrators

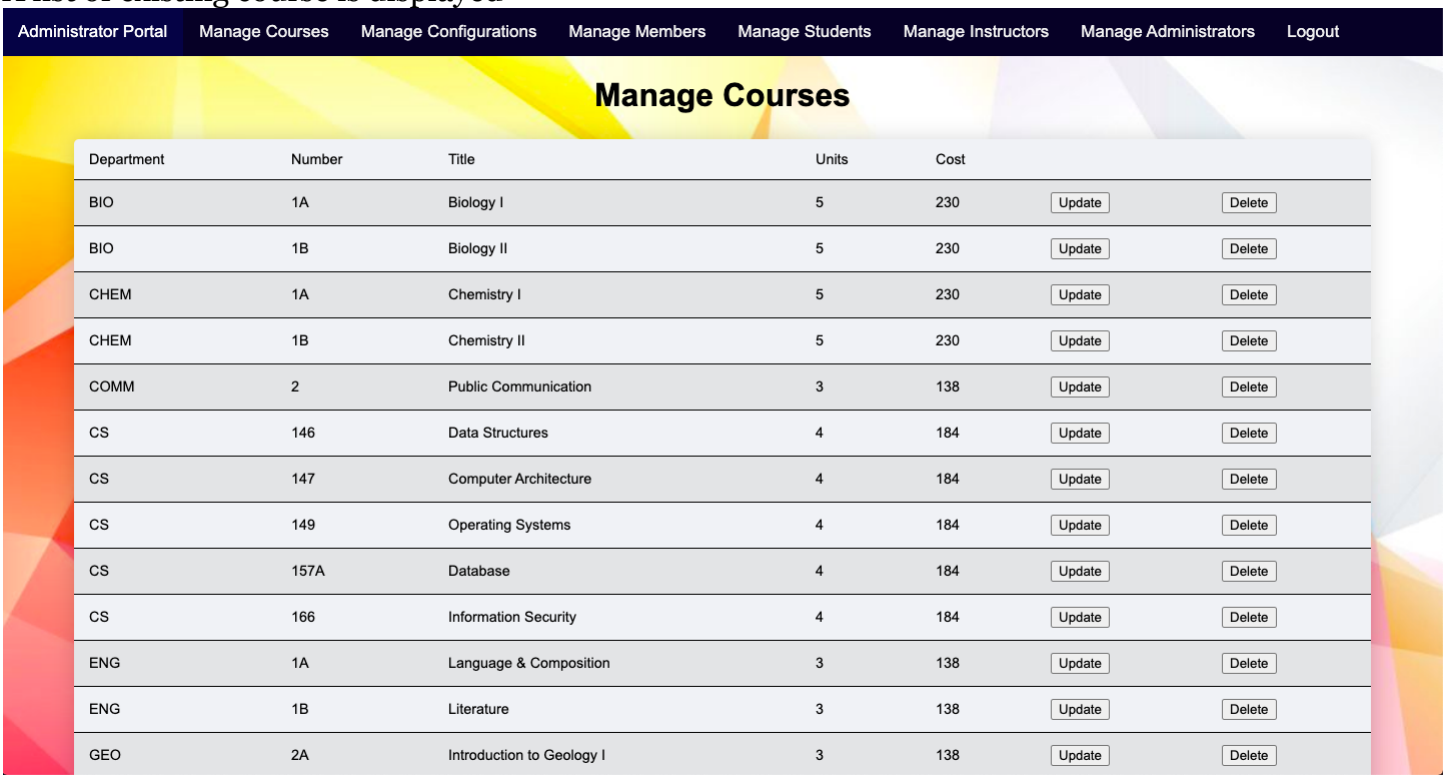
After logging into the portal, an administrator can do certain tasks depending on the clearance.

Manage courses – clearance 1 or 3

Click ‘Manage Courses’.

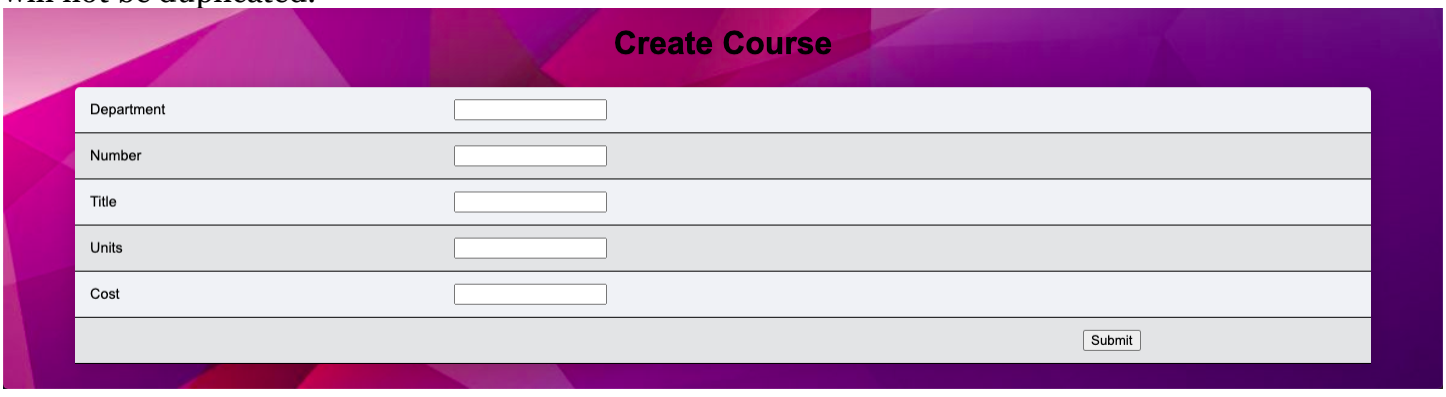
View existing courses

A list of existing course is displayed



Create course

At the bottom of the page, you may enter new fields to create a course. If the course already exists, it will not be duplicated.

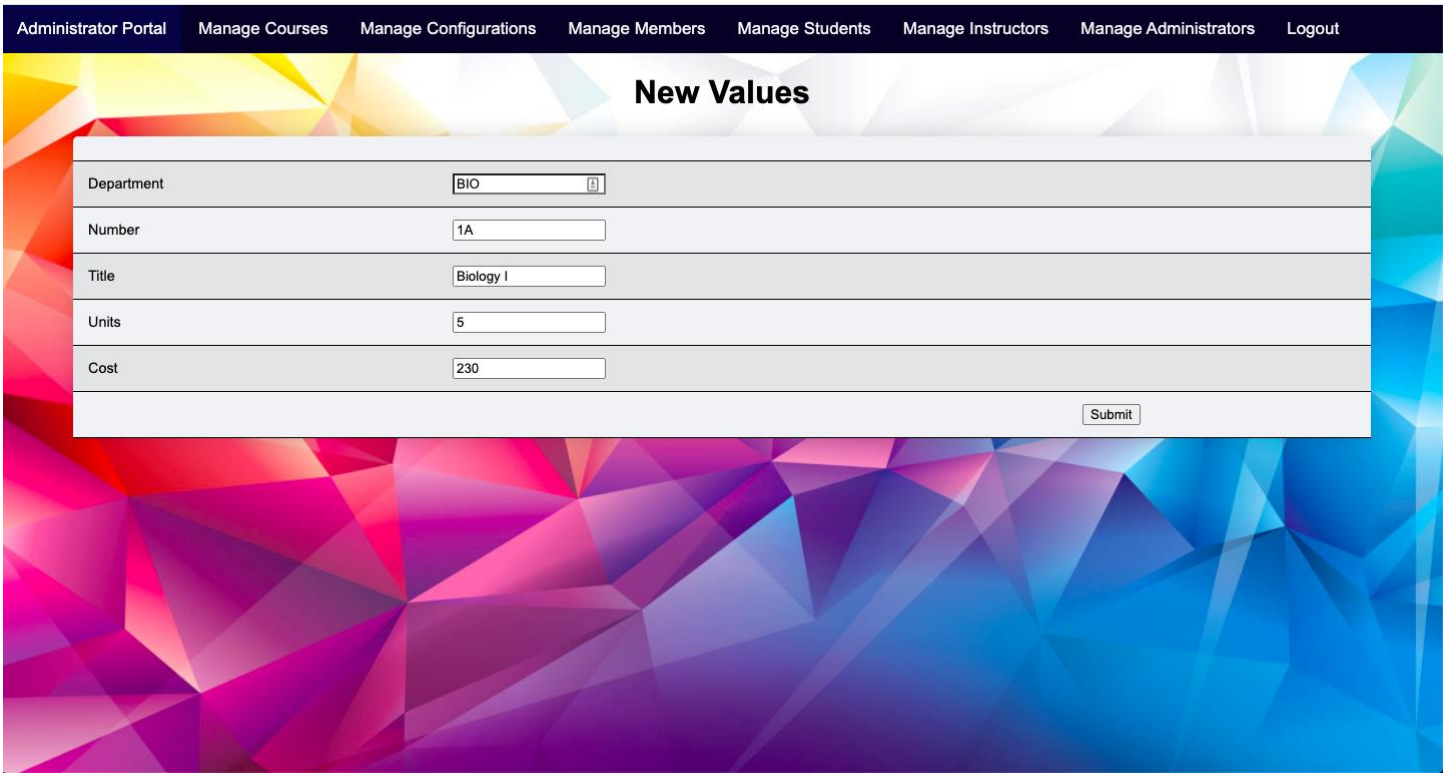


Delete course

Click the delete button and the course will disappear from the list and database.

Update course

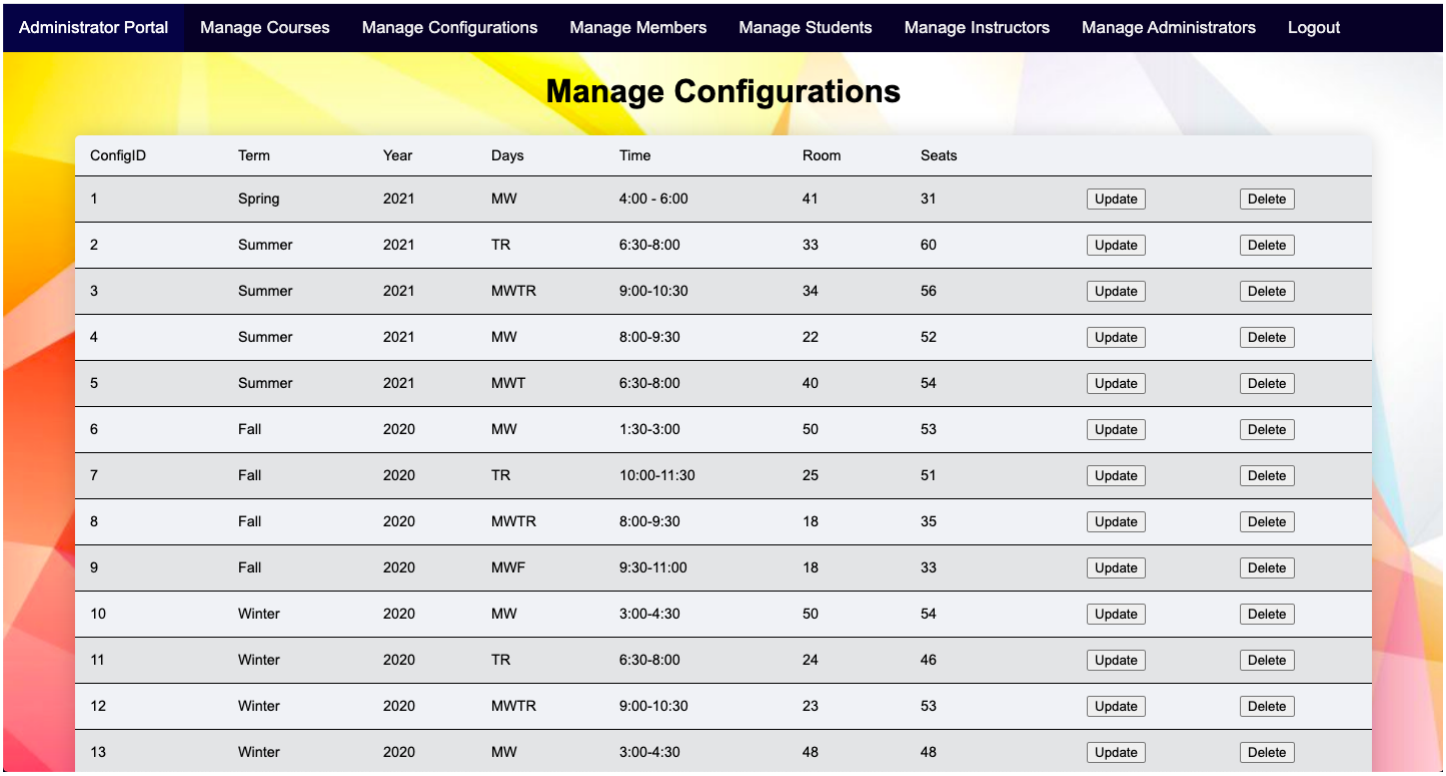
Click the ‘Update’ button next to a course. You will be redirected to a page with the course’s info filled in. Modify the course. The course will update if the department and number do not conflict with another course.



Manage course configurations – clearance 1 or 3

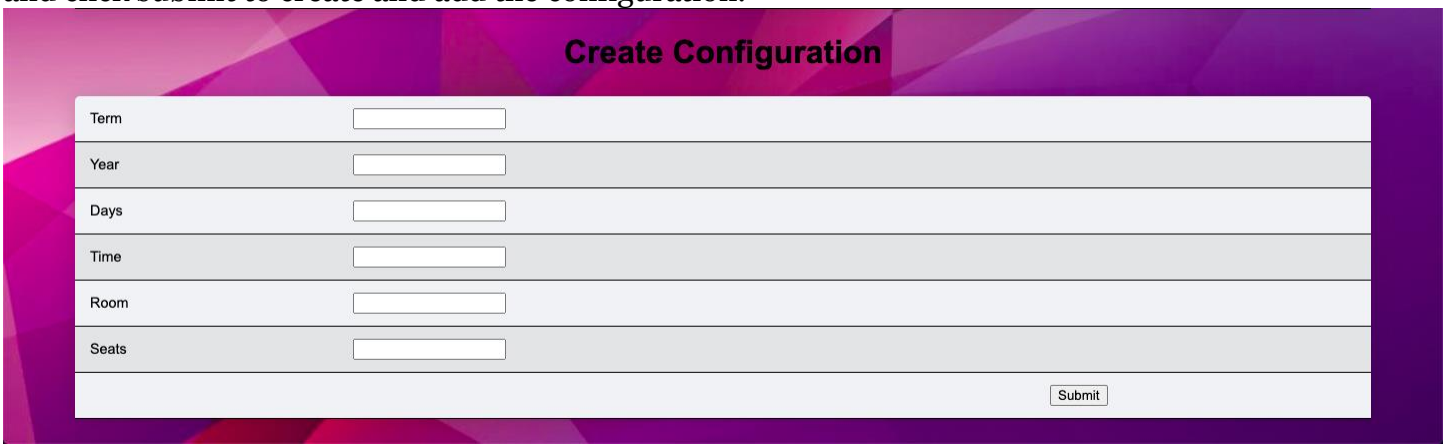
View existing configurations

Click ‘Manage Configurations’ You will see a page with all the existing configurations.



Create configurations

At the bottom of the page you will see a form to add a configuration. Type in the desired information and click submit to create and add the configuration.

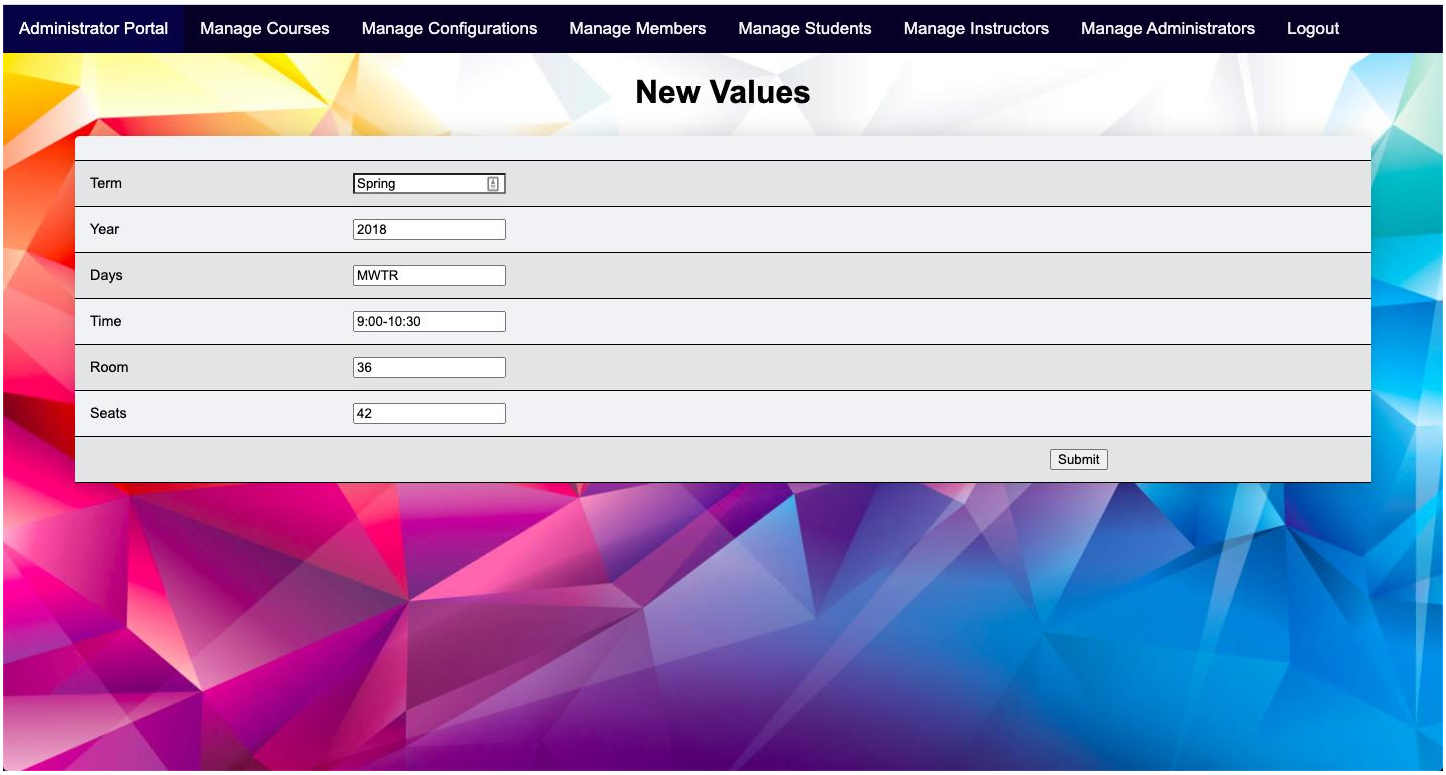


Delete configurations

Click the delete button next to the configuration to delete it.

Update configurations

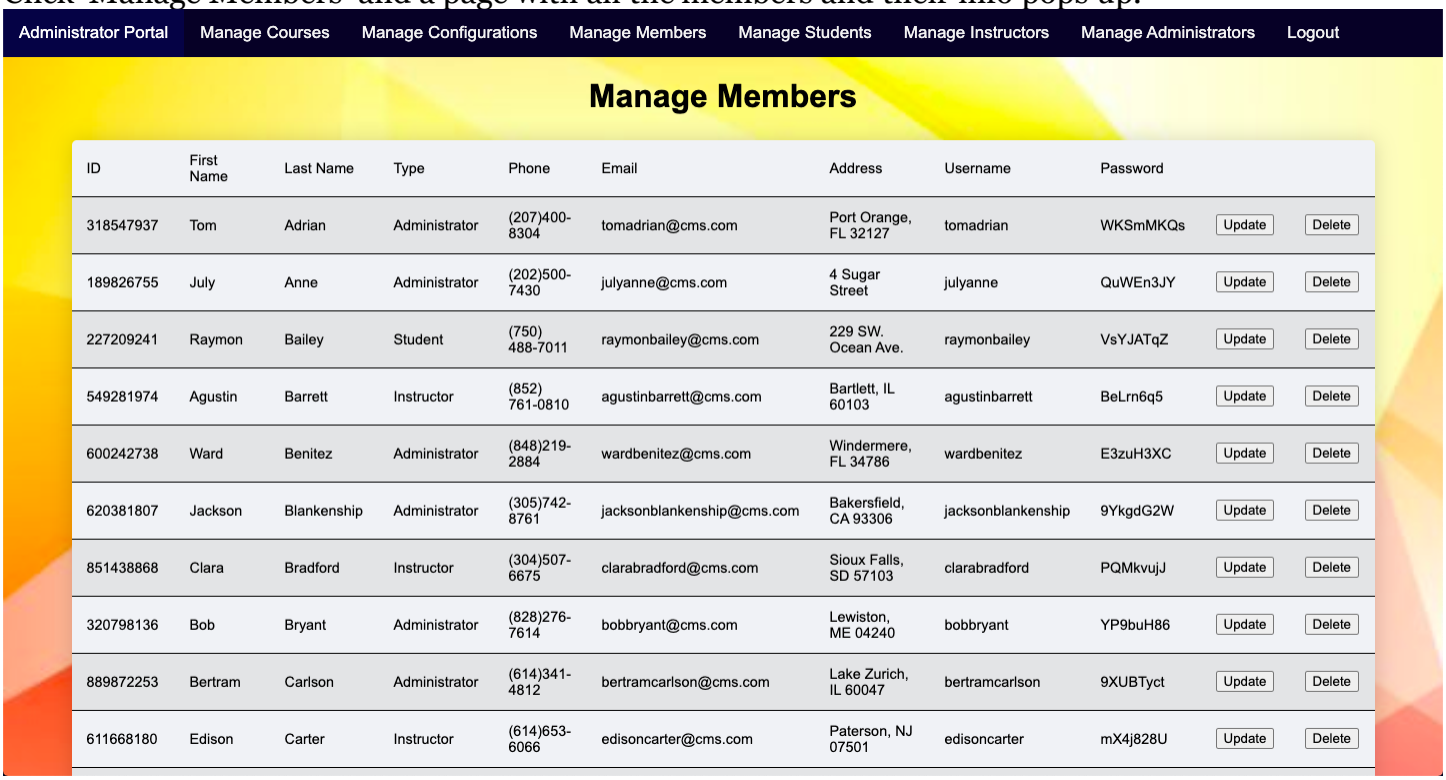
Click the ‘Update’ button next to a configuration. You will be redirected to a page with the configuration’s info filled in. Modify the configuration and click submit.



Manage members – clearance 2 or 3

View existing members

Click 'Manage Members' and a page with all the members and their info pops up.



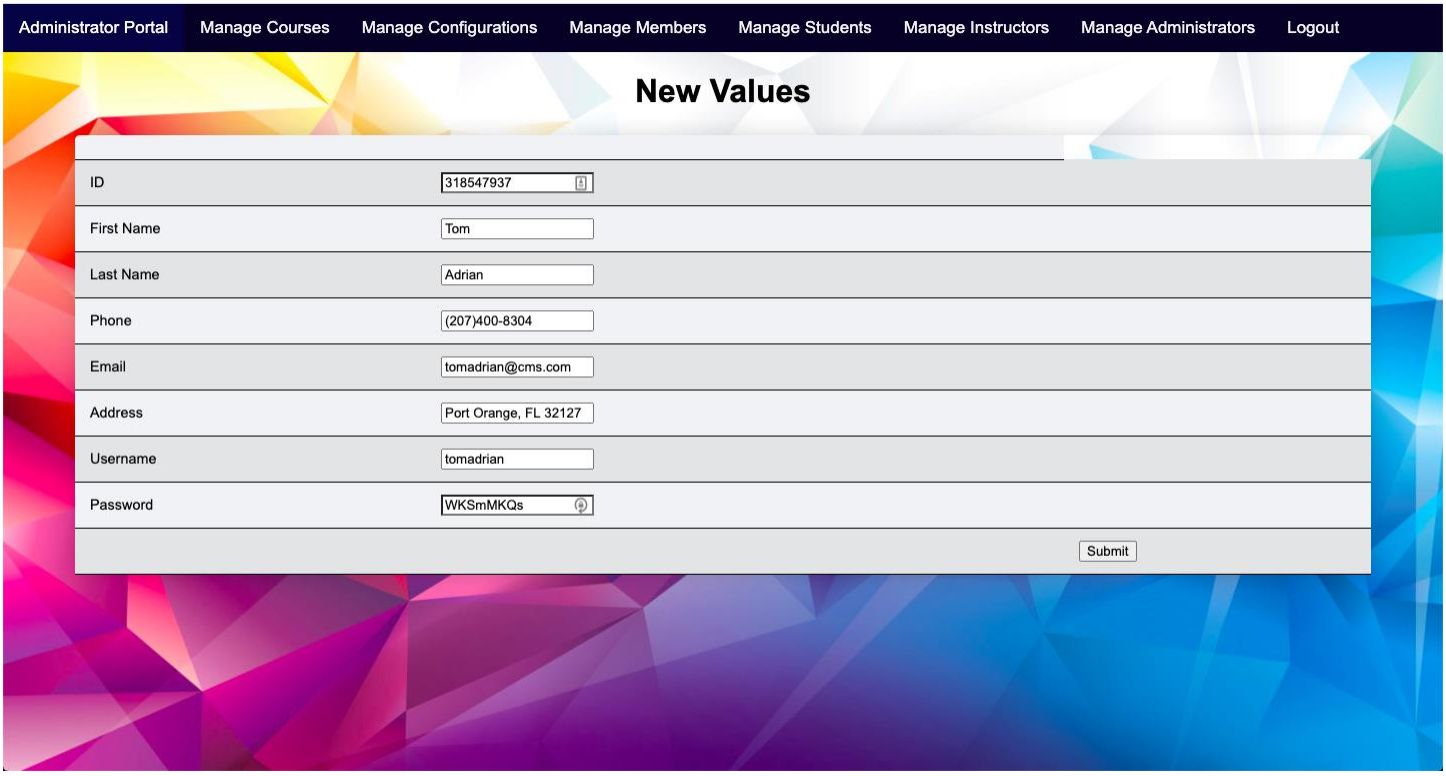
ID	First Name	Last Name	Type	Phone	Email	Address	Username	Password		
318547937	Tom	Adrian	Administrator	(207)400-8304	tomadrian@cms.com	Port Orange, FL 32127	tomadrian	WKSmMKQs	Update	Delete
189826755	July	Anne	Administrator	(202)500-7430	julyanne@cms.com	4 Sugar Street	julyanne	QuWEn3JY	Update	Delete
227209241	Raymon	Bailey	Student	(750) 488-7011	raymonbailey@cms.com	229 SW. Ocean Ave.	raymonbailey	VsYJATqZ	Update	Delete
549281974	Agustin	Barrett	Instructor	(852) 761-0810	agustinbarrett@cms.com	Bartlett, IL 60103	agustinbarrett	BeLrn6q5	Update	Delete
600242738	Ward	Benitez	Administrator	(848)219-2884	wardbenitez@cms.com	Windermere, FL 34786	wardbenitez	E3zuH3XC	Update	Delete
620381807	Jackson	Blankenship	Administrator	(305)742-8761	jacksonblankenship@cms.com	Bakersfield, CA 93306	jacksonblankenship	9YkgdG2W	Update	Delete
851438868	Clara	Bradford	Instructor	(304)507-6675	clarabradford@cms.com	Sioux Falls, SD 57103	clarabradford	PQMkvujJ	Update	Delete
320798136	Bob	Bryant	Administrator	(828)276-7614	bobbryant@cms.com	Lewiston, ME 04240	bobbryant	YP9buH86	Update	Delete
889872253	Bertram	Carlson	Administrator	(614)341-4812	bertramcarlson@cms.com	Lake Zurich, IL 60047	bertramcarlson	9XUBTyct	Update	Delete
611668180	Edison	Carter	Instructor	(614)653-6066	edisoncarter@cms.com	Paterson, NJ 07501	edisoncarter	mX4j828U	Update	Delete

Delete members

Click the delete button to delete a member.

Update members

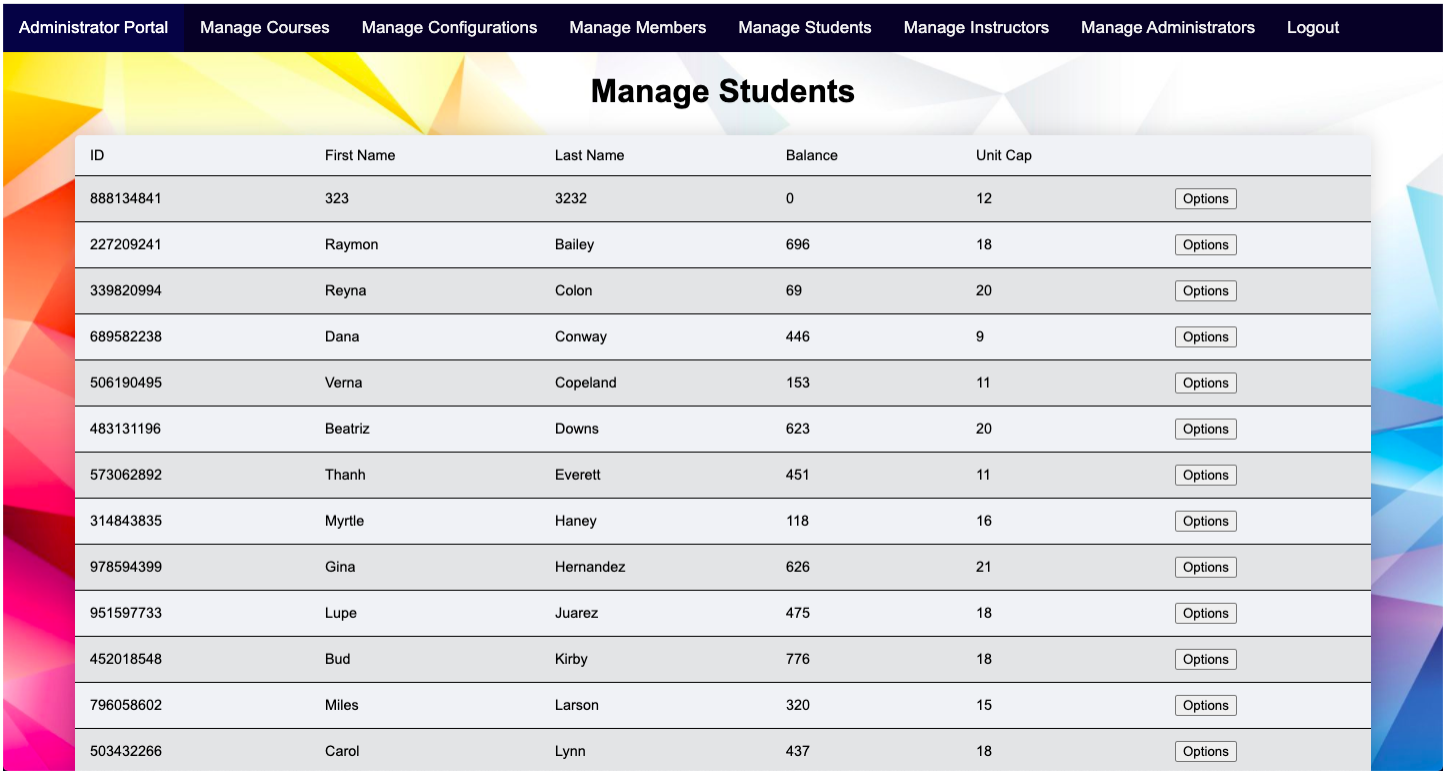
Click the update button. Enter the new fields in the next page and click submit. In this, you can change member attributes as well as user attributes. Use this to create a username and password for a new member.



Manage students – clearance 2 or 3

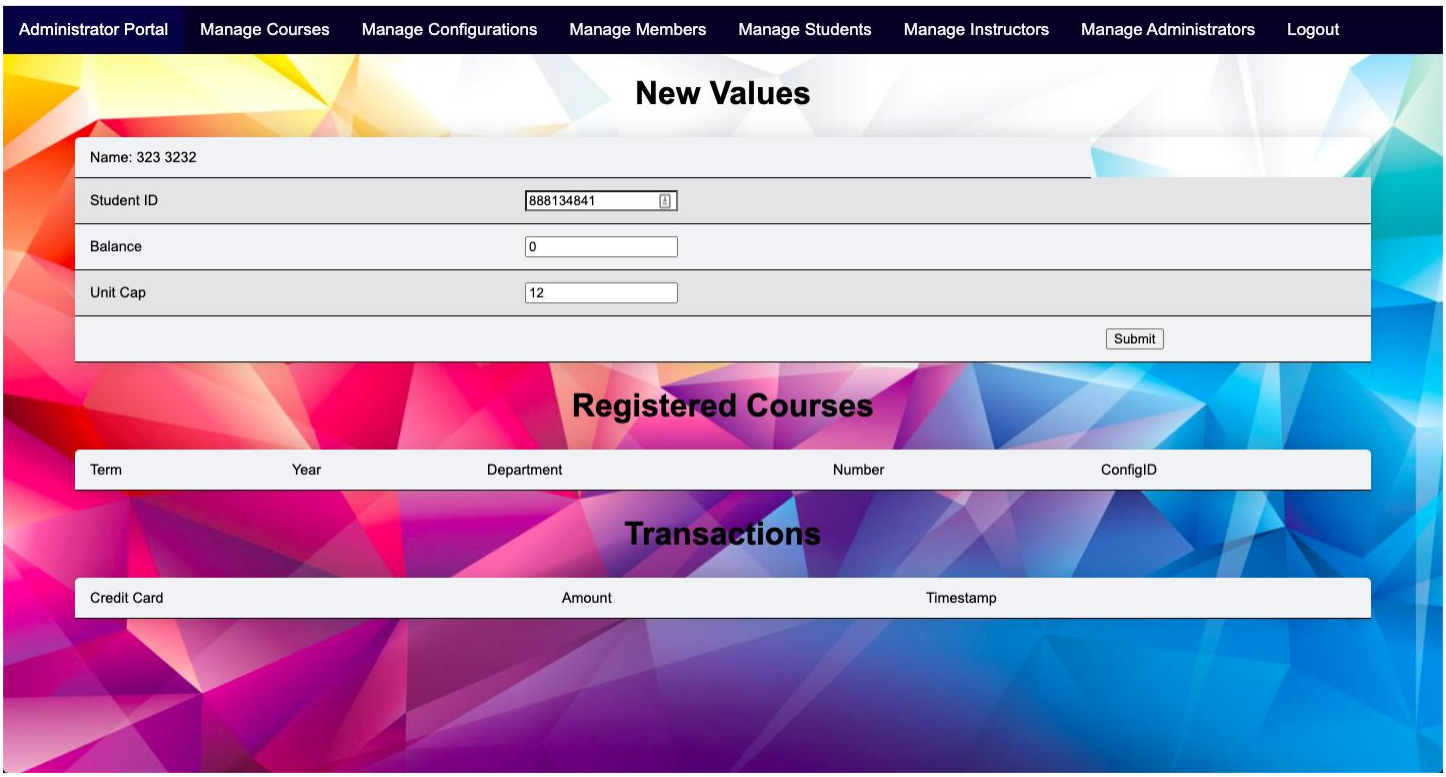
View existing students

Click the ‘Manage Students’ button.



Update student

Click options. You will have the ability to update a student's balance and unit cap. You can also change the ID and this will affect all tables.



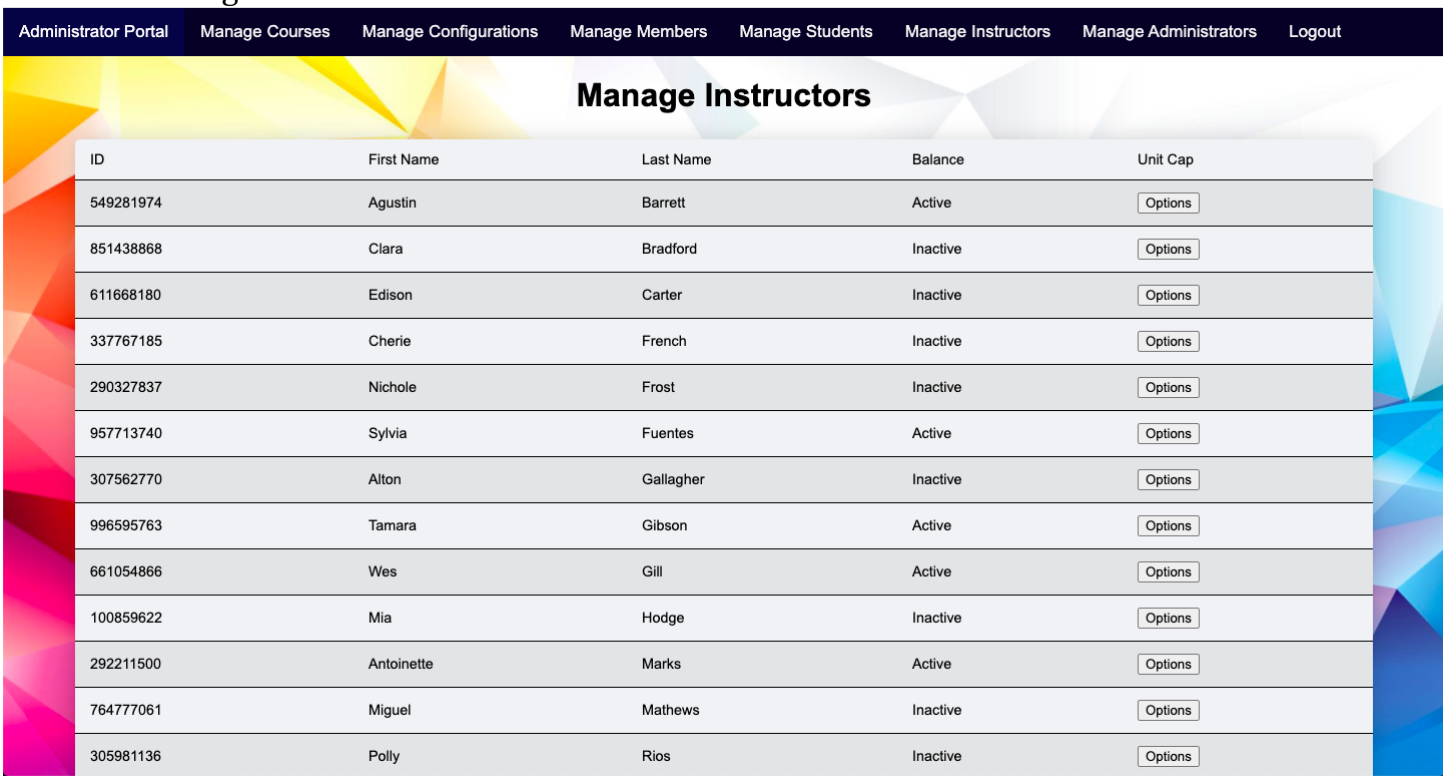
View student's registered courses

Refer to picture above.

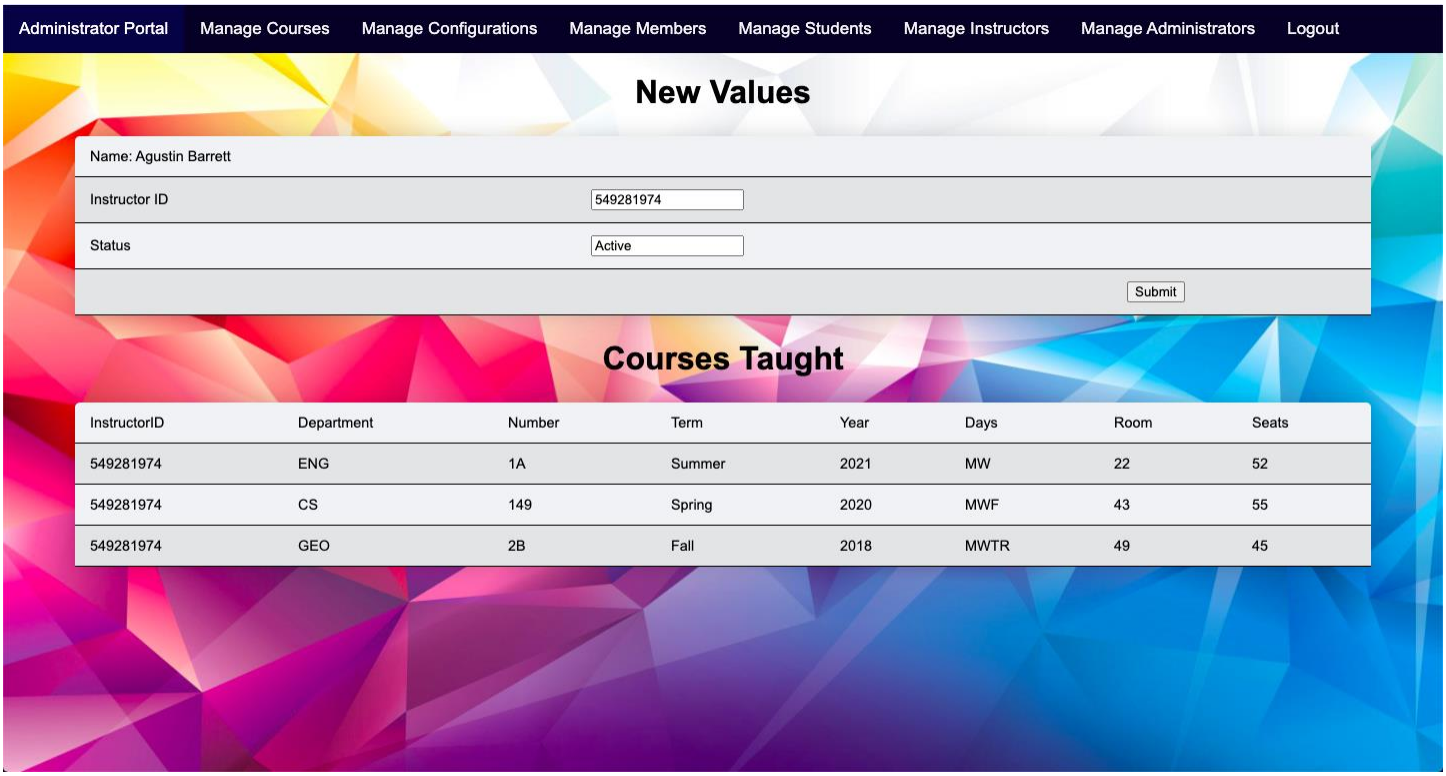
View student's transactions
Refer to picture above.

Manage instructors – clearance 2 or 3

View existing instructors
Click the 'Manage Students' button.



Update instructors
Click 'Options'. You will have the ability to activate or deactive an instructor's account. Enter 'Active' to activate. Enter anything else to deactivate, preferably 'Inactive'. You can also change the ID and this will affect all tables.



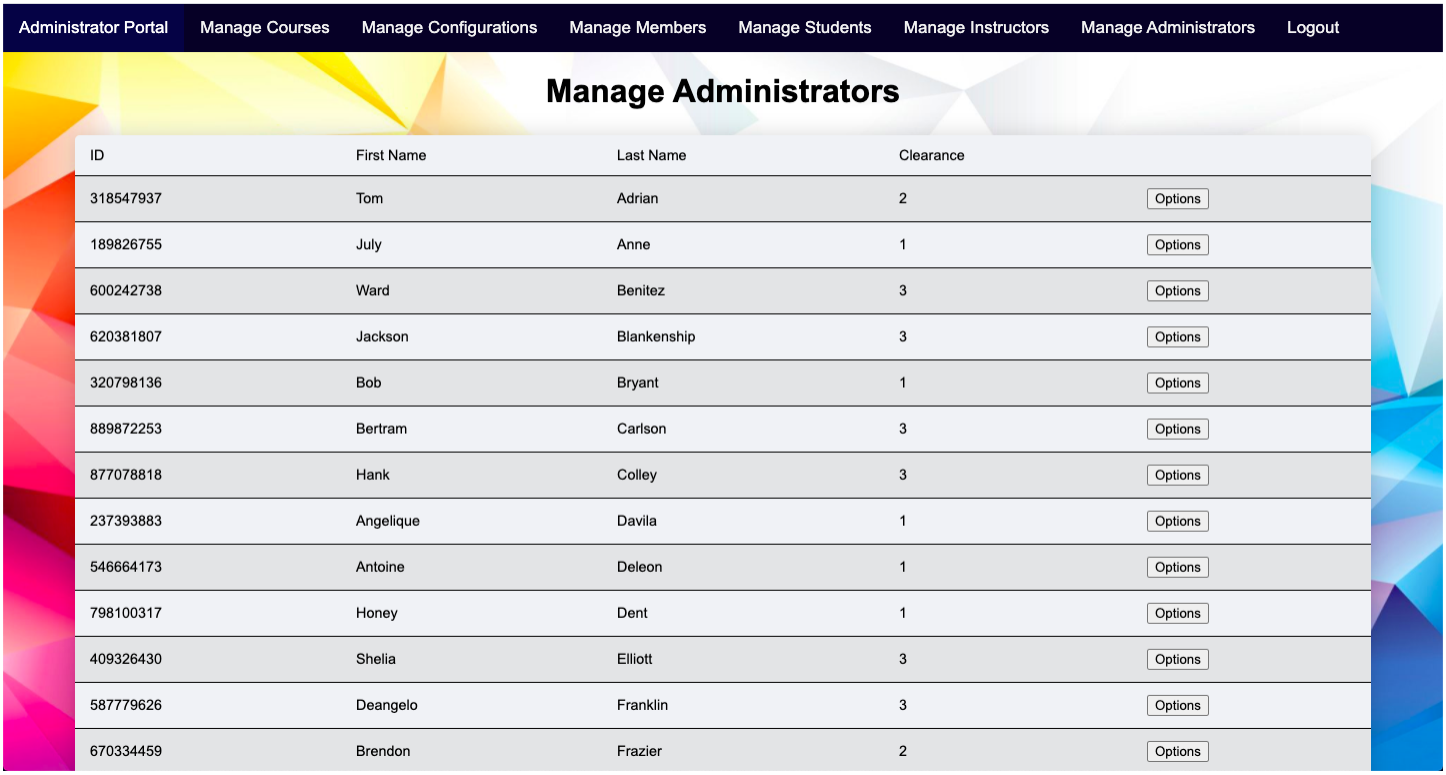
View courses taught

Refer to picture above.

Manage administrators – clearance 2 or 3

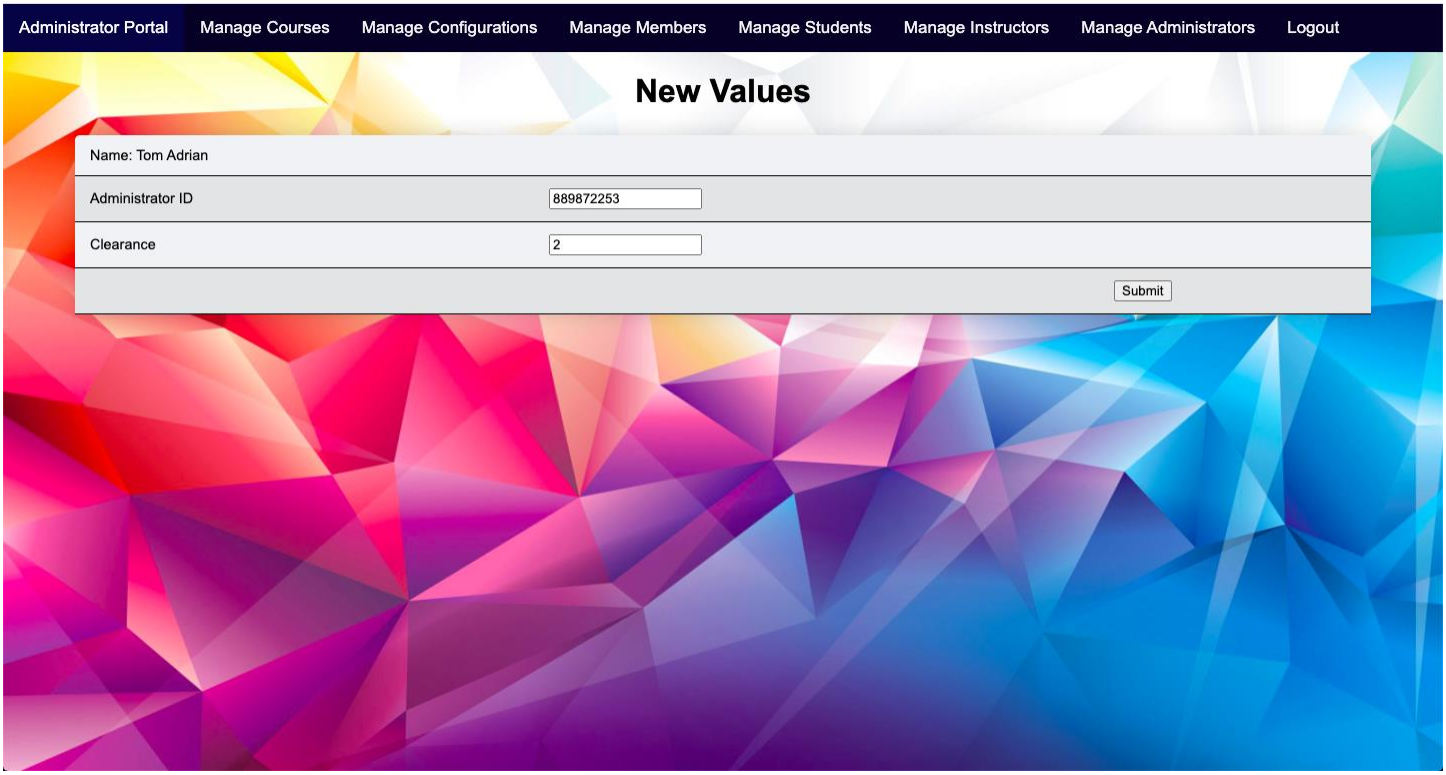
View existing administrators

Click the ‘Manage Administrators’ button.



Update administrators

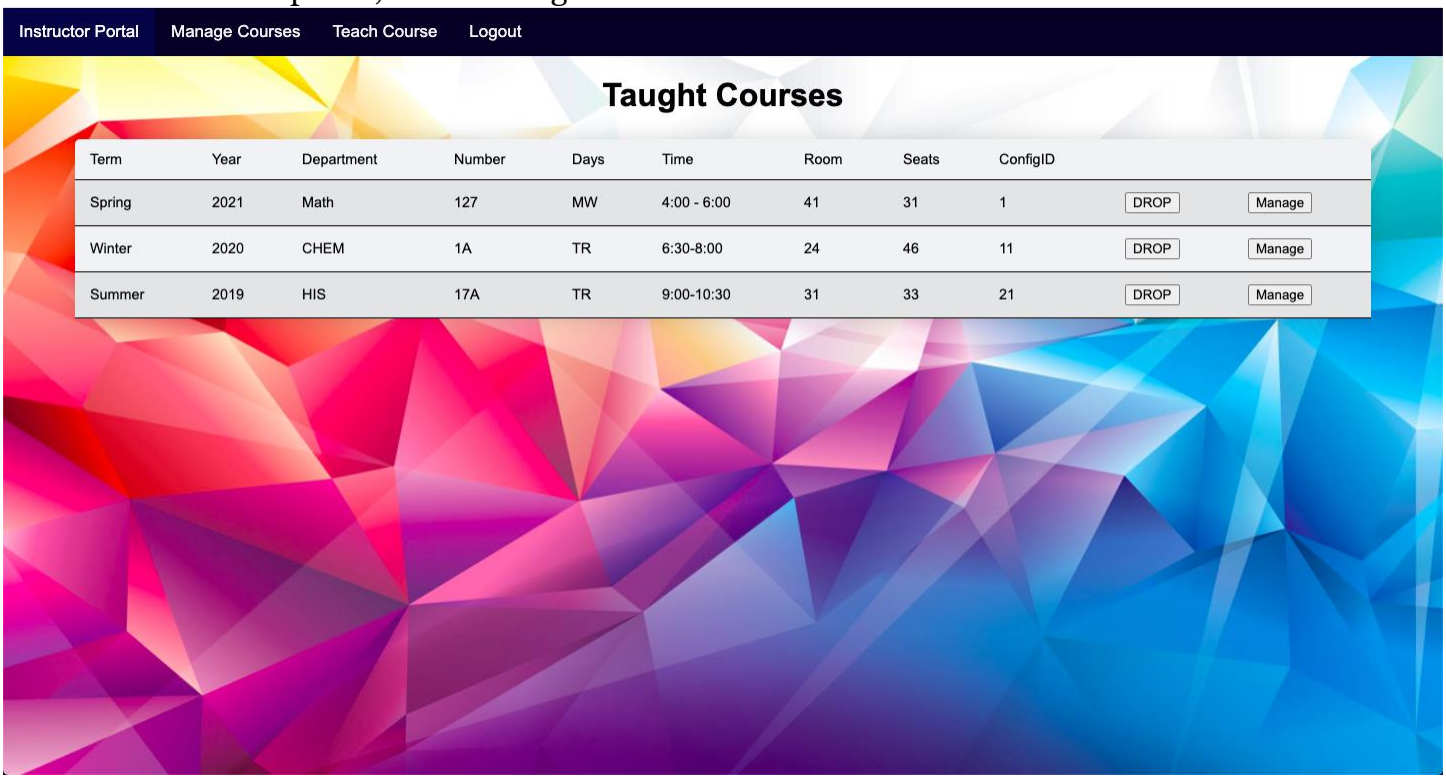
Click ‘Options’. You will have the ability to update an administrator’s clearance. You can also change the ID and this will affect all tables.



Instructors

View courses taught

From the instructor portal, click ‘Manage Courses’.

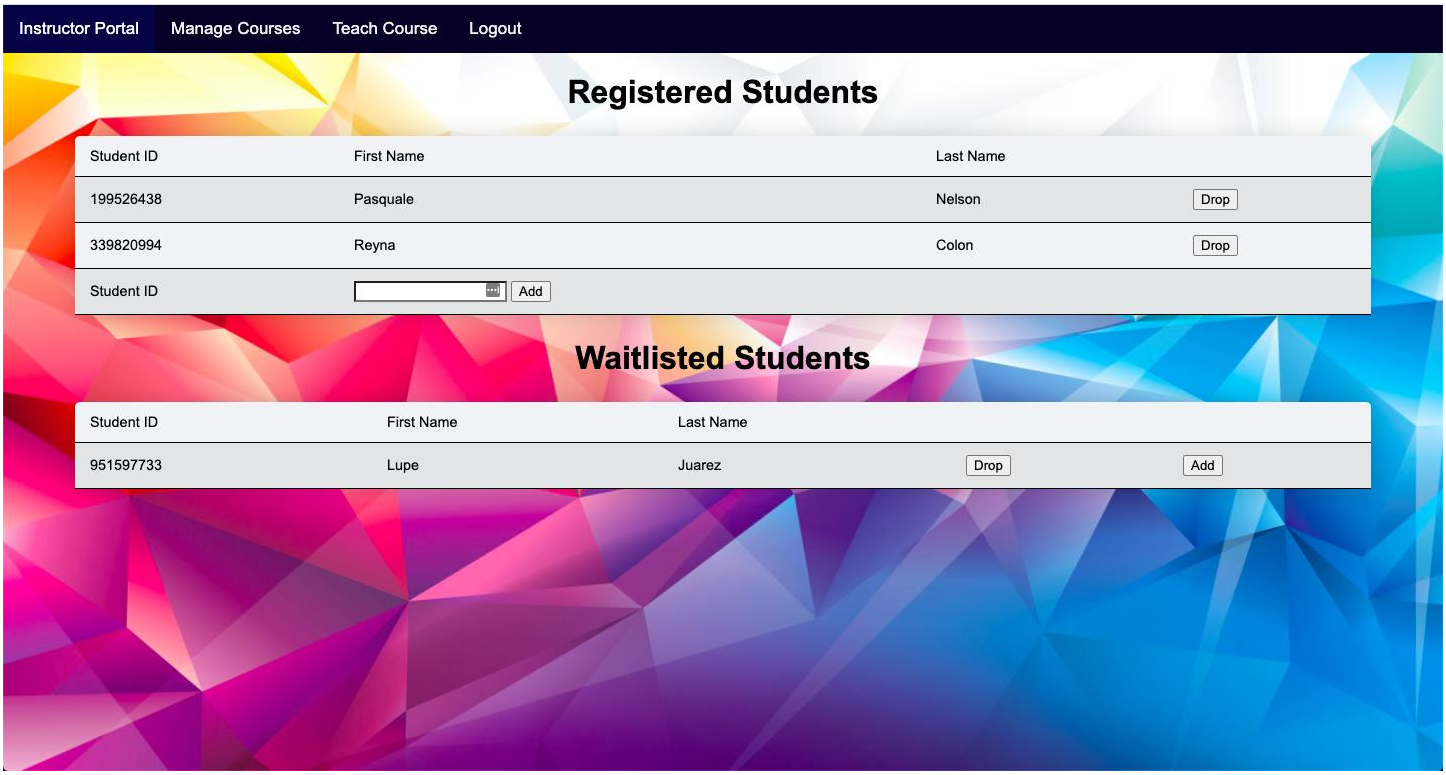


Drop courses taught

Click ‘DROP’ to drop a course.

View registered and waitlisted students

Click ‘Manage’.



Drop registered students

Click the drop button next to the student in the registrants table.

Drop waitlisted students

Click the drop button next to the student in the waitlist table.

Manually add students on waitlist to registered list for a taught course

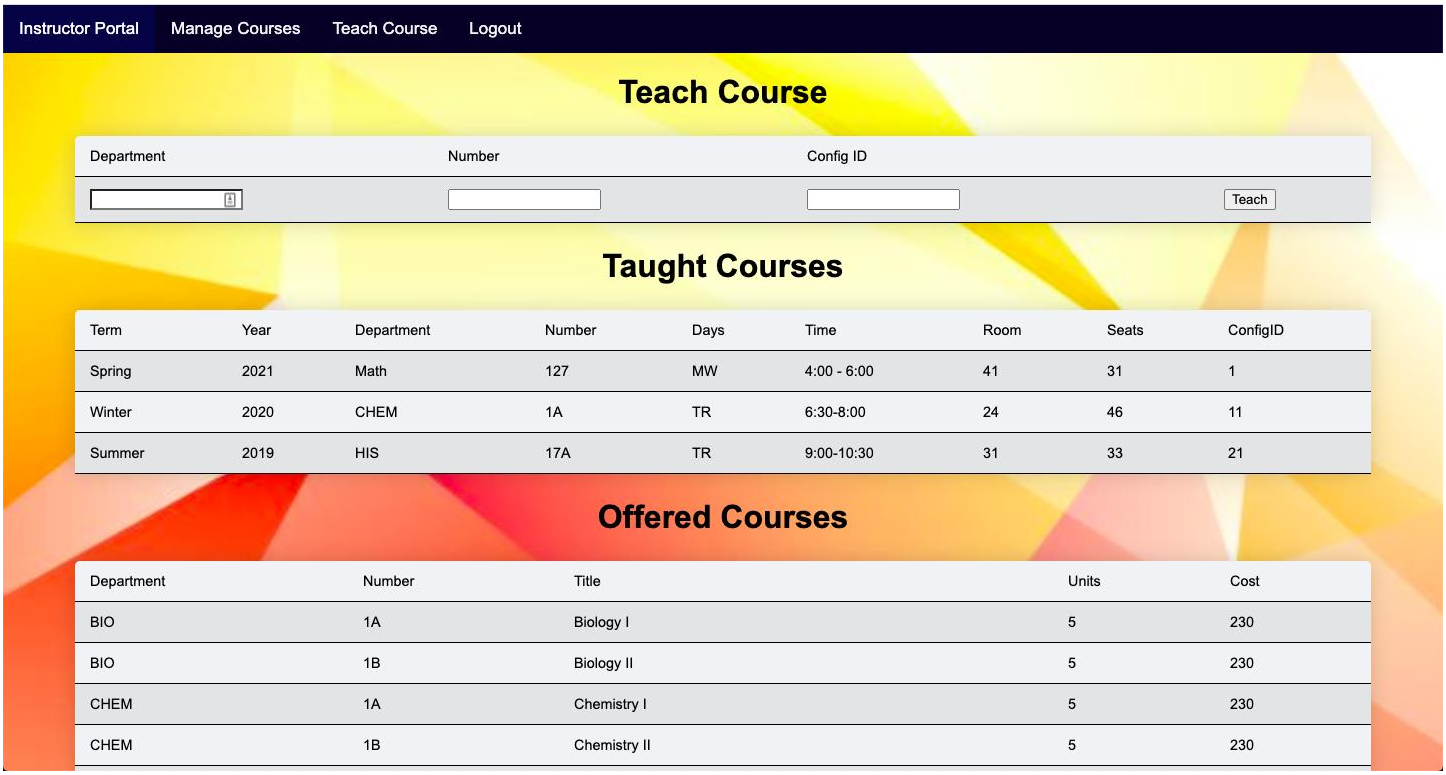
Click add next to the student in the waitlist table.

Manually add students using their ID to registered list for a taught course

Enter student's ID in the textbox and click add to add a student manually.

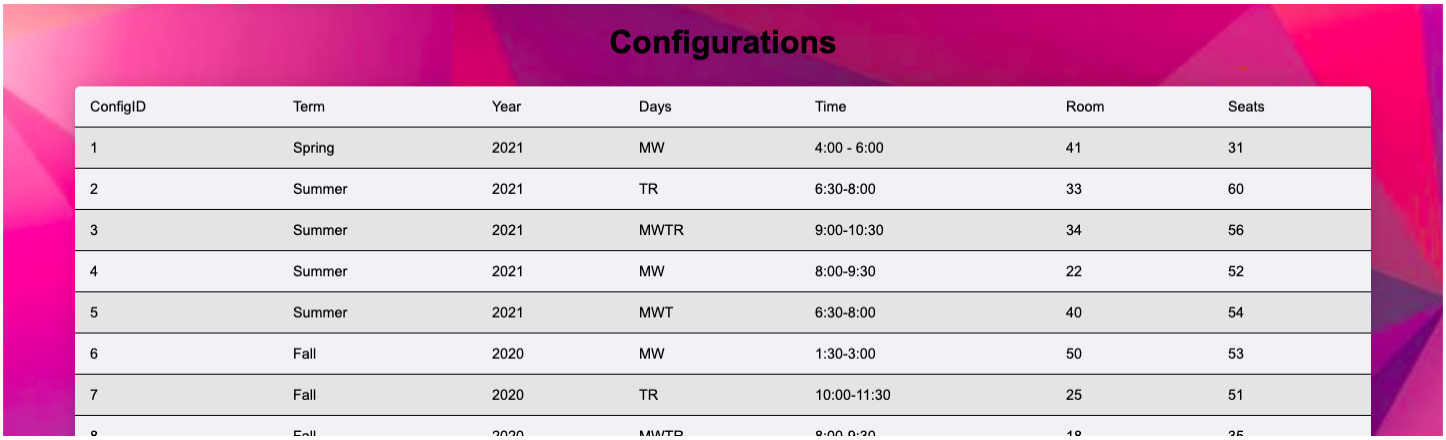
View offered courses

Click 'Teach Course'.



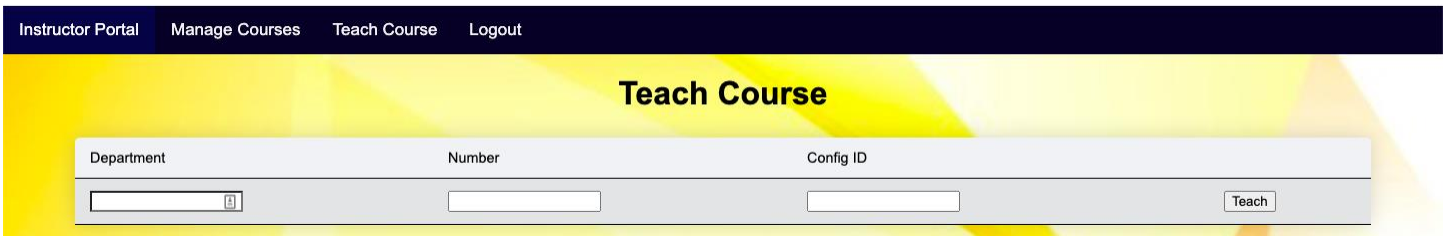
View offered course configurations

Click 'Teach Course'.



Teach a course

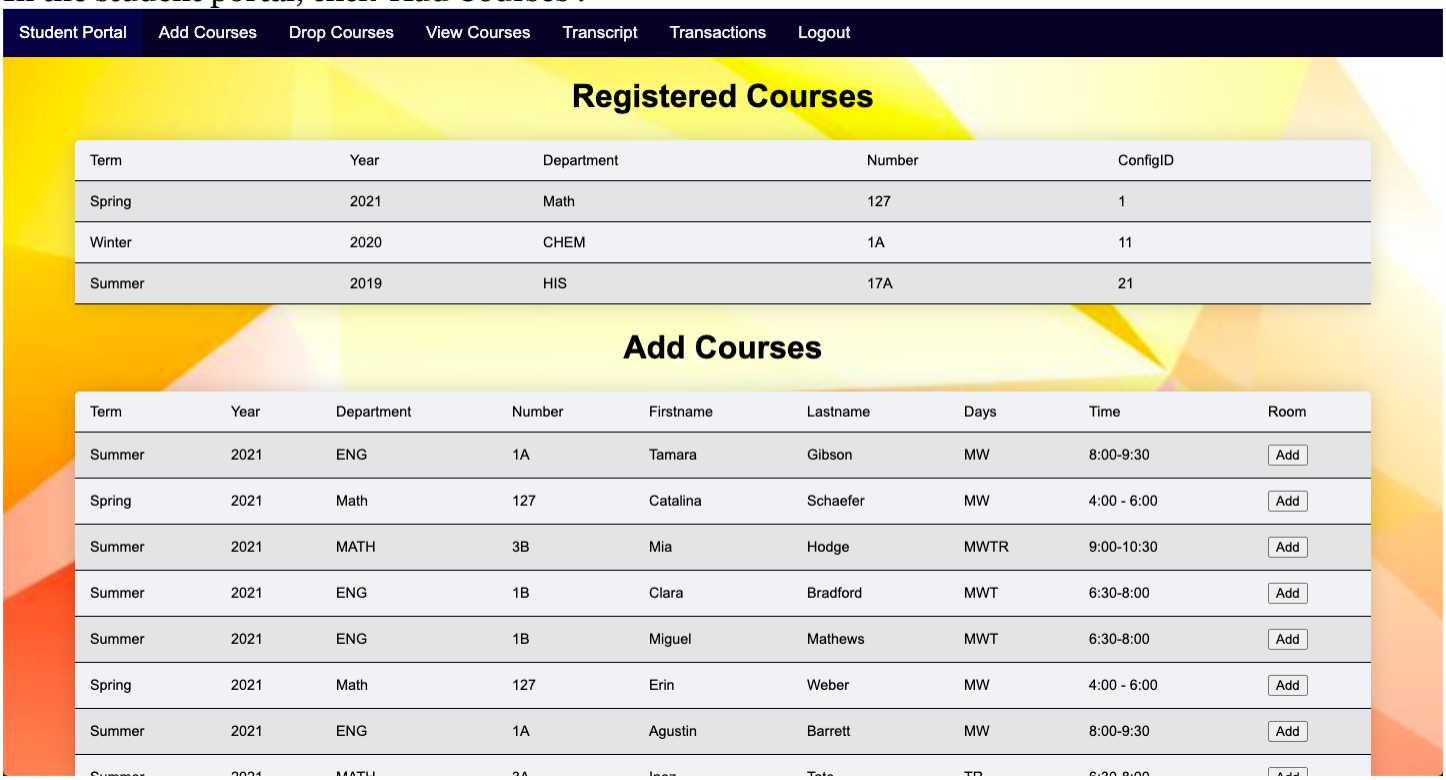
At the top of the page, enter the fields of the course and click submit. Select a course's department and number and config ID to add the course to teaching list. If the course is being taught by you or someone else – a certain combination of department, number, and configID are already in use by someone else – the course will not add.



Students

View registered courses

In the student portal, click ‘Add Courses’.

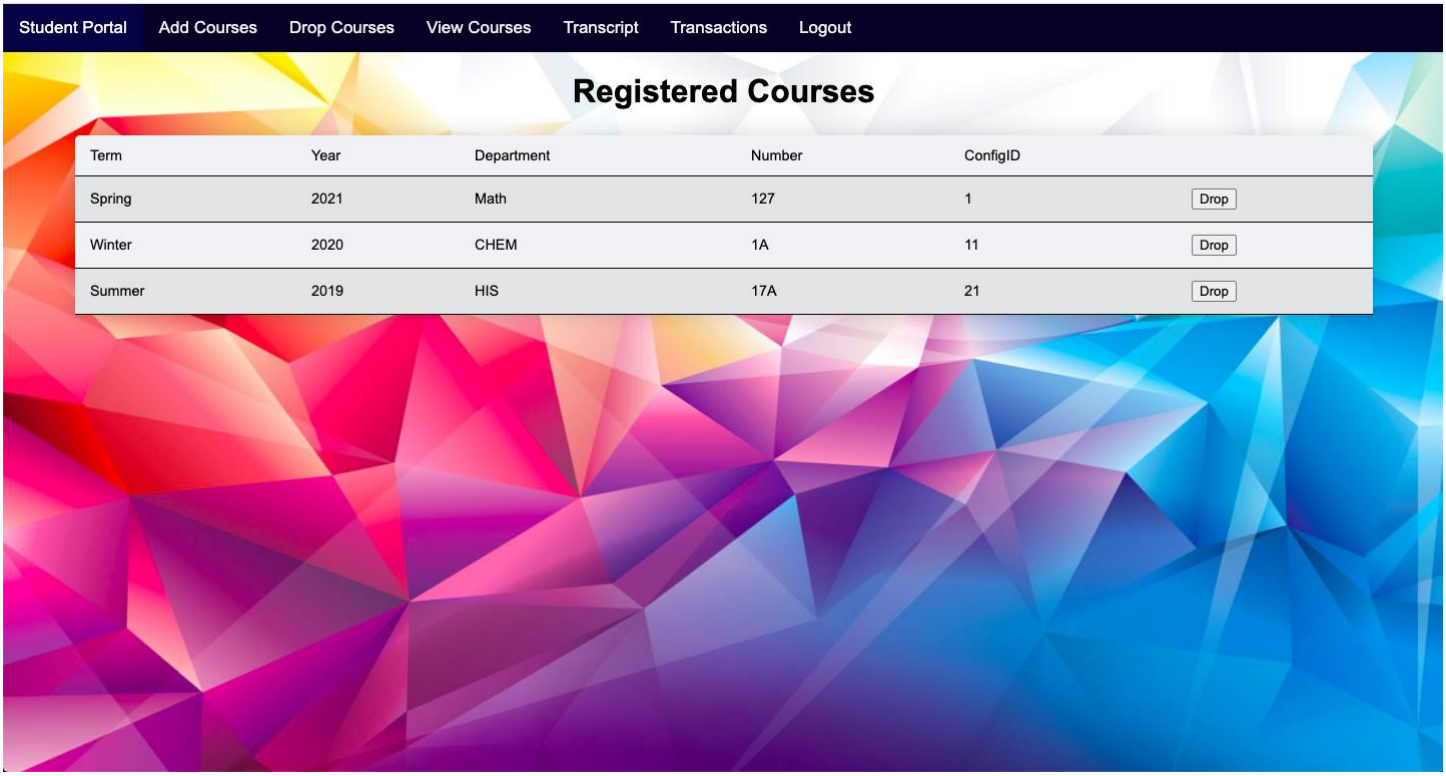


Add courses

In the picture above, click add next to the course to add. If the course is full, you will be added to the waitlist. If you are already registered or waitlisted, you cannot add the course twice.

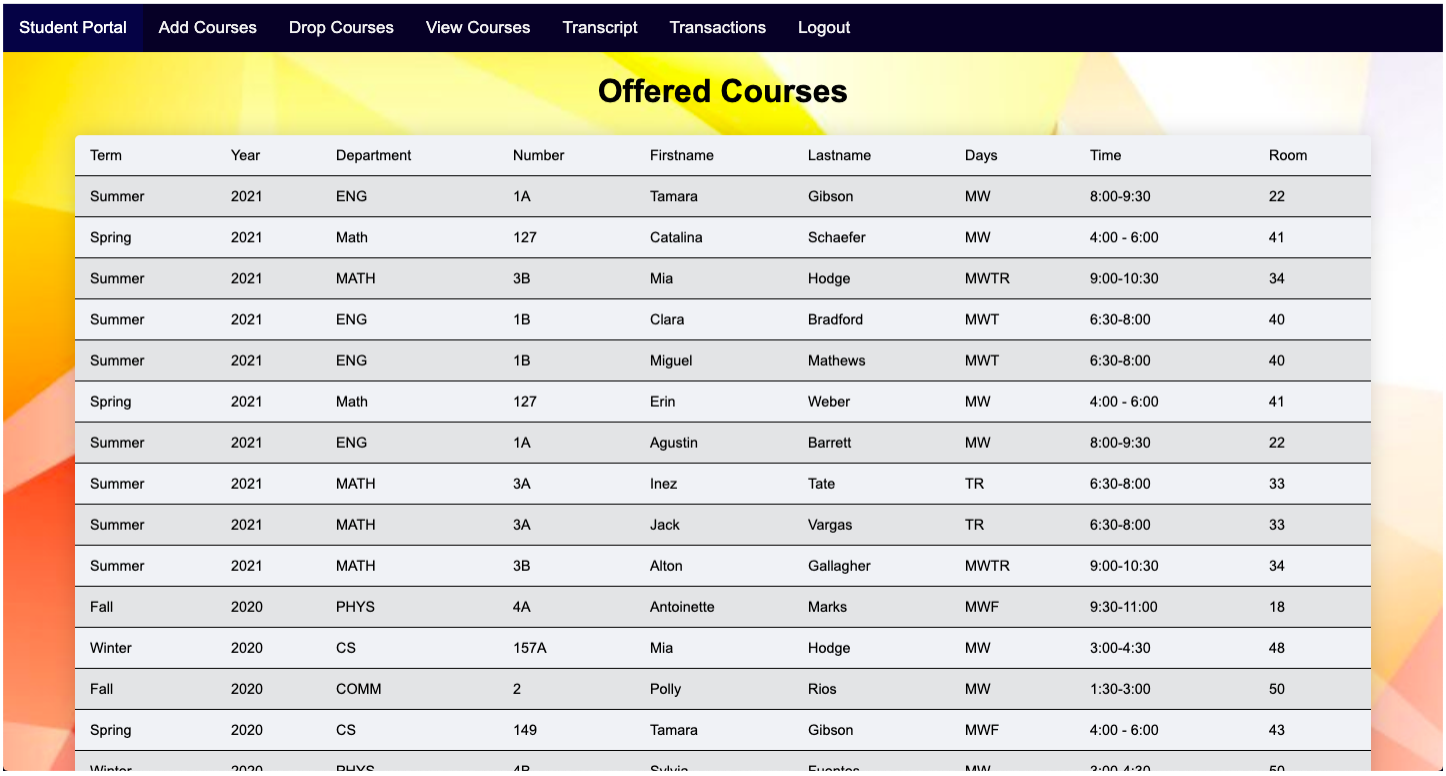
Drop courses

Click ‘Drop Courses’. Then click the drop button next to the course to drop.



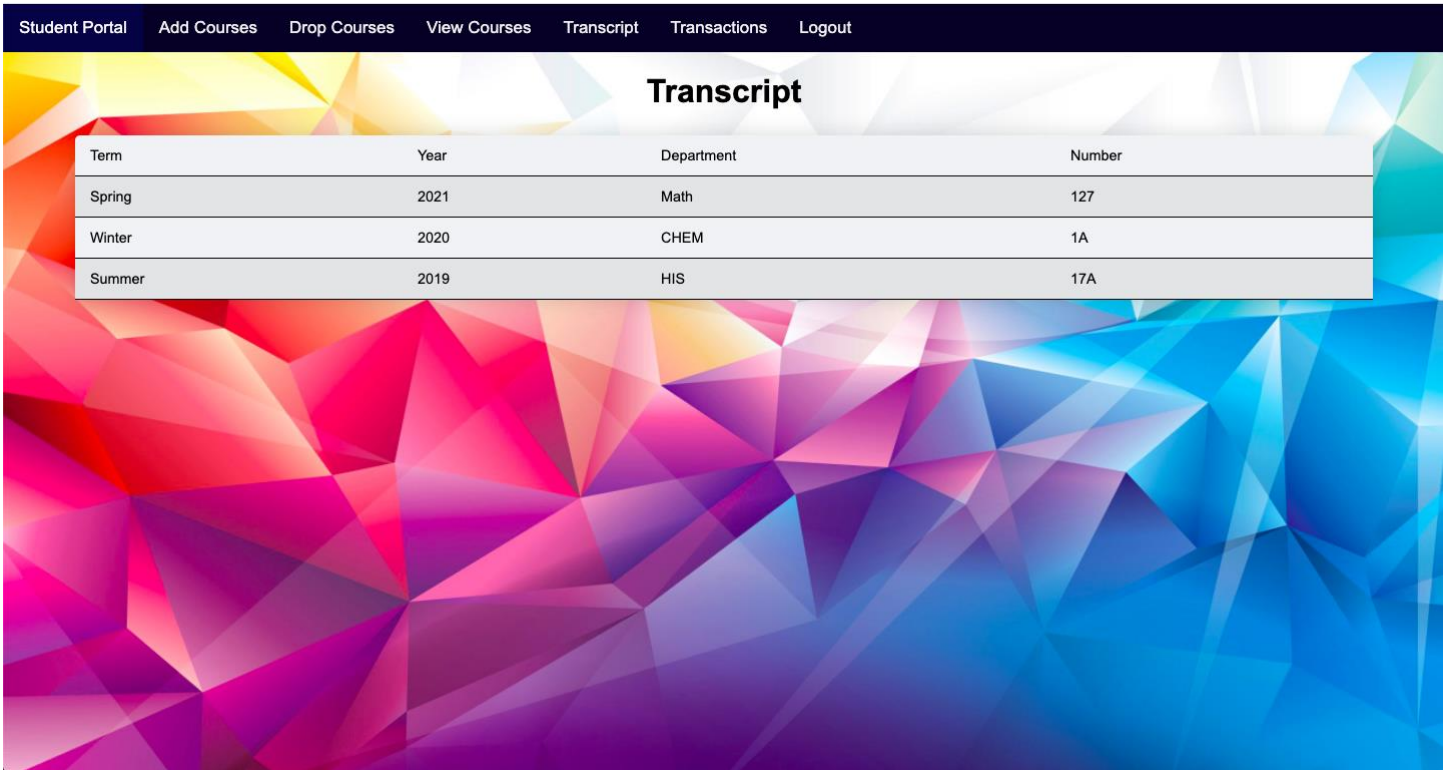
View offered courses

Click 'View Courses'.



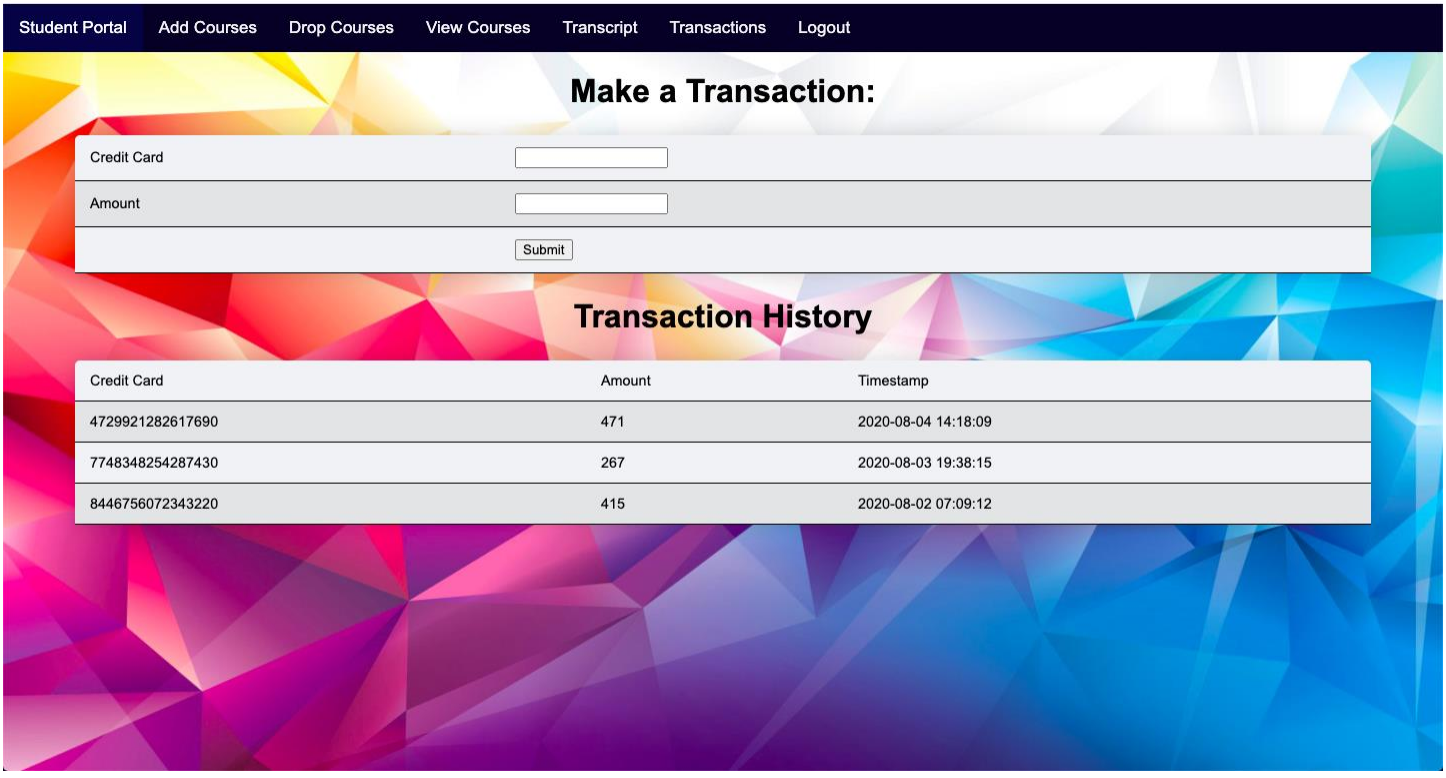
View transcript and registered courses

Click 'Transcript.



View transaction history

Click 'Transactions'.



Pay for courses

Enter credit card information and amount and then click submit. The transaction will be in the portal after submitting.

Non-functional Issues

Detailed descriptions of Graphical User Interface

The online GUI will be made using HTML. It will initially contain the basic elements and may be beautified later. JavaScript may be added later to improve design. Initially, the pages will contain simple links, buttons, and tables. Color and visual appeal may be added later due to time constraints. Overall, the user will access the GUI by entering the server's URL. There will be a sign in page and a link to create a user. If the create user link is clicked, the user enters the required information and if it is valid, the account will be created followed by a success message. The user then clicks returns to the log in page and enters the username and password. After logging in, the user will be redirected to the respective page associated with the account type and will view the features and functions they are allowed to access by links. When the user clicks on a link, the respective page will be displayed allowing users to perform an action or view data.

Primarily there are four types of views. One is for the visitor who wants to register consisting of a form. Another is the student portal fulfilling the functional requirements. Instructors and administrators also have their respective portals. The portal will show limited options for an administrator with lower clearance. An inactive instructor account will not have any links except the logout button.

Detailed descriptions of Security

- Input will be sanitized to prevent SQL injection attacks
- A sign-in page will ensure users log in to their correct accounts
- Users can log out by clicking a "logout" button. They will be immediately logged out when they exit the session.

Detailed descriptions of Access Control

Separate accounts will be created for each type of user. Each type of user will have its own landing page. This ensures security as users don't access features they are not supposed to. This ensures access control and that users only do what they are allowed to and view data which is available for them to view. Users cannot view data they do not have access to nor perform actions they have no access to. The landing page will make sure of that. The status of the account can also be checked before performing any action to add an extra layer of security but that would be unnecessary.

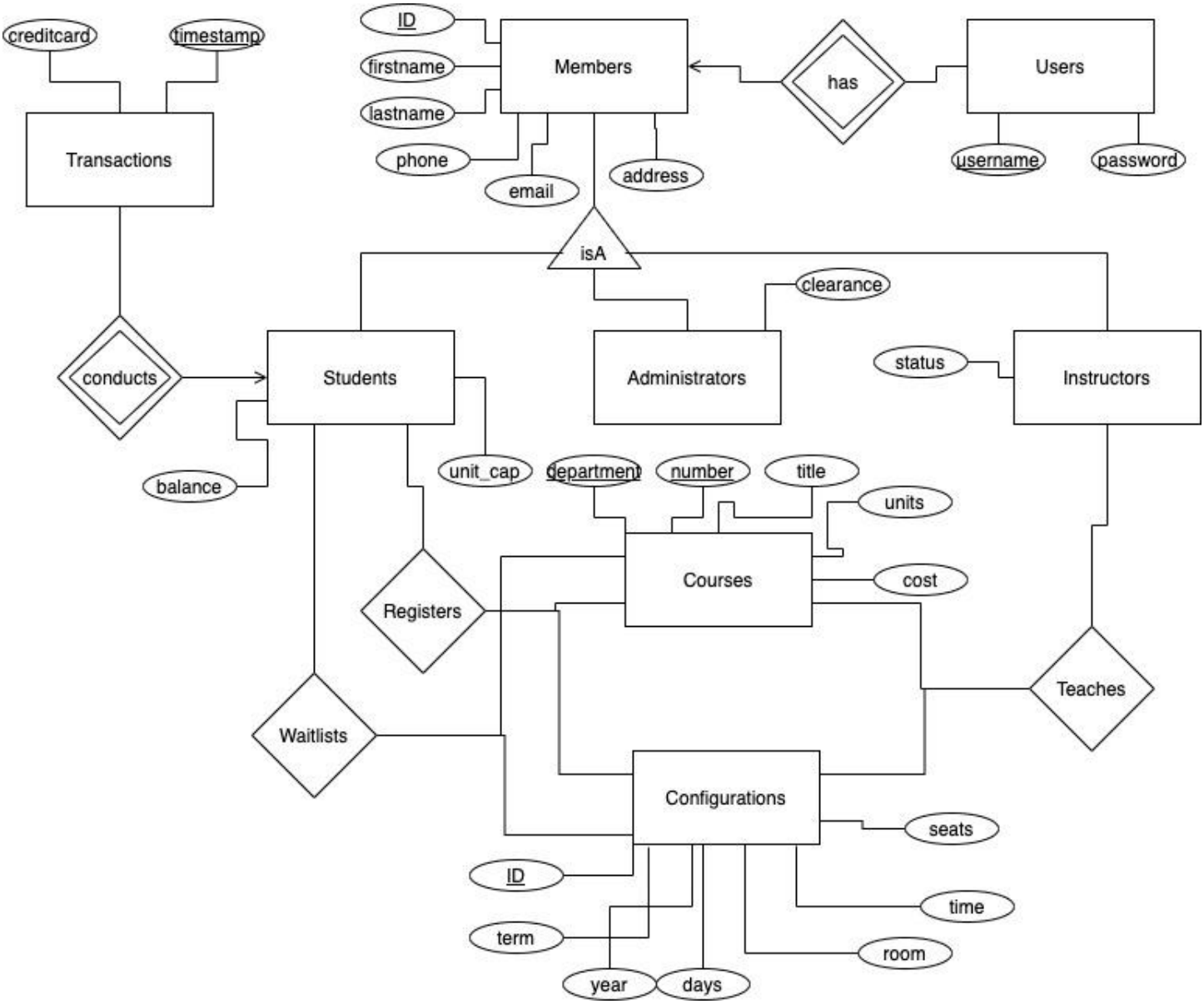
Student users are only able to access the courses available for the coming semester to register or waitlist for and are only able to alter their course schedule by dropping themselves from a selected course. However, they cannot enroll, waitlist, or drop other students into or out of a course or perform any actions reserved for admins and instructors. If they are waitlisted for a course, they are unable to perform any action that will alter their position.

Instructor users can manage the students who join the course. They can manually add and drop students. This is only possible for the courses an instructor teaches, not anyone else.

Administrator users are able to create new courses and configurations. They can manage accounts, create usernames, and reset passwords. They can control accounts and view information about other users but not delete their registered or taught courses.

Project Design

ERD



Database Schemas

Entities

Members(ID, firstname, lastname, phone, email, address)
An entity that represents a member I the system. This is created when you sign up on the homepage. A member is a student, instructor, or administrator. It also has a User account.

Administrators(adminID, clearance)
An administrator is a Member and holds a special attribute clearance for access control in the admin portal

Configurations(configID, term, year, days, time, room, seats)
A course is taught in a particular configuration. A single course can be taught in many configurations. Configurations describe when and where a course is taught.

Courses(department, number, title, units, cost)
An entity representing a course. It has the basic attributes that do not vary. A course combined with a configuration can be taught, registered, or waitlisted.

Instructors(instructorID, status)
A type of member with a special attribute status which maintains access control. If an instructor is inactive, it should not do anything.

Students(studentID, balance, unit_cap)
A type of member with balance and unit cap. Balance is the amount of money a student has to pay for courses. The unit cap specifies the amount of course units a student can add.

Transactions(studentID, creditcard, amount, timestamp)
Is a weak entity set that store financial transaction information for buying a course. It needs studentID to help identify each unique tuple.

Users(ID, username, password)
Is a weak entity set that allows members to log into their portals. A User can have only one member. It borrows ID from Members.

Relationships

Teaches(instructorID, department, number, configID)
Holds information of course (department, number) and the configuration it is taught in.

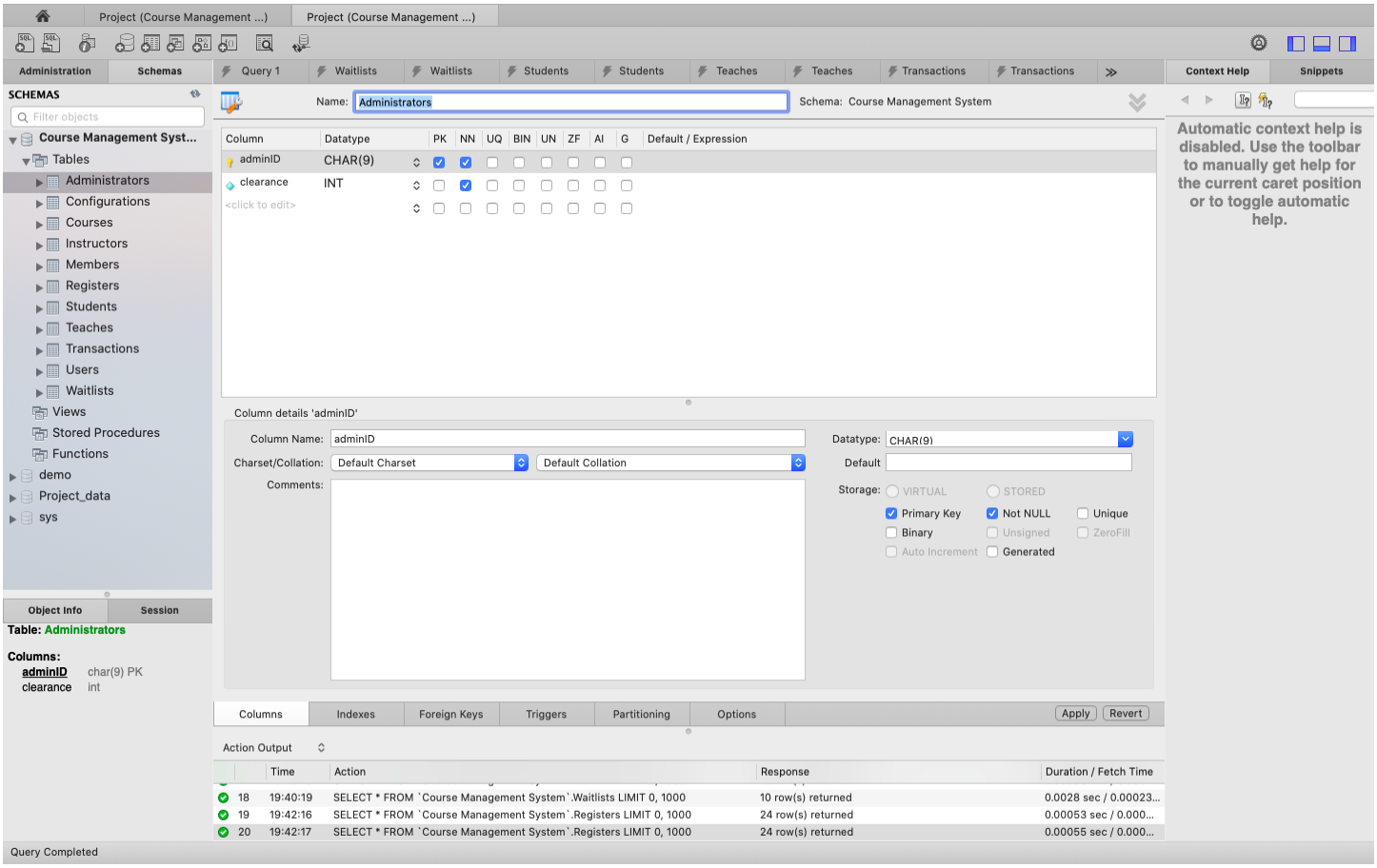
Registers(studentID, department, number, configID)
Holds information of course (department, number) and the configuration it is registered for.

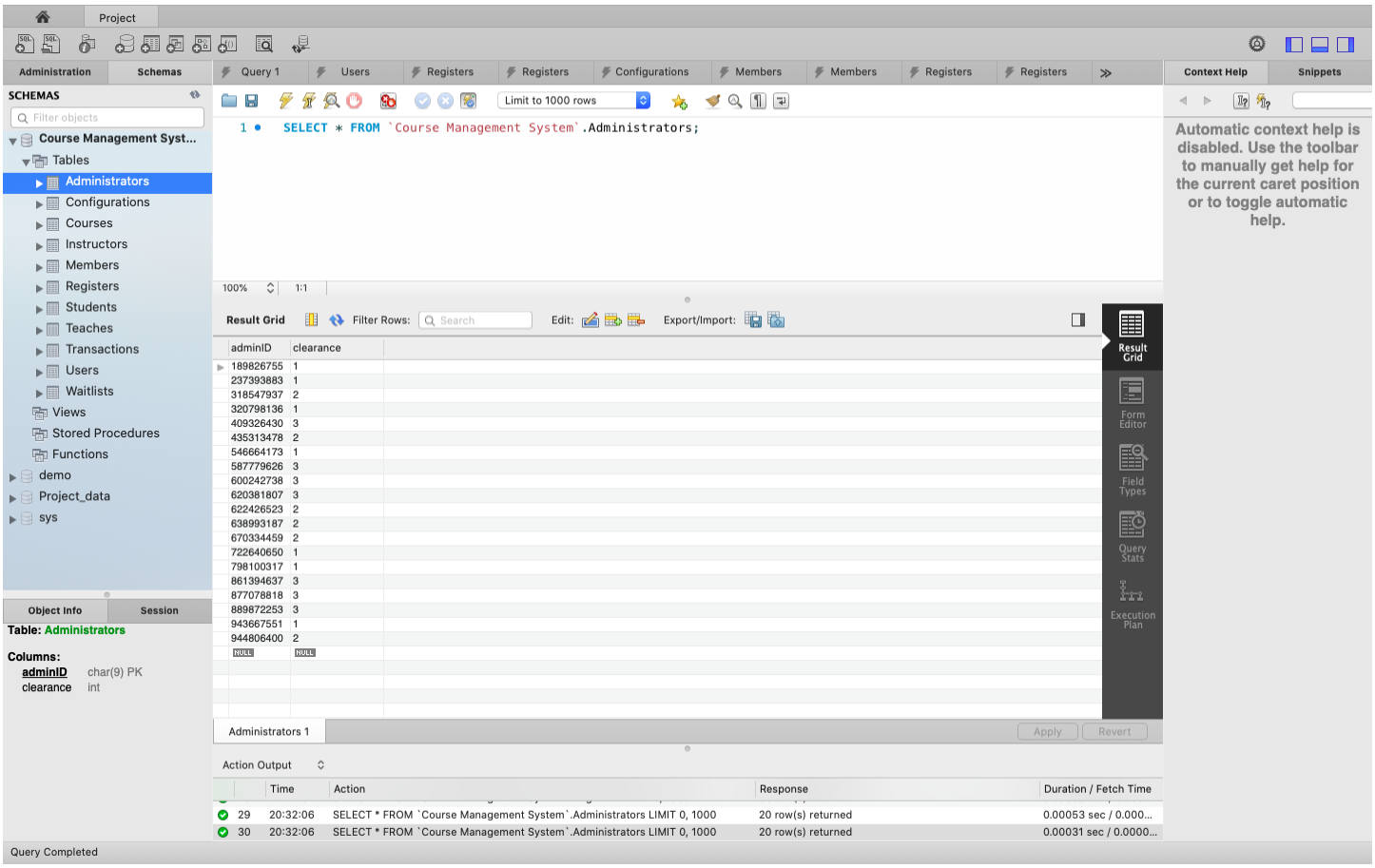
Waitlists(studentID, department, number, configID)
Holds information of course (department, number) and the configuration it is waitlisted for.

Tables According to Schemas and Model of the Data Stored in the Database

Now we will show all the tables in the MySQL Workbench. We will first show the configuration of each table and the datatypes of each attribute. This will show the model of the data stored in the database. Then we will show 15 or more tuples for each table. Then we will show some sample data models in an excel spreadsheet.

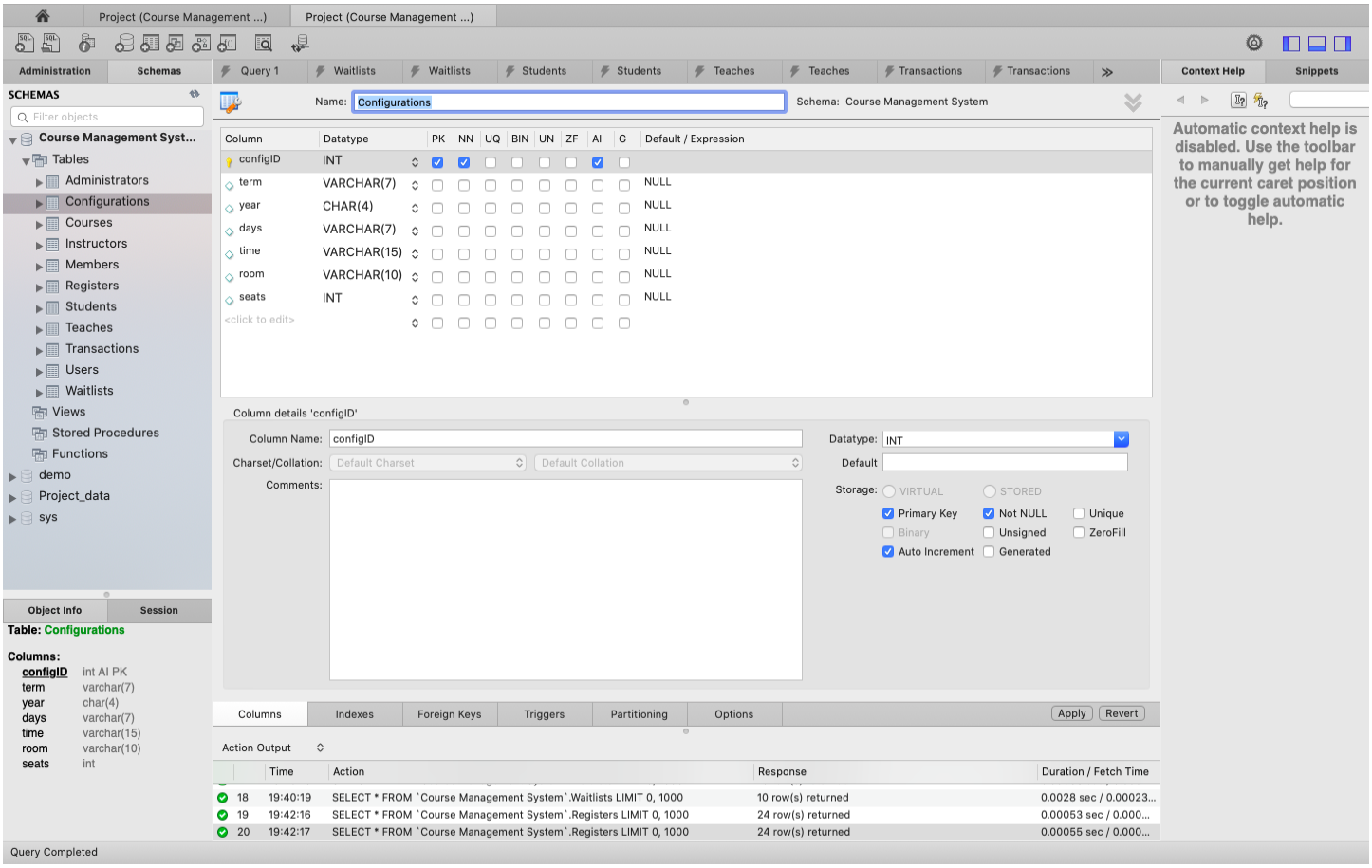
Administrators(<u>adminID</u>, clearance)

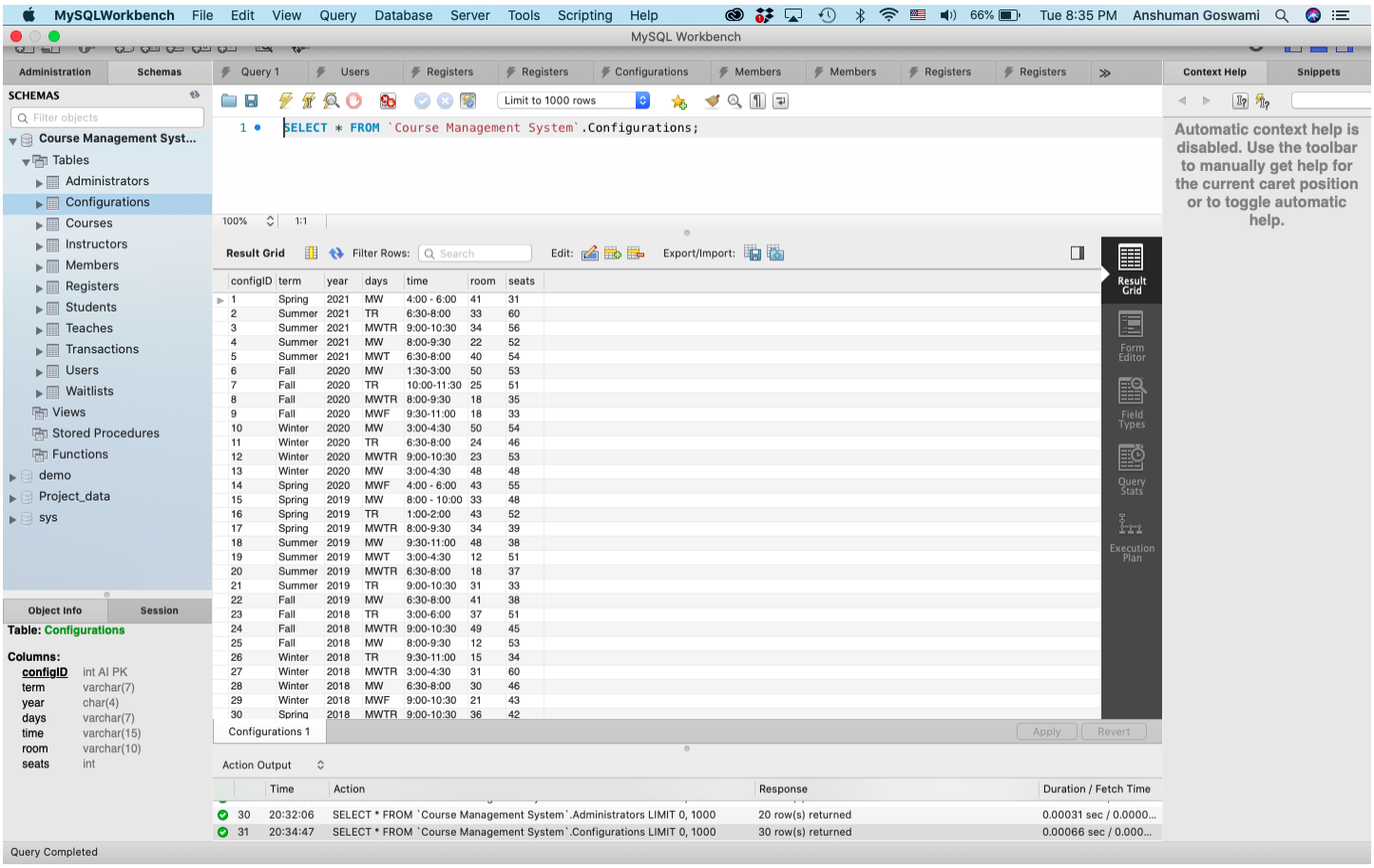




	A	B	C	D
1	Administrators			
2	Tuple Number	adminID	clearance	SQL Statement
3	1	546664173	2	INSERT INTO Administrators VALUES ('546664173', 2);
4	2	620381807	1	INSERT INTO Administrators VALUES ('620381807', 1);
5	3	409326430	2	INSERT INTO Administrators VALUES ('409326430', 2);
6	4	943667551	1	INSERT INTO Administrators VALUES ('943667551', 1);
7	5	237393883	2	INSERT INTO Administrators VALUES ('237393883', 2);
8	6	435313478	1	INSERT INTO Administrators VALUES ('435313478', 1);
9	7	670334459	3	INSERT INTO Administrators VALUES ('670334459', 3);
10	8	600242738	2	INSERT INTO Administrators VALUES ('600242738', 2);
11	9	622426523	1	INSERT INTO Administrators VALUES ('622426523', 1);
12	10	587779626	3	INSERT INTO Administrators VALUES ('587779626', 3);
13	11	189826755	3	INSERT INTO Administrators VALUES ('189826755', 3);
14	12	638993187	1	INSERT INTO Administrators VALUES ('638993187', 1);
15	13	798100317	2	INSERT INTO Administrators VALUES ('798100317', 2);
16	14	944806400	3	INSERT INTO Administrators VALUES ('944806400', 3);
17	15	722640650	3	INSERT INTO Administrators VALUES ('722640650', 3);
18	16	889872253	1	INSERT INTO Administrators VALUES ('889872253', 1);
19	17	861394637	2	INSERT INTO Administrators VALUES ('861394637', 2);
20	18	320798136	2	INSERT INTO Administrators VALUES ('320798136', 2);
21	19	877078818	1	INSERT INTO Administrators VALUES ('877078818', 1);
22	20	318547937	1	INSERT INTO Administrators VALUES ('318547937', 1);

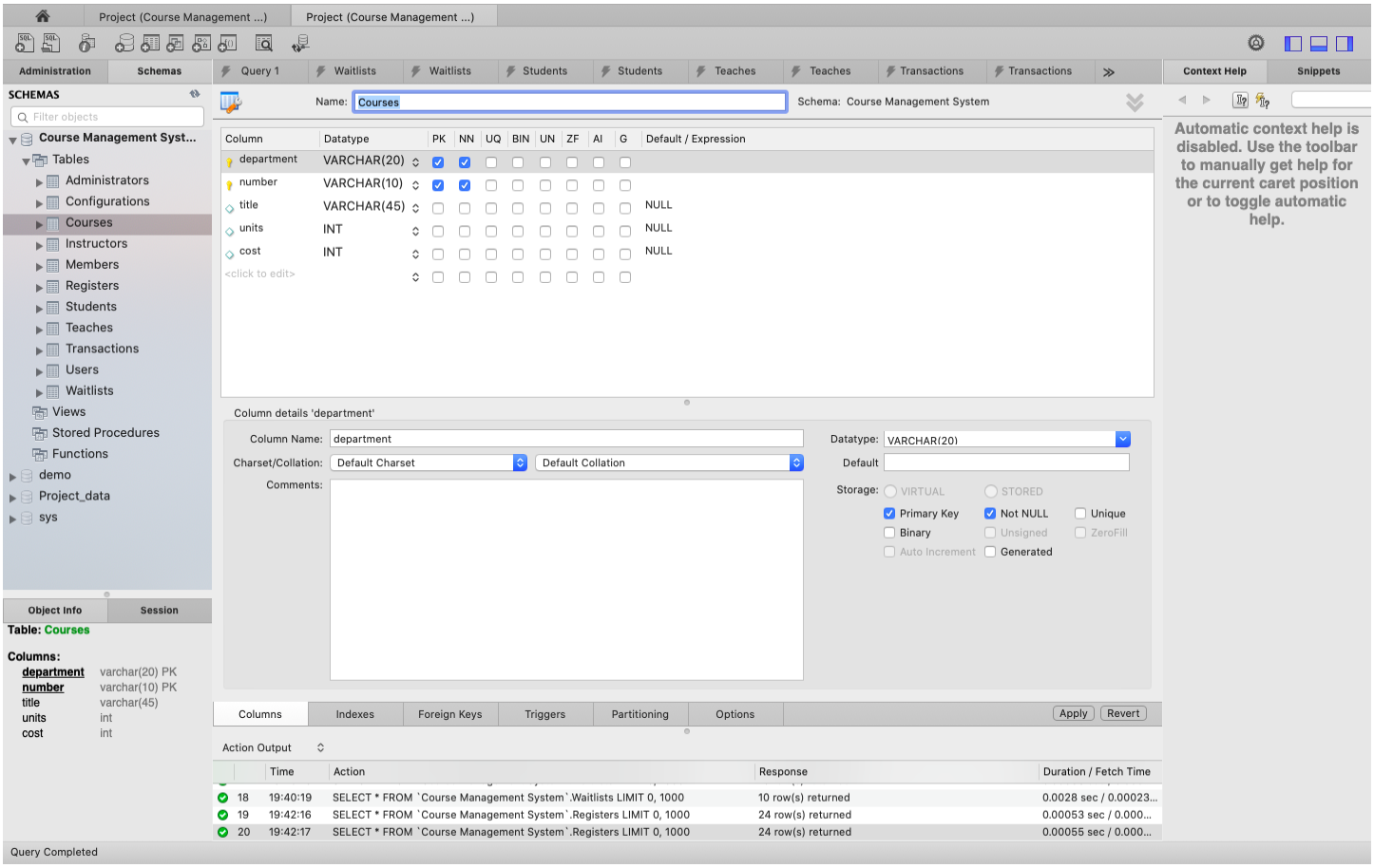
Configurations(configID, term, year, days, time, room, seats)

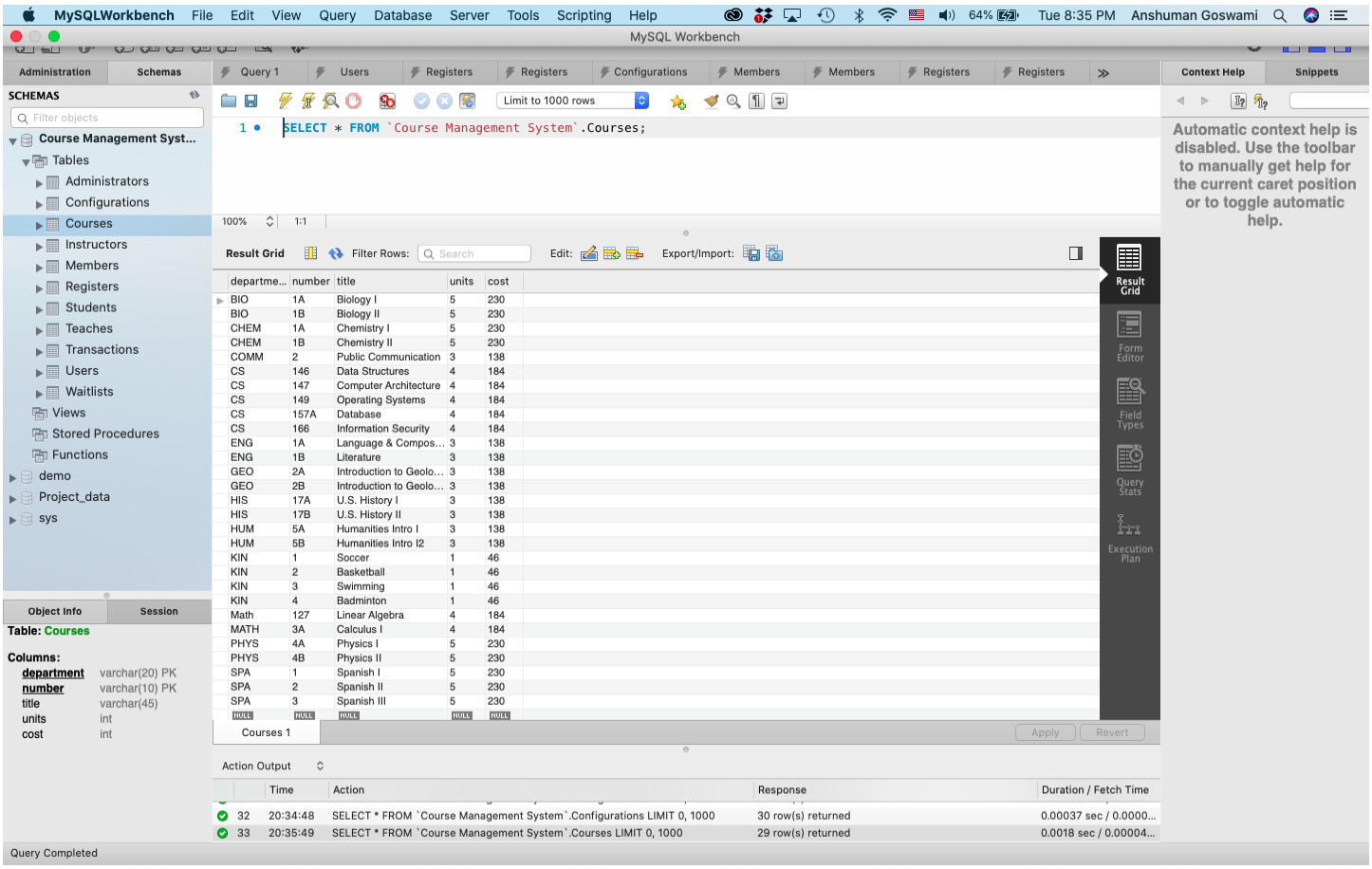




	A	B	C	D	E	F	G	H
1		**Configurations**						
2	ID	Term	Year	Days	Time	Room	Seats	SQL Statement
3	1	Spring	2021	MW	4:00 - 6:00	10	57	INSERT INTO Configurations VALUES(1, 'Spring', '2021', 'MW', '4:00 - 6:00', 10, 57);
4	2	Summer	2021	TR	6:30-8:00	48	42	INSERT INTO Configurations VALUES(2, 'Summer', '2021', 'TR', '6:30-8:00', 48, 42);
5	3	Summer	2021	MWTR	9:00-10:30	39	35	INSERT INTO Configurations VALUES(3, 'Summer', '2021', 'MWTR', '9:00-10:30', 39, 35);
6	4	Summer	2021	MW	8:00-9:30	22	32	INSERT INTO Configurations VALUES(4, 'Summer', '2021', 'MW', '8:00-9:30', 22, 32);
7	5	Summer	2021	MWT	6:30-8:00	49	37	INSERT INTO Configurations VALUES(5, 'Summer', '2021', 'MWT', '6:30-8:00', 49, 37);
8	6	Fall	2020	MW	1:30-3:00	15	53	INSERT INTO Configurations VALUES(6, 'Fall', '2020', 'MW', '1:30-3:00', 15, 53);
9	7	Fall	2020	TR	10:00-11:30	34	60	INSERT INTO Configurations VALUES(7, 'Fall', '2020', 'TR', '10:00-11:30', 34, 60);
10	8	Fall	2020	MWTR	8:00-9:30	44	49	INSERT INTO Configurations VALUES(8, 'Fall', '2020', 'MWTR', '8:00-9:30', 44, 49);
11	9	Fall	2020	MWF	9:30-11:00	21	40	INSERT INTO Configurations VALUES(9, 'Fall', '2020', 'MWF', '9:30-11:00', 21, 40);
12	10	Winter	2020	MW	3:00-4:30	41	55	INSERT INTO Configurations VALUES(10, 'Winter', '2020', 'MW', '3:00-4:30', 41, 55);
13	11	Winter	2020	TR	6:30-8:00	45	36	INSERT INTO Configurations VALUES(11, 'Winter', '2020', 'TR', '6:30-8:00', 45, 36);
14	12	Winter	2020	MWTR	9:00-10:30	39	44	INSERT INTO Configurations VALUES(12, 'Winter', '2020', 'MWTR', '9:00-10:30', 39, 44);
15	13	Winter	2020	MW	3:00-4:30	48	31	INSERT INTO Configurations VALUES(13, 'Winter', '2020', 'MW', '3:00-4:30', 48, 31);
16	14	Spring	2020	MWF	4:00 - 6:00	45	52	INSERT INTO Configurations VALUES(14, 'Spring', '2020', 'MWF', '4:00 - 6:00', 45, 52);
17	15	Spring	2019	MW	8:00 - 10:00	50	60	INSERT INTO Configurations VALUES(15, 'Spring', '2019', 'MW', '8:00 - 10:00', 50, 60);
18	16	Spring	2019	TR	1:00-2:00	48	60	INSERT INTO Configurations VALUES(16, 'Spring', '2019', 'TR', '1:00-2:00', 48, 60);
19	17	Spring	2019	MWTR	8:00-9:30	16	33	INSERT INTO Configurations VALUES(17, 'Spring', '2019', 'MWTR', '8:00-9:30', 16, 33);
20	18	Summer	2019	MW	9:30-11:00	16	58	INSERT INTO Configurations VALUES(18, 'Summer', '2019', 'MW', '9:30-11:00', 16, 58);
21	19	Summer	2019	MWT	3:00-4:30	14	39	INSERT INTO Configurations VALUES(19, 'Summer', '2019', 'MWT', '3:00-4:30', 14, 39);
22	20	Summer	2019	MWTR	6:30-8:00	27	60	INSERT INTO Configurations VALUES(20, 'Summer', '2019', 'MWTR', '6:30-8:00', 27, 60);
23	21	Summer	2019	TR	9:00-10:30	15	32	INSERT INTO Configurations VALUES(21, 'Summer', '2019', 'TR', '9:00-10:30', 15, 32);
24	22	Fall	2019	MW	6:30-8:00	47	41	INSERT INTO Configurations VALUES(22, 'Fall', '2019', 'MW', '6:30-8:00', 47, 41);
25	23	Fall	2018	TR	3:00-6:00	18	30	INSERT INTO Configurations VALUES(23, 'Fall', '2018', 'TR', '3:00-6:00', 18, 30);
26	24	Fall	2018	MWTR	9:00-10:30	23	38	INSERT INTO Configurations VALUES(24, 'Fall', '2018', 'MWTR', '9:00-10:30', 23, 38);
27	25	Fall	2018	MW	8:00-9:30	48	35	INSERT INTO Configurations VALUES(25, 'Fall', '2018', 'MW', '8:00-9:30', 48, 35);
28	26	Winter	2018	TR	9:30-11:00	29	41	INSERT INTO Configurations VALUES(26, 'Winter', '2018', 'TR', '9:30-11:00', 29, 41);
29	27	Winter	2018	MWTR	3:00-4:30	36	53	INSERT INTO Configurations VALUES(27, 'Winter', '2018', 'MWTR', '3:00-4:30', 36, 53);
30	28	Winter	2018	MW	6:30-8:00	18	59	INSERT INTO Configurations VALUES(28, 'Winter', '2018', 'MW', '6:30-8:00', 18, 59);
31	29	Winter	2018	MWF	9:00-10:30	50	44	INSERT INTO Configurations VALUES(29, 'Winter', '2018', 'MWF', '9:00-10:30', 50, 44);
32	30	Spring	2018	MWTR	9:00-10:30	41	54	INSERT INTO Configurations VALUES(30, 'Spring', '2018', 'MWTR', '9:00-10:30', 41, 54);

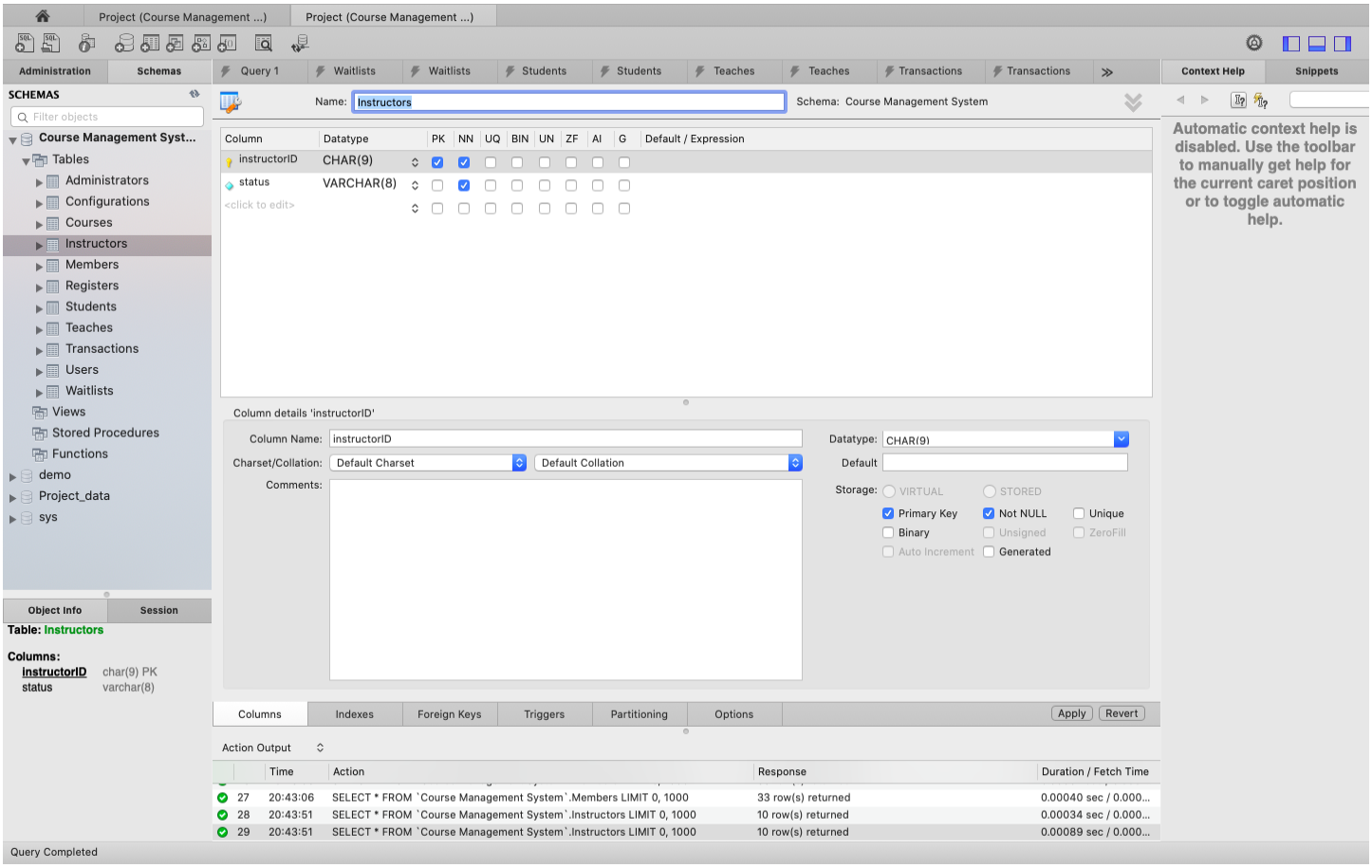
Courses(department, number, title, units, cost)

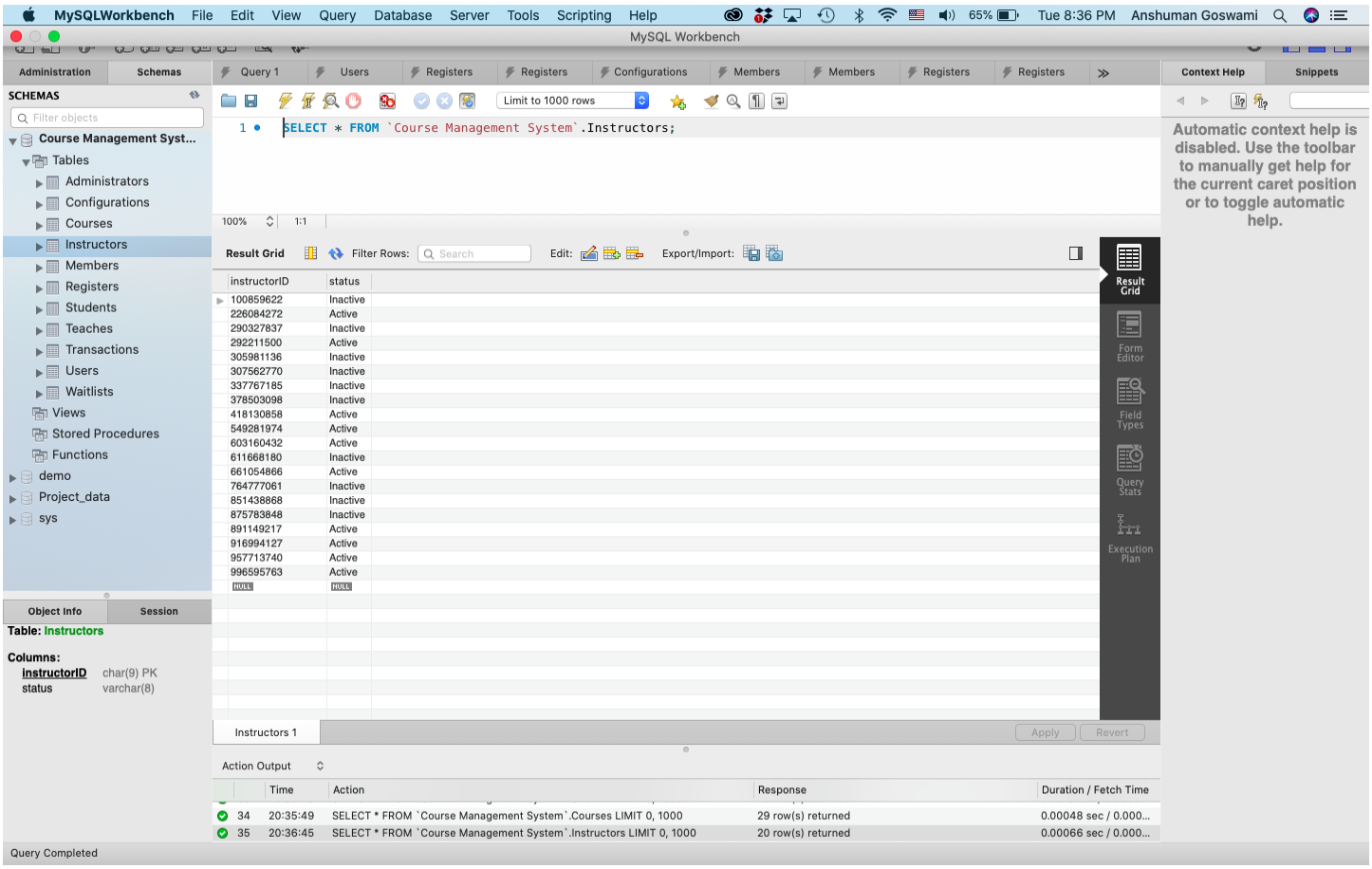




	A	B	C	D	E	F	G
2		Department	Number	Title	Units	Cost	Insert Statement
3	1	Math	127	Linear Algebra	4	184	INSERT INTO Courses VALUES ('Math', '127', 'Linear Algebra', 4, 184);
4	2	MATH	3A	Calculus I	4	184	INSERT INTO Courses VALUES ('MATH', '3A', 'Calculus I', 4, 184);
5	3	MATH	3B	Calculus II	4	184	INSERT INTO Courses VALUES ('MATH', '3B', 'Calculus II', 4, 184);
6	4	ENG	1A	Language & Composition	3	138	INSERT INTO Courses VALUES ('ENG', '1A', 'Language & Composition', 3, 138);
7	5	ENG	1B	Literature	3	138	INSERT INTO Courses VALUES ('ENG', '1B', 'Literature', 3, 138);
8	6	COMM	2	Public Communication	3	138	INSERT INTO Courses VALUES ('COMM', '2', 'Public Communication', 3, 138);
9	7	BIO	1A	Biology I	5	230	INSERT INTO Courses VALUES ('BIO', '1A', 'Biology I', 5, 230);
10	8	BIO	1B	Biology II	5	230	INSERT INTO Courses VALUES ('BIO', '1B', 'Biology II', 5, 230);
11	9	PHYS	4A	Physics I	5	230	INSERT INTO Courses VALUES ('PHYS', '4A', 'Physics I', 5, 230);
12	10	PHYS	4B	Physics II	5	230	INSERT INTO Courses VALUES ('PHYS', '4B', 'Physics II', 5, 230);
13	11	CHEM	1A	Chemistry I	5	230	INSERT INTO Courses VALUES ('CHEM', '1A', 'Chemistry I', 5, 230);
14	12	CHEM	1B	Chemistry II	5	230	INSERT INTO Courses VALUES ('CHEM', '1B', 'Chemistry II', 5, 230);
15	13	CS	157A	Database	4	184	INSERT INTO Courses VALUES ('CS', '157A', 'Database', 4, 184);
16	14	CS	149	Operating Systems	4	184	INSERT INTO Courses VALUES ('CS', '149', 'Operating Systems', 4, 184);
17	15	CS	146	Data Structures	4	184	INSERT INTO Courses VALUES ('CS', '146', 'Data Structures', 4, 184);
18	16	CS	147	Computer Architecture	4	184	INSERT INTO Courses VALUES ('CS', '147', 'Computer Architecture', 4, 184);
19	17	CS	166	Information Security	4	184	INSERT INTO Courses VALUES ('CS', '166', 'Information Security', 4, 184);
20	18	SPA	1	Spanish I	5	230	INSERT INTO Courses VALUES ('SPA', '1', 'Spanish I', 5, 230);
21	19	SPA	2	Spanish II	5	230	INSERT INTO Courses VALUES ('SPA', '2', 'Spanish II', 5, 230);
22	20	SPA	3	Spanish III	5	230	INSERT INTO Courses VALUES ('SPA', '3', 'Spanish III', 5, 230);
23	21	HIS	17A	U.S. History I	3	138	INSERT INTO Courses VALUES ('HIS', '17A', 'U.S. History I', 3, 138);
24	22	HIS	17B	U.S. History II	3	138	INSERT INTO Courses VALUES ('HIS', '17B', 'U.S. History II', 3, 138);
25	23	GEO	2A	Introduction to Geology I	3	138	INSERT INTO Courses VALUES ('GEO', '2A', 'Introduction to Geology I', 3, 138);
26	24	GEO	2B	Introduction to Geology II	3	138	INSERT INTO Courses VALUES ('GEO', '2B', 'Introduction to Geology II', 3, 138);
27	25	HUM	5A	Humanities Intro I	3	138	INSERT INTO Courses VALUES ('HUM', '5A', 'Humanities Intro I', 3, 138);
28	26	HUM	5B	Humanities Intro I2	3	138	INSERT INTO Courses VALUES ('HUM', '5B', 'Humanities Intro I2', 3, 138);
29	27	KIN	1	Soccer	1	46	INSERT INTO Courses VALUES ('KIN', '1', 'Soccer', 1, 46);
30	28	KIN	2	Basketball	1	46	INSERT INTO Courses VALUES ('KIN', '2', 'Basketball', 1, 46);
31	29	KIN	3	Swimming	1	46	INSERT INTO Courses VALUES ('KIN', '3', 'Swimming', 1, 46);
32	30	KIN	4	Badminton	1	46	INSERT INTO Courses VALUES ('KIN', '4', 'Badminton', 1, 46);

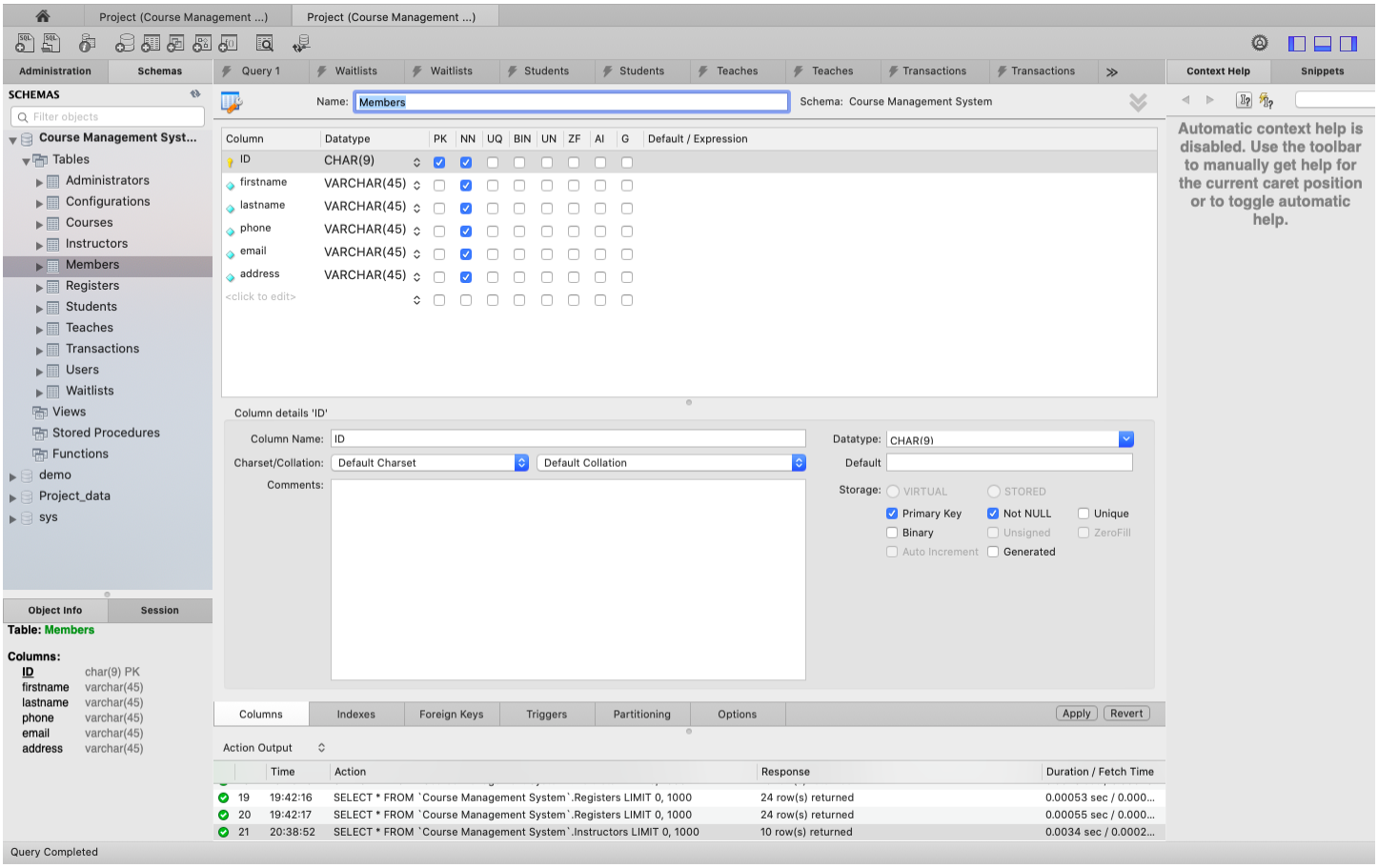
Instructors(instructorID, status)

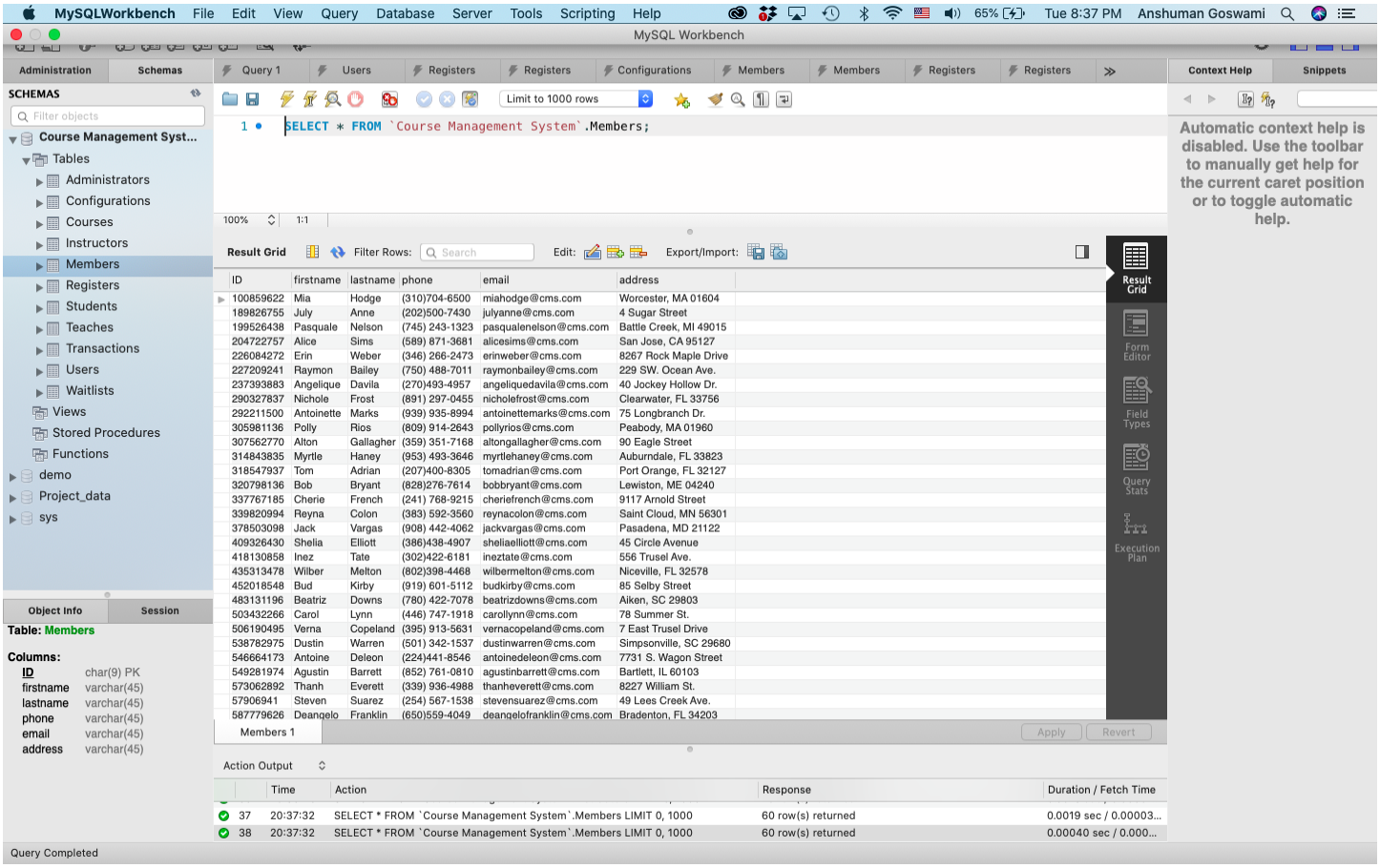




	A	B	C	D
1	Instructors			
2	Tuple Number	instructorID	status	SQL Statement
3	1	226084272	Active	INSERT INTO Instructors VALUES ('226084272', 'Active');
4	2	378503098	Inactive	INSERT INTO Instructors VALUES ('378503098', 'Inactive');
5	3	307562770	Inactive	INSERT INTO Instructors VALUES ('307562770', 'Inactive');
6	4	549281974	Active	INSERT INTO Instructors VALUES ('549281974', 'Active');
7	5	764777061	Inactive	INSERT INTO Instructors VALUES ('764777061', 'Inactive');
8	6	305981136	Inactive	INSERT INTO Instructors VALUES ('305981136', 'Inactive');
9	7	916994127	Active	INSERT INTO Instructors VALUES ('916994127', 'Active');
10	8	290327837	Inactive	INSERT INTO Instructors VALUES ('290327837', 'Inactive');
11	9	292211500	Active	INSERT INTO Instructors VALUES ('292211500', 'Active');
12	10	337767185	Inactive	INSERT INTO Instructors VALUES ('337767185', 'Inactive');
13	11	891149217	Active	INSERT INTO Instructors VALUES ('891149217', 'Active');
14	12	418130858	Active	INSERT INTO Instructors VALUES ('418130858', 'Active');
15	13	100859622	Inactive	INSERT INTO Instructors VALUES ('100859622', 'Inactive');
16	14	996595763	Active	INSERT INTO Instructors VALUES ('996595763', 'Active');
17	15	851438868	Inactive	INSERT INTO Instructors VALUES ('851438868', 'Inactive');
18	16	603160432	Active	INSERT INTO Instructors VALUES ('603160432', 'Active');
19	17	875783848	Inactive	INSERT INTO Instructors VALUES ('875783848', 'Inactive');
20	18	661054866	Active	INSERT INTO Instructors VALUES ('661054866', 'Active');
21	19	611668180	Inactive	INSERT INTO Instructors VALUES ('611668180', 'Inactive');
22	20	957713740	Active	INSERT INTO Instructors VALUES ('957713740', 'Active');

Members(ID, firstname, lastname, phone, email, address)

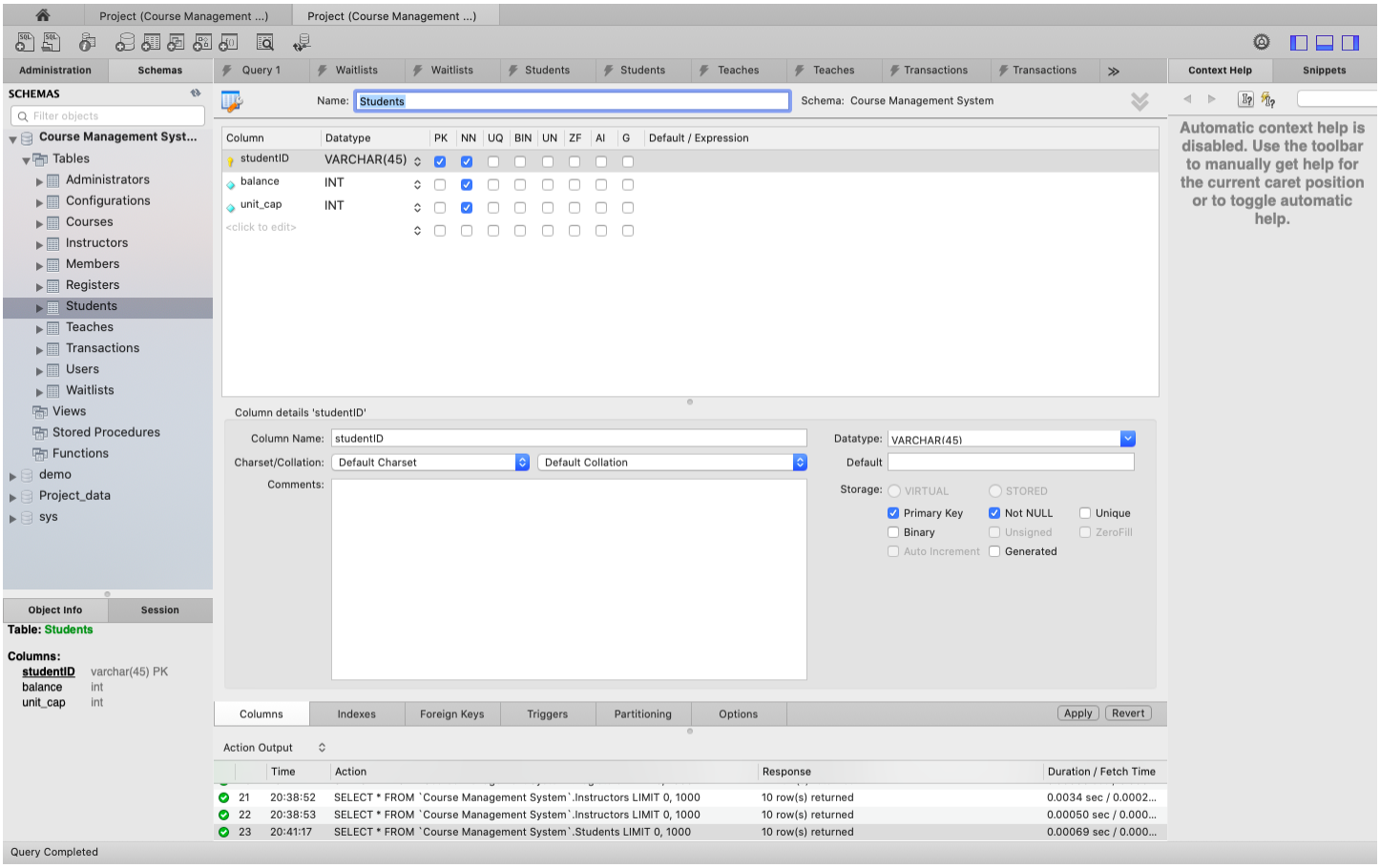


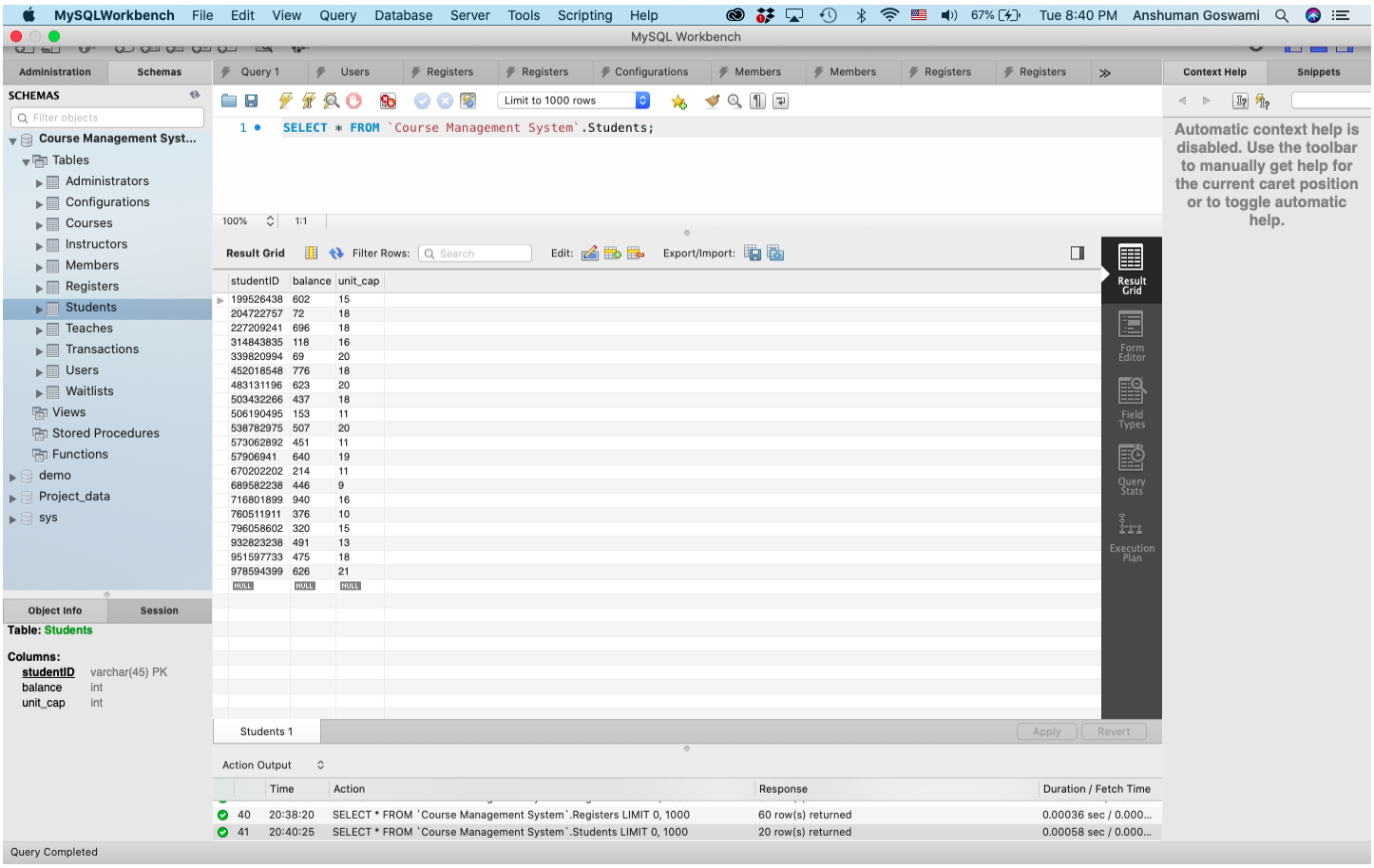


	A	B	C	D	E	F	G	H	I	J
1	Members									
2	Tuple Number	ID	Firstname	Lastname	Phone	Email	Address	SQL Statement		
3	1	199526438	Pasquale	Nelson	(745) 243-1323	pasqualenelson@cms.com	Battle Creek, MI 49015	INSERT INTO Members VALUES ('199526438', 'Pasquale', 'Nelson', '(745) 243-1323', 'pasqualenelson@cms.com', 'Battle Creek, MI 49015');		Student
4	2	951597733	Lupe	Juarez	(816) 842-3578	lupejuarez@cms.com	647 Vale Street	INSERT INTO Members VALUES ('951597733', 'Lupe', 'Juarez', '(816) 842-3578', 'lupejuarez@cms.com', '647 Vale Street');		Student
5	3	483131196	Beatriz	Downs	(780) 422-7078	beatrizdowns@cms.com	Aiken, SC 29803	INSERT INTO Members VALUES ('483131196', 'Beatriz', 'Downs', '(780) 422-7078', 'beatrizdowns@cms.com', 'Aiken, SC 29803');		Student
6	4	503432266	Carol	Lynn	(446) 747-1918	carollynn@cms.com	78 Summer St.	INSERT INTO Members VALUES ('503432266', 'Carol', 'Lynn', '(446) 747-1918', 'carollynn@cms.com', '78 Summer St.');		Student
7	5	314843835	Myrtle	Haney	(953) 493-3646	myrtlehaney@cms.com	Auburndale, FL 33823	INSERT INTO Members VALUES ('314843835', 'Myrtle', 'Haney', '(953) 493-3646', 'myrtlehaney@cms.com', 'Auburndale, FL 33823');		Student
8	6	760511911	Luciano	Smith	(592) 205-4019	lucianosmith@cms.com	251 San Carlos Ave.	INSERT INTO Members VALUES ('760511911', 'Luciano', 'Smith', '(592) 205-4019', 'lucianosmith@cms.com', '251 San Carlos Ave.');		Student
9	7	796058602	Miles	Larson	(898) 723-7801	mileslarson@cms.com	South Portland, ME 0410(	INSERT INTO Members VALUES ('796058602', 'Miles', 'Larson', '(898) 723-7801', 'mileslarson@cms.com', 'South Portland, ME 04106');		Student
10	8	57906941	Steven	Suarez	(254) 567-1538	stevensuarez@cms.com	49 Lees Creek Ave.	INSERT INTO Members VALUES ('57906941', 'Steven', 'Suarez', '(254) 567-1538', 'stevensuarez@cms.com', '49 Lees Creek Ave.');		Student
11	9	538782975	Dustin	Warren	(501) 342-1537	dustinwarren@cms.com	Simpsonville, SC 29680	INSERT INTO Members VALUES ('538782975', 'Dustin', 'Warren', '(501) 342-1537', 'dustinwarren@cms.com', 'Simpsonville, SC 29680');		Student
12	10	670202202	Mose	Mcdonald	(627) 579-8894	mosemcdonald@cms.com	254 Littleton Drive	INSERT INTO Members VALUES ('670202202', 'Mose', 'Mcdonald', '(627) 579-8894', 'mosemcdonald@cms.com', '254 Littleton Drive');		Student
13	11	339820994	Reyna	Colon	(383) 592-3560	reynacolon@cms.com	Saint Cloud, MN 56301	INSERT INTO Members VALUES ('339820994', 'Reyna', 'Colon', '(383) 592-3560', 'reynacolon@cms.com', 'Saint Cloud, MN 56301');		Student
14	12	978594399	Gina	Hernandez	(454) 582-4008	ginahernandez@cms.com	6 High Point St.	INSERT INTO Members VALUES ('978594399', 'Gina', 'Hernandez', '(454) 582-4008', 'ginahernandez@cms.com', '6 High Point St.');		Student
15	13	689582238	Dana	Conway	(583) 630-1598	danaconway@cms.com	Shirley, NY 11967	INSERT INTO Members VALUES ('689582238', 'Dana', 'Conway', '(583) 630-1598', 'danaconway@cms.com', 'Shirley, NY 11967');		Student
16	14	506190495	Verna	Copeland	(395) 913-5631	vernacopeland@cms.com	7 East Trusel Drive	INSERT INTO Members VALUES ('506190495', 'Verna', 'Copeland', '(395) 913-5631', 'vernacopeland@cms.com', '7 East Trusel Drive');		Student
17	15	932823238	Jonas	Padilla	(605) 452-4957	jonaspadilla@cms.com	Klamath Falls, OR 97603	INSERT INTO Members VALUES ('932823238', 'Jonas', 'Padilla', '(605) 452-4957', 'jonaspadilla@cms.com', 'Klamath Falls, OR 97603');		Student
18	16	452018548	Bud	Kirby	(919) 601-5112	budkirby@cms.com	85 Selby Street	INSERT INTO Members VALUES ('452018548', 'Bud', 'Kirby', '(919) 601-5112', 'budkirby@cms.com', '85 Selby Street');		Student
19	17	716801899	Roscoe	Richard	(303) 819-2145	roscoerichard@cms.com	Bardstown, KY 40004	INSERT INTO Members VALUES ('716801899', 'Roscoe', 'Richard', '(303) 819-2145', 'roscoerichard@cms.com', 'Bardstown, KY 40004');		Student
20	18	573062892	Thanh	Everett	(339) 936-4988	thanheverett@cms.com	8227 William St.	INSERT INTO Members VALUES ('573062892', 'Thanh', 'Everett', '(339) 936-4988', 'thanheverett@cms.com', '8227 William St.');		Student
21	19	204722757	Alice	Sims	(589) 871-3681	alicesims@cms.com	San Jose, CA 95127	INSERT INTO Members VALUES ('204722757', 'Alice', 'Sims', '(589) 871-3681', 'alicesims@cms.com', 'San Jose, CA 95127');		Student
22	20	227209241	Raymon	Bailey	(750) 488-7011	raymonbailey@cms.com	229 SW. Ocean Ave.	INSERT INTO Members VALUES ('227209241', 'Raymon', 'Bailey', '(750) 488-7011', 'raymonbailey@cms.com', '229 SW. Ocean Ave.');		Student
24	21	226084272	Erin	Weber	(346) 266-2473	erinweber@cms.com	8267 Rock Maple Drive	INSERT INTO Members VALUES ('226084272', 'Erin', 'Weber', '(346) 266-2473', 'erinweber@cms.com', '8267 Rock Maple Drive');		Instructor
25	22	378503098	Jack	Vargas	(908) 442-4062	jackvargas@cms.com	Pasadena, MD 21122	INSERT INTO Members VALUES ('378503098', 'Jack', 'Vargas', '(908) 442-4062', 'jackvargas@cms.com', 'Pasadena, MD 21122');		Instructor
26	23	307562770	Alton	Gallagher	(359) 351-7168	altongallagher@cms.com	90 Eagle Street	INSERT INTO Members VALUES ('307562770', 'Alton', 'Gallagher', '(359) 351-7168', 'altongallagher@cms.com', '90 Eagle Street');		Instructor
27	24	549281974	Agustin	Barrett	(852) 761-0810	agustinbarrett@cms.com	Bartlett, IL 60103	INSERT INTO Members VALUES ('549281974', 'Agustin', 'Barrett', '(852) 761-0810', 'agustinbarrett@cms.com', 'Bartlett, IL 60103');		Instructor
28	25	764777061	Miguel	Mathews	(841) 394-2348	miguelmathews@cms.com	63 Purple Finch Drive	INSERT INTO Members VALUES ('764777061', 'Miguel', 'Mathews', '(841) 394-2348', 'miguelmathews@cms.com', '63 Purple Finch Drive');		Instructor
29	26	305981136	Polly	Rios	(809) 914-2643	pollyrios@cms.com	Peabody, MA 01960	INSERT INTO Members VALUES ('305981136', 'Polly', 'Rios', '(809) 914-2643', 'pollyrios@cms.com', 'Peabody, MA 01960');		Instructor
30	27	916994127	Quinn	Warner	(385) 289-9498	quinnwarner@cms.com	12 N. Oak Circle	INSERT INTO Members VALUES ('916994127', 'Quinn', 'Warner', '(385) 289-9498', 'quinnwarner@cms.com', '12 N. Oak Circle');		Instructor
31	28	290327837	Nichole	Frost	(891) 297-0455	nicholefrost@cms.com	Clearwater, FL 33756	INSERT INTO Members VALUES ('290327837', 'Nichole', 'Frost', '(891) 297-0455', 'nicholefrost@cms.com', 'Clearwater, FL 33756');		Instructor
32	29	292211500	Antoinette	Marks	(939) 935-8994	antoinettemarks@cms.com	75 Longbranch Dr.	INSERT INTO Members VALUES ('292211500', 'Antoinette', 'Marks', '(939) 935-8994', 'antoinettemarks@cms.com', '75 Longbranch Dr.');		Instructor
33	30	337767185	Cherie	French	(241) 768-9215	cheriefrench@cms.com	9117 Arnold Street	INSERT INTO Members VALUES ('337767185', 'Cherie', 'French', '(241) 768-9215', 'cheriefrench@cms.com', '9117 Arnold Street');		Instructor
34	31	891149217	Catalina	Schaefer	(575)208-7495	catalinaschaefer@cms.com	Lilburn, GA 30047	INSERT INTO Members VALUES ('891149217', 'Catalina', 'Schaefer', '(575)208-7495', 'catalinaschaefer@cms.com', 'Lilburn, GA 30047');		Instructor
35	32	418130858	Inez	Tate	(302)422-6181	ineztate@cms.com	556 Trusel Ave.	INSERT INTO Members VALUES ('418130858', 'Inez', 'Tate', '(302)422-6181', 'ineztate@cms.com', '556 Trusel Ave.');		Instructor
36	33	100859622	Mia	Hodge	(310)704-6500	miahodge@cms.com	Worcester, MA 01604	INSERT INTO Members VALUES ('100859622', 'Mia', 'Hodge', '(310)704-6500', 'miahodge@cms.com', 'Worcester, MA 01604');		Instructor
37	34	996595763	Tamara	Gibson	(289)276-8056	tamaragibson@cms.com	182 Sherman Ave.	INSERT INTO Members VALUES ('996595763', 'Tamara', 'Gibson', '(289)276-8056', 'tamaragibson@cms.com', '182 Sherman Ave.');		Instructor
38	35	851438868	Clara	Bradford	(304)507-6675	clarabradford@cms.com	Sioux Falls, SD 57103	INSERT INTO Members VALUES ('851438868', 'Clara', 'Bradford', '(304)507-6675', 'clarabradford@cms.com', 'Sioux Falls, SD 57103');		Instructor
39	36	603160432	Normand	Sheppard	(346)932-8180	normandsheppard@cms.com	94 Glen Ridge Drive	INSERT INTO Members VALUES ('603160432', 'Normand', 'Sheppard', '(346)932-8180', 'normandsheppard@cms.com', '94 Glen Ridge Drive');		Instructor
40	37	875783848	Allen	Zuniga	(671)635-4007	allenzuniga@cms.com	Vernon Hills, IL 60061	INSERT INTO Members VALUES ('875783848', 'Allen', 'Zuniga', '(671)635-4007', 'allenzuniga@cms.com', 'Vernon Hills, IL 60061');		Instructor
41	38	661054866	Wes	Gill	(479)820-5552	wesgill@cms.com	9089 Edgewater Court	INSERT INTO Members VALUES ('661054866', 'Wes', 'Gill', '(479)820-5552', 'wesgill@cms.com', '9089 Edgewater Court');		Instructor
42	39	611668180	Edison	Carter	(614)653-6066	edisoncarter@cms.com	Paterson, NJ 07501	INSERT INTO Members VALUES ('611668180', 'Edison', 'Carter', '(614)653-6066', 'edisoncarter@cms.com', 'Paterson, NJ 07501');		Instructor
43	40	957713740	Sylvia	Fuentes	(331)254-9063	sylviafuentes@cms.com	7890 Cross Road	INSERT INTO Members VALUES ('957713740', 'Sylvia', 'Fuentes', '(331)254-9063', 'sylviafuentes@cms.com', '7890 Cross Road');		Instructor

45	41	546664173	Antoine	Deleon	(224)441-8546	antoinedeleon@cms.com	7731 S. Wagon Street	INSERT INTO Members VALUES ('546664173', 'Antoine', 'Deleon', '(224)441-8546', 'antoinedeleon@cms.com', '7731 S. Wagon Street');	Administrator
46	42	620381807	Jackson	Blankenship	(305)742-8761	jacksonblankenship@cms.co	Bakersfield, CA 93306	INSERT INTO Members VALUES ('620381807', 'Jackson', 'Blankenship', '(305)742-8761', 'jacksonblankenship@cms.com', 'Bakersfield, CA 93306');	Administrator
47	43	409326430	Shelia	Elliott	(386)438-4907	sheliaelliott@cms.com	45 Circle Avenue	INSERT INTO Members VALUES ('409326430', 'Shelia', 'Elliott', '(386)438-4907', 'sheliaelliott@cms.com', '45 Circle Avenue');	Administrator
48	44	943667551	Justine	Mcbride	(607)898-3165	justinemcbride@cms.com	Derby, KS 67037	INSERT INTO Members VALUES ('943667551', 'Justine', 'Mcbride', '(607)898-3165', 'justinemcbride@cms.com', 'Derby, KS 67037');	Administrator
49	45	237393883	Angelique	Davila	(270)493-4957	angeliquedavila@cms.com	40 Jockey Hollow Dr.	INSERT INTO Members VALUES ('237393883', 'Angelique', 'Davila', '(270)493-4957', 'angeliquedavila@cms.com', '40 Jockey Hollow Dr.');	Administrator
50	46	435313478	Wilber	Melton	(802)398-4468	wilbermelton@cms.com	Niceville, FL 32578	INSERT INTO Members VALUES ('435313478', 'Wilber', 'Melton', '(802)398-4468', 'wilbermelton@cms.com', 'Niceville, FL 32578');	Administrator
51	47	670334459	Brendon	Frazier	(205)879-2848	brendonfrazier@cms.com	8527 Madison Lane	INSERT INTO Members VALUES ('670334459', 'Brendon', 'Frazier', '(205)879-2848', 'brendonfrazier@cms.com', '8527 Madison Lane');	Administrator
52	48	600242738	Ward	Benitez	(848)219-2884	wardbenitez@cms.com	Windermere, FL 34786	INSERT INTO Members VALUES ('600242738', 'Ward', 'Benitez', '(848)219-2884', 'wardbenitez@cms.com', 'Windermere, FL 34786');	Administrator
53	49	622426523	Colette	Stark	(832)665-2899	colettestark@cms.com	95 Gulf Drive	INSERT INTO Members VALUES ('622426523', 'Colette', 'Stark', '(832)665-2899', 'colettestark@cms.com', '95 Gulf Drive');	Administrator
54	50	587779626	Deangelo	Franklin	(650)559-4049	deangelofranklin@cms.com	Bradenton, FL 34203	INSERT INTO Members VALUES ('587779626', 'Deangelo', 'Franklin', '(650)559-4049', 'deangelofranklin@cms.com', 'Bradenton, FL 34203');	Administrator
55	51	189826755	July	Anne	(202)500-7430	julyanne@cms.com	4 Sugar Street	INSERT INTO Members VALUES ('189826755', 'July', 'Anne', '(202)500-7430', 'julyanne@cms.com', '4 Sugar Street');	Administrator
56	52	638993187	Cary	Lank	(567)200-5875	carylank @cms.com	Warren, MI 48089	INSERT INTO Members VALUES ('638993187', 'Cary', 'Lank ', '(567)200-5875', 'carylank @cms.com', 'Warren, MI 48089');	Administrator
57	53	798100317	Honey	Dent	(305)448-4944	honeydent @cms.com	72 N. Pumpkin Hill St.	INSERT INTO Members VALUES ('798100317', 'Honey', 'Dent ', '(305)448-4944', 'honeydent @cms.com', '72 N. Pumpkin Hill St.');	Administrator
58	54	944806400	Artie	Smoak	(229)496-5839	artiesmoak@cms.com	Victoria, TX 77904	INSERT INTO Members VALUES ('944806400', 'Artie', 'Smoak', '(229)496-5839', 'artiesmoak@cms.com', 'Victoria, TX 77904');	Administrator
59	55	722640650	Jeff	Hanson	(339)224-3622	jeffhanson@cms.com	892 Walt Whitman Dr.	INSERT INTO Members VALUES ('722640650', 'Jeff', 'Hanson', '(339)224-3622', 'jeffhanson@cms.com', '892 Walt Whitman Dr.');	Administrator
60	56	889872253	Bertram	Carlson	(614)341-4812	bertramcarlson@cms.com	Lake Zurich, IL 60047	INSERT INTO Members VALUES ('889872253', 'Bertram', 'Carlson', '(614)341-4812', 'bertramcarlson@cms.com', 'Lake Zurich, IL 60047');	Administrator
61	57	861394637	Sam	Heister	(276)447-3045	samheister@cms.com	258 Kent Drive	INSERT INTO Members VALUES ('861394637', 'Sam', 'Heister', '(276)447-3045', 'samheister@cms.com', '258 Kent Drive');	Administrator
62	58	320798136	Bob	Bryant	(828)276-7614	bobbryant@cms.com	Lewiston, ME 04240	INSERT INTO Members VALUES ('320798136', 'Bob', 'Bryant', '(828)276-7614', 'bobbryant@cms.com', 'Lewiston, ME 04240');	Administrator
63	59	877078818	Hank	Colley	(530)655-4881	hankcolley@cms.com	444 Hartford Street	INSERT INTO Members VALUES ('877078818', 'Hank', 'Colley', '(530)655-4881', 'hankcolley@cms.com', '444 Hartford Street');	Administrator
64	60	318547937	Tom	Adrian	(207)400-8304	tomadrian@cms.com	Port Orange, FL 32127	INSERT INTO Members VALUES ('318547937', 'Tom', 'Adrian', '(207)400-8304', 'tomadrian@cms.com', 'Port Orange, FL 32127');	Administrator

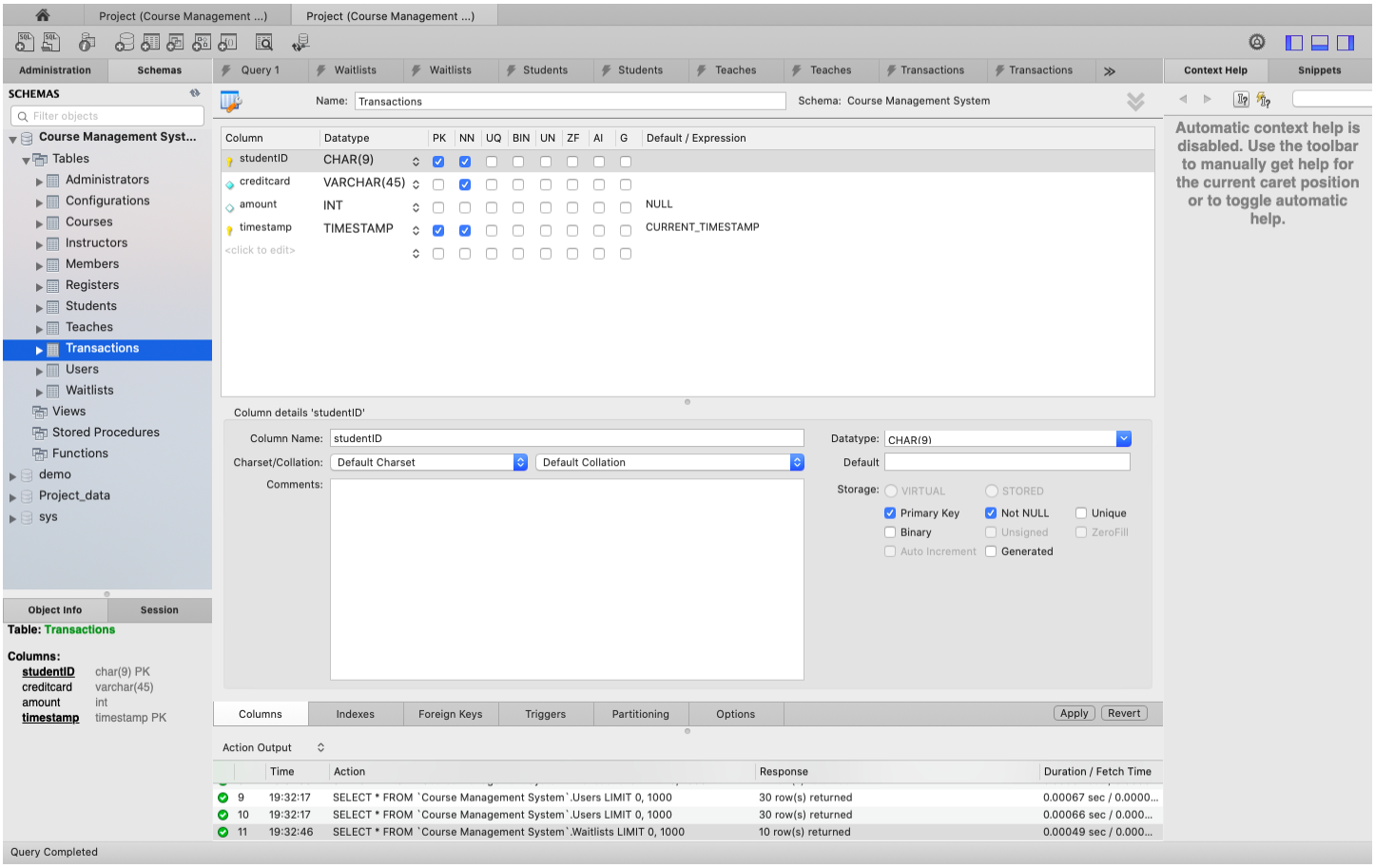
Students(<u>studentID</u>, balance, unit_cap)

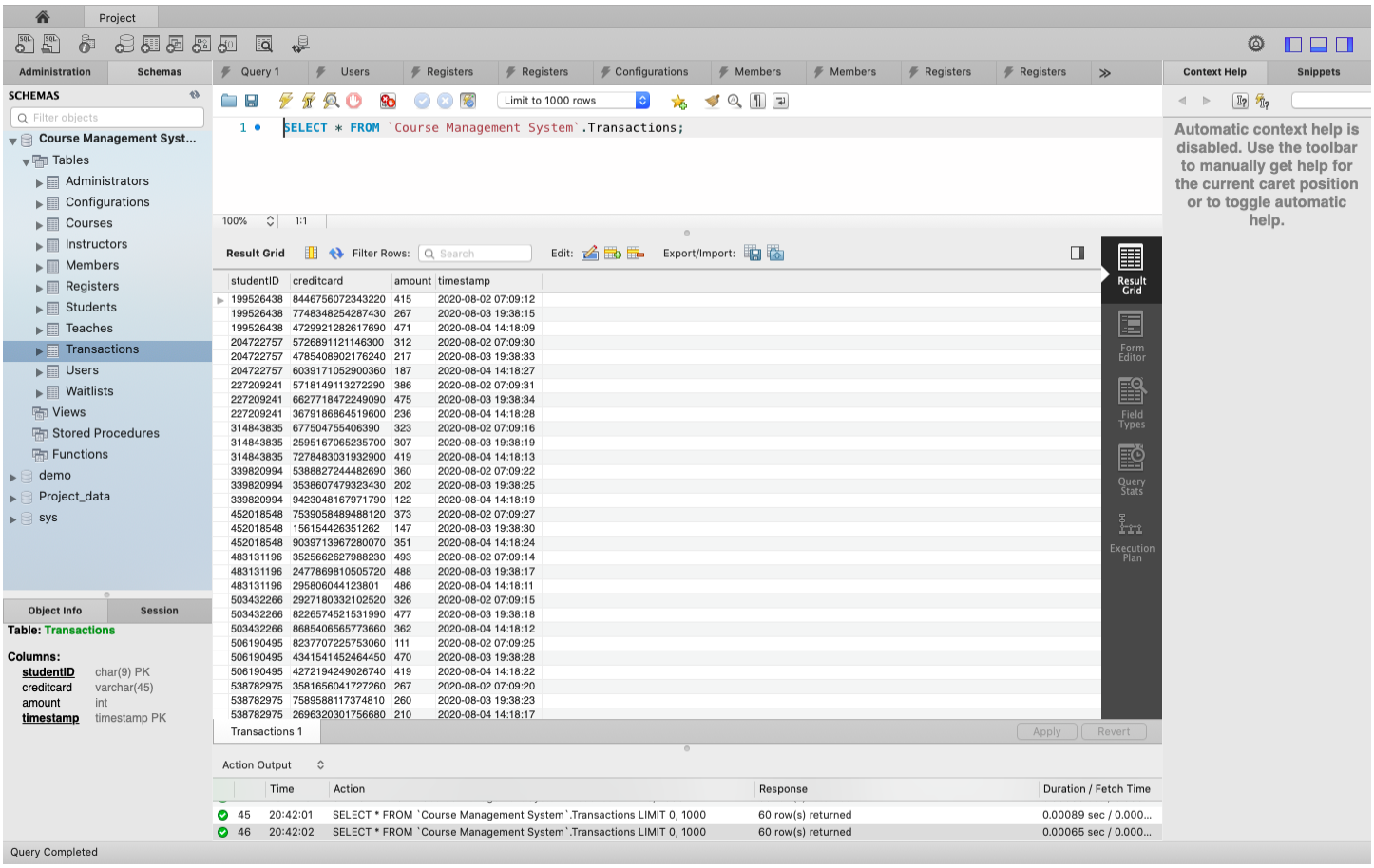




	A	B	C	D	E
1	Students				
2	Tuple Number	studentID	balance	unit_cap	
3	1	199526438	107	18	INSERT INTO Students VALUES ('199526438', 107, 18);
4	2	951597733	474	18	INSERT INTO Students VALUES ('951597733', 474, 18);
5	3	483131196	875	17	INSERT INTO Students VALUES ('483131196', 875, 17);
6	4	503432266	927	11	INSERT INTO Students VALUES ('503432266', 927, 11);
7	5	314843835	282	10	INSERT INTO Students VALUES ('314843835', 282, 10);
8	6	760511911	884	11	INSERT INTO Students VALUES ('760511911', 884, 11);
9	7	796058602	256	21	INSERT INTO Students VALUES ('796058602', 256, 21);
10	8	57906941	575	19	INSERT INTO Students VALUES ('57906941', 575, 19);
11	9	538782975	814	11	INSERT INTO Students VALUES ('538782975', 814, 11);
12	10	670202202	833	16	INSERT INTO Students VALUES ('670202202', 833, 16);
13	11	339820994	449	21	INSERT INTO Students VALUES ('339820994', 449, 21);
14	12	978594399	677	8	INSERT INTO Students VALUES ('978594399', 677, 8);
15	13	689582238	802	18	INSERT INTO Students VALUES ('689582238', 802, 18);
16	14	506190495	940	21	INSERT INTO Students VALUES ('506190495', 940, 21);
17	15	932823238	37	18	INSERT INTO Students VALUES ('932823238', 37, 18);
18	16	452018548	548	19	INSERT INTO Students VALUES ('452018548', 548, 19);
19	17	716801899	143	8	INSERT INTO Students VALUES ('716801899', 143, 8);
20	18	573062892	853	9	INSERT INTO Students VALUES ('573062892', 853, 9);
21	19	204722757	762	16	INSERT INTO Students VALUES ('204722757', 762, 16);
22	20	227209241	534	10	INSERT INTO Students VALUES ('227209241', 534, 10);

Transactions(studentID, creditcard, amount, timestamp)

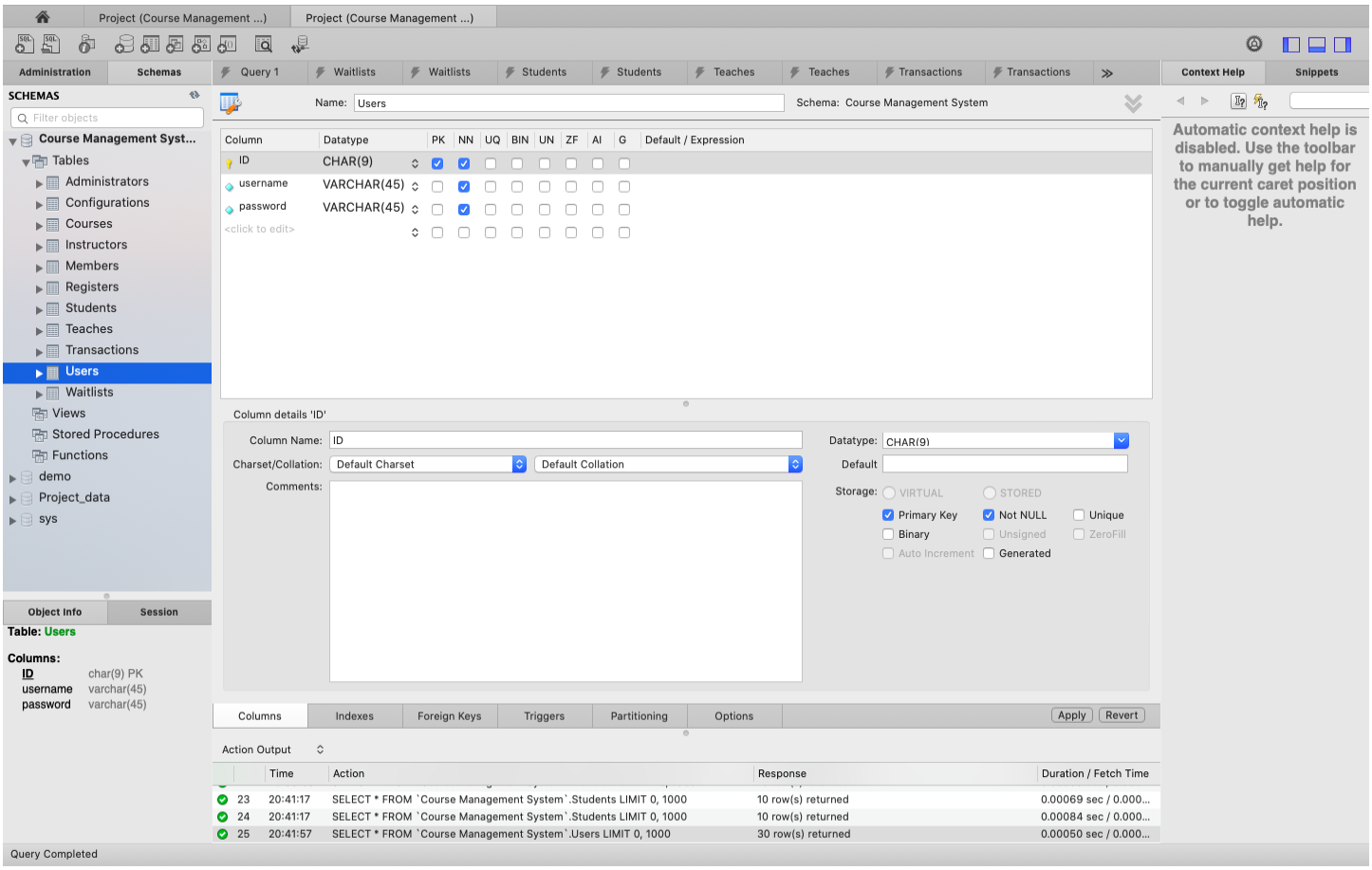




	A	B	C	D	E	F
1	Transactions					
2	Tuple Numb	studentID	creditcard	amount	timestamp	SQL Statement
3	1	199526438	4.72992E+15	23	2020-08-04 14:18:09	INSERT INTO Transactions VALUES ('199526438', 4729921282617690, 23, '2020-08-04 14:18:09');
4	2	951597733	5.57464E+15	23	2020-08-04 14:18:10	INSERT INTO Transactions VALUES ('951597733', 5574644723349960, 23, '2020-08-04 14:18:10');
5	3	483131196	2.95806E+14	401	2020-08-04 14:18:11	INSERT INTO Transactions VALUES ('483131196', 295806044123801, 401, '2020-08-04 14:18:11');
6	4	503432266	8.68541E+15	243	2020-08-04 14:18:12	INSERT INTO Transactions VALUES ('503432266', 8685406565773660, 243, '2020-08-04 14:18:12');
7	5	314843835	7.27848E+15	481	2020-08-04 14:18:13	INSERT INTO Transactions VALUES ('314843835', 7278483031932900, 481, '2020-08-04 14:18:13');
8	6	760511911	5.25354E+15	357	2020-08-04 14:18:14	INSERT INTO Transactions VALUES ('760511911', 5253539480864210, 357, '2020-08-04 14:18:14');
9	7	796058602	2.45476E+15	448	2020-08-04 14:18:15	INSERT INTO Transactions VALUES ('796058602', 2454760920399580, 448, '2020-08-04 14:18:15');
10	8	57906941	2.66599E+15	200	2020-08-04 14:18:16	INSERT INTO Transactions VALUES ('57906941', 2665986493051550, 200, '2020-08-04 14:18:16');
11	9	538782975	2.69632E+15	384	2020-08-04 14:18:17	INSERT INTO Transactions VALUES ('538782975', 2696320301756680, 384, '2020-08-04 14:18:17');
12	10	670202202	6.39899E+15	303	2020-08-04 14:18:18	INSERT INTO Transactions VALUES ('670202202', 6398990889602200, 303, '2020-08-04 14:18:18');
13	11	339820994	9.42305E+15	19	2020-08-04 14:18:19	INSERT INTO Transactions VALUES ('339820994', 9423048167971790, 19, '2020-08-04 14:18:19');
14	12	978594399	4.09564E+15	435	2020-08-04 14:18:20	INSERT INTO Transactions VALUES ('978594399', 4095637251471560, 435, '2020-08-04 14:18:20');
15	13	689582238	3.45492E+15	410	2020-08-04 14:18:21	INSERT INTO Transactions VALUES ('689582238', 3454922700343390, 410, '2020-08-04 14:18:21');
16	14	506190495	4.27219E+15	85	2020-08-04 14:18:22	INSERT INTO Transactions VALUES ('506190495', 4272194249026740, 85, '2020-08-04 14:18:22');
17	15	932823238	8.45386E+15	265	2020-08-04 14:18:23	INSERT INTO Transactions VALUES ('932823238', 8453863461888190, 265, '2020-08-04 14:18:23');
18	16	452018548	9.03971E+15	390	2020-08-04 14:18:24	INSERT INTO Transactions VALUES ('452018548', 9039713967280070, 390, '2020-08-04 14:18:24');
19	17	716801899	6.00465E+15	78	2020-08-04 14:18:25	INSERT INTO Transactions VALUES ('716801899', 6004645319995770, 78, '2020-08-04 14:18:25');
20	18	573062892	5.25561E+15	376	2020-08-04 14:18:26	INSERT INTO Transactions VALUES ('573062892', 5255610566974170, 376, '2020-08-04 14:18:26');
21	19	204722757	6.03917E+15	210	2020-08-04 14:18:27	INSERT INTO Transactions VALUES ('204722757', 6039171052900360, 210, '2020-08-04 14:18:27');
22	20	227209241	3.67919E+15	339	2020-08-04 14:18:28	INSERT INTO Transactions VALUES ('227209241', 3679186864519600, 339, '2020-08-04 14:18:28');

24	21	199526438	8.44676E+15	468	2020-08-02 07:09:12	INSERT INTO Transactions VALUES ('199526438', 8446756072343220, 468, '2020-08-02 07:09:12');
25	22	951597733	7.31115E+15	407	2020-08-02 07:09:13	INSERT INTO Transactions VALUES ('951597733', 7311145967256280, 407, '2020-08-02 07:09:13');
26	23	483131196	3.52566E+15	408	2020-08-02 07:09:14	INSERT INTO Transactions VALUES ('483131196', 3525662627988230, 408, '2020-08-02 07:09:14');
27	24	503432266	2.92718E+15	343	2020-08-02 07:09:15	INSERT INTO Transactions VALUES ('503432266', 2927180332102520, 343, '2020-08-02 07:09:15');
28	25	314843835	6.77505E+14	97	2020-08-02 07:09:16	INSERT INTO Transactions VALUES ('314843835', 677504755406390, 97, '2020-08-02 07:09:16');
29	26	760511911	2.02323E+15	402	2020-08-02 07:09:17	INSERT INTO Transactions VALUES ('760511911', 2023228702884830, 402, '2020-08-02 07:09:17');
30	27	796058602	9.74346E+15	479	2020-08-02 07:09:18	INSERT INTO Transactions VALUES ('796058602', 9743461695855310, 479, '2020-08-02 07:09:18');
31	28	57906941	6.37424E+15	379	2020-08-02 07:09:19	INSERT INTO Transactions VALUES ('57906941', 6374235457377450, 379, '2020-08-02 07:09:19');
32	29	538782975	3.58166E+15	281	2020-08-02 07:09:20	INSERT INTO Transactions VALUES ('538782975', 3581656041727260, 281, '2020-08-02 07:09:20');
33	30	670202202	2.1284E+15	226	2020-08-02 07:09:21	INSERT INTO Transactions VALUES ('670202202', 2128397314854200, 226, '2020-08-02 07:09:21');
34	31	339820994	5.38883E+15	438	2020-08-02 07:09:22	INSERT INTO Transactions VALUES ('339820994', 5388827244482690, 438, '2020-08-02 07:09:22');
35	32	978594399	8.83104E+15	250	2020-08-02 07:09:23	INSERT INTO Transactions VALUES ('978594399', 8831037965403030, 250, '2020-08-02 07:09:23');
36	33	689582238	3.23971E+15	175	2020-08-02 07:09:24	INSERT INTO Transactions VALUES ('689582238', 3239714305043840, 175, '2020-08-02 07:09:24');
37	34	506190495	8.23771E+15	440	2020-08-02 07:09:25	INSERT INTO Transactions VALUES ('506190495', 8237707225753060, 440, '2020-08-02 07:09:25');
38	35	932823238	6.00574E+15	487	2020-08-02 07:09:26	INSERT INTO Transactions VALUES ('932823238', 6005742490778090, 487, '2020-08-02 07:09:26');
39	36	452018548	7.53906E+15	42	2020-08-02 07:09:27	INSERT INTO Transactions VALUES ('452018548', 7539058489488120, 42, '2020-08-02 07:09:27');
40	37	716801899	7.35141E+15	112	2020-08-02 07:09:28	INSERT INTO Transactions VALUES ('716801899', 7351406002102060, 112, '2020-08-02 07:09:28');
41	38	573062892	4.29262E+15	18	2020-08-02 07:09:29	INSERT INTO Transactions VALUES ('573062892', 4292623879684210, 18, '2020-08-02 07:09:29');
42	39	204722757	5.72689E+15	118	2020-08-02 07:09:30	INSERT INTO Transactions VALUES ('204722757', 5726891121146300, 118, '2020-08-02 07:09:30');
43	40	227209241	5.71815E+15	128	2020-08-02 07:09:31	INSERT INTO Transactions VALUES ('227209241', 5718149113272290, 128, '2020-08-02 07:09:31');
45	41	199526438	7.74835E+15	490	2020-08-03 19:38:15	INSERT INTO Transactions VALUES ('199526438', 7748348254287430, 490, '2020-08-03 19:38:15');
46	42	951597733	7.92296E+15	319	2020-08-03 19:38:16	INSERT INTO Transactions VALUES ('951597733', 7922956099596220, 319, '2020-08-03 19:38:16');
47	43	483131196	2.47787E+15	28	2020-08-03 19:38:17	INSERT INTO Transactions VALUES ('483131196', 2477869810505720, 28, '2020-08-03 19:38:17');
48	44	503432266	8.22657E+15	276	2020-08-03 19:38:18	INSERT INTO Transactions VALUES ('503432266', 8226574521531990, 276, '2020-08-03 19:38:18');
49	45	314843835	2.59517E+15	123	2020-08-03 19:38:19	INSERT INTO Transactions VALUES ('314843835', 2595167065235700, 123, '2020-08-03 19:38:19');
50	46	760511911	4.95344E+15	416	2020-08-03 19:38:20	INSERT INTO Transactions VALUES ('760511911', 4953438450105470, 416, '2020-08-03 19:38:20');
51	47	796058602	1.64423E+14	240	2020-08-03 19:38:21	INSERT INTO Transactions VALUES ('796058602', 164423418596531, 240, '2020-08-03 19:38:21');
52	48	57906941	2.32964E+15	388	2020-08-03 19:38:22	INSERT INTO Transactions VALUES ('57906941', 2329642515421580, 388, '2020-08-03 19:38:22');
53	49	538782975	7.58959E+15	112	2020-08-03 19:38:23	INSERT INTO Transactions VALUES ('538782975', 7589588117374810, 112, '2020-08-03 19:38:23');
54	50	670202202	1.95301E+15	248	2020-08-03 19:38:24	INSERT INTO Transactions VALUES ('670202202', 1953010143480940, 248, '2020-08-03 19:38:24');
55	51	339820994	3.53861E+15	126	2020-08-03 19:38:25	INSERT INTO Transactions VALUES ('339820994', 3538607479323430, 126, '2020-08-03 19:38:25');
56	52	978594399	5.72018E+15	383	2020-08-03 19:38:26	INSERT INTO Transactions VALUES ('978594399', 5720183787576280, 383, '2020-08-03 19:38:26');
57	53	689582238	4.90607E+15	385	2020-08-03 19:38:27	INSERT INTO Transactions VALUES ('689582238', 4906070290874800, 385, '2020-08-03 19:38:27');
58	54	506190495	4.34154E+15	239	2020-08-03 19:38:28	INSERT INTO Transactions VALUES ('506190495', 4341541452464450, 239, '2020-08-03 19:38:28');
59	55	932823238	1.67709E+14	464	2020-08-03 19:38:29	INSERT INTO Transactions VALUES ('932823238', 167708681282153, 464, '2020-08-03 19:38:29');
60	56	452018548	1.56154E+14	226	2020-08-03 19:38:30	INSERT INTO Transactions VALUES ('452018548', 156154426351262, 226, '2020-08-03 19:38:30');
61	57	716801899	5.5894E+15	288	2020-08-03 19:38:31	INSERT INTO Transactions VALUES ('716801899', 5589400512089820, 288, '2020-08-03 19:38:31');
62	58	573062892	7.47879E+15	192	2020-08-03 19:38:32	INSERT INTO Transactions VALUES ('573062892', 7478788495416250, 192, '2020-08-03 19:38:32');
63	59	204722757	4.78541E+15	24	2020-08-03 19:38:33	INSERT INTO Transactions VALUES ('204722757', 4785408902176240, 24, '2020-08-03 19:38:33');
64	60	227209241	6.62772E+15	25	2020-08-03 19:38:34	INSERT INTO Transactions VALUES ('227209241', 6627718472249090, 25, '2020-08-03 19:38:34');

Users(ID, username, password)


Project (Course Management ...)
Project (Course Management ...)
Administration
Schemas
Query 1
Waitlists
Waitlists
Students
Students
Teaches
Teaches
Transactions
Transactions
Context Help
Snippets
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Teaches
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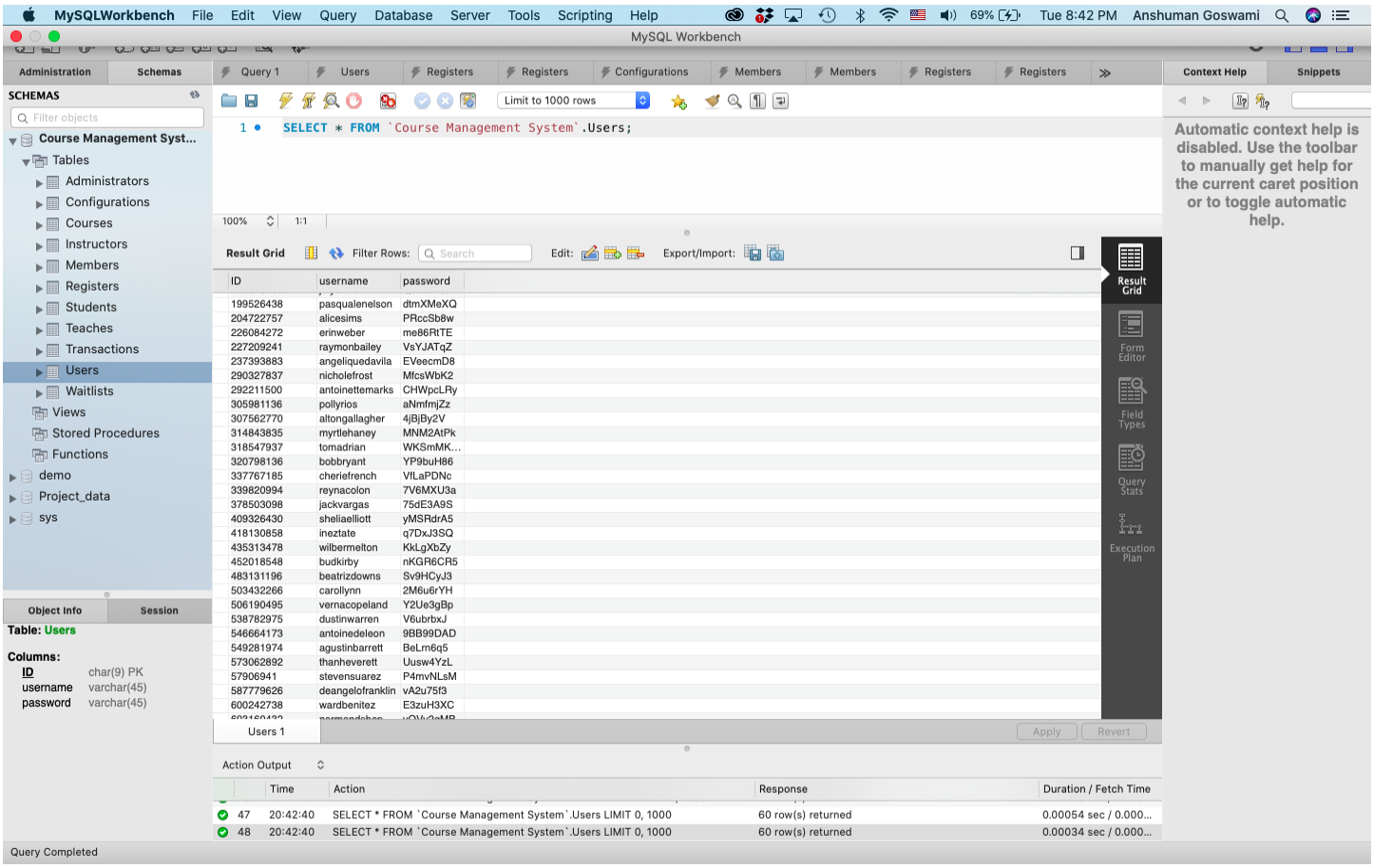
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Name: Users
Schema: Course Management System
Column
Datatype
PK
NN
UQ
BIN
UN
ZF
AI
G
Default / Expression
ID
CHAR(9)
username
VARCHAR(45)
password
VARCHAR(45)
<click to edit>
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Column details 'ID'
Column Name: ID
Charset/Collation: Default Charset
Default Collation
Comments:
Datatype: CHAR(9)
Default
Storage: VIRTUAL STORED
Primary Key
Not NULL
Unique
Binary
Unsigned
ZeroFill
Auto Increment
Generated
Columns
Indexes
Foreign Keys
Triggers
Partitioning
Options
Apply
Revert
Object Info
Session
Table: Users
Columns:
ID char(9) PK
username varchar(45)
password varchar(45)
Action Output
Time
Action
Response
Duration / Fetch Time
23 20:41:17 SELECT * FROM `Course Management System`.Students LIMIT 0, 1000 10 row(s) returned 0.00069 sec / 0.000...
24 20:41:17 SELECT * FROM `Course Management System`.Students LIMIT 0, 1000 10 row(s) returned 0.00084 sec / 0.000...
25 20:41:57 SELECT * FROM `Course Management System`.Users LIMIT 0, 1000 30 row(s) returned 0.00050 sec / 0.000...
Query Completed


MySQLWorkbench File Edit View Query Database Server Tools Scripting Help
69% Tue 8:42 PM Anshuman Goswami
MySQL Workbench
Administration
Schemas
Query 1
Users
Registers
Registers
Configurations
Members
Members
Registers
Registers
Context Help
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Course Management Syst...
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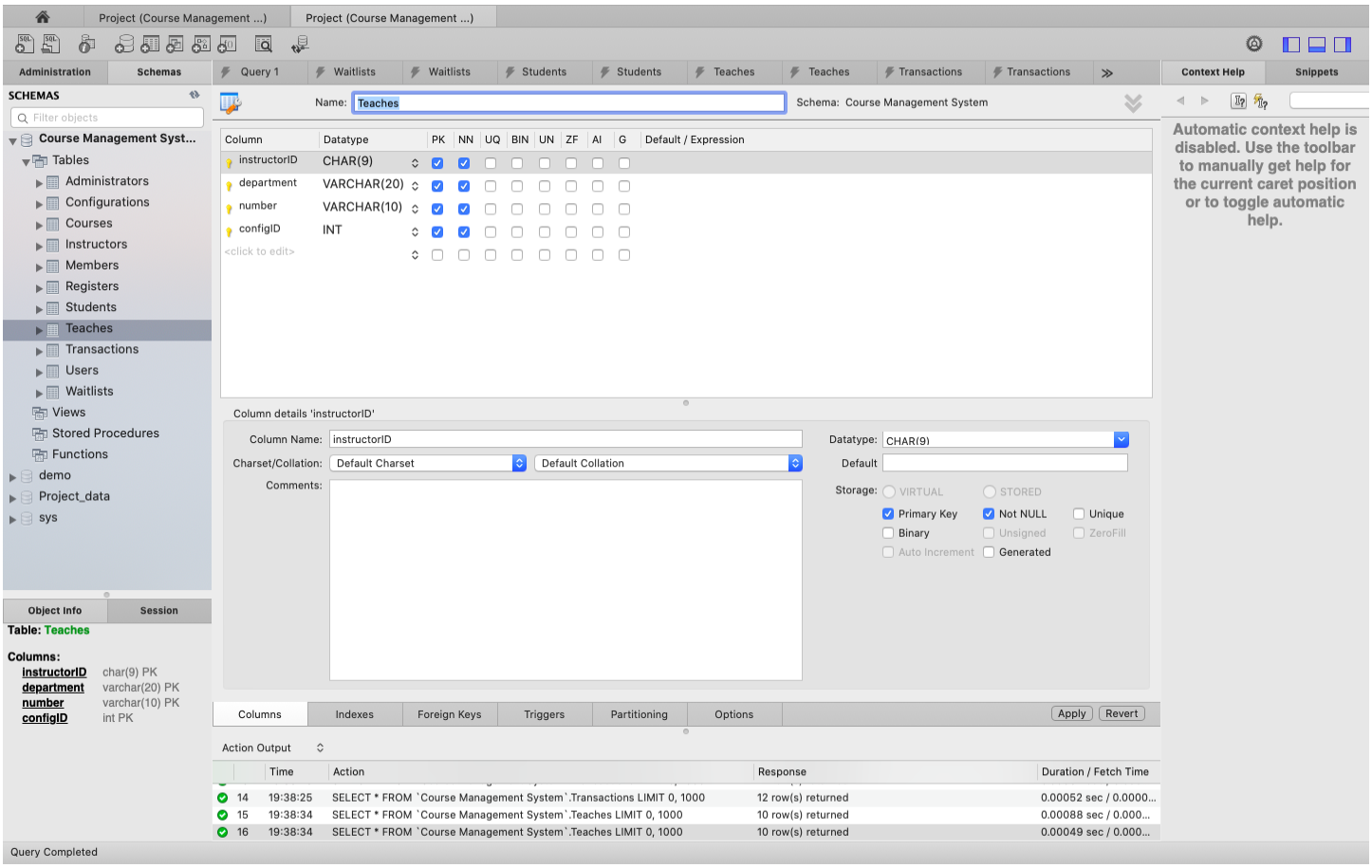
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Limit to 1000 rows
1 • SELECT * FROM `Course Management System`.Users;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Search
Edit:
Export/Import:
ID
username
password
199526438 pasqualenelson dtmXMeXQ
204722757 alicesims PRccSb8w
226084272 erinweber me86RtTE
227209241 raymonbailey VsYJATqZ
237393883 angeliquedavila EVeecmD8
290327837 nicholefrost MfcsWbK2
292211500 antoinettemarks CHWpcLRy
305981136 pollyrios aNmfmjZz
307562770 altongallagher 4jBjBy2V
314843835 myrtlehaney MNM2AtPk
318547937 tomadrian WKSmMK...
320798136 bobbryant YP9buH86
337767185 cheriefrench VfLaPDNc
339820994 reynacolon 7V6MXU3a
378503098 jackvargas 75dE3A9S
409326430 sheliaelliott yMSRdrA5
418130858 ineztate q7DxJ3SQ
435313478 wilbermelton KkLgXbZy
452018548 budkirby nKGR6CR5
483131196 beatrizdowns Sv9HCyJ3
503432266 carollynn 2M6u6rYH
506190495 vernacopeland Y2Ue3gBp
538782975 dustinwarren V6ubrbxJ
546664173 antoinedeleon 9BB9DAD
549281974 agustinbarrett BeLrn6q5
573062892 thanheverett Uusw4YzL
57906941 stevensuarez P4mvNLsM
587779626 deangelofranklin vA2u75f3
600242738 wardbenitez E3zuH3XC
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Users 1
Apply
Revert
Object Info
Session
Table: Users
Columns:
ID char(9) PK
username varchar(45)
password varchar(45)
Action Output
Time
Action
Response
Duration / Fetch Time
47 20:42:40 SELECT * FROM `Course Management System`.Users LIMIT 0, 1000 60 row(s) returned 0.00054 sec / 0.000...
48 20:42:40 SELECT * FROM `Course Management System`.Users LIMIT 0, 1000 60 row(s) returned 0.00034 sec / 0.000...
Query Completed

	A	B	C	D	E	F	G
1	**Users**						
2	Tuple Number	ID	Username	Password	SQL Statement		
3	1	199526438	pasqualenelson	dtmXMeXQ	INSERT INTO Users VALUES('199526438', 'pasqualenelson', 'dtmXMeXQ');		Student
4	2	951597733	lupejuarez	sczEfLZF	INSERT INTO Users VALUES('951597733', 'lupejuarez', 'sczEfLZF');		Student
5	3	483131196	beatrizdowns	Sv9HCyJ3	INSERT INTO Users VALUES('483131196', 'beatrizdowns', 'Sv9HCyJ3');		Student
6	4	503432266	carollynn	2M6u6rYH	INSERT INTO Users VALUES('503432266', 'carollynn', '2M6u6rYH');		Student
7	5	314843835	myrtlehaney	MNM2AtPk	INSERT INTO Users VALUES('314843835', 'myrtlehaney', 'MNM2AtPk');		Student
8	6	760511911	lucianosmith	DZvh6tbG	INSERT INTO Users VALUES('760511911', 'lucianosmith', 'DZvh6tbG');		Student
9	7	796058602	mileslarson	5X4MubZq	INSERT INTO Users VALUES('796058602', 'mileslarson', '5X4MubZq');		Student
10	8	57906941	stevensuarez	P4mvNLsM	INSERT INTO Users VALUES('57906941', 'stevensuarez', 'P4mvNLsM');		Student
11	9	538782975	dustinwarren	V6ubrbxJ	INSERT INTO Users VALUES('538782975', 'dustinwarren', 'V6ubrbxJ');		Student
12	10	670202202	mosemcdonald	NaCkSyed	INSERT INTO Users VALUES('670202202', 'mosemcdonald', 'NaCkSyed');		Student
13	11	339820994	reynacolon	7V6MXU3a	INSERT INTO Users VALUES('339820994', 'reynacolon', '7V6MXU3a');		Student
14	12	978594399	ginahernandez	MWwxgHrK	INSERT INTO Users VALUES('978594399', 'ginahernandez', 'MWwxgHrK');		Student
15	13	689582238	danaconway	SG7rYYvr	INSERT INTO Users VALUES('689582238', 'danaconway', 'SG7rYYvr');		Student
16	14	506190495	vernacopeland	Y2Ue3gBp	INSERT INTO Users VALUES('506190495', 'vernacopeland', 'Y2Ue3gBp');		Student
17	15	932823238	jonaspadilla	vYWxnrY9	INSERT INTO Users VALUES('932823238', 'jonaspadilla', 'vYWxnrY9');		Student
18	16	452018548	budkirby	nKGR6CR5	INSERT INTO Users VALUES('452018548', 'budkirby', 'nKGR6CR5');		Student
19	17	716801899	roscoerichard	jqtkKEqv	INSERT INTO Users VALUES('716801899', 'roscoerichard', 'jqtkKEqv');		Student
20	18	573062892	thanheverett	Uusw4YzL	INSERT INTO Users VALUES('573062892', 'thanheverett', 'Uusw4YzL');		Student
21	19	204722757	alicesims	PRccSb8w	INSERT INTO Users VALUES('204722757', 'alicesims', 'PRccSb8w');		Student
22	20	227209241	raymonbailey	VsYJATqZ	INSERT INTO Users VALUES('227209241', 'raymonbailey', 'VsYJATqZ');		Student
24	21	226084272	erinweber	me86RtTE	INSERT INTO Users VALUES('226084272', 'erinweber', 'me86RtTE');		Instructor
25	22	378503098	jackvargas	75dE3A9S	INSERT INTO Users VALUES('378503098', 'jackvargas', '75dE3A9S');		Instructor
26	23	307562770	altongallagher	4jBjBy2V	INSERT INTO Users VALUES('307562770', 'altongallagher', '4jBjBy2V');		Instructor
27	24	549281974	agustinbarrett	BeLrn6q5	INSERT INTO Users VALUES('549281974', 'agustinbarrett', 'BeLrn6q5');		Instructor
28	25	764777061	miguelmathews	EebfEAPh	INSERT INTO Users VALUES('764777061', 'miguelmathews', 'EebfEAPh');		Instructor
29	26	305981136	pollyrios	aNmfmjZz	INSERT INTO Users VALUES('305981136', 'pollyrios', 'aNmfmjZz');		Instructor
30	27	916994127	quinnwarner	eqbUqL4c	INSERT INTO Users VALUES('916994127', 'quinnwarner', 'eqbUqL4c');		Instructor
31	28	290327837	nicholefrost	MfcsWbK2	INSERT INTO Users VALUES('290327837', 'nicholefrost', 'MfcsWbK2');		Instructor
32	29	292211500	antoinettemarks	CHWpcLRy	INSERT INTO Users VALUES('292211500', 'antoinettemarks', 'CHWpcLRy');		Instructor
33	30	337767185	cheriefrench	VfLaPDNc	INSERT INTO Users VALUES('337767185', 'cheriefrench', 'VfLaPDNc');		Instructor
34	31	891149217	catalinaschaefer	XYnPd2yF	INSERT INTO Users VALUES('891149217', 'catalinaschaefer', 'XYnPd2yF');		Instructor
35	32	418130858	ineztate	q7DxJ3SQ	INSERT INTO Users VALUES('418130858', 'ineztate', 'q7DxJ3SQ');		Instructor
36	33	100859622	miahodge	d5VjTxRv	INSERT INTO Users VALUES('100859622', 'miahodge', 'd5VjTxRv');		Instructor
37	34	996595763	tamaragibson	K4QpExve	INSERT INTO Users VALUES('996595763', 'tamaragibson', 'K4QpExve');		Instructor
38	35	851438868	clarabradford	PQMkvujJ	INSERT INTO Users VALUES('851438868', 'clarabradford', 'PQMkvujJ');		Instructor
39	36	603160432	normandsheppard	yQVv2gMB	INSERT INTO Users VALUES('603160432', 'normandsheppard', 'yQVv2gMB');		Instructor
40	37	875783848	allenzuniga	YCmHmynj	INSERT INTO Users VALUES('875783848', 'allenzuniga', 'YCmHmynj');		Instructor
41	38	661054866	wesgill	AJCvTtW3	INSERT INTO Users VALUES('661054866', 'wesgill', 'AJCvTtW3');		Instructor
42	39	611668180	edisoncarter	mX4j828U	INSERT INTO Users VALUES('611668180', 'edisoncarter', 'mX4j828U');		Instructor
43	40	957713740	sylviafuentes	P4FnnKvG	INSERT INTO Users VALUES('957713740', 'sylviafuentes', 'P4FnnKvG');		Instructor
45	41	546664173	antoinedeleon	9BB99DAD	INSERT INTO Users VALUES('546664173', 'antoinedeleon', '9BB99DAD');		Administrator
46	42	620381807	jacksonblankenship	9YkgdG2W	INSERT INTO Users VALUES('620381807', 'jacksonblankenship', '9YkgdG2W');		Administrator
47	43	409326430	sheliaelliott	yMSRdrA5	INSERT INTO Users VALUES('409326430', 'sheliaelliott', 'yMSRdrA5');		Administrator
48	44	943667551	justinemcbride	7xfP2bZJ	INSERT INTO Users VALUES('943667551', 'justinemcbride', '7xfP2bZJ');		Administrator
49	45	237393883	angeliquedavila	EVeecmD8	INSERT INTO Users VALUES('237393883', 'angeliquedavila', 'EVeecmD8');		Administrator
50	46	435313478	wilbermelton	KkLgXbZy	INSERT INTO Users VALUES('435313478', 'wilbermelton', 'KkLgXbZy');		Administrator
51	47	670334459	brendonfrazier	yNQCzf32	INSERT INTO Users VALUES('670334459', 'brendonfrazier', 'yNQCzf32');		Administrator
52	48	600242738	wardbenitez	E3zuH3XC	INSERT INTO Users VALUES('600242738', 'wardbenitez', 'E3zuH3XC');		Administrator
53	49	622426523	colettestark	fBV6cZbR	INSERT INTO Users VALUES('622426523', 'colettestark', 'fBV6cZbR');		Administrator
54	50	587779626	deangelofranklin	vA2u75f3	INSERT INTO Users VALUES('587779626', 'deangelofranklin', 'vA2u75f3');		Administrator
55	51	189826755	julyanne	QuWEn3JY	INSERT INTO Users VALUES('189826755', 'julyanne', 'QuWEn3JY');		Administrator
56	52	638993187	carylank	7T4gK8rD	INSERT INTO Users VALUES('638993187', 'carylank ', '7T4gK8rD');		Administrator
57	53	798100317	honeydent	HunPcxcs	INSERT INTO Users VALUES('798100317', 'honeydent ', 'HunPcxcs');		Administrator
58	54	944806400	artiesmoak	RAw3dPpX	INSERT INTO Users VALUES('944806400', 'artiesmoak', 'RAw3dPpX');		Administrator
59	55	722640650	jeffhanson	35nv3LG3	INSERT INTO Users VALUES('722640650', 'jeffhanson', '35nv3LG3');		Administrator
60	56	889872253	bertramcarlson	9XUBTyct	INSERT INTO Users VALUES('889872253', 'bertramcarlson', '9XUBTyct');		Administrator
61	57	861394637	samheister	cvJuMuLk	INSERT INTO Users VALUES('861394637', 'samheister', 'cvJuMuLk');		Administrator
62	58	320798136	bobbryant	YP9buH86	INSERT INTO Users VALUES('320798136', 'bobbryant', 'YP9buH86');		Administrator
63	59	877078818	hankcolley	uFg2BP3n	INSERT INTO Users VALUES('877078818', 'hankcolley', 'uFg2BP3n');		Administrator
64	60	318547937	tomadrian	WKSmMKQs	INSERT INTO Users VALUES('318547937', 'tomadrian', 'WKSmMKQs');		Administrator

Teaches(instructorID, department, number, configID)


Project (Course Management ...)
Project (Course Management ...)
Administration
Schemas
Query 1
Waitlists
Waitlists
Students
Students
Teaches
Teaches
Transactions
Transactions
Context Help
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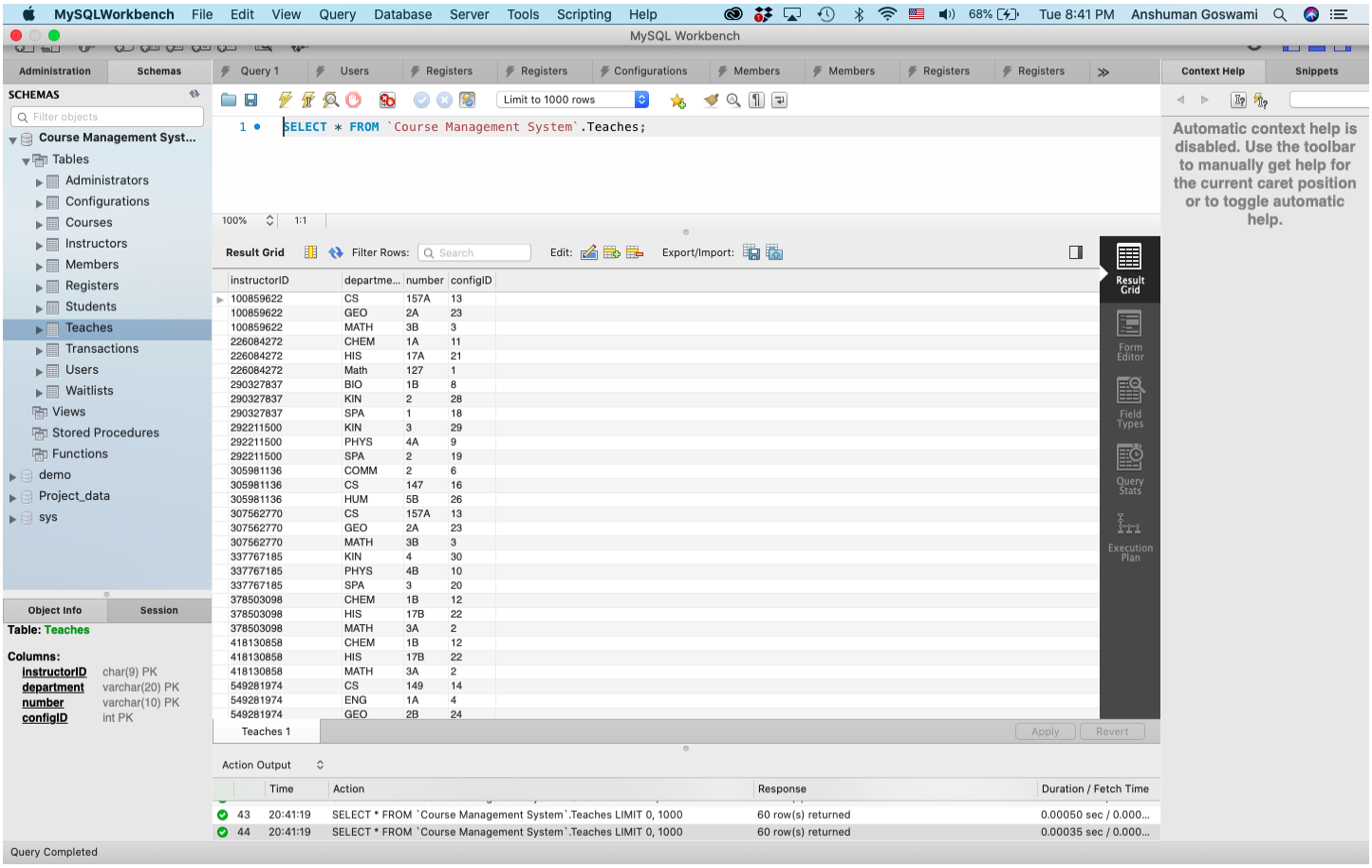
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Name: Teaches
Schema: Course Management System
Column
Datatype
PK
NN
UQ
BIN
UN
ZF
AI
G
Default / Expression
instructorID
CHAR(9)
department
VARCHAR(20)
number
VARCHAR(10)
configID
INT
<click to edit>
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Column details 'instructorID'
Column Name: instructorID
Charset/Collation: Default Charset
Default Collation
Comments:
Datatype: CHAR(9)
Default
Storage:
VIRTUAL
STORED
Primary Key
Not NULL
Unique
Binary
Unsigned
ZeroFill
Auto Increment
Generated
Columns
Indexes
Foreign Keys
Triggers
Partitioning
Options
Apply
Revert
Object Info
Session
Table: Teaches
Columns:
instructorID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Action Output
Time
Action
Response
Duration / Fetch Time
14 19:38:25 SELECT * FROM `Course Management System`.Transactions LIMIT 0, 1000 12 row(s) returned 0.00052 sec / 0.0000...
15 19:38:34 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 10 row(s) returned 0.00088 sec / 0.000...
16 19:38:34 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 10 row(s) returned 0.00049 sec / 0.000...
Query Completed


MySQLWorkbench File Edit View Query Database Server Tools Scripting Help
68% Tue 8:41 PM Anshuman Goswami
MySQL Workbench
Administration
Schemas
Query 1
Users
Registers
Registers
Configurations
Members
Members
Registers
Registers
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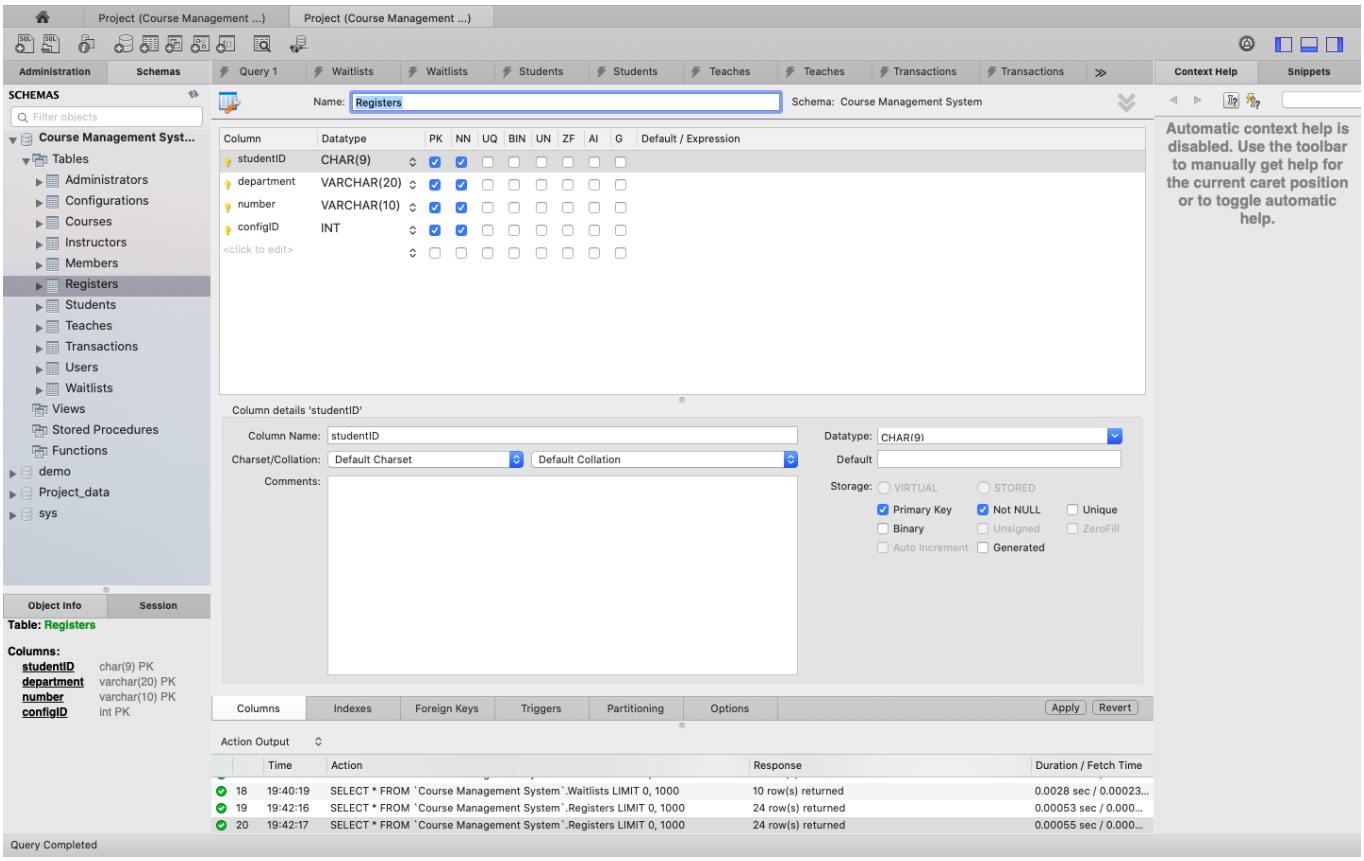
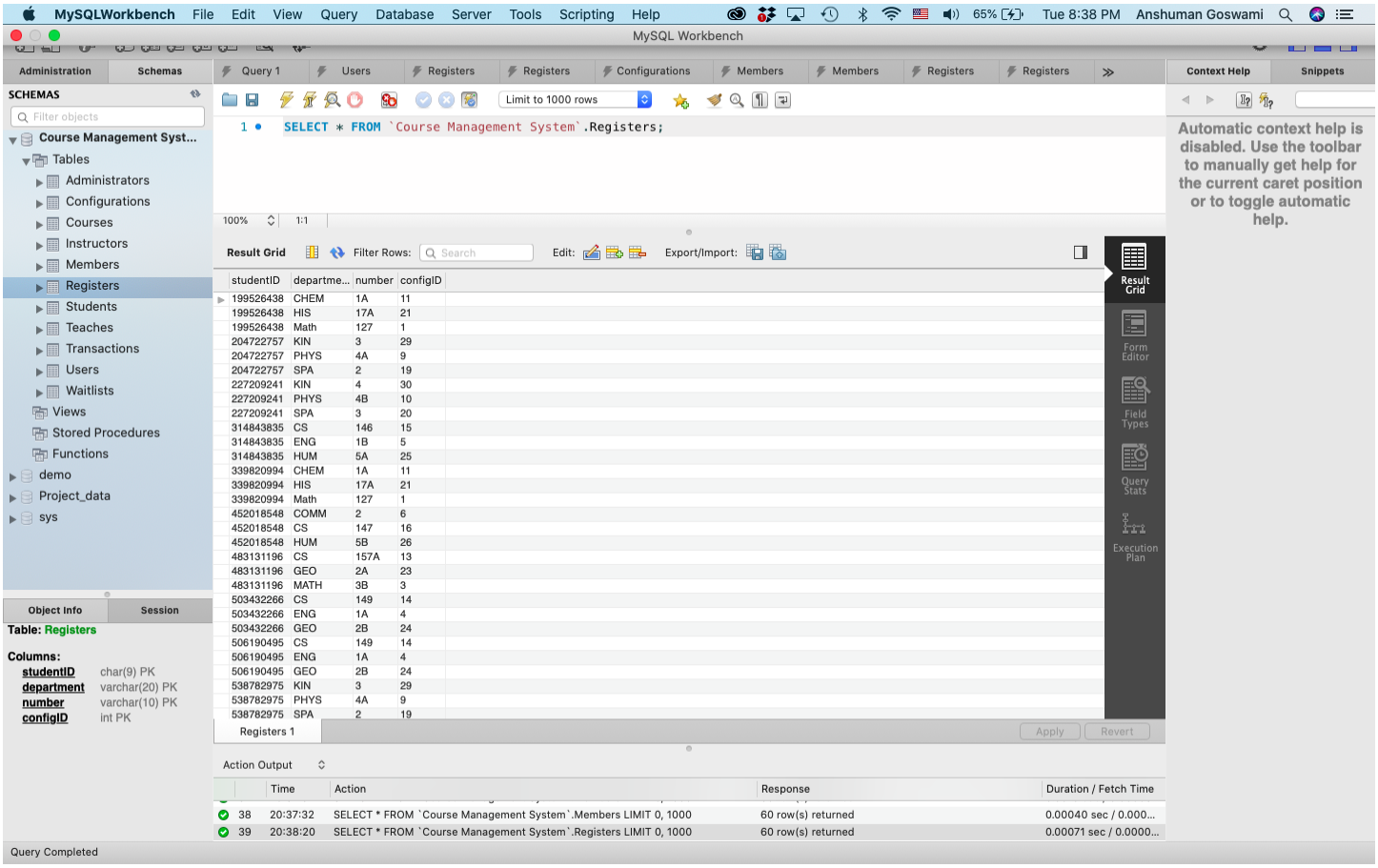
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Limit to 1000 rows
1 SELECT * FROM `Course Management System`.Teaches;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Result Grid
Filter Rows:
Search
Edit:
Export/Import:
instructorID
departme...
number
configID
100859622 CS 157A 13
100859622 GEO 2A 23
100859622 MATH 3B 3
226084272 CHEM 1A 11
226084272 HIS 17A 21
226084272 Math 127 1
290327837 BIO 1B 8
290327837 KIN 2 28
290327837 SPA 1 18
292211500 KIN 3 29
292211500 PHYS 4A 9
292211500 SPA 2 19
305981136 COMM 2 6
305981136 CS 147 16
305981136 HUM 5B 26
307562770 CS 157A 13
307562770 GEO 2A 23
307562770 MATH 3B 3
337767185 KIN 4 30
337767185 PHYS 4B 10
337767185 SPA 3 20
378503098 CHEM 1B 12
378503098 HIS 17B 22
378503098 MATH 3A 2
418130858 CHEM 1B 12
418130858 HIS 17B 22
418130858 MATH 3A 2
549281974 CS 149 14
549281974 ENG 1A 4
549281974 GEO 2B 24
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Teaches 1
Apply
Revert
Object Info
Session
Table: Teaches
Columns:
instructorID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Action Output
Time
Action
Response
Duration / Fetch Time
43 20:41:19 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 60 row(s) returned 0.00050 sec / 0.000...
44 20:41:19 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 60 row(s) returned 0.00035 sec / 0.000...
Query Completed

	A	B	C	D	E	F
1		Teaches				
2	Tuple Number	instructorID	Department	Number	ConfigID	SQL Statement
3	1	226084272	Math	127	1	INSERT INTO Teaches VALUES('226084272', 'Math', '127', 1);
4	2	378503098	MATH	3A	2	INSERT INTO Teaches VALUES('378503098', 'MATH', '3A', 2);
5	3	307562770	MATH	3B	3	INSERT INTO Teaches VALUES('307562770', 'MATH', '3B', 3);
6	4	549281974	ENG	1A	4	INSERT INTO Teaches VALUES('549281974', 'ENG', '1A', 4);
7	5	764777061	ENG	1B	5	INSERT INTO Teaches VALUES('764777061', 'ENG', '1B', 5);
8	6	305981136	COMM	2	6	INSERT INTO Teaches VALUES('305981136', 'COMM', '2', 6);
9	7	916994127	BIO	1A	7	INSERT INTO Teaches VALUES('916994127', 'BIO', '1A', 7);
10	8	290327837	BIO	1B	8	INSERT INTO Teaches VALUES('290327837', 'BIO', '1B', 8);
11	9	292211500	PHYS	4A	9	INSERT INTO Teaches VALUES('292211500', 'PHYS', '4A', 9);
12	10	337767185	PHYS	4B	10	INSERT INTO Teaches VALUES('337767185', 'PHYS', '4B', 10);
13	11	891149217	CHEM	1A	11	INSERT INTO Teaches VALUES('891149217', 'CHEM', '1A', 11);
14	12	418130858	CHEM	1B	12	INSERT INTO Teaches VALUES('418130858', 'CHEM', '1B', 12);
15	13	100859622	CS	157A	13	INSERT INTO Teaches VALUES('100859622', 'CS', '157A', 13);
16	14	996595763	CS	149	14	INSERT INTO Teaches VALUES('996595763', 'CS', '149', 14);
17	15	851438868	CS	146	15	INSERT INTO Teaches VALUES('851438868', 'CS', '146', 15);
18	16	603160432	CS	147	16	INSERT INTO Teaches VALUES('603160432', 'CS', '147', 16);
19	17	875783848	CS	166	17	INSERT INTO Teaches VALUES('875783848', 'CS', '166', 17);
20	18	661054866	SPA	1	18	INSERT INTO Teaches VALUES('661054866', 'SPA', '1', 18);
21	19	611668180	SPA	2	19	INSERT INTO Teaches VALUES('611668180', 'SPA', '2', 19);
22	20	957713740	SPA	3	20	INSERT INTO Teaches VALUES('957713740', 'SPA', '3', 20);
23	21	226084272	HIS	17A	21	INSERT INTO Teaches VALUES('226084272', 'HIS', '17A', 21);
24	22	378503098	HIS	17B	22	INSERT INTO Teaches VALUES('378503098', 'HIS', '17B', 22);
25	23	307562770	GEO	2A	23	INSERT INTO Teaches VALUES('307562770', 'GEO', '2A', 23);
26	24	549281974	GEO	2B	24	INSERT INTO Teaches VALUES('549281974', 'GEO', '2B', 24);
27	25	764777061	HUM	5A	25	INSERT INTO Teaches VALUES('764777061', 'HUM', '5A', 25);
28	26	305981136	HUM	5B	26	INSERT INTO Teaches VALUES('305981136', 'HUM', '5B', 26);
29	27	916994127	KIN	1	27	INSERT INTO Teaches VALUES('916994127', 'KIN', '1', 27);
30	28	290327837	KIN	2	28	INSERT INTO Teaches VALUES('290327837', 'KIN', '2', 28);

31	29	292211500	KIN	3	29	INSERT INTO Teaches VALUES('292211500', 'KIN', '3', 29);
32	30	337767185	KIN	4	30	INSERT INTO Teaches VALUES('337767185', 'KIN', '4', 30);
33	31	891149217	Math	127	1	INSERT INTO Teaches VALUES('891149217', 'Math', '127', 1);
34	32	418130858	MATH	3A	2	INSERT INTO Teaches VALUES('418130858', 'MATH', '3A', 2);
35	33	100859622	MATH	3B	3	INSERT INTO Teaches VALUES('100859622', 'MATH', '3B', 3);
36	34	996595763	ENG	1A	4	INSERT INTO Teaches VALUES('996595763', 'ENG', '1A', 4);
37	35	851438868	ENG	1B	5	INSERT INTO Teaches VALUES('851438868', 'ENG', '1B', 5);
38	36	603160432	COMM	2	6	INSERT INTO Teaches VALUES('603160432', 'COMM', '2', 6);
39	37	875783848	BIO	1A	7	INSERT INTO Teaches VALUES('875783848', 'BIO', '1A', 7);
40	38	661054866	BIO	1B	8	INSERT INTO Teaches VALUES('661054866', 'BIO', '1B', 8);
41	39	611668180	PHYS	4A	9	INSERT INTO Teaches VALUES('611668180', 'PHYS', '4A', 9);
42	40	957713740	PHYS	4B	10	INSERT INTO Teaches VALUES('957713740', 'PHYS', '4B', 10);
43	41	226084272	CHEM	1A	11	INSERT INTO Teaches VALUES('226084272', 'CHEM', '1A', 11);
44	42	378503098	CHEM	1B	12	INSERT INTO Teaches VALUES('378503098', 'CHEM', '1B', 12);
45	43	307562770	CS	157A	13	INSERT INTO Teaches VALUES('307562770', 'CS', '157A', 13);
46	44	549281974	CS	149	14	INSERT INTO Teaches VALUES('549281974', 'CS', '149', 14);
47	45	764777061	CS	146	15	INSERT INTO Teaches VALUES('764777061', 'CS', '146', 15);
48	46	305981136	CS	147	16	INSERT INTO Teaches VALUES('305981136', 'CS', '147', 16);
49	47	916994127	CS	166	17	INSERT INTO Teaches VALUES('916994127', 'CS', '166', 17);
50	48	290327837	SPA	1	18	INSERT INTO Teaches VALUES('290327837', 'SPA', '1', 18);
51	49	292211500	SPA	2	19	INSERT INTO Teaches VALUES('292211500', 'SPA', '2', 19);
52	50	337767185	SPA	3	20	INSERT INTO Teaches VALUES('337767185', 'SPA', '3', 20);
53	51	891149217	HIS	17A	21	INSERT INTO Teaches VALUES('891149217', 'HIS', '17A', 21);
54	52	418130858	HIS	17B	22	INSERT INTO Teaches VALUES('418130858', 'HIS', '17B', 22);
55	53	100859622	GEO	2A	23	INSERT INTO Teaches VALUES('100859622', 'GEO', '2A', 23);
56	54	996595763	GEO	2B	24	INSERT INTO Teaches VALUES('996595763', 'GEO', '2B', 24);
57	55	851438868	HUM	5A	25	INSERT INTO Teaches VALUES('851438868', 'HUM', '5A', 25);
58	56	603160432	HUM	5B	26	INSERT INTO Teaches VALUES('603160432', 'HUM', '5B', 26);
59	57	875783848	KIN	1	27	INSERT INTO Teaches VALUES('875783848', 'KIN', '1', 27);
60	58	661054866	KIN	2	28	INSERT INTO Teaches VALUES('661054866', 'KIN', '2', 28);
61	59	611668180	KIN	3	29	INSERT INTO Teaches VALUES('611668180', 'KIN', '3', 29);
62	60	957713740	KIN	4	30	INSERT INTO Teaches VALUES('957713740', 'KIN', '4', 30);

Registers(studentID, department, number, configID)

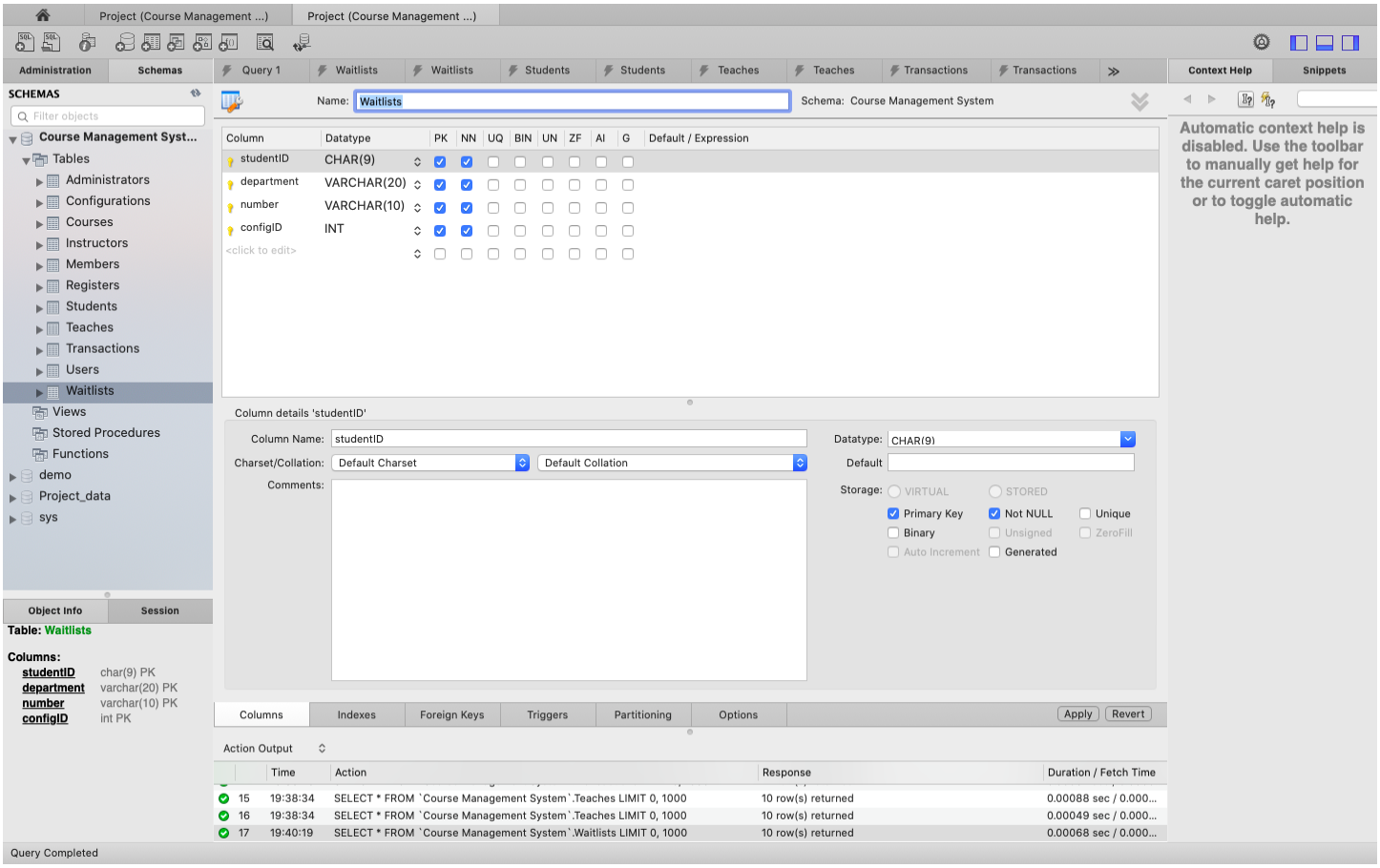

Project (Course Management ...)
Project (Course Management ...)
Administration
Schemas
Query 1
Waitlists
Waitlists
Students
Students
Teaches
Teaches
Transactions
Transactions
Context Help
Snippets
SCHEMAS
Filter objects
Course Management Syst...
Tables
Administrators
Configurations
Courses
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Name: Registers
Schema: Course Management System
Column
Datatype
PK
NN
UQ
BIN
UN
ZF
AI
G
Default / Expression
studentID
CHAR(9)
department
VARCHAR(20)
number
VARCHAR(10)
configID
INT
<click to edit>
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Column details 'studentID'
Column Name: studentID
Charset/Collation: Default Charset
Default Collation
Comments:
Datatype: CHAR(9)
Default
Storage: VIRTUAL STORED
Primary Key
Not NULL
Unique
Binary
Unsigned
ZeroFill
Auto Increment
Generated
Object Info
Session
Table: Registers
Columns:
studentID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Columns
Indexes
Foreign Keys
Triggers
Partitioning
Options
Apply
Revert
Action Output
Time
Action
Response
Duration / Fetch Time
18 19:40:19 SELECT * FROM `Course Management System`.Waitlists LIMIT 0, 1000 10 row(s) returned 0.0028 sec / 0.00023...
19 19:42:16 SELECT * FROM `Course Management System`.Registers LIMIT 0, 1000 24 row(s) returned 0.00053 sec / 0.000...
20 19:42:17 SELECT * FROM `Course Management System`.Registers LIMIT 0, 1000 24 row(s) returned 0.00055 sec / 0.000...
Query Completed

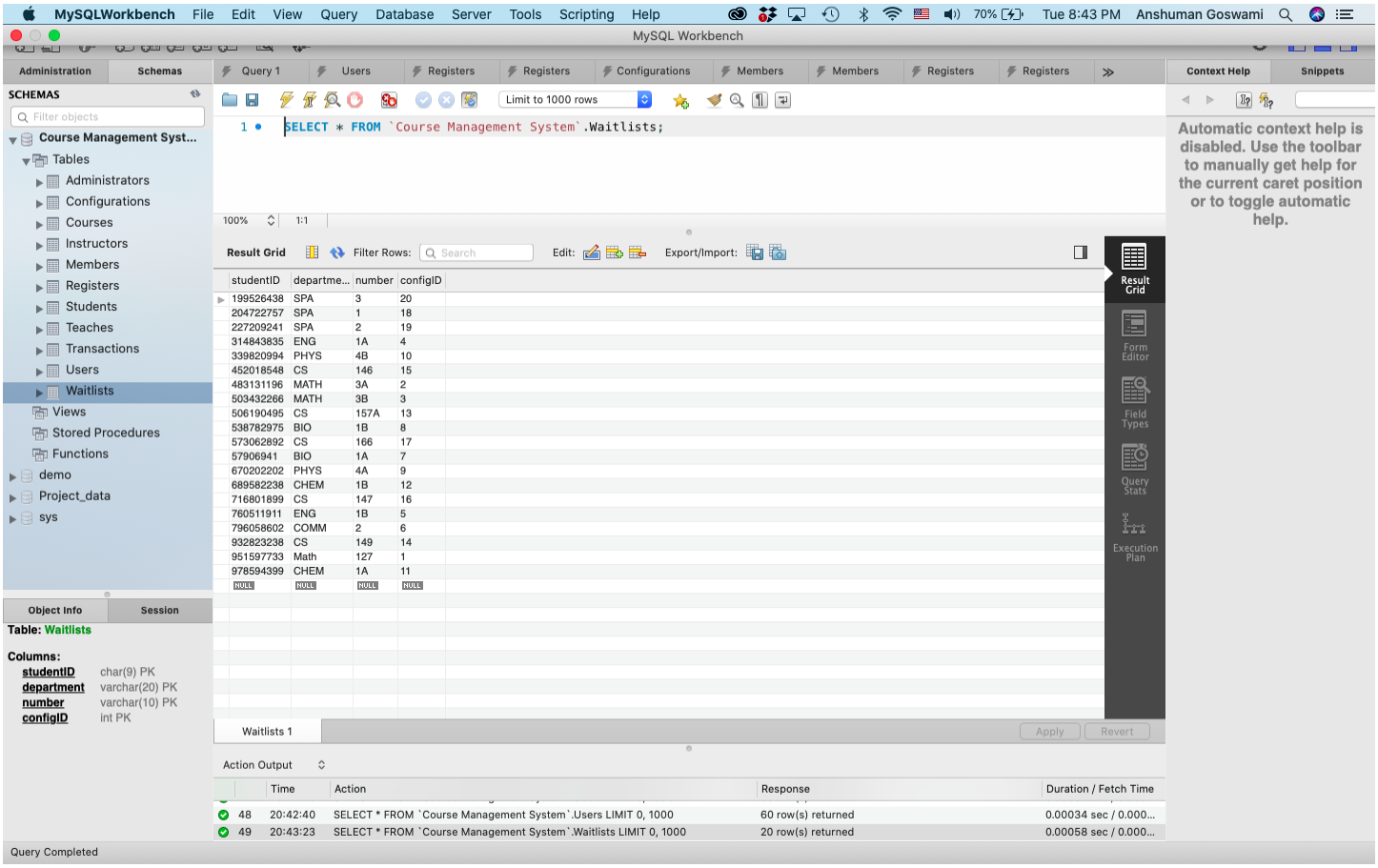

MySQLWorkbench File Edit View Query Database Server Tools Scripting Help
65% Tue 8:38 PM Anshuman Goswami
MySQL Workbench
Administration
Schemas
Query 1
Users
Registers
Registers
Configurations
Members
Members
Registers
Registers
Context Help
Snippets
SCHEMAS
Filter objects
Course Management Syst...
Tables
Administrators
Configurations
Courses
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Limit to 1000 rows
1 • SELECT * FROM `Course Management System`.Registers;
100%
1:1
Result Grid
Filter Rows: Search
Edit:
Export/Import:
studentID departme... number configID
199526438 CHEM 1A 11
199526438 HIS 17A 21
199526438 Math 127 1
204722757 KIN 3 29
204722757 PHYS 4A 9
204722757 SPA 2 19
227209241 KIN 4 30
227209241 PHYS 4B 10
227209241 SPA 3 20
314843835 CS 146 15
314843835 ENG 1B 5
314843835 HUM 5A 25
339820994 CHEM 1A 11
339820994 HIS 17A 21
339820994 Math 127 1
452018548 COMM 2 6
452018548 CS 147 16
452018548 HUM 5B 26
483131196 CS 157A 13
483131196 GEO 2A 23
483131196 MATH 3B 3
503432266 CS 149 14
503432266 ENG 1A 4
503432266 GEO 2B 24
506190495 CS 149 14
506190495 ENG 1A 4
506190495 GEO 2B 24
538782975 KIN 3 29
538782975 PHYS 4A 9
538782975 SPA 2 19
Registers 1
Apply
Revert
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Object Info
Session
Table: Registers
Columns:
studentID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Action Output
Time
Action
Response
Duration / Fetch Time
38 20:37:32 SELECT * FROM `Course Management System`.Members LIMIT 0, 1000 60 row(s) returned 0.00040 sec / 0.000...
39 20:38:20 SELECT * FROM `Course Management System`.Registers LIMIT 0, 1000 60 row(s) returned 0.00071 sec / 0.0000...
Query Completed

	A	B	C	D	E	F
1		**Registers**				Each person 2 courses
2		SID	Department	Number	ConfigID	SQL Statement
3	1	199526438	Math	127	1	INSERT INTO Registers VALUES('199526438', 'Math', '127', 1);
4	2	951597733	MATH	3A	2	INSERT INTO Registers VALUES('951597733', 'MATH', '3A', 2);
5	3	483131196	MATH	3B	3	INSERT INTO Registers VALUES('483131196', 'MATH', '3B', 3);
6	4	503432266	ENG	1A	4	INSERT INTO Registers VALUES('503432266', 'ENG', '1A', 4);
7	5	314843835	ENG	1B	5	INSERT INTO Registers VALUES('314843835', 'ENG', '1B', 5);
8	6	760511911	COMM	2	6	INSERT INTO Registers VALUES('760511911', 'COMM', '2', 6);
9	7	796058602	BIO	1A	7	INSERT INTO Registers VALUES('796058602', 'BIO', '1A', 7);
10	8	57906941	BIO	1B	8	INSERT INTO Registers VALUES('57906941', 'BIO', '1B', 8);
11	9	538782975	PHYS	4A	9	INSERT INTO Registers VALUES('538782975', 'PHYS', '4A', 9);
12	10	670202202	PHYS	4B	10	INSERT INTO Registers VALUES('670202202', 'PHYS', '4B', 10);
13	11	339820994	CHEM	1A	11	INSERT INTO Registers VALUES('339820994', 'CHEM', '1A', 11);
14	12	978594399	CHEM	1B	12	INSERT INTO Registers VALUES('978594399', 'CHEM', '1B', 12);
15	13	689582238	CS	157A	13	INSERT INTO Registers VALUES('689582238', 'CS', '157A', 13);
16	14	506190495	CS	149	14	INSERT INTO Registers VALUES('506190495', 'CS', '149', 14);
17	15	932823238	CS	146	15	INSERT INTO Registers VALUES('932823238', 'CS', '146', 15);
18	16	452018548	CS	147	16	INSERT INTO Registers VALUES('452018548', 'CS', '147', 16);
19	17	716801899	CS	166	17	INSERT INTO Registers VALUES('716801899', 'CS', '166', 17);
20	18	573062892	SPA	1	18	INSERT INTO Registers VALUES('573062892', 'SPA', '1', 18);
21	19	204722757	SPA	2	19	INSERT INTO Registers VALUES('204722757', 'SPA', '2', 19);
22	20	227209241	SPA	3	20	INSERT INTO Registers VALUES('227209241', 'SPA', '3', 20);
23	21	199526438	HIS	17A	21	INSERT INTO Registers VALUES('199526438', 'HIS', '17A', 21);
24	22	951597733	HIS	17B	22	INSERT INTO Registers VALUES('951597733', 'HIS', '17B', 22);
25	23	483131196	GEO	2A	23	INSERT INTO Registers VALUES('483131196', 'GEO', '2A', 23);
26	24	503432266	GEO	2B	24	INSERT INTO Registers VALUES('503432266', 'GEO', '2B', 24);
27	25	314843835	HUM	5A	25	INSERT INTO Registers VALUES('314843835', 'HUM', '5A', 25);
28	26	760511911	HUM	5B	26	INSERT INTO Registers VALUES('760511911', 'HUM', '5B', 26);
29	27	796058602	KIN	1	27	INSERT INTO Registers VALUES('796058602', 'KIN', '1', 27);
30	28	57906941	KIN	2	28	INSERT INTO Registers VALUES('57906941', 'KIN', '2', 28);

33	31	339820994	Math	127	1	INSERT INTO Registers VALUES('339820994', 'Math', '127', 1);
34	32	978594399	MATH	3A	2	INSERT INTO Registers VALUES('978594399', 'MATH', '3A', 2);
35	33	689582238	MATH	3B	3	INSERT INTO Registers VALUES('689582238', 'MATH', '3B', 3);
36	34	506190495	ENG	1A	4	INSERT INTO Registers VALUES('506190495', 'ENG', '1A', 4);
37	35	932823238	ENG	1B	5	INSERT INTO Registers VALUES('932823238', 'ENG', '1B', 5);
38	36	452018548	COMM	2	6	INSERT INTO Registers VALUES('452018548', 'COMM', '2', 6);
39	37	716801899	BIO	1A	7	INSERT INTO Registers VALUES('716801899', 'BIO', '1A', 7);
40	38	573062892	BIO	1B	8	INSERT INTO Registers VALUES('573062892', 'BIO', '1B', 8);
41	39	204722757	PHYS	4A	9	INSERT INTO Registers VALUES('204722757', 'PHYS', '4A', 9);
42	40	227209241	PHYS	4B	10	INSERT INTO Registers VALUES('227209241', 'PHYS', '4B', 10);
43	41	199526438	CHEM	1A	11	INSERT INTO Registers VALUES('199526438', 'CHEM', '1A', 11);
44	42	951597733	CHEM	1B	12	INSERT INTO Registers VALUES('951597733', 'CHEM', '1B', 12);
45	43	483131196	CS	157A	13	INSERT INTO Registers VALUES('483131196', 'CS', '157A', 13);
46	44	503432266	CS	149	14	INSERT INTO Registers VALUES('503432266', 'CS', '149', 14);
47	45	314843835	CS	146	15	INSERT INTO Registers VALUES('314843835', 'CS', '146', 15);
48	46	760511911	CS	147	16	INSERT INTO Registers VALUES('760511911', 'CS', '147', 16);
49	47	796058602	CS	166	17	INSERT INTO Registers VALUES('796058602', 'CS', '166', 17);
50	48	57906941	SPA	1	18	INSERT INTO Registers VALUES('57906941', 'SPA', '1', 18);
51	49	538782975	SPA	2	19	INSERT INTO Registers VALUES('538782975', 'SPA', '2', 19);
52	50	670202202	SPA	3	20	INSERT INTO Registers VALUES('670202202', 'SPA', '3', 20);
53	51	339820994	HIS	17A	21	INSERT INTO Registers VALUES('339820994', 'HIS', '17A', 21);
54	52	978594399	HIS	17B	22	INSERT INTO Registers VALUES('978594399', 'HIS', '17B', 22);
55	53	689582238	GEO	2A	23	INSERT INTO Registers VALUES('689582238', 'GEO', '2A', 23);
56	54	506190495	GEO	2B	24	INSERT INTO Registers VALUES('506190495', 'GEO', '2B', 24);
57	55	932823238	HUM	5A	25	INSERT INTO Registers VALUES('932823238', 'HUM', '5A', 25);
58	56	452018548	HUM	5B	26	INSERT INTO Registers VALUES('452018548', 'HUM', '5B', 26);
59	57	716801899	KIN	1	27	INSERT INTO Registers VALUES('716801899', 'KIN', '1', 27);
60	58	573062892	KIN	2	28	INSERT INTO Registers VALUES('573062892', 'KIN', '2', 28);
61	59	204722757	KIN	3	29	INSERT INTO Registers VALUES('204722757', 'KIN', '3', 29);
62	60	227209241	KIN	4	30	INSERT INTO Registers VALUES('227209241', 'KIN', '4', 30);

Waitlists(studentID, department, number, configID)


Project (Course Management ...)
Project (Course Management ...)
Administration
Schemas
Query 1
Waitlists
Waitlists
Students
Students
Teaches
Teaches
Transactions
Transactions
Context Help
Snippets
SCHEMAS
Filter objects
Course Management Syst...
Tables
Administrators
Configurations
Courses
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Name: Waitlists
Schema: Course Management System
Column
Datatype
PK
NN
UQ
BIN
UN
ZF
AI
G
Default / Expression
studentID
CHAR(9)
department
VARCHAR(20)
number
VARCHAR(10)
configID
INT
<click to edit>
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Column details 'studentID'
Column Name: studentID
Charset/Collation: Default Charset
Default Collation
Comments:
Datatype: CHAR(9)
Default
Storage:
VIRTUAL
STORED
Primary Key
Not NULL
Unique
Binary
Unsigned
ZeroFill
Auto Increment
Generated
Object Info
Session
Table: Waitlists
Columns:
studentID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Columns
Indexes
Foreign Keys
Triggers
Partitioning
Options
Apply
Revert
Action Output
Time
Action
Response
Duration / Fetch Time
15 19:38:34 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 10 row(s) returned 0.00088 sec / 0.000...
16 19:38:34 SELECT * FROM `Course Management System`.Teaches LIMIT 0, 1000 10 row(s) returned 0.00049 sec / 0.000...
17 19:40:19 SELECT * FROM `Course Management System`.Waitlists LIMIT 0, 1000 10 row(s) returned 0.00068 sec / 0.000...
Query Completed

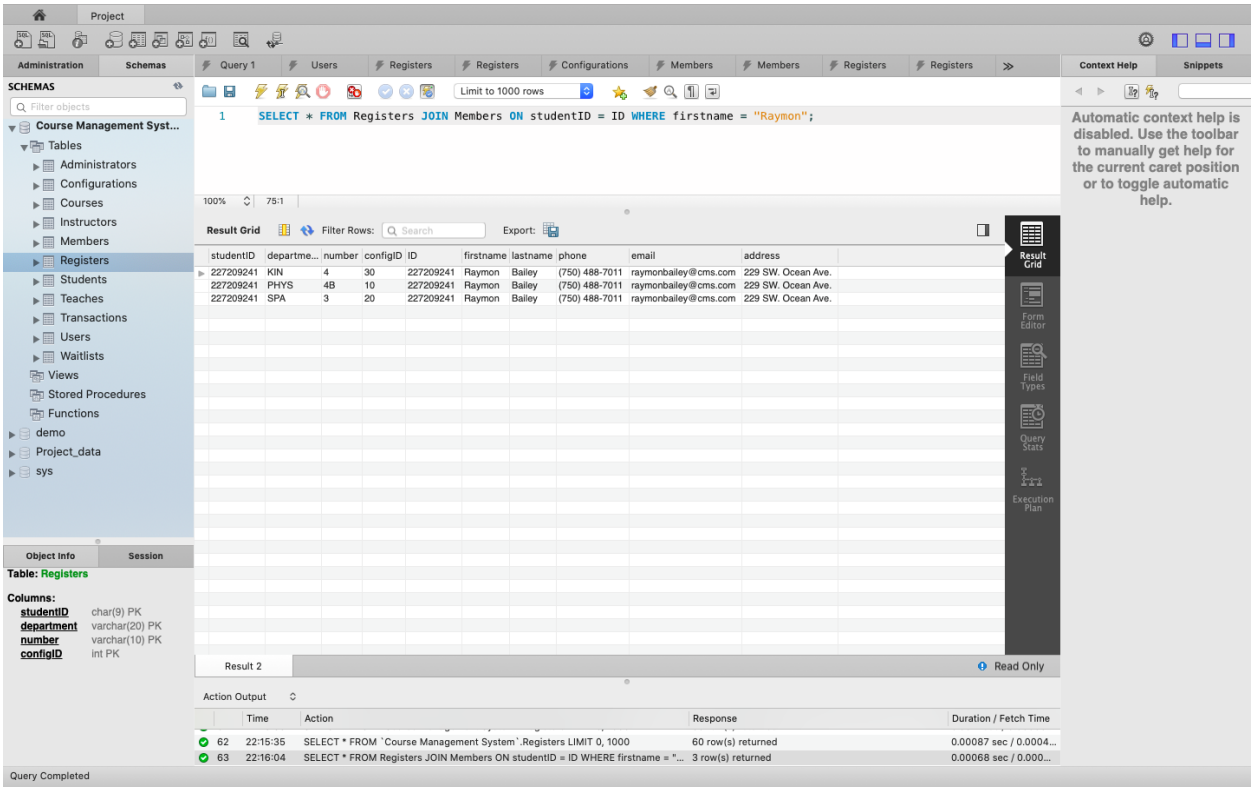

MySQLWorkbench
File
Edit
View
Query
Database
Server
Tools
Scripting
Help
70%
Tue 8:43 PM
Anshuman Goswami
MySQL Workbench
Administration
Schemas
Query 1
Users
Registers
Registers
Configurations
Members
Members
Registers
Registers
Context Help
Snippets
SCHEMAS
Filter objects
Course Management Syst...
Tables
Administrators
Configurations
Courses
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Limit to 1000 rows
1 SELECT * FROM `Course Management System`.Waitlists;
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
100%
1:1
Result Grid
Filter Rows:
Search
Edit:
Export/Import:
studentID departme... number configID
199526438 SPA 3 20
204722757 SPA 1 18
227209241 SPA 2 19
314843835 ENG 1A 4
339820994 PHYS 4B 10
452018548 CS 146 15
483131196 MATH 3A 2
503432266 MATH 3B 3
506190495 CS 157A 13
538782975 BIO 1B 8
573062892 CS 166 17
57906941 BIO 1A 7
670202202 PHYS 4A 9
689582238 CHEM 1B 12
716801899 CS 147 16
760511911 ENG 1B 5
796058602 COMM 2 6
932823238 CS 149 14
951597733 Math 127 1
978594399 CHEM 1A 11
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Object Info
Session
Table: Waitlists
Columns:
studentID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Waitlists 1
Apply
Revert
Action Output
Time
Action
Response
Duration / Fetch Time
48 20:42:40 SELECT * FROM `Course Management System`.Users LIMIT 0, 1000 60 row(s) returned 0.00034 sec / 0.000...
49 20:43:23 SELECT * FROM `Course Management System`.Waitlists LIMIT 0, 1000 20 row(s) returned 0.00058 sec / 0.000...
Query Completed

	A	B	C	D	E	F
1		**Waitlists**				Each person 2 courses
2		SID	Department	Number	ConfigID	SQL Statement
3	1	199526438	SPA	3	20	INSERT INTO Waitlists VALUES('199526438', 'SPA', '3', 20);
4	2	951597733	Math	127	1	INSERT INTO Waitlists VALUES('951597733', 'Math', '127', 1);
5	3	483131196	MATH	3A	2	INSERT INTO Waitlists VALUES('483131196', 'MATH', '3A', 2);
6	4	503432266	MATH	3B	3	INSERT INTO Waitlists VALUES('503432266', 'MATH', '3B', 3);
7	5	314843835	ENG	1A	4	INSERT INTO Waitlists VALUES('314843835', 'ENG', '1A', 4);
8	6	760511911	ENG	1B	5	INSERT INTO Waitlists VALUES('760511911', 'ENG', '1B', 5);
9	7	796058602	COMM	2	6	INSERT INTO Waitlists VALUES('796058602', 'COMM', '2', 6);
10	8	57906941	BIO	1A	7	INSERT INTO Waitlists VALUES('57906941', 'BIO', '1A', 7);
11	9	538782975	BIO	1B	8	INSERT INTO Waitlists VALUES('538782975', 'BIO', '1B', 8);
12	10	670202202	PHYS	4A	9	INSERT INTO Waitlists VALUES('670202202', 'PHYS', '4A', 9);
13	11	339820994	PHYS	4B	10	INSERT INTO Waitlists VALUES('339820994', 'PHYS', '4B', 10);
14	12	978594399	CHEM	1A	11	INSERT INTO Waitlists VALUES('978594399', 'CHEM', '1A', 11);
15	13	689582238	CHEM	1B	12	INSERT INTO Waitlists VALUES('689582238', 'CHEM', '1B', 12);
16	14	506190495	CS	157A	13	INSERT INTO Waitlists VALUES('506190495', 'CS', '157A', 13);
17	15	932823238	CS	149	14	INSERT INTO Waitlists VALUES('932823238', 'CS', '149', 14);
18	16	452018548	CS	146	15	INSERT INTO Waitlists VALUES('452018548', 'CS', '146', 15);
19	17	716801899	CS	147	16	INSERT INTO Waitlists VALUES('716801899', 'CS', '147', 16);
20	18	573062892	CS	166	17	INSERT INTO Waitlists VALUES('573062892', 'CS', '166', 17);
21	19	204722757	SPA	1	18	INSERT INTO Waitlists VALUES('204722757', 'SPA', '1', 18);
22	20	227209241	SPA	2	19	INSERT INTO Waitlists VALUES('227209241', 'SPA', '2', 19);

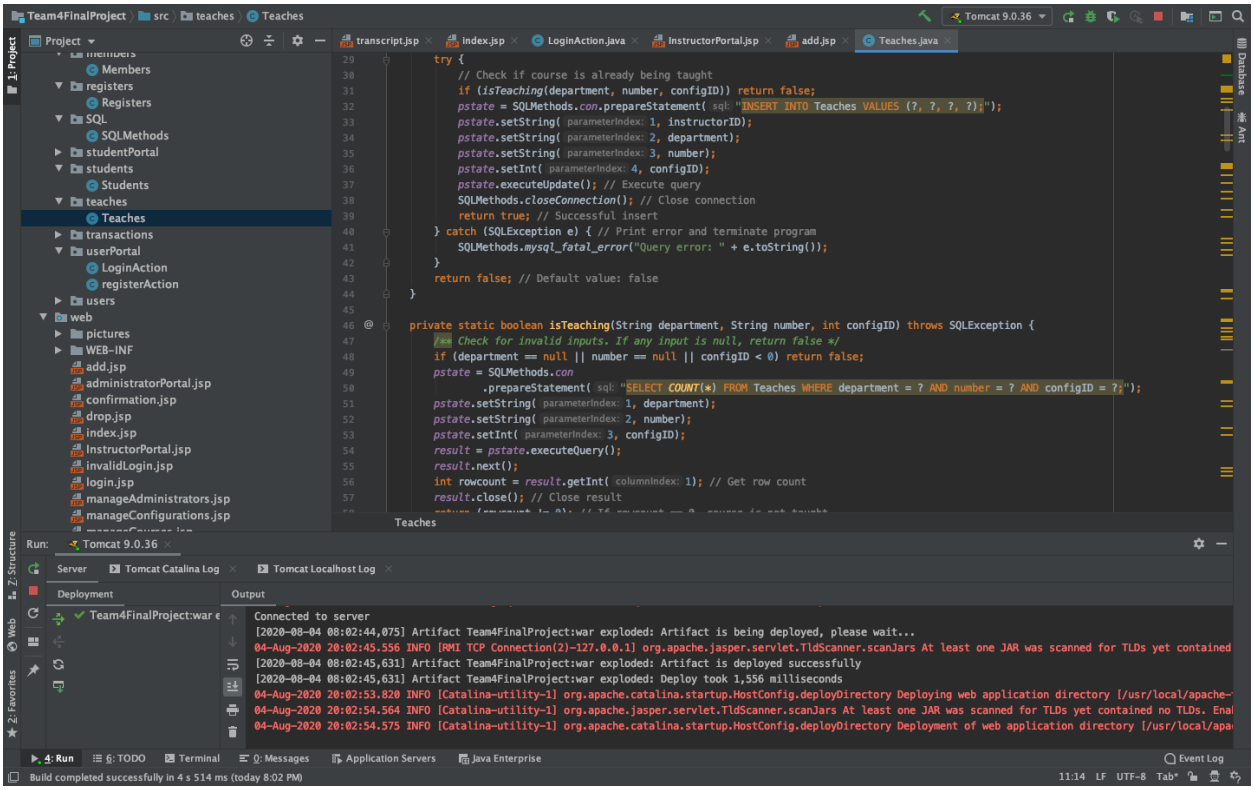
Project Implementation

We started with a simple index.jsp and LoginAction.java servlet. We ran these two files to check how to run a simple web application using Tomcat server. Then eventually we added the main java files: Instructors, Administrators, Students, Courses and their corresponding .jsp files.

The java classes use SQL statements to interact with the database. During development, we first developed the queries and tested on MySQLWorkbench. Once they were functional, we incorporated the SQL statements inside the Java class and tested the output on the console. Finally, we connected the Java class to the jsp file, ran the same statement and displayed the output in the browser. The figure below shows the workflow in the MySQLWorkbench.



The figure below shows the workflow in the Java class.


Team4FinalProject
src
teaches
Teaches
Tomcat 9.0.36
transcript.jsp
index.jsp
LoginAction.java
InstructorPortal.jsp
add.jsp
Teaches.java
Project
Members
registers
Registers
SQL
SQLMethods
studentPortal
students
Students
teaches
Teaches
transactions
userPortal
LoginAction
registerAction
users
web
pictures
WEB-INF
add.jsp
administratorPortal.jsp
confirmation.jsp
drop.jsp
index.jsp
InstructorPortal.jsp
invalidLogin.jsp
login.jsp
manageAdministrators.jsp
manageConfigurations.jsp
try {
// Check if course is already being taught
if (isTeaching(department, number, configID)) return false;
pstate = SQLMethods.con.prepareStatement(sql: "INSERT INTO Teaches VALUES (?, ?, ?, ?);");
pstate.setString(parameterIndex: 1, instructorID);
pstate.setString(parameterIndex: 2, department);
pstate.setString(parameterIndex: 3, number);
pstate.setInt(parameterIndex: 4, configID);
pstate.executeUpdate(); // Execute query
SQLMethods.closeConnection(); // Close connection
return true; // Successful insert
} catch (SQLException e) { // Print error and terminate program
SQLMethods.mysql_fatal_error("Query error: " + e.toString());
}
return false; // Default value: false
}
private static boolean isTeaching(String department, String number, int configID) throws SQLException {
/** Check for invalid inputs. If any input is null, return false */
if (department == null || number == null || configID < 0) return false;
pstate = SQLMethods.con
.prepareStatement(sql: "SELECT COUNT(*) FROM Teaches WHERE department = ? AND number = ? AND configID = ?;");
pstate.setString(parameterIndex: 1, department);
pstate.setString(parameterIndex: 2, number);
pstate.setInt(parameterIndex: 3, configID);
result = pstate.executeQuery();
result.next();
int rowcount = result.getInt(columnIndex: 1); // Get row count
result.close(); // Close result
Teaches
Run:
Tomcat 9.0.36
Server
Tomcat Catalina Log
Tomcat Localhost Log
Deployment
Output
Team4FinalProject:war e
Connected to server
[2020-08-04 08:02:44,075] Artifact Team4FinalProject:war exploded: Artifact is being deployed, please wait...
04-Aug-2020 20:02:45.556 INFO [RMI TCP Connection(2)-127.0.0.1] org.apache.jasper.servlet.TldScanner.scanJars At least one JAR was scanned for TLDs yet contained
[2020-08-04 08:02:45,631] Artifact Team4FinalProject:war exploded: Artifact is deployed successfully
[2020-08-04 08:02:45,631] Artifact Team4FinalProject:war exploded: Deploy took 1,556 milliseconds
04-Aug-2020 20:02:53.820 INFO [Catalina-utility-1] org.apache.catalina.startup.HostConfig.deployDirectory Deploying web application directory [/usr/local/apache-
04-Aug-2020 20:02:54.564 INFO [Catalina-utility-1] org.apache.jasper.servlet.TldScanner.scanJars At least one JAR was scanned for TLDs yet contained no TLDs. Enal
04-Aug-2020 20:02:54.575 INFO [Catalina-utility-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory [/usr/local/apa
4: Run
6: TODO
Terminal
0: Messages
Application Servers
Java Enterprise
Event Log
Build completed successfully in 4 s 514 ms (today 8:02 PM)
11:14
LF
UTF-8
Tab*

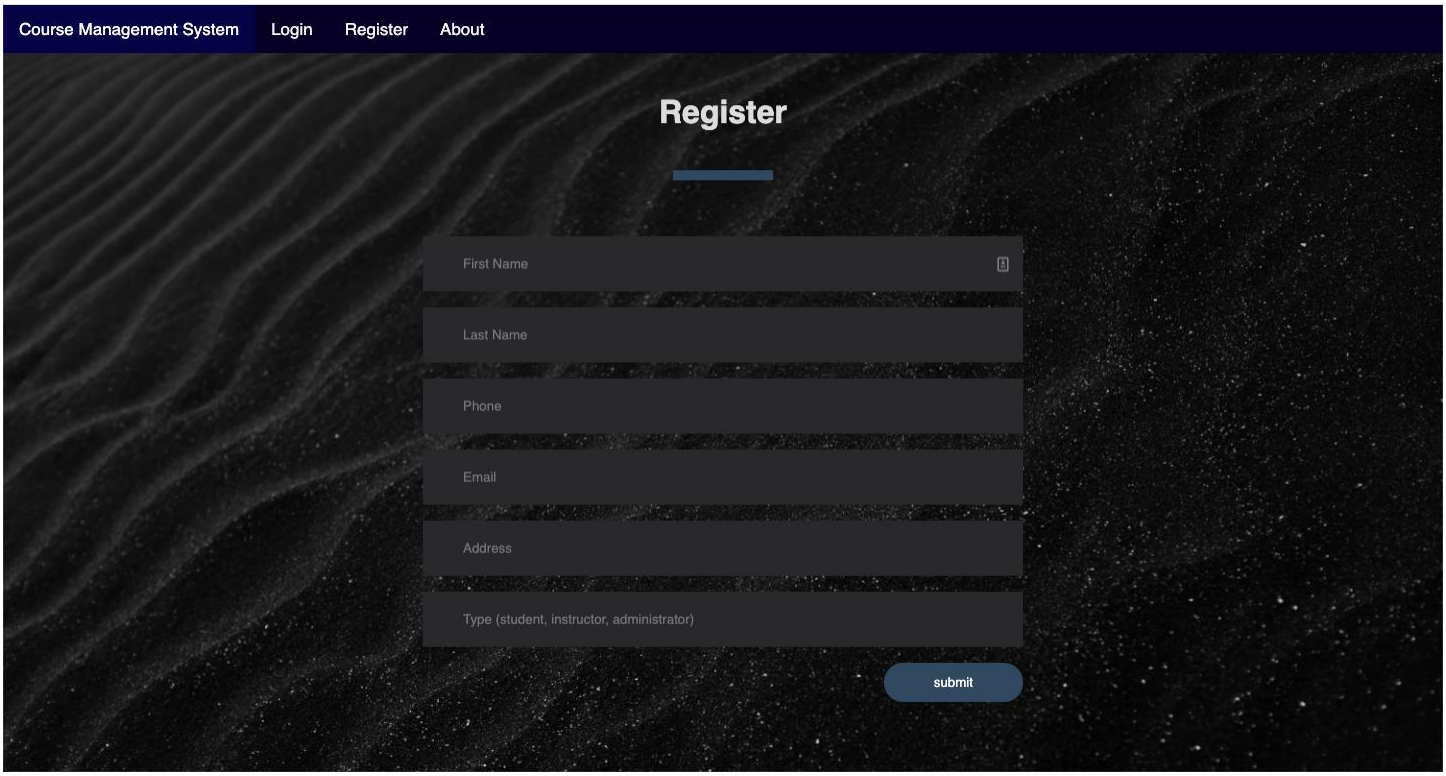
Register in the system

When we run the project, we start from the homepage index.jsp. Visitors go to the homepage.

Code for index.jsp.

```
<style>
body {
    background: url(pictures/home.jpg) no-repeat;
    background-size: cover;
    margin: 0;
    padding: 0;
    font-family: Arial, Helvetica, sans-serif;
}

.topnav {
    overflow: hidden;
    background-color: #030024;
}

.topnav a {
    float: left;
    color: #f2f2f2;
    text-align: center;
    padding: 14px 16px;
    text-decoration: none;
    font-size: 17px;
}

.topnav a:hover {
    background-color: #ddd;
    color: black;
}

.topnav a.active {
    background-color: #010d42;
    color: white;
}
</style>
</head>
<body>
    <div class="topnav">
        <a class="active" href="index.jsp">Course Management System</a> <a
            href="login.jsp">Login</a> <a href="register.jsp">Register</a> <a href="#about">About</a>
    </div>
    <h1 style="color: white; text-align: center; font-size: 200%;">Welcome
        to the Course Management System</h1>

    <h1 style="color: white; text-align: center; font-size: 150%;">Please
        log in or register!</h1>
</body>
</html>

```

If visitors want to register, they click the “Register” button in the navigation bar.They will then be directed to a form. The form will only submit if the fields are not null and if the account type is either ‘student’, ‘instructor’, or ‘administrator’.



Code for register.jsp

```
.topnav {
    overflow: hidden;
    background-color: #030024;
}

.topnav a {
    float: left;
    color: #f2f2f2;
    text-align: center;
    padding: 14px 16px;
    text-decoration: none;
    font-size: 17px;
}

.topnav a:hover {
    background-color: #ddd;
    color: black;
}

.topnav a.active {
    background-color: #010d42;
    color: white;
}
</style>
</head>
<body>
<div class="topnav">
        <a class="active" href="index.jsp">Course Management System</a> <a
            href="login.jsp">Login</a> <a href="register.jsp">Register</a> <a href="#about">About</a>
    </div>
    <div class="contact-section">
        <h1>Register</h1>
        <div class="border"></div>
        <form class="contact-form" action="registerAction" method="post">
            <input type="text" class="contact-form-text" placeholder="First Name" name="firstname">
            <input type="text" class="contact-form-text" placeholder="Last Name" name="lastname">
            <input type="text" class="contact-form-text" placeholder="Phone" name="phone">
            <input type="text" class="contact-form-text" placeholder="Email" name="email">
            <input type="text" class="contact-form-text" placeholder="Address" name="address">
            <input type="text" class="contact-form-text" placeholder="Type (student, instructor, administrat
            <input type="submit" class="contact-form-btn" value="submit">
        </form>
    </div>
</body>
</html>
```

When we submit this form, we then go to the serverlet registerAction which is registerAction.java.

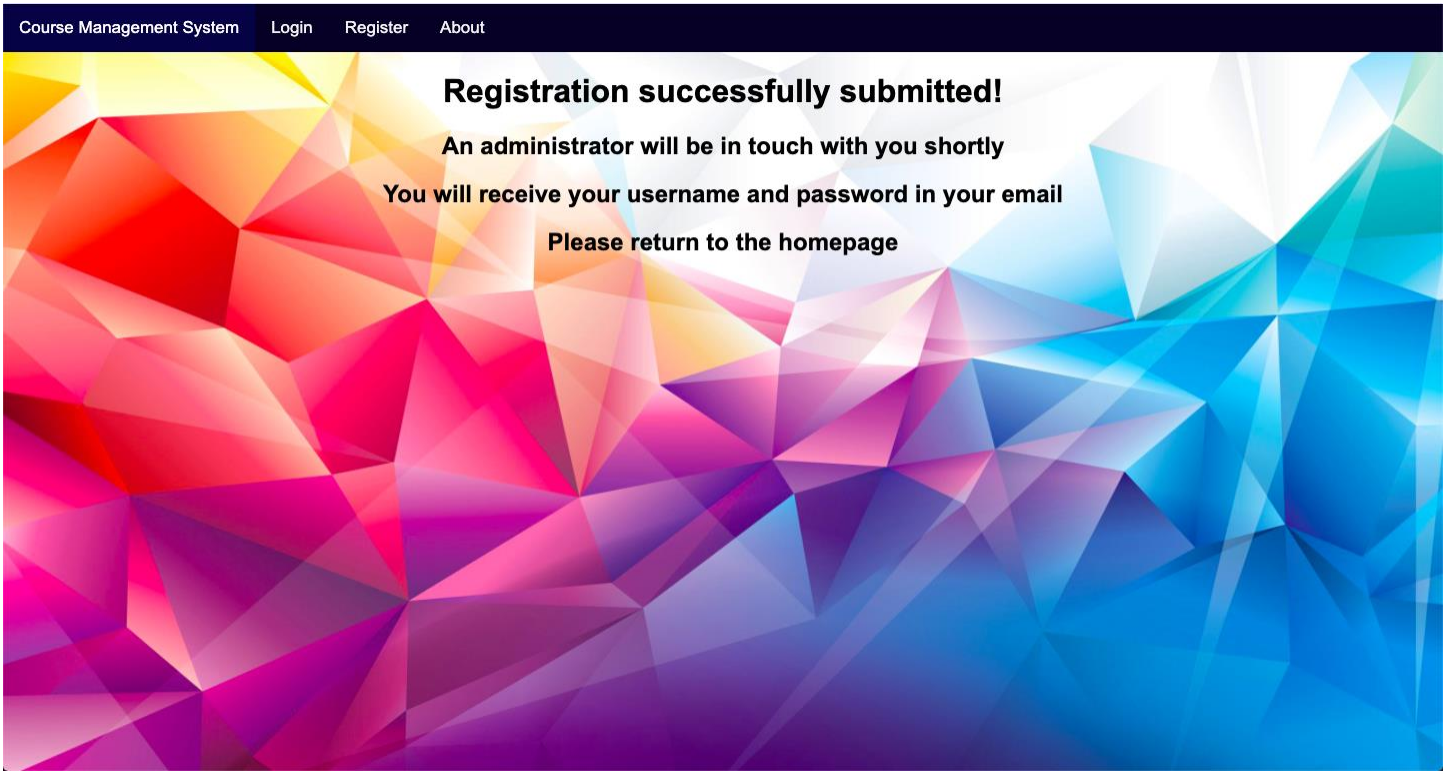
```java
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    // Get fields from form
    String firstname = request.getParameter("firstname");
    String lastname = request.getParameter("lastname");
    String phone = request.getParameter("phone");
    String email = request.getParameter("email");
    String address = request.getParameter("address");
    String type = request.getParameter("type");

    /** If any fields are empty, return back to the form */
    if (firstname.isEmpty() || lastname.isEmpty() || phone.isEmpty() || email.isEmpty() || address.isEmpt
            || type.isEmpty()) {
        RequestDispatcher req = request.getRequestDispatcher("register.jsp"); // Return to the form
        req.include(request, response);
    } else {
        /** Generate ID */
        Random rand = new Random();
        String ID = Integer.toString(rand.nextInt(1000000000)); // Generate ID (9 digits)
        /** Check if ID already exists. Keep on generating until find an ID that DNE */
        while (!Members.checkID(ID))
            ID = Integer.toString(rand.nextInt(1000000000)); // Generate ID (9 digits)
        /** Get type of user (student, instructor, administrator). */
        if (type.equalsIgnoreCase("administrator")) {
            Administrators.insert(ID, 0); // Clearance = 0 (no access until an existing admin eupdates)
            Members.insert(ID, firstname, lastname, phone, email, address); // Add member to DB
            /** Go to confirmation page */
            RequestDispatcher req = request.getRequestDispatcher("confirmation.jsp"); // Go to confirmati
            req.forward(request, response);
        } else if (type.equalsIgnoreCase("instructor")) {
            Instructors.insert(ID, "Inactive");
            Members.insert(ID, firstname, lastname, phone, email, address); // Add member to DB
            /** Go to confirmation page */
            RequestDispatcher req = request.getRequestDispatcher("confirmation.jsp"); // Go to confirmati
            req.forward(request, response);
        } else if (type.equalsIgnoreCase("student")) { // Student
            Students.insert(ID, 0, 12); // Initial unit cap is 12
            Members.insert(ID, firstname, lastname, phone, email, address); // Add member to DB
            /** Go to confirmation page */
            RequestDispatcher req = request.getRequestDispatcher("confirmation.jsp"); // Go to confirmati
            req.forward(request, response);
        } else { // Invalid type. Return to form.
            /** If invalid type, return back to form */
            RequestDispatcher req = request.getRequestDispatcher("register.jsp"); // Return to the form
            req.include(request, response);
        }
    }
```

If any fields are null, return to the user. If the type is not valid, return. Otherwise, add the member to the database using this method. Also, insert into the table corresponding to the type of user.

Insert method in members to add user to database:

```java
    */
    public static boolean insert(String ID, String firstname, String lastname, String phone, String email,
            String address) {
        /** Check for invalid inputs. If any input is null, return false */
        if (ID == null || firstname == null || lastname == null || phone == null || email == null || address
            return false;
        SQLMethods.mysqlConnect(); // Connect to DB
        try { // Attempt to insert
            pstate = SQLMethods.con.prepareStatement("INSERT INTO Members VALUES(?, ?, ?, ?, ?, ?);");
            pstate.setString(1, ID);
            pstate.setString(2, firstname);
            pstate.setString(3, lastname);
            pstate.setString(4, phone);
            pstate.setString(5, email);
            pstate.setString(6, address);
            int rowcount = pstate.executeUpdate();
            SQLMethods.closeConnection(); // Close connection
            return (rowcount == 1); // If rowcount == 1, row successfully inserted
        } catch (SQLException e) { // Print error and terminate program
            SQLMethods.mysql_fatal_error("Query error: " + e.toString());
        }
        return false; // Default value: false
    }
```

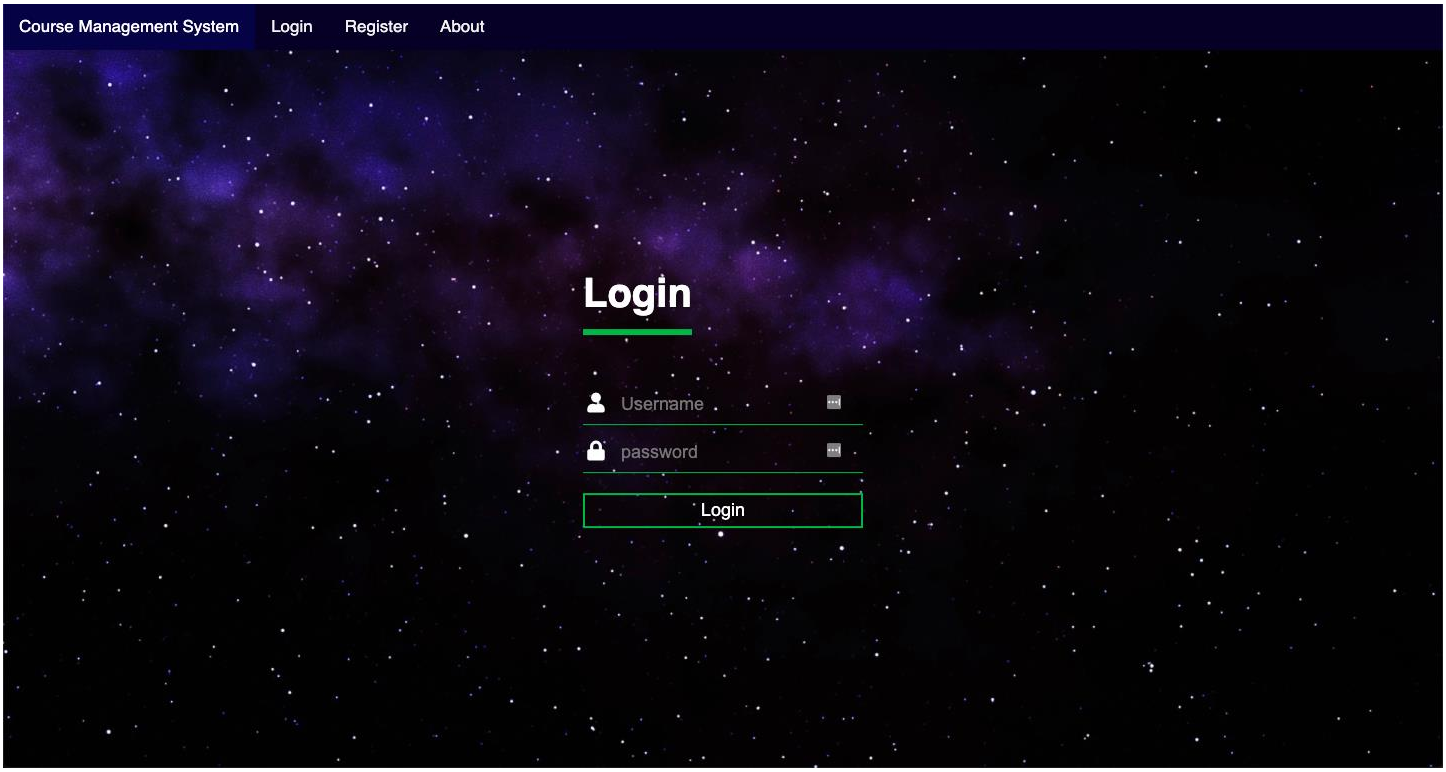
If wrong information is entered, they will get back to the form. If the requirements were met, they will get this confirmation message. An admin will soon email the account credentials.



The visitor can now get back to the homepage or leave.

Log in

Visitors go to the homepage and then click the ‘Login’ button in the navigation bar. They will be redirected to this page.

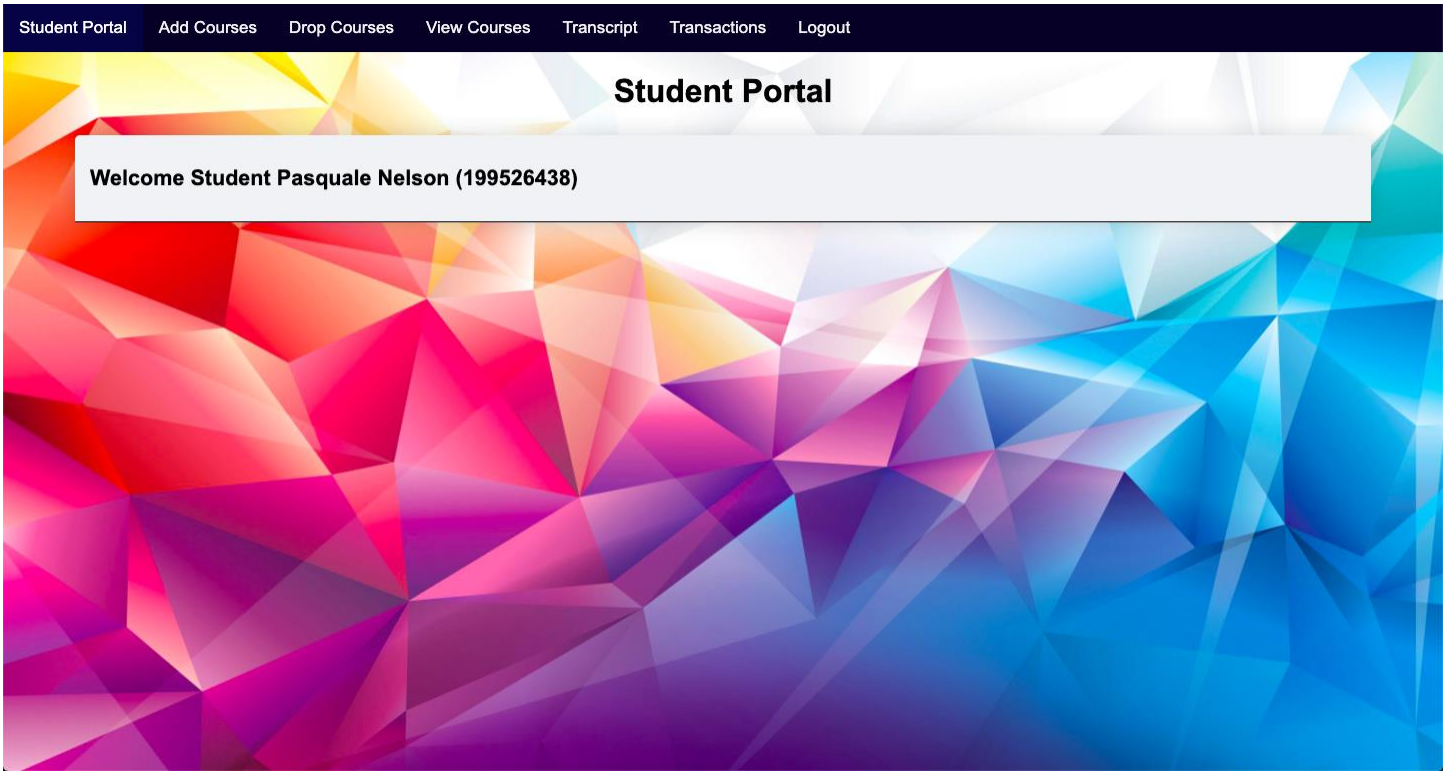

Course Management System
Login
Register
About
Login
Username
password
Login

Code for login.jsp:

```jsp
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>User Login</title>

<link href="style.css" rel="stylesheet" type="text/css"/>
</head>
<body>
    <div class="topnav">
        <a class="active" href="index.jsp">Course Management System</a> <a
            href="login.jsp">Login</a> <a href="register.jsp">Register</a> <a
            href="#about">About</a>
    </div>
    <div class="login-box">
        <h1>Login</h1>
        <form action="LoginAction" method="post">
            <div class="textbox">
                <i class="fas fa-user"></i> <input type="text"
                    placeholder="Username" name="username">
            </div>
            <div class="textbox">
                <i class="fas fa-lock"></i> <input type="password"
                    placeholder="password" name="password">
            </div>
            <input type="submit" class="btn" value="Login">
        </form>
    </div>
</body>
</html>

```

Then they enter credentials and be redirected to a custom portal depending on their user type.

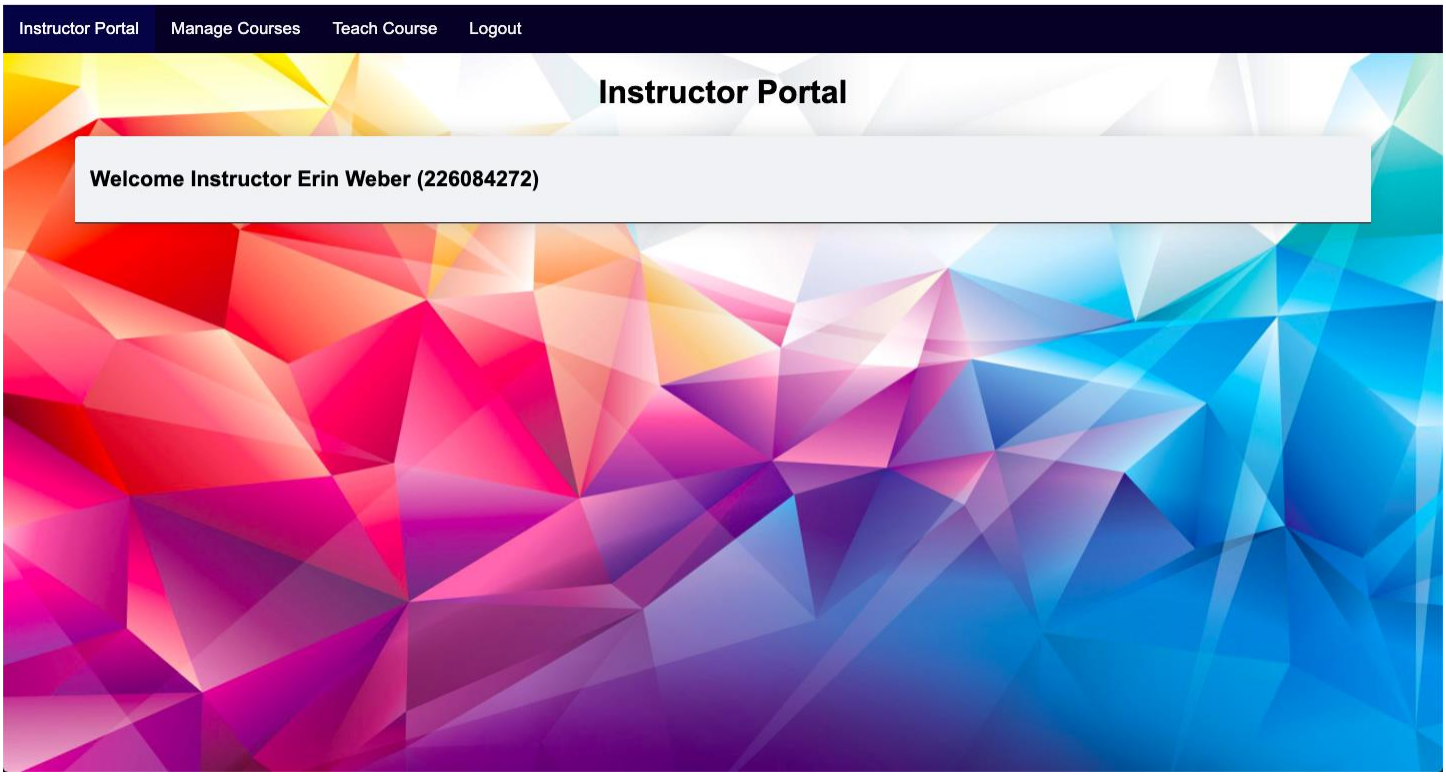
Student Portal



Code for studentPortal.jsp:

```
<%@ page import="users.Users,members.Members,java.util.HashMap" language="java"
    contentType="text/html; charset=UTF-8" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Student Portal</title>
<link href="portal.css" rel="stylesheet" type="text/css"/>
</head>
<body>
    <div class="topnav">
    <%  String username = request.getParameter("username");
        String studentID = request.getParameter("studentID");
        if(username == null) username = Users.search(studentID).get("username");
        if(studentID == null)  studentID = Users.getID(username);
        HashMap<String, String> student = Members.search(studentID);%>
        <a class="active" href=<%="studentPortal.jsp?studentID="+studentID%>>Student Portal</a>
        <a href=<%="add.jsp?studentID="+studentID%>>Add Courses</a>
        <a href=<%="drop.jsp?studentID="+studentID%>>Drop Courses</a>
        <a href=<%="viewCourses.jsp?studentID="+studentID%>>View Courses</a>
        <a href=<%="transcript.jsp?studentID="+studentID%>>Transcript</a>
        <a href=<%="transactions.jsp?studentID="+studentID%>>Transactions</a>
        <a href="index.jsp">Logout</a>
    </div>
    <h1 style="text-align:center;">Student Portal</h1>
    <table class="content-table">
        <tr>
        <td><h2>Welcome Student <%out.println(student.get("firstname") + " " + student.get("lastname"));out.p
        </tr>
    </table>
</body>

```

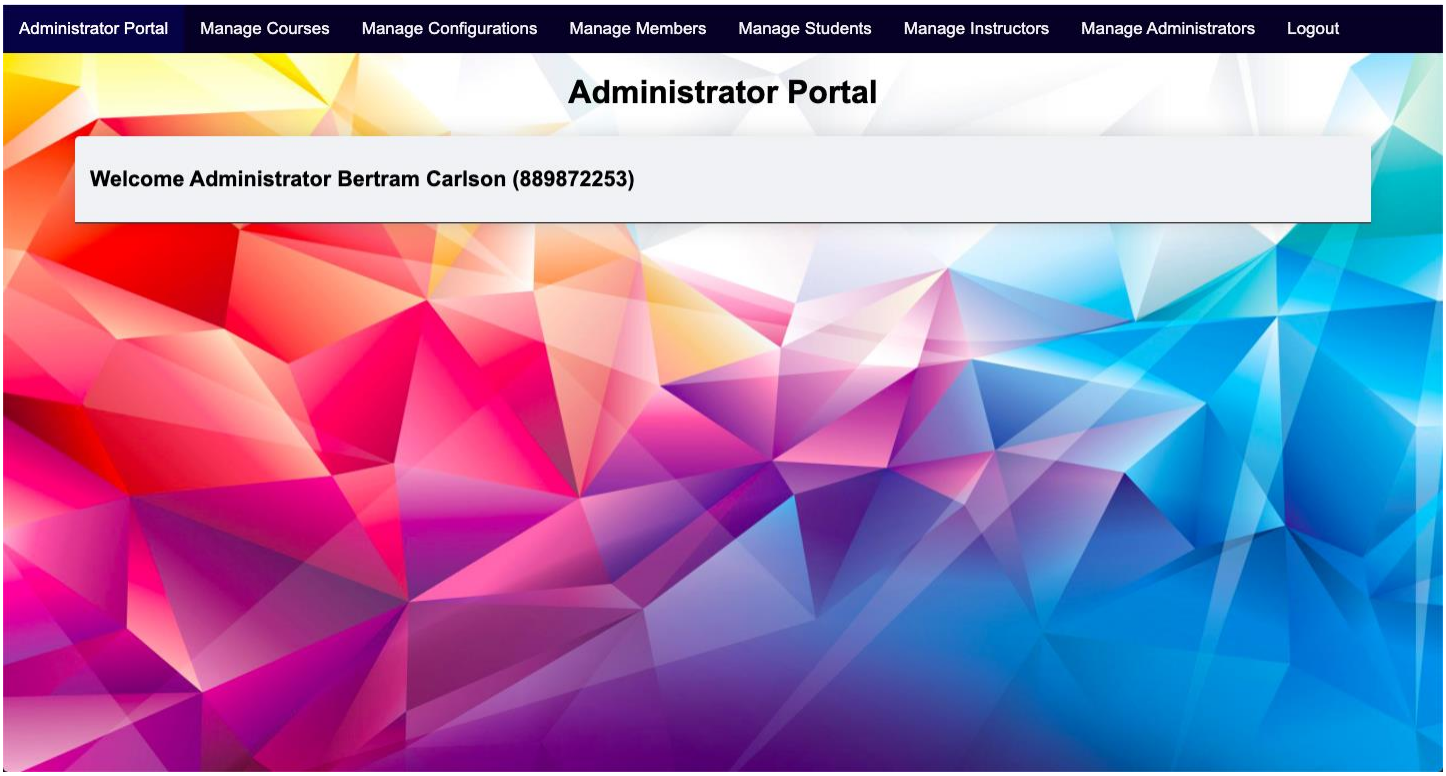
Instructor Portal:



Code for InstructorPortal.jsp

```jsp
<%@ page
    import="users.Users,instructors.Instructors,members.Members,java.util.HashMap"
    language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Instructor Portal</title>
<link href="portal.css" rel="stylesheet" type="text/css" />
</head>
<body>
    <%
        String username = request.getParameter("username");
    String instructorID = request.getParameter("instructorID");
    if (username == null) username = Users.search(instructorID).get("username");
    if (instructorID == null) instructorID = Users.getID(username);
    HashMap<String, String> instructor = Members.search(instructorID);
    String status = Instructors.getStatus(instructorID);
    %>
    <div class="topnav">
        <a class="active"
            href=<%="InstructorPortal.jsp?instructorID=" + instructorID%>>Instructor
            Portal</a>
        <% if (status.equalsIgnoreCase("Active")) { %>
        <a href=<%="roster.jsp?instructorID=" + instructorID%>>Manage Courses</a>
        <a href=<%="teachCourse.jsp?instructorID=" + instructorID%>>Teach Course</a>
        <%
            }
        %>
        <a href="index.jsp">Logout</a>
    </div>
    <h1 style="text-align: center;">Instructor Portal</h1>
    <table class="content-table">
        <tr>
            <td>
                <h2>Welcome Instructor <%out.println(instructor
.get("firstname") + " " + instructor
.get("lastname"));out.println("(" + instructorID + ")");%>
                </h2>
            </td>
        </tr>
    </table>
</body>
</html>
```

Administrator Portal:



Code for administratorPortal.jsp

```jsp
<%@ page import="users.Users,administrators.Administrators,members.Members,java.util.HashMap" language="java"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Administrator Portal</title>
<link href="portal.css" rel="stylesheet" type="text/css"/>
</head>
<body>
    <%  String username = request.getParameter("username");
        String adminID = request.getParameter("adminID");
        if(username == null) username = Users.search(adminID).get("username");
        if(adminID == null)  adminID = Users.getID(username);
        HashMap<String, String> admin = Members.search(adminID);
        int clearance = Administrators.getClearance(adminID);%>
    <div class="topnav">
        <a class="active" href=<%="administratorPortal.jsp?adminID="+adminID%>>Administrator Portal</a>
        <% if(clearance == 1 || clearance == 3) { // Clearance 1 = manage courses and configs %>
        <a href=<%="manageCourses.jsp?adminID="+adminID%>>Manage Courses</a>
        <a href=<%="manageConfigurations.jsp?adminID="+adminID%>>Manage Configurations</a>
        <% } %>
        <% if(clearance == 2 || clearance == 3) { // Clearance 2 = manage accounts %>
        <a href=<%="manageMembers.jsp?adminID="+adminID%>>Manage Members</a>
        <a href=<%="manageStudents.jsp?adminID="+adminID%>>Manage Students</a>
        <a href=<%="manageInstructors.jsp?adminID="+adminID%>>Manage Instructors</a>
        <a href=<%="manageAdministrators.jsp?adminID="+adminID%>>Manage Administrators</a>
        <% } %>
        <a href="index.jsp">Logout</a>
    </div>
    <h1 style="text-align:center;">Administrator Portal</h1>
    <table class="content-table">
        <tr>
        <td><h2>Welcome Administrator <%out.println(admin.get("firstname") + " " + admin.get("lastname"));out
        </tr>
    </table>

</body>
</html>

```

Administrators

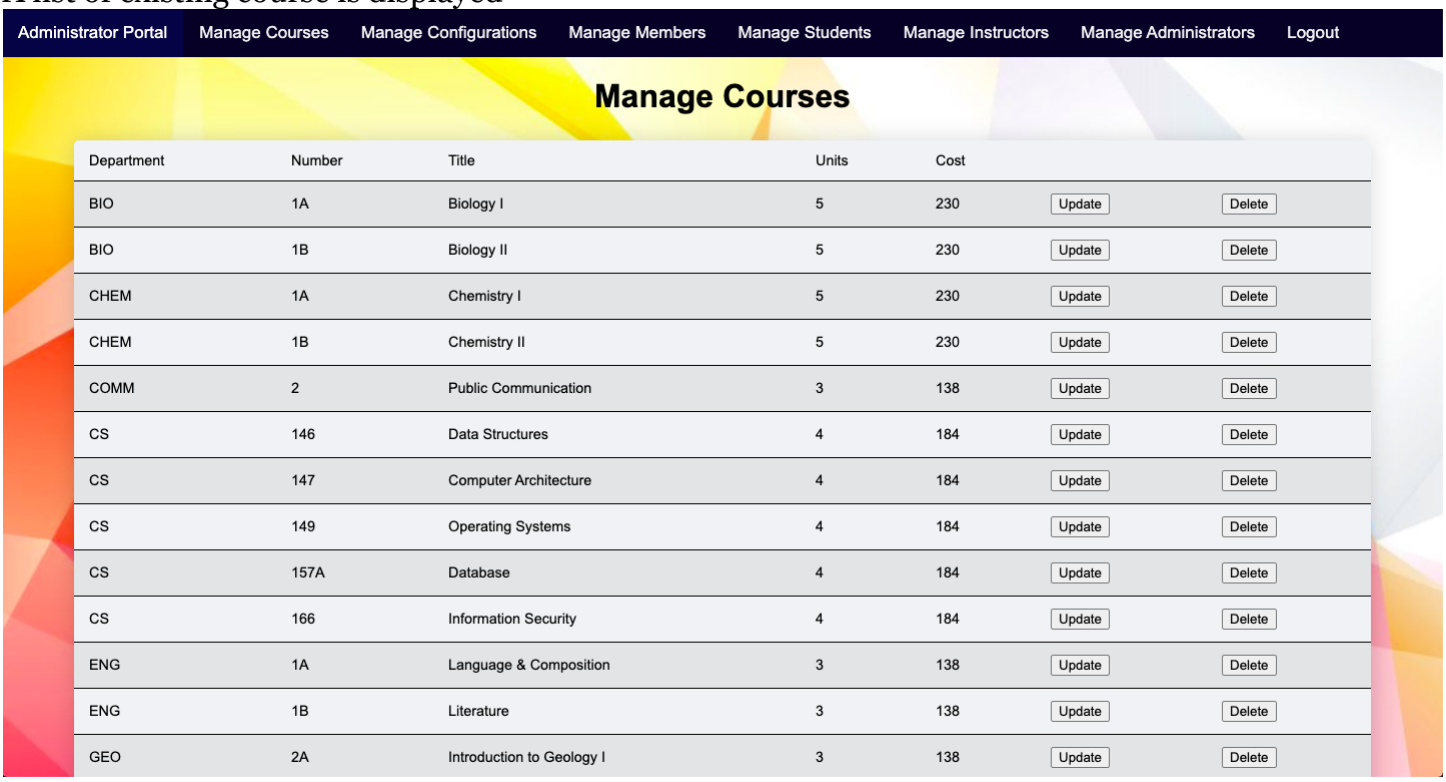
After logging into the portal, an administrator can do certain tasks depending on the clearance.

Manage courses – clearance 1 or 3

Click ‘Manage Courses’.

View existing courses

A list of existing course is displayed

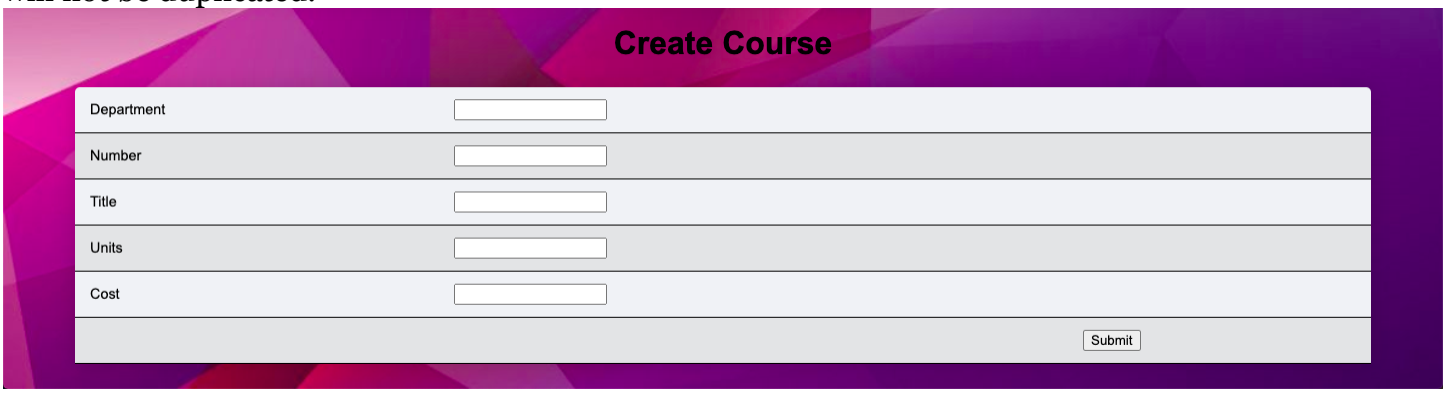


In this portal, we are executing this method and printing it on the webpage. This will execute the SQL statement and will return an array list of HashMap containing the attributes for each registered course which we print to the user.

```
     */
    public static ArrayList<HashMap<String, String>> viewRegisteredCourses(String studentID) {
        ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
        /** Check for invalid inputs. If any input is null, return false */
        if (studentID == null) return output; // Check if studentID is null, return empty list if so
        SQLMethods.mysqlConnect(); // Connect to DB
        try { // Attempt to search
            /** Search and retrieve tuple */
            pstate = SQLMethods.con.prepareStatement(
                    "SELECT * FROM Registers JOIN Configurations Using (configID) WHERE studentID = ? ORDER BY year DESC;");
            pstate.setString(1, studentID);
            result = pstate.executeQuery(); // Execute query
            /** Extract tuple data */
            while (result.next()) {
                HashMap<String, String> tuple = new HashMap<String, String>();
                tuple.put("term", result.getString("term"));
                tuple.put("year", result.getString("year"));
                tuple.put("department", result.getString("department"));
                tuple.put("number", result.getString("number"));
                tuple.put("days", result.getString("days"));
                tuple.put("time", result.getString("time"));
                tuple.put("room", result.getString("room"));
                tuple.put("configID", Integer.toString(result.getInt("configID")));
                output.add(tuple);
            }
            result.close(); // Close result
            SQLMethods.closeConnection(); // Close connection
            return output; // Return output
        } catch (SQLException e) { // Print error and terminate program
            SQLMethods.mysql_fatal_error("Query error: " + e.toString());
        }
        return output; // Return false as a default value
    }
```

Create course

At the bottom of the page, you may enter new fields to create a course. If the course already exists, it will not be duplicated.



Servlet to process form:

```
     */
    protected void doPost(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        String adminID = request.getParameter("adminID");
        String department = request.getParameter("department");
        String number = request.getParameter("number");
        String title = request.getParameter("title");
        int units = Integer.parseInt(request.getParameter("units"));
        int cost = Integer.parseInt(request.getParameter("cost"));
        // Add only if course does not already exist
        if (Courses.search(department, number).size() == 0) Courses.insert(department, number, title, units, cost);
        RequestDispatcher req = request.getRequestDispatcher("manageCourses.jsp?adminID=" + adminID);
        req.forward(request, response);
    }
```

Method containing the SQL statement which is executed:

```
    */
    public static boolean insert(String department, String number, String title, int units, int cost) {
        /** Check for invalid inputs. If any input is null, return false */
        if (department == null || number == null || title == null || units < 0 || cost < 0) return false;
        SQLMethods.mysqlConnect(); // Connect to DB
        try { // Attempt to insert
            pstate = SQLMethods.con.prepareStatement("INSERT INTO Courses Values (?, ?, ?, ?, ?);");
            pstate.setString(1, department);
            pstate.setString(2, number);
            pstate.setString(3, title);
            pstate.setInt(4, units);
            pstate.setInt(5, cost);
            int rowcount = pstate.executeUpdate(); // Number of rows affected
            SQLMethods.closeConnection(); // Close connection
            return (rowcount == 1); // If rowcount == 1, row successfully inserted
        } catch (SQLException e) { // Print error and terminate program
            SQLMethods.mysql_fatal_error("Query error: " + e.toString());
        }
        return false; // Default value: false
    }
```

Delete course

Click the delete button and the course will disappear from the list and database.

Servlet to process delete:

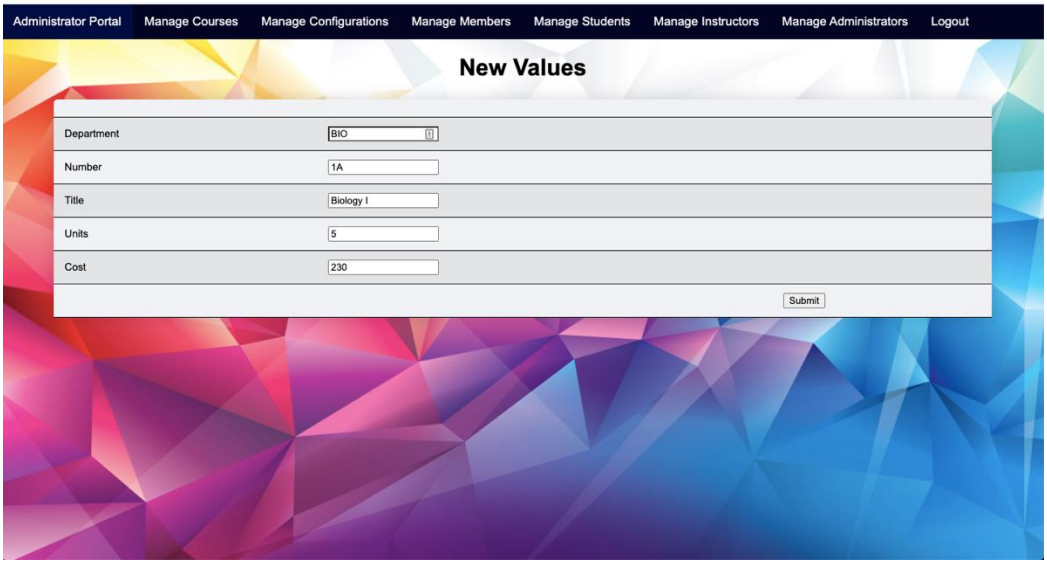
```
     */
    protected void doPost(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        /** Get inputs */
        String adminID = request.getParameter("adminID");
        String department = request.getParameter("department");
        String number = request.getParameter("number");
        /** Delete Course */
        Courses.delete(department, number); // Remove course
        /** Return to manageCourses.jsp */
        RequestDispatcher req = request.getRequestDispatcher("manageCourses.jsp?adminID=" + adminID);
        req.forward(request, response); // Return to manageCourses.jsp
    }
```

Delete method:

```
    */
public static boolean delete(String department, String number) {
    /** Check for invalid inputs. If any input is null, return false */
    if (department == null || number == null) return false;
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to delete using PreparedStatement
        pstate = SQLMethods.con.prepareStatement("DELETE FROM Courses WHERE department = ? AND number = ?;");
        pstate.setString(1, department);
        pstate.setString(2, number);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Update course

Click the 'Update' button next to a course. You will be redirected to a page with the course's info filled in. Modify the course. The course will update if the department and number do not conflict with another course.



Serverlet method:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    /** Get inputs */
    String adminID = request.getParameter("adminID");
    String oldDept = request.getParameter("oldDepartment");
    String oldNum = request.getParameter("oldNumber");
    String newDept = request.getParameter("department");
    String newNum = request.getParameter("number");
    String title = request.getParameter("title");
    int units = Integer.parseInt(request.getParameter("units"));
    int cost = Integer.parseInt(request.getParameter("cost"));
    // If new attributes conflict with an existing course, return
    if (Courses.search(newDept, newNum).size() == 0) {
        // Update references to the course
        Registers.updateCourse(oldDept, oldNum, newDept, newNum);
        Teaches.updateCourse(oldDept, oldNum, newDept, newNum);
        // Update course
        Courses.update(oldDept, oldNum, newDept, newNum, title, units, cost);
    }
    RequestDispatcher req = request.getRequestDispatcher("manageCourses.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

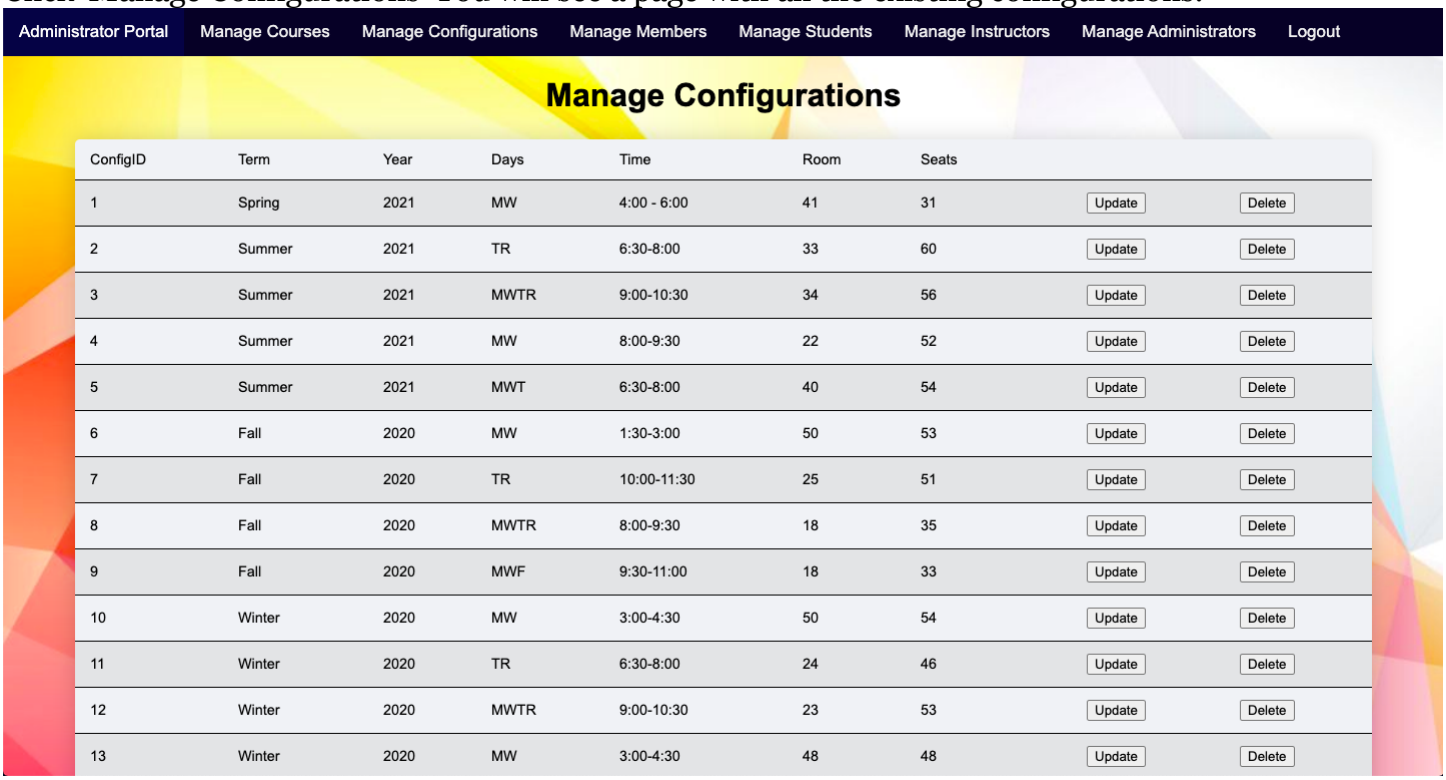
Update method:

```java
public static boolean update(String oldDepartment, String oldNumber, String newDepartment, String newNumber,
        String newTitle, int newUnits, int newCost) {
    /** Check for invalid inputs. If any input is null, return false */
    if (oldDepartment == null || oldNumber == null || newDepartment == null || newNumber == null || newTitle == null
            || newUnits < 0 || newCost < 0)
        return false; // PK cannot be null
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        /*
         * HashMap<String, String> course = search(oldDepartment, oldNumber); // Search for course to update
         * if (newDepartment == null) newDepartment = oldDepartment; // Determine if we
         * want to change old value if (newNumber == null) newDepartment = oldNumber; //
         * Determine if we want to change old value if (newTitle == null) newTitle =
         * course.get("title"); // Determine if we want to change old value if (newUnits
         * == -1) newUnits = Integer.parseInt(course.get("units")); if (newCost == -1)
         * newCost = Integer.parseInt(course.get("cost"));
         */
        pstate = SQLMethods.con.prepareStatement(
                "UPDATE Courses SET department = ?, number = ?, title = ?, units = ?, cost = ? WHERE department = ? AND number = ?;");
        pstate.setString(1,
        pstate.setString
        pstate.setString
        pstate.setInt(4,
        pstate.setInt(5,
        pstate.setString
        pstate.setString(7, oldNumber);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Manage course configurations – clearance 1 or 3

View existing configurations

Click 'Manage Configurations' You will see a page with all the existing configurations.



Java method:

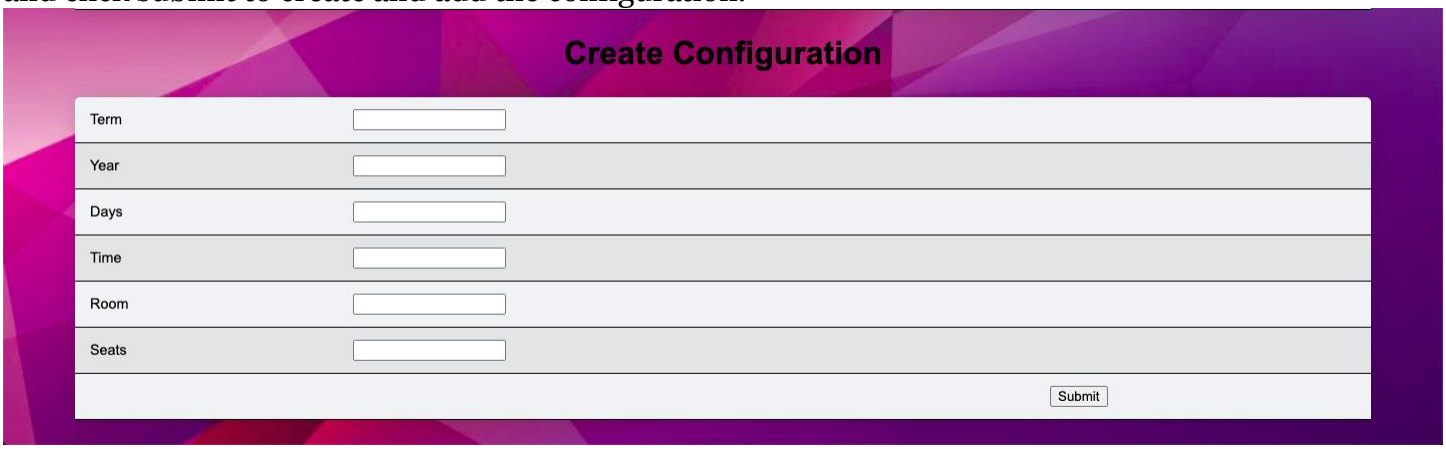
```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement("SELECT * FROM Configurations ORDER BY year DESC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            tuple.put("term", result.getString("term"));
            tuple.put("year", Integer.toString(result.getInt("year")));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("seats", Integer.toString(result.getInt("seats")));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

JSP file:

```jsp
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Manage Configurations</title>
<link href="portal.css" rel="stylesheet" type="text/css"/>
</head>
<body>
    <% String adminID = request.getParameter("adminID");
    int clearance = Administrators.getClearance(adminID);
    %>
    <div class="topnav">
        <a class="active" href=<%="administratorPortal.jsp?adminID="+adminID%>>Administrator Portal</a>
        <% if(clearance == 1 || clearance == 3) { // Clearance 1 = manage courses and configs %>
        <a href=<%="manageCourses.jsp?adminID="+adminID%>>Manage Courses</a>
        <a href=<%="manageConfigurations.jsp?adminID="+adminID%>>Manage Configurations</a>
        <% } %>
        <% if(clearance == 2 || clearance == 3) { // Clearance 2 = manage accounts %>
        <a href=<%="manageMembers.jsp?adminID="+adminID%>>Manage Members</a>
        <a href=<%="manageStudents.jsp?adminID="+adminID%>>Manage Students</a>
        <a href=<%="manageInstructors.jsp?adminID="+adminID%>>Manage Instructors</a>
        <a href=<%="manageAdministrators.jsp?adminID="+adminID%>>Manage Administrators</a>
        <% } %>
        <a href="index.jsp">Logout</a>
    </div>
<h1 style="text-align:center;">Manage Configurations</h1>
    <table class="content-table">
        <tr>
            <td>ConfigID</td>
            <td>Term</td>
            <td>Year</td>
            <td>Days</td>
            <td>Time</td>
            <td>Room</td>
            <td>Seats</td>
            <td></td>
            <td></td>
            <td></td>
        </tr>
        <%
            ArrayList<HashMap<String, String>> configurations = Configurations.getAll();
        for (int i = 0; i < configurations.size(); i++) {
            HashMap<String, String> configuration = configurations.get(i);
        %>
        <tr>
            <td><%=configuration.get("configID")%></td>
            <td><%=configuration.get("term")%></td>
            <td><%=configuration.get("year")%></td>
            <td><%=configuration.get("days")%></td>
            <td><%=configuration.get("time")%></td>
            <td><%=configuration.get("room")%></td>
            <td><%=configuration.get("seats")%></td>
            <td>
            <td>
            <form action=<%="updateConfigurations.jsp?adminID="+adminID%> method="post">
                <input type="hidden" id="configID" name="configID" value=<%=configuration.get("configID")%>>
                <input type="submit" value="Update">
            </form>
            </td>
            <td>
            <form action="deleteConfiguration" method="post">
                <input type="hidden" id="adminID" name="adminID" value=<%=adminID%>>
                <input type="hidden" id="configID" name="configID" value=<%=configuration.get("configID")%>>
                <input type="submit" value="Delete">
            </form>
            </td>
        </tr>
        <%
            }
        %>
    </table>
    <h1 style="text-align:center;">Create Configuration</h1>
    <form action="insertConfiguration" method="post">
```

Create configurations

At the bottom of the page you will see a form to add a configuration. Type in the desired information and click submit to create and add the configuration.



Serverlet method:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    // String configID = request.getParameter("configID"); // configID is
    // autogenerated
    String adminID = request.getParameter("adminID");
    String term = request.getParameter("term");
    int year = Integer.parseInt(request.getParameter("year"));
    String days = request.getParameter("days");
    String time = request.getParameter("time");
    String room = request.getParameter("room");
    int seats = Integer.parseInt(request.getParameter("seats"));
    Configurations.insert(term, year, days, time, room, seats);
    RequestDispatcher req = request.getRequestDispatcher("manageConfigurations.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

Insert method:

```
public static boolean insert(String term, int year, String days, String time, String room, int seats) {
    /** Check for invalid inputs. If any input is null, return false */
    SQLMethods.mysqlConnect();
    try {
        // configID is auto incremented in SQL table
        pstate = SQLMethods.con.prepareStatement("INSERT INTO Configurations VALUES (NULL, ?, ?, ?, ?, ?, ?);");
        pstate.setString(1, term);
        pstate.setInt(2, year);
        pstate.setString(3, days);
        pstate.setString(4, time);
        pstate.setString(5, room);
        pstate.setInt(6, seats);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Delete configurations

Click the delete button next to the configuration to delete it.

Serverlet method:

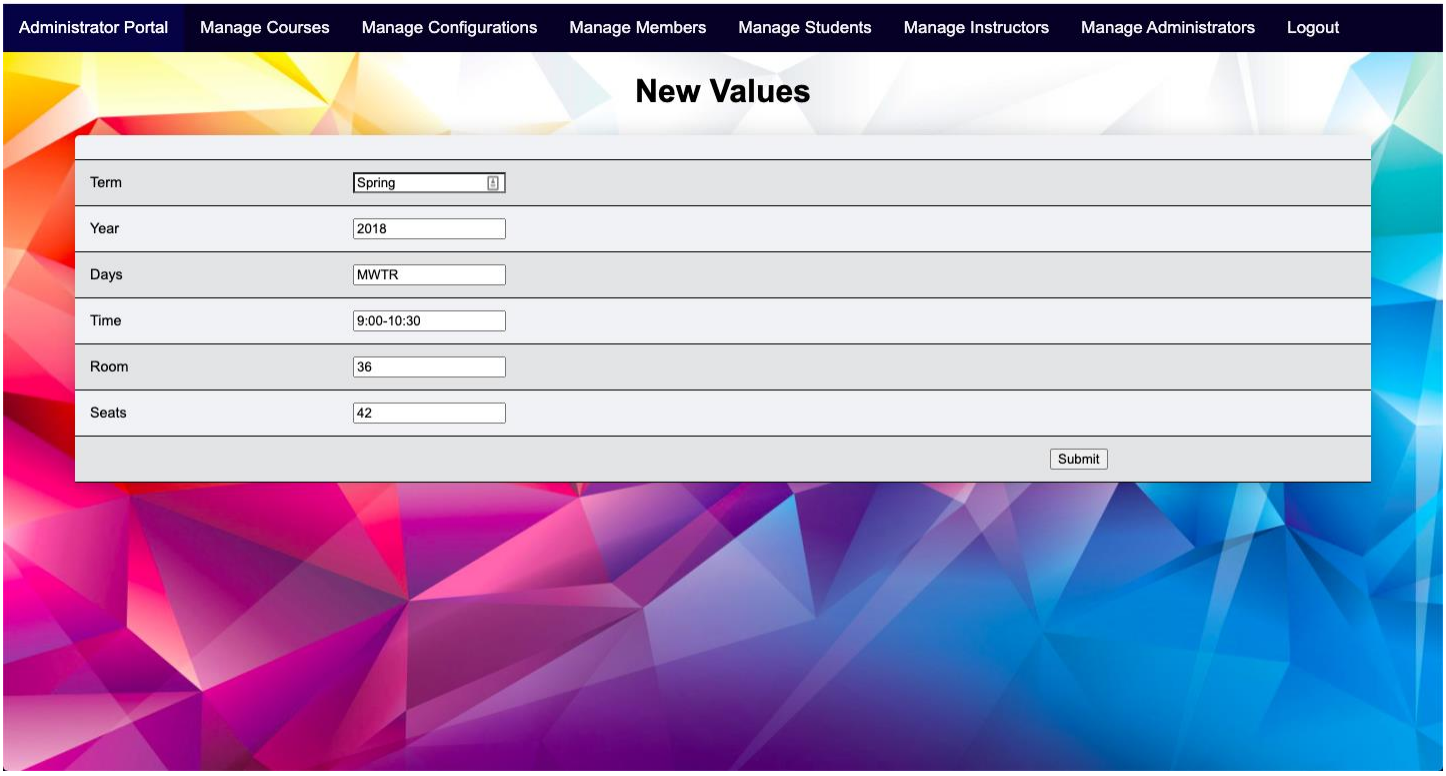
```
protected void doPost(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {
    /** Get inputs */
    String adminID = request.getParameter("adminID");
    String configID = request.getParameter("configID");
    /** Delete configuration */
    Configurations.delete(configID); // Remove configuration
    /** Return to manageConfigurations.jsp */
    RequestDispatcher req = request.getRequestDispatcher("manageConfigurations.jsp?adminID=" + adminID);
    req.forward(request, response); // Return to manageConfigurations.jsp
}
```

Delete method:

```
public static boolean delete(String configID) {
    /** Check for invalid inputs. If any input is null, return false */
    if (configID == null) return false;
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to delete using PreparedStatement
        pstate = SQLMethods.con.prepareStatement("DELETE FROM Configurations WHERE configID = ?;");
        pstate.setString(1, configID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, 1 row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Return false as a default value
}
```

Update configurations

Click the 'Update' button next to a configuration. You will be redirected to a page with the configuration's info filled in. Modify the configuration and click submit.



Serverlet:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    // int oldConfigID = Integer.parseInt(request.getParameter("oldConfigID"));
    // int newConfigID = Integer.parseInt(request.getParameter("newConfigID"));
    // It's better to not change configID - autogenerated
    String adminID = request.getParameter("adminID");
    int configID = Integer.parseInt(request.getParameter("configID"));
    String term = request.getParameter("term");
    int year = Integer.parseInt(request.getParameter("year"));
    String days = request.getParameter("days");
    String time = request.getParameter("time");
    String room = request.getParameter("room");
    int seats = Integer.parseInt(request.getParameter("seats"));

    // Registers.updateConfigID(oldConfigID, newConfigID);
    // Teaches.updateConfigID(oldConfigID, newConfigID);
    // Configurations.update(oldConfigID, newConfigID, term, year, days, time, room,
    // seats);
    Configurations.update(configID, term, year, days, time, room, seats);

    RequestDispatcher req = request.getRequestDispatcher("manageConfigurations.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

Update method:

```
public static boolean update(int configID, String term, int year, String days, String time, String room,
        int seats) {
    /** Check for invalid inputs. If any input is null, return false */
    if (configID < 0 || term == null || year < 1900 || days == null || time == null || room == null || seats < 0)
        return false;
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        // HashMap<String, String> course = search(oldConfigID); // Search for config to
        // update
        SQLMethods.mysqlConnect(); // Connect to DB
        pstate = SQLMethods.con.prepareStatement(
                "UPDATE Configurations SET term = ?, year = ?, days = ?, time = ?, room = ?, seats = ? WHERE configID = ?;");
        pstate.setString(1, term);
        pstate.
        pstate.
        pstate.
        pstate.
        pstate.
        pstate.
        int row
        SQLMeth
        return
    } catch (SQ
        SQLMeth
    }
    return fals
}
```

void java.sql.PreparedStatement.setString(int parameterIndex, String x) throws SQLException

Sets the designated parameter to the given Java `String` value. The driver converts this to an SQL `VARCHAR` or `LONGVARCHAR` value (depending on the argument's size relative to the driver's limits on `VARCHAR` values) when it sends it to the database.

Parameters:

parameterIndex the first parameter is 1, the second is 2, ...

x the parameter value

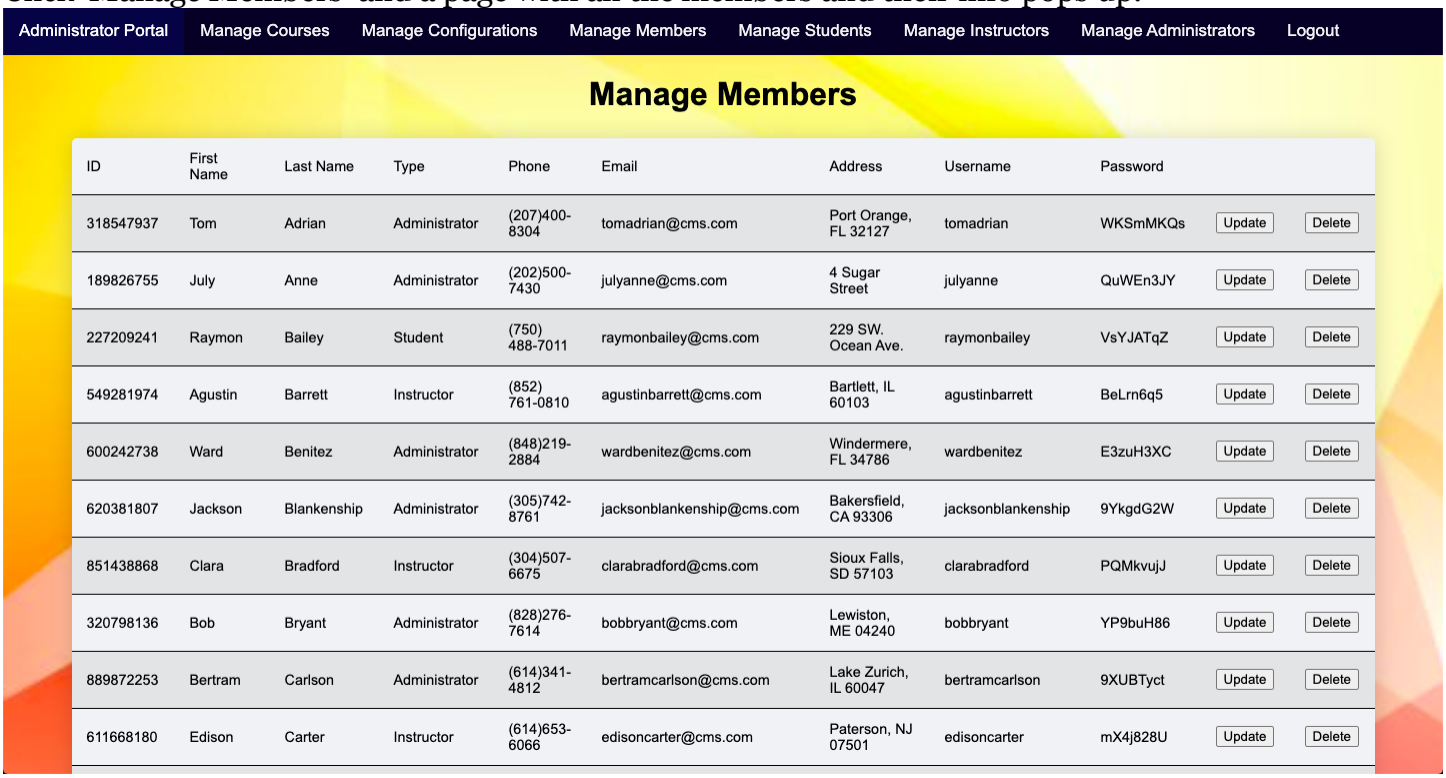
Throws:

SQLException - if parameterIndex does not correspond to a parameter marker in the SQL statement; if a database access error occurs or this method is called on a closed `PreparedStatement`

Manage members – clearance 2 or 3

View existing members

Click ‘Manage Members’ and a page with all the members and their info pops up.



Method to retrieve all tuples:

```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement("SELECT * FROM Members NATURAL JOIN Users ORDER BY lastname ASC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("ID", result.getString("ID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            tuple.put("phone", result.getString("phone"));
            tuple.put("email", result.getString("email"));
            tuple.put("address", result.getString("address"));
            tuple.put("username", result.getString("username"));
            tuple.put("password", result.getString("password"));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Delete members

Click the delete button to delete a member.
Code for deleteMember:

```
<td>
    <form action="deleteMember" method="post">
        <input type="hidden" id="adminID" name="adminID" value=<%=adminID%>>
        <input type="hidden" id="ID" name="ID" value=<%=member.get("ID")%>>
        <input type="submit" value="Delete">
    </form>
</td>
```

Serverlet method:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    /** Get inputs */
    String adminID = request.getParameter("adminID");
    String ID = request.getParameter("ID");
    String number = request.getParameter("number");
    /** Delete Member and User */
    Members.delete(ID);
    Users.delete(ID);
    /** Delete all dependencies to this ID */
    Administrators.delete(ID);
    Students.delete(ID);
    Registers.dropAll(ID);
    Transactions.deleteAll(ID);
    Instructors.delete(ID);
    Teaches.dropAll(ID);

    /** Return back */
    RequestDispatcher req = request.getRequestDispatcher("manageMembers.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

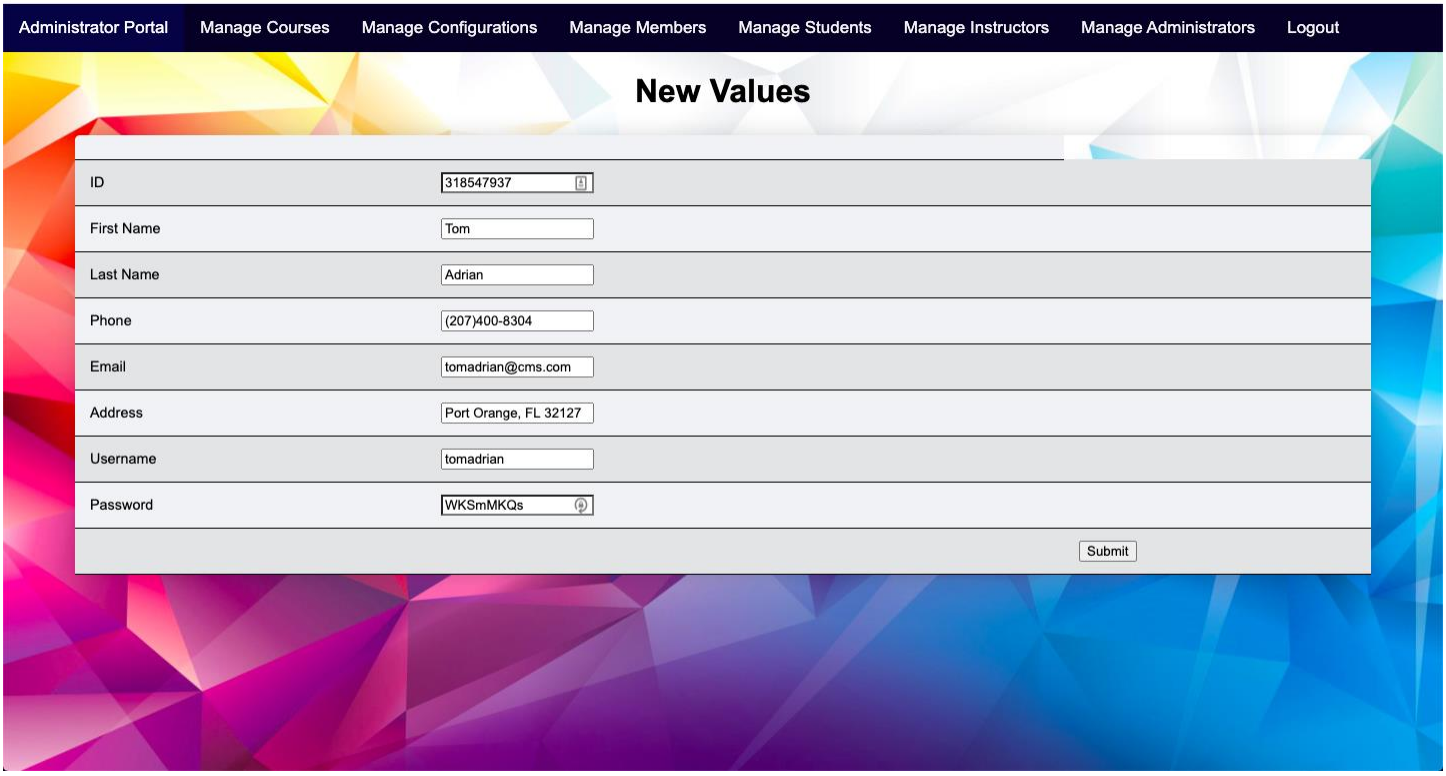
Delete method:

```
public static boolean delete(String ID) {
    if (ID == null) return false; // Check if ID is null
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to delete
        pstate = SQLMethods.con.prepareStatement("DELETE FROM Members WHERE ID = ?;");
        pstate.setString(1, ID);
        int rowcount = pstate.executeUpdate();
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; /
}
```

```
void SQL.SQLMethods.mysql_fatal_error(String
error)
```

Update members

Click the update button. Enter the new fields in the next page and click submit. In this, you can change member attributes as well as user attributes. Use this to create a username and password for a new member.



Serverlet method:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    String adminID = request.getParameter("adminID");
    String oldID = request.getParameter("oldID");
    String newID = request.getParameter("newID");
    String firstname = request.getParameter("firstname");
    String lastname = request.getParameter("lastname");
    String phone = request.getParameter("phone");
    String email = request.getParameter("email");
    String address = request.getParameter("address");
    String username = request.getParameter("username");
    String password = request.getParameter("password");

    // If new ID conflicts with an existing member, return
    if (newID.equals(oldID) || Members.search(newID).size() == 0) {
        // Update references in all tables
        Students.updateID(oldID, newID);
        Instructors.updateID(oldID, newID);
        Administrators.updateID(oldID, newID);
        Registers.updateID(oldID, newID);
        Transactions.updateID(oldID, newID);
        Teaches.updateID(oldID, newID);
        // Update Members
        Members.update(oldID, newID, firstname, lastname, phone, email, address);
        // Update User
        Users.update(oldID, newID, username, password);
    }
    RequestDispatcher req = request.getRequestDispatcher("manageMembers.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

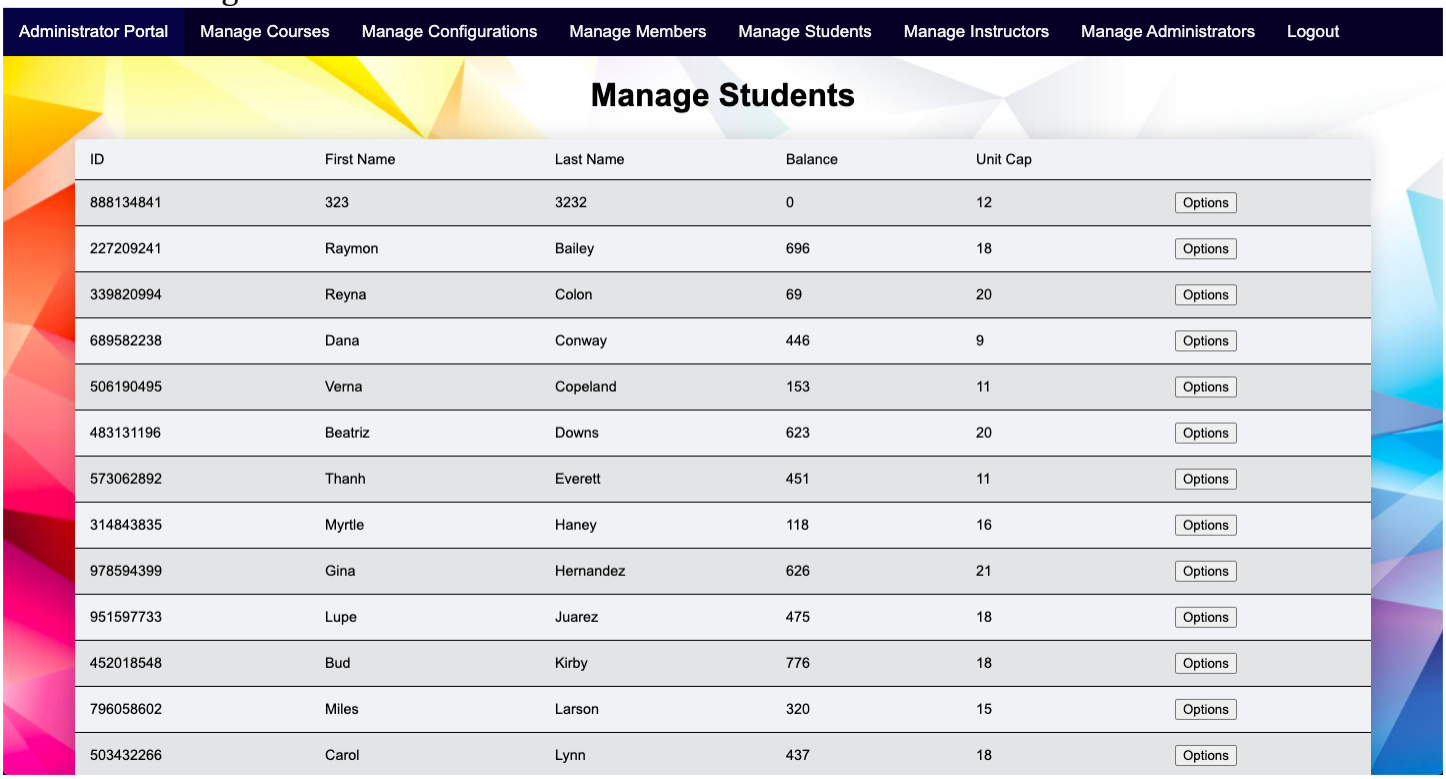
Update method:

```
public static boolean update(String oldID, String newID, String firstname, String lastname, String phone,
        String email, String address) {
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        /** Update tuple in Members */
        pstate = SQLMethods.con.prepareStatement(
                "UPDATE Members SET ID = ?, firstname = ?, lastname = ?, phone = ?, email = ?, address = ? WHERE ID = ?;");
        pstate.setString(1, newID);
        pstate.setString(2, firstname);
        pstate.setString(3, lastname);
        pstate.setString(4, phone);
        pstate.setString(5, email);
        pstate.setString(6, address);
        pstate.setString(7, oldID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Manage students – clearance 2 or 3

View existing students

Click the 'Manage Students' button.

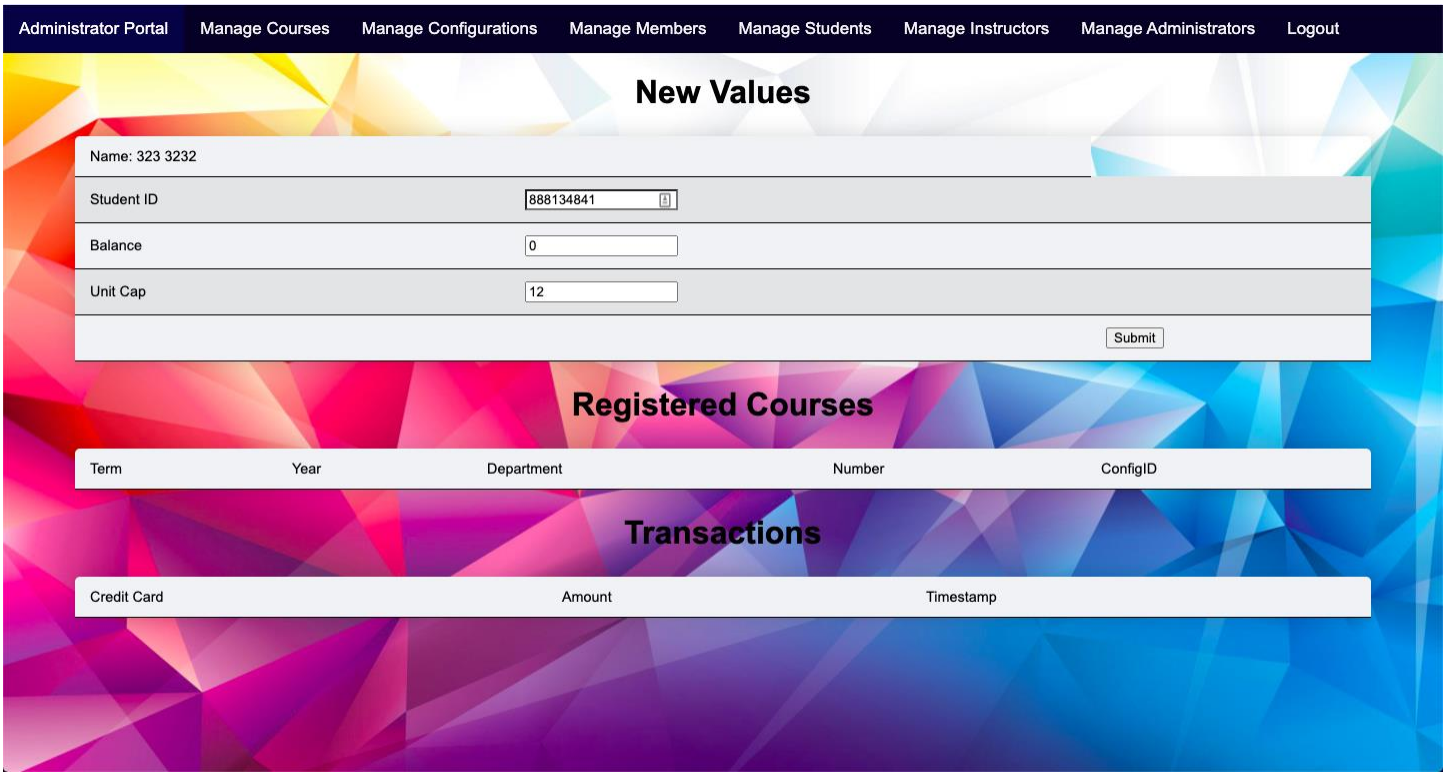


Method to get all tuples:

```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con
                .prepareStatement("SELECT * FROM Students JOIN Members ON studentID = ID ORDER BY lastname ASC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("studentID", result.getString("studentID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            tuple.put("balance", Integer.toString(result.getInt("balance")));
            tuple.put("unit_cap", Integer.toString(result.getInt("unit_cap")));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Update student

Click options. You will have the ability to update a student's balance and unit cap. You can also change the ID and this will affect all tables.



Update method:

```
public static boolean update(String oldStudentID, String newStudentID, int balance, int unit_cap) {
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        pstate = SQLMethods.con.prepareStatement(
                "UPDATE Students SET studentID = ?, balance = ?, unit_cap = ? WHERE studentID = ?;");
        pstate.setString(1, newStudentID);
        pstate.setInt(2, balance);
        pstate.setInt(3, unit_cap);
        pstate.setString(4, oldStudentID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully updated
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

View student's registered courses

Refer to picture above.

Method:

```
public static ArrayList<HashMap<String, String>> viewRegisteredCourses(String studentID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    /** Check for invalid inputs. If any input is null, return false */
    if (studentID == null) return output; // Check if studentID is null, return empty list if so
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        /** Search and retrieve tuple */
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Registers JOIN Configurations Using (configID) WHERE studentID = ? ORDER BY year DESC;");
        pstate.setString(1, studentID);
        result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("term", result.getString("term"));
            tuple.put("year", result.getString("year"));
            tuple.put("department", result.getString("department"));
            tuple.put("number", result.getString("number"));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // Return false as a default value
}
```

View student's transactions

Refer to picture above.

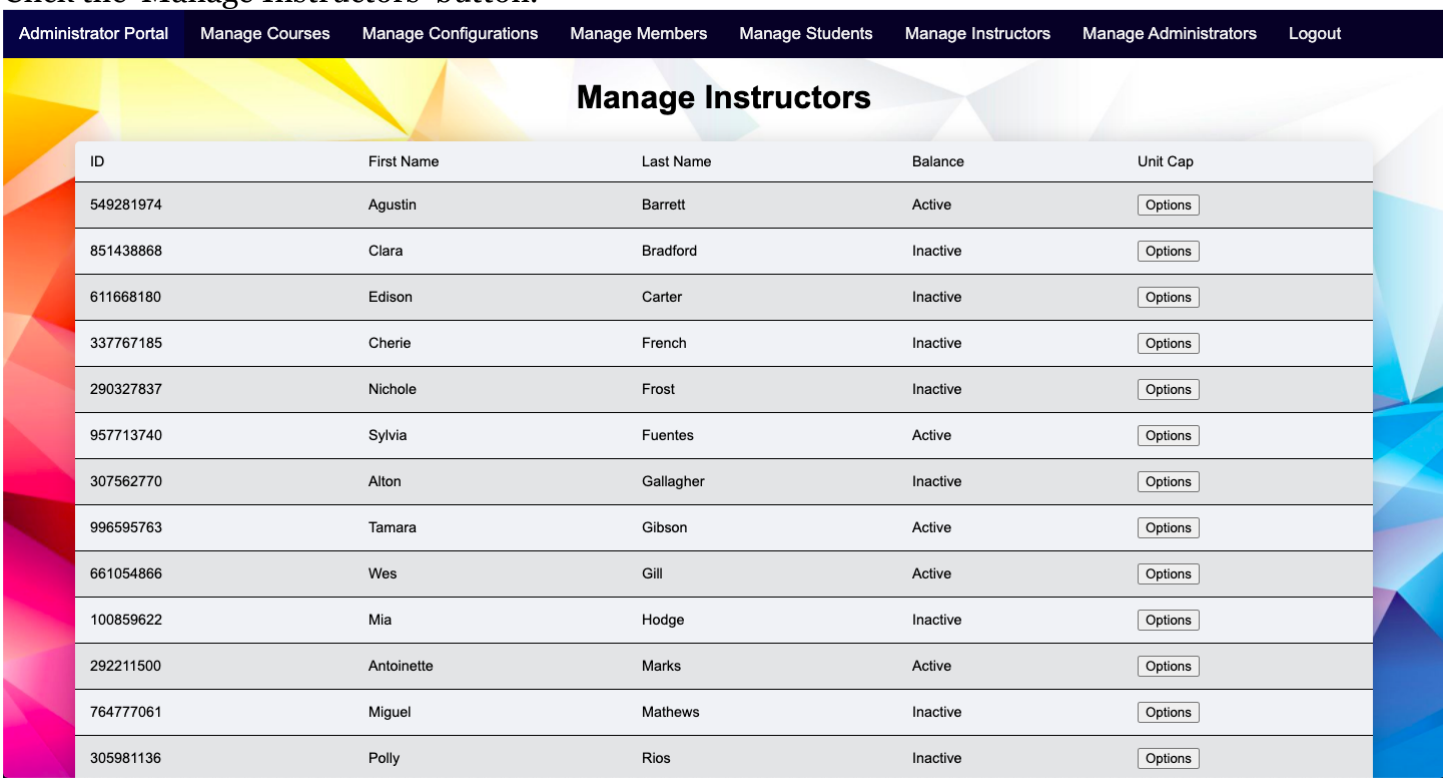
Method:

```
public static ArrayList<HashMap<String, String>> viewTransactions(String studentID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    if (studentID == null) return output; // Return empty list
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con
                .prepareStatement("SELECT * FROM Transactions WHERE studentID = ? ORDER BY timestamp DESC;");
        pstate.setString(1, studentID);
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("studentID", result.getString("studentID"));
            tuple.put("creditcard", result.getString("creditcard"));
            tuple.put("amount", result.getString("amount"));
            tuple.put("timestamp", result.getString("timestamp"));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Success
    } catch (SQLException e) {
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // default value
}
```

Manage instructors – clearance 2 or 3

View existing instructors

Click the ‘Manage Instructors’ button.



HTML:

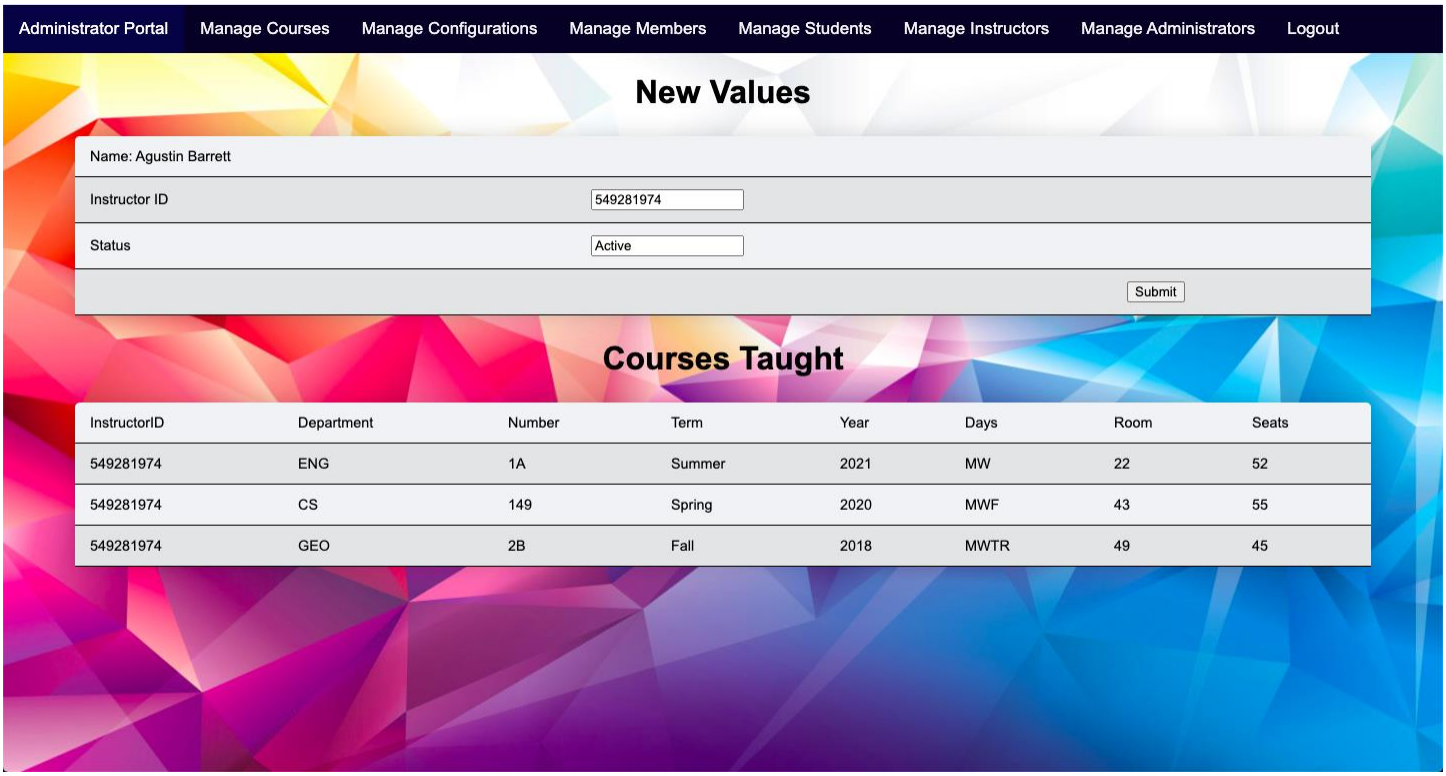
```
<h1 style="text-align: center;">Manage Instructors</h1>
<table class="content-table">
    <tr>
        <td>ID</td>
        <td>First Name</td>
        <td>Last Name</td>
        <td>Balance</td>
        <td>Unit Cap</td>
    </tr>
    <%
        ArrayList<HashMap<String, String>> instructors = Instructors.getAll();
    for (int i = 0; i < instructors.size(); i++) {
        HashMap<String, String> instructor = instructors.get(i);
    %>
```

Java Method:

```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Instructors JOIN Members ON instructorID = ID ORDER BY lastname ASC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("instructorID", result.getString("instructorID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            tuple.put("status", result.getString("status"));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Update instructors

Click ‘Options’. You will have the ability to activate or deactivate an instructor’s account. Enter ‘Active’ to activate. Enter anything else to deactivate, preferably ‘Inactive’. You can also change the ID and this will affect all tables.



HTML:

```
<td>
    <form action=<%="updateInstructors.jsp?adminID="+adminID%> method="post">
        <input type="hidden" id="adminID" name="adminID" value=<%=adminID%>>
        <input type="hidden" id="instructorID" name="instructorID" value=<%=instructor.get("instructorID")%>>
        <input type="hidden" id="firstname" name="firstname" value=<%=instructor.get("firstname")%>>
        <input type="hidden" id="lastname" name="lastname" value=<%=instructor.get("lastname")%>>
        <input type="hidden" id="status" name="status" value=<%=instructor.get("status")%>>
        <input type="submit" value="Options">
    </form>
</td>
```

Serverlet method:

```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    String adminID = request.getParameter("adminID");
    String oldInstructorID = request.getParameter("oldInstructorID");
    String newInstructorID = request.getParameter("newInstructorID");
    String status = request.getParameter("status");

    // If new ID conflicts with an existing member, return
    if (oldInstructorID.equals(newInstructorID) || Members.search(newInstructorID).size() == 0) {
        // Update references of ID in all tables (if we want to change ID)
        Members.updateID(oldInstructorID, newInstructorID); // Update reference in Members
        Users.updateID(oldInstructorID, newInstructorID); // Update reference in Users
        Teaches.updateID(oldInstructorID, newInstructorID); // Update reference in Teaches
        // Update instructor
        Instructors.update(oldInstructorID, newInstructorID, status);
    }
    RequestDispatcher req = request.getRequestDispatcher("manageInstructors.jsp?adminID=" + adminID);
    req.forward(request, response);
}
```

Update method:

```java
public static boolean update(String oldInstructorID, String newInstructorID, String status) {
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        /** Update instructor tuple */
        pstate = SQLMethods.con
                .prepareStatement("UPDATE Instructors SET instructorID = ?, status = ? WHERE instructorID = ?;");
        pstate.setString(1, newInstructorID);
        pstate.setString(2, status);
        pstate.setString(3, oldInstructorID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

View courses taught

Refer to picture above.

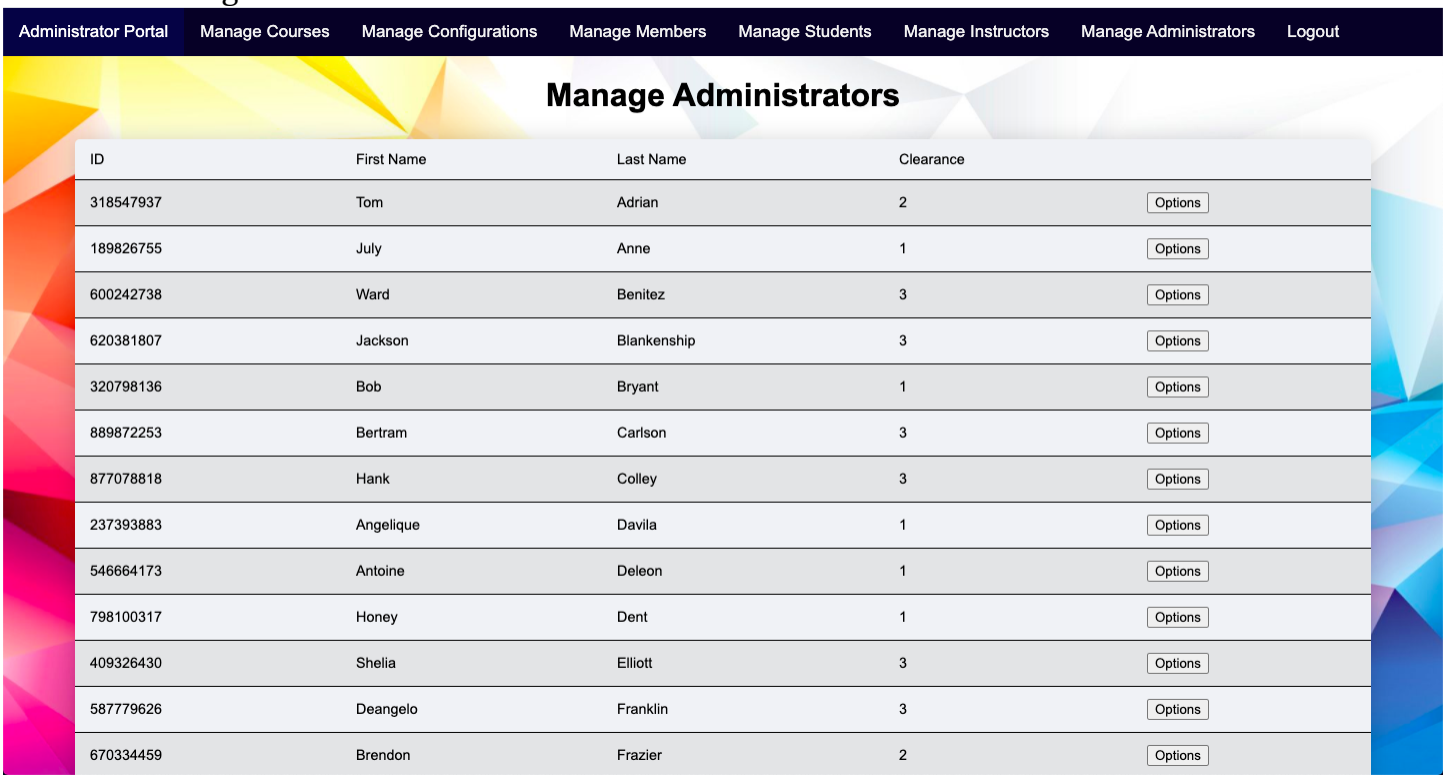
Method:

```
public static ArrayList<HashMap<String, String>> viewTaughtCourses(String instructorID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    /** Check for invalid inputs. If any input is null, return false */
    if (instructorID == null) return output; // Check if studentID is null, return empty list if so
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        /** Search and retrieve tuple */
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Teaches JOIN Configurations Using (configID) WHERE instructorID = ? ORDER BY year DESC;");
        pstate.setString(1, instructorID);
        result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("instructorID", result.getString("instructorID"));
            tuple.put("department", result.getString("department"));
            tuple.put("number", result.getString("number"));
            tuple.put("term", result.getString("term"));
            tuple.put("year", result.getString("year"));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("seats", result.getString("seats"));
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // Return false as a default value
}
```

Manage administrators – clearance 2 or 3

View existing administrators

Click the 'Manage Administrators' button.

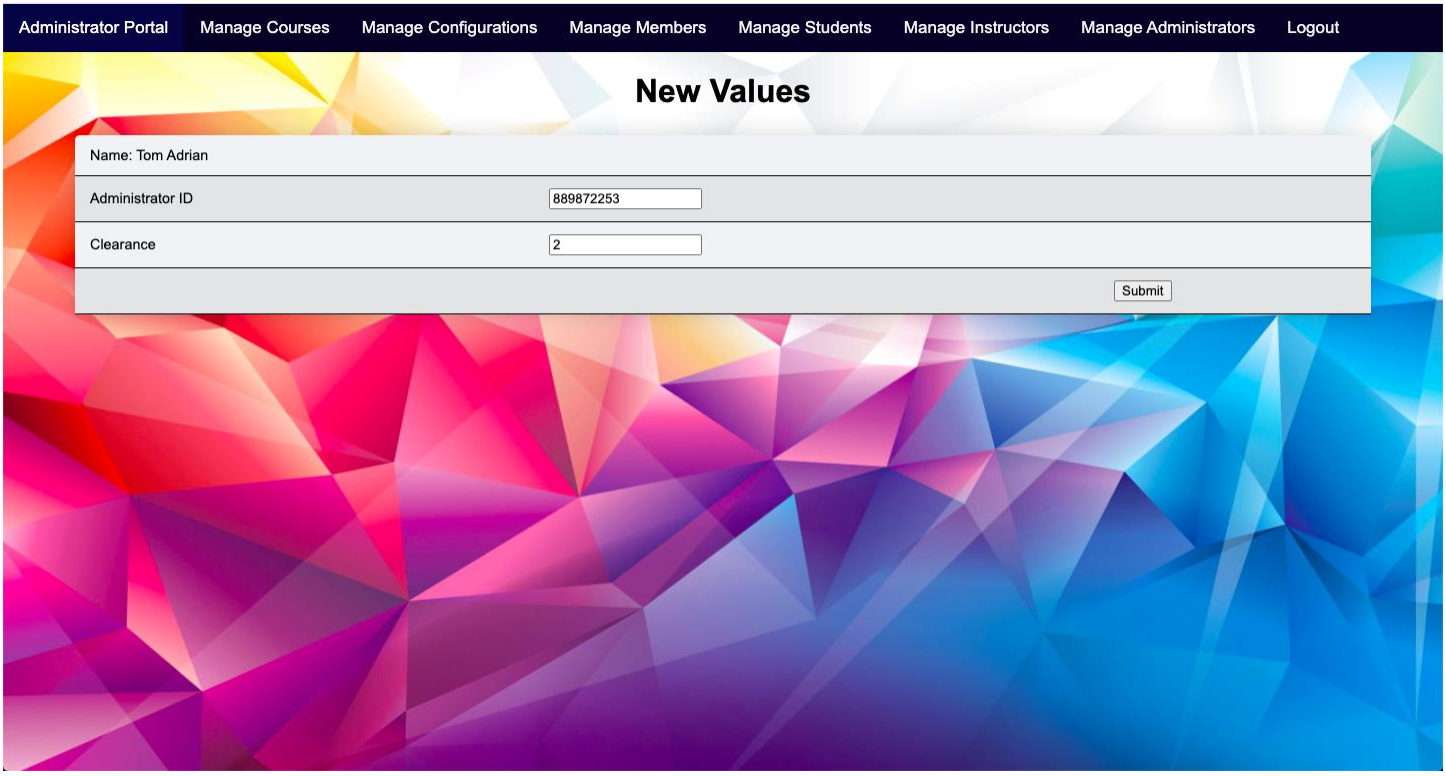


Method:

```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Administrators JOIN Members ON adminID = ID ORDER BY lastname ASC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("adminID", result.getString("adminID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            tuple.put("clearance", Integer.toString(result.getInt("clearance")));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Update administrators

Click ‘Options’. You will have the ability to update an administrator’s clearance. You can also change the ID and this will affect all tables.



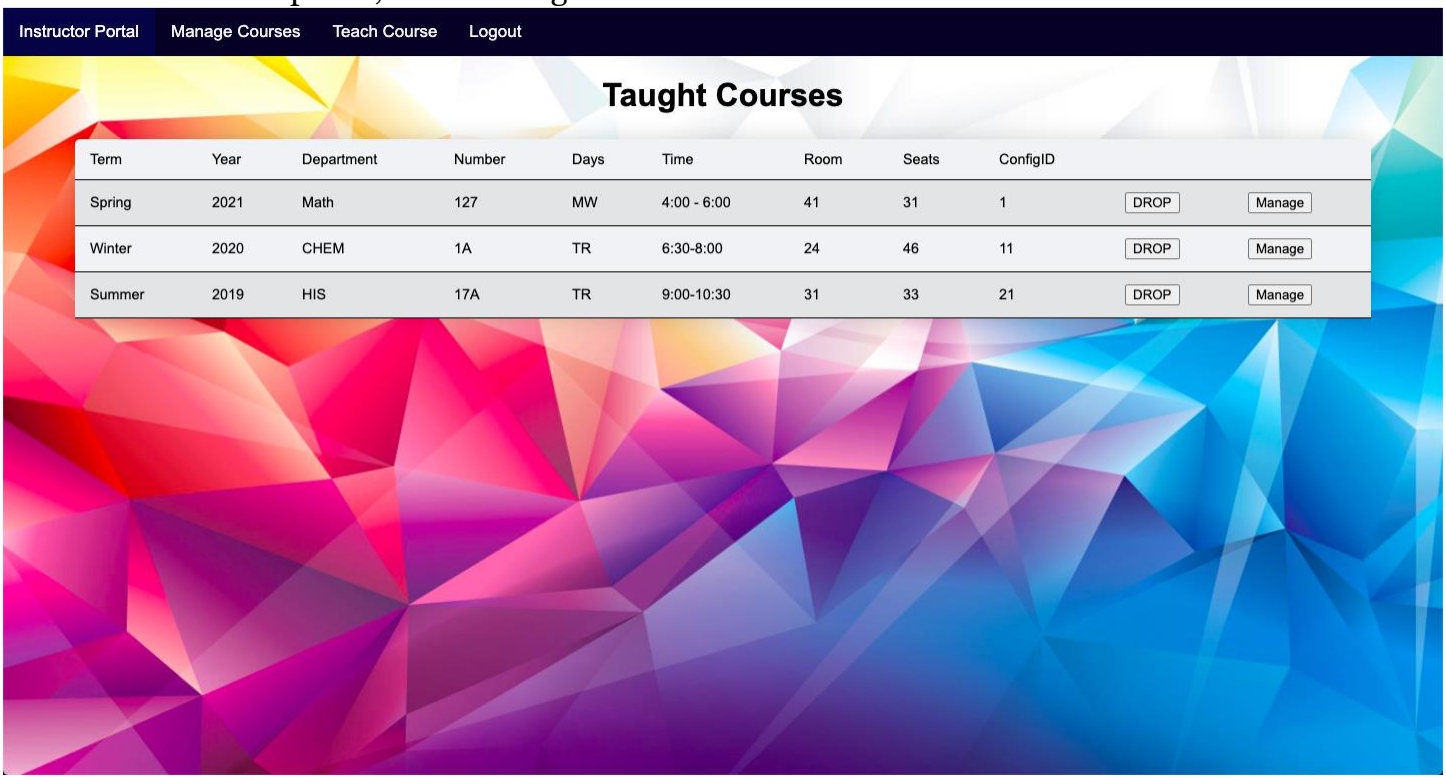
Method:

```
public static boolean update(String oldAdminID, String newAdminID, int clearance) {
    Members.updateID(oldAdminID, newAdminID); // Update reference in Members
    Users.updateID(oldAdminID, newAdminID); // Update reference in Users
    SQLMethods.mysqlConnect(); // Connect to DB
    try { /** Update admin tuple */
        pstate = SQLMethods.con
                .prepareStatement("UPDATE Administrators SET adminID = ?, clearance = ? WHERE adminID = ?;");
        pstate.setString(1, newAdminID);
        pstate.setInt(2, clearance);
        pstate.setString(3, oldAdminID);
        pstate.executeUpdate();
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Instructors

View courses taught

From the instructor portal, click ‘Manage Courses’.




```
public static ArrayList<HashMap<String, String>> viewTaughtCourses(String instructorID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    /** Check for invalid inputs. If any input is null, return false */
    if (instructorID == null) return output; // Check if studentID is null, return empty list if so
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        /** Prepare statement to retrieve tuple */
        PreparedStatement pstate = SQLMethods.con.prepareStatement(
            "SELECT * FROM Teaches JOIN Configurations Using (configID) WHERE instructorID = ? ORDER BY year DESC;");
        pstate.setString(1, instructorID);
        ResultSet result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("instructorID", result.getString("instructorID"));
            tuple.put("department", result.getString("department"));
            tuple.put("number", result.getString("number"));
            tuple.put("term", result.getString("term"));
            tuple.put("year", result.getString("year"));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("seats", result.getString("seats"));
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // Return false as a default value
}
```

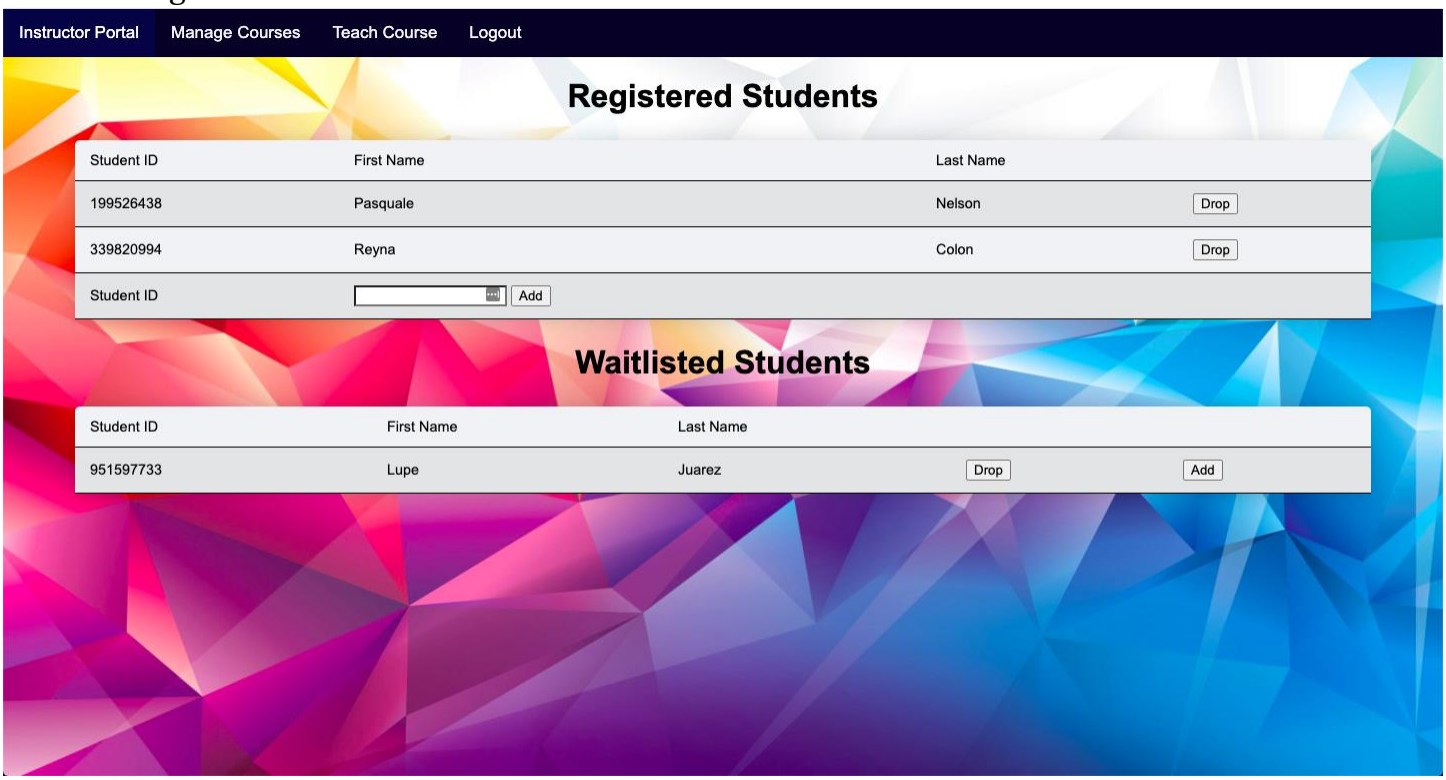
Drop courses taught

Click ‘DROP’ to drop a course.

```
   */
  public static boolean delete(String instructorID, String department, String number, int configID) {
      /** Check for invalid inputs. If any input is null, return false */
      if (instructorID == null || department == null || number == null || configID < 0) return false;
      SQLMethods.mysqlConnect(); // Connect to DB
      try { // Attempt to delete
          pstate = SQLMethods.con.prepareStatement(
                  "DELETE FROM Teaches WHERE instructorID = ? AND department = ? AND number = ? AND configID = ?;");
          pstate.setString(1, instructorID);
          pstate.setString(2, department);
          pstate.setString(3, number);
          pstate.setInt(4, configID);
          int rowcount = pstate.executeUpdate(); // Execute query

          // When course is dropped, remove registered and waitlisted students
          pstate = SQLMethods.con
                  .prepareStatement("DELETE FROM Registers WHERE department = ? AND number = ? AND configID = ?;");
          pstate.setString(1, department);
          pstate.setString(2, number);
          pstate.setInt(3, configID);
          rowcount += pstate.executeUpdate(); // Execute query

          pstate = SQLMethods.con
                  .prepareStatement("DELETE FROM Waitlists WHERE department = ? AND number = ? AND configID = ?;");
          pstate.setString(1, department);
          pstate.setString(2, number);
          pstate.setInt(3, configID);
          rowcount += pstate.executeUpdate(); // Execute query

          SQLMethods.closeConnection(); // Close connection
          return true; // Successful insert
      } catch (SQLException e) { // Print error and terminate program
          SQLMethods.mysql_fatal_error("Query error: " + e.toString());
      }
      return false; // Default value: false
  }
```

View registered and waitlisted students

Click ‘Manage’.




```
public static ArrayList<HashMap<String, String>> getRegisteredStudents(String department, String number,
        int configID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Registers JOIN Members ON studentID = ID WHERE department = ? AND number = ? AND configID = ?;");
        pstate.setString(1, department);
        pstate.setString(2, number);
        pstate.setInt(3, configID);
        result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("studentID", result.getString("studentID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

```
public static ArrayList<HashMap<String, String>> getWaitlistedStudents(String department, String number,
        int configID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Waitlists JOIN Members ON studentID = ID WHERE department = ? AND number = ? AND configID = ?;");
        pstate.setString(1, department);
        pstate.setString(2, number);
        pstate.setInt(3, configID);
        result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("studentID", result.getString("studentID"));
            tuple.put("firstname", result.getString("firstname"));
            tuple.put("lastname", result.getString("lastname"));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Drop registered students

Click the drop button next to the student in the registrants table.

```
     */
    public static boolean drop(String studentID, String department, String number, int configID) {
        if (studentID == null || department == null | number == null || configID < 0) return false;
        SQLMethods.mysqlConnect(); // Connect to DB
        try { // Attempt to delete
            /**
             * Check if student is in Registers. If so, we check else statement. If not, we
             * have another student waiting on waitlist, so we move waiting student to
             * Registers and delete old student.
             */
            int value = 0;
            if (isWaitlisted(studentID, department, number, configID)) { // If student is on waitlist
                pstate = SQLMethods.con.prepareStatement(
                        "DELETE FROM Waitlists WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
                pstate.setString(1, studentID);
                pstate.setString(2, department);
                pstate.setString(3, number);
                pstate.setInt(4, configID);
                value = pstate.executeUpdate();
            } else {
                pstate = SQLMethods.con.prepareStatement(
                        "DELETE FROM Registers WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
                pstate.setString(1, studentID);
                pstate.setString(2, department);
                pstate.setString(3, number);
                pstate.setInt(4, configID);
                value = pstate.executeUpdate();

                /** Adjust the watlist if needed */
                adjustWaitlist(studentID, studentID, number, configID);
            }
            SQLMethods.closeConnection(); // Close connection
            return true; // Success
        } catch (SQLException e) {
            SQLMethods.mysql_fatal_error("Query error: " + e.toString());
        }
        return false; // Return false as a default value
    }
```

Drop waitlisted students

Click the drop button next to the student in the waitlist table.

```
     */
    public static boolean drop(String studentID, String department, String number, int configID) {
        if (studentID == null || department == null | number == null || configID < 0) return false;
        SQLMethods.mysqlConnect(); // Connect to DB
        try { // Attempt to delete
            /**
             * Check if student is in Registers. If so, we check else statement. If not, we
             * have another student waiting on waitlist, so we move waiting student to
             * Registers and delete old student.
             */
            int value = 0;
            if (isWaitlisted(studentID, department, number, configID)) { // If student is on waitlist
                pstate = SQLMethods.con.prepareStatement(
                        "DELETE FROM Waitlists WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
                pstate.setString(1, studentID);
                pstate.setString(2, department);
                pstate.setString(3, number);
                pstate.setInt(4, configID);
                value = pstate.executeUpdate();
            } else {
                pstate = SQLMethods.con.prepareStatement(
                        "DELETE FROM Registers WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
                pstate.setString(1, studentID);
                pstate.setString(2, department);
                pstate.setString(3, number);
                pstate.setInt(4, configID);
                value = pstate.executeUpdate();

                /** Adjust the watlist if needed */
                adjustWaitlist(studentID, studentID, number, configID);
            }
            SQLMethods.closeConnection(); // Close connection
            return true; // Success
        } catch (SQLException e) {
            SQLMethods.mysql_fatal_error("Query error: " + e.toString());
        }
        return false; // Return false as a default value
    }
```

Manually add students on waitlist to registered list for a taught course

Click add next to the student in the waitlist table.

```
public static boolean overrideRegister(String studentID, String department, String number, int configID) {
    /** Check for invalid inputs. If any input is null, return false */
    if (studentID == null || department == null || number == null || configID < 0) return false;
    /** Check if student already registered for this course */
    if (isRegistered(studentID, department, number, configID)) return false;
    drop(studentID, department, number, configID); // Drop student from waitlist if possible
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to insert
            // Ignore if seats are filled
        pstate = SQLMethods.con.prepareStatement("INSERT INTO Registers VALUES (?, ?, ?, ?);");
        pstate.setString(1, studentID);
        pstate.setString(2, department);
        pstate.setString(3, number);
        pstate.setInt(4, configID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

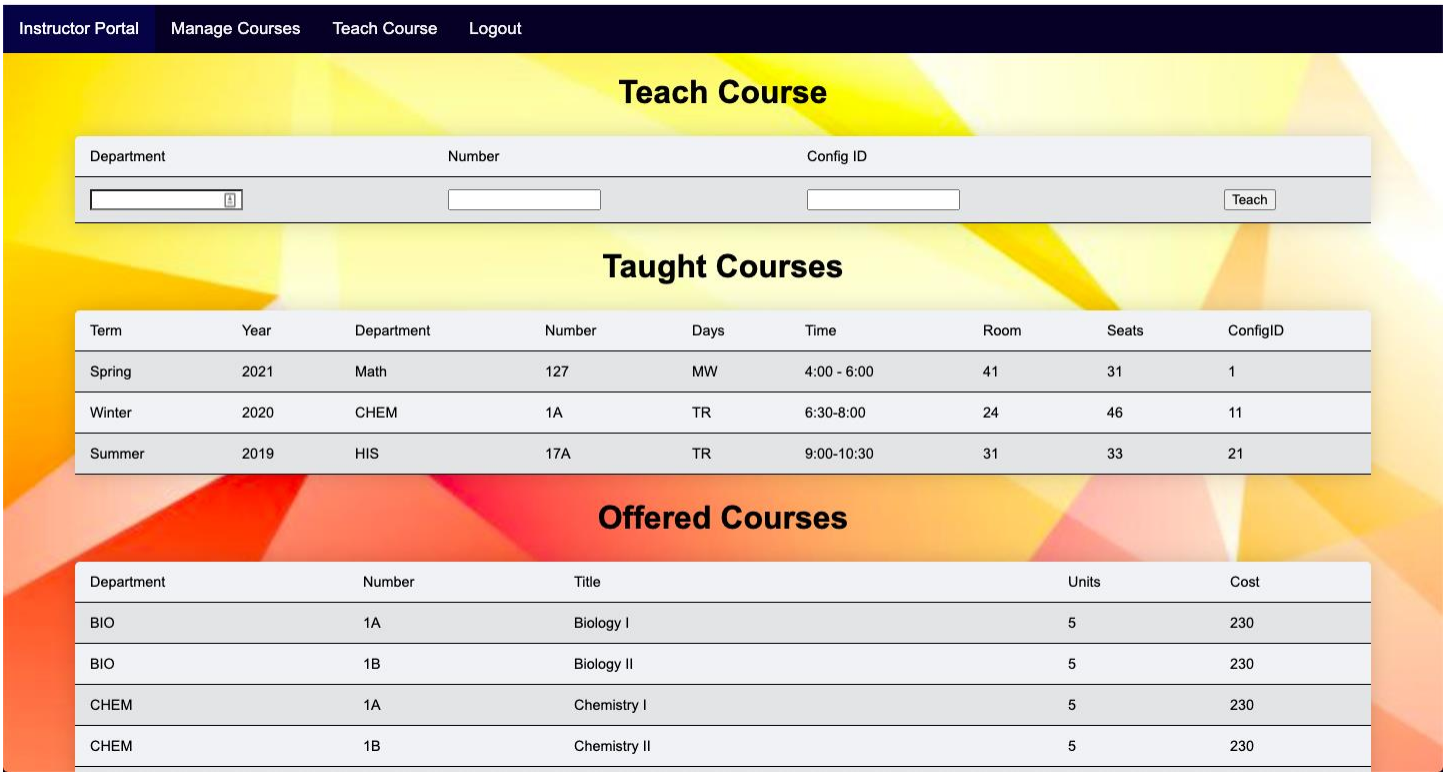
Manually add students using their ID to registered list for a taught course

Enter student's ID in the textbox and click add to add a student manually.

```
public static boolean overrideRegister(String studentID, String department, String number, int configID) {
    /** Check for invalid inputs. If any input is null, return false */
    if (studentID == null || department == null || number == null || configID < 0) return false;
    /** Check if student already registered for this course */
    if (isRegistered(studentID, department, number, configID)) return false;
    drop(studentID, department, number, configID); // Drop student from waitlist if possible
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to insert
            // Ignore if seats are filled
        pstate = SQLMethods.con.prepareStatement("INSERT INTO Registers VALUES (?, ?, ?, ?);");
        pstate.setString(1, studentID);
        pstate.setString(2, department);
        pstate.setString(3, number);
        pstate.setInt(4, configID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

View offered courses

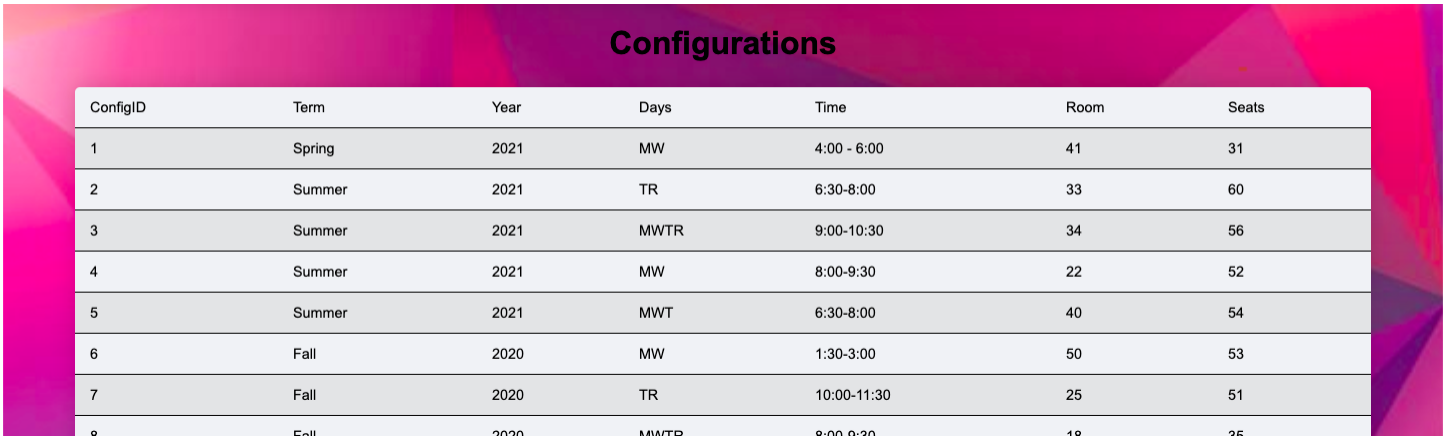
Click ‘Teach Course’.




```
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement("SELECT * FROM Courses ORDER BY department ASC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("department", result.getString("department"));
            tuple.put("number", result.getString("number"));
            tuple.put("title", result.getString("title"));
            tuple.put("units", Integer.toString(result.getInt("units")));
            tuple.put("cost", Integer.toString(result.getInt("cost")));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

View offered course configurations

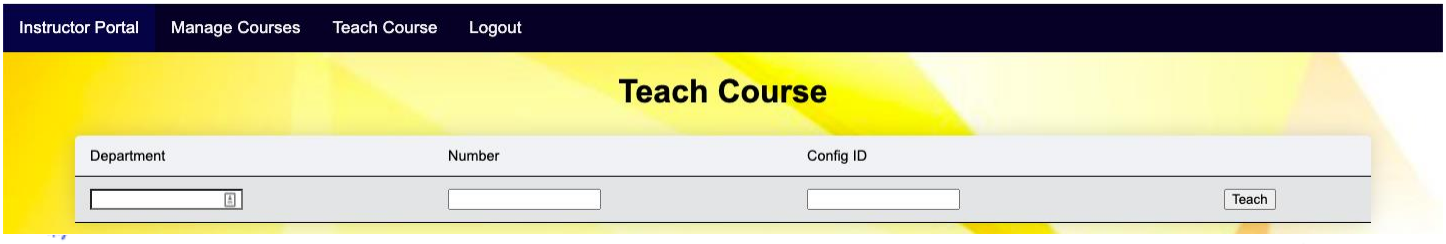
Click ‘Teach Course’.




```java
public static ArrayList<HashMap<String, String>> getAll() {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con.prepareStatement("SELECT * FROM Configurations ORDER BY year DESC;");
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            tuple.put("term", result.getString("term"));
            tuple.put("year", Integer.toString(result.getInt("year")));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("seats", Integer.toString(result.getInt("seats")));
            output.add(tuple);
        }
        result.close(); // Close result
        return output; // Successful search
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output;
}
```

Teach a course

At the top of the page, enter the fields of the course and click submit. Select a course's department and number and config ID to add the course to teaching list. If the course is being taught by you or someone else – a certain combination of department, number, and configID are already in use by someone else – the course will not add.

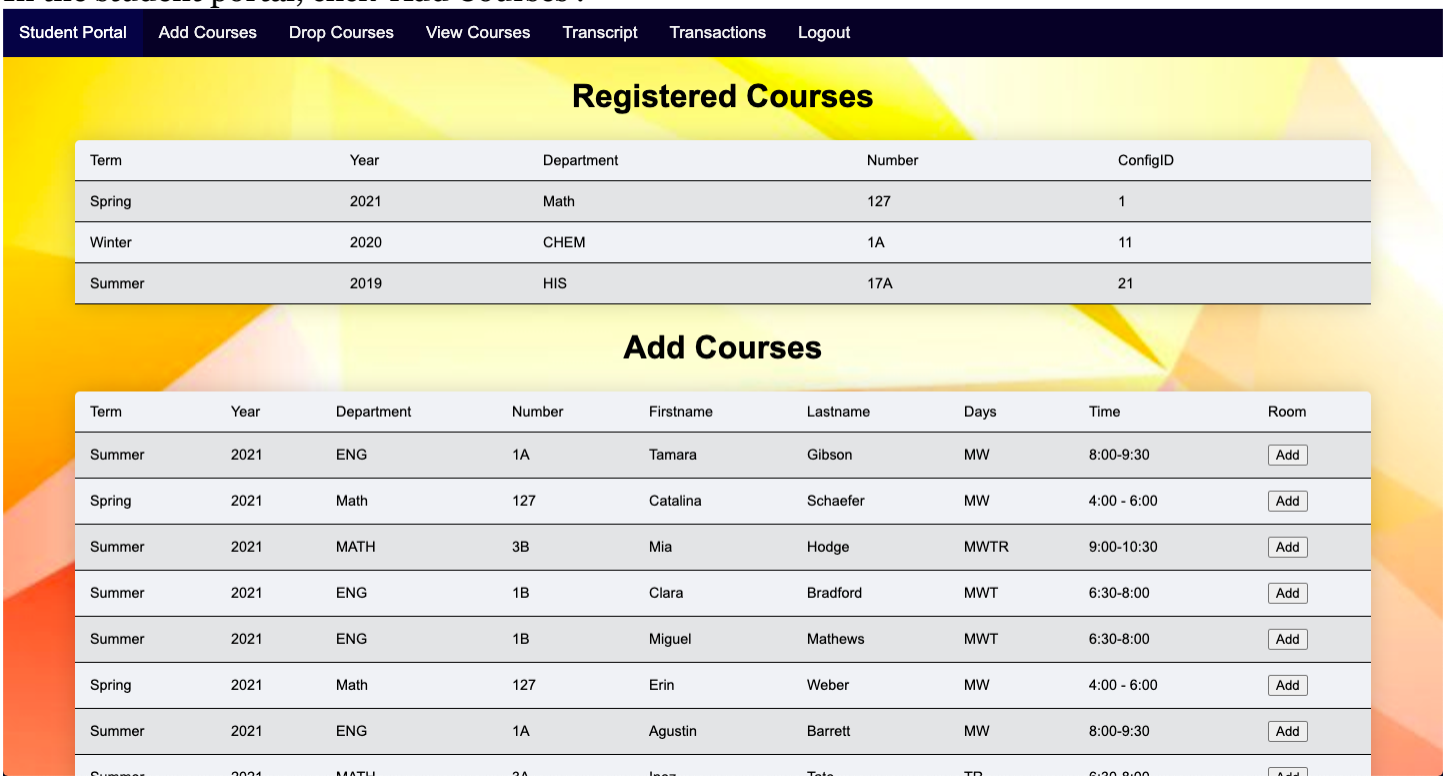



```java
public static boolean insert(String instructorID, String department, String number, int configID) {
    /** Check for invalid inputs. If any input is null, return false */
    if (instructorID == null || department == null || number == null || configID < 0) return false;
    /** Insert tuple */
    SQLMethods.mysqlConnect(); // Connect to DB
    try {
        // Check if course is already being taught
        if (isTeaching(department, number, configID)) return false;
        pstate = SQLMethods.con.prepareStatement("INSERT INTO Teaches VALUES (?, ?, ?, ?);");
        pstate.setString(1, instructorID);
        pstate.setString(2, department);
        pstate.setString(3, number);
        pstate.setInt(4, configID);
        pstate.executeUpdate(); // Execute query
        SQLMethods.closeConnection(); // Close connection
        return true; // Successful insert
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Students

View registered courses

In the student portal, click ‘Add Courses’.




```java
public static ArrayList<HashMap<String, String>> viewRegisteredCourses(String studentID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    /** Check for invalid inputs. If any input is null, return false */
    if (studentID == null) return output; // Check if studentID is null, return empty list if so
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        /** Search and retrieve tuple */
        pstate = SQLMethods.con.prepareStatement(
                "SELECT * FROM Registers JOIN Configurations Using (configID) WHERE studentID = ? ORDER BY year DESC;");
        pstate.setString(1, studentID);
        result = pstate.executeQuery(); // Execute query
        /** Extract tuple data */
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("term", result.getString("term"));
            tuple.put("year", result.getString("year"));
            tuple.put("department", result.getString("department"));
            tuple.put("number", result.getString("number"));
            tuple.put("days", result.getString("days"));
            tuple.put("time", result.getString("time"));
            tuple.put("room", result.getString("room"));
            tuple.put("configID", Integer.toString(result.getInt("configID")));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Return output
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // Return false as a default value
}
```

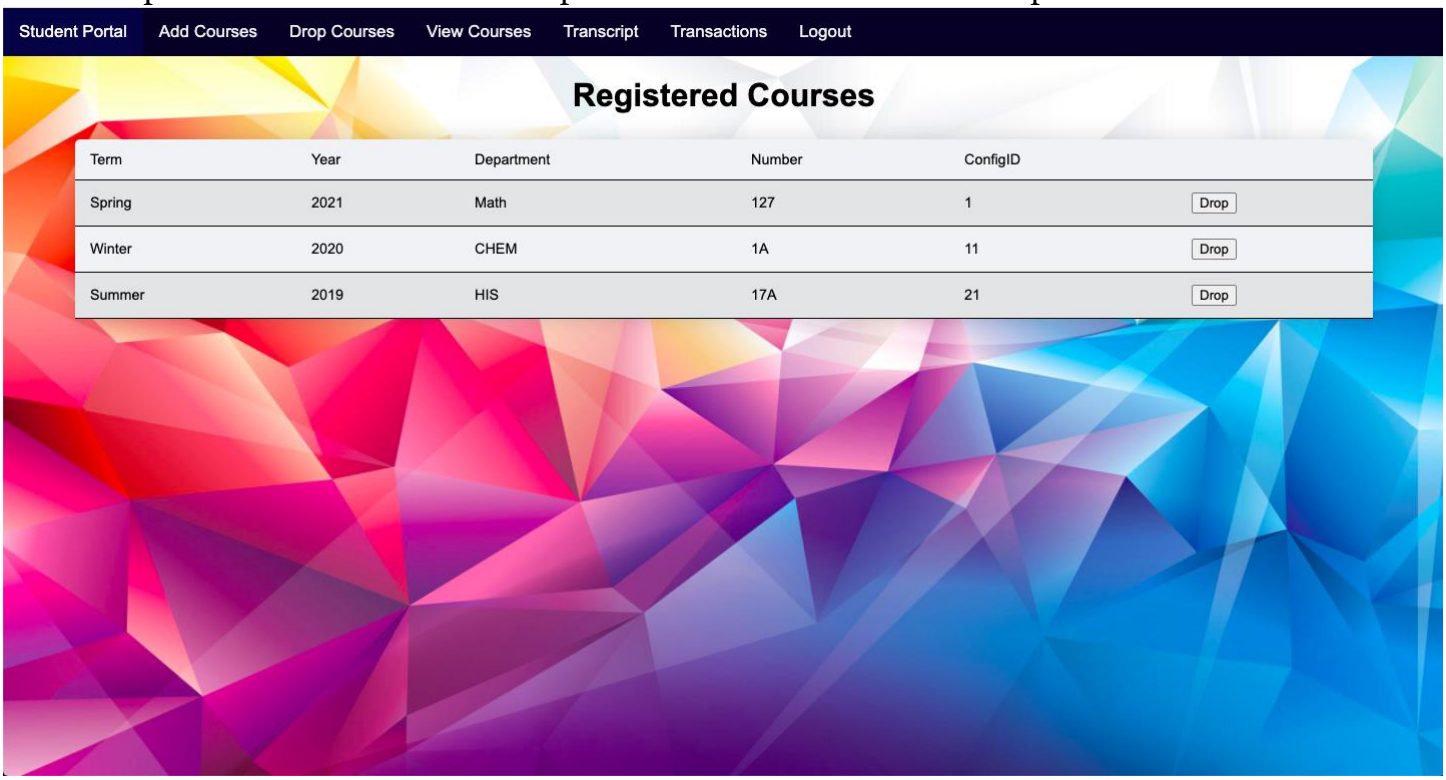
Add courses

In the picture above, click add next to the course to add. If the course is full, you will be added to the waitlist. If you are already registered or waitlisted, you cannot add the course twice.

```
public static boolean register(String studentID, String department, String number, int configID) {
    /** Check for invalid inputs. If any input is null, return false */
    if (studentID == null || department == null || number == null || configID < 0) return false;
    /** Check if student already registered for this course */
    if (isRegistered(studentID, department, number, configID)) return false;
    /** Check if student already waitlisted this course */
    if (isWaitlisted(studentID, department, number, configID)) return false;
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to insert
        /** Check if seats are open */
        // If course is open, register for course
        // If course is not open, waitlist course
        if (isOpen(department, number, configID))
            pstate = SQLMethods.con.prepareStatement("INSERT INTO Registers VALUES (?, ?, ?, ?);");
        else
            pstate = SQLMethods.con.prepareStatement("INSERT INTO Wailtlists VALUES (?, ?, ?, ?);");
        pstate.setString(1, studentID);
        pstate.setString(2, department);
        pstate.setString(3, number);
        pstate.setInt(4, configID);
        int rowcount = pstate.executeUpdate(); // Number of rows affected
        SQLMethods.closeConnection(); // Close connection
        return (rowcount == 1); // If rowcount == 1, row successfully inserted
    } catch (SQLException e) { // Print error and terminate program
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Default value: false
}
```

Drop courses

Click ‘Drop Courses’. Then click the drop button next to the course to drop.




```java
public static boolean drop(String studentID, String department, String number, int configID) {
    if (studentID == null || department == null | number == null || configID < 0) return false;
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to delete
        /**
         * Check if student is in Registers. If so, we check else statement. If not, we
         * have another student waiting on waitlist, so we move waiting student to
         * Registers and delete old student.
         */
        int value = 0;
        if (isWaitlisted(studentID, department, number, configID)) { // If student is on waitlist
            pstate = SQLMethods.con.prepareStatement(
                    "DELETE FROM Waitlists WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
            pstate.setString(1, studentID);
            pstate.setString(2, department);
            pstate.setString(3, number);
            pstate.setInt(4, configID);
            value = pstate.executeUpdate();
        } else {
            pstate = SQLMethods.con.prepareStatement(
                    "DELETE FROM Registers WHERE studentID = ? AND department = ? AND number = ? AND configID = ?;");
            pstate.setString(1, studentID);
            pstate.setString(2, department);
            pstate.setString(3, number);
            pstate.setInt(4, configID);
            value = pstate.executeUpdate();

            /** Adjust the watlist if needed */
            adjustWaitlist(studentID, studentID, number, configID);
        }
        SQLMethods.closeConnection(); // Close connection
        return true; // Success
    } catch (SQLException e) {
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return false; // Return false as a default value
}
```

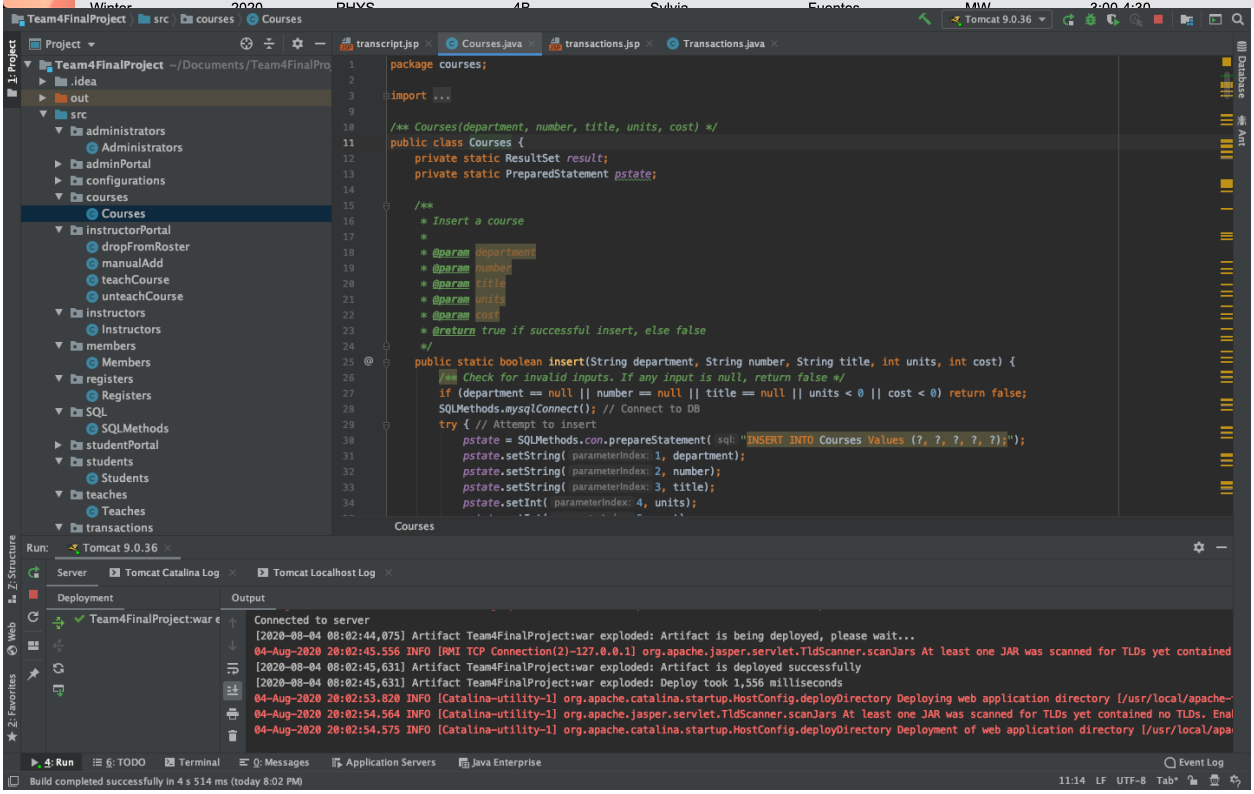
View offered courses

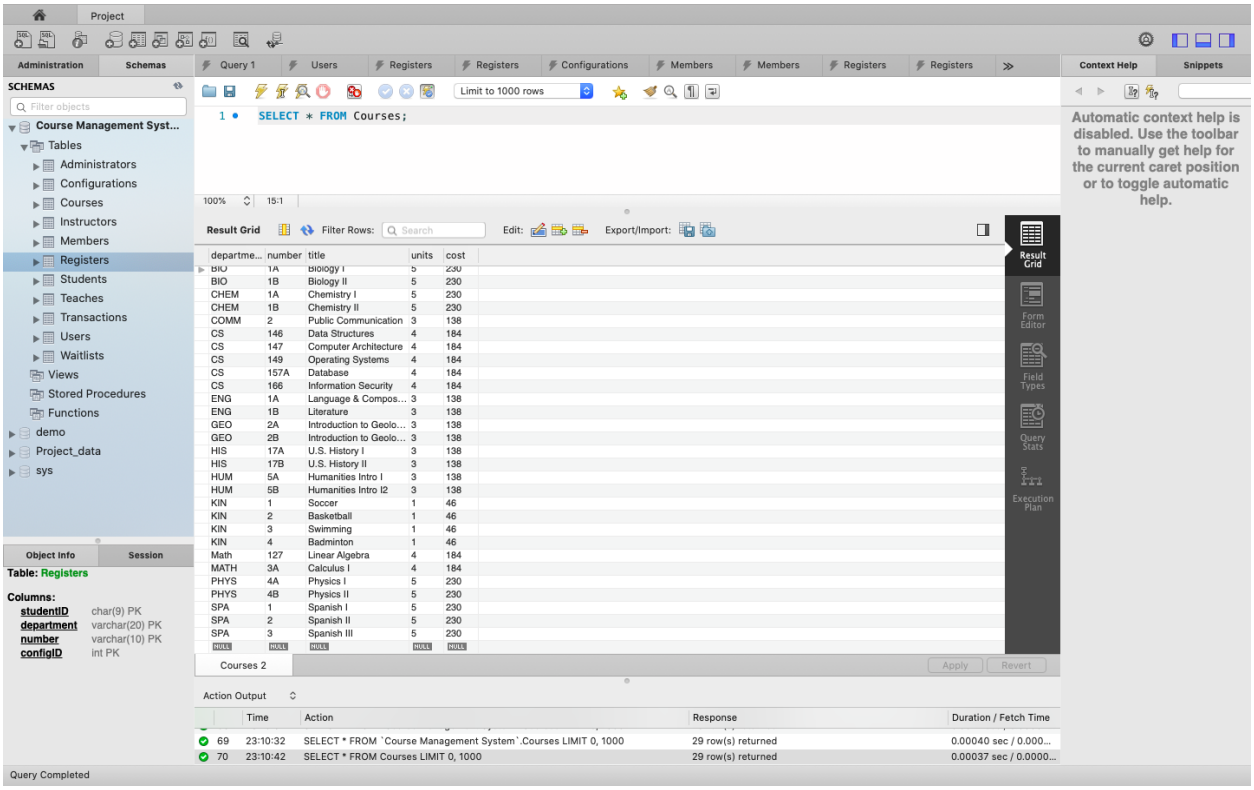
Click ‘View Courses’.

Student Portal | Add Courses | Drop Courses | View Courses | Transcript | Transactions | Logout

Offered Courses

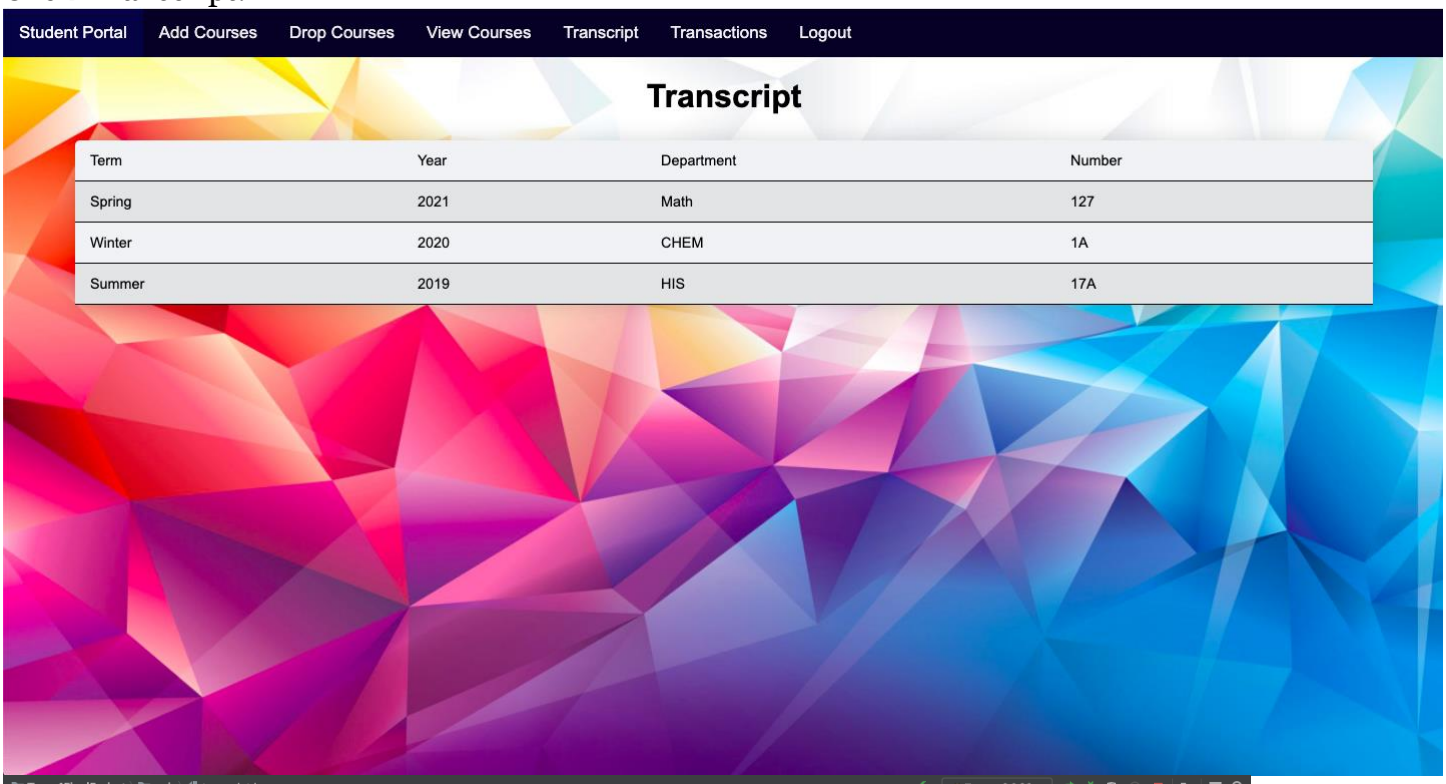
Term	Year	Department	Number	Firstname	Lastname	Days	Time	Room
Summer	2021	ENG	1A	Tamara	Gibson	MW	8:00-9:30	22
Spring	2021	Math	127	Catalina	Schaefer	MW	4:00 - 6:00	41
Summer	2021	MATH	3B	Mia	Hodge	MWTR	9:00-10:30	34
Summer	2021	ENG	1B	Clara	Bradford	MWT	6:30-8:00	40
Summer	2021	ENG	1B	Miguel	Mathews	MWT	6:30-8:00	40
Spring	2021	Math	127	Erin	Weber	MW	4:00 - 6:00	41
Summer	2021	ENG	1A	Agustin	Barrett	MW	8:00-9:30	22
Summer	2021	MATH	3A	Inez	Tate	TR	6:30-8:00	33
Summer	2021	MATH	3A	Jack	Vargas	TR	6:30-8:00	33
Summer	2021	MATH	3B	Alton	Gallagher	MWTR	9:00-10:30	34
Fall	2020	PHYS	4A	Antoinette	Marks	MWF	9:30-11:00	18
Winter	2020	CS	157A	Mia	Hodge	MW	3:00-4:30	48
Fall	2020	COMM	2	Polly	Rios	MW	1:30-3:00	50
Spring	2020	CS	149	Tamara	Gibson	MWF	4:00 - 6:00	43

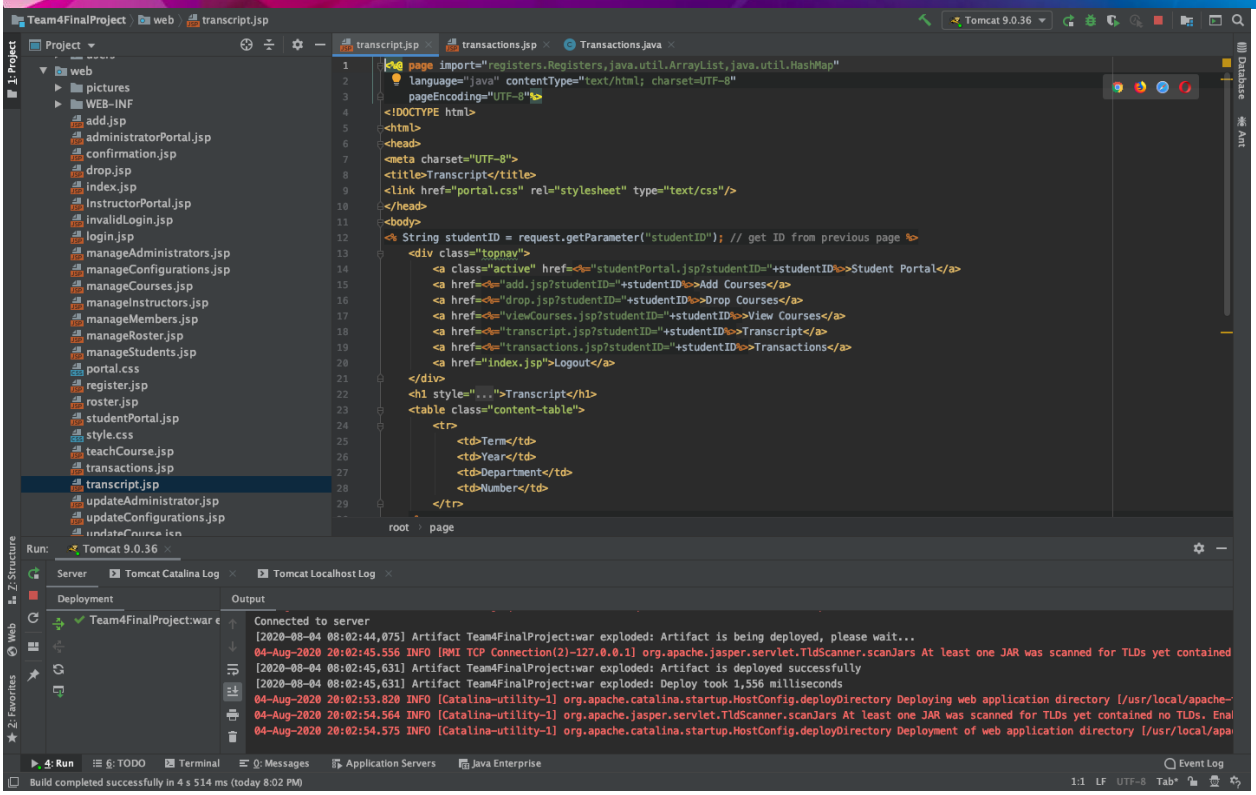



Project
Administration
Schemas
Query 1
Users
Registers
Registers
Configurations
Members
Members
Registers
Registers
Context Help
Snippets
SCHEMAS
Filter objects
Course Management Syst...
Tables
Administrators
Configurations
Courses
Instructors
Members
Registers
Students
Teaches
Transactions
Users
Waitlists
Views
Stored Procedures
Functions
demo
Project_data
sys
Limit to 1000 rows
1 • SELECT * FROM Courses;
100%
15:1
Result Grid
Filter Rows:
Search
Edit:
Export/Import:
departme... number title units cost
BIO 1A Biology I 5 230
BIO 1B Biology II 5 230
CHEM 1A Chemistry I 5 230
CHEM 1B Chemistry II 5 230
COMM 2 Public Communication 3 138
CS 146 Data Structures 4 184
CS 147 Computer Architecture 4 184
CS 149 Operating Systems 4 184
CS 157A Database 4 184
CS 166 Information Security 4 184
ENG 1A Language & Compos... 3 138
ENG 1B Literature 3 138
GEO 2A Introduction to Geolo... 3 138
GEO 2B Introduction to Geolo... 3 138
HIS 17A U.S. History I 3 138
HIS 17B U.S. History II 3 138
HUM 5A Humanities Intro I 3 138
HUM 5B Humanities Intro I2 3 138
KIN 1 Soccer 1 46
KIN 2 Basketball 1 46
KIN 3 Swimming 1 46
KIN 4 Badminton 1 46
Math 127 Linear Algebra 4 184
MATH 3A Calculus I 4 184
PHYS 4A Physics I 5 230
PHYS 4B Physics II 5 230
SPA 1 Spanish I 5 230
SPA 2 Spanish II 5 230
SPA 3 Spanish III 5 230
Courses 2
Apply
Revert
Result Grid
Form Editor
Field Types
Query Stats
Execution Plan
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
Object Info
Session
Table: Registers
Columns:
studentID char(9) PK
department varchar(20) PK
number varchar(10) PK
configID int PK
Action Output
Time Action Response Duration / Fetch Time
69 23:10:32 SELECT * FROM `Course Management System`.Courses LIMIT 0, 1000 29 row(s) returned 0.00040 sec / 0.000...
70 23:10:42 SELECT * FROM Courses LIMIT 0, 1000 29 row(s) returned 0.00037 sec / 0.0000...
Query Completed

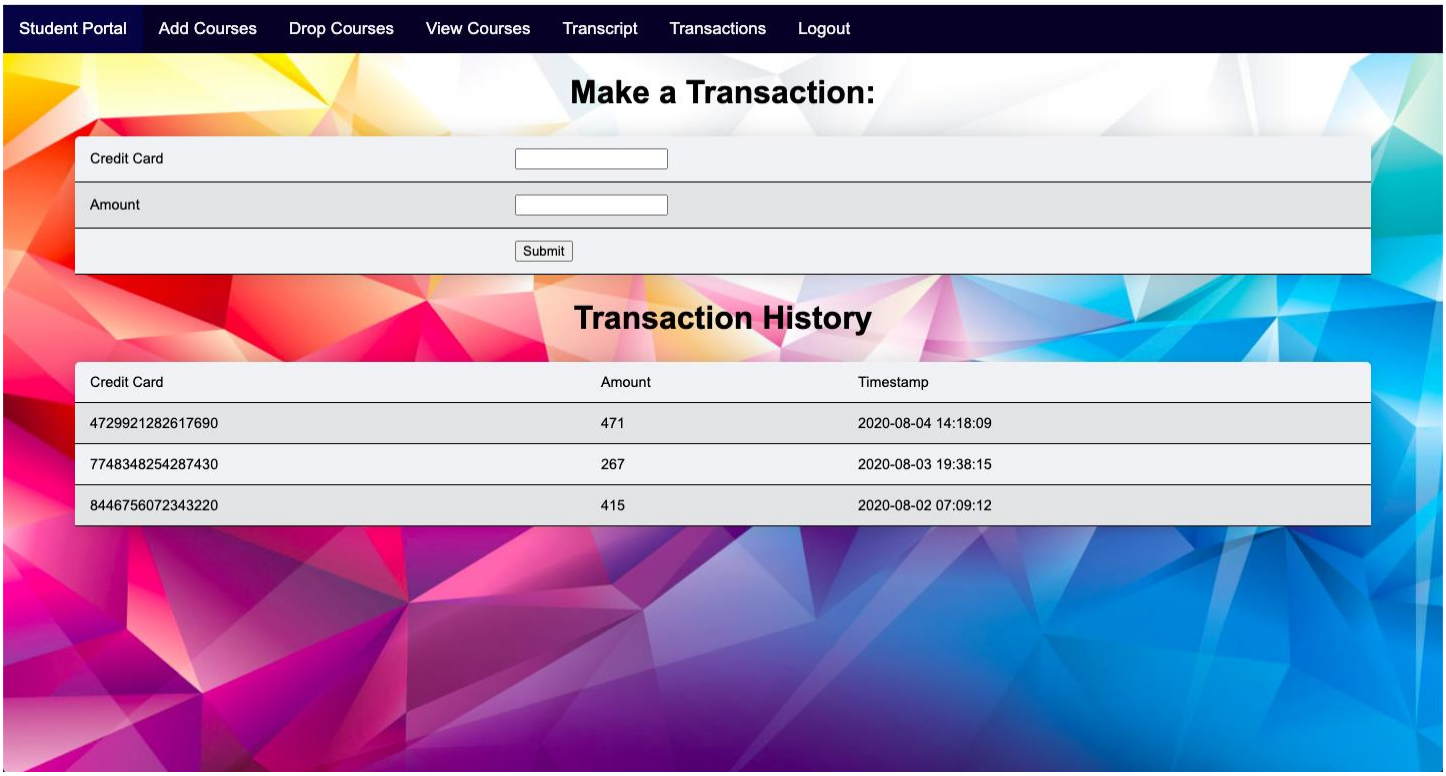
View transcript and registered courses

Click ‘Transcript.





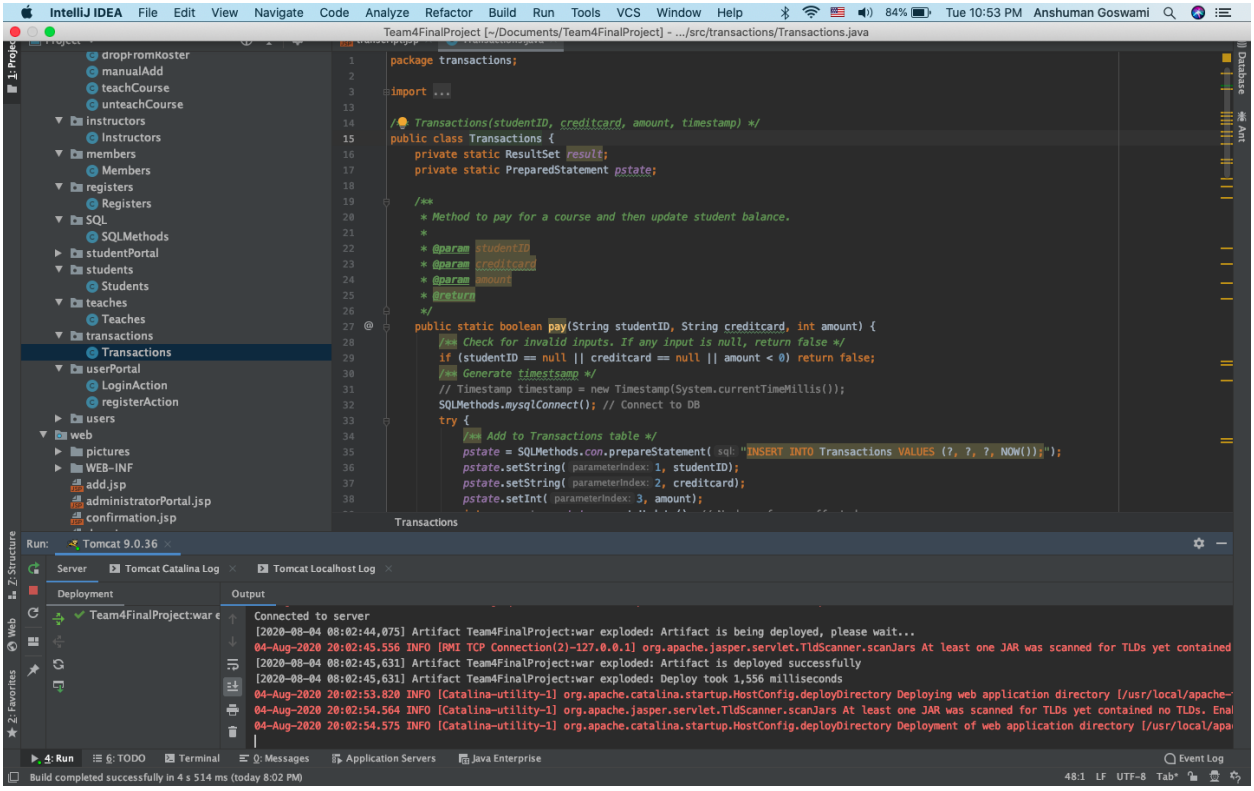
View transaction history
Click 'Transactions'.

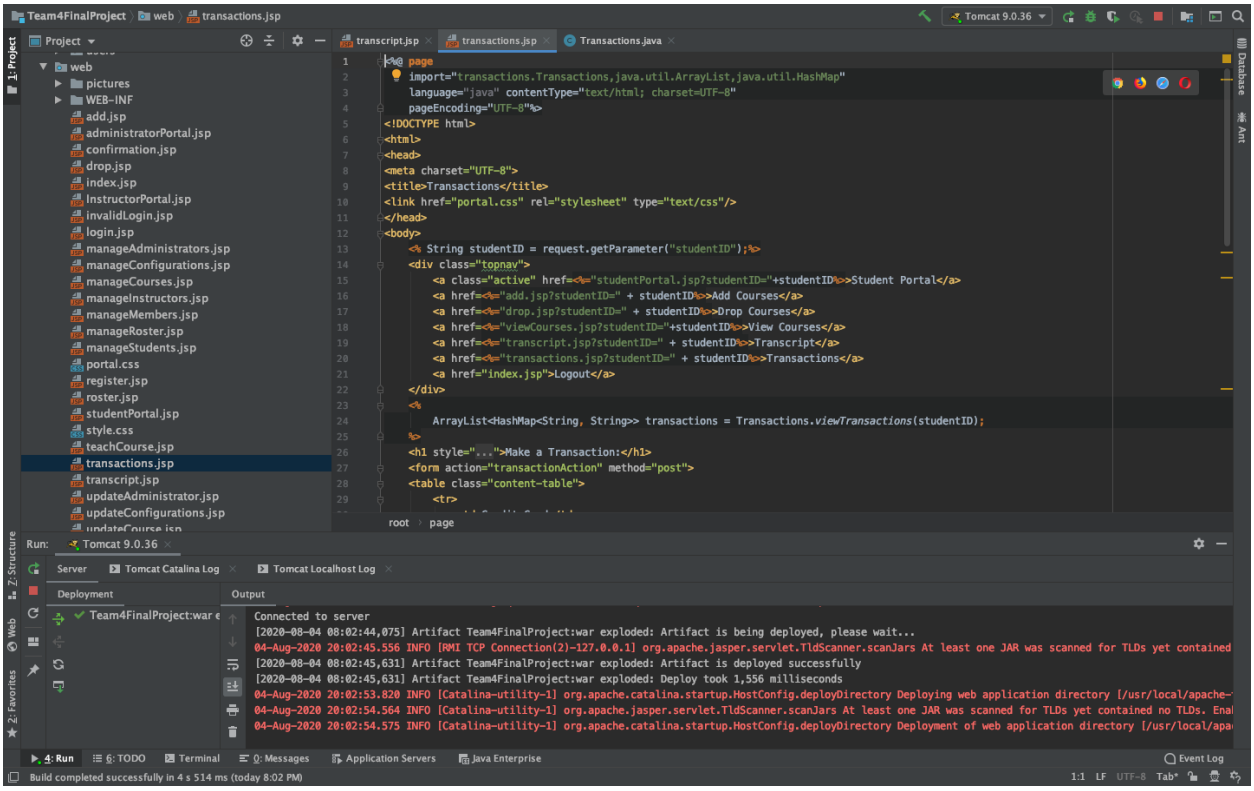



```
*/
public static ArrayList<HashMap<String, String>> viewTransactions(String studentID) {
    ArrayList<HashMap<String, String>> output = new ArrayList<HashMap<String, String>>();
    if (studentID == null) return output; // Return empty list
    SQLMethods.mysqlConnect(); // Connect to DB
    try { // Attempt to search
        pstate = SQLMethods.con
                .prepareStatement("SELECT * FROM Transactions WHERE studentID = ? ORDER BY timestamp DESC;");
        pstate.setString(1, studentID);
        result = pstate.executeQuery(); // Execute query
        while (result.next()) {
            HashMap<String, String> tuple = new HashMap<String, String>();
            tuple.put("studentID", result.getString("studentID"));
            tuple.put("creditcard", result.getString("creditcard"));
            tuple.put("amount", result.getString("amount"));
            tuple.put("timestamp", result.getString("timestamp"));
            output.add(tuple);
        }
        result.close(); // Close result
        SQLMethods.closeConnection(); // Close connection
        return output; // Success
    } catch (SQLException e) {
        SQLMethods.mysql_fatal_error("Query error: " + e.toString());
    }
    return output; // default value
}
```

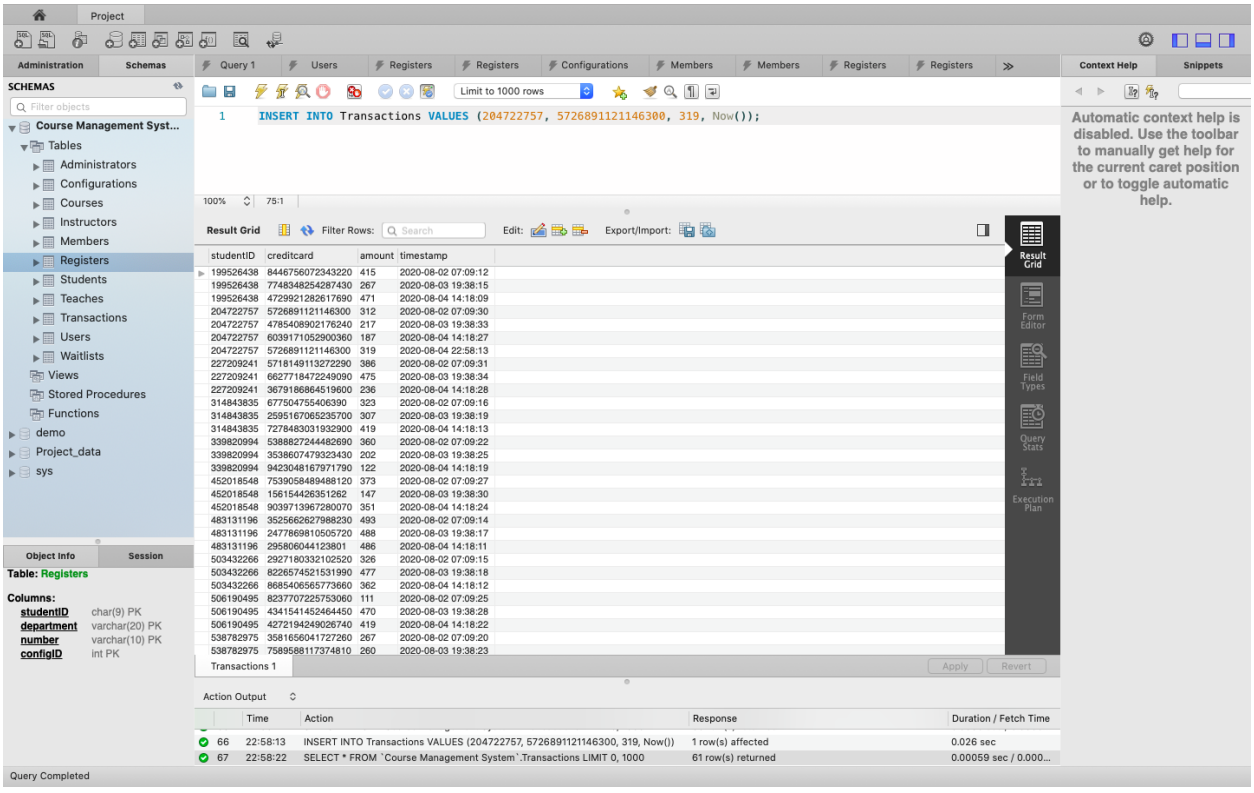
Pay for courses

Enter credit card information and amount and then click submit. The transaction will be in the portal after submitting.





Add a new transaction:
INSERT INTO Transactions VALUES (204722757, 5726891121146300, 319, Now());



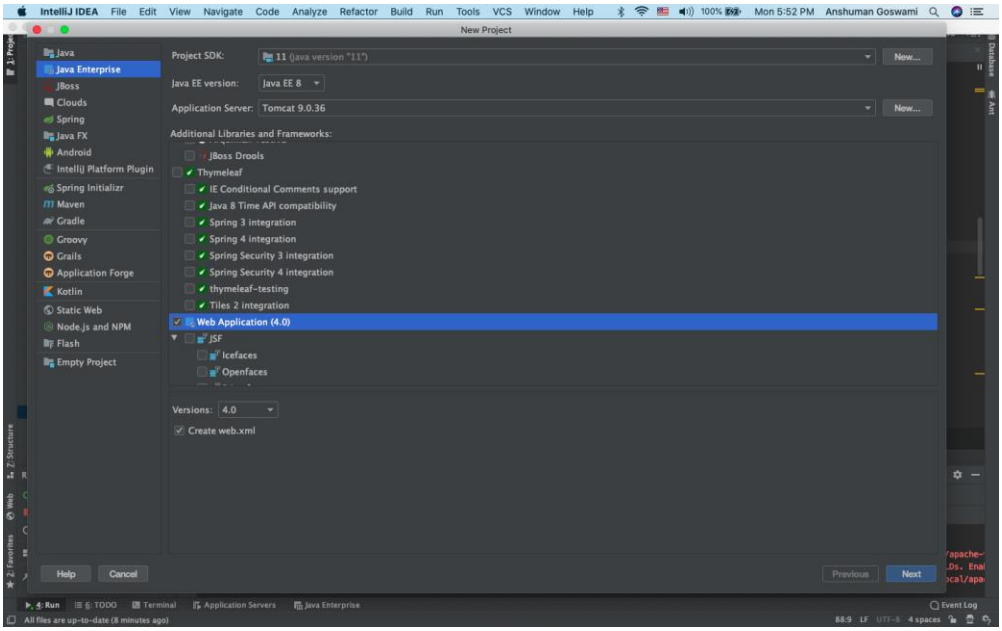
Procedures how to set up and run our system:

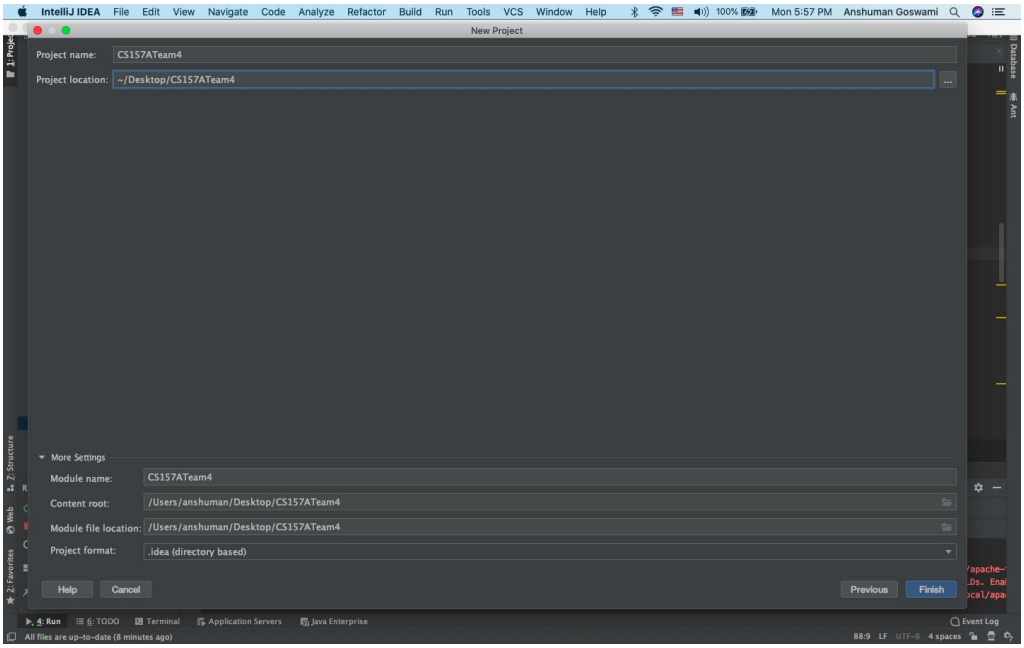
- Installed Apache Tomcat server to run the program.
- Downloaded my-sql-connector-java-8.0.21.jar to connect java files with the database.
- In our team we used a mix of Eclipse and Intellij.

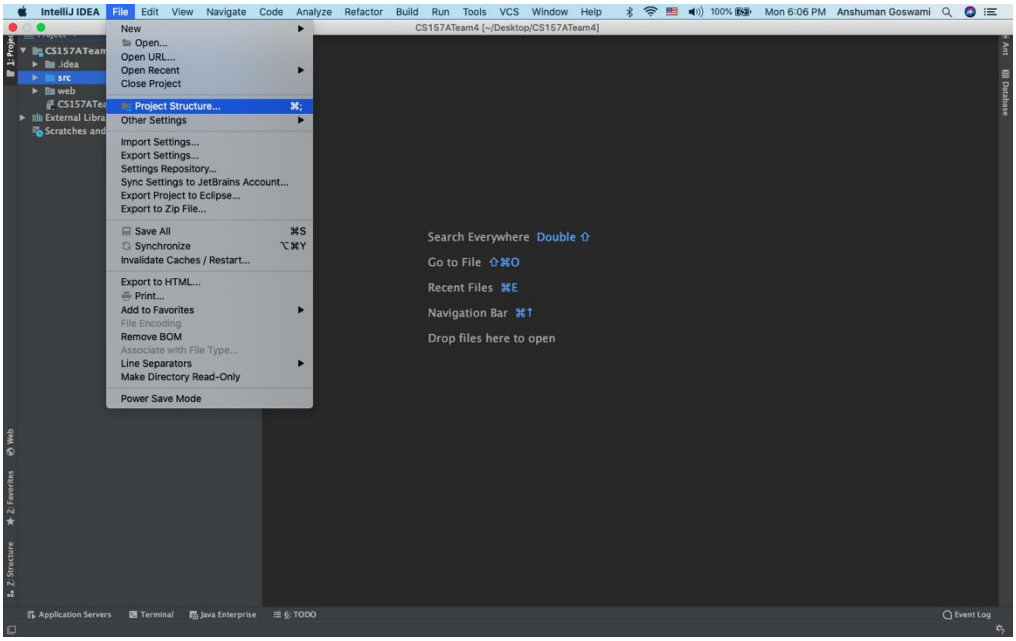
Notes when testing

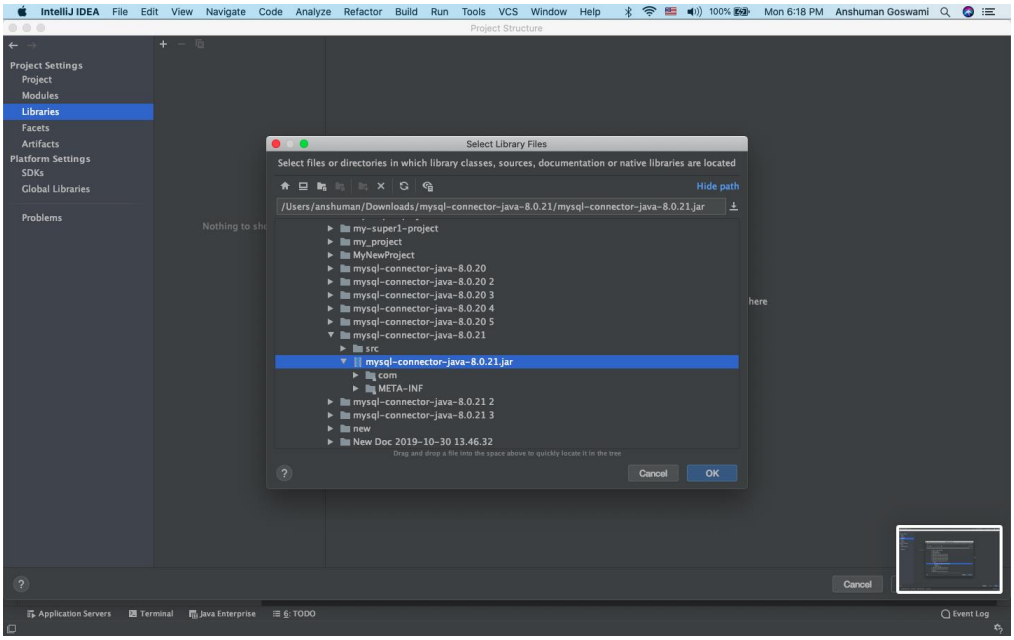
- Please use admin account with clearance 3
    - You can find this in the excel sheet or use the pictures
- You may have difficulty adding existing courses. That is because other instructors are teaching this section. Try logging in as admin, creating a course, and then teach the course with an instructor account.

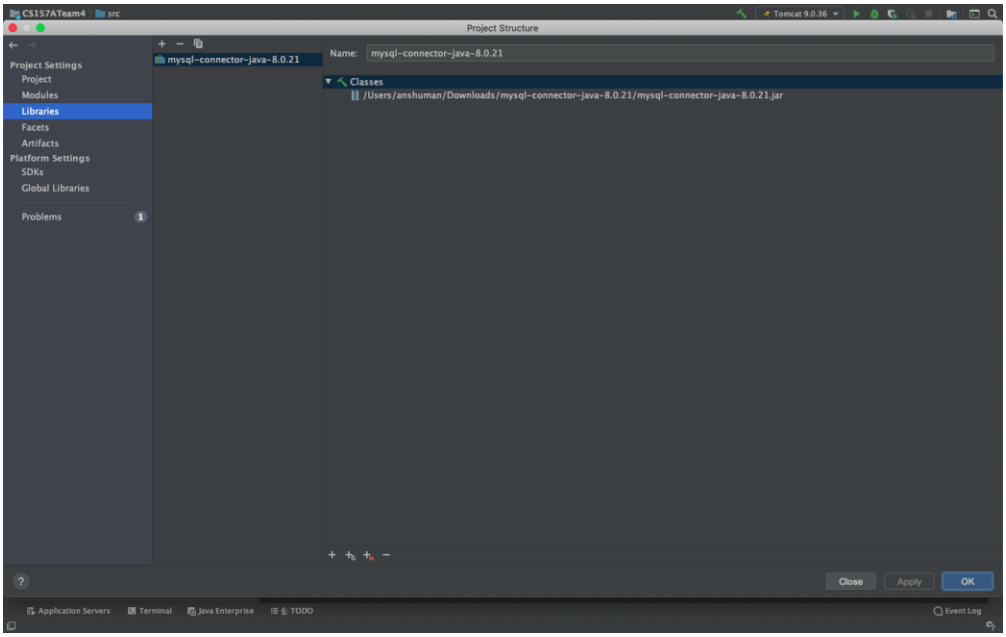
Here are some screenshots of the step by step procedure in Intellij how we set and run our system.

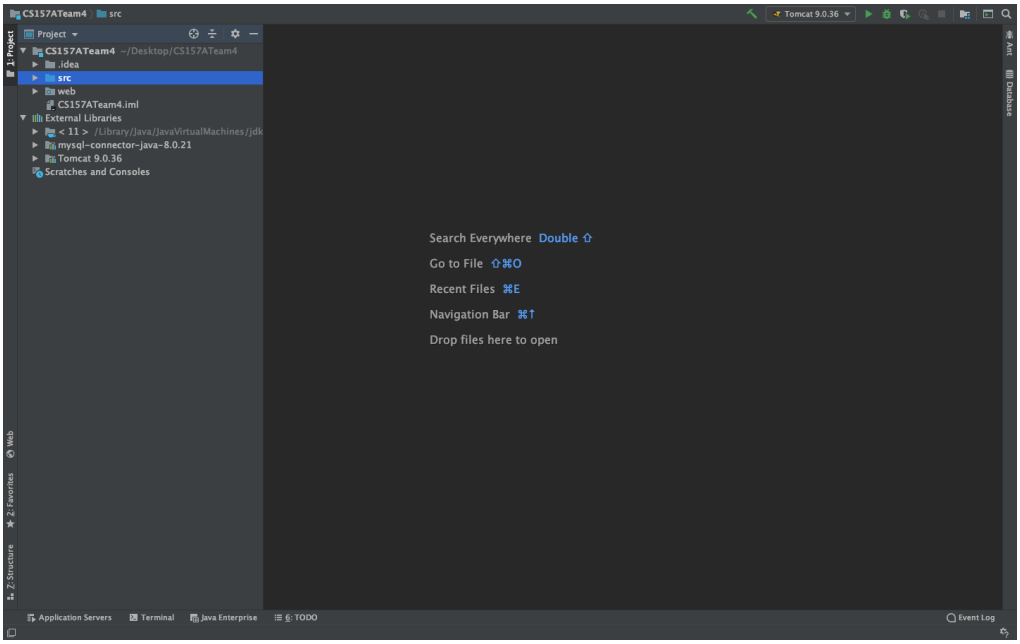


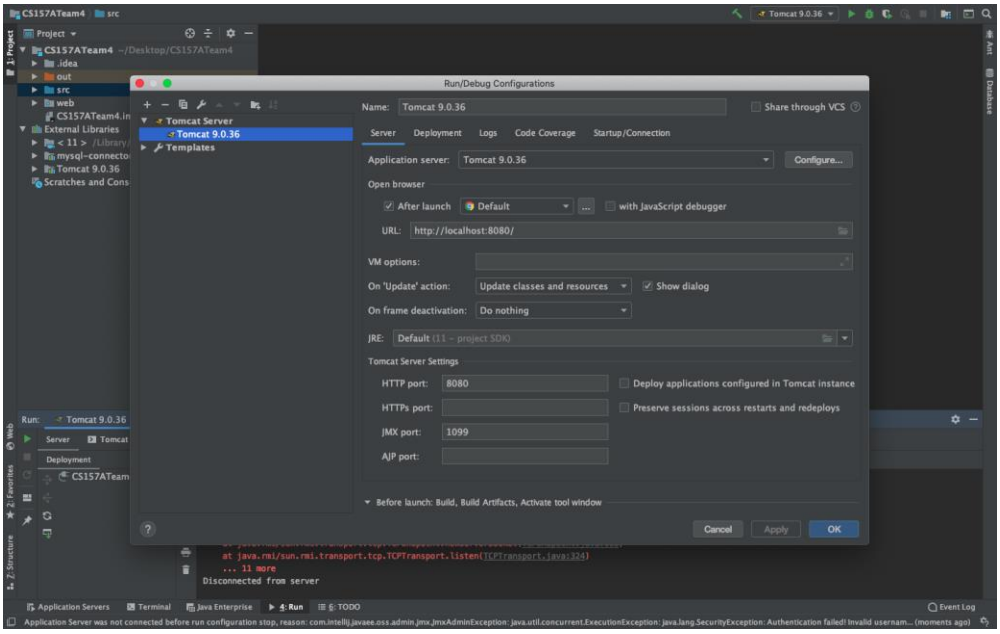

IntelliJ IDEA File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help Mon 5:57 PM Anshuman Goswami
New Project
Project name: CS157ATeam4
Project location: ~/Desktop/CS157ATeam4
More Settings
Module name: CS157ATeam4
Content root: /Users/anshuman/Desktop/CS157ATeam4
Module file location: /Users/anshuman/Desktop/CS157ATeam4
Project format: .idea (directory based)
Help
Cancel
Previous
Finish
4: Run 6: TODO Terminal Application Servers Java Enterprise Event Log
All files are up-to-date (8 minutes ago)

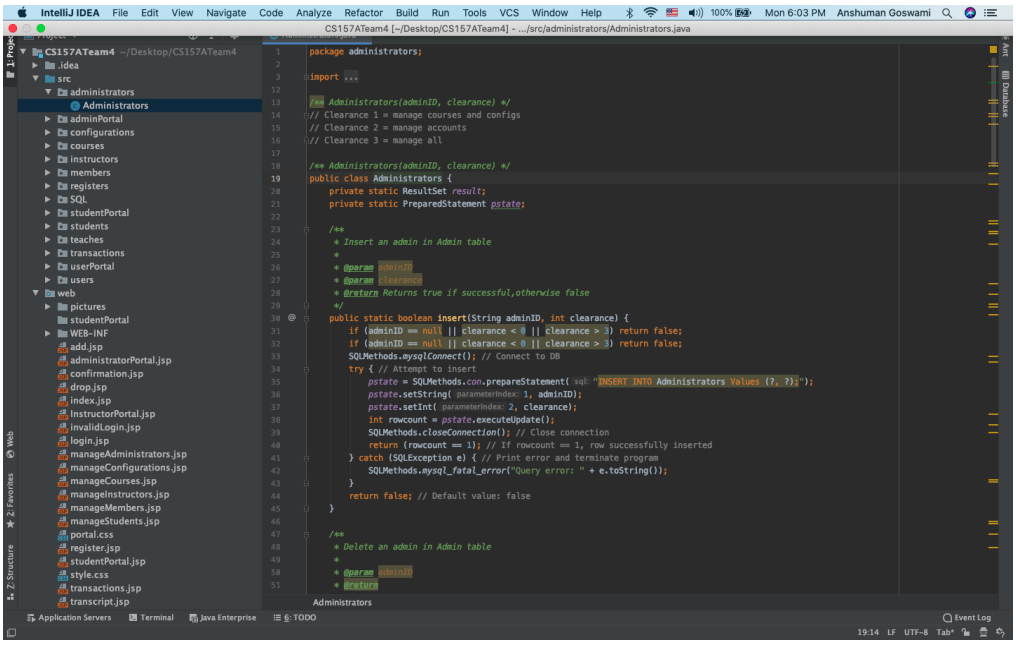

IntelliJ IDEA File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help Mon 6:06 PM Anshuman Goswami
CS157ATeam4 [~/Desktop/CS157ATeam4]
New
Open...
Open URL...
Open Recent
Close Project
Project Structure... ⌘;
Other Settings
Import Settings...
Export Settings...
Settings Repository...
Sync Settings to JetBrains Account...
Export Project to Eclipse...
Export to Zip File...
Save All ⌘S
Synchronize ⌥⌘Y
Invalidate Caches / Restart...
Export to HTML...
Print...
Add to Favorites
File Encoding
Remove BOM
Associate with File Type...
Line Separators
Make Directory Read-Only
Power Save Mode
Search Everywhere Double ⇧
Go to File ⇧⌘O
Recent Files ⌘E
Navigation Bar ⌘↑
Drop files here to open
Application Servers Terminal Java Enterprise 6: TODO Event Log


Project Structure
Project Settings
Project
Modules
Libraries
Facets
Artifacts
Platform Settings
SDKs
Global Libraries
Problems
Select Library Files
Select files or directories in which library classes, sources, documentation or native libraries are located
Hide path
/Users/anshuman/Downloads/mysql-connector-java-8.0.21/mysql-connector-java-8.0.21.jar
my-super1-project
my_project
MyNewProject
mysql-connector-java-8.0.20
mysql-connector-java-8.0.20 2
mysql-connector-java-8.0.20 3
mysql-connector-java-8.0.20 4
mysql-connector-java-8.0.20 5
mysql-connector-java-8.0.21
src
mysql-connector-java-8.0.21.jar
com
META-INF
mysql-connector-java-8.0.21 2
mysql-connector-java-8.0.21 3
new
New Doc 2019-10-30 13.46.32
Cancel
OK
Application Servers
Terminal
Java Enterprise
6: TODO
Event Log

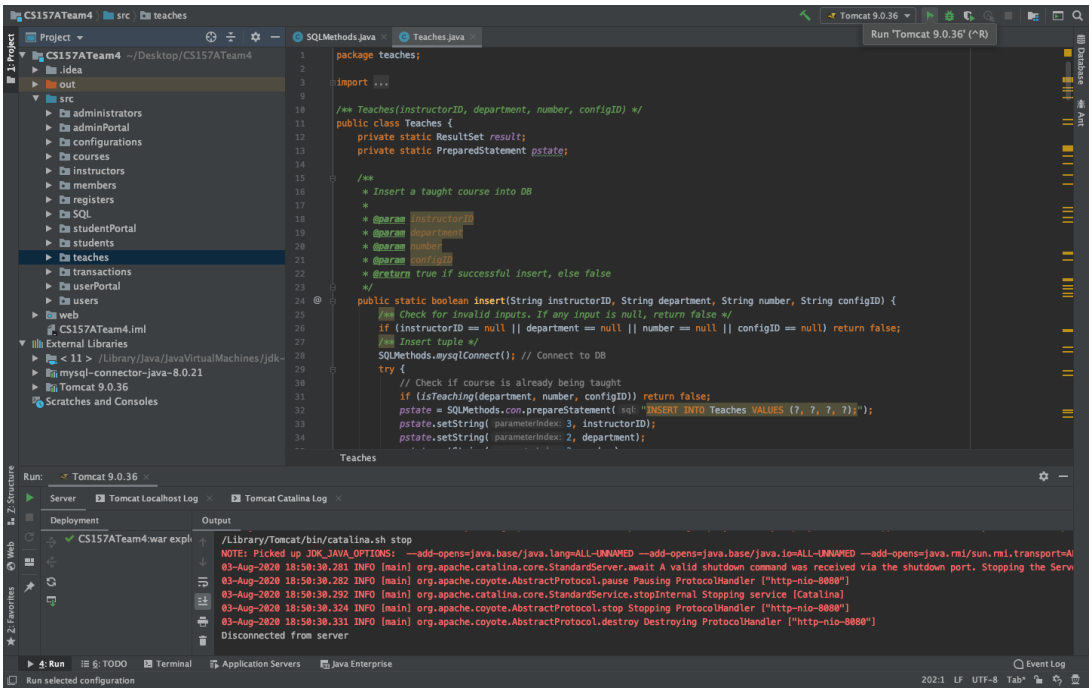

CS157ATeam4
src
Tomcat 9.0.36
Project Structure
Project Settings
Project
Modules
Libraries
Facets
Artifacts
Platform Settings
SDKs
Global Libraries
Problems
mysql-connector-java-8.0.21
Name:
mysql-connector-java-8.0.21
Classes
/Users/anshuman/Downloads/mysql-connector-java-8.0.21/mysql-connector-java-8.0.21.jar
Close
Apply
OK
Application Servers
Terminal
Java Enterprise
6: TODO
Event Log


CS157ATeam4
src
Tomcat 9.0.36
Project
CS157ATeam4 ~/Desktop/CS157ATeam4
.idea
src
web
CS157ATeam4.iml
External Libraries
< 11 > /Library/Java/JavaVirtualMachines/jdk
mysql-connector-java-8.0.21
Tomcat 9.0.36
Scratches and Consoles
Search Everywhere Double ⇧
Go to File ⇧⌘O
Recent Files ⌘E
Navigation Bar ⌘↑
Drop files here to open
Application Servers
Terminal
Java Enterprise
6: TODO
Event Log

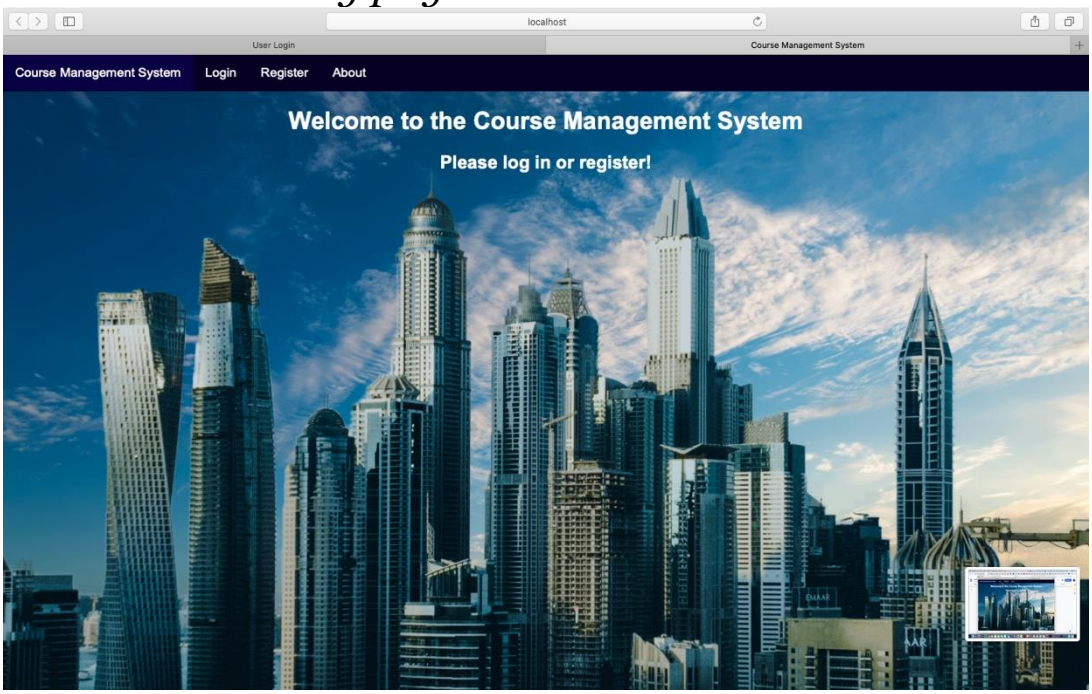

Run/Debug Configurations
Tomcat Server
Tomcat 9.0.36
Templates
Name: Tomcat 9.0.36
Share through VCS
Server
Deployment
Logs
Code Coverage
Startup/Connection
Application server: Tomcat 9.0.36
Configure...
Open browser
After launch
Default
with JavaScript debugger
URL: http://localhost:8080/
VM options:
On 'Update' action: Update classes and resources
Show dialog
On frame deactivation: Do nothing
JRE: Default (11 - project SDK)
Tomcat Server Settings
HTTP port: 8080
HTTPs port:
JMX port: 1099
AJP port:
Deploy applications configured in Tomcat instance
Preserve sessions across restarts and redeploys
Before launch: Build, Build Artifacts, Activate tool window
Cancel
Apply
OK
Disconnected from server



Run the program using Tomcat server.



This is our landing page.



Success!

Lessons Learned

Abdurrahman Mohammad

This was the first time I used GitHub. It was a real learning experience. I learned how to install it on Eclipse and set it up. I learned how to make a web project in Java using Java, HTML, and CSS. I learned how to use JSP files. I learned how to make tables and input forms and then retrieve input from these forms. I learned how to style with CSS and link CSS sheets to pages. I learned and practiced SQL and learned how to use the MySQL Workbench. I learned how to link MySQL with my Java project and connect my schemas. I learned how to execute SQL statement in Java and open and close connections to the database. Overall, I have furthered my knowledge and experience in Java. I learned how to do web development. I have successfully learned how to create a proper, fully-functioning database application.

Susmita Goswami

It was a bit difficult at first since I had to learn both SQL and JSP in order to work on this project. I've also had to learn how to use MySQL Workbench to test out if the project is actually updating the database. This has helped me to become a bit familiar with web development as I also had to learn that for this project. Since this was a team project, working on it allowed me to become a bit more familiar with using git to update my project files and pushing updates to our GitHub repository.

Anudeep Gogineni

I have learned two three new concepts - SQL, servlets and JSP. I have learned new tools - Tomcat server, MySQL Workbench and IntelliJ web application development. I have also learned important tricks of debugging a web application. I spent a lot of time getting my installation ready and this gives me confidence to do it better in future projects. Also, I got a chance to polish my collaborative development skills using git.