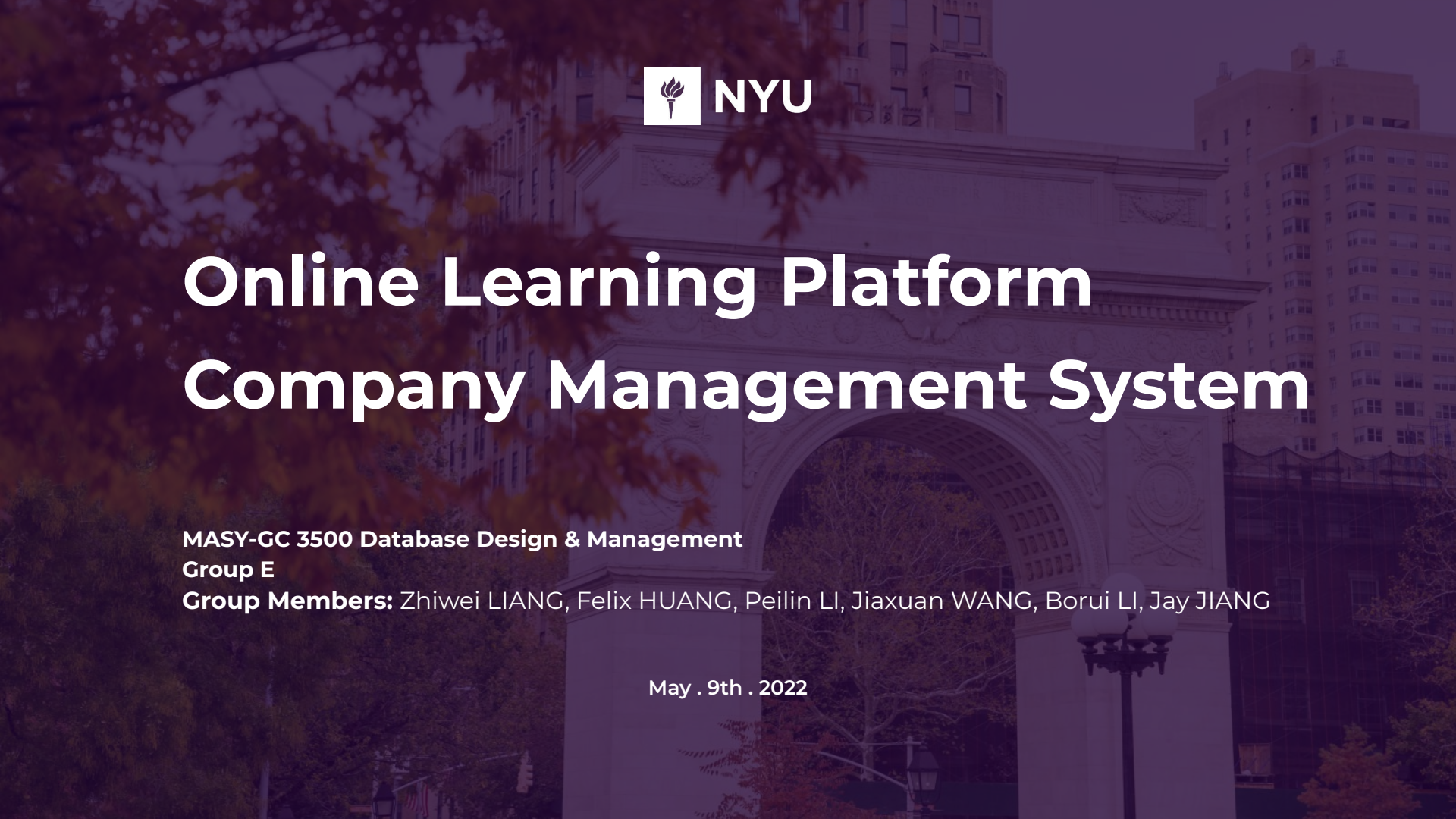

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Online Learning Platform Company Management System

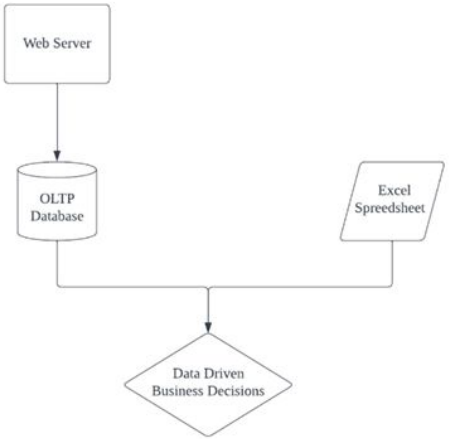
MASY-GC 3500 Database Design & Management
Group E
Group Members: Zhiwei LIANG, Felix HUANG, Peilin LI, Jiaxuan WANG, Borui LI, Jay JIANG

May . 9th . 2022

Executive Summary

We used to be a Traditional Educational company. The business was fine until recently the Covid hit; our business took a big fall. We decided to slowly transform it into an Online Learning Platform company. Our business model would be similar to Other Online learning Platforms such as Coursera, Udemy, and Udacity. Our company has 25 employees working in four departments, which are sales, marketing, financial, and product. However, our business has run into some problems along the line. I will provide our business overview below, and the business problems that we are facing.

We are currently using an Excel spreadsheet to track all students' data, we also have an OLTP database that's being managed by a third-party company which is for powering our Online Learning Platform. The OLTP only contains the current student's information, and some class contents. Our model show as below:



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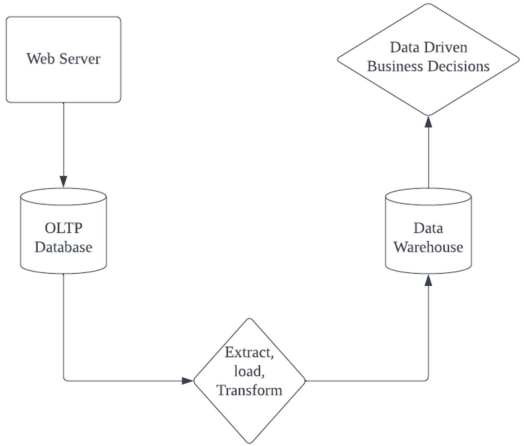
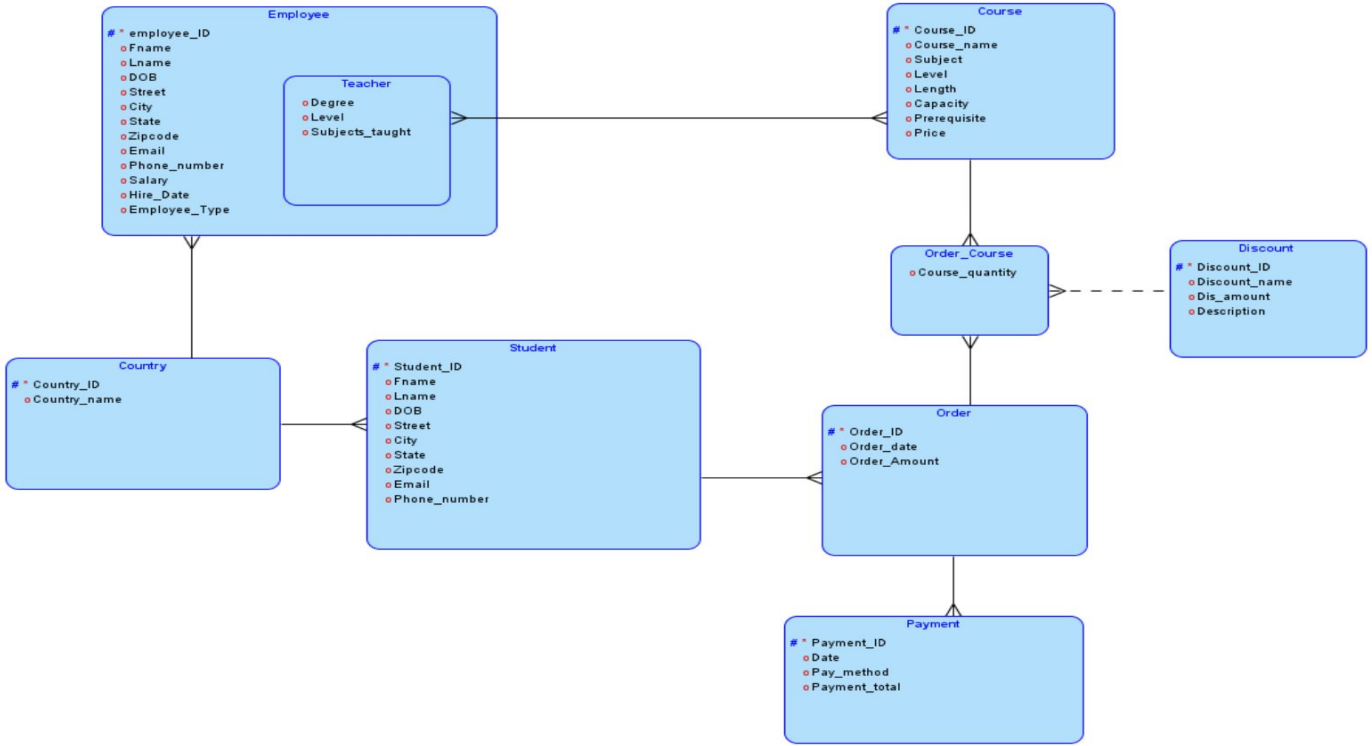
We ran into some major problems in this model.
The first one is that it's hard for us to scale our business and expand our customers since we don't have a central database. It's hard for our data analysts to perform deep analysis on our customers to better market our content.
Second, it's hard for us to track payment.
We wish to develop a model that can implement discounts in our payment. We wish to transform our business into:



By developing a RDBMS, we wish to solve two major problems.
The database should be about to track all students' information, including past, current students. The database should be able to track all payment invoices.

Logical Data Model



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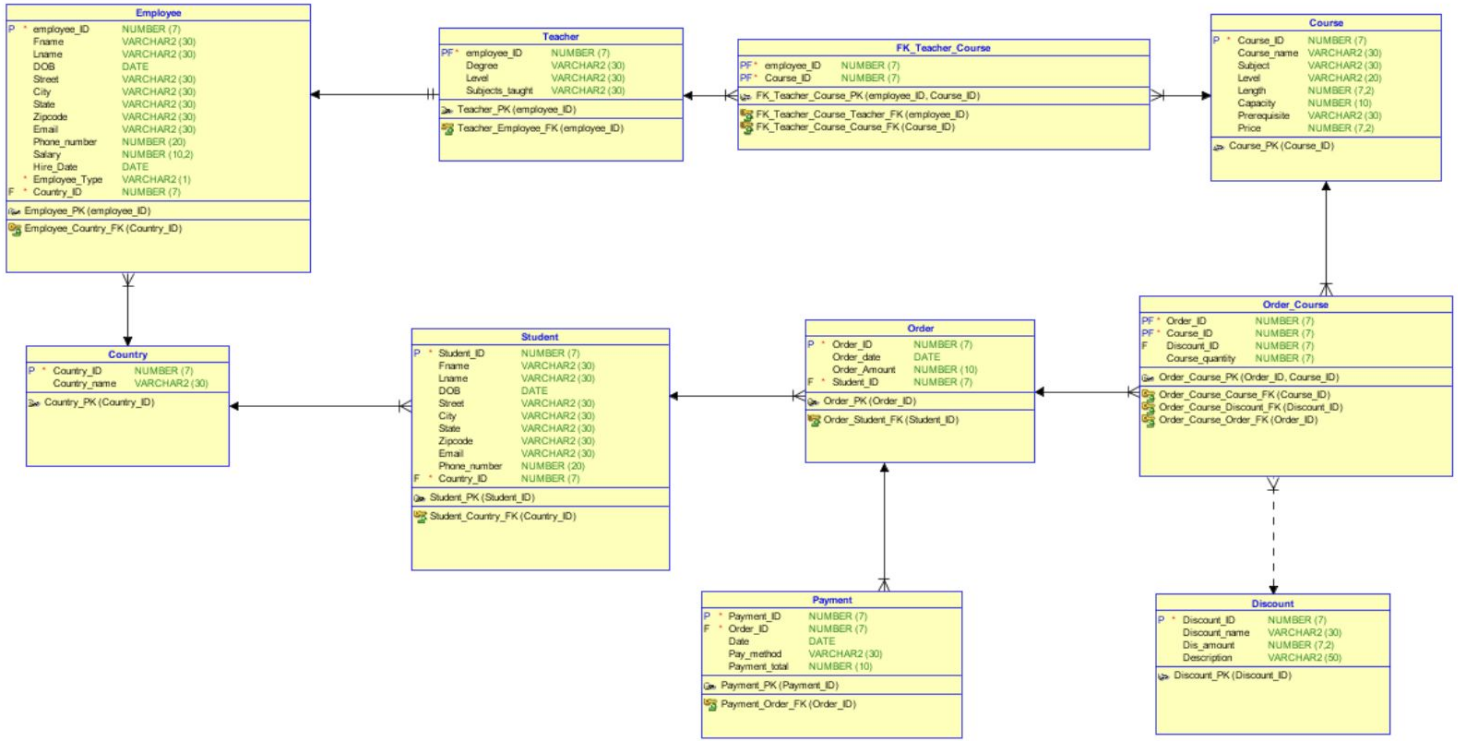
Relational Data Model



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List of tables

SQL Worksheet

```
1  --list of tables
2  select table_name
3  from user_tables;
```

TABLE_NAME
COUNTRY
COURSE
DISCOUNT
EMPLOYEE
FK_TEACHER_COURSE
ORDER_COURSE
Order
PAYMENT
STUDENT
TEACHER

Download CSV
10 rows selected.

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Record count for each table

```
9
10  select table_name,
11         to_number(extractvalue(xmltype(dbms_xmlgen.getxml('select count(*) c from '||owner||'."'||table_name ||'"')),'/ROWSET/ROW/C'))
12         as count
13  from all_tables
14  where owner = 'SQL_XCDJAHHIFMZEJCSAONXGMFSJA'
```

TABLE_NAME	COUNT
COUNTRY	8
COURSE	13
DISCOUNT	10
EMPLOYEE	16
FK_TEACHER_COURSE	13
ORDER_COURSE	15
Order	15
PAYMENT	15
STUDENT	15
TEACHER	13

Download CSV

10 rows selected.

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Query 1

The purpose of using this sub-query is to give teachers a raise who has a PhD degree in our company. Experienced teachers can attract more students to choose our institute. This is to show our higher-level teachers our appreciation and acknowledge their accomplishments. The salary raise for the employees who has a PhD degree is because we want to reward them for their knowledge, hard work, loyalty, and also they know the most about our teaching content and can pass on their valuable experience and knowledge to others. Also, we can attract more higher-level teachers to choose to work for our company with a higher salary.

```
382 UPDATE EMPLOYEE
383 SET SALARY= SALARY * 1.25
384 WHERE 'PHD' IN (SELECT DEGREE FROM TEACHER WHERE TEACHER.EMPLOYEE_ID = EMPLOYEE.EMPLOYEE_ID);
385 SELECT * FROM EMPLOYEE
```

EMPLOYEE_ID	FNAME	LNAME	DOB	STREET	CITY	STATE	ZIPCODE	EMAIL	PHONE_NUMBER	SALARY	HIRE_DATE	EMPLOYEE_TYPE	COUNTRY_ID
1000001	STEVE	RICKEY	10-JAN-80	4467 POWDER HOUSE ROAD	DELRAY BEACH	FL	33484	STEVER01@GMAIL.COM	5917102067	5625	01-JAN-16	T	1
1000002	DARRYL	RUSS	10-MAY-81	3925 HEATHER SEES WAY	NASHOBA	OK	74558	DARRYLR05@GMAIL.COM	4414456783	4500	01-SEP-16	T	1
1000003	MARIA	BELL	11-JUL-79	1403 PETUNIA WAY	BIRMINGHAM	AL	35209	MARIABELL07@GMAIL.COM	4245056907	6250	01-JAN-15	T	1
1000004	NIJIYA	YAMAMURA	16-OCT-82	452-1119 TAKAGAWARA	ISHII-CHO	TOKUSHIMA	-	NIJIYA16@GMAIL.COM	498587149	4375	01-SEP-21	T	81
1000005	ALBERT	HUDSON	10-OCT-80	1003 BRENTWOOD DRIVE	COUPLAND	TX	78615	ALBERTH10@GMAIL.COM	4663615746	5625	01-JAN-16	T	1
1000006	TAO	TIEN	17-OCT-90	644 FENGYANG ROAD	JIANGAN	SHANGHAI	200023	TAOTIEN1017@GMAIL.COM	13073352797	4375	01-SEP-21	T	86
1000007	VIR	TRIKHA	13-MAY-79	1005, A WING, MITTAL TOWERS	BANGALORE	KARNATAKA	560001	VIRTRIKHA13@GMAIL.COM	8025582470	5625	01-JAN-16	T	91
1000008	RUILIN	HE	22-OCT-80	200 UPPER THOMSON ROAD	SINGAPORE	-	574424	RUILINHE22@GMAIL.COM	62568145	5625	01-JAN-16	T	65
1000009	SIMON	CHAPMAN	10-JAN-80	95 OVERTON CIRCLE	LITTLE WELNETHAM	-	IP30 7HH	SIMONCHAP10@GMAIL.COM	7878537202	5625	01-JAN-16	T	44
1000010	DONALD	COLLINS	18-SEP-75	2562 ARMBRESTER DRIVE	CULVER CITY	CA	90232	DONALDC18@GMAIL.COM	6144631983	6250	01-JAN-15	T	1
1000011	LINSEY	FINDLAY	30-JUL-72	2722 TEA BERRY LANE	WAUSAU	WI	54403	LINSEYF30@GMAIL.COM	3885490812	7500	01-JAN-15	T	1
1000012	DOUGLAS	ROBINSON	27-FEB-70	3617 HEAVNER AVENUE	MARIETTA	GA	30064	DOUGLASR27@GMAIL.COM	6702497100	7500	01-JAN-15	T	1
1000013	NORMA	GILL	06-APR-79	3997 BEN STREET	NORTH CREEK	NY	12853	NORMAG06@GMAIL.COM	5182510782	6875	01-SEP-16	T	1
1000014	BOBBY	WEST	07-APR-76	1223 WOODSTOCK DRIVE	EL MONTE	CA	91731	BOBBYW07@GMAIL.COM	6265795209	5500	01-SEP-16	0	1
1000015	MAYZE	SCHIAVONE	29-AUG-77	4952 WOLF PEN ROAD	BURLINGAME	CA	94010	MAYZES29@GMAIL.COM	6503403753	5000	01-SEP-18	0	1
1000016	SUE	DAWSON	10-AUG-85	1889 CAYNOR CIRCLE	RED BANK	NJ	07701	SUEDAWSON10@GMAIL.COM	9085835639	4000	01-JAN-20	0	1

Download CSV
16 rows selected.

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Query 2

The purpose of using this sub-query is to check the students who take course 20001, because the instructor would like to send an email notification before the class begins. Also, the instructor would like to assign a group project and decides who is in Group A.

```
383 Select *
384 from Student a
385 Where a.Student_ID In (Select b.Student_ID From "Order" b Join Order_Course c On b.Order_ID = c.Order_ID Where c.Course_ID=20001)
```

STUDENT_ID	FNAME	LNAME	DOB	STREET	CITY	STATE	ZIPCODE	EMAIL	PHONE_NUMBER	COUNTRY_ID
7	ZULAIKHA	SARIM	11-AUG-95	1039 TAMAN CITY	KUALA LUMPUR	MALAYSIA	51200	ZULAIKHAS@GMAIL.COM	362583570	60
5	KARAN	NIGAM	16-JAN-97	5 TEMPLE TANK ROAD	DELHI	DELHI	110014	KNIGAM@GMAIL.COM	24376836	91

Download CSV

2 rows selected.

Query 3

The purpose of using this query is for our employees to look up the courses that students have chosen in their corresponding orders easily and intuitively. The aggregation of historical orders information enables our educational institution to recommend relevant advanced courses to students based on their progress and needs in the future, so our courses can be better promoted.

SQL Worksheet

Clear Find Actions Save Run

```
1  SELECT a.student_id, a.lname as "Student Last Name", a.fname as "Student First Name", b.order_id,c.course_id, d.course_name
2  FROM  student a JOIN "Order" b ON a.student_id=b.student_id JOIN order_course c ON b.order_id=c.order_id JOIN course d ON c.course_id=d.course_id;
3
```

STUDENT_ID	Student Last Name	Student First Name	ORDER_ID	COURSE_ID	COURSE_NAME
1	ROGGERS	STEVE	2800001	10000	Project Management
2	LI	JIANG	2800002	10001	Management in Global Economy
3	MIRO	JOAN	2800003	10002	Strategic Management
4	GRATER	ALLIE	2800004	20000	Molecular Systems
5	NIGAM	KARAN	2800005	20001	Protein Biochemistry
6	MARWAH	RYAN	2800006	20000	Molecular Systems
7	SARIM	ZULAIKHA	2800007	20001	Protein Biochemistry
8	LAI	YONGBIN	2800008	20002	Intro to Electron Microscopy
9	KAYO	KUBA	2800009	30000	Intro to Data Science
10	RATKE	CHRIS	2800010	30001	Mathematical Statistics
11	TOWNE	VITA	2800011	30002	Database Systems
12	RIPPIN	CHRISTELLE	2800012	30003	Practical Training for DA
13	BACH	KIRK	2800013	40000	Intro to Musicology
14	ZULUF	TYREE	2800014	40001	Sem/Tech of Music Compos
15	BARTELL	SANTIAGO	2800015	40002	Reading & Research

Download CSV

15 rows selected.

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Query 4

With this table join query, it's easy to find out how many students are buying the course and what kind of discount are they using. Through this query, we can explore the degree of discount consumers like and study the sales volume of discount.

```
1  SELECT a.student_id, a.lname as "Student Last Name", a.fname as "Student First Name", b.order_id,c.discount_id, d.dis_amount, d.description
2  FROM
3  student a
4  JOIN
5  "Order" b ON a.student_id=b.student_id
6  JOIN
7  order_course c ON b.order_id=c.order_id
8  JOIN
9  discount d ON c.discount_id=d.discount_id;
```

STUDENT_ID	Student Last Name	Student First Name	ORDER_ID	DISCOUNT_ID	DIS_AMOUNT	DESCRIPTION
1	ROGGERS	STEVE	2800001	202106	.8	VACATION DISCOUNT
2	LI	JIANG	2800002	202106	.8	VACATION DISCOUNT
3	MIRO	JOAN	2800003	202106	.8	VACATION DISCOUNT
4	GRATER	ALLIE	2800004	202106	.8	VACATION DISCOUNT
5	NIGAM	KARAN	2800005	202106	.8	VACATION DISCOUNT

Download CSV

5 rows selected.

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Query 5

This View is created mainly for staff to quickly search and easily find out all the teachers whose nationality is the United States. We can know the United States teachers' names, contact details, salary, etc within one chart. With this View, our company are able to better understand the overall conditions of our US faculty, which allow us to evaluate their performance and decide whether continue to hire them, subsidy them or not.

```
-- Create a view of all the teacher from United States

Create or Replace view US_teacher
as
Select
    b.employee_ID, b.Fname "first name", b.Lname "Last name", b.EMAIL, b.PHONE_NUMBER, b.SALARY, c.DEGREE,
    c."Level", c.SUBJECTS_TAUGHT, a.COUNTRY_NAME
from
    Country a
        join
    Employee b on a.Country_ID = b.Country_ID
        join
    Teacher c on b.employee_ID = c.employee_ID
Where
    a.COUNTRY_ID = 1;


-- -- select from the view

select * from US_teacher;
```

EMPLOYEE_ID	first name	Last name	EMAIL	PHONE_NUMBER	SALARY	DEGREE	Level	SUBJECTS_TAUGHT	COUNTRY_NAME
1000001	STEVE	RICKEY	STEVER01@GMAIL.COM	5917102067	4500	PHD	S	Project Management	UNITED STATES
1000002	DARRYL	RUSS	DARRYLR05@GMAIL.COM	4414456783	4500	Master	A	Management in Global Economy	UNITED STATES
1000003	MARIA	BELL	MARIABELL07@GMAIL.COM	4245056907	5000	PHD	S	Strategic Management	UNITED STATES
1000005	ALBERT	HUDSON	ALBERTH10@GMAIL.COM	4663615746	4500	PHD	S	Protein Biochemistry	UNITED STATES
1000010	DONALD	COLLINS	DONALDC18@GMAIL.COM	6144631983	5000	PHD	SS	Practical Training for DA	UNITED STATES
1000011	LINSEY	FINDLAY	LINSEYF30@GMAIL.COM	3885490812	6000	PHD	A	Intro to Musicology	UNITED STATES
1000012	DOUGLAS	ROBINSON	DOUGLASR27@GMAIL.COM	6702497100	6000	PHD	A	Sem/Tech of Music Compos	UNITED STATES
1000013	NORMA	GILL	NORMAG06@GMAIL.COM	5182510782	5500	PHD	S	Reading & Research	UNITED STATES

Download CSV

```
    Country a
        join
    Employee b on a.Country_ID = b.Country_ID
        join
    Teacher c on b.employee_ID = c.employee_ID
Where
    a.COUNTRY_ID = 1;


-- -- select from the view

select * from US_teacher;

-- select teachers that from United States and have a PHD degree and have a salary no less than 5000$

select *
from US_teacher
where SALARY >= 5000 and DEGREE = 'PHD';
```

EMPLOYEE_ID	first name	Last name	EMAIL	PHONE_NUMBER	SALARY	DEGREE	Level	SUBJECTS_TAUGHT	COUNTRY_NAME
1000003	MARIA	BELL	MARIABELL07@GMAIL.COM	4245056907	5000	PHD	S	Strategic Management	UNITED STATES
1000010	DONALD	COLLINS	DONALDC18@GMAIL.COM	6144631983	5000	PHD	SS	Practical Training for DA	UNITED STATES
1000011	LINSEY	FINDLAY	LINSEYF30@GMAIL.COM	3885490812	6000	PHD	A	Intro to Musicology	UNITED STATES
1000012	DOUGLAS	ROBINSON	DOUGLASR27@GMAIL.COM	6702497100	6000	PHD	A	Sem/Tech of Music Compos	UNITED STATES
1000013	NORMA	GILL	NORMAG06@GMAIL.COM	5182510782	5500	PHD	S	Reading & Research	UNITED STATES

Download CSV

5 rows selected.

Learning Outcome

Through this course, we indeed learned a lot about database management systems and applications. In our group project, we are able to transform business needs into viable and efficient databases aligned with business requirements, construct conceptual logical data models, create databases based on the relational database model, and use different SQL functions for data processing and analysis to solve business problems.

We learned from the most basic steps to solve more and more complicated and real-life issues. The logical model enables us to set up a clear, concise, and important framework of the entire project. We gave “life” to each table, attributes, etc. It may take time, but worth it. Standing on the shoulders of logical model and relational model, we learned various SQL language, and how to use different queries to find and combine necessary data and information we need, allowing us to view and process quickly and more efficiently.

Through Group project, we divided complex tasks into parts and deepened our understanding through discussion. We share different perspectives, but ultimately promote a common direction, which increases our efficiency.

Thank You !

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