

# COMPX223-23A Project Deliverable 1 Report

## Contribution table

Please specify the contribution (in percentage) each group member has made.

Name	Part 1	Part 2	Part 3	Part 4
Aaron	50%	50%	40%	30%
Ben	50%	50%	60%	50%
Aibel	0%	0%	0%	20%

## Part 1: ER Diagram (40 points)

Task 1: **Draw the ER Diagram of the database** that consists of entities, attributes, relationships and cardinalities, and **underline the attribute(s) that will be used as primary key**

Miro board [https://miro.com/app/board/uXjVMfY2vzQ=](https://miro.com/app/board/uXjVMfY2vzQ=/)

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Task 2. **Explain the attributes that are not self-explanatory**, for example, attributes with unclear names, that will be normalised, or have constraints on the values.

**Course -> Prerequisites:** The requirements in order to enroll into the course to begin with. Constraint could include having done a course before to do a recertification course. Payment is required to enroll into the course.

**Certification -> Credits:** Credits received by completing the course and obtaining a certification, will be an integer.

**Order -> Method:** Payment methods used for the order. Constraints include cash, credit card, bank cheque.

**Instructor -> Availability:** Will be a string that can be up to 50 characters, for example "Monday-Friday, 9am-3pm". or "Weekends, 12pm-3pm".

## Part 2: Relational Model (10 points)

Task: **Create the relational model** from the ER diagram developed in Part 1. Make sure to (1) underline primary keys, (2) point out the foreign keys and the relations they reference (look at Week 2 lecture slides on Relational Model for examples) and (3) normalise to 1NF.

Instructor(id, fname, name, email, phone, availability)

Customer(id, address, fname, name, email, phone)

Cust\_book\_class(*customerID*, *classID*)

Cust\_enrol\_class(*customerID*, *classID*, Certified, Mark, Attendance)

Class\_uses\_equ(*classID*, *productName*, quantity)

Instr\_teach\_class(*classID*, *InstructorID*)

Order(id, date, method, discount, **customerID**)

Course(id, name, description, duration, prerequisites, cost, **OrderID**, **QualificationName**)

Class(id, date, time, **CourseID**)

Qualification(name, **InstructorID**)

Equipment(name, description, price, stock, **OrderID**)

Underline = Primary key

*Italic underline* = Foreign key as Primary key

**Bold** = Foreign key

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## Part 3: SQL Tables (20 points)

Task: **Convert the relational model in Part 2 to SQL tables.** Make sure to use appropriate data types, specify the primary and foreign keys, and include sensible check constraints.

```
create table customer(  
    id int IDENTITY(100,1) ,  
    fname varchar(30) NOT NULL,  
    lname varchar(30) NOT NULL, /*rest can be entered after course*/  
    homeAddress varchar(100) ,  
    email varchar(50) ,  
    phone bigint,  
    primary key (id)  
)
```

```
create table instructor(  
    id int IDENTITY(100,1) ,  
    fname varchar(30) NOT NULL,  
    lname varchar(30) NOT NULL,  
    email varchar(50) NOT NULL,  
    phone bigint NOT NULL,  
    available varchar(50) NOT NULL,  
    primary key (id)  
)
```

```
create table qualification(  
    qualName varchar(250) NOT NULL,
```

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```
instructorID int NOT NULL,

primary key (qualName),

foreign key (instructorID) references instructor

)

create table course(

    id int IDENTITY(100,1),

    courseName varchar(250) NOT NULL,

    courseDescription varchar(300), /*description up to 300
characters*/

    duration varchar(30) NOT NULL, /* num days */

    prerequisites varchar(255) NOT NULL, /* could be a long list of
things*/

    cost decimal NOT NULL,

    qualName varchar(250) NOT NULL, /*qualification required to
teach*/

    primary key (id),

    foreign key (qualName) references qualification

)

create table purchaseOrder(

    id int IDENTITY(100,1),

    orderDate date NOT NULL,

    method varchar(30) NOT NULL,

    discount int, /* can be from 0-100 */

    customerID int NOT NULL,

    primary key (id),
```

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```
foreign key (customerID) references customer

)

create table equipment(

    equipmentName varchar(250) NOT NULL,

    equipmentDescription varchar(300),

    price decimal NOT NULL,

    stock int NOT NULL,

    orderID int NOT NULL,

    primary key (equipmentName ),

    foreign key (orderID) references purchaseOrder

)

create table class(

    id int IDENTITY(100,1),

    classDate smalldatetime NOT NULL,

    courseID int NOT NULL,

    classLocation varchar(50) NOT NULL,

    capacity int,

    primary key (id),

    foreign key (courseID) references course

)

create table custBookClass (

    customerID int NOT NULL,
```

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```
classID int NOT NULL,  
  
primary key (customerID, classID),  
  
foreign key (customerID) references customer,  
  
foreign key (classID) references class  
  
)  
  
create table custEnrolClass(  
  
    customerID int NOT NULL,  
  
    classID int NOT NULL,  
  
    Certified varchar(3), /*yes or no*/  
  
    mark int,  
  
    attended varchar(3),  
  
    primary key (customerID, classID),  
  
    foreign key (customerID) references customer,  
  
    foreign key (classID) references class  
  
)  
  
create table classUsesEqu(  
  
    classID int NOT NULL,  
  
    productName varchar(250) NOT NULL,  
  
    quantity int NOT NULL,  
  
    primary key (classID, productName),  
  
    foreign key (classID) references class,  
  
    foreign key (productName) references equipment  
  
)  
  
create table instrTeachClass(  

```

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```
classID int NOT NULL,  
  
instructorID int NOT NULL,  
  
primary key (classID, instructorID),  
  
foreign key (classID) references class,  
  
foreign key (instructorID) references instructor,  
  
)  
  
create table orderForCourse(  
  
orderID int NOT NULL,  
  
courseID int NOT NULL,  
  
primary key (orderID, courseID),  
  
foreign key (orderID) references purchaseOrder,  
  
foreign key (courseID) references course  
  
)
```

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## Part 4: Testing and reflection (30 points)

### Task 1: Insert at least two rows into all tables.

```
insert into customer (fname, lname, homeAddress, email, phone) values
('John', 'Smith', '123 Main St, Anytown NZ', 'johnsmith@email.com',
5551234567)
```

```
insert into customer (fname, lname, homeAddress, email, phone) values
('Sarah', 'Johnson', '456 Elm St, Anytown NZ', 'sarahj@email.com',
5559876543)
```

```
insert into instructor (fname, lname, email, phone, available) values
('Jane', 'Doe', 'janedoe@email.com', 5555551212, 'Mon-Fri, 9am-5pm')
insert into instructor (fname, lname, email, phone, available) values
('Mark', 'Johnson', 'markjohnson@email.com', 5551234567, 'Weekends,
9am-5pm')
```

```
insert into qualification (qualName, instructorID) values ('American
Heart Association BLS Instructor', 100)
insert into qualification (qualName, instructorID) values ('Red Cross
First Aid/CPR/AED', 101)
insert into qualification (qualName, instructorID) values ('First
Aid/CPR/AED', 101)
insert into qualification (qualName, instructorID) values
('Wilderness First Responder Instructor', 100)
```

```
insert into course (courseName, courseDescription, duration,
prerequisites, cost, qualName) values ('Advanced First Aid', 'A 3-day
course that builds on the skills taught in the Basic First Aid course
and covers advanced techniques for managing medical emergencies, such
as heart attacks and strokes.', '3 days', 'Basic First Aid course
completion', 400, 'First Aid/CPR/AED')
insert into course (courseName, courseDescription, duration,
prerequisites, cost, qualName) values ('Wilderness First Aid', 'is a
two-day specialized course designed to teach individuals how to
respond to medical emergencies in remote or wilderness settings. The
course covers the essential skills and techniques needed to assess,
```



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stabilize, and manage a variety of injuries and illnesses that may occur in the outdoors.', '2 days', 'None', 400, 'Wilderness First Responder Instructor')

```
insert into class (classDate, courseID, classLocation, capacity)
values ('2023-01-15 15:00:00', 100, 'Anytown State Park', 15)
insert into class (classDate, courseID, classLocation, capacity)
values ('2023/03/15 08:00:00', 101, 'Anytown Community Center', 20)
```

```
insert into purchaseOrder (orderDate, method, discount, customerID)
values ('01/02/23', 'Credit Card', 25, 100)
insert into purchaseOrder (orderDate, method, discount, customerID)
values ('01/03/23', 'Cash', 0, 101)
```

```
insert into equipment (equipmentName, equipmentDescription, price,
stock, orderID) values ('First Aid Kit', 'A portable kit containing a
range of essential first aid supplies, including bandages, gauze,
antiseptic wipes, and more.', 50, 100, 100)
insert into equipment (equipmentName, equipmentDescription, price,
stock, orderID) values ('Automated External Defibrillator (AED)', 'An
easy-to-use device that can analyse the heart's rhythm and deliver
an electric shock to restore normal heartbeat in case of cardiac
arrest.', 1500, 10, 101)
```

```
/* insert custom booked class */
insert into custBookClass (customerID,classID) values (100,100) /*
changed id values*/
insert into custBookClass (customerID,classID) values (101,101)
```

```
/* insert custom enrolled class */
insert into custEnrolClass (customerID, classID, certified,mark,
attended) values (100, 100 , 'no', 20,'yes') /* implement 1 for
attendance */
insert into custEnrolClass (customerID, classID, certified,mark,
attended) values (101, 101 , 'yes', 80,'yes')
```

```
/* insert instructor taught class */
```

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```
insert into instrTeachClass (classID , instructorID) values (100,100)
insert into instrTeachClass (classID , instructorID) values (101,101)

/* insert order for class props */
insert into orderForCourse (orderID,courseID) values (100,101)
insert into orderForCourse (orderID,courseID) values (101,100)

/* insert class used equipments */
insert into classUsesEqu (classID,productName,quantity) values (101
,'First Aid Kit' , 1)
insert into classUsesEqu (classID,productName,quantity)values (100
,'Automated External Defibrillator (AED)' , 1)
```

**Task 2: Write a query that retrieves data from all tables.** For example, retrieve the details of each customer including the details of courses they have attended and equipment they have purchased. Show the results.

```
select DISTINCT ofc.courseID as 'Course order course id',
co.courseName as 'Course name', cbc.classID as 'Class booked id',
cl.classDate as 'Class date and time', cec.Certified as 'Certified',
cu.id as 'customer ID',cu.fname as 'Frist name', po.id as 'Customer
```

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```
order id', qu.qualName as 'Instructor qualification',  
eq.equipmentName as 'Equipment Name'
```

```
from course co, class cl, customer cu, custEnrolClass cec,  
purchaseOrder po, qualification qu, custBookClass cbc, equipment eq,  
orderForCourse ofc order by cu.id DESC;
```

100 %										
Results Messages										
	Course order course id	Course name	Class booked id	Class date and time	Certified	customer ID	Frist name	Customer order id	Instructor qualification	Equipment Name
1	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	American Heart Association BLS Instructor	Automated External Defibrillator (AED)
2	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	American Heart Association BLS Instructor	First Aid Kit
3	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	First Aid/CPR/AED	Automated External Defibrillator (AED)
4	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	First Aid/CPR/AED	First Aid Kit
5	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	Red Cross First Aid/CPR/AED	Automated External Defibrillator (AED)
6	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	Red Cross First Aid/CPR/AED	First Aid Kit
7	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	Wilderness First Responder Instructor	Automated External Defibrillator (AED)
8	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	100	Wilderness First Responder Instructor	First Aid Kit
9	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	American Heart Association BLS Instructor	Automated External Defibrillator (AED)
10	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	American Heart Association BLS Instructor	First Aid Kit
11	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	First Aid/CPR/AED	Automated External Defibrillator (AED)
12	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	First Aid/CPR/AED	First Aid Kit
13	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	Red Cross First Aid/CPR/AED	Automated External Defibrillator (AED)
14	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	Red Cross First Aid/CPR/AED	First Aid Kit
15	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	Wilderness First Responder Instructor	Automated External Defibrillator (AED)
16	100	Advanced First Aid	100	2023-01-15 15:00:00	no	101	Sarah	101	Wilderness First Responder Instructor	First Aid Kit
17	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	American Heart Association BLS Instructor	Automated External Defibrillator (AED)
18	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	American Heart Association BLS Instructor	First Aid Kit
19	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	First Aid/CPR/AED	Automated External Defibrillator (AED)
20	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	First Aid/CPR/AED	First Aid Kit
21	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	Red Cross First Aid/CPR/AED	Automated External Defibrillator (AED)
22	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	Red Cross First Aid/CPR/AED	First Aid Kit
23	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	Wilderness First Responder Instructor	Automated External Defibrillator (AED)
24	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	100	Wilderness First Responder Instructor	First Aid Kit
25	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	101	American Heart Association BLS Instructor	Automated External Defibrillator (AED)
26	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	101	American Heart Association BLS Instructor	First Aid Kit
27	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	101	First Aid/CPR/AED	Automated External Defibrillator (AED)
28	100	Advanced First Aid	100	2023-01-15 15:00:00	yes	101	Sarah	101	First Aid/CPR/AED	First Aid Kit

There are more lines but they can't all be captured

**Task 3: Write a query** that selects each class, showing details about the course, attending students and instructors, the first aid supplies used, and if the class has been paid for yet. Show the results.

```
select cl.id as 'Class id', co.courseName as 'Course name',  
cec.customerID as 'Customer enrolled id', ins.fname as 'Instructor  
teaching name', cue.productName as 'Equipment uses'
```

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```
from class cl, course co, instructor ins, classUsesEqu cue,
custEnrolClass cec where cec.attended = 'yes' order by cl.id DESC;
```

	Class id	Course name	Customer enrolled id	Instructor teaching name	Equipment uses
1	101	Advanced First Aid	100	Jane	Automated External Defibrillator (AED)
2	101	Wilderness First Aid	100	Jane	Automated External Defibrillator (AED)
3	101	Advanced First Aid	100	Mark	Automated External Defibrillator (AED)
4	101	Wilderness First Aid	100	Mark	Automated External Defibrillator (AED)
5	101	Advanced First Aid	100	Jane	First Aid Kit
6	101	Wilderness First Aid	100	Jane	First Aid Kit
7	101	Advanced First Aid	100	Mark	First Aid Kit
8	101	Wilderness First Aid	100	Mark	First Aid Kit
9	101	Advanced First Aid	101	Jane	Automated External Defibrillator (AED)
10	101	Wilderness First Aid	101	Jane	Automated External Defibrillator (AED)
11	101	Advanced First Aid	101	Mark	Automated External Defibrillator (AED)
12	101	Wilderness First Aid	101	Mark	Automated External Defibrillator (AED)
13	101	Advanced First Aid	101	Jane	First Aid Kit
14	101	Wilderness First Aid	101	Jane	First Aid Kit
15	101	Advanced First Aid	101	Mark	First Aid Kit
16	101	Wilderness First Aid	101	Mark	First Aid Kit
17	100	Advanced First Aid	100	Jane	Automated External Defibrillator (AED)
18	100	Wilderness First Aid	100	Jane	Automated External Defibrillator (AED)
19	100	Advanced First Aid	100	Mark	Automated External Defibrillator (AED)
20	100	Wilderness First Aid	100	Mark	Automated External Defibrillator (AED)
21	100	Advanced First Aid	100	Jane	First Aid Kit
22	100	Wilderness First Aid	100	Jane	First Aid Kit
23	100	Advanced First Aid	100	Mark	First Aid Kit
24	100	Wilderness First Aid	100	Mark	First Aid Kit
25	100	Advanced First Aid	101	Jane	Automated External Defibrillator (AED)
26	100	Wilderness First Aid	101	Jane	Automated External Defibrillator (AED)
27	100	Advanced First Aid	101	Mark	Automated External Defibrillator (AED)
28	100	Wilderness First Aid	101	Mark	Automated External Defibrillator (AED)
29	100	Advanced First Aid	101	Jane	First Aid Kit
30	100	Wilderness First Aid	101	Jane	First Aid Kit
31	100	Advanced First Aid	101	Mark	First Aid Kit
32	100	Wilderness First Aid	101	Mark	First Aid Kit

Couldn't show if the course had been paid for, we assumed customers would have to pay for a class before they can enroll in it. One workaround for the current setup would be to compare the customer order ID orders for the course and the ID of the customer enrolling for the course.

**Task 4: Discuss the problems or challenges encountered when designing the database** (between 200-300 words). This can include the following:

Any assumptions you have made based on insufficient information from the client.

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Any limitations of your design that affect what data can be stored or could cause anomalies that should be addressed when designing the application.

Any changes made to the design (ER, Relational model, or table definition) and why these changes were made.

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## Assumptions

While designing our database, we had encountered some problems and challenges along the iterative process of the ER Diagram design. Some assumptions were made and we had different interpretations of how some entities relate to others, and what sort of constraints and cardinalities they have. We assumed that 'customer' and 'individual' were separate entities and that equipment was divided into two entities: one for the retail store and one for equipment assigned to a course. Payment was another entity that we assumed was on its own, however it's closely tied to order so we merged it into that entity. Another assumption was customers must pay before they enroll in a course.

## Limitations

One limitation is some of the data types used in the design of some of the attributes. Character limitations on attributes, such as descriptions mean that the information has to be condensed in the database. Another limitation of this design is a use case scenario where an organization could book or enroll into a course with multiple people i.e a workplace with multiple employees booked for a first aid course.

The class object has limited information about its time as it only stores start date, end data, and start time. There is no information stored about breaks, finish time, or start data of another day.

## Changes

1. Our earliest designs had relationships and entities that were redundant or unnecessary, such as separating equipment into two separate entities: retail and course equipment
2. We had an entity defined for payment with a relationship 'for' order. This was changed because it could be merged into the order entity as an attribute instead.
3. The customer and individual were separated into two entities, later merged into one just called customer as only that entity is needed in the context of the business. 'Individual' was a redundant entity.
4. The class entity was created to reflect the relationship between the instructor, customer, course and equipment entities. The customer to class relationship has two, 'enrolls' in a class and 'books' a class.
5. Cardinalities were changed throughout the iterative process, as the entities and relationships changed along the way. One to many and many to many relationships.