Logical Model Representation

Student Name: Geliang Liang   Student ID: 24139871

Student Name: Zhulin Lyu   Student ID: 24516605

Entity
Client (clientNumber, familyName, personalName, title, streetAddress, postCode, contactPhoneNumber1, contactPhoneNumber2, contactPhoneNumber3, emailAddress, birthDate, medicareNumber, billPayerNumber**)** **Primary Key** clientNumber **Foreign Key** bilPayerNumber **references** Client (clientNumber)

Reason
Client is a strong entity and the super class of Customer and Patient. Since they share the same Primary Key clientNumber, these three entities would be merged into one entity. The attributes contactPhoneNumber1, contactPhoneNumber2, contactPhoneNumber3, emailAddress, birthDate and medicareNumber from the two sub classes should be also merged into the Client entity as for their "Mandatory – And" relationship. clientNumber, familyName, personalName, title, streetAddress, postcode are NOT NULL as they are shared attributes in table Client, Customer and Patient. billPayerNumber is a customer responsible for paying fees that were posted into Client from a 1:* Pays For relationship between Customer and Patient where Costumer is the parent and Patient is the child, and billPayerNumber was referencing the primary key of Customer table since there was a 1:1 mandatory participation on both Customer and Patient sides. clientNumber is NOT NULL as it's used to uniquely identify each customer and patient.

Entity
Room (uniqueNumber) **Primary Key** uniqueNumber

Reason
Room is a strong entity. It has a simple attribute uniqueNumber.

Entity
Surgeon (uniqueIdentifierCode, familyName, personalName, title, contactPhoneNumber, qualification1, qualification2, qualification3) **Primary Key** uniqueIdentifierCode

Reason

Surgeon is a strong entity. It has simple attributes uniqueIdentifierCode, familyName, personalName, title, contactPhoneNumber, qualifications.

Entity
Service (prescribedCode, description, currentServiceFee)   **Primary Key** prescribedCode

Reason
Service is a strong entity. It has simple attributes prescribedCode, description, currentServiceFee.

Entity
Works_In (uniqueIdentifierCode, preferredRoom)   **Primary Key** uniqueIdentifierCode**,** preferredRoom   **Foreign Key** uniqueIdentifierCode **references** Surgeon (uniqueIdentifierCode) ON UPDATE CASCADE ON DELETE NO ACTION   **Foreign Key** preferredRoom **references** Room (uniqueNumber) ON UPDATE CASCADE ON DELETE NO ACTION

Reason
Creating an entity named Works_In represent the relationship Works In due to a 2:* relationship between Surgeon and Room.   uniqueIdentifierCode has been posted as a foreign key into Works_In from Surgeon. uniqueIdentifierCode is NOT NULL as it is the primary key in Works_In.   This entity includes one attribute named preferredRoom, which, in combination with the uniqueNumber attribute of Room, uniquely identifies the preferred room for each surgeon. preferredRoom is NOT NULL as it is the primary key in Works_In.   UPDATE CASCADE has been selected to update uniqueIdentifierCode whenever the attribute changes in the Surgeon table. DELETE NO ACTION has been chosen to prevent Surgeon deletion without first updating Works_In.   UPDATE CASCADE has been chosen to update preferredRoom whenever the attribute changes in the Room table. DELETE NO ACTION has been selected to prevent Room deletion without first updating Works_In.

Entity
Giving (uniqueIdentifierCode, prescribedCode)   **Primary Key** uniqueIdentifierCode**,** prescribedCode   **Foreign Key** uniqueIdentifierCode **references** Surgoen(uniqueIdentifierCode)   **Foreign Key** prescribedCode **references** Service (prescribedCode) ON UPDATE CASCADE ON DELETE NO ACTION

Reason
Creating an entity named Giving represent the relationship Gives due to a *:* relationship between Surgeon and Service. Both uniqueIdentifierCode and prescribedCode serve as foreign keys and together form the primary key. UPDATE CASCADE has been selected to update UniqueIdentifierCode whenever the attribute changes in the Surgeon table. DELETE NO ACTION has been chosen to prevent Surgeon deletion without first updating Giving. UPDATE CASCADE has been chosen to update prescribedCode whenever the attribute changes in the Service table. DELETE NO ACTION has been selected to prevent Service deletion without first updating Giving.

Entity
Appointment (clientNumber, uniqueNumber, uniqueIdentifierCode, date, startTime) **Primary Key** clientNumber, uniqueIdentifierCode, date **Alternate Key** uniqueIdentifierCode, date, startTime **Alternate Key** uniqueNumber, date, startTime **Foreign Key** clientNumber **references** Client (clientNumber) ON UPDATE CASCADE ON DELETE NO ACTION **Foreign Key** uniqueNumber **references** Room (uniqueNumber) ON UPDATE CASCADE ON DELETE NO ACTION **Foreign Key** uniqueIdentifierCode **references** Surgeon (uniqueIdentifierCode) ON UPDATE CASCADE ON DELETE NO ACTION

Reason
Appointment is a strong entity. It has simple attributes date, startTime. clientNumber has been posted as a foreign key into Appointment from a 1:* Scheduled For relationship, where Appointment is a child entity and Client is the parent. clientNumber is NOT NULL as Appointment has mandatory participation in the Scheduled For relationship uniqueNumber has been posted as a foreign key into Appointment from a 1:* For relationship where Appointment is a child entity and Room is the parent. uniqueNumber is NOT NULL as Appointment has mandatory participation in the For relationship uniqueIdentifierCode has been posted as a foreign key into Appointment from a 1..* With relationship where Appointment is a child entity and Surgeon is the parent. uniqueIdentifierCode is NOT NULL as Appointment has mandatory participation in the With relationship. UPDATE CASCADE has been chosen to update clientNumber whenever the attribute changes in the Client table. DELETE NO ACTION has been selected to prevent Client deletion without first updating Appointment.

UPDATE CASCADE has been chosen to update uniqueNumber whenever the attribute changes in the Room table. DELETE NO ACTION has been selected to prevent Room deletion without first updating Appointment.
UPDATE CASCADE has been chosen to update uniqueIdentifierCode whenever the attribute changes in the Surgeon table. DELETE NO ACTION has been selected to prevent Surgeon deletion without first updating Appointment.

Entity
Requiring (clientNumber, uniqueIdentifierCode, date, prescribedCode, actualFee) **Primary Key** clientNumber, uniqueIdentifierCode, date**,** prescribedCode **Foreign Key** prescribedCode **references** Service (prescribedCode) ON UPDATE CASCADE ON DELETE NO ACTION **Foreign Key** clientNumber, uniqueIdentifierCode, date **references** Appointment (clientNumber, uniqueIdentifierCode, date) ON UPDATE CASCADE ON DELETE NO ACTION

Reason
Creating an entity named Requiring represent the relationship Required For due to a 5:* relationship between Appointment and Service. The Required For relationship has one attributes called actualFee, which can vary based on a doctor's decision. prescribedCode has been posted as a foreign key into Requiring from Service. prescribedCode is NOT NULL as it is the primary key in Requiring. clientNumber, uniqueIdentifierCode and appointmentDate have been posted as a foreign key into Requiring from Appointment. And the attribute appointmentDate in Appointment entity is referred to as date. clientNumber, uniqueIdentifierCode, date are NOT NULL as it is the primary key in Requiring. UPDATE CASCADE has been chosen to update prescribedCode whenever the attribute changes in the Service table. DELETE NO ACTION has been selected to prevent Service deletion without first updating Requiring. UPDATE CASCADE has been chosen to update clientNumber, uniqueIdentifierCode, and appointmentDate whenever the attributes change in the Appointment table. DELETE NO ACTION has been selected to prevent Appointment deletion without first updating Requiring.

Entity
Invoice (uniqueInvoiceNumber, relevantDate, clinicalComment, status, totalFee, clientNumber, uniqueIdentifierCode, appointmentDate) **Primary Key** uniqueInvoiceNumber **Foreign Key** clientNumber, uniqueIdentifierCode, date **references** Appointment (clientNumber, uniqueIdentifierCode, appointmentDate) ON UPDATE CASCADE ON DELETE NO ACTION

Reason

Invoice is a strong entity. It has simple attributes uniqueInvoiceNumber, relevantDate, clinicalComment, status, totalFee.

The attribute relevantDate means the last update date and time of the Invoice since the status was updated.

The attribute status has three different options: C, B, and P. Initially, the invoice, upon generation, has a status of 'C' ("completed"). After sending bills to the customer, the status is changed to 'B' ("bill sent"), and eventually, when the bill is paid by the customer, the status is changed to 'P' ("paid").

The attribute totalFee is the sum of all the actualFee of the Requiring Entity for the same appointment.

There exists a 1:1 relationship between Invoice and Appointment. Each Invoice is generated for one Appointment, but not all Appointments generate an Invoice, indicating mandatory participation on one side.

clientNumber, uniqueIdentifierCode, appointmentDate have been posted as foreign keys into Invoice from a 1:1 Generated For relationship where Invoice is a child entity and Appointment is the parent.

clientNumber, uniqueIdentifierCode, appointmentDate are NOT NULL as Invoice has mandatory participation in the Generated For relationship.

UPDATE CASCADE is chosen to update clientNumber, uniqueIdentifierCode, appointmentDate attributes in the Invoice table whenever the attribute changes in the Appointment table. DELETE NO ACTION is selected to prevent the deletion of an Appointment without first updating the corresponding Invoice.