

First Project Deliverable

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Contents

[Introduction 2](#_Toc382777450)

[Assumptions 2](#_Toc382777451)

[Children groups and regulations 2](#_Toc382777452)

[Monthly expenses related to the operation of the facility 2](#_Toc382777453)

[Parents, guardians and authorized contacts. 2](#_Toc382777454)

[Payments 3](#_Toc382777455)

[Employee Scheduling and Salaries 3](#_Toc382777456)

[Login information 3](#_Toc382777457)

[Database Relation schema and functional dependencies 3](#_Toc382777458)

[References 6](#_Toc382777459)

# Introduction

Les Centres de la Petite Enfance et Garderie is requesting a database system in order to monitor and manage its daycare facilities. Our group members composed of Giuseppe Astrologo, Mohammed Haider, Louis-Maxime Gendron, and Fen-Yee Chen will propose such a system that will make day to day management easier in accordance with the requirements of **COMP 353** final project.

The first deliverable will describe the database through an ER diagram. Furthermore, the ER diagram will converted to database schema as well as an explanation as to why these schemas are created as described.

# Assumptions

During the design phase of the database, we needed to include a few key features that were not listed in the project requirements.

## Children groups and regulations

According to the Quebec Educational childcare act daycare centers must ensure the following three conditions (Quebec, 2014)

1. One member for 5 or fewer children present under 18 months of age;
2. One member for 8 or fewer children present from 18 months of age to under 4 years of age;
3. One member for 10 or fewer children present from 4 years of age to under 5 years of age on 30 September;
4. One member for 20 or fewer children present from 5 years of age and older on 30 September.

However the project specifies those exclusively under 18 months (infants) and children exclusively above 18 months(toddlers).

## Monthly expenses related to the operation of the facility

Every successful business requires book keeping and organization of expenses. The monthly payment of utility, if the establishment is being rented, employee pays all must be taken into consideration when organizing expense reports.

## Parents, guardians and authorized contacts.

Not all parents are legal guardians, as such in the guardian table related to family is an attribute “LegalGuardianORParent”. Legal guardians are assumed to be the primary caretaker in the family.

A family also authorizes a close friend or family member to pick up their children when the need calls. Furthermore, not all authorized contacts are listed as emergency contacts. All emergency contacts are assumed to be authorized contacts. Furthermore, a distinction needs to be made what type of relationship the authorized contact has with the family.

## Payments

Of course every business based on a subscription model needs to have payments made to them by its subscribers. So in the case of the daycare, the primary caretakers of a child are assumed to be the ones making the payments. An invoice is created every month and funds are withdrawn from their credit cards on a monthly basis.

## Employee Scheduling and Salaries

Employee payments are kept track through an employee salary table. In the beginning of every month, the tally of the employee salaries are to be noted in the expense sheet of that particular facility.

Employee hours and days worked are listed in the scheduling table.

## Login information

We assumed that all employees of the CPE have access to the database on some level. The login information is assumed to be related to the employee table as all employees user names are their own employee id. Their access level is restricted to the day care center they work at or manage. However the CPE administrator has access to all the information of a organization.

# Database Relation schema and functional dependencies

Family(familyID, EmergencyPhone)

FD = { familyID → EmergencyPhone }

In this case, familyID is the key.

AuthorizedContact(ContactNumber, Name, TypeOfRelationship, IsEmergencyContact)

FD = { ContactNumber → Name , TypeOfRelationsip, IsEmergencyContact }

In this case, contactNumber is the key.

IsAuthorized(familyID, ContactNumber)

FD = {ContactNumber → familyID}

ContactNumber is the superkey.

ContactNumber and familyID are foreign keys.

PrimaryCaretaker(FamilyID, GuardianID)

FD = { FamilyID, GuardianID → FamilyID, GuardianID )

In this case, the FD is trivial. All the attribute are part of the key.

Both familyID and GuardianID are foreign keys from Family and Guardian entity sets repectively.

At least 1 guardianID must exist per FamilyID but not more than 2.

Guardian(GuardianID, GuardianName, Address, TelephoneNumber, IsGuardianOrParent)

FD = { GuardianID → GuardianName, Address, TelephoneNumber, IsGuardianOrParent )

In this case GuardianID is the key.

ChildOf(FamilyID, MedicareNum)

FD  = { MedicareNum → FamilyID )

MedicareNum is the key.

Both MedicareNum and FamilyID are foreign keys from Child and Family entity sets respectively.

Child(MedicareNum, Sex, Photo, DOB, Name, AgeGroup)

FD = { MedicareNum → Sex, Photo, DOB, Name, AgeGroup )

In this case, MedicareNum is a superkey.

SeatedInto(MedicareNum, RoomID)

FD ={ MedicareNum → RoomID}

MedicareNum is the key and this relation is in 3NF.

Both attributes are foreign keys from Child and Room entity sets.

Constraint: Child.AgeGroup = Room.AgeGroup

MedicalSheet(MedicareNum, DrugCode)

FD = { MedicareNum, DrugCode → MedicareNum, DrugCode )

In this case, the FD is trivial. All the attribute are part of the key.

Both attributes are foreign keys.

MedicareNum from Child Entity Set and DrugCode from Medication Entity Set.

AllergySheet(MedicareNum, AlergyType)

FD ={ MedicareNum, AlergyType → MedicareNum, AlergyType }

MedicareNum and AlergyType is the composite primary key.

It’s trivial to it’s in 3NF.

They are both foreign keys.

Allergies(AlergyType, Severity,  RecommendedAct)

FD = { AlergyType  → Severity,  RecommendedAct )

In this case, AlergyType is the key.

Medication(DrugCode, MedicationName, DrugAdministration)

FD = { DrugCode → MedicationName, DrugAdministration )

In this case, DrugCode is the key.

RegistrationSheet(MedicareNum, FacilityID, StartDate, EndDate,ageGroup)

FD = { MedicareNum →  StartDate, EndDate,ageGroup)

In this case, MedicareNum is a key.

It’s also a foreign key from Child entity set.

FacilityID is a foreign key from Facility.

The constraint of a facility:

If Facility.facilityType = homeCare

then n<=9 AND (registrationSheet.ageGroup = infant n <=4 OR registrationSheet.ageGroup = toddler  m<=9 -n)

else if  Facility.facilityType = daycare

then registrationSheet.ageGroup=infant 5n:m employees AND  registrationSheet.ageGroup=toddler 8n:m employees

Facility(FacilityID, FacilityType, Address, PrimaryPhone, numOfEmployees)

FD = { FacilityID → FacilityType, Address, PrimaryPhone,numOfEmployees )

In this case, FacilityID is the key.

LogIns(EmpID, Password, AccessType)

FD = { EmpID → Password , AccessType )

In this case, EmpID is a key.

EmpID is the primary key and foreign key from Employee entity set.

Houses(RoomID, FacilityID)

FD = { RoomID → FacilityID )

In this case RoomID is the key and it’s in 3NF.

Both attributes are primary keys from Facility and Room.

Room(RoomID, AgeGroup, Ext)

FD = { RoomID → AgeGroup, Ext )

In this case, RoomID is the key.

Ext is the phone number extension for the room.

EmployedList(FacilityID, EmpID)

FD = { EmpID  → FacilityID )

EmpID is the key; the relation is in 3NF.

Both attributes are foreign keys from Employee and Facility entity sets.

Employee(EmpID, Name, Address, Role, StartDate, EndDate, SSN)

FD = { EmpID → Name, Address, Role, StartDate, EndDate, SSN )

In this case, EmpID is the key.

Manages(ManagerID, EmpID)

FD = { EmpID → ManagerID }

EmpID is the key; this relation is in 3NF.

Both attributes are foreign keys from Manager and Employee entity sets.

Supervises(EmpID, RoomID)

FD = { EmpID  → RoomID }

EmpID is the key; this relation is in 3NF.

Both attributes are foreign keys in Employee and Room entity sets.

Invoices(InvoiceID, Balance)

FD = { InvoiceID → Balance }

In this case, InvoiceID is the key

Payment(FamilyID, Invoice ID)

FD = { InvoiceID → FamilyID }

Invoice is the key; this is in 3NF.

Both attributes are foreign keys from Family and Invoice entity sets.

PaymentType(InvoiceID, ExpirationDate, CreditCardNum, Preauthorized)

FD = { InvoiceID → ExpirationDate, CreditCardNum, Preauthorized }

In this case, InvoiceID is the key.

Invoice is a foreign key from Invoice entity set.

FacilityExpenseSheet(ExpenseSheetID, MonthYear, Total)

FD = { ExpenseSheetID → Month, Year )

In this case, ExpenseSheetID is the key.

MonthlyExpenses(ExpenseSheetID, UtilityBill, Rent)

FD = { ExpenseSheetID → UtilityBill, Rent }

In this case, ExpenseSheetID is the key.

ExpenseSheetID is a foreign key from FacilityExpenseSheet entity set.

Expenses(FacilityID, ExpenseSheetID)

FD = { ExpenseSheetID → FacilityID }

In this case, ExpenseSheetID is the key.

ExpenseSheetID is a foreign key from FacilityExpenseSheet entity set.

Schedule(EmpID, Day, Hours)

FD = { EmpID, Day → Hours)

In this case, the composite key EmpID and Day form the primary key.

EmpID is a foreign key from Employee entity set.

EmployeeSalary(EmpID, BiWeeklyDate, ExpenseSheetID, Wage)

FD = { EmpID, BiWeeklyDate, ExpenseSheetID → Wage }

In this case, EmpID, BiWeeklyDate and ExpenseSheetID form the key.

EmpID and ExpenseSheetID are foreign keys from the Employee and FacilityExpenseSheet entity sets.

All the FDs follow at least one of the conditions to be 3NF. They are either trivial relationship or one attribute (or a combinations of attributes) is a key, giving us all the other attributes of the relationship.

# References

Quebec, G. O. (2014). *Educational Childcare Regulation*. Retrieved from Educational Childcare Regulation: http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=3&file=/S\_4\_1\_1/S4\_1\_1R2\_A.HTM