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DataBase Assignement

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M1SIAM – Big Data

Data Base Assignment, Part I:

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Ski Resort

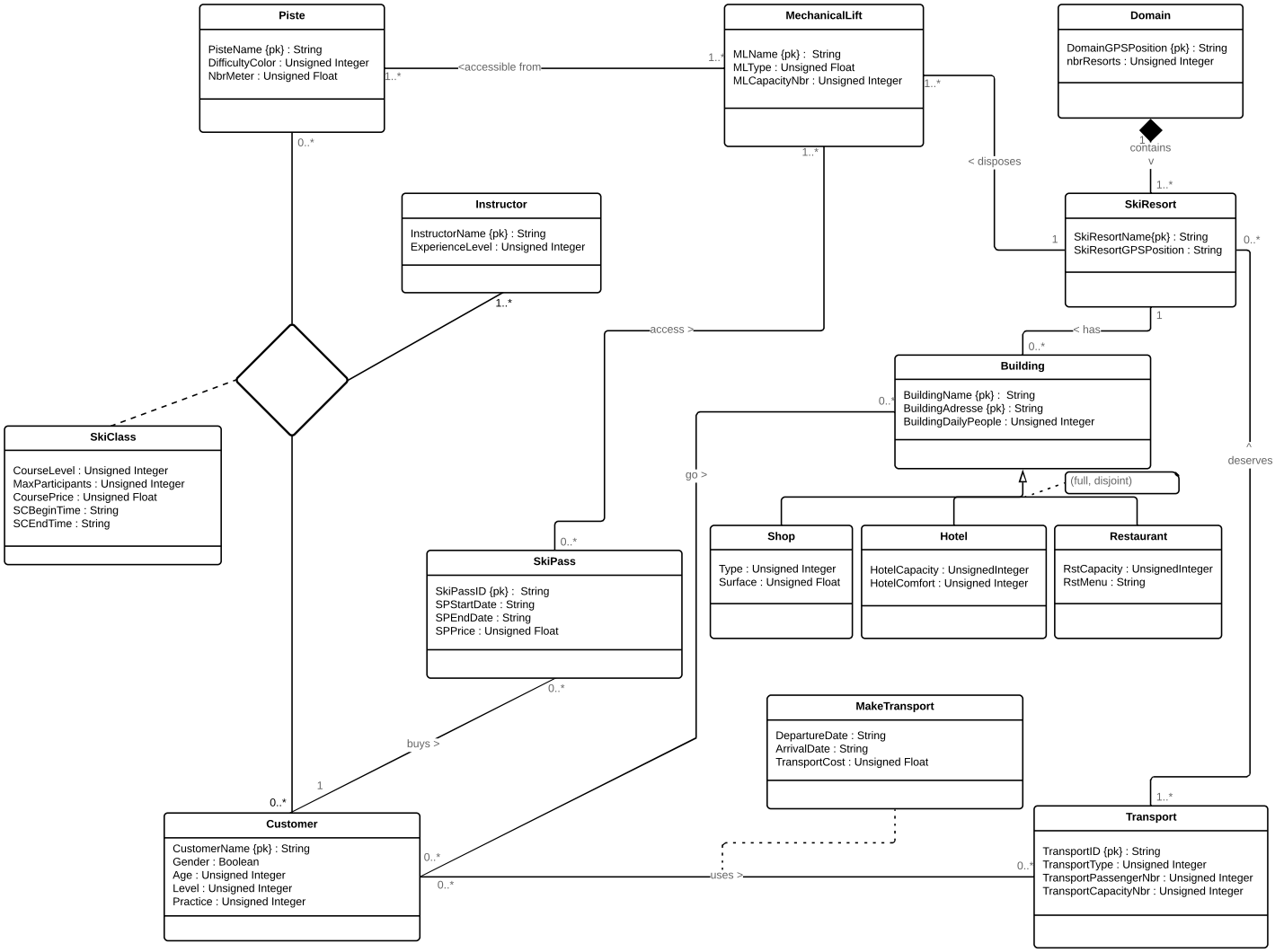
It's winter, you are surrounded with snow-covered mountains. Would you follow us for a tour in the ski resorts?

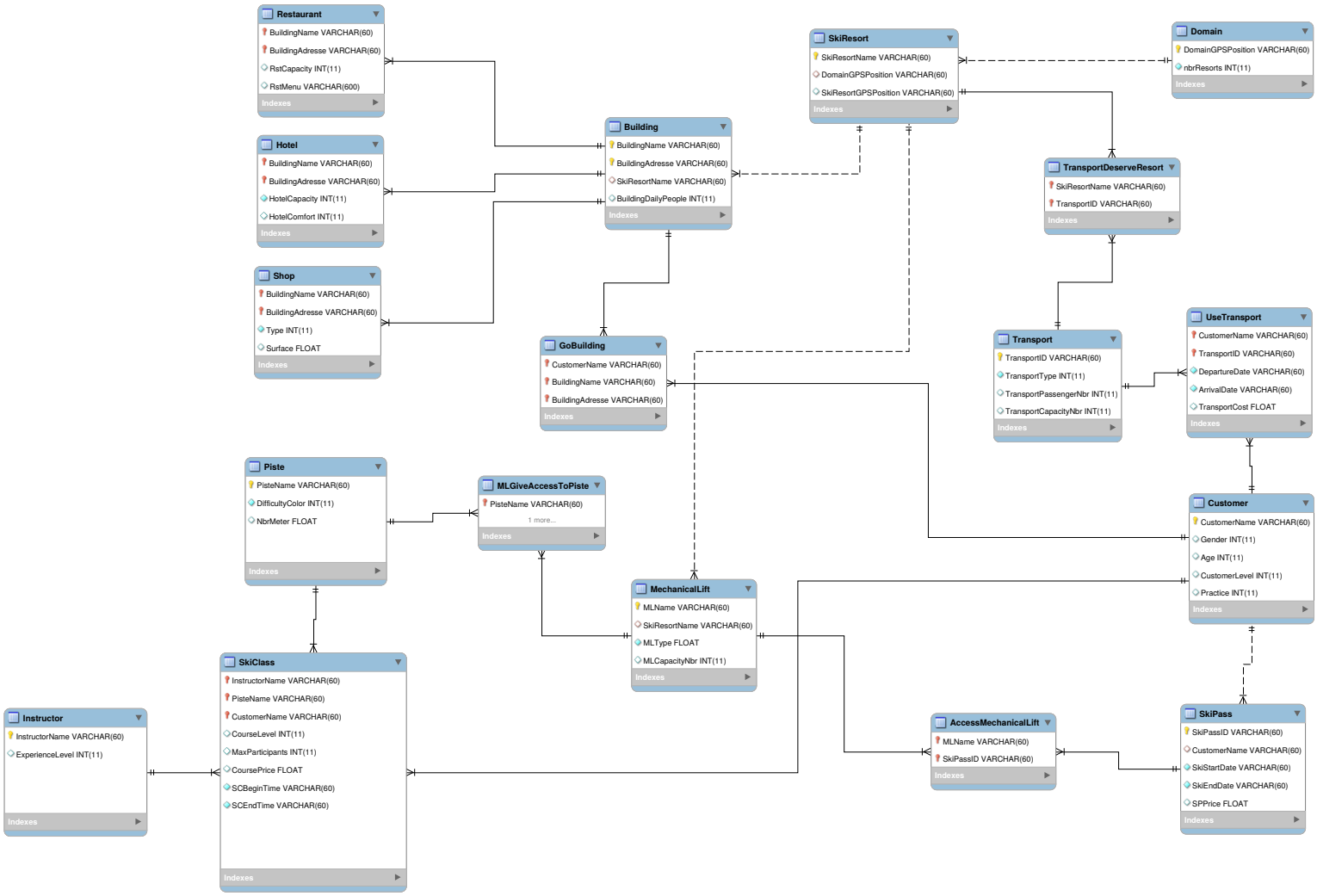
In this project, we defined a database about an overview of a ski resort built among our personal choices. First, we describe the data stored by a text to explain the application (page 1). Then, we present the UML diagram designed for our database (page 2).

A **Ski Resort** is contained in one and just one **Domain**, but a **Domain** can contain a certain number of *Ski Resort.* Also, a **Domain** is defined by a unique GPS position**.**
A **Ski Resort** has a unique name and has a GPS position**.** The ***S*ki Resort** disposes of at least one *Mechanical Lifts* and can be deserved by at least one *Transports.* It also can has *Buildings, or not,* that are of the following classes *Hotels, Restaurants* and *Shops.*
Each **Building** has unique tuple of name and address and keep the number of *Customers* coming by day. A **Building** is in one *Ski Resort* and the 3 types of building have their own attributes. The **Shop** has a type (sport shop, service shop, tourist shop, …) and his surface in m². A **Hotel** is defined by a capacity and a level of comfort (number of stars). Finally, a **Restaurant** hold a menu list and a capacity of *Customers*.
A **Customer** is identified by a unique name, he has a gender, an age, a level, and a practice (ski, snow,…). *A* **Customer** can use *Transports* and go to none or many *Buildings*, may buy many or none *Ski Pass*, and take many or none *Ski Classes* in a Ski Resort.
A **Piste** has a unique name, a color (green, blue, red and black) and a the length of the slope. On a **Piste** can occur many or none *Ski Class.* One **Piste** is accessible from at least one *Mechanical Lift*.
A **Ski Pass**, has an unique id**,** a starting and ending date and a price. It allows to access some *Mechanical Lifts* (at least one). It is bought by one unique *customer*.
A **Mechanical Lift** has a unique name**,** it has a type (gondola lift, ski lift, button lift) and also a capacity number . It gives access to one or many *Pistes.* A **Mechanical Lift** is in one and just one *Ski Resort* and is accessible by at least one *Ski Pass* or can be in a free access.
A **Transport** is designated by a unique id, a type (bus, car or other) **,** we save the actual number of passenger and the total capacity of the **Transport**. It can be taken by many or none *Customers,* to come and leave the *Ski Resort* at given dates (departure and arrival), for a given cost.
A **Ski Class** involves a least one *Customers,* at least one *Instructor,* and can occur on *many or none Pistes (beginners are maybe not ready for taking pistes),* it has a beginning and ending date, a course level and a maximum number of participants, we also want to save its price**. Instructors** have a unique name, and a level of experience.

M1SIAM Big Data Project - Ski Resort

[BLANC-FATIN Pierre, LAURENDEAU Matthieu, PARENT Nicolas] | February 21, 2019




Restaurant
BuildingName VARCHAR(60)
BuildingAdresse VARCHAR(60)
RstCapacity INT(11)
RstMenu VARCHAR(600)
Indexes
Hotel
BuildingName VARCHAR(60)
BuildingAdresse VARCHAR(60)
HotelCapacity INT(11)
HotelComfort INT(11)
Indexes
Shop
BuildingName VARCHAR(60)
BuildingAdresse VARCHAR(60)
Type INT(11)
Surface FLOAT
Indexes
Building
BuildingName VARCHAR(60)
BuildingAdresse VARCHAR(60)
SkiResortName VARCHAR(60)
BuildingDailyPeople INT(11)
Indexes
GoBuilding
CustomerName VARCHAR(60)
BuildingName VARCHAR(60)
BuildingAdresse VARCHAR(60)
Indexes
SkiResort
SkiResortName VARCHAR(60)
DomainGPSPosition VARCHAR(60)
SkiResortGPSPosition VARCHAR(60)
Indexes
Domain
DomainGPSPosition VARCHAR(60)
nbrResorts INT(11)
Indexes
TransportDeserveResort
SkiResortName VARCHAR(60)
TransportID VARCHAR(60)
Indexes
Transport
TransportID VARCHAR(60)
TransportType INT(11)
TransportPassengerNbr INT(11)
TransportCapacityNbr INT(11)
Indexes
UseTransport
CustomerName VARCHAR(60)
TransportID VARCHAR(60)
DepartureDate VARCHAR(60)
ArrivalDate VARCHAR(60)
TransportCost FLOAT
Indexes
Piste
PisteName VARCHAR(60)
DifficultyColor INT(11)
NbrMeter FLOAT
Indexes
MLGiveAccessToPiste
PisteName VARCHAR(60)
1 more...
Indexes
MechanicalLift
MLName VARCHAR(60)
SkiResortName VARCHAR(60)
MLType FLOAT
MLCapacityNbr INT(11)
Indexes
Customer
CustomerName VARCHAR(60)
Gender INT(11)
Age INT(11)
CustomerLevel INT(11)
Practice INT(11)
Indexes
SkiClass
InstructorName VARCHAR(60)
PisteName VARCHAR(60)
CustomerName VARCHAR(60)
CourseLevel INT(11)
MaxParticipants INT(11)
CoursePrice FLOAT
SCBeginTime VARCHAR(60)
SCEndTime VARCHAR(60)
Indexes
Instructor
InstructorName VARCHAR(60)
ExperienceLevel INT(11)
Indexes
AccessMechanicalLift
MLName VARCHAR(60)
SkiPassID VARCHAR(60)
Indexes
SkiPass
SkiPassID VARCHAR(60)
CustomerName VARCHAR(60)
SkiStartDate VARCHAR(60)
SkiEndDate VARCHAR(60)
SPPrice FLOAT
Indexes

Algebraic expressions

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You will below, the algebraic expressions for five of our queries. Of course, we just give the relational algebra expression for these.

In the following, we will denote by :

- σ_C the selection with condition C.
- π_L the projection of attributes L.
- $\times$ the product.
- $\bowtie$ the natural theta join.
- $\bowtie_C$ the theta join at condition C.

We will also denote . the application of the selection or projection.

R1- Give the name of all instructor that have at least a 50 score

$$\pi_{CustomerName}.\sigma_{ExperienceLevel \geq 50}(Instructor)$$

R2- Give the names of the customers that have already followed a ski class and have more than 50 years old

$$\pi_{CustomerName}.\sigma_{Age \geq 50}.\,(Customer \bowtie SkiClass)$$

R3-Give the Names of Mechanical Lift that give access to at least to 2 pistes

$$T1 = MLGiveAccessToPiste,$$

$$T2 = MLGiveAccessToPiste,$$

$$C = \{T1.MLName = T2.MLName, T1.PisteName \neq T2.PisteName\}$$

$$\pi_{MLName}.\,(T1 \bowtie_C T2)$$

R4- What is the mean price of the ski pass by ski resorts

$$\pi_{\{SkiPassId, SkiResortName, SPPrice\}}.\,(MechanicalLift \bowtie AccessMechanicalLift \bowtie SkiPass)$$

on this, you can group by SkiResortName, and select the SkiResortName with AVG(SPPrice).

R5- Give the transportType that are most used by customer that have taken at least 5 skipass

$$MakeTransport \bowtie SkiPass$$

then, you can group by CustomerName, select those having $count(SkiPassId) \geq 5$, group by transportType, and select transportType with $Max(CustomerName)$