Requirements specification for Ski lift transportation business process

1. General description of business process

Ski lift transportation

A general description of the business process.

Ski lift transportation as a business process consists of a skier or a snowboarder scanning their ski pass at the entrance gates. If the pass is valid the gate will allow the ski pass owner to pass through the gate. Upon crossing the gate, information about ski pass id and current time will be sent to database. Subsequently the skier or snowboarder will board the ski lift (chairlift, magic carpet, rope tow or gondola). Next, they will travel up the mountain to the offboarding station, where they will dismount the ski lift. This completes the ski lift transportation service.

Example queries

- Average amount of ski lift uses, during a given hour, across all days.
- What are the most popular lifts during a given month.
- Compare average usage of lifts that lead to slopes with and without floodlights, at evening hours in entire season.
- Whether adding floodlights to a slope increased average usage of ski lift connected to that slope during daylight hours.
- Whether the oldest ski lift in the resort was used on the given day.
- Whether the given ski lift was used after 4:00 pm.
- Give the 10 most used lifts of last season.

Data sources

All the ski lift transportation data is sent to the database and excel spreadsheet. Both data storage solutions will receive ski pass identification number and date and time of scanning. In addition, the database holds information about previous scanning and identification number of ski pass user. There is also some information about users such as age, name, gender and country of origin.

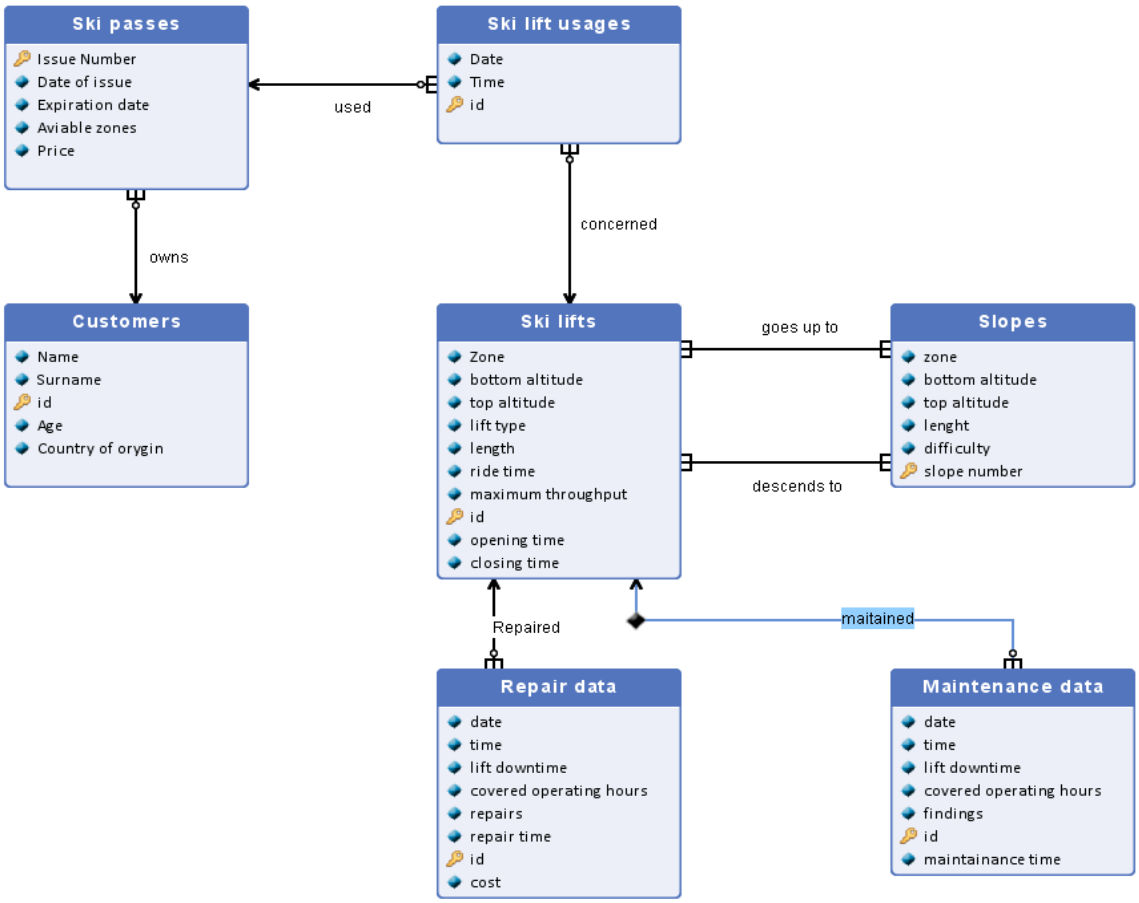
Measurable goals

1. Seasonal increase in the amount of ski lift usage of at least 4%.
2. Seasonal increase in the average daily time of ski pass owners spent on the slopes and lifts of at least 4%.

2. Data sources structures

SQL Database

- ERD Diagram



- Entity set description

Customers			
The table containing data on all current and past owners of ski passes. New entries added whenever a new customer buys a ski pass and are never removed. Cardinality: ~100 000			
Name	**Primary key**	**Type/Domain**	**Description**
Name	No	String	Name of the customer
Surname	No	String	Surname of the customer
id	**Yes**	int	Main differentiation method for customers
Age	No	int	Age of the customer in years
Country of origin	No	String	The country where the customer currently presides in

Ski passes			
The table containing information on all ski passes issued during a given ski season. New entries are added whenever a ski pass is issued and all ski passes not valid for the next season are removed at the end of one. Cardinality: ~10 000			
Name	**Primary key**	**Type/Domain**	**Description**
Issue Number	**Yes**	int	Number given to each ski pass upon issuing
Date of issue	No	Date	The date on which the ski pass was originally issued
Expiration date	No	Date	The last day on which the ski pass grants entry on the ski lifts
Available zones	No	byte	List of zones saved in a binary format, in which the ski pass is valid
Price	No	Double	Price of the ski pass in euros

Ski lift usages			
Table containing data on singular instances of ski lift access. New entries are added whenever a ski pass owner uses a ski lift and all entries are removed at the end of a ski season. Cardinality: ~1 000 000			
Name	**Primary key**	**Type/Domain**	**Description**
Date	No	Date	Date of usage

Time	No	Time	Time of usage
id	**Yes**	int	id of usage

Ski lifts			
Table containing data on ski lifts in the resort. New entries are added whenever a new ski lift is built and deleted whenever one is removed. Cardinality: ~30			
Name	**Primary key**	**Type/Domain**	**Description**
Zone	No	char	the resort zone in which the lift is located
bottom altitude	No	double	the altitude in meters above the sea level at which the boarding station is located
top altitude	No	double	the altitude in meters above the sea level at which the offboarding station is located
lift type	No	Enum	One of 4 types of ski lifts (magic carpet, rope tow, chairlift, gondola)
length	No	double	length of the ski lift in meters
ride time	No	double	the time taken by the lift to traverse from the bottom station to the top station in seconds
maximum throughput	No	int	theoretical maxim amount of customers that can use the lift in 1 hour
id	**Yes**	int	identification number of the ski lift
opening time	No	time	the time on which the lift opens to skiers
closing time	No	time	the time of the last call for the lift

Slopes			
Table containing data on ski slopes in the resort. New entries are added whenever a new ski slope is built and deleted whenever one is removed. Cardinality: ~50			
Name	**Primary key**	**Type/Domain**	**Description**
zone	No	char	the resort zone in which the slope is located
bottom altitude	No	double	the altitude in meters above the sea level at which the slope ends
top altitude	No	double	the altitude in meters above the sea level at which the slope starts

length	No	double	length of the ski slope in meters
difficulty	No	Enum	one of the 5 difficulties of slopes (green, blue, red, black, double black)
slope number	**Yes**	int	the number given to the slope for navigation purposes

Maintenance data			
Table containing data on all maintenance done on lifts in the resort. New entries are added whenever a new maintenance is performed and deleted whenever its corresponding lift is removed is removed. Cardinality: ~100 000			
Name	**Primary key**	**Type/Domain**	**Description**
date	No	date	the date on which the maintenance started
time	No	time	the time on which the maintenance started
lift downtime	No	int	how long was the lift unable to be operated because of the maintenance in minutes
covered operating hours	No	Boolean	whether the maintenance happened to encroach on the lift's operating time
findings	No	string	a short summary on what the maintenance uncovered
id	**Yes**	int	identification number of the maintenance session
maintenance time	No	int	how long did the maintenance take in minutes

Repair data			
Table containing data on all repairs done on lifts in the resort. New entries are added whenever a new repair is performed and deleted whenever its corresponding lift is removed is removed. Cardinality: ~1 000			
Name	**Primary key**	**Type/Domain**	**Description**
date	No	date	the date on which the repair started
time	No	time	the time on which the repair started
lift downtime	No	int	how long was the lift unable to be operated because of the repairs in minutes
covered operating hours	No	Boolean	whether the repairs happened to encroach on the lift's operating time

repairs	No	string	a short summary on what the repairs were and how they were conducted
repair time	No	int	how long did the repairs take in minutes
id	**Yes**	int	identification number of the repair session
cost	No	double	the cost of parts and equipment required to fully repair the ski lift

- Relationships description

Name	Entity set 1	Entity set 2	Cardinality	Description
goes up to	Ski lifts	Slopes	1..n : 1..n	What ski lift leads to what slope.
concerned	Ski lift usages	Ski lifts	0..n : 1	Ski lifts concerned for a given ski lift usage.
maintained	Ski lifts	Maintenance data	1 : 0..n	maintenance pertaining to a given ski lift.
used	Ski passes	Ski lift usages	1 : 0..n	Ski passes used for a given ski lift use.
owns	Ski passes	Customers	0..n : 1	Ski passes currently owned by given customers.
descends to	Ski lifts	Slopes	1..n : 1..n	what ski slope leads to what ski lift.
Repaired	Ski lifts	Repair data	1 : 0..n	repairs pertaining to a given ski lift.

CEO Excel sheet

Sheet 1 (Information about ski lifts currently in the resort, each line describes singular ski lift):
Column A – Ski lift identification number (numeric, 0 decimal precision)
Column B – Zone (text),
Column C – Bottom altitude (numeric, 1 decimal precision)
Column D - Top altitude (numeric, 1 decimal precision)
Column E – Length (numeric, 1 decimal precision)
Column F – Hourly maximum throughput (numeric, 0 decimal precision)
Column G – Number of support towers (numeric, 0 decimal precision)
Column H – Lift model number (text)
Column I – Lift manufacturer (text)
Column J – Lift assembly company (text)
Column K – Production cost (currency)
Column L – Construction cost (currency)
Column M – Construction date (date)

Sheet 2 (Information about ski slopes currently in the resort, each line describes singular ski slope):
Column A – Ski slope identification number (numeric, 0 decimal precision)
Column B – Zone (text),
Column C – Bottom altitude (numeric, 1 decimal precision)
Column D - Top altitude (numeric, 1 decimal precision)
Column E – Length (numeric, 1 decimal precision)
Column F – Number of snow towers along the slope (numeric, 0 decimal precision)
Column G – Slope manufacturer (text)
Column H – Construction cost (currency)
Column I – Construction date (date)

3. Scenarios of analytical problems

Why was there an increase/decrease in total lift usage this month?

1. Compare the total amount of ski lift usage of this month to the last month.
2. Find the lift with the biggest numeric difference of uses compared to last month.
3. Compare the lift type which achieved the greatest average number of riders per lift per day this month and last month.
4. Which lift manufacturer achieved the greatest average number of riders per lift per day this month and last month?
5. Compare the average slope length, to which the most used lift this month and last month leads.
6. Do more expensive lifts achieve higher usage numbers?
7. Did the 10 most used lifts change during national holiday days? (neither the excel nor the database contain data about holidays)

Which factors contributed to the number of repairs of ski lifts in the resort?

1. How many repairs were conducted on average on ski lifts made by a given manufacturer?
2. Do lifts with more support towers have a higher average cost of repairs?
3. Do more expensive ski lifts require less repairs?
4. Which assembly companies assembled the 10 ski lifts with most repairs conducted on this season?
5. Find the average number of ski lift repairs per season of ski lifts that are longer than 1 km.
6. Do worse skier-rated lifts break down more often? (our database doesn't include user ratings, and the data cannot be easily accessed from other sources; would require a new form of data collection)

4. Data needed for analytical problems

Analytical problem: " Why was there an increase/decrease in total lift usage this month?"

1. Compare the total amount of ski lift usage of this month to the last month.
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
2. Find the lift with the biggest numeric difference of uses compared to last month.
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift number – ski lifts table from database; Column A, sheet 1, Excel
3. Compare the lift type which achieved the greatest average number of riders per lift per day this month and last month.
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift type – ski lifts table from database
4. Which lift manufacturer achieved the greatest average number of riders per lift per day this month and last month?
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift manufacturer – Column I, sheet 1, Excel
5. Compare the average slope length, to which the most used lift this month and last month leads.
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift number – ski lifts table from database; Column A, sheet 1, Excel
    - Slope Length – slopes table from database; Column E, sheet 2, Excel
6. Do more expensive lifts achieve higher average daily usage numbers?
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift production cost - Column K, sheet 1, Excel
    - Lift construction cost - Column L, sheet 1, Excel
7. Did the 10 most used lifts change during national holiday days? (neither the excel nor the database contain data about holidays)
    - Number of uses – ski lift usages column from database
    - Date of use – ski lift usages column from database
    - Lift number – ski lifts table from database; Column A, sheet 1, Excel
    - Date of national holidays – data must be collected from an outside source

Analytical problem: Which factors contributed to the number of repairs of ski lifts in the resort?

1. How many repairs were conducted on average on ski lifts made by a given manufacturer?
    - Number of repairs – Repair data table from database

- Lift manufacturer – Column I, sheet 1, Excel

2. Do lifts with more support towers have a higher average cost of repairs?
   - Number of support towers – Column G, sheet 1, Excel
   - Cost of Repair – Repair data table form database
3. Do more expensive ski lifts require less repairs?
   - Number of repairs – Repair data table from database
   - Production cost – Column K, sheet 1, Excel
   - Construction cost – Column L, sheet 1, Excel
4. Which assembly companies assembled the 10 ski lifts with the most repairs conducted on this season?
   - Number of repairs – Repair data table from database
   - Lift assembly company – Column I, sheet 1, Excel
   - Repair date – Repair data table from database
5. Find the average number of ski lift repairs per season of ski lifts that are longer than 1 km.
   - Number of repairs – Repair data table from database
   - Repair date – Repair data table from database
   - Ski lift length – Ski lifts table from database
6. Do worse skier-rated lifts break down more often?
   - Number of repairs – Repair data table from database
   - Ski lift rating – Data unavailable, would require the resort to change the business process, implementing ski lift ratings
   - Lift construction date - Column M, sheet 1, Excel