KinderGarten - Data Warehouse design

Business process

The Data warehouse is designed for Feeding kids business process. This process is described in the document Requirements specification for Feeding kids in school canteen business process.

Relational database schema

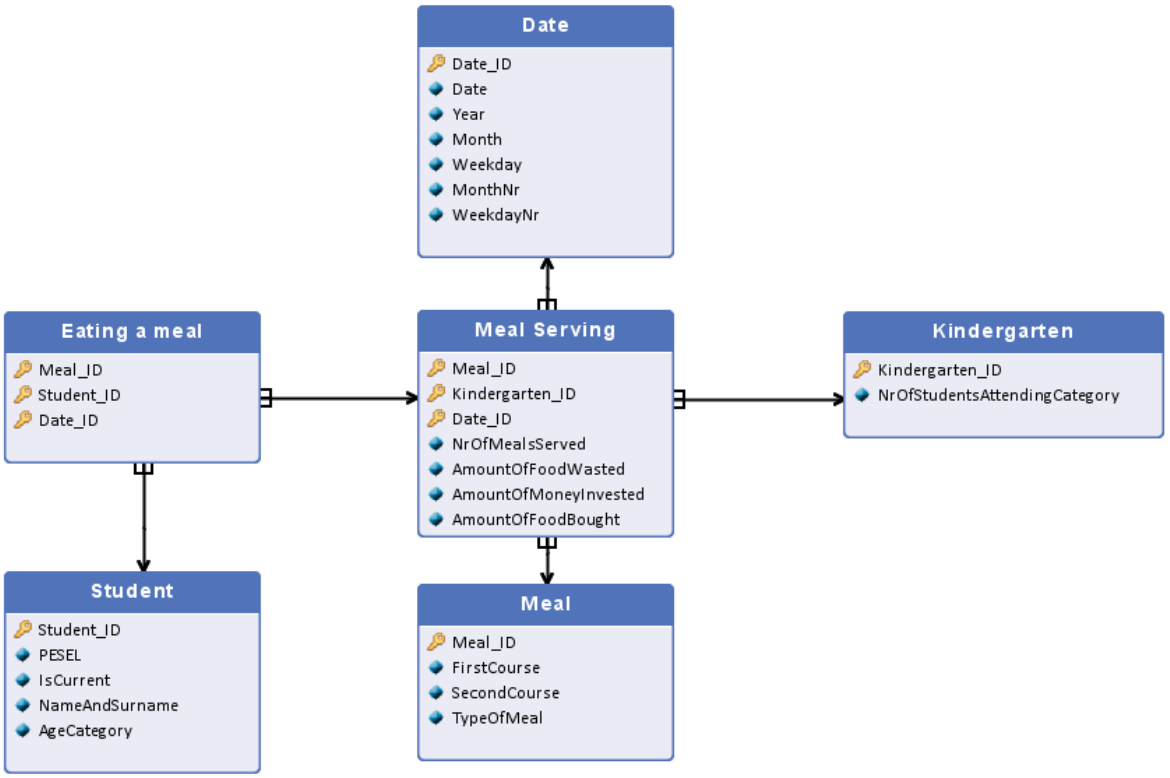

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TABLE NAME	ATTRIBUTE	ATTRIBUTE TYPE	DESCRIPTION
MEAL SERVING (FACT TABLE)	One tuple describes one meal served daily in kindergarten.		
	MealServing_ID	Numeric	PK
	Meal_ID	Numeric	FK Meal.
	Kindergarten_ID	Numeric	FK Kindergarten Kindergarten
	MealServingDate_ID	Numeric	FK Date Meal Serving date
	NrOfMealsServed	Numeric	Amount of meals served at determined day and kindergarten
	AmountOfFood Wasted	Numeric	Number of kilograms of Food/Ingredients thrown out at day of registration
	AmountOfMoney Invested	Numeric	Number of PLN used to buy ingredients at day of registration
	AmountOfFood Bought	Numeric	Number of kilograms of Food/Ingredients bought at the day of registration
EATING A MEAL (FACT TABLE)	One tuple describes the fact of eating a meal by the student		
	MealServing_ID	Numeric	FK Meal Serving Meal Serving
	Student_ID	Numeric	FK Student Student
STUDENT (DIMENSION TABLE)	One tuple describes a student, in the specified age category		

	Student_ID	Numeric	PK (surrogate key)
	PESEL	11 digits	Pesel no.
	IsCurrent	Boolean	1 if information is current, otherwise 0. (SCD2 implementation)
	NameAndSurname	Varchar(50)	Name and surname of the student
	AgeCategory	Varchar(20)	Age category. Allowed values: less than 3, between 3 and 5, from 5 to 6, from 6 to 7, more than 7
MEAL (DIMENSION TABLE)	one tuple describes one meal that may be served.		
	Meal_ID	Numeric	PK (surrogate key)
	First	Varchar(10)	A first course that is served as a part of meal
	SecondCourse	Varchar(10)	A second course that is served as a part of meal
DATE (DIMENSION TABLE)	One tuple describes one day.		
	Date_ID	Numeric	PK (surrogate key)
	Date	Date	Date
	Year	4 digits	Year
	Month	Varchar(10)	Month. Allowed values: January, February, March, April, May, June, July, August, September, October, November and December.

	Weekday	Varchar(10)	Day of week. Allowed values: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday
	MonthNo	Numeric	Month's numeric values
	WeekdayNo	Numeric	Weekday's numeric values
	Season	Varchar(8)	Season. Allowed values: Spring, Summer, Autumn, Winter.
KINDERGARTEN (DIMENSION TABLE)	One tuple describes one kindergarten.		
	Kindergarten_ID	Numeric	PK (surrogate key)
	NoOfStudents AttendingCategory	Varchar(20)	No of students attending category. Allowed values: less than 20, from 20 to 50, from 50 to 100, from 100 to 150, from 150 to 200, more than 200.

Dimensional model

Fact definitions

Fact 1 Serving a meal fact: Serving a specific meal (type of the meal is considered not just one occurrence of meal), in a specific kindergarten and on a specific date and the specific number of meals that type. Also buying and throwing out the specific amount of food, on the specific date and in a specific kindergarten.

Fact table: Meal_serving

Granularity:

- a specified meal type
- a specified kindergarten
- a specified date of serving
- a specified amount of money invested to buy food
- a specified amount of food wasted

Measures and aggregation functions:
Number of different meals served - COUNT (1)
Number of total meals served - SUM(NrOfMealsServed)
Amount of food wasted SUM(AmountOfFoodWasted)
Amount of food bought SUM(AmountOfFoodBought)
Amount of money invested SUM(AmountOfMoneyInvested)
Average food cost = AmountOfMoneyInvested/AmountOfFoodBought

Fact 2 Eating a meal fact: Eating a meal by a specific person

Fact table: Eating_a_meal

Granularity:

- a specified person with specified age
- a specified meal type

Measures and aggregation functions:
Number of meals eaten by a kids - COUNT(Student_ID)

Dimensions definitions

Dimensions for Fact 1 Serving a meal fact:

DIMENSION/DIMENSION ATTRIBUTE	TABLE/COLUMN	TYPE
MEAL	MEAL	Dimension
FIRST COURSE	Meal.FirstCourse	Dimension attrtibute
SECOND COURSE	Meal.SecondCourse	Dimension attrtibute
KINDERGARTEN	KINDERGARTEN	Dimension
NO OF STUDENTS ATTENDING CATEGORY	Kindergarten.NoOfStudentsAttendingCategory	Dimension attrtibute
SERVING A MEAL DATE	DATE	Dimension
SERVING A MEAL YEAR	Date.Year	Dimension attrtibute
SERVING A MEAL SEASON	Date.Season	Dimension attrtibute
SERVING A MEAL MONTH	Date.Month	Dimension attrtibute
SERVING A MEAL WEEKDAY	Date.Weekday	Dimension attrtibute
SERVING A MEAL DATE HIERARCHY	● Date.Year ●● Date.Season ●●● Date.Month ●●●● Date.Date	Hierarchical dimension

Dimensions for Fact 2 Eating a meal fact:

DIMENSION/DIMENSION ATTRIBUTE	TABLE/COLUMN	TYPE
STUDENT	STUDENT	Dimension
STUDENT PESEL	Student.PESEL	Dimension attrtibute
STUDENT NAME	Student.NameAndSurname	Dimension attrtibute
STUDENT AGE	Student.AgeCategory	Dimension attrtibute
STUDENT HIERARCHY	● Student. PESEL ●● Student.AgeCategory ●●● Student.NameAndSurname	Hierarchical dimension

Checking the feasibility of queries based on the multidimensional model

1. Compare the number of children in the school canteen between months.
   Measure: Number of total meals served
   Dimension: Meal Serving Date (dimension attributes: Meal Serving Month)
2. Compare the number of meals eaten by every kid to this age.
   Measure: Number of meals eaten by a kids
   Dimension: Student (dimension attribute: Age Category)
3. Compare the number of meals sold of different types in an analyzed month relative to the previous month.
   Measure: Number of different meals served
   Dimension: Meal Serving Date (dimension attributes: Meal Serving Month, Meal Serving MonthNo)
   Dimension: Meal (dimension attribute: First Course, Second Course)
4. What is the difference in number of children eating in school between the seasons?
   Measure: Number of total meals served
   Dimension: Meal Serving Date (dimension attribute: Meal Serving Season)
5. Compare the number of children between weekdays.
   Measure: Number of total meals served
   Dimension: Meal Serving Date (dimension attribute: Meal Serving Weekday, Meal Serving WeekdayNo)
6. Compare the number of kids eating annually in relation to kindergarten size, defined as the number of kids attending kindergarten, in the current and previous month.
   Measure: Number of total meals served
   Dimension: Meal Serving Date (dimension attributes: Meal Serving Month, Meal Serving MonthNo)
   Dimension: Kindergarten (dimension attributes: NrOfStudentsAttendingCategory)
7. What are the differences in the number of children between months?
   Measure: Number of total meals served
   Dimension: Meal Serving Date (dimension attributes: Meal Serving Month, Meal Serving MonthNo)
8. Which meals cause a higher amount of food wasted than on average?
   Measure: Amount of food wasted
   Dimension: Meal (dimension attributes: First Course, Second Course)
9. Compare the number of meals served the day before and the number of food wasted in that day?
   Measure: Number of total meals served, Amount of food wasted
   Dimension: Meal Serving Date (dimension attribute: Meal Serving Weekday, Meal Serving WeekdayNo)
10. Compare the number of money invested to buy products daily to amount of food thrown out.
    Measure: Amount of food wasted, Amount of money invested
    Dimension: Meal Serving Date (dimension attribute: Meal Serving Weekday, Meal Serving WeekdayNo)
11. Compare the effect of the popularity of meal to the amount of food wasted.

Measure: Number of total meals served, Amount of food wasted
Dimension: Meal Serving Date (dimension attributes: Meal Serving Month, Meal Serving MonthNo)

Checking if there are Data in the Data sources needed to fill the Data warehouse

TABLE NAME	COLUMN	SOURCE
MEAL SERVING	One tuple describes one meal served daily in kindergarten.	
	MealServing_ID	Primary Key, generated by system
	Meal_ID	Meal served ID. Foreign key from dimension table. Based on MealID stored in the GanterSystem
	Kindergarten_ID	Kindergarten in which serving is placed. Foreign key from dimension table. Based on KindergartenID stored in the GanterSystem
	MealSDate_ID	Date of serving ID. Foreign key from dimension table. Based on DateID stored in the GanterSystem
	NrOfMealsServed	Counting the number of rows in the Eating table from GartenSystem grouped by date of Meal
INGREDIENTS MANAGEMENT	One tuple describes one fact of daily management of ingredients and food.	
	Kindergarten_ID	Kindergarten in which managing the ingredients is placed. Foreign key from dimension table. Based on KindergartenID stored in the GanterSystem
	Date_ID	Date of managing the ingredients ID. Foreign key from dimension table. Based on DateID stored in the GanterSystem

	AmountOfFood Wasted	Sheet 1, column B
	AmountOfMoney Invested	Sheet 1, column D
	AmountOfFood Bought	Sheet 1, column C
EATING A MEAL	One tuple describes the fact of eating a meal by the student	
	MealServing_ID	Primary key, generated by system
	Student_ID	Student that is eating meals. Foreign key from dimension table. Based on KindergartenID stored in the GanterSystem
STUDENT	One tuple describes a student, in the specified age category	
	Student_ID	Surrogate key - generated by database
	PESEL	Taken from Person table, column PESEL in GanterSystem
	IsCurrent	Taken from Student table, column isCurrent in GanterSystem.
	NameAndSurname	Taken from GanterSystem, Person table, columns name and surname
	AgeCategory	AgeCategory Calculated from Person table, column DateOfBirth in GanterSystem
MEAL	one tuple describes one meal that may be served.	
	Meal_ID	Surrogate key - generated by database
	FirstCourse	Name of the first course. Taken from Meal table, column FirstCourse from

		GanterSystem
	SecondCourse	Name of the first course. Taken from Meal table, column SecondCourse from GanterSystem
DATE	One tuple describes one day.	
	All the data in this table are generated tuple by tuple based on any calendar, before ETL process	
KINDERGARTEN	One tuple describes one kindergarten.	
	Kindergarten_ID	Primary Key, generated by system
	NoOfStudents AttendingCategory	Counted from GartenSystem the number of students that are current