Requirements specification for Conducting Exams business process

1. General description of business process

a. A general description of the business process and a description of the performance metrics generated by this process, possible current analytical problems.

The process of conducting exams at a school typically involves several steps to effectively assess students' knowledge and understanding. On the exam day, at a specified time, students come to the appointed room and take the test. After this process the supervising teacher collects the tests. Within 14 working days exams shall be checked by the teachers and entered the system next to the name, surname and index of the student. Once grading is complete, exam results are compiled and released to students and parents. Schools may analyze overall performance trends and individual student progress.

The increase in the average satisfaction from the grade at a level not less than 1% compared to the previous month.

The increase in the overall average grade from the exam at a level not less than 1% compared to the previous month.

b. Typical questions

- Give the students' average grade from the specific month
- Does the results from exams vary when it comes to different years
- Compare the number of students that passed the exam in the current month with the previous month.

- Students from which district score the highest average grade?
- Does the exam type influence the average grade?
- Does the number of positive grades differ between different supervisors?
- Does gender influence exam results?
- Does the time of the day have an impact on the grade?
- Compare the scoring of the students that are not living the same city as the school is located to those who are living the same city
- Does the number of students that have passed the exam differ when the supervisor was a Female or Male?

c. Data

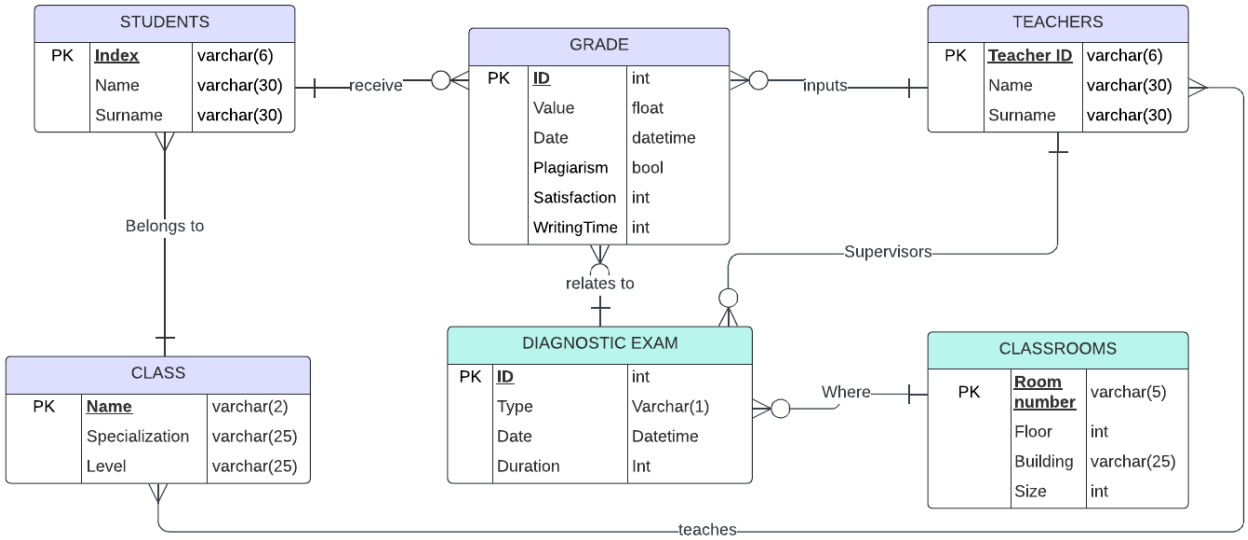
Data sufficient to analyze the grades of the students is extracted from the 'SchoolSystem' database. It stores most of the data about the exams and the grades each student received, which teachers input the grade and who was the exam's supervisor. The dates of conducted diagnostic exams are stored too.

Additionally, more detailed information about students and teachers is stored in the CSV files. Those files contain information about where they live (both city and its district), their gender and date of birth. The teachers' file has information about their scientific degree (title) and the date they've started working in the school. In the School_Students CSV file there is also a telephone number and e-mail for students' legal guardian.

2. **Data sources structures**

SchoolSystem

ERD



RDB

Students (Index, Name, Surname, ID_Class REF Class)

Class (Name, Specialization, Level)

Grades (Grade ID, Grading datetime, Value, Plagiarism, Satisfaction, WritingTime, StudentID REF Students, TeacherID REF Teachers, ExamID REF Diagnostic Exams)

Teachers (Teachers ID, Name, Surname)

Diagnostic Exams (ID, Date, Type, Duration, Examiner REF Teachers, Room Number REF Classrooms)

Classrooms (Number, Floor, Building, Size)

Is_teaching (Teachers ID REF Teachers, ClassID REF Class)

Students:

Index – varchar(6) - unique identifier for a student consisting of exactly 6 numbers
Name – varchar(30) – name of a student
Surname – varchar(30) – surname of a student

Teachers:

Teacher ID – varchar(6) - unique identifier for a teacher consisting of exactly 6 numbers
Name – varchar(30) – name of a teacher
Surname – varchar(30) – surname of a teacher

Diagnostic Exams:

ID – int – unique identifier for the diagnostic exam
Type – varchar(1) - 'H' - humanistic, 'S' - scientific, 'L' - linguistic
Date – datetime – the date and time of the diagnostic exam
Duration – int – duration of the exam expressed in minutes

Classrooms:

Room_Number – varchar(5)– a room number
Floor – int – information about the school floor that the room is located
Building – varchar(20) - information in which building is room located in
Size – int – information about the area of the room

Class:

Name – varchar(2) - identifier of a class consisting of exactly two characters (for example 2C, 3A, 2D…)
Specializaiton – varchar(20) -information about the specialization of the class
Level – varchar(15) - educational level of the class

Grades:

ID – int – unique identifier of each grade
Value – float – the value of the grade. From 1 to 5 including partial numbers like 1.5, 2.5 etc.
Date – datetime – date and time of the grade being accepted into the system
Plagiarism – bool – indicator whether the negative grade was put due to the cheating

Satisfaction – int – student's satisfaction from the grade

WritingTime – int – the time student was writing the exam

Is_Teaching – *represents the n-n relationship between teachers and classes***:**

FK_Teacher - varchar(6) - unique identifier for a teacher consisting of exactly 6 numbers
FK_Class - varchar(2) - identifier of a class consisting of exactly two characters (for example 2C, 3A, 2D…)

School_Teachers CSV

Completness of data about the teachers working in the Academy of Success:

Column A – Teacher_ID – Identification number of the teacher (Int)

Column B – Name – First name of the teacher (Text)

Column C – Surname – Surname of the teacher (Text)

Column D – Title – scientific title of the teacher (or his education if he hasn't got one) (Title)

Column E – Begginingdate – the date teacher started working at our school (YYYY-MM-DD format)

Column F – City – city the teacher lives in (text)

Column G – District – district of the city that the teacher lives in (none if it is a small city) (text)

Column H – Gender – the gender of the teacher in a ‘F’/’M’ format (text)

Column I – Dateofbirth – date of birth of the teacher in YYYY-MM-DD format

School_Students CSV

Completness of data about the teachers working in the Academy of Success:

Column A – Student_ID – Identification number of the student (Int)

Column B – Name – First name of the student (Text)

Column C – Surname – Surname of the student (Text)

Column D – Gender – Gender of the student (Gender)

Column E – Dateofbirth – The date that the student was born (YYYY-MM-DD format)

Column F – TelNumber – Telephone number for the pupil’s legal guardian (Text)

Column G – Email – Email address for the pupil’s legal guardian (Text)

Column H – City – City in which the student is living (Text)

Column I – District – District of the city in which the student is living (Text)

3. Scenarios of analytical problems

1. Reasons for increase/decrease in the overall grades average from the diagnosing exams in the current month

A) Compare the grades from exams conducted in the morning to the exams conducted in the noon
B) Compare the grades at the near-the-holidays days in the current and previous month
C) Which class achieves the lowest scoring?
D) Compare the scoring of the students that are not living the same city as the school is located to those who are living the same city

E) Compare the scoring of exams depending on the weather (whether the day was sunny or rainy)
F) What kind of influence do additional learning methods have on exam scoring?
G) Teachers from which districts grade the highest?
H) Which of the teachers grading the exams from the previous month managed to get students highest grades?
I) Compare the average writing time based on the type of the exam
J) Compare the students' average satisfaction from the grade based on their age

2. Why did the average satisfaction from the exams this month increase/ decrease?

A) What type of exam achieves the highest average satisfaction?
B) Which class specialization has the highest average satisfaction?
C) Does the average satisfaction from the exam differ when the supervisor was a Female or Male?
D) Does the average satisfaction differentiate between genders?
E) Compare the average satisfaction from diagnostic exams from the previous month compared to the current month, grouped by title of the supervisor teacher

4. Data needed for analytical problems

Analytical problem: Reasons for increase/decrease in the overall grades average from the diagnosing exams in the current month

A) Compare the grades from exams conducted in the morning to the exams conducted in the noon

   Value of grade – SchoolSystem – table Grade – column Value
   Date & Time – SchoolSystem – table Diagnostic Exams – column Date

B) Compare the grades at the near-the-holidays days in the current and previous month

   Value of grade – SchoolSystem – table Grade – column Value
   Near-the-holidays – information to be gathered from the public source
   Date & Time – SchoolSystem – table Diagnostic Exams – column Date

C) Which class achieves the lowest scoring?

   Class – SchoolSystem – table Class – column Name
   Scoring – SchoolSystem – table Grade – column Value

D) Compare the scoring of the students that are not living the same city as the school is located to those who are living the same city

   Scoring – SchoolSystem – table Grade – column Value
   City – School_Students CSV – column P - city of the student

E) Compare the scoring of exams depending on the weather (whether the day was sunny or rainy)

   Scoring – SchoolSystem – table Grade – column Value
   Weather during the day – information to be gathered from the public sources
   Date & Time – SchoolSystem – table Diagnostic Exams – column Date

F) What kind of influence do additional learning methods have on the exam scoring

   Scoring – SchoolSystem – table Grade – column Value
   Learning methods used – no such information (will be gathered from the

questionnare below)

G) Teachers from which districts grade the highest?

Scoring – SchoolSystem – table Grade – column Value
District – School_Teachers CSV – table G - District

H) Which of the teachers making the exams from the previous month managed to get students highest grades?

Scoring – SchoolSystem – table Grade – column Value
Teacher ID – SchoolSystem – table Teachers – column Teacher ID
Date & Time – SchoolSystem – table Diagnostic Exams – column Date

I) Compare the average writing time based on the type of the exam

WritingTime- SchoolSystem – table Grade – column WritingTime

Type of the exam – SchoolSystem – table exam – column Type

J) Compare the students' average satisfaction from the grade based on their age

Satisfaction – SchoolSystem – table Grade – column Satisfaction

Age – School_Students.csv - column E - DateOfBirth

Analytical problem: Why did the number of students that passed the exams this month increase/decrease?

A) What type of exam achieves the highest average satisfaction?

Satisfaction – SchoolSystem – table Grade – column Satisfaction
ExamType – SchoolSystem – table Diagnostic exams – column Type

B) Which class specialization has the highest average satisfaction?

Satisfaction – SchoolSystem – table Grade – column Satisfaction
ClassSpecialization – SchoolSystem – table Class– column Specialization
ClassName - SchoolSystem – table Class – column Name

C) Does the average satisfaction from the exam differ when the supervisor was a Female or Male?

Teacher ID – SchoolSystem – table Teachers – column Teacher ID
Satisfaction – SchoolSystem – table Grade – column Satisfaction
Gender – School_Teachers CSV – column H - Gender

D) Does the number of students that passed the exam differentiate between genders?

Student_ID – SchoolSystem – table Students – column Index
Satisfaction – SchoolSystem – table Grade – column Satisfaction
Gender – School_Students CSV – column D - Gender

E) Compare the average satisfaction from diagnostic exams from the previous month compared to the current month, grouped by title of the supervisor teacher

Satisfaction – SchoolSystem – table Grade – column Satisfaction
Teacher_ID – SchoolSystem – table Teachers – column Teacher_ID
Title – School_Teachers CSV – column D – column Title
Date – SchoolSystem – table Diagnostic Exams – column Date

It is not possible to answer all the questions solely with the data extracted from the SchoolSystem database and the school CSV files. We suggest conducting a questionnaire sent by e-mail to the legal guardian of the student with the following questions:

- Does your child/pupil use any additional learning methods apart from those used in school and if so, what are they?

- How often (estimate in hours) does your child/pupil use those additional learning methods per month?

The results of the questionnaire are automatically uploaded to the school survey system and entered in the new CSV file.

Column A – Student ID

Column B – additional methods used (text) - describes the methods used by the student, none if he doesn't use any additional methods

Column C – number of hours dedicated to the additional learning methods per month