

# **Requirements specification for recruitment business process**

## **1. General description of business process**

1. Once every half a year there is a recruitment process ongoing. Students use a dedicated website to choose their preferred courses of study and rank from those that they want to study the most and the least. After the deadline, each student has their grade calculated based on the A levels grades. For a specific course, students with the highest scores are selected until the course is full. For students that were unable to get on the list at their first preference course, score for next pick is calculated until the student is assigned to one of the courses or they ran out of preferred courses.

The increase in the number of students at the whole university at a level not less than 2,5% per semester compared to the previous one.

Median increase of number of students at each department 2,5% per semester compared to the previous one.

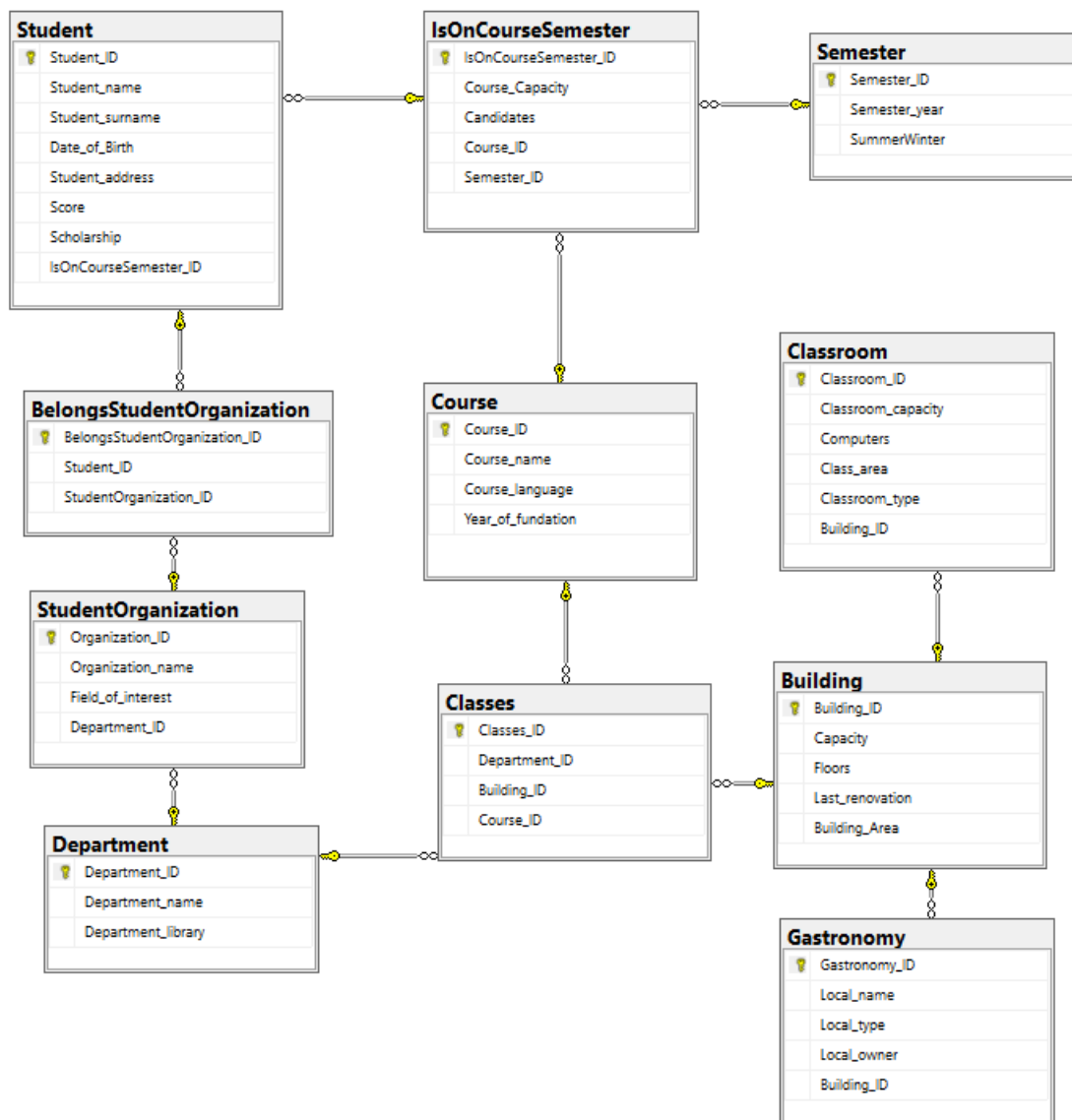
## **2. Typical questions:**

- What are the most popular courses?
- Which course has the fastest growth rate?
- Compare the number of students between departments.
- Compare the number of students at a given department with the number from last year.
- Compare the number of students at each course in a given department.
- What are the most popular departments?
- Which department lost the most students in comparison to the previous year?
- What is the least popular department?
- What is the least popular course?
- How many students are there on the least popular course?

### 3. Data:

All the data about the students are extracted from the system “MojaPG”. The system stores the information about the students and courses that they are enrolled in. Data about departments, capacity of their buildings and so on is stored in an Excel file.

### ERD



Every relationship above is one to many

ENTITY NAME	ATTRIBUTE	TYPE	DESCRIPTION
Student	Student and basic informations about him		
	Student_ID	Numercial	PK
	Student_name	String – 40 characters	First name
	Student_surname	String – 40 characters	Surname
	Date_of_birth	DateTime	Date of birth
	Student_address	String – 40 characters	Address
	Score	Numercial	Score from A levels
	Scholarship	Bit	Does student receive scholarship
	IsOnCourseSemester_ID_FK	Numercial	Student is assigned to one course
IsOnCourseSemester	Implementation of many-to-many relationship between Course and Semester. It means a given course conducted at a given time represented by Semester. It represents every semester of every year of a course.		
	IsOnCourseSemester_ID	Numercial	PK
	Course_capacity	Numercial	Number of possible spots on the course
	Candidates	Numercial	Number of people that applied for the course
	Course_ID_FK	Numercial	FK pointing to the entity Course
	Semester_ID_FK	Numercial	FK pointing to the semester in which the certain course was conducted.
Semester	Every semester that took place at the university. It means that every year there will be two semesters added to the database.		
	Semester_ID	Numercial	PK
	Semester_year	Numerical	Year when the semester was conducted
	SummerWinter	Bit	Information if the semester was winter or summer
Course (kierunek)	Basic information about the courses.		

	Course_ID	Numercial	PK
	Course_name	String – 40 characters	Name of course
	Course_language	String – 40 characters	In which language are classes conducted
	Year_of_fundation	DateTime	When was the first recruitment started.
BelongsStudentOrganization	Implementation of many-to-many relationship between Student and StudentOrganization. It means a given student belongs to a given organization.		
	BelongsStudentOrganization_ID	Numercial	PK
	Student_ID_FK	Numercial	FK pointing to the specific student
	StudentOrganization_ID_FK	Numercial	FK pointing to the entity StudentOrganization
StudentOrganization	Organization and the field of its interest		
	Organization_ID	Numercial	PK
	Organization_name	String – 40characters	Name
	Field_of_interest	String – 50 characters	Brief description of the main goals of the organization
	Department_ID_FK	Numercial	Organization is located at a department
Classes			
	Classes_ID	Numercial	PK
	Department_ID_FK	Numercial	Classes are taught on a given department
	Building_ID_FK	Numercial	Classes take place in a given building
	Course_ID_FK	Numercial	Classes are conducted for a given course
Department	Basic informations about Department concerning its name and whether it has library		
	Department_ID	Numercial	PK
	Department_name	String – 50characters	Name
	Department_library	Bit	Is there a library on a

			department
Gastronomy	Basic informations about Gastronomy concerning its name, type and owner		
	Gastronomy_ID	Numercial	PK
	Local_name	String – 40 characters	Name
	Local_type	String – 40 characters	Restaurant/buffet/cafe and so on
	Local_owner	String – 40 characters	Owner
	Building_ID_FK	Numercial	Local is in the building
Building	Basic informations about Building concerning its capacity, area, number of floors and the date of the last renovation		
	Building_ID	Numercial	PK
	Capacity	Numercial	Max number of students that can have classes in the building at the same time
	Floors	Numercial	Number of floors in the building
	Last_renovation	DateTime	When was the last renovation conducted
	Building_Area	Numercial	Are of the building in square meters
Classroom	Basic informations about classroom concerning its capacity, area and whether it is equipped in computers or not		
	Classroom_ID	Numercial	PK
	Classroom_capacity	Numercial	How much students can fit in a classroom
	Computers	Bit	Does the classroom have computers
	Classroom_area	Numercial	Are of the classroom in square meters
	Building_ID_FK	Numercial	Classroom is located in a building

## EXCEL

- Column A - Student ID
- Column B - Nationality
- Column C - Erasmus student (1 if Yes, 0 if No)
- Column D - IZP student (1 if Yes, 0 if No)

Analytical problems:

*sum of all students* - depending on the query, we take Courses which are connected to a Semester of a given year or all courses at the university. Then, for each of them, we count the number of students enrolled into that course. The final number is the sum of all of those smaller sums for each course that we are interested in.

How do foreign and erasmus students influence the total growth in the university?

- 1. Show what percentage of all students, in the year with the highest number of students, were erasmus and foreign ones.**

*sum of all students* - taken only from courses that are connected to the semester with highest number of student

*year with highest number of students* - max value from sum of all students (only 'smaller' sums)

*erasmus students* - from EXCEL file we take IDs of all students with column C (Erasmus student) equal to 1, then we sum only those IDs that in ERD are connected to course that is on semester with highest number of students

*foreign students* - from EXCEL file we take IDs of all students with column B (Nationality) different from Polish, then we sum only those IDs that in ERD are connected to course that is on semester with highest number of students

- 2. Show the growth of students who graduated from highschool and those who graduated from technical school between year 2021 and 2022. (Requires additional data and change in business process - holding information about graduation)**

*sum of all students at the given course* - sum of students that are connected to the course that we are analyzing

*IZP students* - while

*Erasmus students* - EXCEL, column Erasmus

- 3. Show the average percentage of foreign students between Gdańsk University of Technology and other technology universities in the year of 2022. (Requires additional data but does not change business process)**

*sum of all students* - courses connected to the semester with attribute Semester\_year equal to 2022

*foreign students* - in EXCEL, we take IDs of all foreign students and check in ERD if they are attending course that is connected to Semester → Semester\_year = 2022

*number of students of other university* - data must be collected from public available data of the compared university

*foreign students of other university* - data must be collected from public available data of the compared university

- 4. Show student growth at the courses conducted in english between the year 2021 and 2022 and the course average for the whole university during the same time.**

*sum of all students* - for year 2021 and 2022, then calculate the growth number

*sum of all students* - for year 2021 and 2022, attribute

Course\_language in the entity Course has to be equal to English, then calculate the growth number

- 5. Show the growth of the number of foreign students over the last five years, show the growth in the number of total students during the same period. Growth is calculated based on the previous year.**

*sum of all students* - for every year that we are analyzing

*foreign students* - we take all IDs of students with nationality other than Polish in the EXCEL

*sum of all foreign student* - calculated as before but with IDs taken from EXCEL

How infrastructure impacts growth of the number of students at the university?

- 1. Show average student growth between departments in which over 60% of buildings were last renovated after 2010 with the ones that do not satisfy that condition. Growth is calculated from the year 2021 to 2022.**

*departments with over 60% renovated buildings* - for every department we take all of the buildings that are connected to it and calculate the number of those which satisfy the criterion and those which don't. Lastly, the number of renovated buildings compared to the total number of buildings has to be higher than 60%.

*other departments* - those departments that do not satisfy the above condition

*date of renovation* - ERD, entity Building, attribute Last\_renovation

*sum of students at the department* - we take all of the courses that are connected to a given department and then sum all of the students at a given course as we did in the first problem



- 2. Show a difference in growth of students between buildings with and without any Gastronomy between the year 2021 and 2022.**

*buildings with gastronomy* - Buildings that have gastronomy connected to them

*sum of students having classes at a given building 2021 and 2022*

- we take all courses that have some classes at a given building and sum the students enrolled to that course as in the previous problem. We do it for courses during the year 2021 and 2022.

- 3. Show the average congestion (capacity divided by area) on a given department and growth in the number of the students there. Growth calculated from 2021 to 2022.**

*sum of all all students having classes at a given building* - we take all of the courses that have classes inside the given building and sum the number of students in those courses as before

*congestion in a building* - sum of all students having classes at a given building divided by Capacity of that building

*average congestion on a given department* - we calculate the congestion for every building that is connected to a given department and from those number we calculate the average congestion

- 4. Show the list of all departments, whether they have a library or not, the sum of all restaurants in the buildings where a given department have classes and the sum of student organizations located at those departments. For every single department, show the growth in the number of students between the year 2021 and 2022.**

*libraries at a given department* - attribute library in the entity Department

*sum of all restaurants* - we take all buildings where a given department have classes and sum all of the gastronomy that is inside that building

*sum of all student organization* - sum of the organizations that are connected to a given department

*sum of students at the department* - we take all of the courses that are connected to a given department and then sum all of the students at a given course as we did in the first problem. For courses during 2021 and 2022 only.

**5. Show the percentage of classrooms with computers in the buildings of a given department and their growth in the number of students between the year 2021 and 2022?**

*percentage of classrooms with computers for a department* - we take all of the buildings where a given department has classes and then we look at the attribute Computers to determine the percentage of classrooms with and without them

*sum of students at the department* - we take all of the courses that are connected to a given department and then sum all of the students at a given course as we did in the first problem. For courses during 2021 and 2022 only.