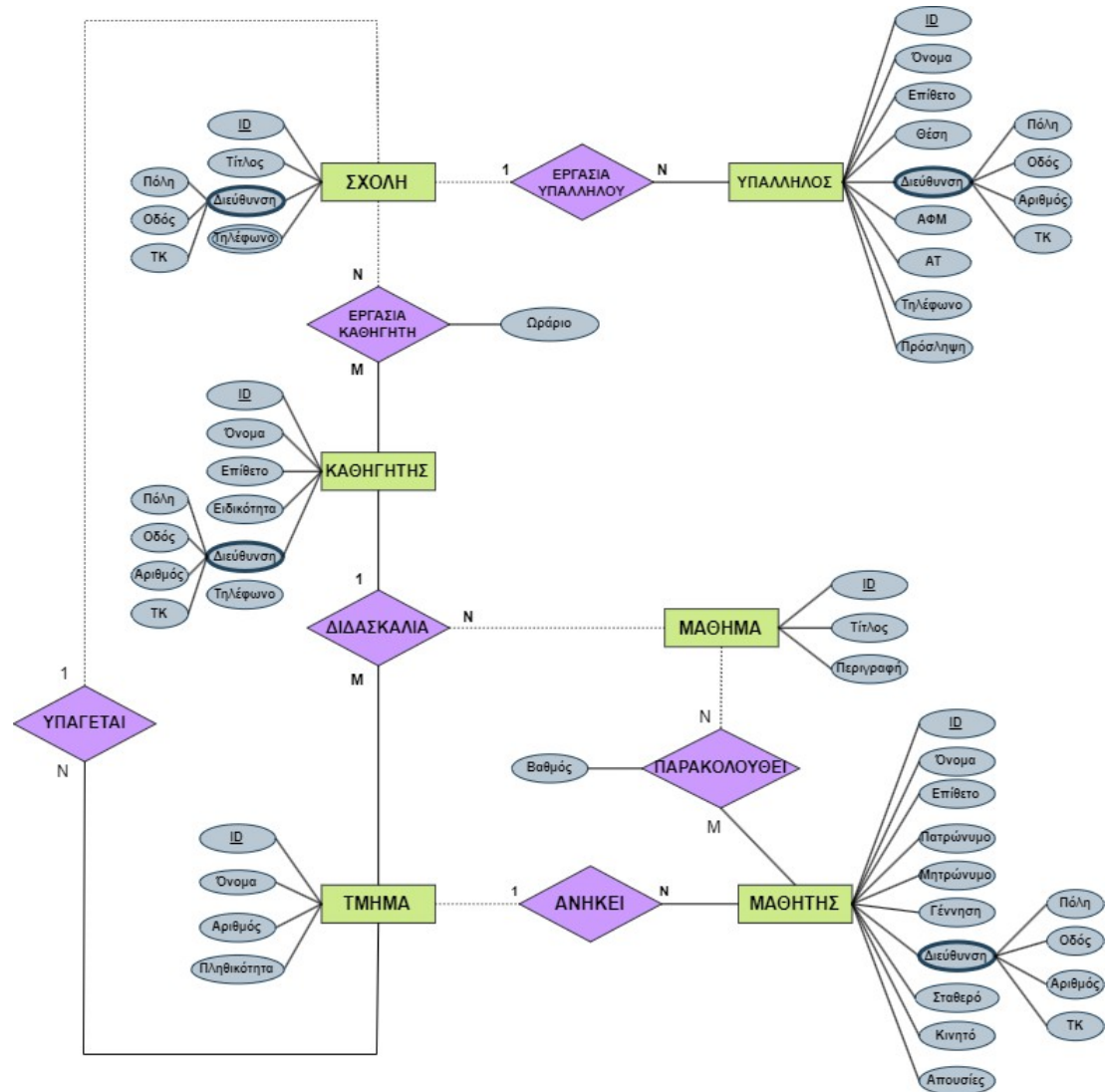


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## DIAGRAM OF CORRELATION ENTITIES

### Education Group Database



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## REFERENCES

The educational group's database has a set of schools, for each of which a unique code, its title, its address (city, street, number and postcode) and its telephone numbers (as many as it has) are recorded. Thus, the entity **SCHOOL** has the following attributes.

Each Employee is identified in the database by a unique code and his/her name, surname, job position in the group, home address (city, street, number and postal code), VAT number, ID number, contact telephone number and date of employment are recorded. Therefore, the entity **EMPLOYEE** has the attributes **ID** (master key), **Name**, **Surname**, **Position**, **City**, **Street**, **Number**, **ZIP Code**, **Tax ID**, **Tax ID**, **Postal Code**, **Telephone number**, **Recruitment**.

As stated in the pronunciation, each school employs many employees and each employee works in a particular school of the group. Thus the binary relationship **EMPLOYMENT\_Employee** is introduced between the entities **SCHOOL** and **EMPLOYEE**. For the participation of entity sets, after speculation, the following was decided:

- On the part of the entities of the set **EMPLOYEE** there is universal participation as if an employee does not offer his services to a school, then his status as an employee does not exist.
- On the part of the entities of the set **SCHOOL** there is optional participation as a school may have been registered in the database but the appropriate staff has not yet been found.

For each teacher who teaches in the various schools, a unique code is registered, his/her name, surname, speciality, home address (city, street, number and postal code) and contact telephone number. Therefore, the entity set **TEACHER** has the attributes **ID** (master key), **Name**, **Surname**, **Profession**, **City**, **Street**, **Postal code**, **Telephone number**.

As mentioned in the pronunciation, each school employs many teachers and each teacher may work in several schools, of course at different times during the week. Thus the binary relationship **WORK\_TEACHER** is introduced between the entities **SCHOOL** and **TEACHER**. For the participation of the entity sets, after speculation, the following was decided:

- On the part of the entities of the set **TEACHER** there is universal participation as if a teacher does not teach students of a faculty, then his/her status as a teacher does not exist.
- On the part of the entities of the set **SCHOOL** there is optional participation as a school may have been registered in the database but the appropriate staff has not been found yet.

The above relationship has the **Hours** attribute that specifies the working hours of a teacher during the week for a particular school.

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For each course a unique code, a title and a description of the course are recorded. Therefore, the entity COURSE contains the following attributes.

For each student, information such as his/her password, name, surname, mother's and father's name, date of birth, home address (city, street, number, postal code), contact telephone numbers (landline and mobile) and the total number of absences he/she has made are recorded. Thus, the entity set **STUDENT** has the following attributes.

In order to describe the association between students and courses, the binary relationship **OBSERVE** is introduced in the diagram with N:M multiplicities (each student attends several courses and each course is attended by several students). A student's participation in the relationship is universal while a course may not be attended by any student (e.g. it may be an elective course and it may happen that no student chose it or it may not be offered in the current year).

The pronunciation states that for each student a list of the grades of the courses he or she is taking is recorded, so the relationship **OBSERVE** has the attribute: **Grade**.

Students are organised into sections, each of which is assigned a unique code, a distinctive title, the section number and the number of students it holds. Therefore, the entity **SECTION** has the attributes **ID** (master key), **Name**, **Number** (section), **Number** (number of students).

In order to associate students with their sections in the database the relation **LIKE**.

- A class has many students, while one student corresponds to only one class, so the ratio is 1:N.
- A student, in order to be able to attend classes, must be compulsorily enrolled in a class (universal participation), while on the part of the department the design choice was made to allow a class to exist without students being placed yet (optional participation).

The pronunciation states that "The students of a school are organised into sections" which suggests that a school consists of several sections. Therefore, a relationship is introduced in the diagram between schools and departments with plurals of 1:N respectively (i.e. a department is subordinate to a school). Furthermore, a school may not yet have any declared departments (as with employees and teachers), while a department does not make sense if it does not belong to a school. Therefore, the corresponding types of membership are also declared.

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Finally, the entity sets TEACHER, STUDENT and STUDY are semantically indivisible concepts, so they were all associated through the triadic relationship **TEACHER** with participation of sets 1:N:M respectively.

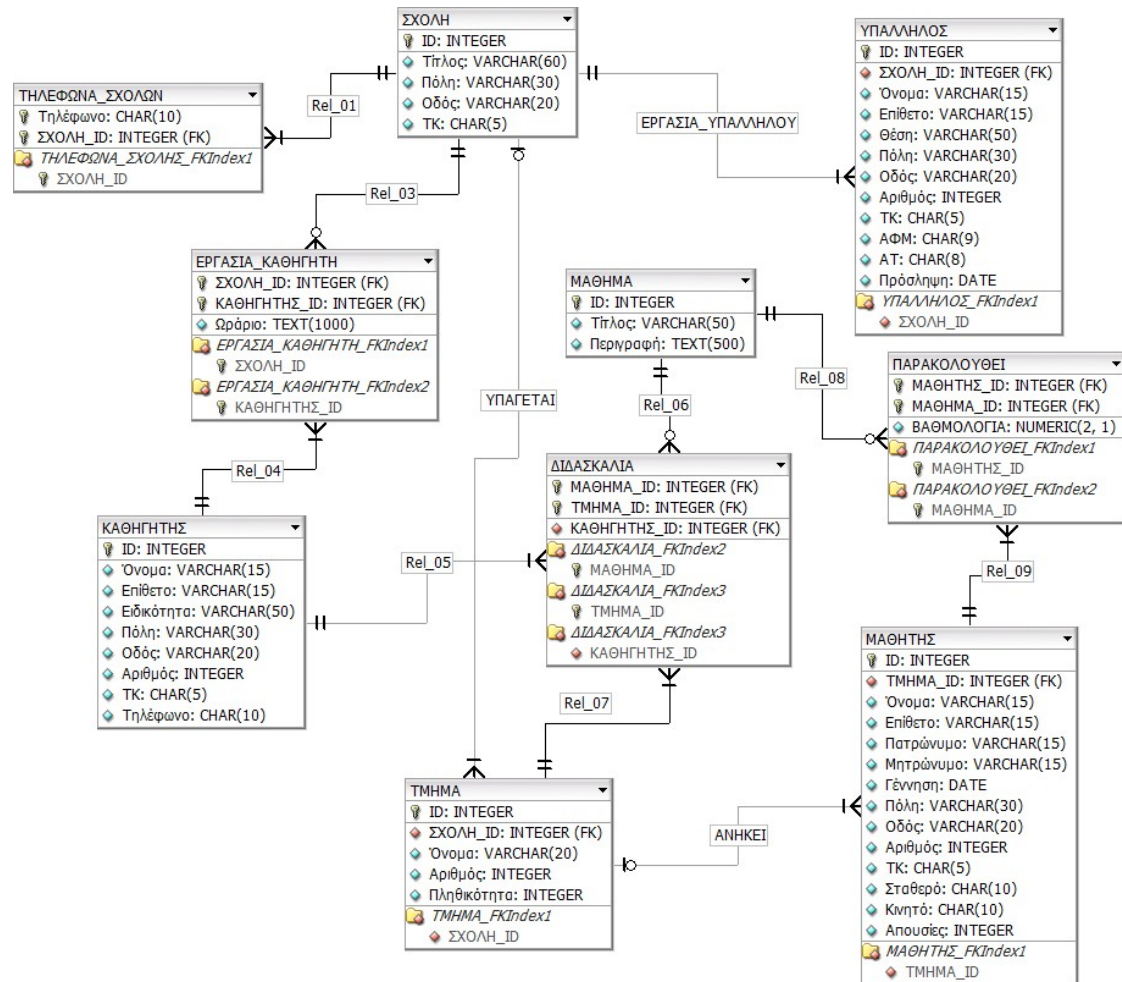
- A teacher can teach a given course in many departments, so a pair <teacher, course> can be associated with many departments.
- One teacher can teach many subjects. This can be expressed in the triadic relation that a professor in a given department can teach several courses (since there is no restriction in the utterance that a professor can teach only one course in each department). So a pair <teacher, department> is associated with many courses.
- A course is taught by several teachers, but the pronouncement states that a particular course is taught by only one teacher within a department. So a pair <course, section> is associated with only one teacher.

It makes no sense for a teacher not to teach, nor for a class not to attend classes (universal attendance). Otherwise, the organisation may have decided, for whatever reason, not to teach a course in the current academic year (optional participation).

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## RELATIONAL MODEL



### Comments:

- The attribute "Telephone" of the entity set SCHOOL has been converted to the separate table PHONE\_TELEPHONE\_CHOOLS as it is a plural attribute. The primary key of the SCHOOL set became a foreign key (SCHOOL\_ID) and together with the attribute (Telephone) became the primary key of the TELEPHONE\_CHOOLS table.
- The association WORK\_STUDENT was converted to a separate table as it was of type N:M and also has the attribute "Hours". The master keys of the entities involved in this association became foreign keys (SCHOOL\_ID, TEACHER\_ID), which together form the master key of the WORK\_TEACHER table.
- The association EMPLOYMENT\_Employee was not converted into a separate table as it was of type 1:N with global participation on the part of the entity with N multiplicity. Therefore, the master key of the SCHOOL table was simply added as a foreign key to the EMPLOYEE table (SCHOOL\_ID).
- The correlation OBSERVE was converted to a separate table as it was of type N:M and also has the attribute "Grade". The primary keys of the entities involved in this association were made foreign keys (STUDENT\_ID,

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STUDY\_ID), which together form the master key of the OBSERVED table. The 'Grade' attribute counts from 0 to 10 (with the tenths in between) a student's grade. An empty value is supported for the 'Grade' attribute as it is not possible, semantically, to immediately enter a grade for a course).

- The correlation YPAGETAI was not converted into a separate table as it was of type 1:N with global participation on the part of the entity with N multiplicity. Therefore, the master key of the SCHOOL table was simply added as a foreign key to the DEPARTMENT table (SCHOOL\_ID).
- The association ANIKEI was not converted to a separate table as it was of type 1:N with global participation on the part of the entity with N multiplicity. Therefore, the master key of the MOMMY table was simply added as a foreign key to the STUDENT table (MOMMY\_ID).
- The correlation TEACHING was converted to a separate table as it is trivariate. The master keys of the entities involved in this association were made foreign keys (TEACHER\_ID, STUDENT\_ID, STUDENT\_ID, DEPARTMENT\_ID), which together would constitute the master key of the table. However, the teacher entity participates in the association with multiplicity 1 so it is omitted from the composite key. Therefore, the master key of the TEACHER table is <MACHINE\_ID, DEPARTMENT\_ID>.