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***SHARIN HAZLIN BINTI HUSPI 11809***

#### **Project Task 2: Conceptual Design (ERD Design)**

YAP YOONG SENG

A14CS0150

MOHAMMAD ZULKIFLI BIN ZAINUL

A14CS0173

QURATUL AIN NABIHAH BINTI MOHD HIZAM

A14CS0126

# **STUDENT SUBJECT REGISTRATION SYSTEM**

In this student subject registration system, there are 4 entities are involved. The entities are including Student, Class, Subject and Staff.

In the Student entity, the attributes are student name, matric number, address, class name, contact number, student ID, identity card number, e-mail and subject code. However, there are some attributes that are containing similar data will be grouped under an attribute. For example, the first name and last name of a student are grouped under student name attribute. The matric number is the primary key of Student entity. The address attribute contains street, city, postcode and state. The class name is foreign key for Class entity which originally from Class entity as primary key. It represents the class that the particular student will be entered. For instance, the form 4 science stream student is arranged into either 4A, 4B, or 4C class, the form 3 student that has greater rank is arranged into 3A or 3B class. In the contact number attribute, it has mobile phone number and home telephone number. The student ID is the account name of the student that login into online system for administration of timetable, tuition fees, and examination results. The subject code is foreign key in the Class entity which is from Subject entity as primary key. The subject code is a multivalued attribute that holds the code of subjects that particular student is taking. A student can takes at least 8 subjects and maximum of 12 subjects.

Besides that, class name, number of student in class, staff number (teacher) and staff number (staff) are the attributes for Class entity. The class name is the primary key, while staff number (teacher) and staff number (staff) are the foreign keys.

For the Subject entity, it has subject code, subject name, number of student that taking the subject, staff number (teacher) and staff number (staff) attributes. The subject code is obviously a primary key in Subject entity, complementing the staff number (teacher) and staff number (staff) as foreign keys.

The another prime entity is Staff entity. It has a superclass Staff and also 3 subclasses which are including Teacher, Secretary, and Headmaster. The Staff superclass undergoes generalization, containing attributes of staff name (first name and last name), staff number, identity card number, address (street, city, postcode and state) and staff e-mail. The staff number is primary key in the entity. Meanwhile in the subclasses, the Teacher holds subject code and class name attributes, as foreign keys from Subject and Class entities respectively. The Secretary and Headmaster subclasses got no attribute. There are 2 constraints are applied in this entity between superclass and subclasses, that are participation constraint and disjoint constraint. The participation constraint involves mandatory which is the Staff superclass must be member of Teacher, Secretary and Headmaster subclasses. While for disjoint constraint, it is non-disjoint, means the Staff entity occurrence can be a member of more than a subclass.

In term of entity relationships, a student can only enter to a class. There is limitation for number of student in class, indicating that there are minimum 10 students up to 40 students in a class. For the Student and Class entities, a student takes at least 8 subjects and maximum 12 subjects. A particular subject can be taken by no student or many students. Regarding to the relationship between Subject and Class entities, a subject determines the class by its stream. For example, the Biology subject belongs to science stream, therefore it identifies the student to enter the class A, B or C of form 4 and 5. The Economy and Art subjects belongs to account and art stream separately, so apply to class D, E, F (account stream class), and I, J, K (art stream class) respectively. A class also is determined by its subjects following the stream. For instance, a student which is taking 9 subjects that including Malay language, English, Mathematics, History, Moral, Additional Mathematics, Biology, Chemistry and Physics, the student is arranged to enter class A, B or C. The Staff and Class also have their relationship. A staff manages a class up to many classes, while a class only can be managed by a staff. The Teacher and Subject entities, a teacher teaches one to three subjects, and a subject can be taught by minimum 1 teacher up to many teachers. A headmaster supervises 1 to many staffs, but a staff only can be supervised by one and only headmaster.

For the entity integrity for our ERD database is that none of our primary key is null. it. All this primary key matricNo, subjectCode, className and staffNo in our ERD must have value in it. In our Student table we got 2 foreign key which is className that reference with the Class table and subjectCode that reference from Subject table. For Class table we got two foreign which is staffNo(T) for the Teacher table from the Staff subclass and staffNo(S) for the Secretary tbale from the Staff subclass. In the Teacher table we got subjectCode and also className as a foreign key same as Secretary table also got same foreign key. The Subject table we got staffNo(T) for the teacher so we know what kind of subject this teacher teach and staffNo(S) for secretary so we know which secretary that handle particular subject.

**ERD for the Subject Registration System**

