Team Beginners

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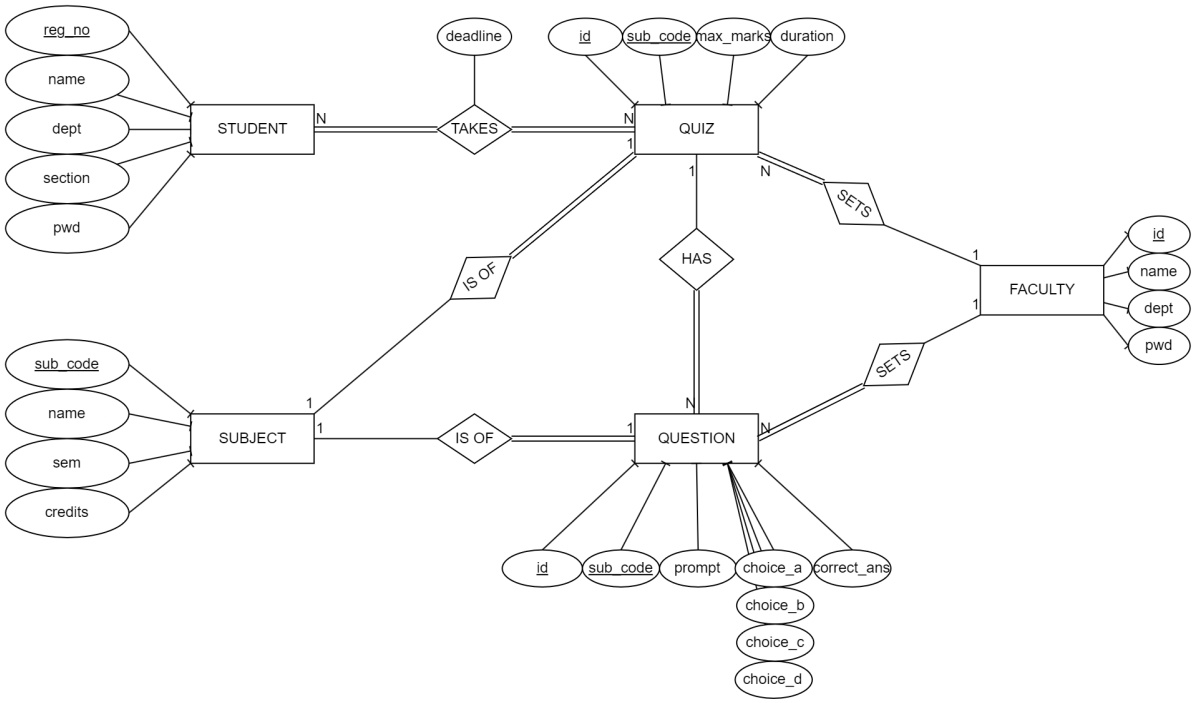
Quiz Application Entity-Relation Diagram



INITIAL RELATIONAL TABLES:

STUDENT							
reg_no	name	dept	section	pwd			
TAKES							
reg_no	q_id	deadline					
QUIZ							
q_id	sub_code	max_marks	duration				
SUBJECT							
sub_code	name	sem	credits				
FACULTY							

f_id	name	dept	pwd				
QUESTION							
qu_id	sub_code	prompt	choice_a	choice_b	choice_c	choice_d	correct_ans

Justification for 1NF:
All attributes in all 6 tables only hold atomic values, i.e, no attribute can be further divided. No table contains any multivalued attributes.

Functional Dependencies:
STUDENT-
{reg_no → name; reg_no → dept; reg_no → section; reg_no → pwd} i.e, in 2NF

TAKES-
{(reg_no,q_id) → deadline} i.e, in 2NF

QUIZ-
{q_id → max_marks; q_id → duration} i.e, Partial Dependency exists in QUIZ.

SUBJECT-
{sub_code → name; sub_code → sem; sub_code → credits} i.e, in 2NF

FACULTY-
{f_id → name; f_id → dept; f_id → pwd} i.e, in 2NF

QUESTION-
{qu_id → prompt; qu_id → choice_a; qu_id → choice_b; qu_id → choice_c; qu_id → choice_d; qu_id → correct_ans} i.e, Partial Dependency exists in QUESTION.

Converting QUIZ table to 2NF:

QUIZ				QUIZ_IS_OF	
q_id	max_marks	duration		q_id	sub_code

Converting QUESTION table to 2NF:

QUESTION						
qu_id	prompt	choice_a	choice_b	choice_c	choice_d	correct_ans
QUES_IS_OF						
qu_id	sub_code					

All tables are now in 2nd Normal Form.

Justification for 3NF:
In STUDENT table, all non-prime attributes are individually dependent on reg_no. No non-prime attributes are dependent on other non-prime attributes. Thus, no transitive dependency is shown. Hence, STUDENT is in 3NF.

In TAKES table, there is only one non-prime attribute, dependent on (reg_no, q_id). Thus, no transitive dependency can be shown. Hence, STUDENT is in 3NF.

In QUIZ table, all non-prime attributes are individually dependent on q_id. No non-prime attribute is dependent on other non-prime attributes. In QUIZ_IS_OF table, there are no non-prime attributes. Thus, no transitive dependency can be shown in QUIZ and QUIZ_IS_OF tables. Hence, QUIZ and QUIZ_IS_OF are in 3NF.

In SUBJECT table, all non-prime attributes are individually dependent on sub_code. No non-prime attributes are dependent on other non-prime attributes. Thus, no transitive dependency is shown. Hence, SUBJECT is in 3NF.

In FACULTY table, all non-prime attributes are individually dependent on f_id. No non-prime attributes are dependent on other non-prime attributes. Thus, no transitive dependency is shown. Hence, FACULTY is in 3NF.

In QUESTION table, all non-prime attributes are individually dependent on qu_id. No non-prime attribute is dependent on other non-prime attributes. In QUESTION_IS_OF table, there are no non-prime attributes. Thus, no transitive dependency can be shown in QUESTION and QUESTION_IS_OF tables. Hence, QUESTION and QUESTION_IS_OF are in 3NF.

Justification for BCNF:
In STUDENT table, no non-prime attribute can determine the primary key reg_no, as they are not unique to each value of reg_no, i.e, 2 different reg_no values can have the same non-prime attributes. Hence, STUDENT is in BCNF.

In TAKES table, deadline(non-prime attribute) can not determine q_id or reg_no, as it is not unique to either individually. reg_no can not determine q_id and vice versa as both are foreign keys of the TAKES table, referring to STUDENT table and QUIZ table respectively. Hence, TAKES is in BCNF.

In QUIZ table, no non-prime attribute can determine the primary key q_id, as they are not unique to each value of q_id, i.e, 2 different q_id values can have the same non-prime attributes. Hence, QUIZ is in BCNF.
In QUIZ_IS_OF table, q_id and sub_code are primary key together, and individually are foreign keys referring to QUIZ table and SUBJECT table respectively. Hence, QUIZ_IS_OF is in BCNF.

In SUBJECT table, no non-prime attribute can determine the primary key sub_code, as they are not unique to each value of sub_code, i.e, 2 different sub_code values can have the same non-prime attributes. Hence, SUBJECT is in BCNF.

In FACULTY table, no non-prime attribute can determine the primary key f_id, as they are not unique to each value of reg_no, i.e, 2 different f_id values can have the same non-prime attributes. Hence, FACULTY is in BCNF.

In QUESTION table, no non-prime attribute can determine the primary key qu_id, as they are not unique to each value of qu_id, i.e, 2 different qu_id values can have the same non-prime attributes. Hence, QUESTION is in BCNF.
In QUESTION_IS_OF table, qu_id and sub_code are primary key together, and individually are foreign keys referring to QUESTION table and SUBJECT table respectively. Hence, QUESTION_IS_OF is in BCNF.

FINAL RELATIONAL TABLES:

STUDENT						
reg_no	name	dept	section	pwd		
TAKES						
reg_no	q_id	deadline				
QUIZ				**QUIZ_IS_OF**		
q_id	max_marks	duration		q_id	sub_code	
SUBJECT						
sub_code	name	sem	credits			
FACULTY						
f_id	name	dept	pwd			
QUESTION						
qu_id	prompt	choice_a	choice_b	choice_c	choice_d	correct_ans
QUES_IS_OF						

qu_id	sub_code					