Data Management Coursework Year 1

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November - December 2025

1 Relational Model

ex4

Faculties

FACULTIES(faculty,building,room,capacity,lecturer_email,lecturer_firstname,lecturer_surname)

Students

STUDENTS(student firstname,student surname,student id,student email,year,address,contact number,module id,module name,leader,
lecturer1,lecturer2,exam mark,coursework1,coursework2,coursework3)

ex5

Faculties

$lecturer\_email \rightarrow lecturer\_firstname$
$lecturer\_email \rightarrow lecturer\_surname$
$lecturer\_email \rightarrow faculty$

$building, room \rightarrow capacity$

Students

$studentid \rightarrow studentfirstname$
$studentid \rightarrow studentsurname$
$studentid \rightarrow studentemail$
$studentid \rightarrow year$
$studentid \rightarrow contactnumber$
$studentid \rightarrow moduleid$

$moduleid \rightarrow modulename$
$moduleid \rightarrow leader$
$moduleid \rightarrow lecturer1$
$moduleid \rightarrow lecturer2$
$moduleid \rightarrow coursework1$
$moduleid \rightarrow coursework2$
$moduleid \rightarrow coursework3$

$studentid, module \rightarrow exammark$

ex6

1.0.1 Faculties candidate keys

lecturer_email and building_room lecturer_email is the primary key because it is used for only one lecturer within the faculty, although they may teach in multiple rooms.

1.0.2 Faculties candidate keys

student id and module id student id is the primary key because it corresponds to only one student, although they may be enrolled on multiple modules.

2 Normalisation

ex7

Required for first normal form

- Elements are atomic
- No repeating groups

Making the data first normal form

The faculties relation is already in first normal form because every relation is atomic (each element is only one piece of data) and there are no repeating groups (each column is unique). We can keep our relation:

FACULTIES(faculty,building,room,capacity,lecturer_email,lecturer_firstname,lecturer_surname)

However, the students relation is not first normal form. Firstly, the address column is not atomic because it contains the postcode and street name. Secondly, there are repeated groups. The lecturer columns are repeated (lecturer1, lecturer2) and the coursework columns are repeated (coursework1, coursework2, coursework3). Therefore, we need a new set of minimal functional dependencies:

STUDENTS(student firstname,student surname,student id,student email,year,address,contact number,module id)

MODULES(module id, module name, leader)

STUDENTMODULES(student id, module id, exam mark)

LECTURERMODULES(lecturer email, module id)

COURSEWORKMARKS(student id, coursework id, module id, mark)

3 Modelling

4 Querying