

# Data Management Coursework Year 1

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## 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* → *lecturer\_firstname*

*lecturer\_email* → *lecturer\_surname*

*lecturer\_email* → *faculty*

*building, room* → *capacity*

#### Students

*studentid* → *studentfirstname*

*studentid* → *studentsurname*

*studentid* → *studentemail*

*studentid* → *year*

*studentid* → *contactnumber*

*studentid* → *moduleid*

*moduleid* → *modulename*

*moduleid* → *leader*

*moduleid* → *lecturer1*

*moduleid* → *lecturer2*

*moduleid* → *coursework1*

*moduleid* → *coursework2*

*moduleid* → *coursework3*

*studentid, module* → *exammark*

### ex6

#### Faculties candidate keys

lecturer\_email, building and room is the primary key because it is used for only one lecturer within the faculty, although they may teach in multiple rooms.

#### Students candidate keys

student id and module 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)

### ex8

#### Partial-key dependencies

A partial key is when one of the non-key columns depends on only a part of a composite key. There are partial-key dependencies in our data:

- $building, room \rightarrow capacity$
- $lecturer\_email \rightarrow lecturer\_firstname, lecturer\_surname$
- $building \rightarrow faculty$
- $lecturer\_email \rightarrow faculty$

#### Required for second normal form

- No partial key dependencies (as described above)

## 3 Modelling

## 4 Querying