

## Assessment Specification

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| <b>Course / Programme:</b>            | BSc (Hons.) Computing/ BEng (Hons.) Software Engineering   |
| <b>Module Name:</b>                   | Databases  |
| <b>Module Code:</b>                   | SWE4103  |
| <b>Assignment Number &amp; Title:</b> | 001 – Assignment 1 – Design documents for a database   |
| <b>Weighting:</b>                     | 50%  |
| <b>Issue Date:</b>                    | 23 November 2020   |
| <b>Submission Deadline:</b>           | <b>Via Moodle 04 January 2021 by 11:59pm</b>   |
| <b>Learning Outcomes:</b>             | <b>LO1:</b> Construct a relational data model<br><b>LO2:</b> Execute the techniques of data normalisation to 3NF   |
| <b>Specific Assessment Criteria:</b>  | <ul style="list-style-type: none"> <li>• Understand a set of requirements and construct a suitable data model to represent them in a computer system</li> <li>• Demonstrate an understanding of normalisation process by normalising the designed model to 3NF and documenting/explaining each step as necessary</li> <li>• Explaining the pros and cons of normalised databases in general terms</li> </ul> |

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## Scenario

Planning for the future in a post-Covid19 world, once a vaccine has seen the virus no longer a threat and normality returns, the University of Bolton would like to increase recreational opportunities for students as a means of helping them recover from the impacts of the virus. One way it could consider doing this is to make better use of its lecture theatres in the evenings for entertainment purposes.

As a database analyst/designer, you have been asked to design (assignment 1) and implement (assignment 2) only the database for the future development of a web-based computerised booking system that will assist the University in achieving their aims.

On the main campus, the University has 6 lecture theatres:

| Room Number | Seating Capacity |
|-------------|------------------|
| F2-08       | 150              |
| M1-11       | 50               |
| M1-12       | 76               |
| M1-14       | 76               |
| M1-16       | 50               |
| M2-11       | 50               |

The University's lecture theatres would be used (for example) for showing movies or stand up comedy sessions (generically otherwise known as "entertainment events" or just "events") at least. But there could be other kinds of "entertainment events" that could also be hosted but which have not yet been identified, ideally the design of the system should allow flexibility for this to be decided and added at a later date without requiring additional programming changes.

It is envisioned that any "entertainment event" will take place in the evenings at 7pm (but start times may vary and this should be allowed for).

A lecture theatre will only host one event on any given evening. But it is possible that more than one lecture theatre hosts the same event on a given evening (i.e. multiple theatres showing the same movie is entirely possible).

While there is no requirement that all lecture theatres host any event on a given evening, they could do so in theory if there were a sufficient number of "events" (i.e. up to all 6 theatres could host events on a given evening).

Any event may run for one evening only or for several nights in succession. If an event runs for several nights in a row it will do so at the same time and in the same room for each of those evenings. It is safe to assume that no specific event will utilise more than one lecture theatre at a given time.

No events will ever take place on Saturdays or Sundays when the campus is otherwise closed.

Some of these events will be free but others may be chargeable by way of an entrance fee. In the case of chargeable events, payments will only be taken "at the door" on the evening of the event itself, not taken in advance.

## The Future Booking System

It is intended that the future computerised booking system will support the following operations, and while it not necessary for you to understand how to implement such functionality now, it is necessary for you to know what functionality is expected and to think about how that might work in usability and database structure and constraint terms when designing the database so that you can be sure that the database will later support these functions:

- Implements a user login system with password and defines at least two “staff roles” of “AdminUser” and “StaffUser”. There would thus be an appropriate screen to manage users and assign roles to them.
- Provides some form of administration facility that allows staff users only the ability to:
  - Add/Edit events and information about those events as described above and assign them to a specific lecture theatre, correctly handling and preventing “double booking” of rooms and ensuring that if an event is reassigned to another room it is only if it is okay to do so (i.e. it either has no bookings or current bookings do not exceed the capacity of room to be swapped to). (“AdminUser” role only)
  - Allow events already entered into the system to be “cancelled”. I.e. once events have bookings it should not be possible to delete them, only cancel them and display as such on the student “front end” screen. Only events that have not yet had any bookings can be deleted. (“AdminUser” role only)
  - View how many seats have been booked/still available for a given event. (“AdminUser” and “StaffUser” roles)
  - A means for those “manning the doors” to check that a student coming to see an event has actually booked to do so (“AdminUser” and “StaffUser” roles).
- Provides a “front end” screen that allows students to see what events are available (by showing the event’s title and perhaps a picture related to it) and on what dates, times and rooms they are to take place in, along with any entrance fees applicable for:
  - All possible upcoming events (i.e. no date filter applied but excluding those in the past)
  - The current week
  - The following week
  - The entire month
- Allows the viewing of a specific event’s details. This should show further information about the event, such as a synopsis (in the case of a movie) or description of the kind of humour involved or the performers (in the case of a comedy show) etc. It could also include a link to any 3rd-party site resources for the event (such as movie trailers).
- Allow students to “book” a seat at any future event in a lecture theatre but it should not allow more students to book an event than there are seats remaining available for the event.
- Allow students to see a list of bookings they have made for themselves only for upcoming events (i.e. for today onwards).

## Requirements / Deliverables

For this first assignment you are required to:

- Design the data model for a computerised system for this intended system by producing an Entity-Relationship model using a suitable recognised notation, taking fully into account the details given above
- Having initially built your data model to 1st Normal Form, normalise your data model down to 3<sup>rd</sup> Normal Form (3NF) via 2<sup>nd</sup> Normal form.

You should regard this work as to be presented to senior management and developers at the university. Submit your completed work via Moodle on or before the deadline shown above as a design report.

**Remember:** You **will not** be asked to build the actual application in this module, your tasks are merely to design the database model (in this assignment) by producing a data model and (in the second later assignment) construct the database schema and then verify the model design by implementing it and running queries against it using SQL.

The management would also like you explain why normalisation is necessary and what the advantages and disadvantages of normalising to 3NF are in general. This should be included as a section in your design report.

While normalising your data model, you must show and explain each stage of normalisation for each table (as appropriate), do not simply design the database in 3NF from the outset and ignore 1NF and 2NF.

You will find it very helpful to create some test data while doing this in order to visualise the scenario better, so you will need to "invent" the details of some imaginary events and students who are to be attending them.

### Late submission

For late submission, see Assessment Regulations for Undergraduate Programmes:

<https://www.bolton.ac.uk/assets/Uploads/Assessment-Regulations-for-Undergraduate-Programmes-2020-21.pdf>

## Marking Criteria

| <b>To be awarded a given grade, submissions will typically (but not necessarily exclusively) exhibit the following indicative attributes</b> |   |
|--|---|
| <b>D<br/>(40-49%)</b>  | <ul style="list-style-type: none"> <li>• A database model has been constructed to a satisfactory standard that takes into account and supports some of the data flows and processes explained in the scenario</li> <li>• The data model as been normalised from 1NF to 3NF to a satisfactory standard and some of the stages may have been described correctly and in sufficient detail</li> <li>• The advantages and disadvantages of normalisation in general may have been explained to a satisfactory standard</li> </ul> |
| <b>C<br/>(50-59%)</b>  | <ul style="list-style-type: none"> <li>• A reasonably logical, mostly complete database model has been constructed to a good standard that takes into account and supports the majority of the data flows and processes explained in the scenario</li> <li>• The data model as been normalised from 1NF to 3NF to a good standard and many of the stages are described correctly and in sufficient detail</li> <li>• The advantages and disadvantages of normalisation in general are explained to a good standard</li> </ul> |
| <b>B<br/>(60-69%)</b>  | <ul style="list-style-type: none"> <li>• A logical, complete database model has been constructed to a very good standard that takes into account and supports most of the data flows and processes explained in the scenario</li> <li>• The data model as been normalised from 1NF to 3NF to a very good standard and most of the stages are described correctly and in sufficient detail</li> <li>• The advantages and disadvantages of normalisation in general are explained to a very good standard</li> </ul>            |
| <b>A<br/>(70-100%)</b>   | <ul style="list-style-type: none"> <li>• A logical, complete database model has been constructed to an excellent standard that takes into account and supports all of the data flows and processes explained in the scenario</li> <li>• The data model as been normalised from 1NF to 3NF to an excellent standard and all stages are described correctly and in sufficient detail</li> <li>• The advantages and disadvantages of normalisation in general are explained to an excellent standard</li> </ul>                  |

## **Student Notes**

*Use this page to scribble any informal notes you feel necessary during discussions about this assignment in class or else where here.*