

COURSEWORK SPECIFICATIONS

5COSC002W DATABASE SYSTEMS COURSEWORK (2019/2020)

Module leader	Francois ROUBERT
Unit	Database Systems Coursework – INDIVIDUAL COURSEWORK
Weighting:	60%
Qualifying mark	30%
Description	Produce a conceptual data model & a logical data model following given specs. Write SQL statements to complete specific tasks. Produce a supporting report.
Learning Outcomes Covered in this Assignment:	<ul style="list-style-type: none"> • LO1 design a data model using standard EERM constructs and convert this model into a relational database schema; • LO2 use UML notations to produce a design that would encompass procedural aspects of a data management system; • LO3 apply normalisation up to BCNF to a set of relational database tables; • LO5 produce SQL queries to retrieve information from one or more tables; • LO6 write a simple application program in a procedural language that interacts with a relational database.
Handed Out:	THURSDAY 10 OCT 2019
DUE DATE	<ul style="list-style-type: none"> • MONDAY 11th NOVEMBER 2019 at 9.00AM – Part A • THURSDAY 28th NOVEMBER 2019 at 9.00AM – Part A + Part B
DELIVERABLES	<ul style="list-style-type: none"> • MONDAY 11th NOVEMBER 2019 – Intermediary Report: Part A Report in PDF format, font Calibri size 11 <ul style="list-style-type: none"> ▪ 1 cover page for part A, student details & tutorial group attended ▪ 1 side featuring conceptual ERD ▪ 4 data dictionary tables supporting conceptual ERD • THURSDAY 28th NOVEMBER 2019 – FINAL REPORT: Part A + Part B Report in PDF format, font Calibri size 11, <ul style="list-style-type: none"> ▪ 1 cover page for part A+B, student details & tutorial group attended ▪ 1 side featuring conceptual ERD ▪ 4 data dictionary tables supporting conceptual ERD ▪ 1 side featuring logical ERD ▪ 2-3 sides featuring step-by-step guide for logical ERD ▪ SQL code (DDL) for creating 3 tables and screenshots of structures of the tables ▪ SQL code (DML) for inserting records into 3 tables and screenshots of the content of the tables
SUBMISSION	Online in '2019-2020 SUBMIT COURSEWORK' section on Blackboard.
Type of Feedback and Due Date:	<p>PART A: verbal formative feedback on conceptual ERD in tutorial following submission (week 5), failure to attend will restrict opportunity for feedback.</p> <p>PART A + B: online feedback and marks 15 working days (3 weeks) after the submission deadline.</p> <p>All marks provisional until formally agreed by Assessment Board.</p>

BCS Accreditation Criteria

- 2.1.1 Knowledge and understanding of facts, concepts, principles & theories
- 2.1.2 Use of such knowledge in modelling and design
- 2.2.1 Specify, design or construct computer-based systems
- 2.3.2 Development of general transferable skills
- 3.1.3 Knowledge of systems architecture
- 3.2.1 Specify, deploy, verify and maintain information systems

Assessment regulations

For detailed information regarding University Assessment Regulations on how you are assessed, penalties and late submissions, what constitutes plagiarism etc. please refer to the following website:

<http://www.westminster.ac.uk/study/current-students/resources/academic-regulations>

Penalty for Late Submission

If you submit your coursework late but within 24 hours or one working day of the specified deadline, 10 marks will be deducted from the final mark, as a penalty for late submission, except for work which obtains a mark in the range 40 – 49%, in which case the mark will be capped at the pass mark (40%). If you submit your coursework more than 24 hours or more than one working day after the specified deadline you will be given a mark of zero for the work in question unless a claim of Mitigating Circumstances has been submitted and accepted as valid.

It is recognised that on occasion, illness or a personal crisis can mean that you fail to submit a piece of work on time. In such cases you must inform the Campus Office in writing on a mitigating circumstances form, giving the reason for your late or non-submission. You must provide relevant documentary evidence with the form. This information will be reported to the relevant Assessment Board that will decide whether the mark of zero shall stand. For more detailed information regarding University Assessment Regulations, please refer to the following website:

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Coursework Specifications Part A: Conceptual ERD [35 Marks]

Part A Project Brief: AKKTIVATION

AKKTIVATION is a large leisure and fitness company that has branches all around the South East of England. AKKTIVATION's mission statement is to give the opportunity to everyone to get active and fit in a stimulating and supportive environment. To this effect, AKKTIVATION provides first-rate facilities for people to undertake fitness training on their own, to take fitness classes in groups, or to just simply enjoy swimming in high-quality pools. Every AKKTIVATION branch features a swimming pool (25 metres long with 6 lanes), a fitness suite (i.e. a standard gym with specialised fitness equipment for working out), and several fitness studios (i.e. typically wooden-floored rooms with mirrors specially dedicated to fitness classes).

General customers can use the gym and the swimming pool as they wish, in a very straight forward manner. They just need to set up a payment balance with AKKTIVATION and every time they come, their attendance to a session is registered and their payment balance is debited by the price of a session. To credit their balance, they just need to pay in person at the counter. This way, they can swim in the pool or work out in the gym at their best convenience, in the simplest possible manner.

In order to benefit from additional exclusive services, customers can sign up for an AKKTIVATION membership and become members. AKKTIVATION members are required to pay a membership fee and to provide data about their physical characteristics (such as height, weight, existing conditions, etc.) and can set up fitness objectives, if they wish to. The key advantage from being an AKKTIVATION member is essentially the ability to book sessions in any AKKTIVATION branch. Members can place bookings for three types of sessions: fitness classes (such as yoga, pilates, body balance, Zumba, etc.), swimming lessons (with an instructor, to learn how to swim or improve your swimming) or one-to-one training sessions in the gym (with a personal trainer, to work on a particular aspect of your fitness). If members want to benefit from one-to-one training sessions, they must first book a one-to-one induction session: it is an introductory session during which a personal trainer evaluates the member's needs, show them how to do specific exercises, and authorises the use of special equipment. The special equipment that is authorised after each one-to-one induction session needs to be carefully recorded.

Regarding the staffing of AKKTIVATION personnel working locally at branch level, there are essentially three categories. First, personal trainers conduct one-to-one training sessions in the gym to support the training regime of members and educate them about fitness (and therefore also conduct one-to-one induction sessions). Second, the role of support staff is to maintain the facilities and particularly the equipment available in every branch to make sure it is in pristine condition. And finally, the third group consists of instructors who deliver booked sessions: swimming instructors give swimming lessons in the pool and fitness instructors teach fitness classes in the fitness studios.

Part A Questions

You have been hired by AKKTIVATION as a **database architect** to undertake a database project to support the data needs of the company. Your job in this first part is to produce a high-quality **CONCEPTUAL ENTITY RELATIONSHIP DIAGRAM (ERD)** and to produce a **data dictionary** to document and support your model.



Prefix the names of all entities and attributes with your id number starting with w.

- 1) Produce a complete **CONCEPTUAL ERD** for AKKTIVATION.

It needs to include all the **entities, relationships, multiplicities, attributes** and **primary keys** that you have identified and needs to fit on one page of the report.

- 2) Create a **Data Dictionary** to document how you identified the **entities** for AKKTIVATION. To achieve this, fill in the 2 tables below to summarise and explain how you identified the entities for your data model.

Entity name	Description

General entity	Specialised entity	Explanation

For more information, please refer to page 510 of the 6th edition of the Connolly's textbook.

- 3) Create a **Data Dictionary** to document how you identified the **relationships** and **multiplicities** for AKKTIVATION. To achieve this, fill in the table below to summarise and explain how you identified the relationships and multiplicities for your data model.

Entity name	Multiplicity	Relationship	Multiplicity	Entity name	Justifications for the multiplicity (4 statements for each relationship)

For more information, please refer to page 513 of the 6th edition of the Connolly's textbook.

Create your own separate table if you identify complex relationships to identify the entities involved and provide justifications.

- 4) Create a **Data Dictionary** to document how you identified the **attributes** and **primary keys** for each entity for AKKTIVATION. To achieve this, fill in the table below to summarise and explain how you identified the **attributes** and **primary keys** for your data model.

Entity name	Attributes for this entity (include PK)	Justification

For more information, please refer to page 516 of the 6th edition of the Connolly's textbook.



Interactive FAQ

In order to provide you with the support you may require as a Database Architect and answer any questions you may have about the AKKTIVATION brief, an interactive FAQ is offered on padlet, a Web tool to build a virtual wall / bulletin board. This allows you to ask specific targeted questions to the AKKTIVATION Managing Directors about the AKKTIVATION business so that to improve and refine your conceptual ERD and for these questions and their answers to be shared with the entire class. The padlet is available on https://padlet.com/f_roubert/AKKTIVATION_FAQ

Part A Marks Allocation

Part A will be marked based on the following marking criteria:

Criteria	Mark per component
Correct identification of entities + data dictionary tables	10
Correct identification of relationships + data dictionary table	10
Correct identification of multiplicities + data dictionary table	10
Correct identification of attributes and primary keys + table	05
PART A TOTAL	35

Coursework Specifications Part B: Logical ERD, SQL & PHP [65 Marks]

Part B Project Brief: AudioVizzion

AudioVizzion is a large retail chain that offers optical and audiology services and essentially sells spectacles and hearing aids to the public. AudioVizzion operates globally from a large number of branches located all around Britain. Every branch offers AudioVizzion customers the opportunity to get tested on their vision and/or on their hearing before being able to purchase what the company refers to as Visual Devices (i.e. frames and lenses for glasses) and/or Hearing Devices (i.e. hearing aids).

Part B Questions

You have been hired by AudioVizzion as a **database architect** to undertake a database project to support the data needs of the firm. In this second part, you are given a conceptual data model for AudioVizzion (**figure 1**) and your first goal is to **map it** onto a high-quality **LOGICAL ENTITY RELATIONALHIP DIAGRAM (ERD)** to logically represent how the key business data needs can be organised as a set of interrelated tables that can then be implemented. These tables need to be interconnected according to the strict rules of the relational model to be implementable. You also have to create tables in SQL and insert some data in these tables.



Prefix the names of all tables and attributes/columns with your id number starting with w.

- 5) Produce a complete **LOGICAL ERD** for AudioVizzion (mapped out from the Conceptual ERD given on **figure 1**). This needs to include all the **correct tables, relationships, multiplicity constraints, attributes, primary keys and foreign keys**.
This needs to fit on one page of the report.
- 6) Provide a **step-by-step guide** explaining how you produced the AudioVizzion **logical ERD** i.e. how you **mapped** the AudioVizzion conceptual ERD (**figure 1**) into a full **logical relational schema**. To achieve this, write a series of numbered **bullet points** (e.g. [1], [2], [3], etc.) to explain how you applied the **10 rules of the Logical Data Modelling Methodology** (see Lecture 04 and Lecture 05), and in which order, to convert the given Conceptual ERD into a Logical ERD.
This needs to fit on no more than two or three pages of the report.
- 7) Write SQL code to **CREATE** in the MySQL RDBMS **the 3 tables** that should result from **the mapping of the entity Device and its specialised entities** (see figure 1).

Follow the instructions below:

- The 3 tables should all have the correct constraints for primary keys, foreign keys and alternate keys.
- Include the **SQL code** used to create the tables and **screenshots of the structures of the tables**.
- The names of all the tables and all columns must be prefixed with your id number starting with w.
- The screenshots should clearly show your student id numbers (in the names of the tables and attributes and also right above the tabs for the structure of the table and on the left hand-side in PHPMYAdmin, **see figure 2**).

8) Write SQL code to INSERT in the MySQL RDBMS records in the 3 tables that you have just created.

Follow the instructions below:

- The SQL statements needs to **insert the data related to the following products:**
 - One “Emporio Armani Ultra-Light frame” for glasses.
 - Brand: Emporio Armani.
 - Model: Empo324.
 - Description: Brand new grey and blue ultra-light frame, latest trend in 2019.
 - Availability: in stock.
 - One “Optimo Single Vision Lens” for glasses.
 - Serial Number: opto456321987.
 - Vision type: Single vision for short-sightedness.
 - Tint: clear.
 - Thinness Level: ultra-thin.
 - Description: Optimal single vision lens, 2020 style, anti-scratch and anti-shock.
 - Availability: in stock.
 - One “Phono Titanium Digital Hearing Aid” to support hearing.
 - Make: Phono Titanium.
 - Model: phono2021.
 - Description: Ultra-sensitive digital hearing aid, adjustable through an App.
 - Availability: currently being ordered.
- Include the **SQL code** used to insert the records in the 3 tables and **screenshots of the content of the tables.**
- The screenshots should clearly show your student id numbers (in the names and of the table and attributes and also right above the tabs for the structures of the table and on the left hand-side in PHPMYAdmin, **see figure 2**).

Part B Marks Allocation

Part B will be marked based on the following marking criteria:

Criteria	Mark per component
Correct mapping of specialisations + sound explanation	20
Correct mapping of relationship (M:M) + sound explanation	08
Correct mapping of simple relationships (1:M & 1:1) + sound explanation	13
Correct SQL Data Definition Language (DDL) query to create tables	15
Correct SQL Data Definition Language (DDL) query to insert records	09

PART B TOTAL

65



Key Requirements for the entire coursework

- Only **UML notations** are accepted, as introduced in this module.
- You need to **prefix** all your entities and attributes with “w + the 7 digits of your ID number” as provided by the University.

For example, if my name is Francois Roubert and my ID number is w1234567, when I identify the entity “Module” and its attributes “moduleCode”, “moduleName” and “moduleType”, I will have to represent it this way

w1234567_Module
w1234567_moduleCode{PK}
w1234567_moduleName
w1234567_moduleType

Figure 1: AKKTIVATION Conceptual ERD to be mapped to a LOGICAL ERD (PART B)

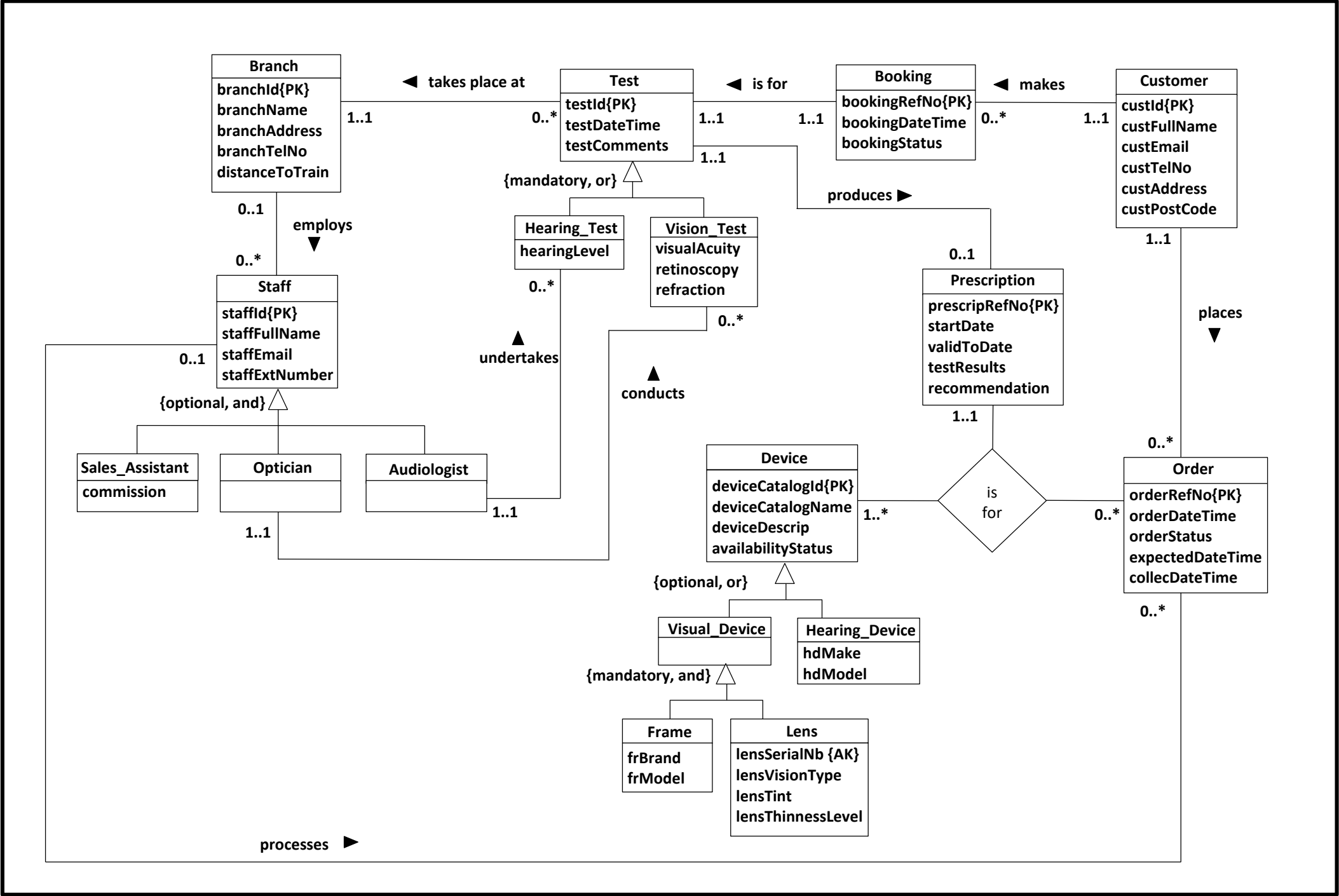


Figure 2: screenshots for the structure and content of the tables in part B questions 7) and 8)

