Note: This is an individual assignment. While it is expected that students will discuss their ideas with one another, students need to be aware of their responsibilities in ensuring that they do not deliberately or inadvertently plagiarize the work of others.

CP2404 : TR2-2024

Assignment 1 – Database (conceptual) Modelling

Assessment Weight: 30%

Rationale

This assignment has been designed to assess students' ability to model a database, by constructing an entity-relationship diagram for a particular business scenario. This assignment addresses the following learning objectives for this subject:

- Develop a database model using the entity-relationship model
- Apply the techniques of normalisation

Requirements (Tasks)

You are given a business scenario and are required to draw an ERD for the scenario.

- **Task 1 :** Draw an **Entity-Relationship Diagram (ERD)**, which is fully labelled and implementable, based on the business descriptions. Include all entities, relationships, optionalities, connectivities, cardinalities and constraints. You must use **Crow's foot notation** and **MySQL Workbench** to create the ERD. **A Hand-drawn ERD will NOT be accepted**. A sample ERD can be found in Appendix A of this document.
- **Task 2 :** In the Word document, Write a **point-form summary** to describe the major justifications, assumptions and limitations related to your database design. For example: Assumption/justifications for optionality, connectivities, constraints data type and data domain, and Special cases or data integrity issues that cannot be handled.

Submission Items (3):

Include the following in your submission (via LearnJCU):

- The original Workbench file containing your ERD (.mwb). Name the file as **LastnameFirstname-A1.mwb**
- Export the ERD diagram as a picture PNG file. Name the file as **LastnameFirstname-A1.PNG**
- A document file (DOCX or PDF format) which contains your **answers for Task-2**. Name the file as **LastnameFirstname-A1.docx** or **LastnameFirstname-A1.pdf**.

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Business Description (Scenario)

Alex is a very rich investor. He is enthusiastic with sports related businesses. He owns a

number of sports training schools, where children are given coaching for various sports by expert trainers. Customers sign up their child/children for training sessions on a need basis, such as when they have competitions, when they have school holidays, etc. For several years, each school has been run independently, thereby creating several problems of inconsistency and different standards. Recently, Alex decided to transform his business to build an extended school group. In this new business system, existing schools will be combined as one school group named "FunPlay" and each school will be run as a branch of this giant school group. Alex has bigger plans to build more branch schools throughout Singapore and increase enrollment. He decided to develop a new central database system to store, integrate and manage all relevant data and to computerize its operations. Once this central system is in operation, each branch school will be connected to this central database and their data-related operations will be governed by this central database system.

You have been asked to design a database that satisfies many user requirements provided by this school group. General business description and various user requirements are summarized in the following sections.

FunPlay has its headquarters in Kallang while the branches are located at several places including Kallang and other districts such as Clementi, Bugis, Bishan, etc. The central database keeps information about branches, employees, equipment, customers and their children, and training-session information. Each branch has an ID number that uniquely identifies the branch, and the authorized users of the database should be able to track details of the branch such as name, location, details of employees who currently work there, etc.

Every branch of FunPlay is supervised by a branch manager. One requirement is FunPlay database will be used to generate reports for various HR (Human Resources) purposes. For example, an authorized user should be able to generate a report to show the current employee records of a specific branch, a report to list all the branches and their details, a report to show the employee history of a branch including all records of previous managers and other employees, or a report to compare how much total salary has been paid for each branch over the past 5 years.

FunPlay has several employees. Basic personal particulars (name, contact, address, DOB, start date, end date, etc.) are required to be kept and managed.

Some of FunPlay employees are professional sports trainers, who train the children on various sports and while others are admin employees, who take care of paperwork, attend phone calls, etc. Only admin employees are given a specific room and a specific phone number. Trainers are usually in the sports facilities and are not given a specific room. In order to achieve high quality coaching, a trainer is allowed to train only one specific sports that he is best in. This info along with number of years of experience in that sport is recorded. All trainers and admin employees are permanently employed by FunPlay. Every permanent employee has a unique health insurance number and an allowance number, which allows them to claim from the company. Additionally, there are also some casual employees are employed for facilities cleaning. During school holidays, more trainings are required and the sports facilities needs more frequent cleaning. For casual workers, details such as payment rate, work hours etc. are required to be kept, as these change for different workers.

Trainers are required to gain certifications for various skills, to improve their standards. FunPlay has a standard list of certifications for various sports, with details of which institute teaches the course, along with course fees. Whenever trainers pass the certifications, the database should keep track of certification start/expiry date info, etc of all trainers so that an authorized user of the database can generate a report to show the status of professional human resources that FunPlay employs.

All permanent employees (trainers and admin) must have an access card while some of them use an iPad, both of which are assigned to each employee when they join the company, and which they return when they leave. Casual workers are provided an access card but not an iPad. Each access card and iPad have a unique number for stock-take purposes. Access cards or iPads are fully managed by FunPlay for any issue including repair, faulty parts, etc.

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Employees can return their assigned equipment when faulty, to replace with other good-condition equipment. The authorized user of the database should generate a report showing, for each access card, the access card's number, the building sections it allows access to, and the name of the employee it has been supplied to and assign start/end dates. In a similar way, the user should be able to generate a report that shows for each iPad : the iPad number, model, colour, other specifications, history of repairs (if exists) and the name of the employee(s) it has been assigned to.

FunPlay also wants to keep their all customer-relevant data centrally so that the head office can manage status of all customers (and their children) of each branch and can generate a report to compare each branch's customer status (in terms of current numbers, growing rate, etc.). FunPlay runs an incentive system to reward annually the branch which achieved the most significant growth rate throughout the year. Customer information includes contact details to enable newsletters and other information to be mailed to the customer.

The school has different billing rates depending on the customer. Employees receive a 15% discount on all sports training sessions and sports gear purchase, while valued customers may qualify for a 10% discount. The discount rates are reviewed each year and are open to change (eg. Employee discount rate was 10% but at the last wage bargaining discussions it was agreed to increase the rate to 15% in lieu of a salary rise).

Customers can bring their children to these schools for specific sports training sessions depending on their timings and needs. Various particulars of the children such as name, date of birth, gender, height, weight, digital photo etc. are gathered and stored in the database. The trainers would also like to be able to store a general comment about the child with their record as well. If a child has not been in for a training-session in the last 3 years, then the child's records are removed from the database. The school believes in healthy lifestyle for the children. If the child did not attend coaching at the school for 6 months, then a reminder notice is mailed to the parent.

All branches provide the same set of trainings. For instance, Badminton – Beginners level, Badminton – Medium level and Badminton – Advanced level are some examples of trainings. Customers can commit to a training for their child/children on specific date/time. A training session can have only one trainer, but several children. Every child's training-session information should be recorded to keep details about the specific training done, the trainer information, number of hours, etc. Customers may also buy certain sports gear such as bats, balls, gloves, t-shirts, bags, etc if the children need them, during the session. Details of quantity and which gear bought should be recorded.
All customers receive an itemized account of each training-session. If the training-session involves more than one child, each child's training and gear purchased appear grouped together with a subtotal. All training-sessions incur an 8% Goods and Services Tax which is shown on the invoice.

The database needs to provide user-interfaces for facilitating the entry of the information by the school admin employees. The new system design needs to be able to produce several reports which can be used by authorized users. Some of these include a name listing of all the current customers and their children, training-session invoicing reports and mailing labels. Samples of what the client expects these reports to look like are shown in the next page of this document. Note that these are just some report samples and other new reports requested by various staff should be made available too by the school admin employees or head office once the database is fully implemented.

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Samples of few of the required reports are below :

1) Report that provides a list of all children who attended sessions in Feb-2024, with details of their parent's names, contact, date and session fees ($$) made.

SessionDate	Child name	Parent's name	Parent Contact	Session Fees ($)
2-Feb-2024	Jenny Kor	Lucy So	97475637	$ 456.00
3-Feb-2024	Kalidas R	Rajendran	97354758	$ 873.50
10-Feb-2024	Susan Tan	Tan Meng Sion	94264725	$ 357.75
17-Feb-2024	Goh Meng	Meng Ho Tat	96582665	$ 735.00

2) Report that lists Total Salary paid to employees for each branch by year:

District	BranchID	Total Salary Paid	Year
Clementi	BR001	$ 56,345.00	2022
Bugis	BR002	$ 83,234.00	2022
Bishan	BR003	$ 5,765.00	2022
Kallang	BR004	$ 73,643.00	2022

3) Report that lists all the iPads with their details and the name of employee to whom they have each been assigned to :

EquipmentID	Equipment Type	Purchase Date	Date Assigned	Date Returned	Employee ID	Employee Name
EQP1002	iPad Mini	20/12/21	12/02/22	03/02/23	23	Shelly Fox
EQP1004	iPad Pro	11/10/22	07/01/23	-	41	Melissa R
EQP1011	iPad Air	15/07/22	29/12/22	-	67	Mani Selvan
EQP1018	iPad Air	25/02/22	13/01/23	14/01/23	73	Henley Yeng

4) Invoice to Customer :

Customer Info :	Winona Jack	**Invoice No:**	TRAG1105
	13, Clementi Ave,	**Invoice Date:**	23/02/2024
	Singapore 765436	**Child's Name**	Melly Song
	Session	**Details**	**Price**
	Training	Badminton (2 hours)	$ 500.00
	Sports Gear	Badminton Net (1)	$ 25.00
		Total	**$ 525.00**
		Discount (15%)	$ 78.75

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		SubTotal	$ **446.25**
		GST (8%)	$ 35.70
		Amount Due :	**$ 481.95**

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