

Note¹: All labs are mandatory, and you will be marked on 4, randomly chosen out of 11 labs. These will account for 20% of your overall mark (5% each).

Note²: If a marker requests for a specific lab (e.g. Lab 3) and you do not have Lab 3 available, you can ask for another lab to be marked (e.g. Lab 2) but the total marks for Lab 2 will be reduced by 50%.

Note³: All the labs should be created on one single document following the [provided template](#), saved in your drive (or computer) and accessible anytime. Labs are individual works, and they will be submitted into Moodle Dropbox - see deadline.

Note⁴: If a LAB is not finished in the scheduled session, you should complete it at your most convenient time by the beginning of the next session.

Note⁵: Use a code editor and do not type into VM directly

Online documentation: <https://devdocs.io/>

LAB 2 - Normalisation

- Q1.** You have the following table (Fig.1) with data. Normalise the table in 1NF (show 1NF) and create the ERD for 3NF, with associated data type.

order_id	order_date	cust_id	cust_name	cust_country	prod_id	prod_name	prod_price	prod_qty
1001 1001 1001	01/10/2022 01/10/2022 01/10/2022	1	Apple Apple Apple	US	7, 5, 4	table, desk, chair	800, 325, 200	1, 1, 5
1002 1002	02/10/2022 02/10/2022	2	Samsung	KO	11, 4	dresser, chair	500, 200	4, 2
1003	03/10/2022	3	Benq	DE	11	dresser	500	3

Fig. 1

- Q2.** You are given the following table in 1NF. Normalise data in 3NF and create the ERD with all data type and size.

dept_id	dep_name	emp_id	emp_name	project_id	project_name	budgeted_time
10	Finance	1	Harry	100	Alpha	4.5
10	Finance	5	Dewey	105	Beta	3
10	Finance	11	Louie	103	Gamma	7
20	R&D	2	Jack	107	Delta	8
20	R&D	4	Jill	102	Echo	9

Q3. University of Portsmouth keeps the following details about a student and the various modules the student studied (not accurate):

up_number (student registration number to university)
stu_name (student name)
stu_addr (student address)
tut_id (tutor id)
tut_name (tutor name)
course_id - (course code)
course_name (course name)
module_id (module code)
module_name (module name)
module_results (module exam result)

in a relation:

Student(up_number, stu_name, stu_addr, tut_id, tut_name, course_id, course_name, (module_code, module_name, module_results))

The functional dependencies are:

course_code → course_name
tut_id → tut_name
up_number, module_id → module_results
module_code → module_name

Which of the following is a first step of the normalisation of the relation (table) **Student** to **2NF**?

Hint: you can input a quick sample output in a spreadsheet (like Q1) and remove the repeating group.

- a. **STUDENT**(up_number, stu_name, stu_addr, tutor_id, tutor_name, course_id, course_name)
MODULE(up_number, module_id, module_name, module_results)
- b. **STUDENT**(up_number, stu_name, stu_addr, tutor_id, tutor_name, course_id, course_name, (module_code, module_results))
MODULE(module_code, module_name)
- c. **STUDENT**(up_number, stu_name, stu_addr, tutor_id, tutor_name, course_id, (module_id, module_name, module_results))
COURSE(course_id, course_name)
- d. **STUDENT**(student_id, stu_name, stu_addr, tutor_id, tutor_name, course_id)
MODULE(student_id, module_id, module_name, module_results)
COURSE(course_id, course_name)

Q4. Based on the previous data sample, what would be a 3NF normalisation? Write just the table names and the attributes as above

Q5. You have a SUPPLY table that records details about suppliers, products, and cities where the products are supplied. Acknowledge that a supplier will supply in many cities and a city will have many suppliers.

SUPPLY(supplier_id, supplier_name, product_id, product_name, city_id, city_name)

Normalize the table into 3NF. Assume that the table is already in 1NF, explain why certain attributes had to be separated.

Q6. Consider the following ORDER table that records:

ORDER(order_id, customer_id, customer_name, product_id, product_name, quantity, date)

Normalize the ORDER table to 3NF.

Q7. Open your VM and create a new database (lab2). You are given the following data dictionary.

ANIMAL_TYPE						
Attribute Name	Data Type	Size	Key	Reference	Constraints	Description
animal_type_id	SERIAL		PK			
common_name	VARCHAR	50			NOT NULL, UNIQUE	(eg. 'Arctic Wolf')
scientific_name	VARCHAR	150			NOT NULL	Official scientific name of the animal
conservation_status	VARCHAR	50			NOT NULL	('Endangered', 'Least Concerned')

MENAGERIE						
Attribute Name	Data Type	Size	Key	Reference	Constraints	Description
menagerie_id	SERIAL		PK			
common_name	VARCHAR	50	FK	animal_type > common_name	NOT NULL	
date_aquired	DATE				NOT NULL	
gender	CHAR	1			NOT NULL	
aquired_from	VARCHAR	250			NOT NULL	
name	VARCHAR	50			NOT NULL	
notes	TEXT					

and the data sample output:

animal_type_id	common_name	scientific_name	conservation_status
1	Bengal Tiger	Panthera tigris tigris	Endangered
2	Arctic Wolf	Canis lupus arctos	Least Concern

menagerie_id	common_name	date_acquired	gender	acquired_from	name	notes
1	Bengal Tiger	2011-07-14	F	Dhaka Zoo	Ariel	Healthy coat at last exam.
2	Arctic Wolf	2008-09-30	F	National Zoo	Freddy	Strong appetite.
3	Bengal Tiger	2006-06-01	M	Scotland Zoo	Spark	Likes to play
4	Arctic Wolf	2007-06-12	F	Southampton National Park	Mia	Doesn't like sun

- Write the CREATE statements for tables ANIMAL_TYPE and MENAGERIE, including PKs, FKs, constraints, data type and size.
- Write 6 INSERT STATEMENTS for the following:
 - Common Name: 'Bengal Tiger', 'Arctic Wolf'
 - Scientific Name: 'Panthera tigris tigris', 'Canis lupus arctos'
 - Conservation Status: 'Endangered', 'Least Concern'
 - Acquired Date: '14/07/2011', '30/09/2008', '01/06/2006', '12/06/2007'
 - Gender: 'M', 'F'
 - Acquired From: 'Dhaka Zoo', 'National Zoo', 'Scotland Zoo', 'Southampton National Park'
 - Name: 'Ariel', 'Freddy', 'Spark', 'Mia'
 - Notes: 'Healthy coat at last exam', 'Strong appetite', 'Likes to play', 'Doesn't like sun'

The output of both tables should be exactly like in provided examples for ANIMAL_TYPE and MENAGERIE .

Q8. Based on the previous database you have created, list all the animals that are endangered, along with common name, scientific name, animal name and date acquired.