ADVANCED DATABASES
ADDB6311
PRACTICUM GUIDE 2024
(First Edition: 2024)

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Table of Contents

1. Introduction

The summative assessment for this module takes the form of a Practicum:

- During the semester you are provided with a Practicum Guide, which will be released at the end of Assessment Week 2.
- The Practicum Guide sets out a practical problem that is similar to the practical problem that you must complete for the summative assessment at the end of the module.
- Developing a solution to the practice problem given in the Practicum Guide provides you with the opportunity to develop your skills so that you can prepare effectively for the final assessment.
- The problem that you need to solve in the final Practicum session is not identical to the practice problem but is similar in the scope of what is expected from you. Students are therefore challenged to show that they can apply the skills that they have practiced during the semester.
- Students will save their project files in their allocated GitHub repository for the module and should complete and test their Practicum project using GitHub before submitting the final Practicum project in the LMS.

2. Preparing for the Summative Practicum

Experimenting and practicing the skills covered in this module in a practical setting provides the opportunity for students to develop the skills to apply the concepts introduced in theory sessions. It supports the learning of the theory; develops student knowledge and problem-solving skills; and generates self-confidence in the skills covered.

This Practicum Guide contains a practical problem that was developed to be similar (but not identical to) the practical problem that you will be asked to solve during the summative assessment for this module.

You must ensure that you spend time during the semester to practice and develop the skills that you will have to demonstrate in your final summative. Your formative assessments as well as the practice problem contained in the Practicum Guide will help you to identify and master the relevant skills.

3. The Summative Practicum Session

The summative assessment takes the form of a Practicum and is scheduled as part of the examination cycle at the end of the semester.

- The Practicum is an open book assessment.
- Students can use lab computers or their personal devices to connect to Azure Lab Services and to complete the assessment. If students choose to use their own devices, they must ensure they can connect to campus networks, Azure Lab Services and the LMS before the assessment sitting. No campus assistance is available to troubleshoot problems with personal devices.

- For open book assessments the students may have open access to all resources inclusive of notes, books (hardcopy and e-books) and the Internet. These resources may be accessed as hard copies or as electronic files on electronic devices. All electronic devices batteries must be fully charged before the assessment as no charging of devices will be permitted during the sitting of the assessment. The IIE and its sites of delivery accept no liability for the loss or damage incurred to electronic devices used during open book assessments.

This Practicum session is scheduled for a maximum of 8 hours, which is allocated as follows:

- Hour 1: Setup and reading time.
- Hours 2-5: Complete and submit the Practicum assessment.
- Hours 6-8: This time is used ONLY to accommodate students who were pre-approved for additional time or are allocated extra time by the invigilator due to infrastructure problems that prevented students from starting or completing in time.

For the final Practicum students will complete the practical work in Azure Lab Services:

- Log into your virtual machine for this module that is provided in Azure Lab Services.
- Save your project files for this assessment in your GitHub folder for this module.
- At the end of this assessment, you must log into the LMS to submit your completed work using the Practicum submission link for this module. Be careful to follow the instructions given on the cover page of the assessment to create and submit a single document which contains the link to your GitHub project folder.

4. Submitting the practicum assessment

The practicum assessment is scheduled on the exam timetable for the exam sitting that takes place at the end of the semester.

- You will complete the practicum assessment under exam conditions in a designated venue. The Practicum assessment paper will be handed out in the venue.
- The LMS page for this module contains a link where you can submit your practicum. Your lecturer will enable this submission link before your assessment sitting takes place.

You will submit your assessment in the LMS before leaving the exam venue.

- **Important:** Upon completion of your assessment, you must save and close all your open files before submitting your work. You must then complete the following steps to submit your assessment on the LMS page for this module.
- **To complete your submission:** Create a document in MS-Word or Notepad. The document name must follow the format shown here:
- **StudentNumber_ModuleCode_Practicum.** E.g., if your student number is 12345 and you are writing a Practicum for the module ADDB6311, create a document named **12345_ADDB6311_Practicum. Submit your FINAL Document in PDF Format.**
- In this document include the following: Your student number, the module code, and **the link to your GitHub repository** where you saved your practical work. If you are required to include any written answers, also include your typed answers in the same document.
- Submit this document in the LMS, using the Practicum submission link for this module.

5. The Practice Problem

Below is an example of a real-world applicable case study .

The Repair Shop

A. The Brief

IT Gear Dealer is an IT repairs store located in Benoni; a town situated on the East Rand of the Gauteng province. It specialises in the repairs of laptops, desktops, servers, and notebooks and reselling them. The company was started by Barnard and Ian, a Father-Son duo and therefore is a family-owned business. IT Gear Dealer has been in business for 20 years and has continued to do very well. Currently IT Gear Dealer employs 10 employees – the owner (Barnard), the store manager (Ian), and 8 support staff members. Over the past few years, IT Gear Dealer has experienced huge growth since its inception in 2012 and have been trying to manage this growth. The owners have decided to open a second repairs shop in the nearby Brakpan town mostly because they have realised that:

1) there are no other repair and resell shops with the same specialised skill in Brakpan.
2) Brakpan is home to the Carnival City, and therefore prospects of branching out in other areas of expertise in the business are higher.
3) they can service more customers through expansion.

The owners are hoping that the successful opening of a new store in Brakpan will help them further expand to other towns such as Springs, which host manufacturing and engineering industries. With this move , they can service more customers and help the business grow further. Currently, the owners face the main challenge of meeting this anticipated business growth and therefore need to prepare their current data management system, that is, spreadsheets, to include the anticipated new customers along with preserving the existing customer base. They envision being able to track their customers' interests and even offering personalised discounts, for example, to repeat customers. Barnard and Ian understand that it will no longer be feasible to address their needs of maintaining data while utilising spreadsheets with their expansion drive in mind.

You, a database specialist, have been contracted to assist IT Gear Dealer's management to develop a more efficient and effective way to meet their needs of maintaining data, reaching out to old and new customers and search for information. You have conducted interviews as part of your information gathering process. You have prepared your findings in the form of

1. a functional report (as provided below)

2. a sample of data required for the system (as provided in the preload) .

B. Functional System Requirements:

The owners require a database that allows them to track the repairs done, who has completed the repair work, the amount of stock at hand, as well as an understanding of who their customers are. Importantly, the owners have been experiencing challenges with the current system where they struggle to reconcile the stock at hand, the sales made, and the jobs completed. Ian feels that the spreadsheets might be tampered with and hence security is of importance. Being able to account for the working hours of each employee will ensure proper billing is made to each customer.

Lastly, the owners need to extract information about the sales made when filing the company taxes as well as information about their customers for surveys, awarding discounts and newsletter purposes.

IT Gear Dealer currently have individual customers who are stored in a single customer spreadsheet. Each customer can have many repairs done in a single transaction. All the transactions made, need to be recorded in a separate table in the database. Each transaction or sale consists of Sale Number, the Sale Date, The Sale Amount, the Customer's ID and the Repair ID. To date, all customers come into the shop to drop and/or collect the repaired equipment.

IT Gear Dealer keeps stock of hardware and/or peripherals required for repairs and/or repaired. Each stock item has a Stock ID, Stock Type, Stock Model, and the name of the Manufacturer. When a repair is done, the company tracks the work done and the amount of time taken to complete the work. Information about the repairs done is kept in a spreadsheet. This includes the Repair ID, Repair Work, the date when the repair was done/completed and the number of hours it took to complete the work. Such information is important for the company for billing purposes as well as for wages.

The sample data is also as shown below:

STOCK

STOCK_ID	STOCK_TYPE	STOCK_MODEL	MANUFACTURER
12345	Desktop	Proline K100	Acer
54321	Laptop	J55	Mecer
78945	Server	HP9000	Samsung
98754	Laptop	Aspire 450	HP

55311	Notebook	L920	Lenovo

CUSTOMER

CUST _ID	CUST_FNAME	CUST_SNAME	CUST_ADDRESS	CUST_CONTACT
C115	Jeff	Willis	3 Main Road	0821253659
C116	Andre	Watson	13 Cape Road	0769658547
C117	Wallis	Smith	3 Mountain Road	0863256574
C118	Alex	Hanson	8 Circle Road	0762356587
C119	Bob	Bitterhout	15 Main Road	0821235258
C120	Thando	Zolani	88 Summer Road	0847541254
C121	Philip	Jackson	3 Long Road	0745556658
C122	Sarah	Jones	7 Sea Road	0814745745

REPAIRS

REPAIR_ID	REPAIR_WORK	REPAIR_DATE	REPAIR_HOURS
1	HD defragmentation	15/JUL/23	2
2	RAM module replaced. Time taken to diagnose problem	18/JUL/23	3
3	Battery Replaced	19/JUL/23	2
4	OS Upgraded	20/JUL/23	2
5	Faulty hard disk replaced	25/JUL/23	3

SALES

SALES_NUM	SALES_DATE	SALES_AMT	STOCK_ID	CUST_ID	REPAIR_ID
101	27/JUL/23	R 1700	98754	C121	3
102	20/JUL/23	R 1500	12345	C120	4
103	23/JUL/23	R 1650	55311	C119	5
104	17/JUL/23	R 1300	54321	C117	2
105	19/JUL/23	R 1900	12345	C122	1

C. Deliverables:

You have been provided with the spreadsheets with the information currently stored by the company (**ADDB6311PG_Preload**).You have done your own research and analysis and have suggested to IT Gear Dealer to implement an Oracle database-based system. Based on the information provided in Sections A and B, as well as any additional information provided below, follow the instructions, and complete the following:

CAREFULLY NOTE:

1. ***In the final Practicum assessment, you are required to show evidence of having completed all requirements. Along with the code files (e.g. sql files), you will need to include a word document that includes screen shots of each question's code solution and result.***
2. ***Each task might or might not indicate the sample result. If provided, this should be used as a guide of the expected format and/or result. However, the sample result, in some cases, may only include a single record of the expected results.***

Question 1 **(Marks: 10)**

TASK: ERD & Database Setup:

1. You are required to set up the database using Oracle, based on the information provided in Sections A and B and/or the preload provided. Ensure the appropriate constraints are established (primary keys, foreign keys, nullable attributes, etc).

2. Generate an Entity Relationship Diagram (ERD) for the Database. Use a suitable graphical modelling tool (e.g. Visio, Oracle SQL Developer Modeler, etc) and appropriate notation to indicate the correct cardinalities where suitable. Ensure the ERD corresponds with the database schemer.

Mark Allocation

Mark Allocation	**Levels of Achievement**				**Feedback**
	Excellent	**Good**	**Developing**	**Poor**	
	Score Ranges Per Level (½ marks possible)				
Professional and Complete ERD, with correct, consistent notation, correct cardinality.	**4 - 5**	**3**	**1-2**	**0**	
Database correctly setup: tables implemented according Case study. Appropriate constraints are set	**4 - 5**	**3**	**1-2**	**0**	

Question 2 **(Marks: 5)**

TASK: Query Time taken to complete Repairs.

Using SQL only; display the combined customer name, the repair work, repair date and repair hours. In your query only display the results that had a repair time less than 3 hours.

Mark Allocation

Requirement	**Mark Allocation**
Correct select statement used.	2
Correct Tables used	2
Correct output	1
TOTAL	**5**

Question 3 (Marks: 5)

TASK: Query Sales Made

Using PL/SQL, display the Customer ID, Stock Type and the Sales Amount. In your query only display the results where the sales amount is less than R 1 500.
Sample Results

Mark Allocation

Requirement	**Mark Allocation**
Correct variables created	1
Correct select statement used	1
Correct Use of PL/SQL Blocks	2
Correct output	1
Total	**5**

Question 4 **(Marks: 15)**

TASK: Query Calculate Commission

IT Gear Dealer has a policy that states that, for any individual sale made, the employee who completed the repair work receives a certain commission.

Using PL/SQL, display the Customer ID, Stock ID, Sales Number, the Repair ID, the Sales Amount, and the commission payable which will be calculated as follows:

- For an individual sale of R999 or less, apply a 5% commission.
- An individual sale between R1000 and R1 499, apply a 10% commission.
- An individual sale of R1 500 or more, apply a 15% commission.

Mark Allocation

Requirement	**Mark Allocation**
Correct variables created	3
Correct select statement used	3
Correct use PL/SQL structure	3
Correct implementation of conditional structures	5
Correct output	1
Total	**15**

Question 5 (Marks: 5)

TASK: Create View

Create a view called **Repair_View** that will display the combined Customer Name, Stock ID, Repair Date and the Repair Work done. In your query also include the statement to run the view.

Mark Allocation:

Requirement	**Mark Allocation**
Create or replace view used	1
Correct select statement used & Correct tables used	2
Correct code to run the view	1
Correct output	1
Total	**5**

Question 6 **(Marks: 10)**

TASK: Create Trigger

Create a Trigger called **Sales_Entry** that will prevent a user from entering a sales amount that is less than zero. In your query include the code to test the trigger.

Mark Allocation

Requirement	**Mark Allocation**
Create or replace trigger used	2
Correct use of after insert or update used	2
Correct variables created	2
Correct selection statement used	1
Correct code to display restriction message	1
Correct code to test the trigger	2
Total	10

Question 7 **(Marks: 15)**

TASK: Create Stored Procedure

Create a stored procedure called **sp_customer_details** that accepts sales and display the customer id, customer first name, surname and their contact number.
In your solution display the data for any customer and provide the code to execute the procedure with relevant exception handling and relevant code comments.

Mark Allocation:

Requirement	**Mark Allocation**
Create or replace procedure used	2
Correct variables created	2
Correct select statement used	3
Correct code to run procedure	3
Correct use of exception handling	2
Correct use of comments to aid communication	2
Correct output	1
Total	**15**

Question 8 **(Marks: 15)**

TASK: Create Function

Create a function called **fn_IT_Gear** that would be meaningful and relevant for this database. Your function should accept at least 1 input parameter and display at least 4 relevant pieces of information.
In your solution,

- display the data and provide the code to execute the function.
- use relevant exception handling and
- provide relevant code comments .

Mak Allocation:

Requirement	**Mark Allocation**
Create or replace function used	2
Correct variables created	2
Correct select statement used	3
Correct code to run function	3
Correct use of exception handling	2
Correct use of comments	2
Correct output	1
Total	**15**

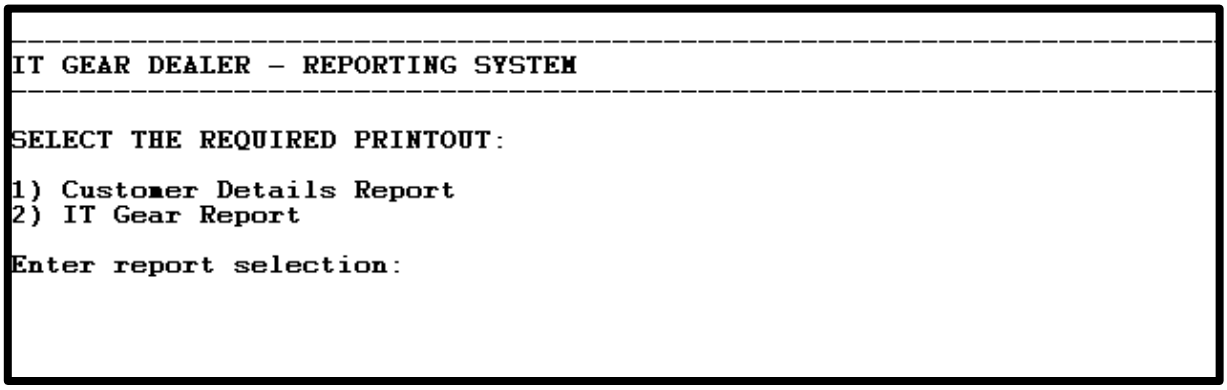
Question 9 (Marks: 10)

TASK: Create GUI

Management of IT Gear Dealer require an external program that will provide a graphical user interface to display the results for the following stored procedures and functions you have created:

- **sp_customer_details**
- **func_IT_Gear**

At this moment, you are not required to link the GUI to the database. You are allowed to use any programming language and integrated development environment to achieve this functionality. The following has been provided as an example:



Mark Allocation	Levels of Achievement				Feedback
	Excellent	Good	Developing	Poor	
	Score Ranges Per Level (½ marks possible)				
Graphical user interface created to display menu choices for the different report types	8-10	5-7	1-4	0	

Question 10 (Marks: 10)

TASK: Database Security Mini- Presentation

At the moment, the management requires a mini presentation on how you would achieve data security. Provide at least five (5) ways you would ensure database security, referring to the case study in your answer.

Requirement	**Mark Allocation**
Introduction	2
Importance of database security	1
Ensuring database security points presented	5
Link to the Case Study	5
Conclusion	2
Report Presentation (Tools, Structure, Grammar, Graphics)	5
Total	**20 /2**