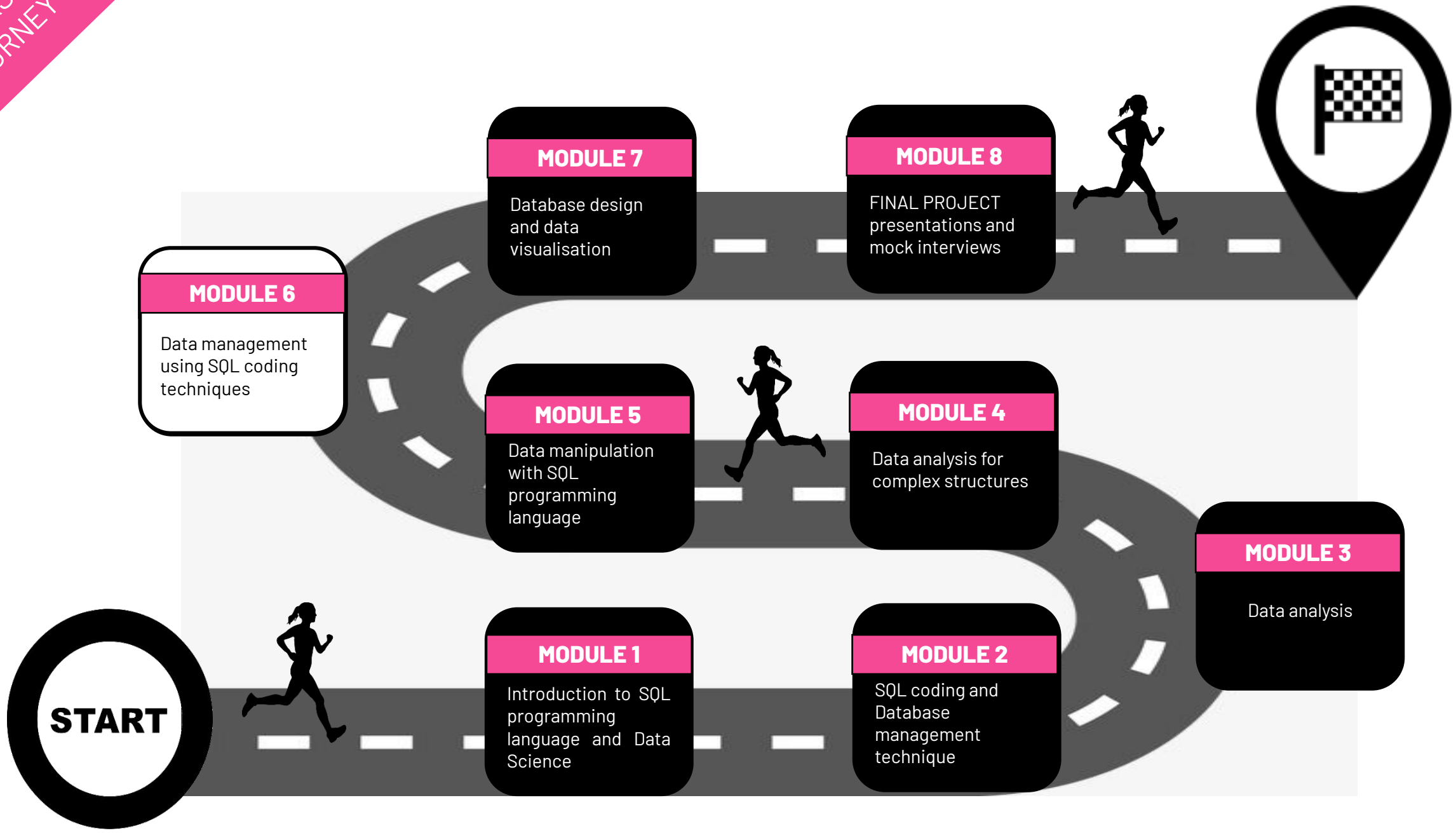
# WELCOME TO CFG

## YOUR INTRODUCTION TO DATABASES & SQL PROGRAMMING LANGUAGE

CODE FIRST GIRLS

TECH OPENS UP LIMITLESS OPPORTUNITIES FOR GIRLS

COURSE JOURNEY



# 06 DATA MANAGEMENT SQL CODING TECHNIQUES

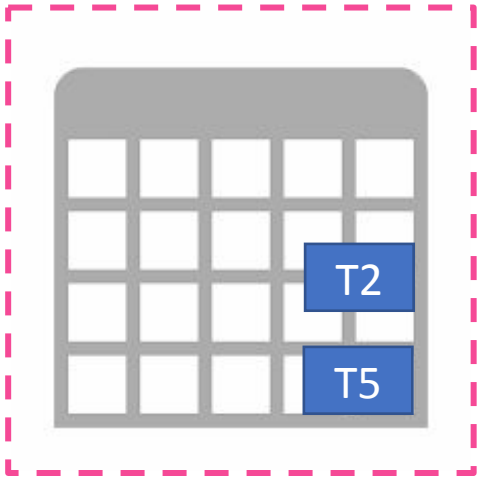
1. Creating and managing VIEWS
2. Stored Procedures implementation
3. Extra-topic: triggers and events

# VIEWS

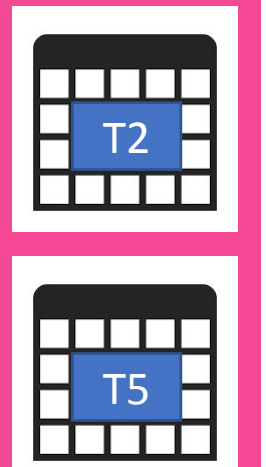
- A view is commonly known as a **virtual table**
- A view is a virtual table based on the result set of the SQL statement
- A view consists of a SELECT statement that is stored as an object in the database
- The tables referenced in the Views are known as a **base table** (or base tables if we performed a join and wrote a more complex select statement)
- Views do not store any data. They are a virtual snapshot, aka representation of a table(s) with data. A user accessing a view does not have a direct access to the database or tables on which the view is based.
- We can also create **nested views**, i.e. a view based on another view based on another view rather than table objects in DB.

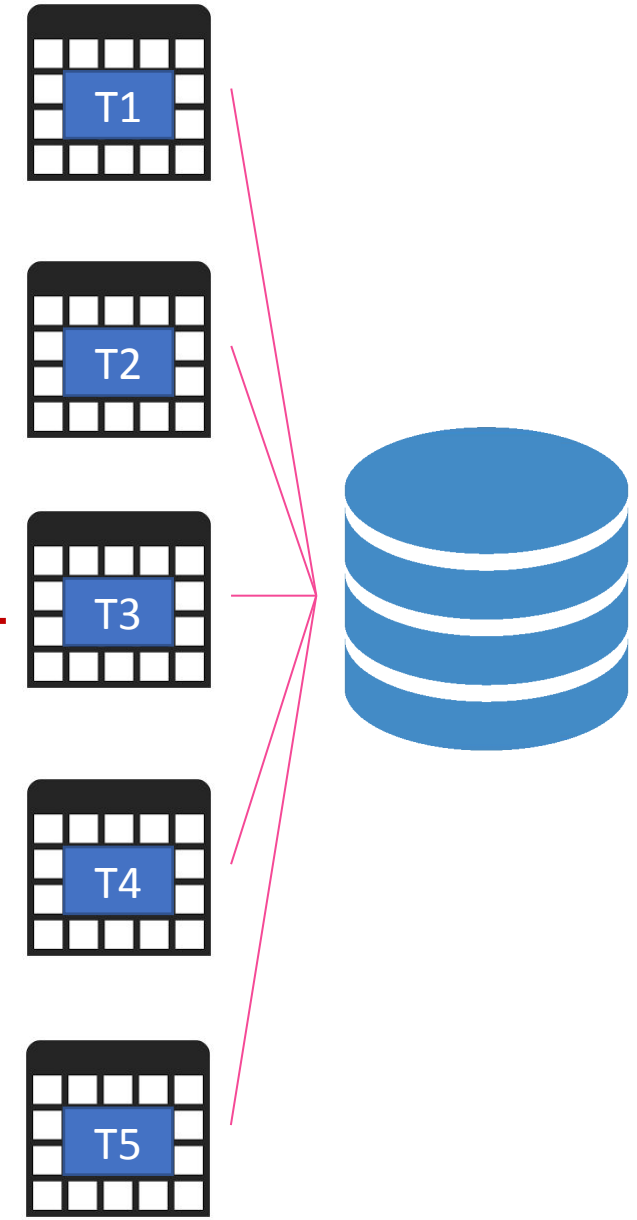
**VIEW or Virtual Table**

**Base tables for the VIEW**




We SELECT items from few joined tables to create a View, which is added to our DB as




User has access to the view, retrieving data stored in there. The user is not able to modify or access other tables in the DB.

SYNTAX

```
CREATE VIEW <view_name>
AS
    SELECT [(column list)]
    FROM <table_name>
```

EXAMPLE

- **CREATE command and the View name**
- **AS keyword**
- **A query that can be of any level of complexity, include joins, filters and any other elements.**

# VIEWS ADVANTAGES

- Simplified queries summarise data from various tables and contain complex logic

- Data security restrict access to data by using SELECT statement with WHERE clause

# VIEWS RESTRICTIONS

After we have created a view, we treat it as a table, so it can be updated and values can be inserted into it. However, there are a number of exceptions that apply to a view.

**A view is not updatable if it contains any of the following:**

- Aggregate functions (SUM(),MIN(),MAX(),COUNT() and others)
- DISTINCT
- GROUP BY
- HAVING
- UNION or UNION ALL
- Subquery in the select list
- Certain types of joins
- Non updatable view in the FROM clause (applied restriction)
- A subquery in the WHERE clause that refers to a table in the FROM clause
- Refers only to literal values (Literal strings are enclosed in single or double quotation marks)
- Multiple references to any column of a base table.

# WITH CHECK OPTION

- A view created with WITH CHECK OPTION will prevent modifying a row in such a way that it would no longer be part of the view result
- In order to understand it better, let's think of an example where we create a view to reveal the partial data of a table.
- However, a simple view is updatable, therefore it is possible to update data which is not visible through the view. This kind of update makes the view inconsistent. This is why we can use the WITH CHECK OPTION clause to ensure consistency of the view
- The WITH CHECK OPTION prevents a view from updating or inserting rows that are not visible through it.
- In other words, whenever you update or insert a row of the base tables through a view, MySQL ensures that the insert or update operation is conformed with the definition of the view.

# PRACTICE
(optional)

**TASKS**

- Follow instructor’s demo to learn how Views are implemented
- Create a table that contains information about staff, their names, departments, salary figures
- Create a view based on the staff table that does not include salary column
- Insert new data into the staff table through the newly created view.
- Create another view based on the staff table, but this time with the check option. Try to include data into the staff table then.
- Do it together with your instructor

# STORED PROCEDURES

- A **stored procedure** is a subroutine available to applications that access a relational database system
- A stored procedure contains one or more SQL statements stored in the database
- Typically used for Data Validation as well Access Control Methods
- A stored procedure is often called a **sproc** or **procedure**
- Parameters are used to pass one or more values from calling program

# STORED PROCEDURES ADVANTAGES

- Similar to stored functions we create a procedure that has a particular responsibility and re-use it when a task needs to be performed (hence reducing overhead)
- Avoidance of Network Traffic
- Encapsulation of Business Logic
- Delegation of Access Rights
- Protection from SQL Injection

SYNTAX

```
DELIMITER//
CREATE PROCEDURE
<proc_name>()
BEGIN
    DECLARE <variable>;
    <proc_logic>

END//
DELIMITER ;


CALL <proc_name>();
```

EXAMPLE

- SET DELIMITER to //
- Declare a proc name to CREATE a new STORED PROCEDURE
- BEGIN keyword

- A query that can be of any level of complexity, include joins, filters and any other elements.

- END keyword at the end of a proc
- SET DELIMITER to ;

- To execute a proc, we use a keyword CALL

# STORED FUNCTIONS

- A Stored Function is an executable database object with SQL procedural code.
- A Stored Function is often called a User Defined Functions (UDF) or just a function
- A function can't modify or change anything in the database by executing INSERT, UPDATE or DELETE statements
- The code to call Stored Functions is similar to built-in functions
- MySQL supports a scalar functions, which returns a single value

SYNTAX

```
DELIMITER//
CREATE FUNCTION <func_name>(param
TYPE)
RETURNS TYPE

BEGIN
      DECLARE <variable>;
      <func_logic>

RETURN(<result>)
END//
DELIMITER ;
```

EXAMPLE

- SET DELIMITER to //
- Declare a func name to CREATE a new FUNCTION
- Declare return type expected as output

- BEGIN keyword

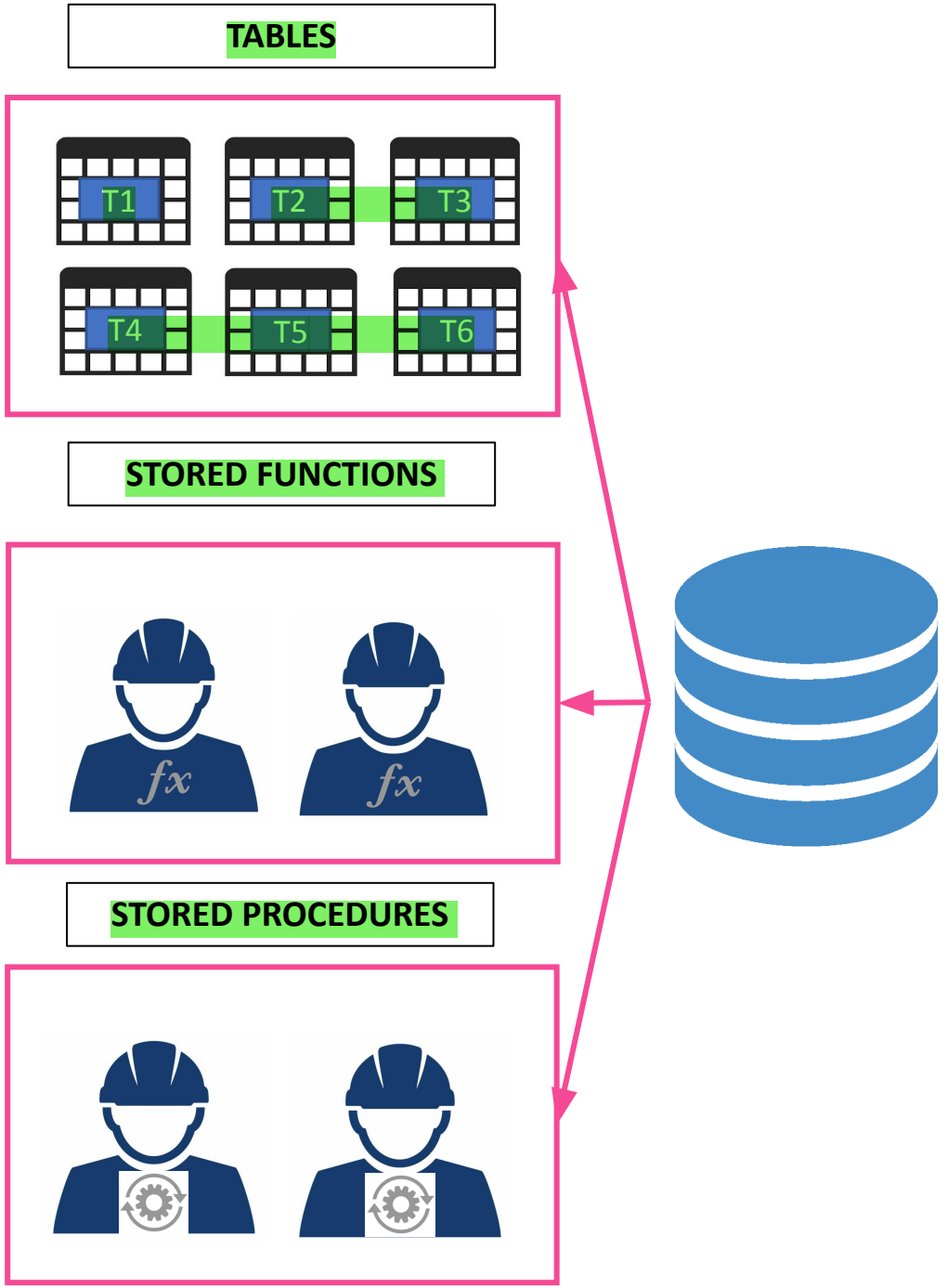
- A query that can be of any level of complexity, include joins, filters and any other elements.
- RETURN function outcome
- END keyword at the end of a proc
- SET DELIMITER to ;

# PROCEDURE VS FUNCTION

It may appear at first that both Stored Procedure and Stored Function are very similar objects that play the same role. However, there are a number of very important distinctive differences between them.

| STORED PROCEDURE | STORED FUNCTION |
| --- | --- |
| • Returns many values | • Returns only 1 value |
| • Input and output parameters | • Only input parameters |
| • Can't be used in SELECT | • Can be used in SELECT |
| • Proc can call functions | • Function can't call Proc |
| • May not return value | • Must return a value |
| • Read and Modify Data | • Reads only Data |
| • INSERT/UPDATE/DELETE/SELECT | • Allows only SELECT |
| • Transaction Management | • No Transaction Management |

DB can be populated by different objects including tables, functions, stored procedures and many other. Together functions and procs form an army of mini-workers that are very useful for performing specific tasks.

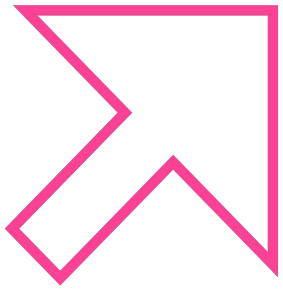


# PRACTICE

**TASK**

- In the bank DB write a stored function that accepts customer account's balance as a parameter and is assessing whether he/she is eligible for a credit.
- Create a simple greetings stored procedure to get the gist of procs syntax and structure.
- Write a stored procedure that accepts parameters and inserts values into a table in the bakery database.
- Do these tasks with your instructor.

CODE FIRST GIRLS



# EXTRA CURRICULUM TOPICS

REVISION

# TRIGGERS

- A trigger is a block of code that is executed automatically when DML operations like INSERT, UPDATE or DELETE are executed
- Trigger execution is often called **trigger firing**
- Triggers must be created with FOR EACH ROW clause as it creates a row level trigger firing for each row
- The OLD keyword gets a value from the rows that is being updated or deleted
- The NEW keyword gets a value from the row that is being inserted or updated
- The primary reasons to use triggers is to enforce rules for data consistency and integrity as well as maintain the audit table.

# EVENTS

- An event is a block of code that is executed automatically according to event scheduler
- Event execution is often called **event firing**
- An Event can be a **one time event** as well **recurring event**
- The primary reasons to use events to do various maintenance tasks related to the table

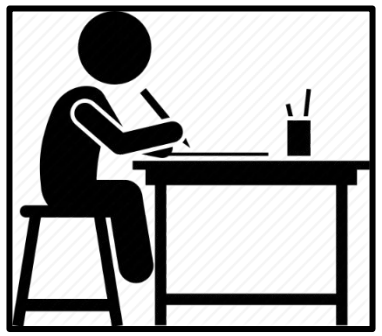
# PRACTICE

**TASKS**

- Write a trigger that activates before the INSERT statement on inserted values
- Write a one off event  and recurring event that log timestamp values in a table (similar to a scheduler)
- Do these tasks together with your instructor.

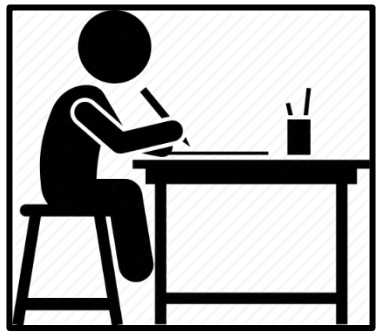
**IF THIS EXERCISE CANNOT BE COMPLETED IN CLASS DUE TO TIME RESTRICTIONS, THEN CODING EXAMPLES WITH COMMENTS WILL BE SHARED WITH YOU AT THE END OF THE SESSION**

# HOMEWORK



- Write one function, one stored procedure, one trigger and one event for any of the DBs in our portfolio (trigger and event are optional).
- The above objects can perform any role of your choice. The most important thing is that you write a piece of code that works and is functional. Submit your code for review.
- Think about potential functions or procs that you could write for your project DB. You can draft them using a pseudo-code (not a real code, but words that describe what your object is doing/needs to do)

# HOMEWORK



**DOWNLOAD AND INSTALL TABLEAU**

We need this tool to be able to practice some basic data visualisation techniques

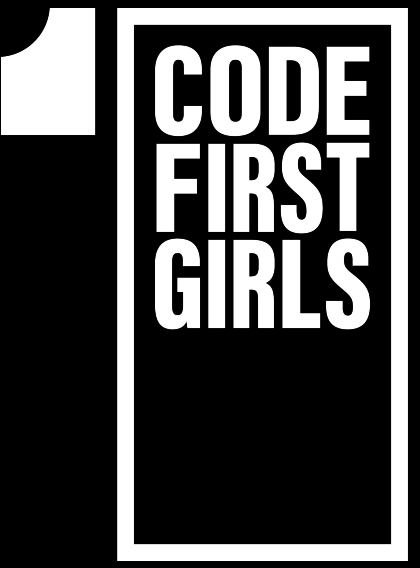
- **Tableau Public is a limited, but free version (we are going to use it for practice)**
- There is another version called Tableau Desktop (it is not free – do now download)

**Step 1)** Go to https://public.tableau.com/en-us/s/download on your web browser. Now you need to enter your email id and click on "**DOWNLOAD THE APP**" button.

**Step 2)** This will start downloading the .exe file for Windows by default, and you can see the downloading process in the bottom left corner of the website.

**Step 3)** Open the downloaded file. Accept the terms and conditions and click on "Install" button.

# THANK YOU
# HAVE A GREAT WEEK!



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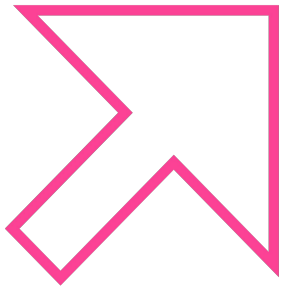

# REFERENCE MATERIALS

REVISION

# QUICK SUMMARY

- A view is a virtual table based on the result set of the SQL statement
- The tables referenced in the views are known as base tables
- The advantages of the views are
  - Simplified Queries
  - Data Security
- View does not store data within but retrieves data from the base tables

# QUICK SUMMARY

- There are four different types of the stored programs
  - Stored Function
  - Stored Procedure
  - Trigger
  - Event

- The major advantage of stored procedure is transaction management and performance

- The major advantage of stored function is that it can be used in different clauses of the SELECT statement

# QUICK SUMMARY

- If set for execution, a trigger fires automatically when operations like INSERT, UPDATE or DELETE are run

- There are two different types of triggers
  - Before Trigger
  - After Trigger

- An event fires automatically according to the event schedule

- There are two different types of events
  - One time event
  - Recurring event