Information Technology Institute

Menofia Branch

Power BI Track

Graduation Project

Q3 - 2024

Prepared by:

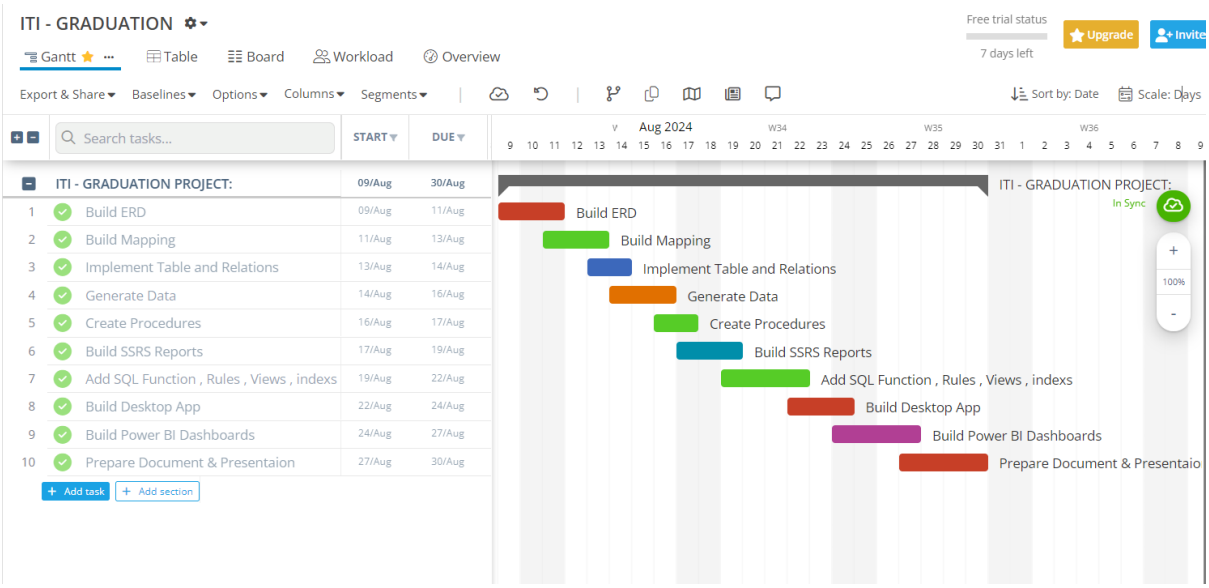
- Moaz Mahmoud Saad	
- Ahmed Tarek Hamed	
- Raghad Ashraf Elghobashy	
- Osama Mostafa Mohamed	
- Ahmed Ashraf Ahmed	

CONTENT

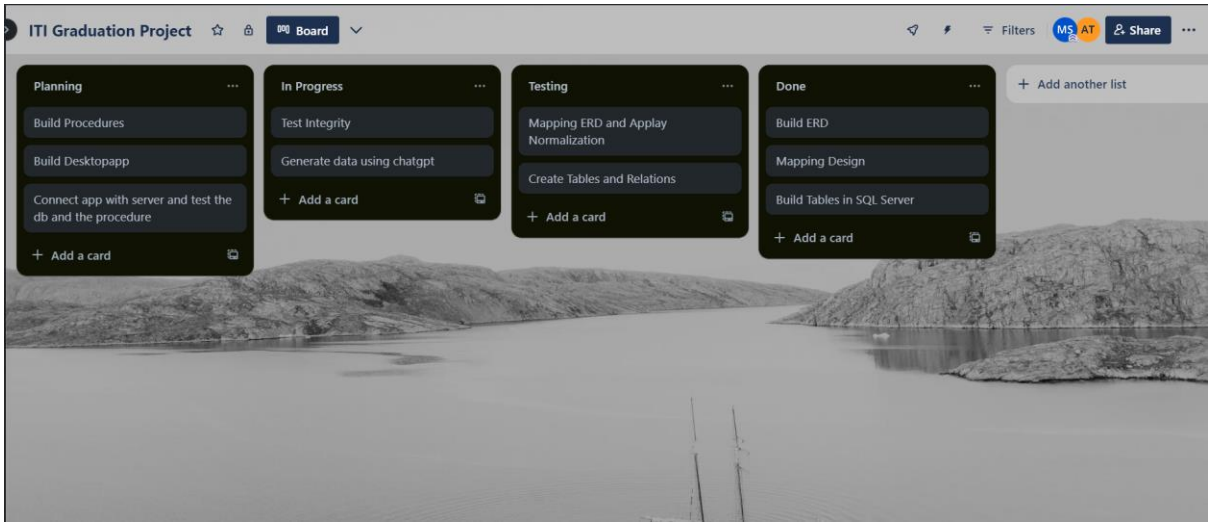
Project Overview:

- In This Project we try as a team to enhance our capabilities and make sure that apply all what we have learn during the last 4 months
- Our view is to build the database and apply what we learn then move to the phase of the reporting using SSRS and Power BI
- Applying all the non-technical skills of communicating , organising , planning
- Make this project the best as much as we can

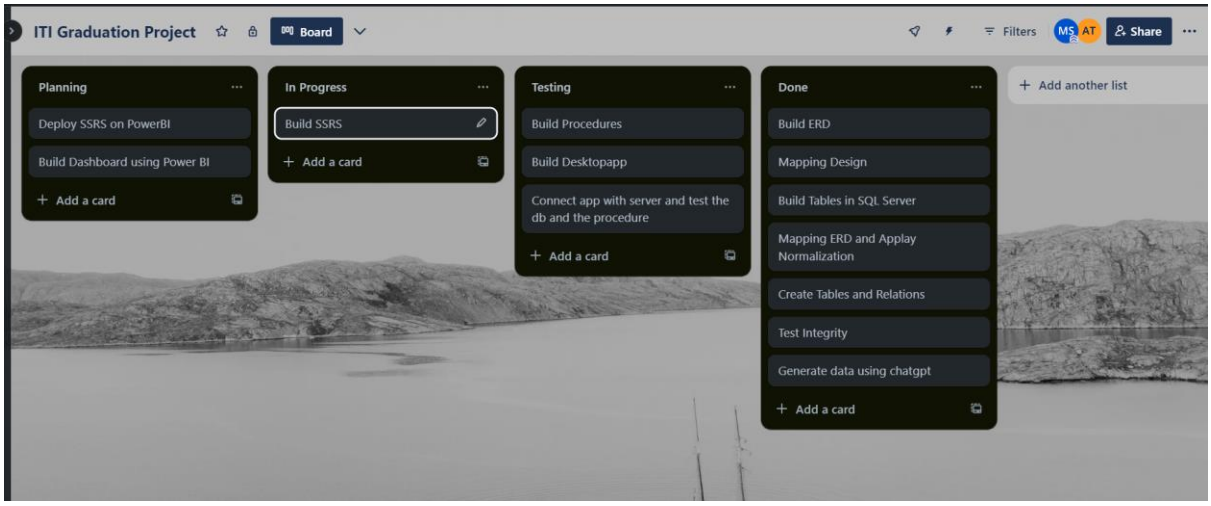
Gantt Chart



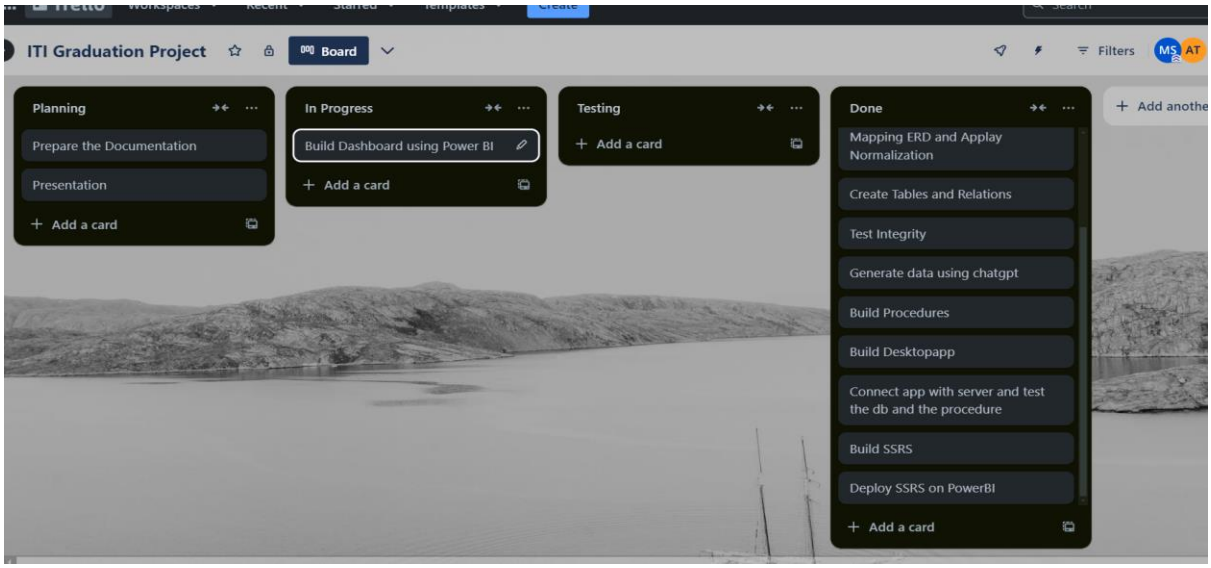
Trello



Phase - 1

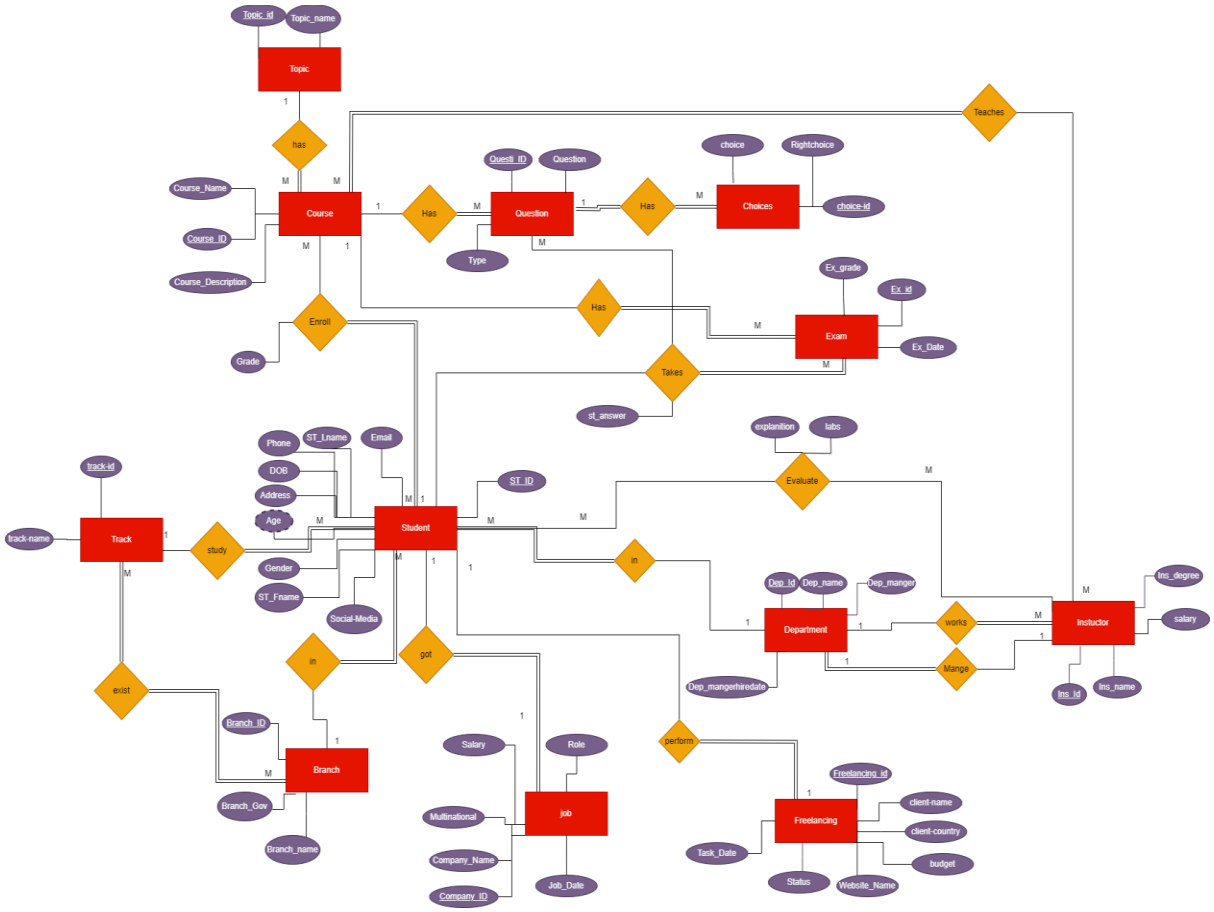


Phase - 2



Phase - 3

ERD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Topic
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Teaches
Course_Name
Course_ID
Course_Description
Course
Has
Question
Ques_ID
Question
Type
Has
Choices
choice
Rightchoice
choice-id
Enroll
Grade
Has
Exam
Ex_grade
Ex_id
Ex_Date
Takes
st_answer
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ST_Lname
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Address
Age
Gender
ST_Fname
Social-Media
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track-id
track-name
Track
study
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Branch_ID
Branch_Gov
Branch_name
Branch
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Salary
Role
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Company_ID
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Dep_name
Dep_manger
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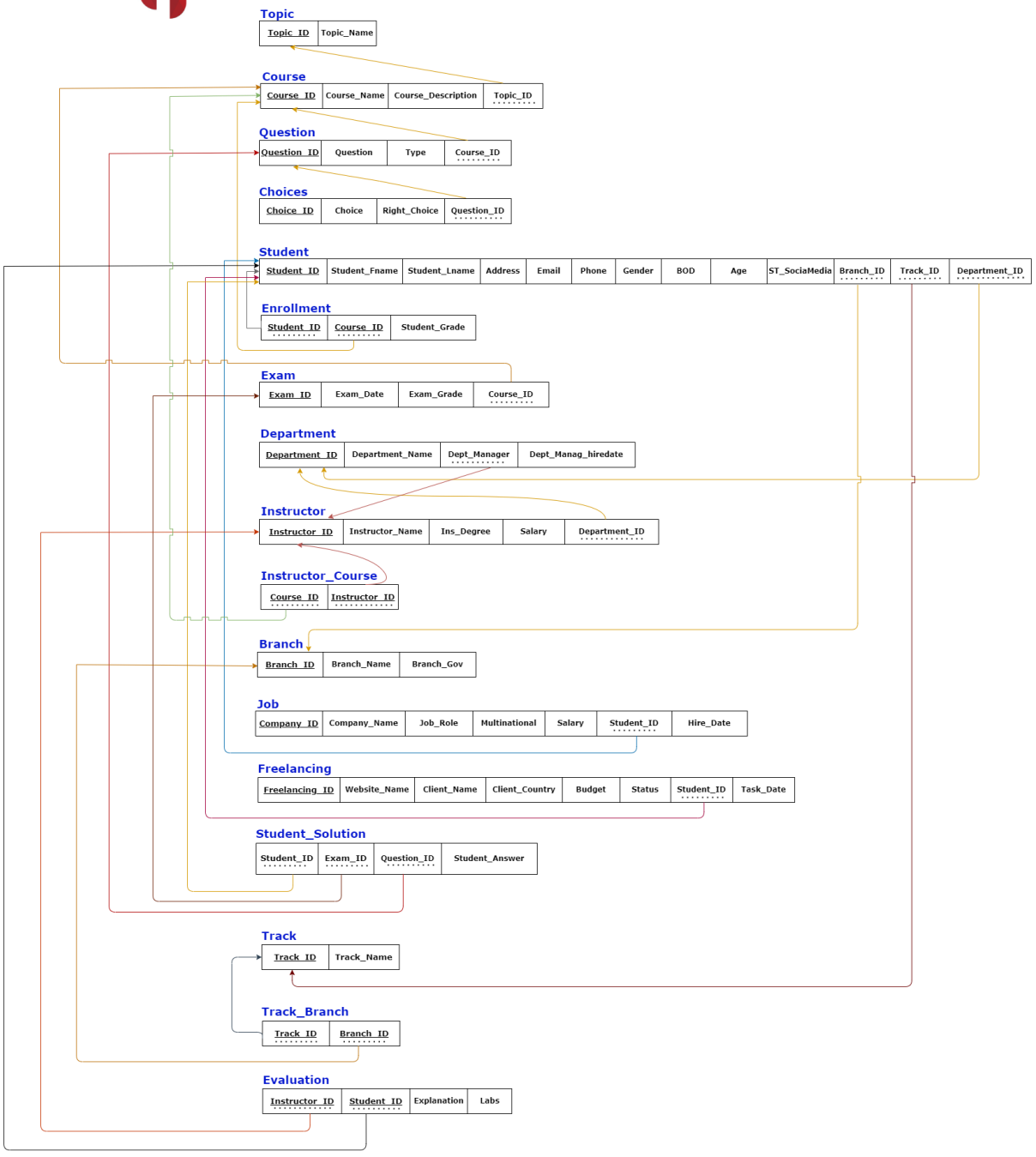
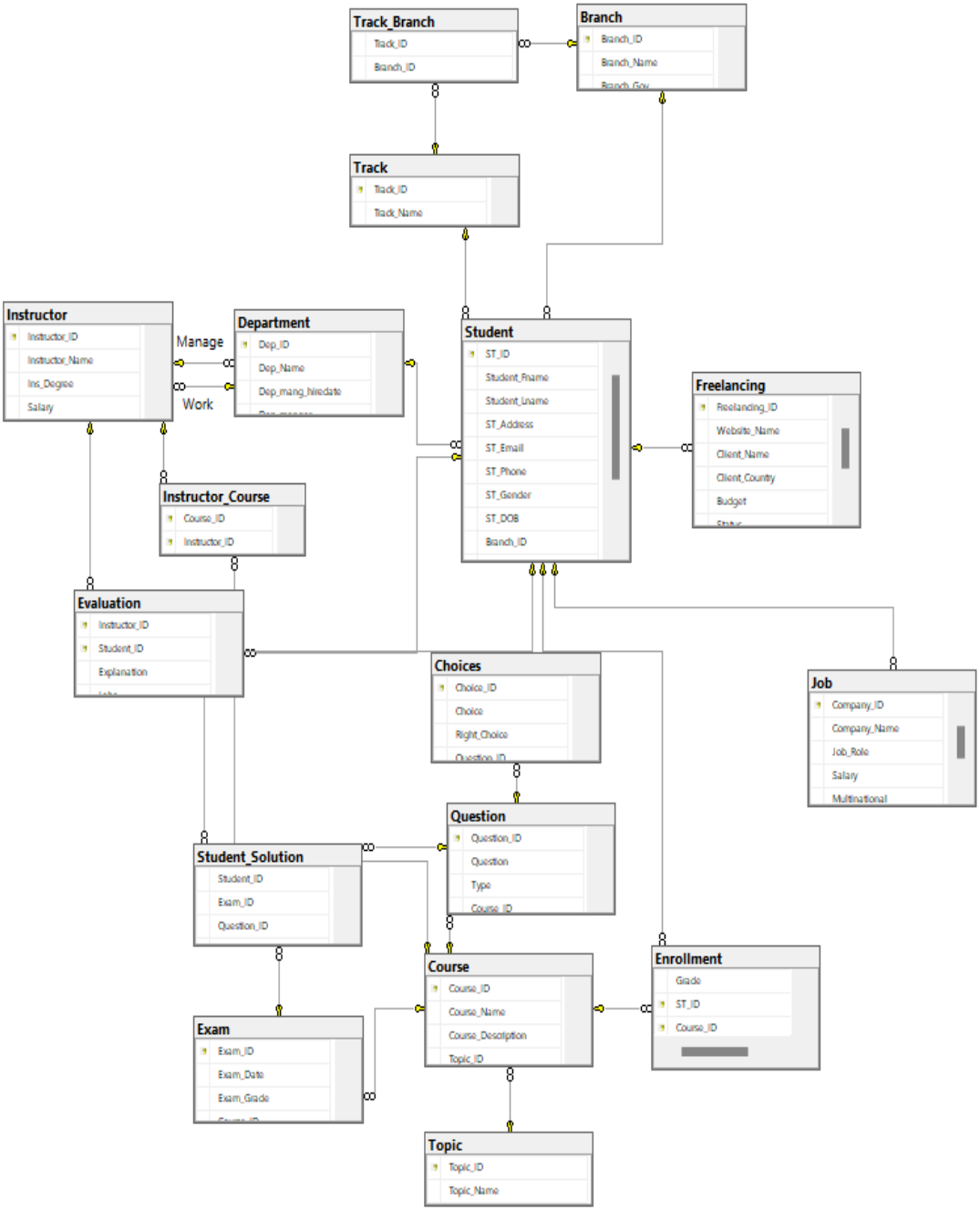
client-name
client-country
budget
Freelancing
Task_Date
Status
Website_Name

Mapping

Examination System Mapping



Schema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Track_ID
Branch_ID
Branch
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Track
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Track_Name
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Ins_Degree
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Department
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ST_ID
Student_Fname
Student_Lname
ST_Address
ST_Email
ST_Phone
ST_Gender
ST_DOB
Branch_ID
Freelancing
Freelancing_ID
Website_Name
Client_Name
Client_Country
Budget
Instructor_Course
Course_ID
Instructor_ID
Evaluation
Instructor_ID
Student_ID
Explanation
Choices
Choice_ID
Choice
Right_Choice
Job
Company_ID
Company_Name
Job_Role
Salary
Multinational
Question
Question_ID
Question
Type
Course_ID
Student_Solution
Student_ID
Exam_ID
Question_ID
Course
Course_ID
Course_Name
Course_Description
Topic_ID
Enrollment
Grade
ST_ID
Course_ID
Exam
Exam_ID
Exam_Date
Exam_Grade
Topic
Topic_ID
Topic_Name

Procedures

- **Overview**

- **Build Stored Procedures for each table as required (Insert - Select - Update - Delete)**
- **Build Two Triggers *instead of update or delete* and display message not allowed to do such operations**

```
CREATE  Trigger Delete_Student_Solution
on [dbo].[Student_Solution]
instead of delete
as
    begin
    Select 'Answers cant be deleted'
    end
```

-

```
------------------------------------------------------------
CREATE  Trigger Update_Student_Solution
on [dbo].[Student_Solution]
instead of update
as
    begin
    Select 'Answers cant be updated'
    end
```

-
- Exam_Generation Procedure
  - This Procedure created to generate exam questions and return for each question with the corresponding choices from choice table
  - it is used in the desktop app to display the generated exam question and choice
  - Simply it takes 3 parameters the number of MCQ , TF questions and the Course ID

```
CREATE or ALTER PROCEDURE EXAM_GENERATION_TWO (@MCQ_NUM INT , @TF_NUM INT , @Course_ID INT )
AS
BEGIN
    begin try

    declare @ex_date_time datetime
    set @ex_date_time=getdate()
    exec [dbo].[Insert_New_Exam] @ex_date_time , @Course_ID

    CREATE TABLE #TempTable (question_id INT, Question varchar(120) , Choice varchar(100));

    declare @x int = 1,  @question_id int ,@max int,@min int

    select @min=min([Question_ID])
    from [dbo].[Question]
    where [Course_ID] = @Course_ID and [Type] =0


    set @question_id  = @min

    while (@x <= @MCQ_NUM)
    begin

        insert into #TempTable
            select q.Question_ID,q.[Question] , c.[Choice]
            from [dbo].[Question] as q inner join [dbo].[Choices] as c
            on c.Question_ID = q.Question_ID and q.Question_ID=@question_id

        set @x+=1
        set @question_id+=1
    end

    select @min=min([Question_ID])
    from [dbo].[Question]
    where [Course_ID] = @Course_ID and [Type] =1


    set @x=1
    set @question_id  = @min

    while (@x <= @TF_NUM)
    begin
        insert into #TempTable
            select q.Question_ID,q.[Question] , c.[Choice]
            from [dbo].[Question] as q inner join [dbo].[Choices] as c
            on c.Question_ID = q.Question_ID and q.Question_ID=@question_id

        set @x+=1
        set @question_id+=1
    end


    select * from #TempTable
    end try

    begin catch
        select 'An Error Occured'
    end catch
END
```

- EXAM_CORRECTION Procedure
    - each time user finish the exam in the app this procedure run
    - It checks the student's choice against the correct answer and if the choice right the grade variable increased by 1 the repeat all the process until remarking the exam questions then update the grade in the exam table

```sql
CREATE OR ALTER PROCEDURE EXAM_CORRECTION @EXAM_ID INT
AS

    Declare Exam_cursor cursor
    for select [Question_ID],[Student_Answer]
    from [dbo].[Student_Solution]
    where[Exam_ID]=@EXAM_ID

    open Exam_cursor

    Declare @answer varchar(100), @rightanswer varchar(100);
    Declare @grade int =0 ,@questionid int;

    Fetch Next from Exam_cursor into @questionid,@answer

    while @@FETCH_STATUS = 0
    begin

        select @rightanswer=[Choice]
        from [dbo].[Choices]
        where [Question_ID]=@questionid and [Right_Choice]=1

        if ( @answer like @rightanswer)
            set @grade +=1;

        FETCH NEXT FROM Exam_cursor INTO
            @questionid,
            @answer;
    end

    update [dbo].[Exam]
    set [Exam_Grade] = @grade
    where[Exam_ID]=@EXAM_ID

    CLOSE Exam_cursor;
    Deallocate Exam_cursor;
```

- Insert_Student_Solution Procedure

- each time student choose an answer the procedure execute and insert the data in the student solution table

```sql
CREATE OR ALTER PROCEDURE Insert_Student_Solution (@exam_id int,@stud_id int,@quest_id int ,@st_answer varchar(100))
as
    begin try
        INSERT INTO [dbo].[Student_Solution]([Student_ID],[Exam_ID],[Question_ID],[Student_Answer]) VALUES
        (@stud_id,@exam_id,@quest_id,@st_answer)
    end try
    begin catch
        SELECT 'An Error Occured'
    end catch
```

Views

View	Description
AVG_Grades_V	- VIEW to display Average grades for students by Branch and Tracks
Budget_V	- VIEW to display MAX & MIN $ budget and freelancing platform for freelancing jobs
S_Salary_V	- VIEW to display MAX & MIN $ Salary and Company Name for Student who got jobs
Total_Students_V	- VIEW to display # of Students for every branchy

Index

- **Create the possible index on the tables to make the process of retrieving data faster.**

```
------------------------------------- Indexes -------------------------------------

CREATE NONCLUSTERED INDEX Branch_Name_IDX
ON Branch (Branch_Name)

CREATE NONCLUSTERED INDEX Course_Name_IDX
ON Course (Course_Name)

CREATE NONCLUSTERED INDEX Dept_Name_IDX
ON Department (Dep_Name)

CREATE NONCLUSTERED INDEX Website_Name_IDX
ON Freelancing (Website_Name)

CREATE NONCLUSTERED INDEX Instructor_Name_IDX
ON Instructor (Instructor_Name)

CREATE NONCLUSTERED INDEX ST_Fname_IDX
ON Student (Student_Fname)

CREATE NONCLUSTERED INDEX ST_Lname_IDX
ON Student (Student_Lname)

CREATE NONCLUSTERED INDEX Topic_Name_IDX
ON Topic (Topic_Name)

CREATE NONCLUSTERED INDEX Track_Name_IDX
ON Track (Track_Name)
```

-

Functions

Function Name	Description
Branch_Description	- SQL ***Scalar*** function that return a line describe the branch briefly
GetStudentsByGovAsXML	- SQL function that return ***XML*** describe the number of student in each branch
Student_Course_Exam_Grade	- SQL ***inline*** function that return table of student exam course grades
HIRED_COMPANY	- SQL ***inline*** function that return table contains number of hired students grouped by company
Student_Track	- SQL ***inline*** function that return table contains number of hired students grouped by tracks

Rules

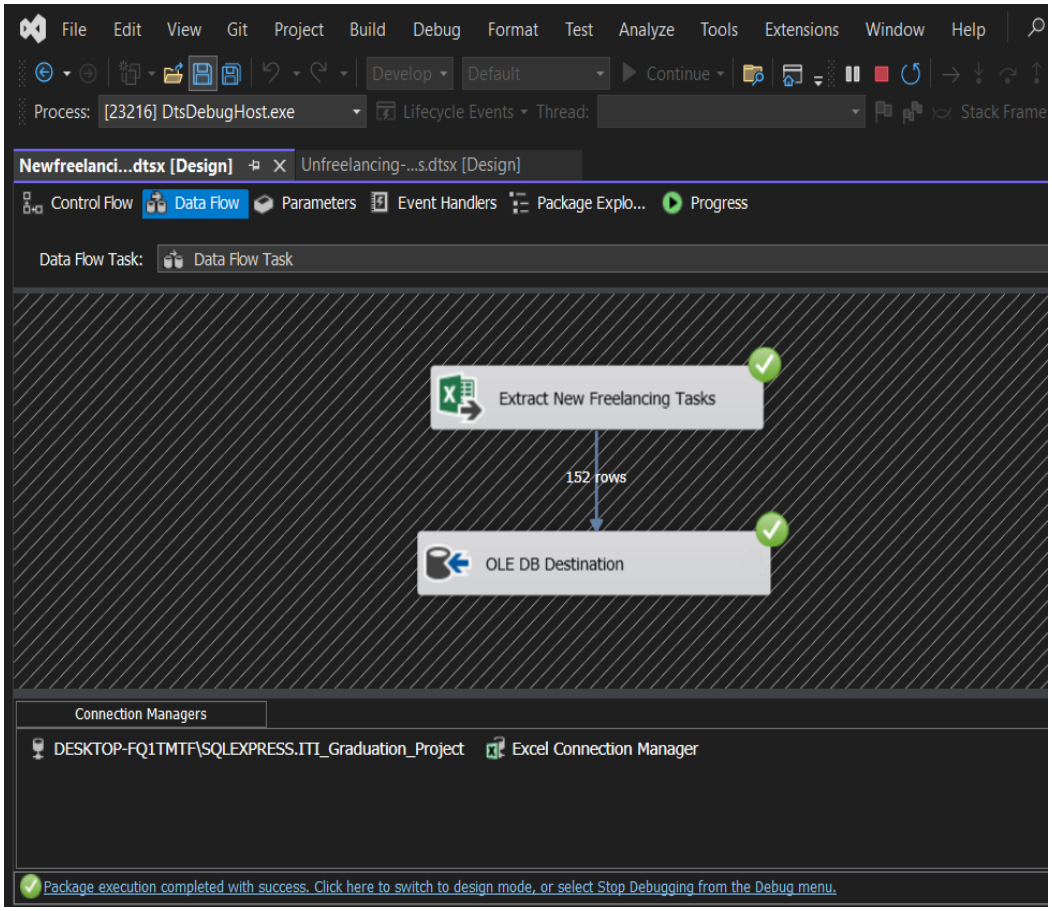
- **We build three rules to insure the data validation**
  - **Rule to check the phone is right**
  - **Rule to check the mail validation**
  - **Rule to check the salary > 0**

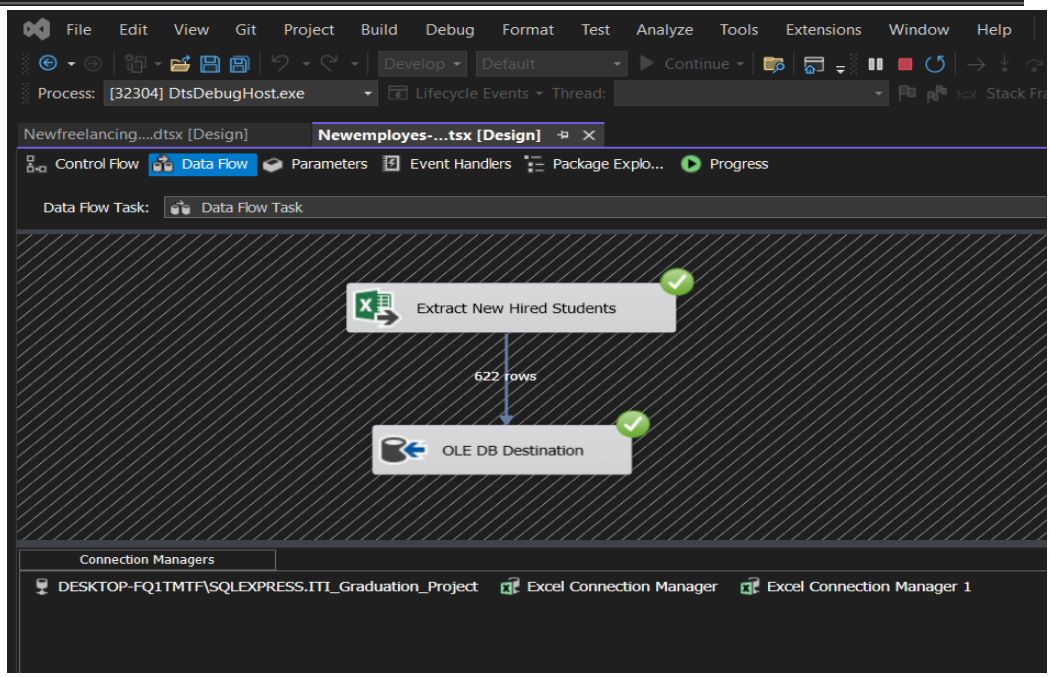
```
-- Rule --> The Student Phone Must Start with 010 / 011 / 012 / 015
CREATE RULE Student_Phone AS @value LIKE '01[0125]%'
SP_BINDRULE Student_Phone , 'Student.ST_Phone'


-- Rule --> Check The Student Email in The Right Form
CREATE RULE Student_Email AS @Email LIKE '%@%'
SP_BINDRULE Student_Email , 'Student.ST_Email'


-- Rule --> Check The Instructor Salary > 0
CREATE RULE Instructor_Salary AS @Salary > 0
SP_BINDRULE Instructor_Salary , 'Instructor.Salary'
```

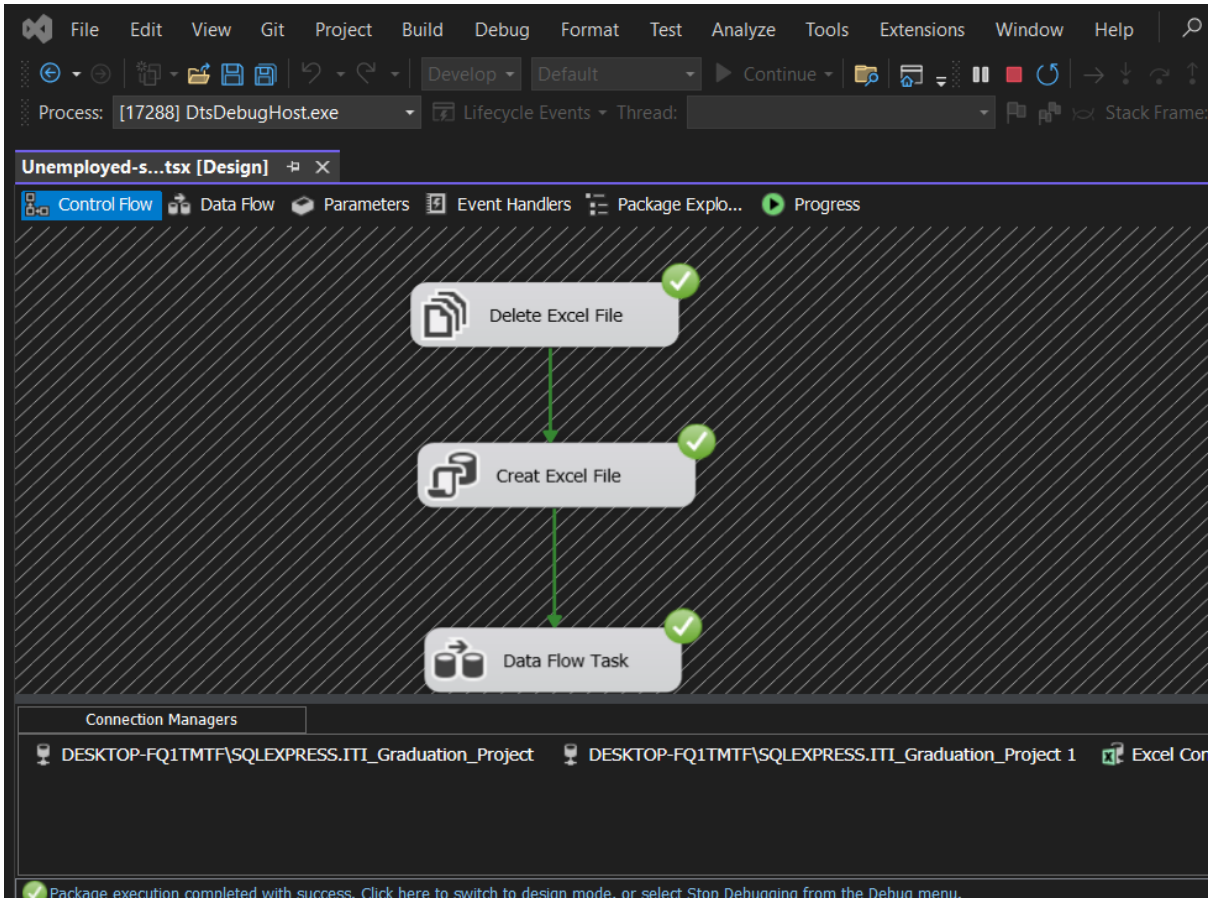
SSIS - ETL

- **We have build 4 SSIS packages ,**

- **the business logic is to follow up with the students that didn't find a job or didn't perform freelancing tasks**
- **Also to update the database with the new hired and the students that have done a freelancing tasks**



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Event Handlers
Package Explo...
Progress
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Creat Excel File
Data Flow Task
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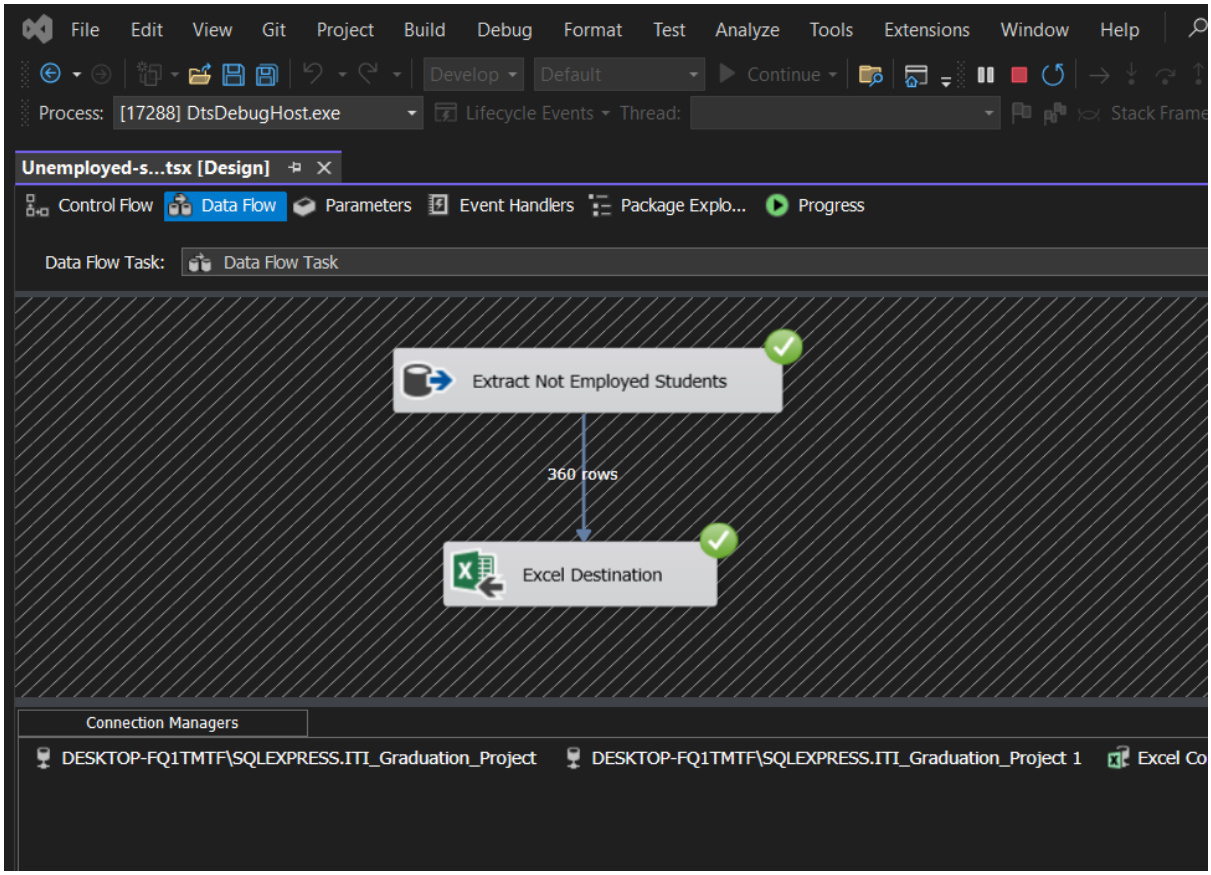
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Lifecycle Events
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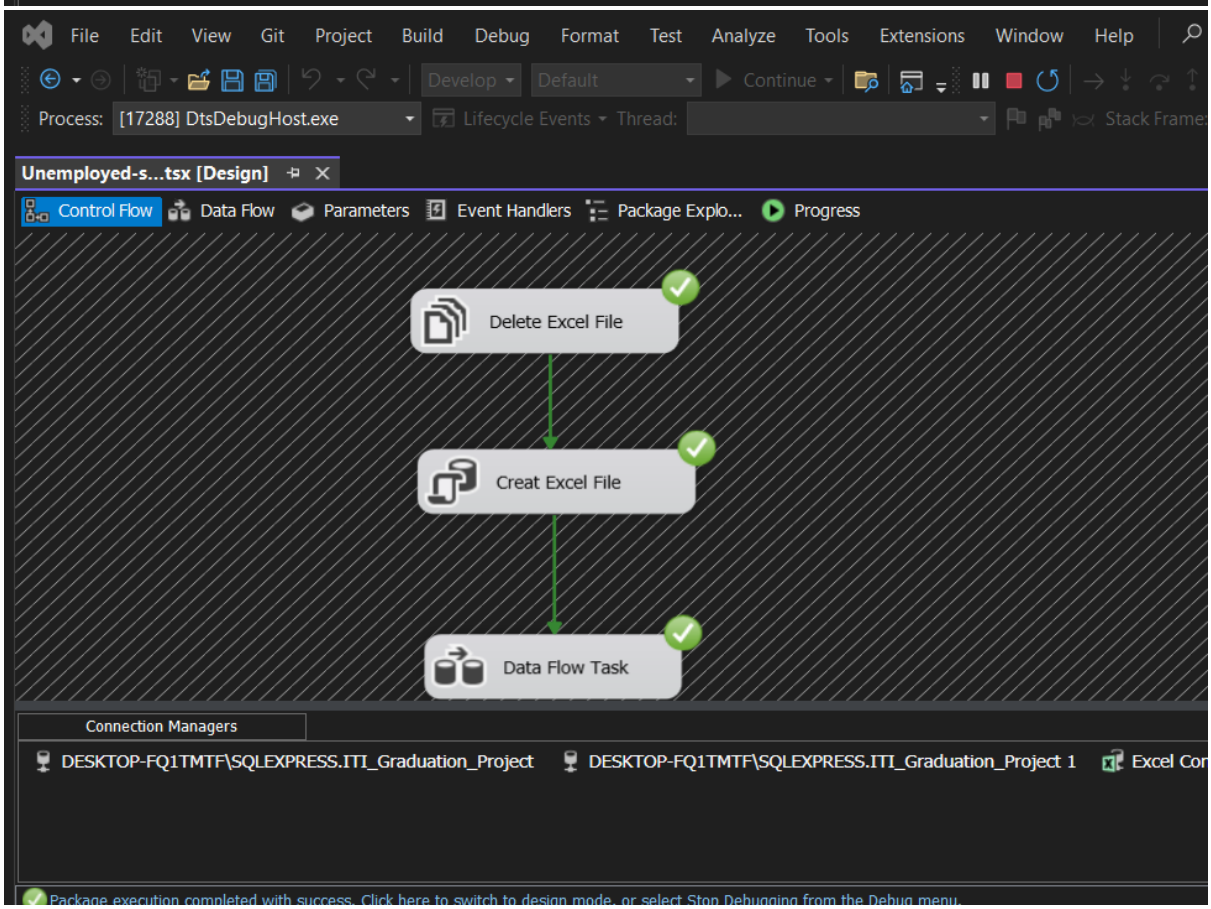
Control Flow
Data Flow
Parameters
Event Handlers
Package Explo...
Progress
Data Flow Task:
Data Flow Task
Extract Not Employed Students
360 rows
Excel Destination
Connection Managers
DESKTOP-FQ1TMTF\SQLEXPRESS.ITI_Graduation_Project
DESKTOP-FQ1TMTF\SQLEXPRESS.ITI_Graduation_Project 1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Process: [17288] DtsDebugHost.exe
Lifecycle Events
Thread:
Unemployed-s...tsx [Design]
Control Flow
Data Flow
Parameters
Event Handlers
Package Explo...
Progress
Delete Excel File
Creat Excel File
Data Flow Task
Connection Managers
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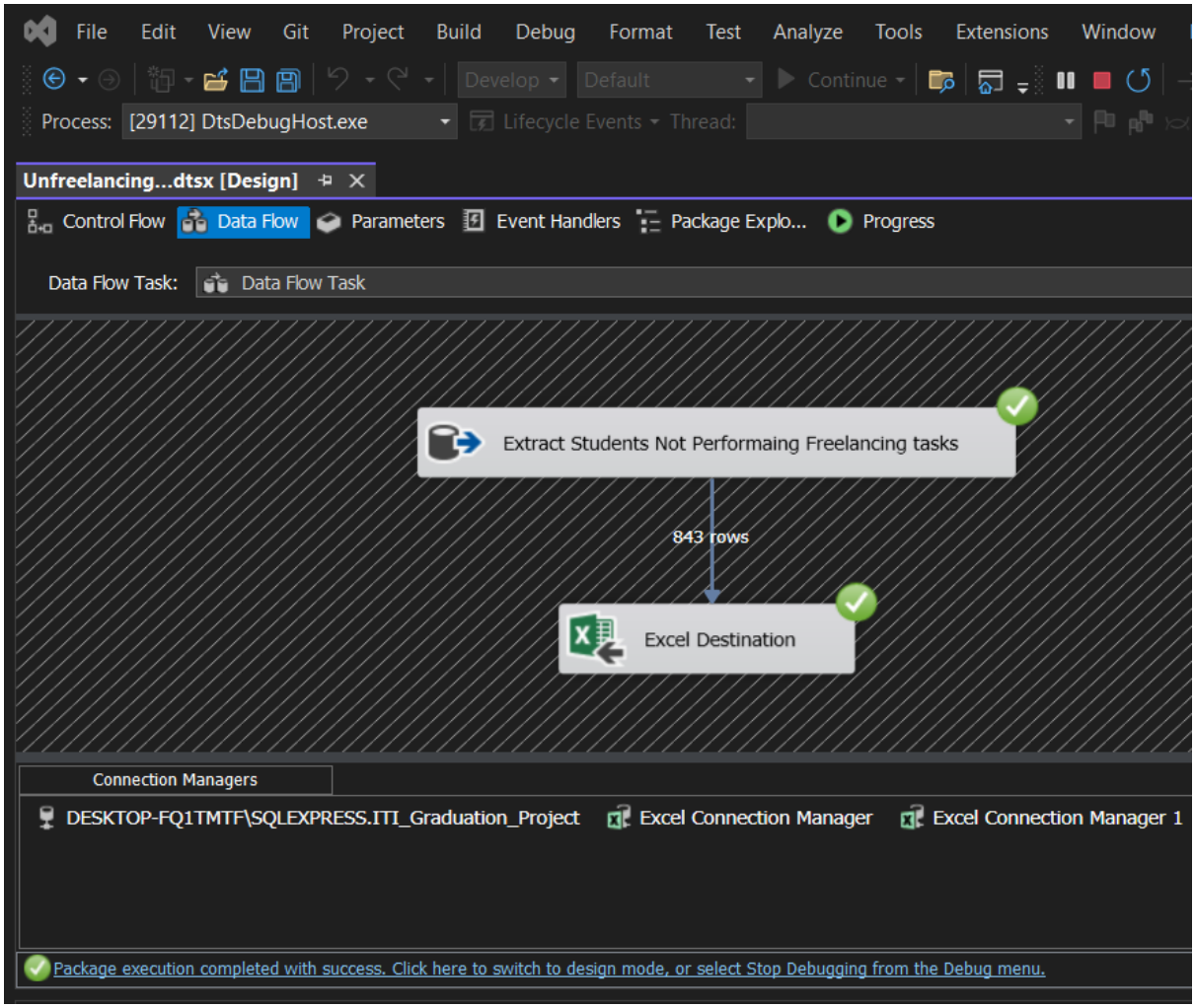
Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.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Develop
Default
Continue
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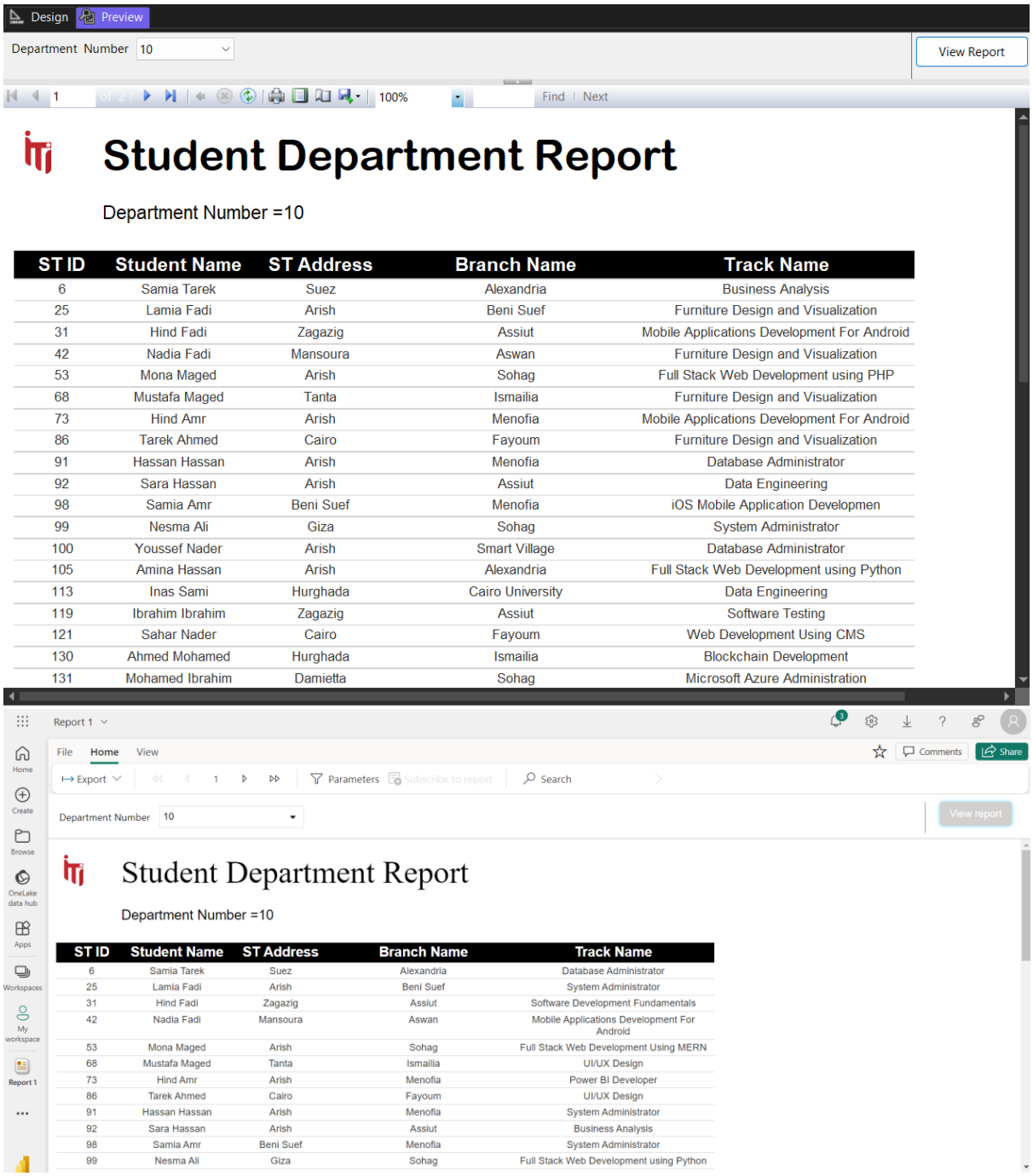
Lifecycle Events
Thread:
Unfreelancing...dtsx [Design]
Control Flow
Data Flow
Parameters
Event Handlers
Package Explo...
Progress
Data Flow Task:
Data Flow Task
Extract Students Not Performaing Freelancing tasks
843 rows
Excel Destination
Connection Managers
DESKTOP-FQ1TMTF\SQLEXPRESS.ITI_Graduation_Project
Excel Connection Manager
Excel Connection Manager 1
Package execution completed with success. Click here to switch to design mode, or select Stop Debugging from the Debug menu.

SSRS

Report 1-

Report that returns the students information according to Department No parameter



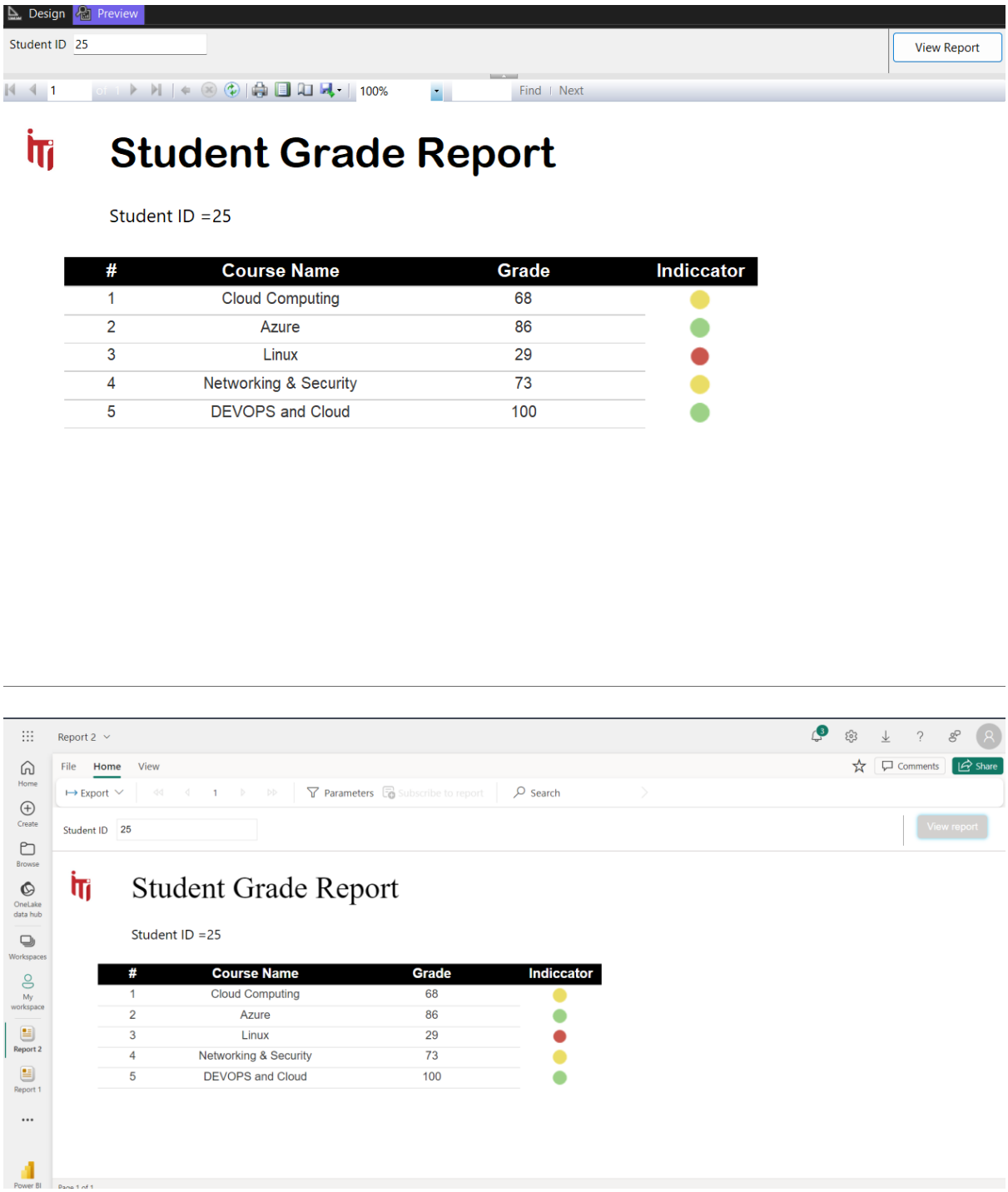
ST ID	Student Name	ST Address	Branch Name	Track Name
6	Samia Tarek	Suez	Alexandria	Business Analysis
25	Lamia Fadi	Arish	Beni Suef	Furniture Design and Visualization
31	Hind Fadi	Zagazig	Assiut	Mobile Applications Development For Android
42	Nadia Fadi	Mansoura	Aswan	Furniture Design and Visualization
53	Mona Maged	Arish	Sohag	Full Stack Web Development using PHP
68	Mustafa Maged	Tanta	Ismailia	Furniture Design and Visualization
73	Hind Amr	Arish	Menofia	Mobile Applications Development For Android
86	Tarek Ahmed	Cairo	Fayoum	Furniture Design and Visualization
91	Hassan Hassan	Arish	Menofia	Database Administrator
92	Sara Hassan	Arish	Assiut	Data Engineering
98	Samia Amr	Beni Suef	Menofia	iOS Mobile Application Developmen
99	Nesma Ali	Giza	Sohag	System Administrator
100	Youssef Nader	Arish	Smart Village	Database Administrator
105	Amina Hassan	Arish	Alexandria	Full Stack Web Development using Python
113	Inas Sami	Hurghada	Cairo University	Data Engineering
119	Ibrahim Ibrahim	Zagazig	Assiut	Software Testing
121	Sahar Nader	Cairo	Fayoum	Web Development Using CMS
130	Ahmed Mohamed	Hurghada	Ismailia	Blockchain Development
131	Mohamed Ibrahim	Damietta	Sohag	Microsoft Azure Administration

ST ID	Student Name	ST Address	Branch Name	Track Name
6	Samia Tarek	Suez	Alexandria	Database Administrator
25	Lamia Fadi	Arish	Beni Suef	System Administrator
31	Hind Fadi	Zagazig	Assiut	Software Development Fundamentals
42	Nadia Fadi	Mansoura	Aswan	Mobile Applications Development For Android
53	Mona Maged	Arish	Sohag	Full Stack Web Development Using MERN
68	Mustafa Maged	Tanta	Ismailia	UI/UX Design
73	Hind Amr	Arish	Menofia	Power BI Developer
86	Tarek Ahmed	Cairo	Fayoum	UI/UX Design
91	Hassan Hassan	Arish	Menofia	System Administrator
92	Sara Hassan	Arish	Assiut	Business Analysis
98	Samia Amr	Beni Suef	Menofia	System Administrator
99	Nesma Ali	Giza	Sohag	Full Stack Web Development using Python

Report Deployed on Power BI Workspace

Report 2-

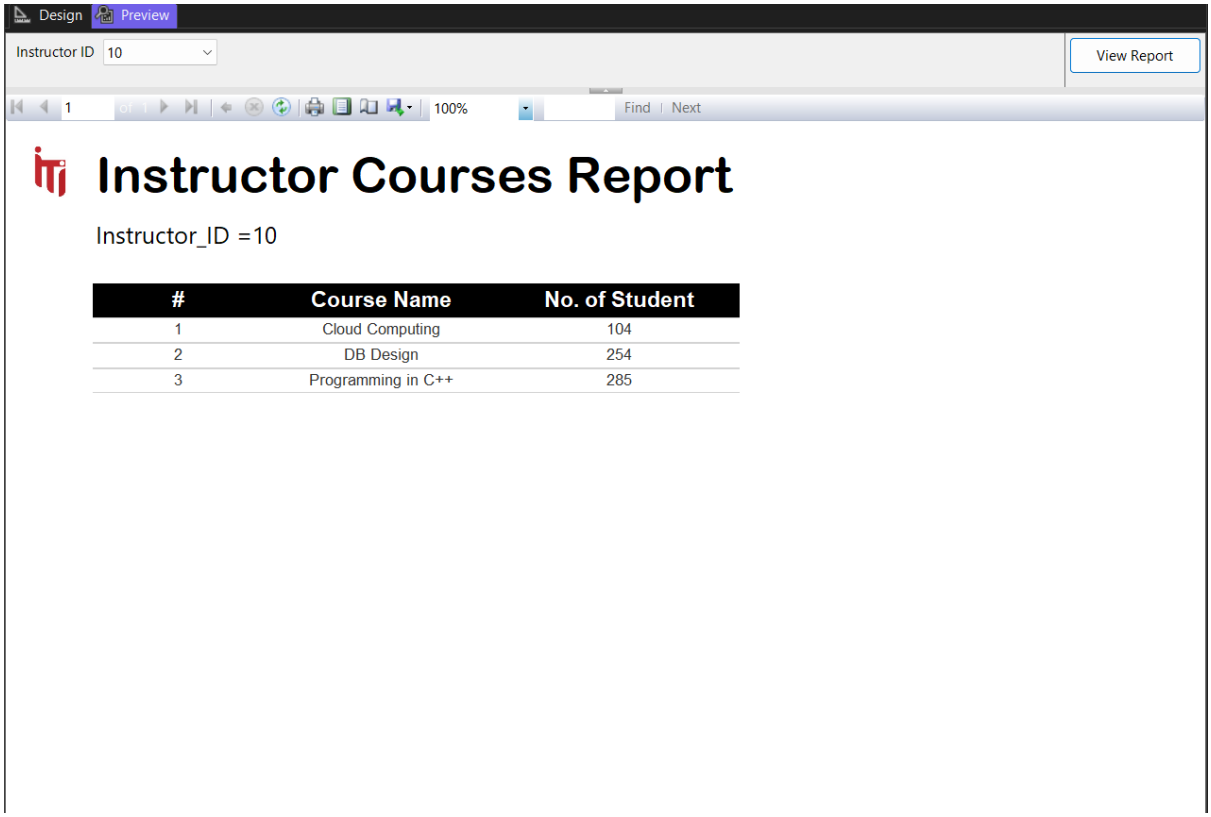
Report that takes the student ID and returns the grades of the student in all courses.

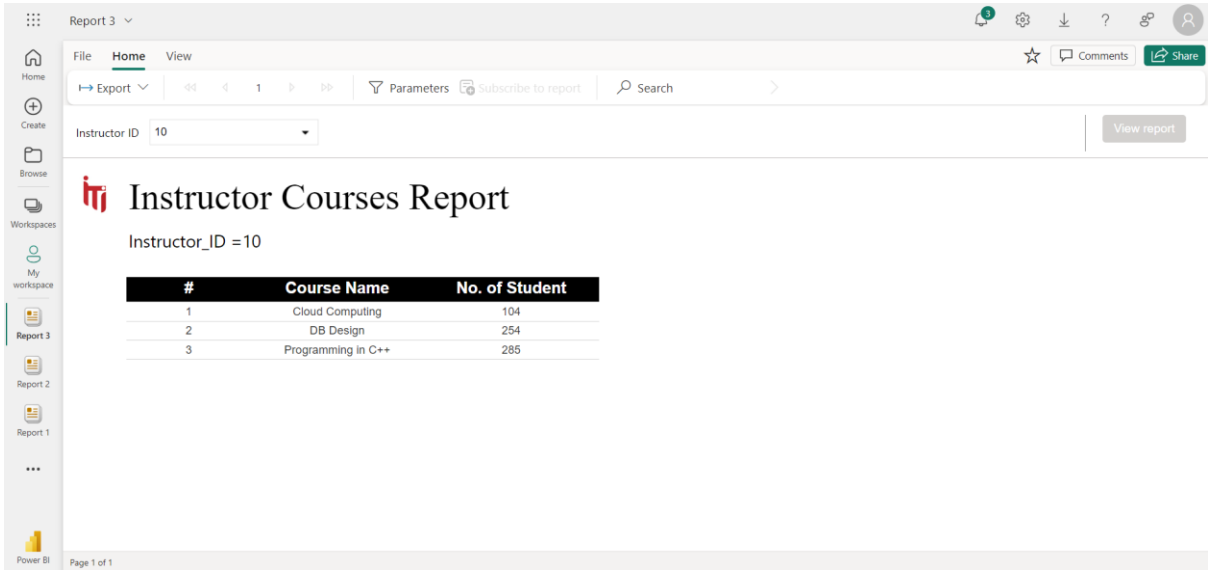


Report Deployed on Power BI Workspace

Report 3-

takes the instructor ID and returns the name of the courses that he teaches and the number of students per course.

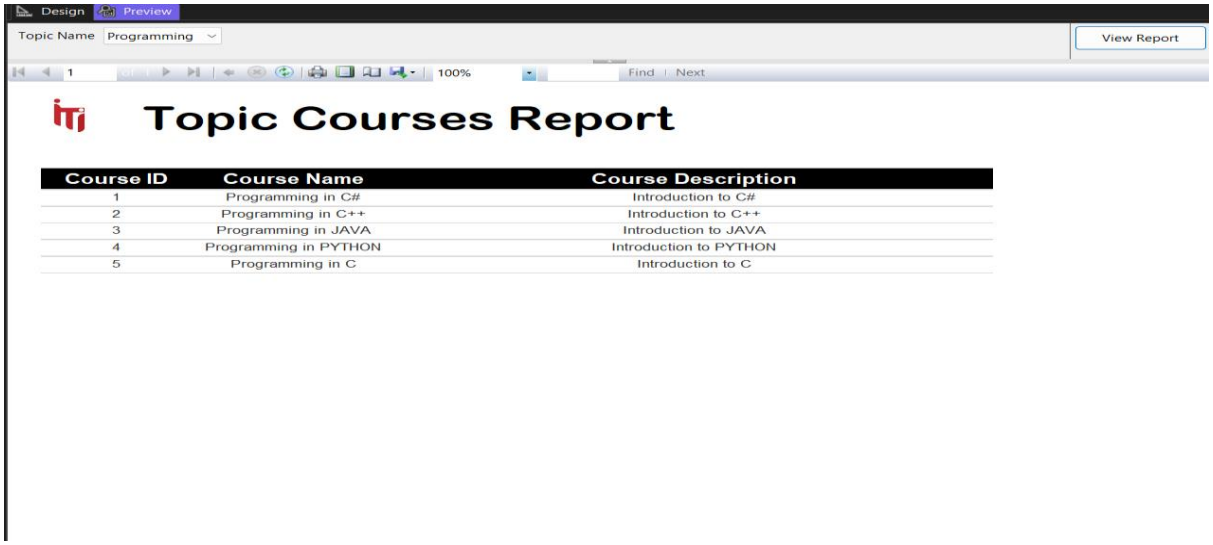




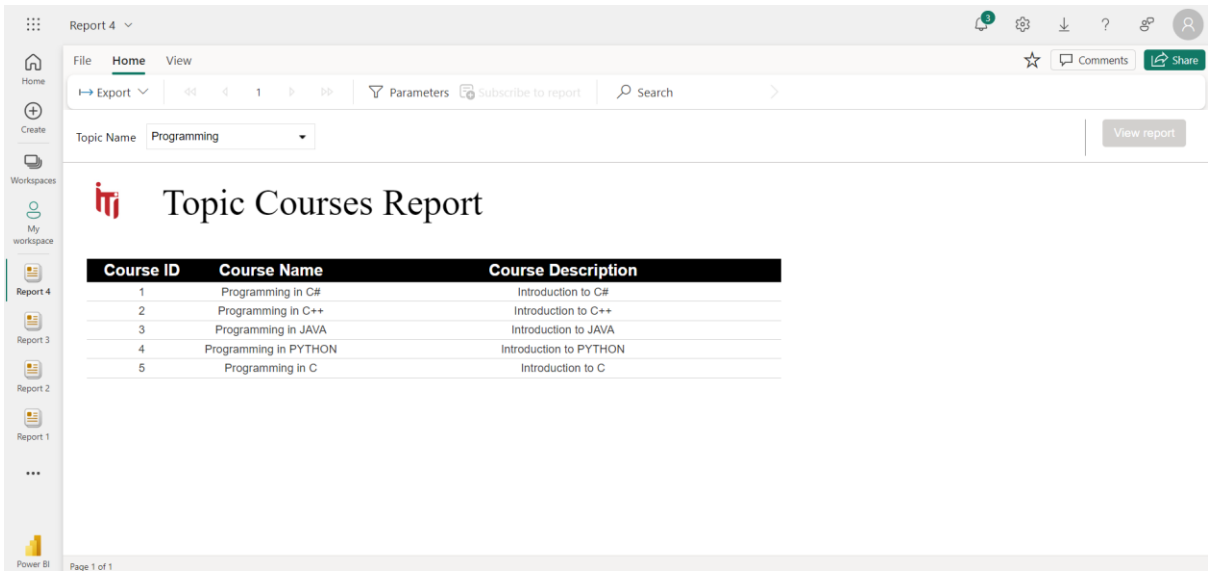
Report Deployed on Power BI Workspace

Report 4-

Report that takes Topic ID and returns its Courses



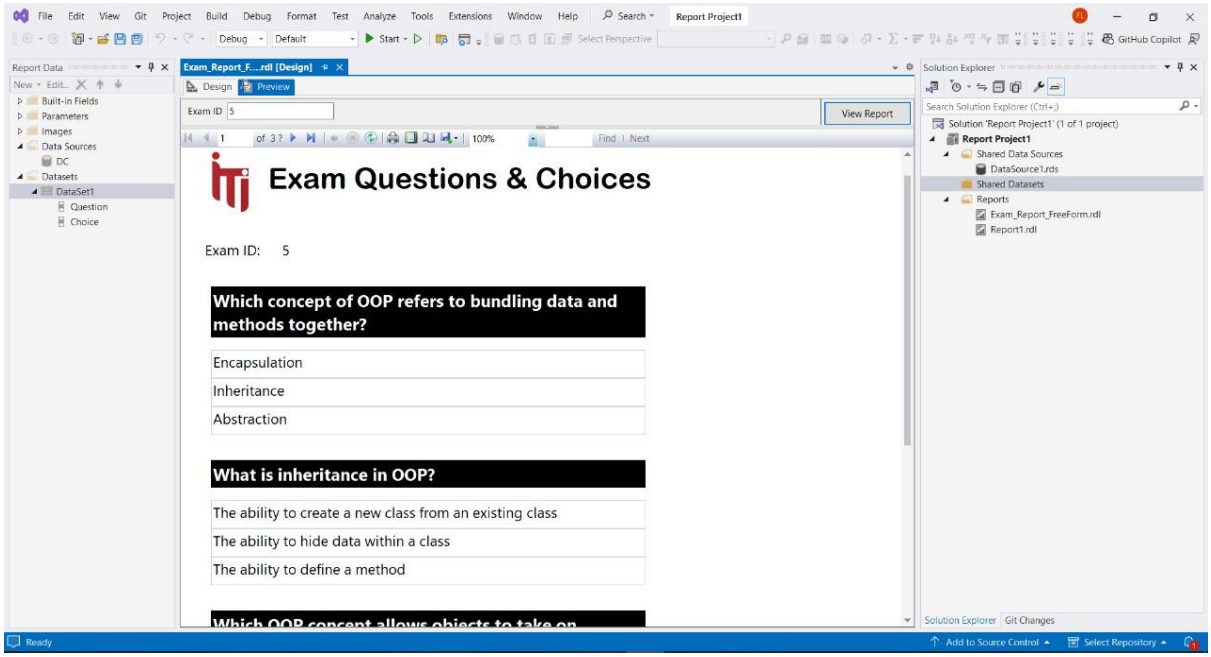
Course ID	Course Name	Course Description
1	Programming in C#	Introduction to C#
2	Programming in C++	Introduction to C++
3	Programming in JAVA	Introduction to JAVA
4	Programming in PYTHON	Introduction to PYTHON
5	Programming in C	Introduction to C

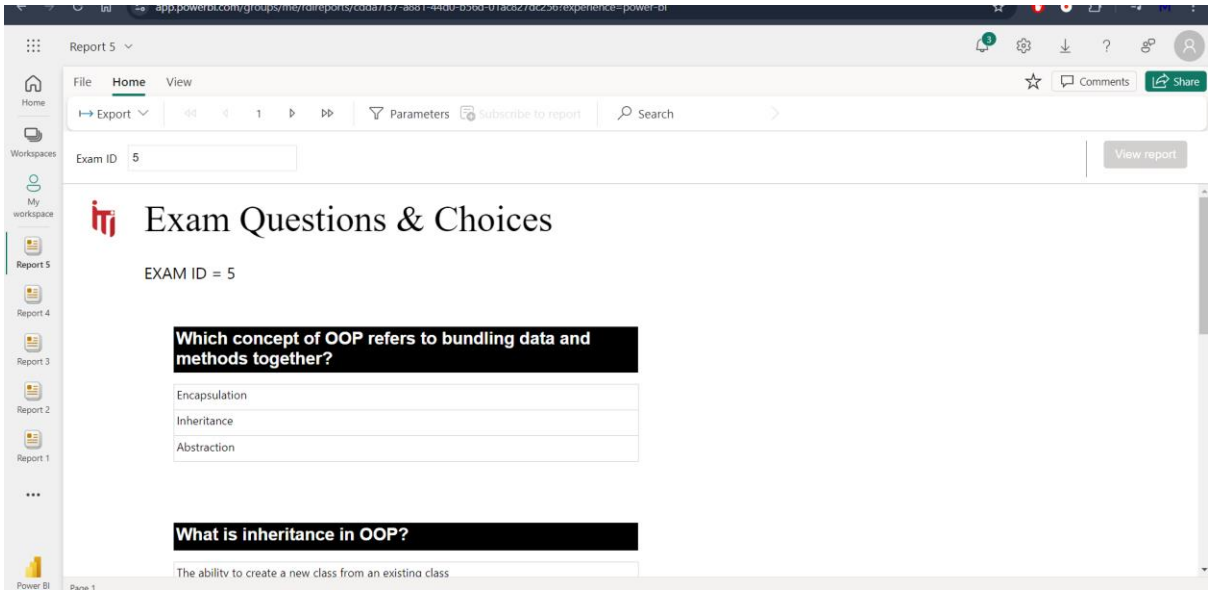


Report Deployed on Power BI Workspace

Report 5-

Report that takes exam number and returns the Questions in it and choices [freeform report]

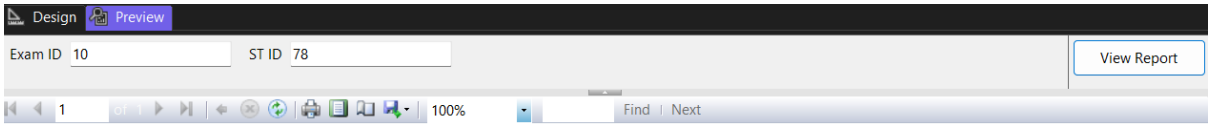




Report Deployed on Power BI Workspace

Report 6-

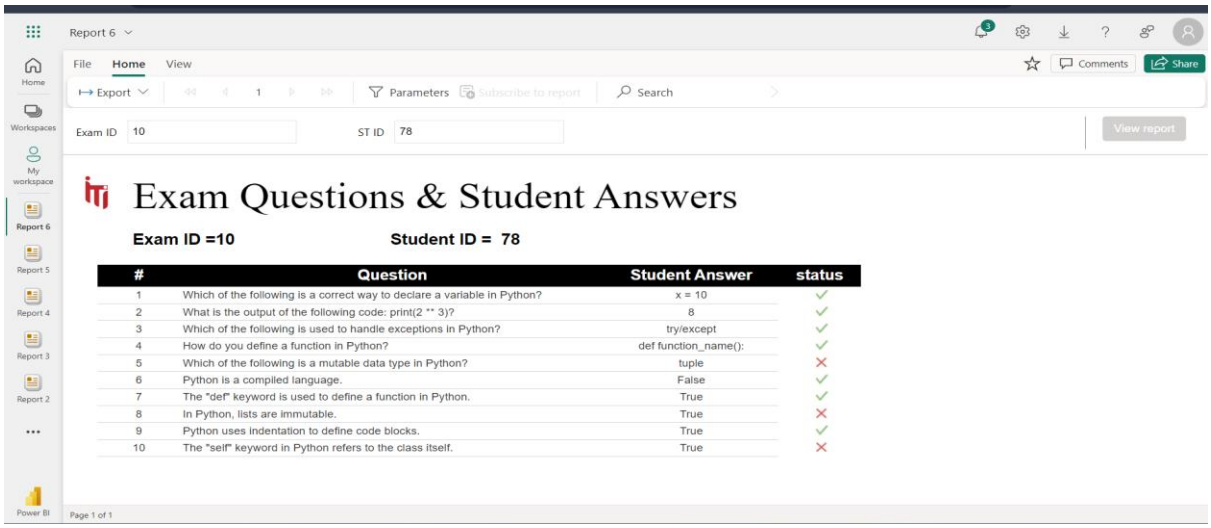
Report that takes exam number and the student ID then returns the Questions in this exam with the student answers.



Exam Questions & Student Answers

Exam ID =10 **Student ID = 78**

#	Question	Student Answer	status
1	Which of the following is a correct way to declare a variable in Python?	x = 10	✓
2	What is the output of the following code: print(2 ** 3)?	8	✓
3	Which of the following is used to handle exceptions in Python?	try/except	✓
4	How do you define a function in Python?	def function_name():	✓
5	Which of the following is a mutable data type in Python?	tuple	✗
6	Python is a compiled language.	False	✓
7	The "def" keyword is used to define a function in Python.	True	✓
8	In Python, lists are immutable.	True	✗
9	Python uses indentation to define code blocks.	True	✓
10	The "self" keyword in Python refers to the class itself.	True	✗



Report Deployed on Power BI Workspace

Desktop App

- Building Desktop App Using Windows Forms App / .NET 8.0
- App mainly concerned with the Student registration and examination process
- First Form is to choose either to add new student or take an exam
- In case of choosing Exam Take
    - First Form is for entering the student ID (Only INT) and if the student ID not exist a message appears telling the user that this id Not Exist - Figure (a)
    - Second Form is for choosing one of the courses that the student already enrolled in only and entering the number of the mcq and true/false questions with total 10 questions only Figure (b)
    - Third Form displaying the questions and the choice for each question and at the end of the exam a message box display that the exam completed successfully
- In the back-end we invoke two procedure at the beginning we invoke exam generation procedure that generate the exam questions and get the choices for each question Figure (c)
- While student answering the questions the answers captured and inserted in the student solution table
- After the exam completion the exam correction procedure run and check the student answer if correct or not and calculate grade then update the exam grade in exam table
- In case of choosing Student Registration
    - A registration form appear to make user enter his metadata
- In case student didn't enter all data
    - a message box appear telling him to enter all the data fields
- After entering all the data values a stored procedure (Insert-student) run and add the new student

Snapshots

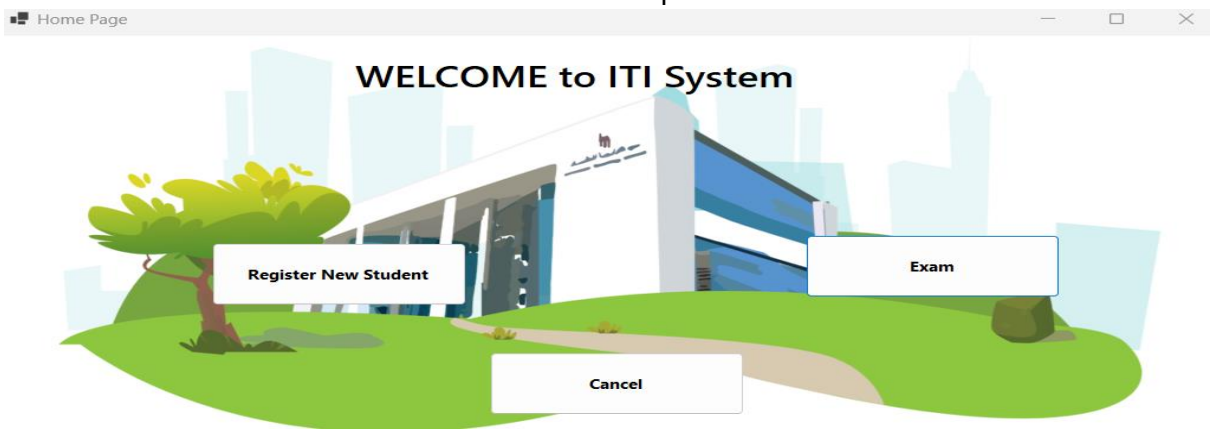


Fig - A (Home Page)

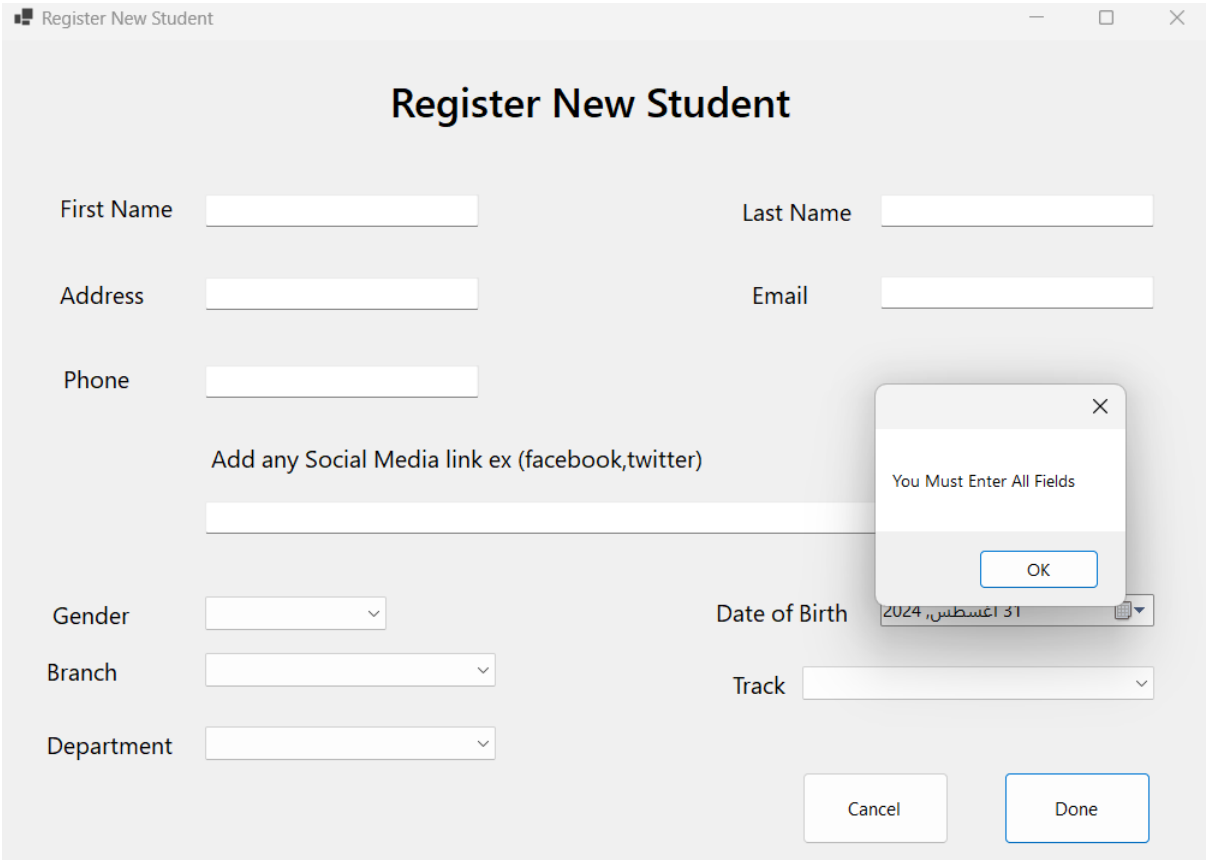


Fig - B

(User Choose Register New Student and didn't enter any data)

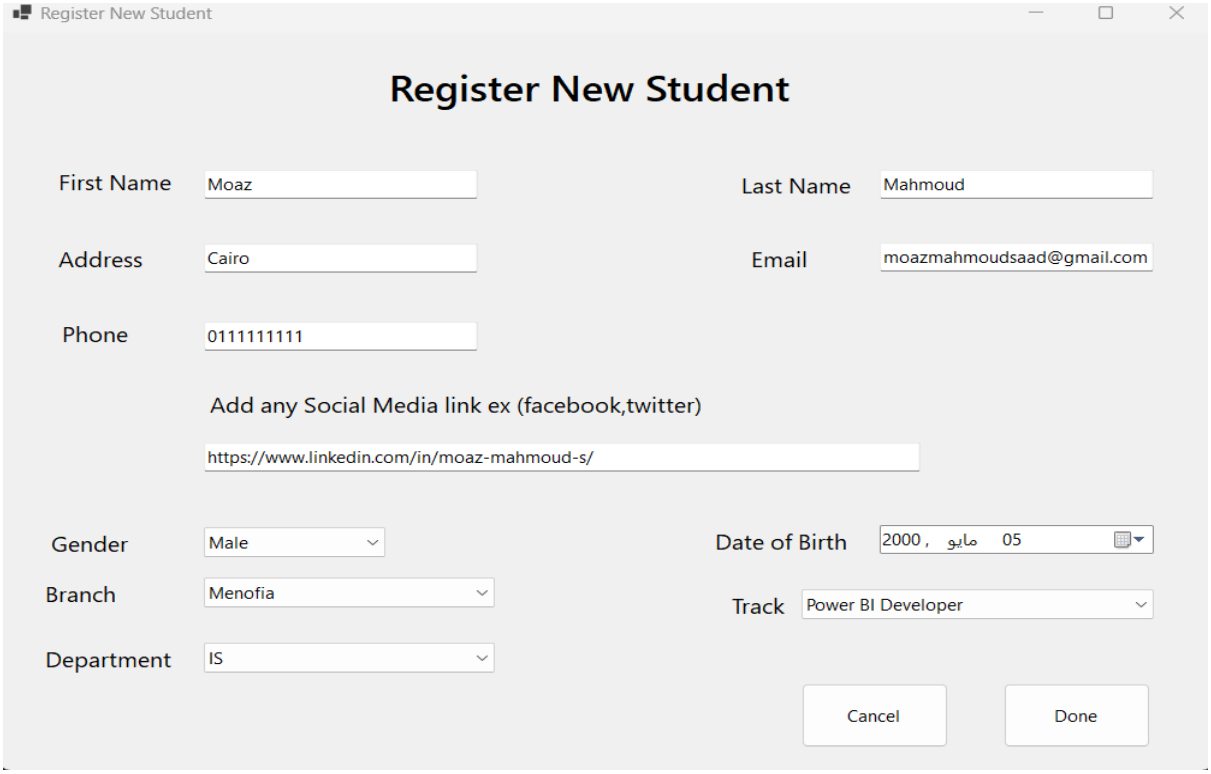


Fig - C

(User Enter Valid Data in all fields)

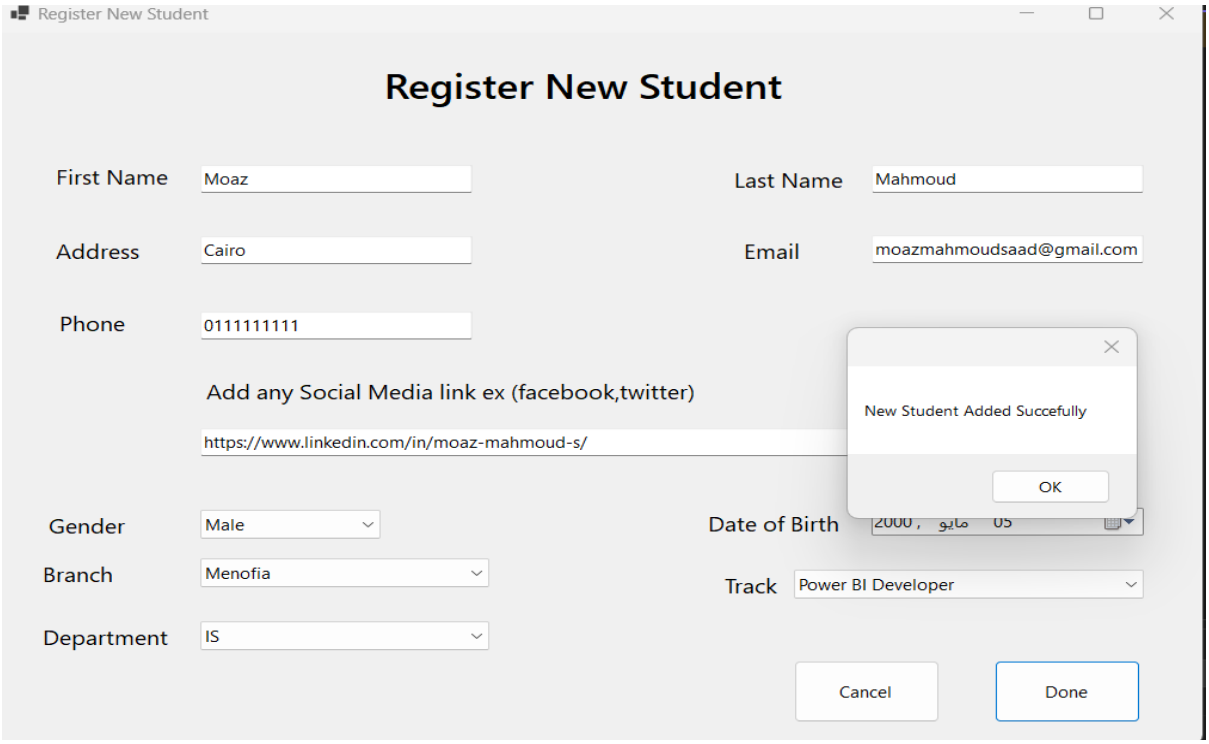


Fig - D
(New Student Inserted in the DB)

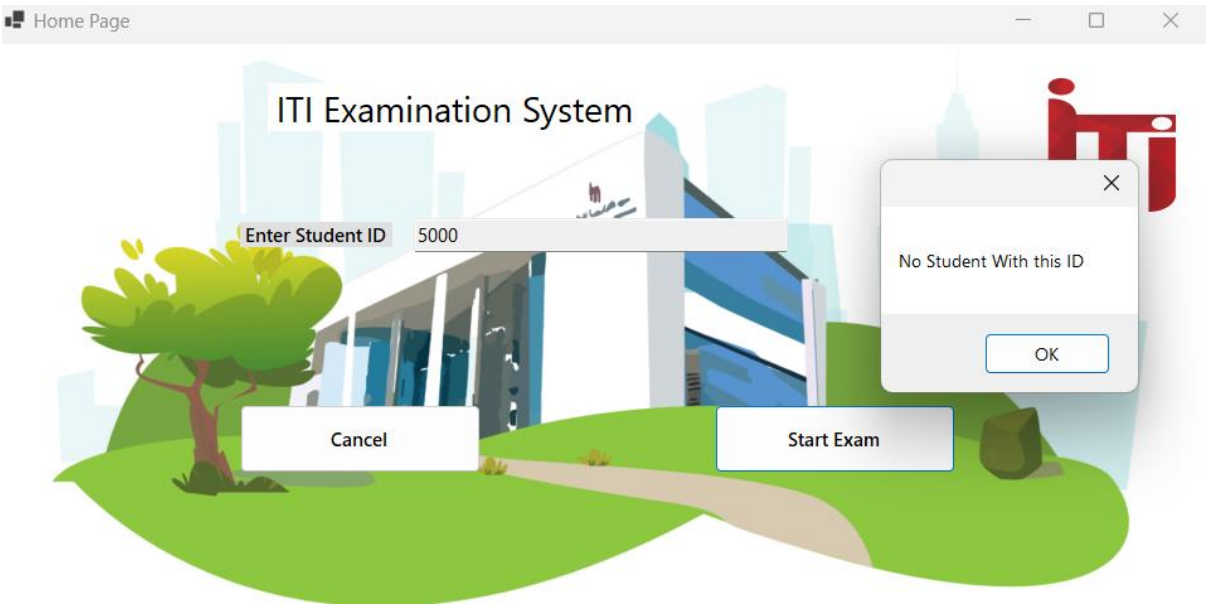


Fig - E
(User Choose Start Exam and enter id not exist)

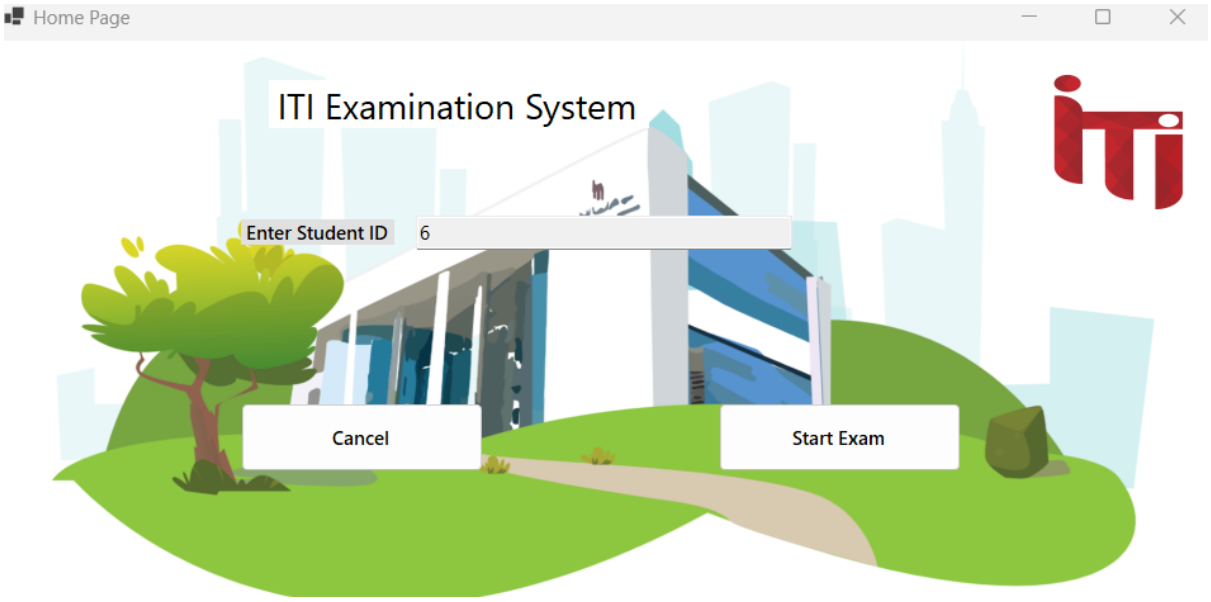


Fig - F
(If the id is correct)

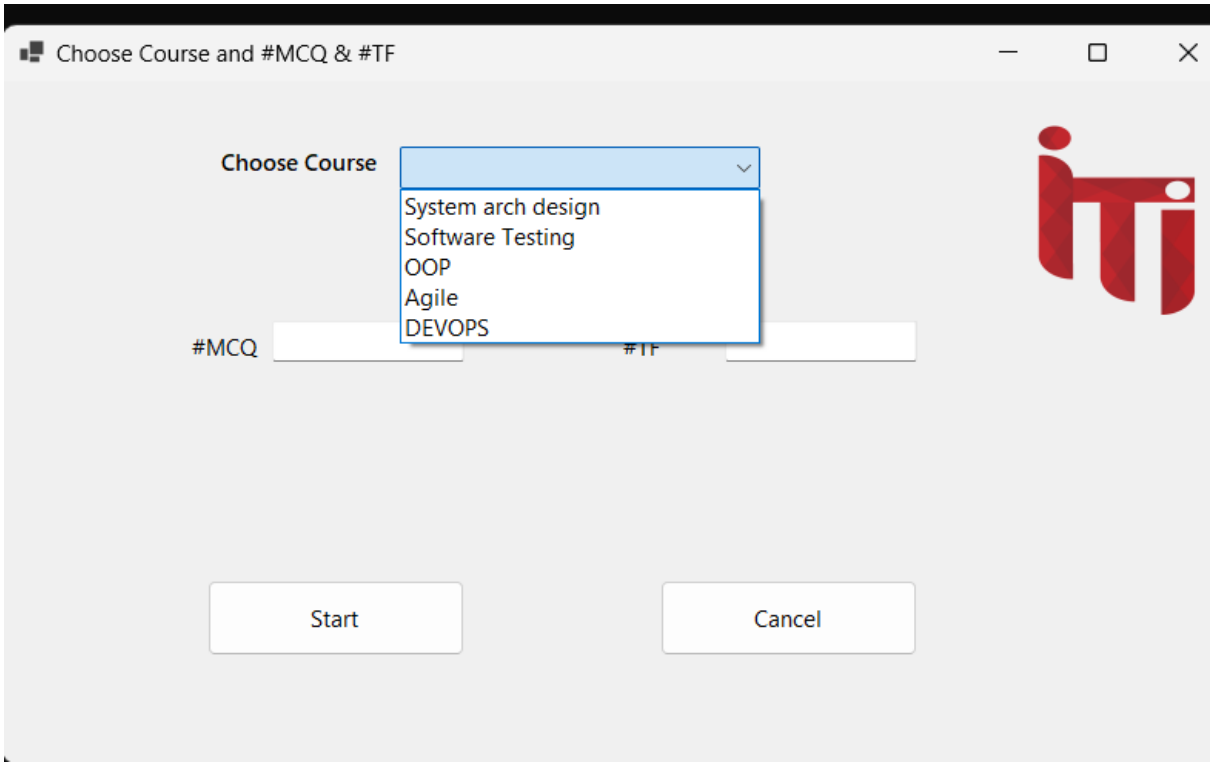


Fig - G
(A student can choose only the courses in which they are enrolled.)

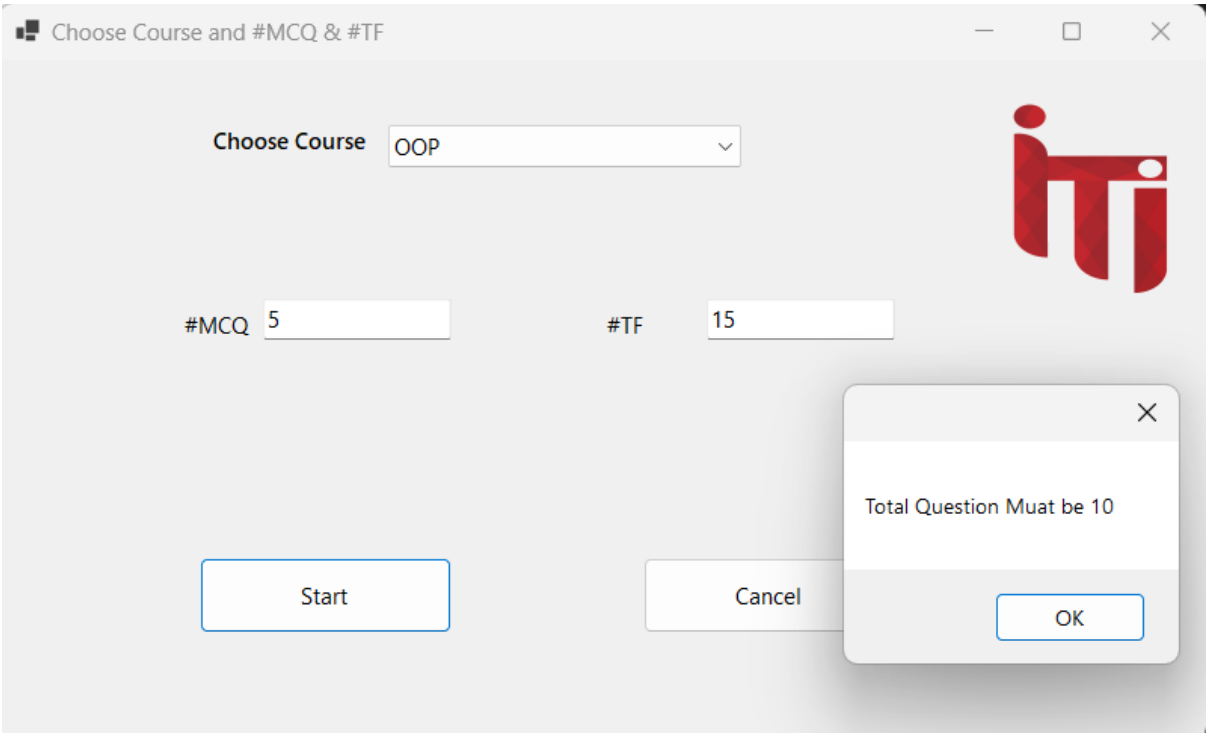


Fig - H
(Number of the questions only 10 not more or less.)

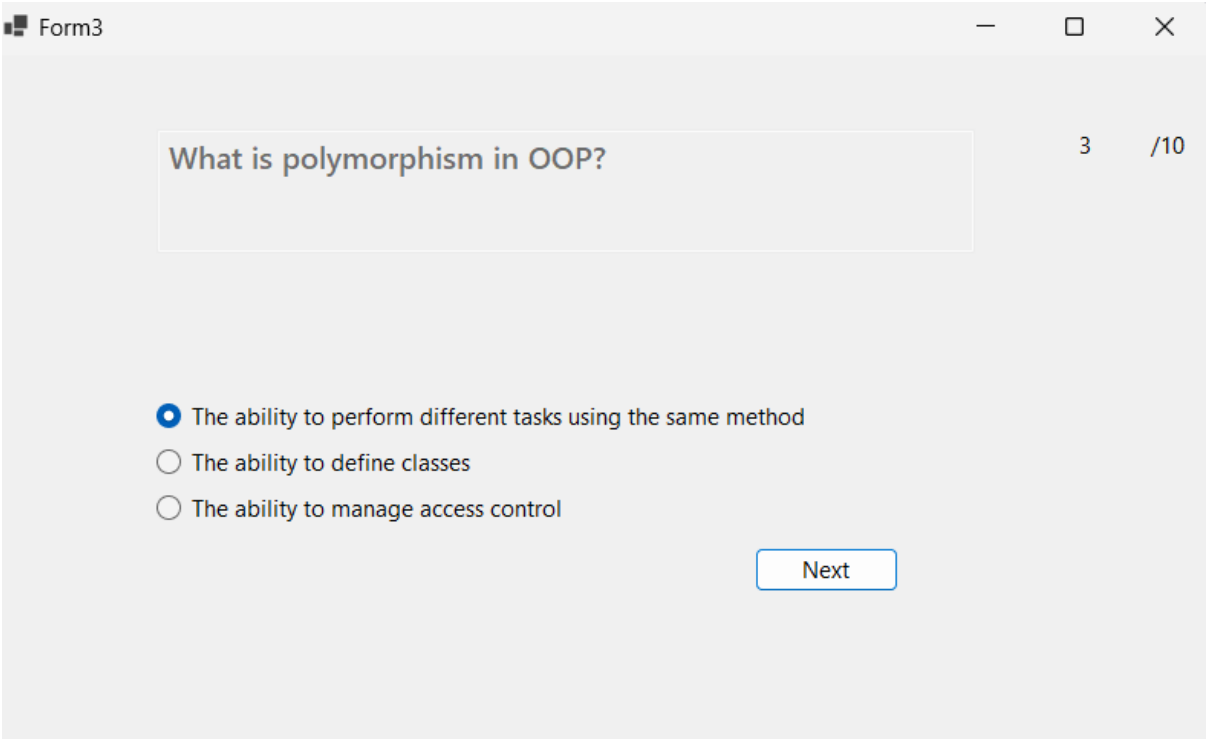


Fig - I
(Question sample)

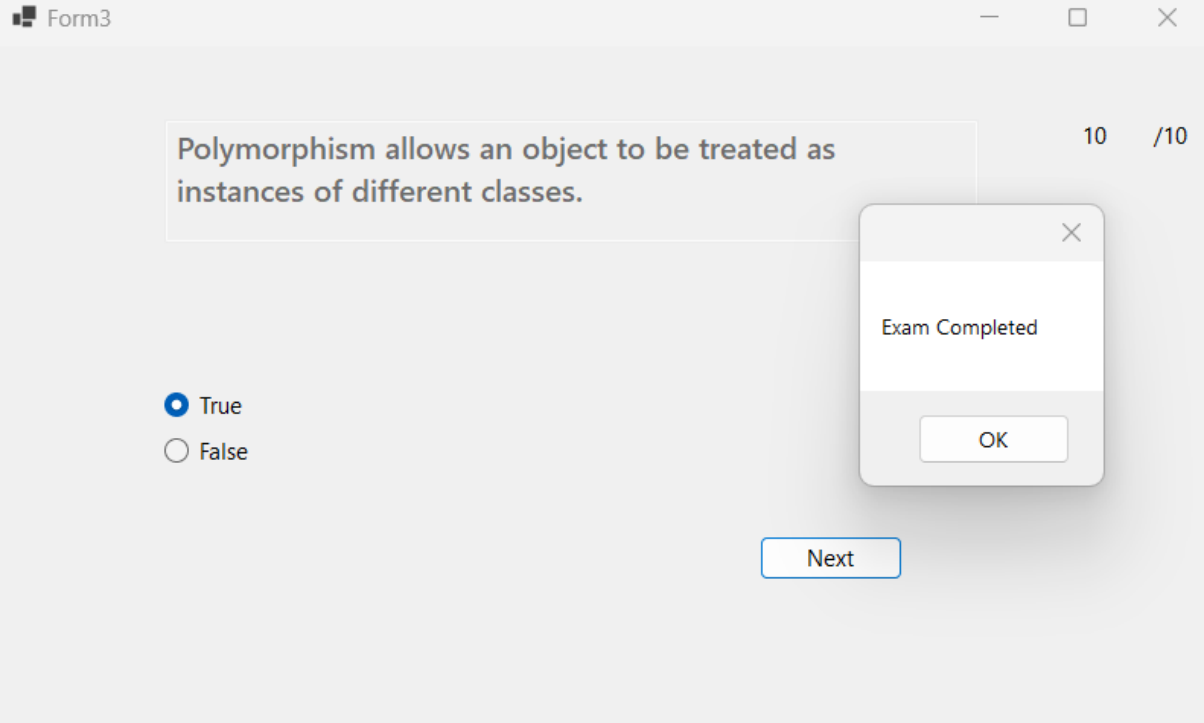


Fig - J
(Exam Compilation)

Desktop App - Test-Cases

Project Name: ITI Graduation Project

Test Case

Test Case ID: Login_1
Test Priority (Low/Medium/High): High
Module Name: Student login screen
Test Title: Verify login with valid student ID
Description: Test the student login page

Test Designed by: Muaz
Test Designed date: 24/8/2024
Test Executed by: Muaz
Test Execution date: 24/8/2024

Pre-conditions: User has valid ID

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to login Form	ID = 6	Student should be able to login	User is navigated to	Pass	
2	Provide valid Student ID			The second form		
3	Click on Start button					

Post-conditions:
User is validated with database and successfully login to account. The Student Registered Courses retrieved from the database and displayed in the second form

Test Case - 1

Project Name: ITI Graduation Project

Test Case

Test Case ID: Login_2
Test Priority (Low/Medium/High): High
Module Name: Student login screen
Test Title: Prevent login with invalid student ID
Description: Test the student login page

Test Designed by: Muaz
Test Designed date: 24/8/2024
Test Executed by: Muaz
Test Execution date: 24/8/2024

Pre-conditions: User enter invalid ID

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to login Form	ID = 5000	Student shouldn't be able to login	Message box appears telling invalid user id	Pass	
2	Provide valid Student ID					
3	Click on Login button					

Post-conditions:
The Student can't navigate to another form

Test Case - 2

Test Case

Test Case ID: Questions_2
Test Priority (Low/Medium/High): High
Module Name: #Questions_screen
Test Title: enter more than 10 question
Description: Test the form of entering the #questions

Test Designed by: Muaz
Test Designed date: 24/8/2024
Test Executed by: Muaz
Test Execution date: 24/8/2024

Pre-conditions: User enter more than 10 questions totally

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to second Form	#mcq=5 #tf=15	Student shouldn't be able to start the exam	Message box appears telling total question must be 10	Pass	
2	Student choose the course					
3	Student enter the number of TF and mcq question					

Post-conditions:
The student can't start the exam

Test Case - 3

Test Case

Test Case ID: Exam_1
Test Priority (Low/Medium/High): High
Module Name: #Exam_screen
Test Title: user didn't choose answer
Description: Test the form of answering exam questions

Test Designed by: Muaz
Test Designed date: 24/8/2024
Test Executed by: Muaz
Test Execution date: 24/8/2024

Pre-conditions: User didn't choose any answer

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to exam Form		Student shouldn't be able to navigate to the following question	Message box appears telling must choose an answer	Pass	
2	Student didn't choose any answer					
3	Student press next question					

Post-conditions:
The student can't navigate to following question

Test Case - 4

Test Case

Test Case ID: Registration_1
Test Priority (Low/Medium/High): High
Module Name: #Registration_screen
Test Title: user didn't enter data in data fields
Description: Test the form of registering new student

Test Designed by: Muaz
Test Designed date: 24/8/2024
Test Executed by: Muaz
Test Execution date: 24/8/2024

Pre-conditions: User didn't enter any data in the fields

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to home_Form		Message Box appear to inform hon to fill all the data fields	Message box appears telling must enter all the data	Pass	
2	User choose to register new student					
3	User didn't enter any data and click DONE Button					

Post-conditions:
New Student not inserted in the database

Test Case - 5

PowerBI - DashBoard

Dashboard	Description
- **Student Enrollment Overview Dashboard**	• Student enrollment trends over Track. • Student enrollment trends over Courses.
- **Course Performance Dashboard**	• Analyse student AVG grades across different courses. • Courses Distribution According to Topic. • All Courses Desc, Ins & Depts.
- **Instructor Performance Dashboard**	• Instructors Degrees & Distribution through Departments. • Highlight Instructors Salaries & # Courses.
- **Exam Analysis Dashboard**	• Analyze the exam - topic distribution and the exam progress over date • The count of the exams by top 5 courses • Show the grade segment (A,B,C,F) distribution
- **Department Overview Dashboard**	• Analyze the exam demographic in each department • Show the student distribution among departments • Show the exam count by departments • Display the instructors for rach department and their education degree
- **Freelancing Projects Dashboard**	• Track the students that perform and didn't perform the freelancing tasks • Display the total budget

	• The tasks trend overtime • The top 5 branches did the freelancing tasks
- **Job Placement Dashboard**	• Monitor job placements and analyse by job role and Salary. • Monitor job placements by Gender • Monitor job placements by local and multinational company • Monitor job placements by Branch and track
- **Branch Performance Dashboard**	• Branch by location • Branch by salary • Branch by course grade
- **Course Topic Popularity Dashboard**	• Topic & Course by students • Topic by grade
- **Student Demographics Dashboard**	• Visualize student demographics such as age, gender, and location. • Analyze demographic trends across different courses and branches.
- **Student Communication Dashboard**	• Track student communication details including email and phone. • Segment by branch, course, and department for targeted communication.
- **Instructor Qualifications Overview**	• Analyze the qualifications of instructors across different departments. • Compare instructor qualifications with student performance metrics.
- **Evaluation & Feedback Dashboard**	• Monitor student evaluations and feedback across different courses. • Analyze the impact of feedback on course and instructor performance**.**

- **Student Progress Tracking**	• Student Distribution into Branches & Tracks. • Top & Bottom Students by Total Grades through All Courses.
- **Job Role Analysis**	• Display the number of hired and not hired students • Top 5 hired job role • Top Hired Branches
- **OVERVIEW**	• Analyze all the data and give an overview of how it looks from above .
- **Company Dashboard**	• Analyze for each company the avg salary the gender distribution . • Top hired roles and branches
- **Address Analysis**	• Analyze student branch distribution . • Add Q&A Questions
- **Top 10 Students**	• Top student by branch, track and course
- **Freelancing Student Performance**	• Analyze students performance in freelancing tasks