Information Technology Institute

Examination System

Team-1-Graduation Project-Discussion

Information Technology Institute

Examination System

Graduation Project Discussion

Our team

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Content overview

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Introduction

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Database

SQL Server

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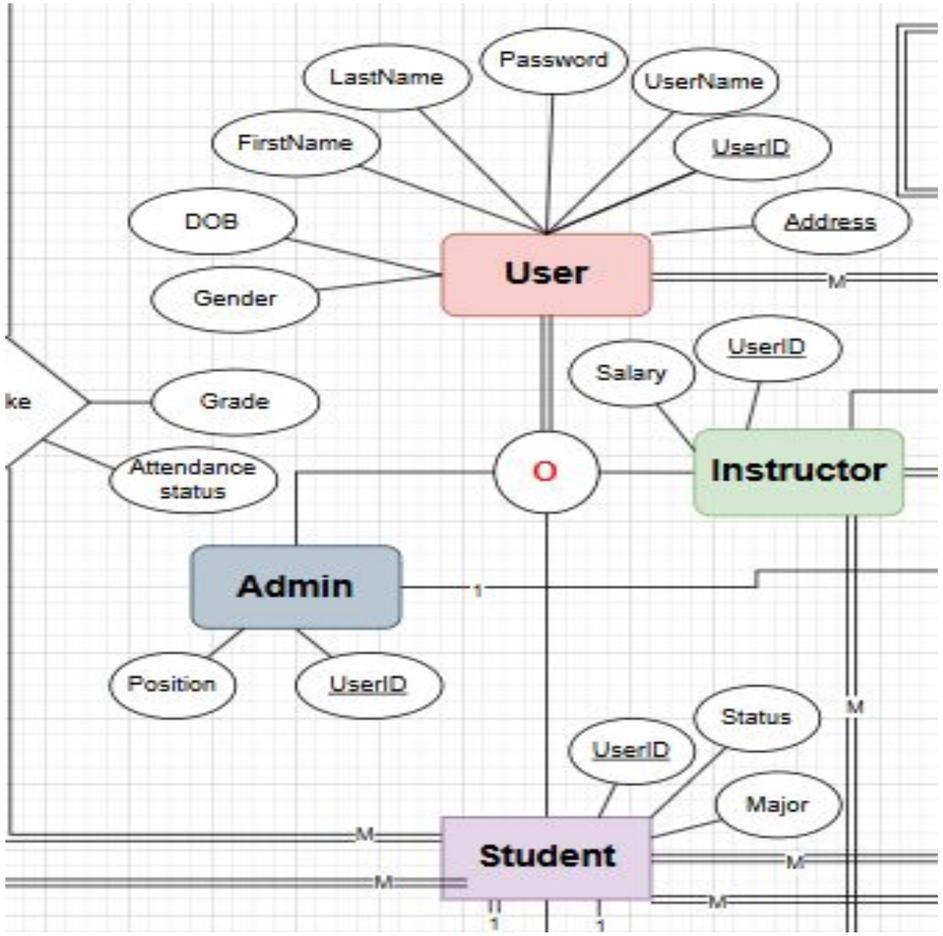
Database | ERD

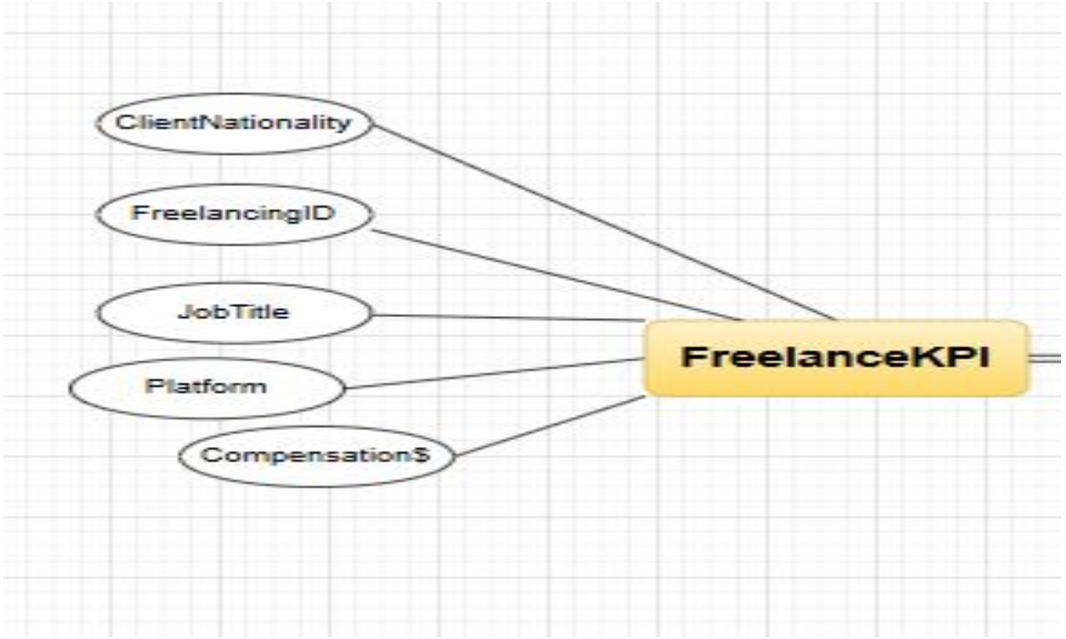
Enhanced ERD

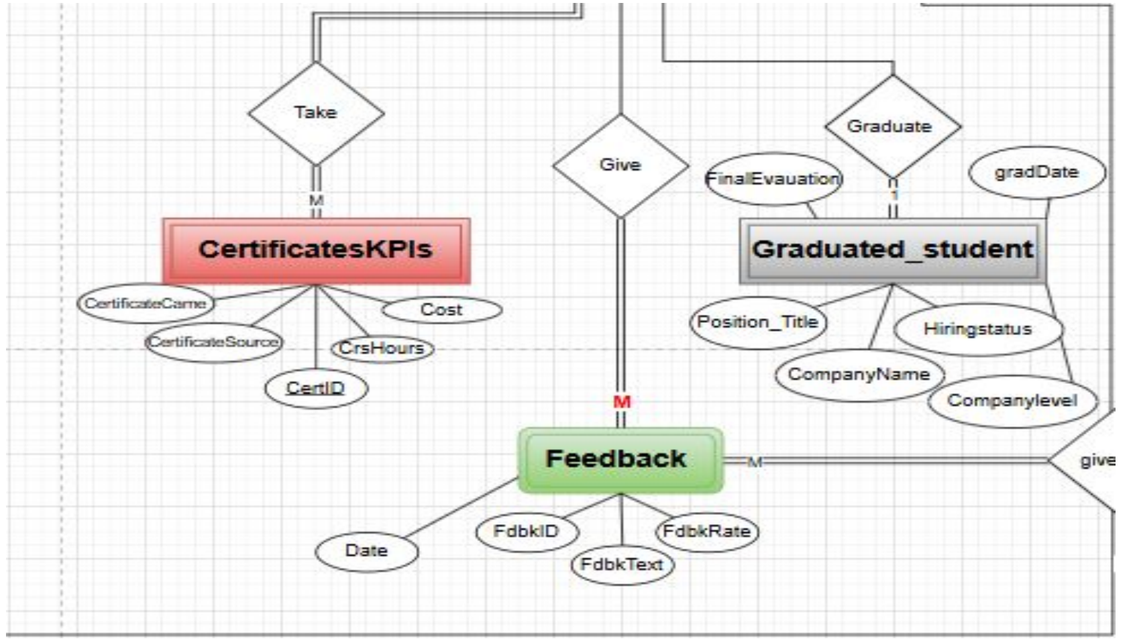
- **User as Supertype:** Centralizes common attributes for all user types.
- **Inheritance Model:** Instructor, Admin, Student inherit from User.
- **Role Management:** Efficiently handles distinct user roles through specialization.



Database | ERD

- **Freelance & Certificate KPIs:** Quantifying professional development.
- **Feedback & Student Tracking:** Gathering insights and monitoring outcomes.
- **Data-Driven Decisions:** Informing improvements based on these entities.





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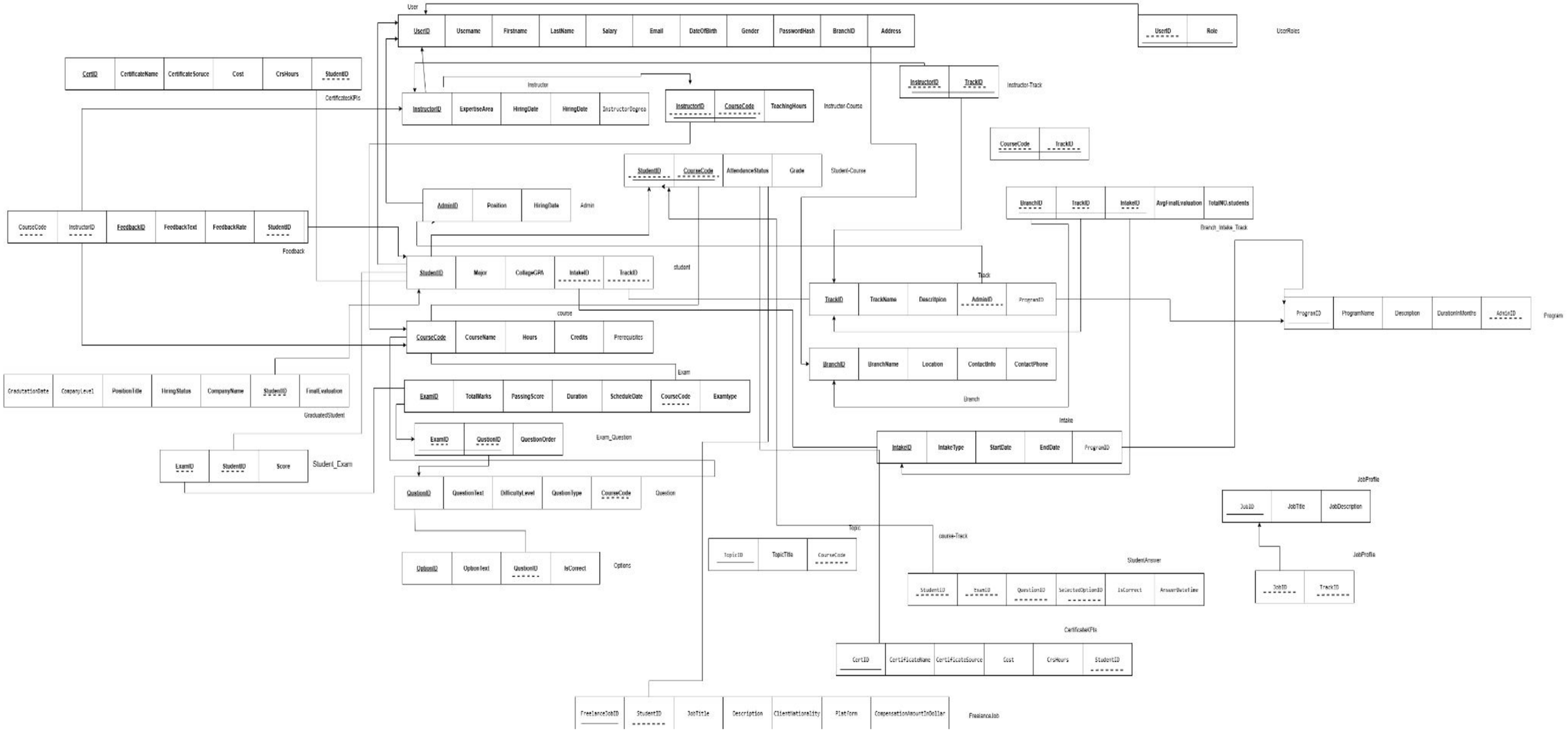
Database | Mapping



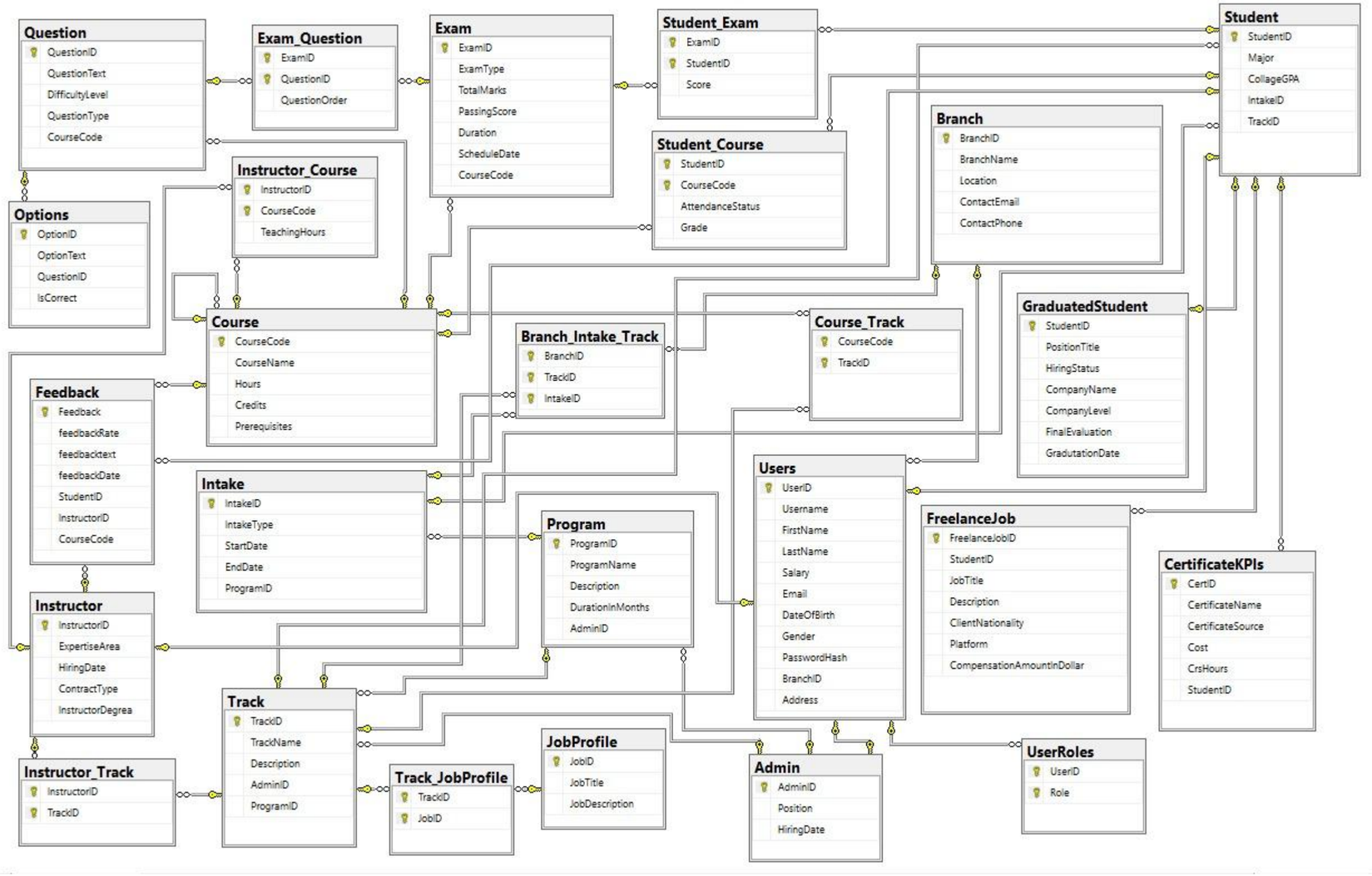
Database | Implimentation

Logical-to-Physical Mapping:

ERD translated into a functional SQL schema.

Normalized Database:

Designed for reduced redundancy and consistency.



Data Generation

- **Realistic Data Generation:** Used Faker to create lifelike test data.
- **Populating Databases:** Efficiently filled our schema with diverse entries.
- **Development & Testing:** Crucial for robust application validation.

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Stored Procedure

SQL Server

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Stored Procedure

What Are Stored Procedures?

- Stored Procedures are precompiled SQL scripts stored in the database that perform specific tasks such as Insert, Update, Delete, or complex operations.

Stored Procedure

Why We Used Stored Procedures?

- Improve performance
- Ensure consistency
- Separate logic from the application
- Enhance security and prevent SQL Injection
- Make testing and maintenance easier

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Stored Procedure

1 Branch Stored Procedures?

- Add new branches
- Update branch info
- Delete a branch if needed
- Retrieve all available branches
- Retrieve specific branch

2 Certificate Stored Procedures?

- Add New Certificate
- Update Certificate Info
- Delete a Certificate if needed
- Retrieve all Certificate
- Retrieve specific Certificate

3 Course Stored Procedures?

- Add new Course
- Update Course info
- Delete a Course if needed
- Retrieve all available Courses
- Retrieve specific Course

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Stored Procedure

4 Intake Stored Procedures?

- Add new Intakes
- Update Intake info
- Delete a Intake if needed
- Retrieve all available Intakes
- Retrieve specific Intake

5 Topic Stored Procedures?

- Add New Topics
- Update Topic Info
- Delete a Topic if needed
- Retrieve all Topic
- Retrieve specific Topic

6 Track Stored Procedures?

- Add new Tracks
- Update Track info
- Delete a Track if needed
- Retrieve all available Tracks
- Retrieve specific Track

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Stored Procedure

7

User Stored Procedures?

- Add new Users
- Update User info
- Delete a User if needed
- Retrieve all available Users
- Retrieve specific User

8

Program Stored Procedures?

- Add New Programs
- Update Program Info
- Delete a Program if needed
- Retrieve all Programs
- Retrieve specific Program

9

Exam Stored Procedures?

- Add new Exams
- Update Exam info
- Delete a Exam if needed
- Retrieve all available Exams
- Retrieve specific Exam

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Stored Procedure

10 Freelancing Stored Procedures?

- Add new Freelancing Job Info
- Update Freelancing info
- Delete a Freelancing info
- Retrieve all Freelance Jobs
- Retrieve specific Freelance Job

11 Question Stored Procedures?

- Add Question with options
- Update Question Info
- Delete Question and its options
- Retrieve all available Questions
- Retrieve specific Question

12 Grad Std Stored Procedures?

- Add new Grad Student
- Update Grad Student info
- Delete a Grad Student Info
- Retrieve all Grad Students
- Retrieve specific Grad Student

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Stored Procedure

13

Login Stored Procedures?

- Auth User by Username & Password
- Return User Role if not provided
- Validate Role match if specified
- Handles invalid login

14

Exam Logic Stored Procedures?

- Add Question with options
- Update Question Info
- Delete Question and its options
- Retrieve all available Questions
- Retrieve specific Question

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Data Warehouse

SQL Server

Data warehouse | Design

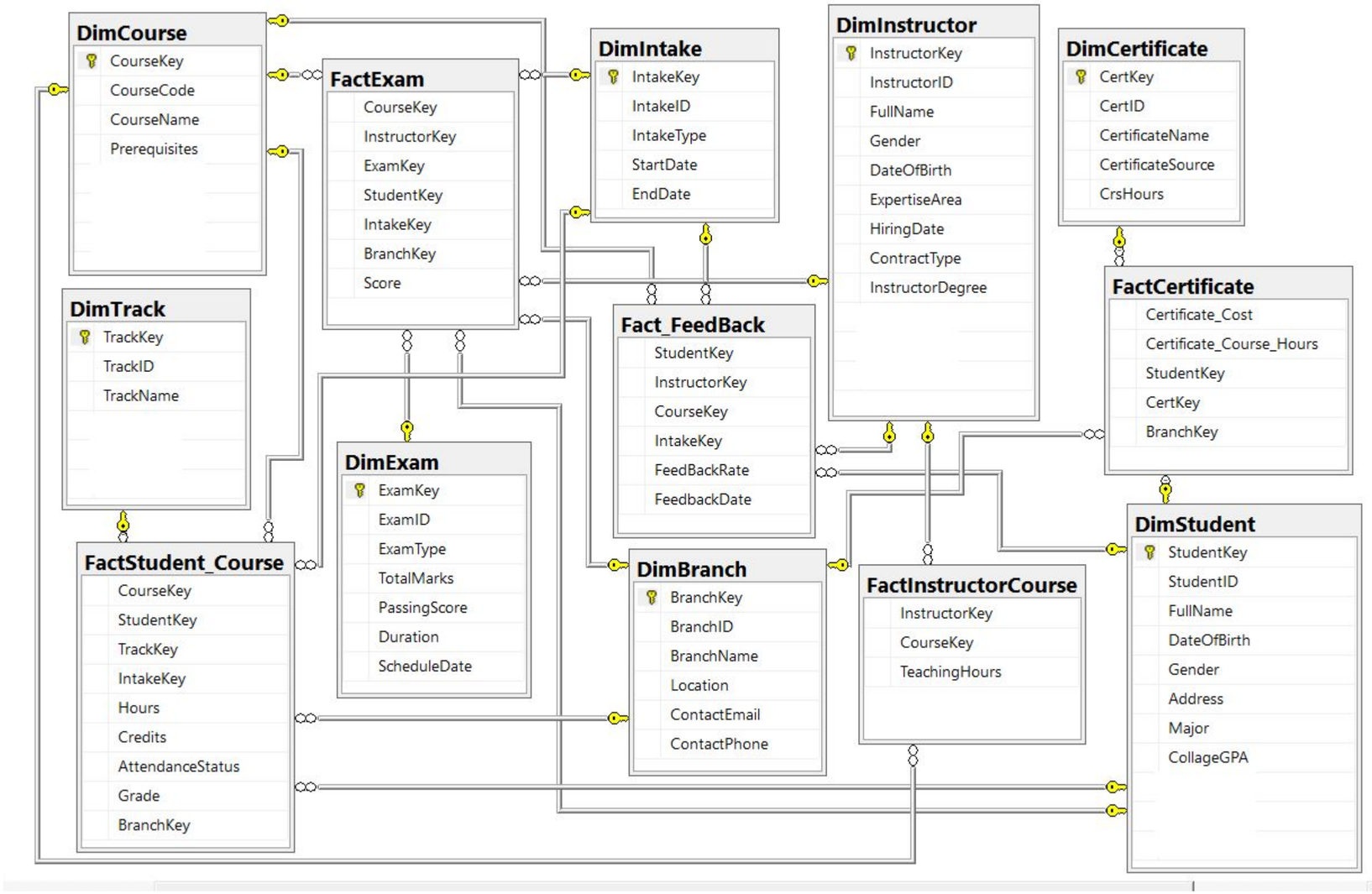
Galaxy Schema

Fact Tables:

1. Fact_Feedback
2. FactExam
3. FactStudent_Course
4. FactInstructorCourse

Dimensions:

1. DimExam
2. DimTrack
3. DimCourse
4. DimIntake
5. DimInstructor
6. DimCertificate
7. DimStudent
8. DimBranch



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ETL

SSIS

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ETL | SSIS

Source Destination mapping

DimBrance	
Source	Destination
BranchID	BranchID
BranchName	BranchName
Location	Location
ContactEmail	ContractEmail
ContactPhone	ContactPhone

SQL Code

```
CREATE VIEW vw_DimBranch  as
SELECT *
FROM Branch;
```

DimTrack	
Source	Destination
TrackID	TrackID
TrackName	TrackName
Description	Description
AdminID	
ProgramID	

SQL Code

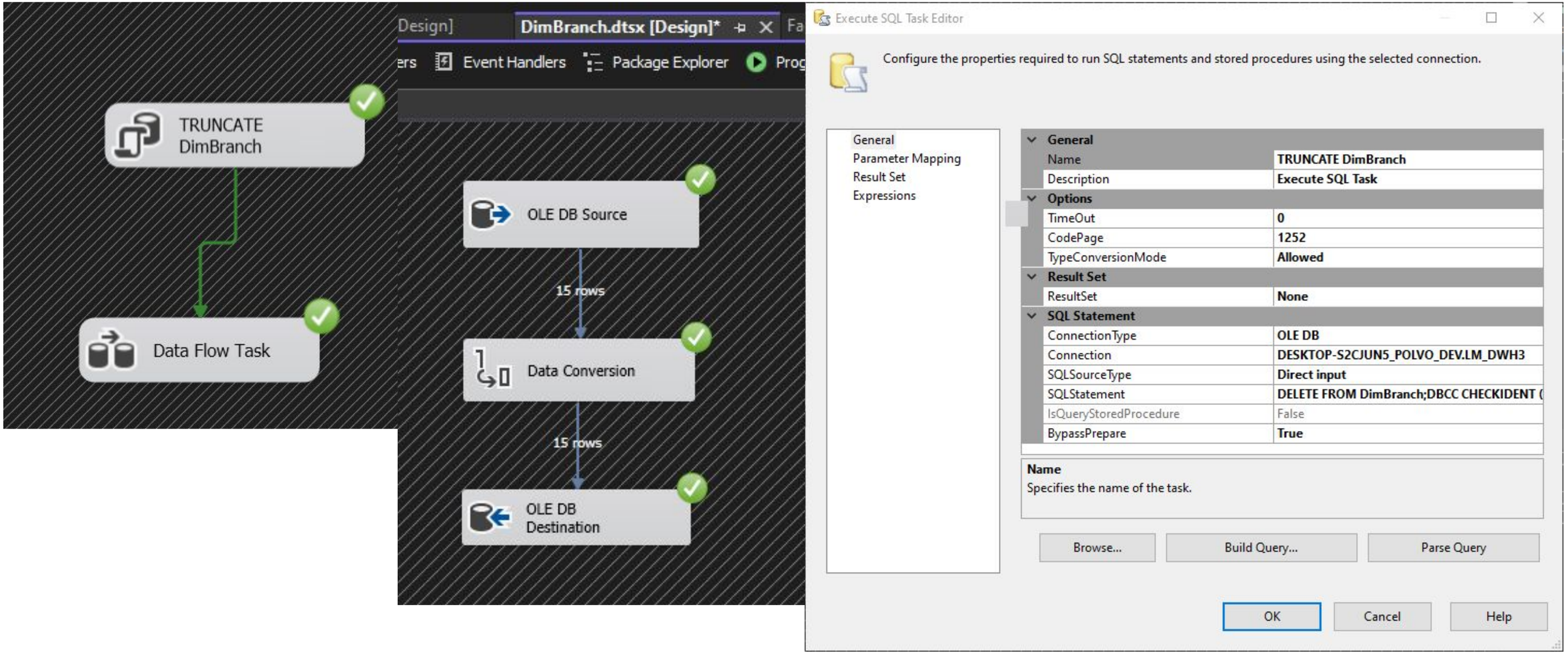
```
CREATE VIEW vw_DimTrack AS
SELECT      TrackID,
            TrackName,
            Description
FROM Track;
```

DimExam	
Source	Destination
ExamID	ExamID
ExamType	ExamType
TotalMarks	TotalMarks
PassingScore	PassingScore
Duration	Duration
ScheduleDate	ScheduleDate
CourseCode	

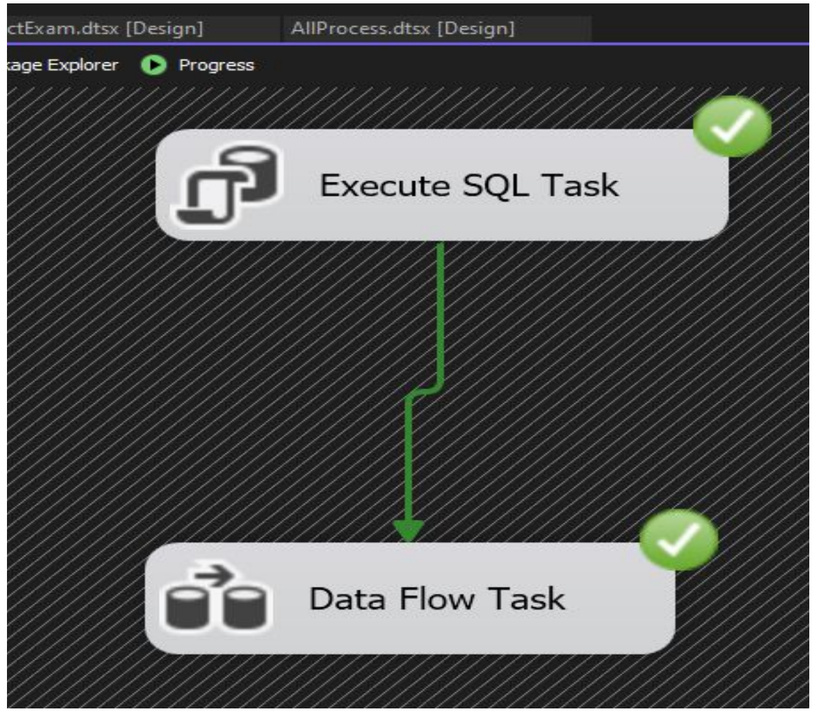
SQL Code

```
SELECT      ExamID,
            ExamType,
            TotalMarks,
            PassingScore,
            Duration,
            ScheduleDate
FROM Exam;
```

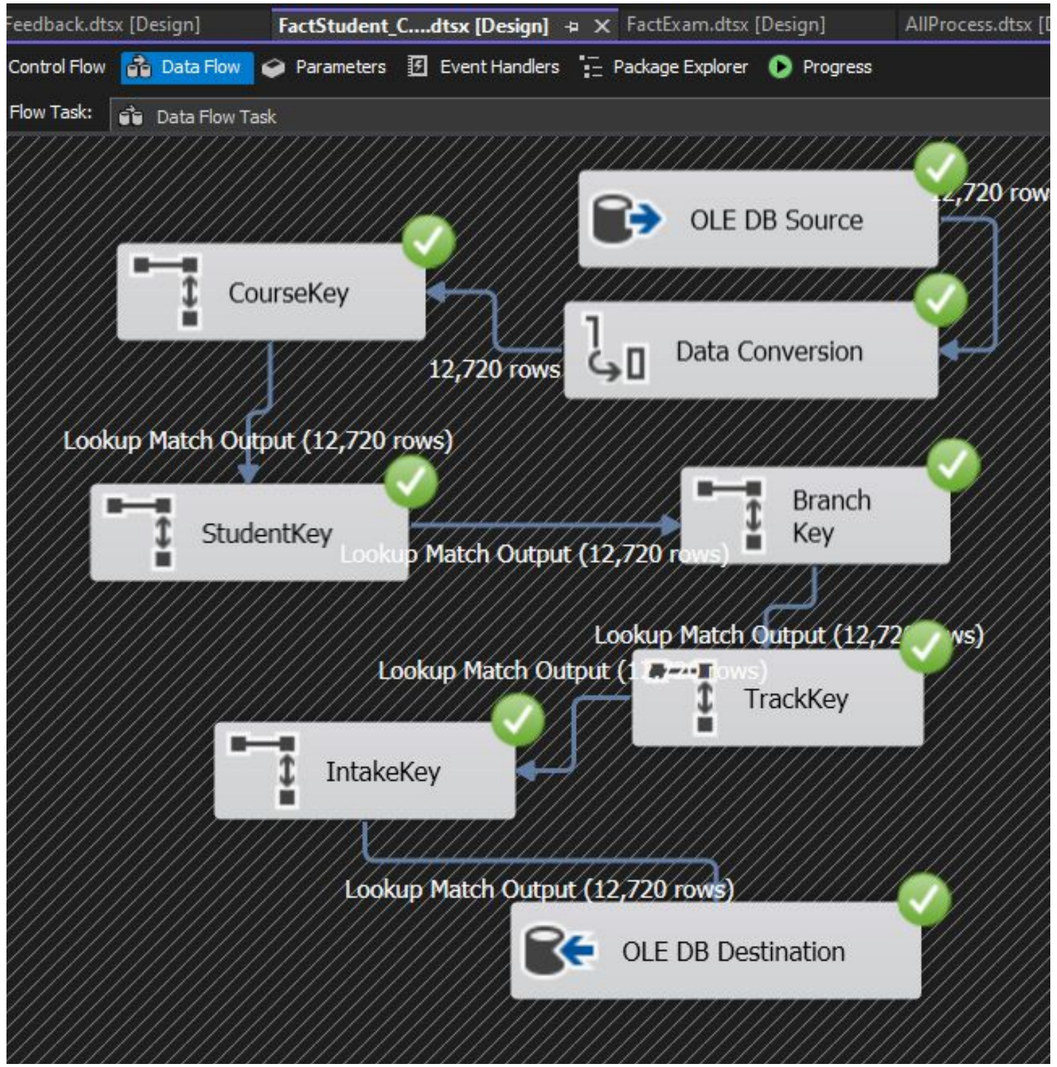
ETL | SSIS | DimBranch



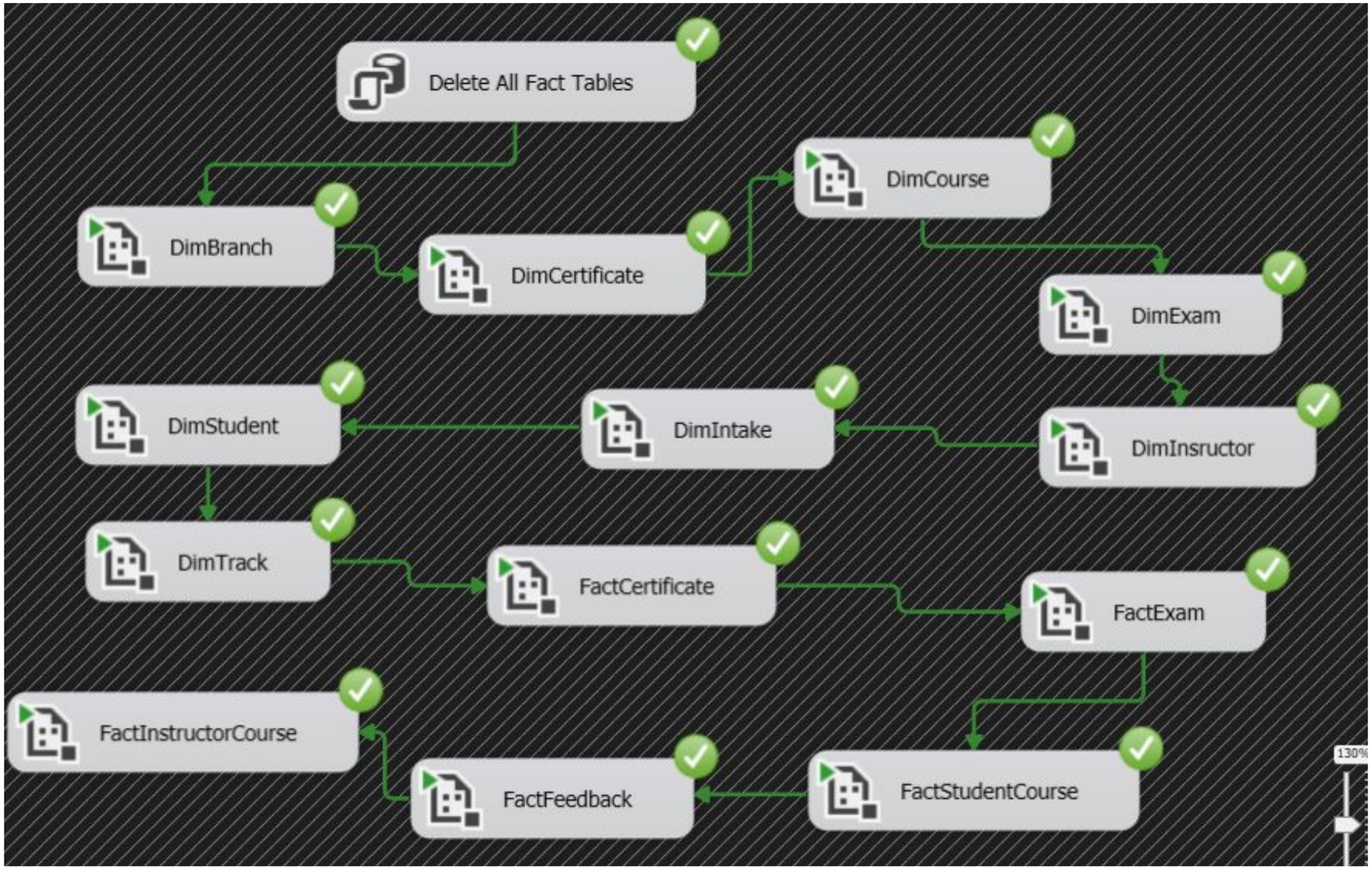
ETL | SSIS | Fact_StudentCourse



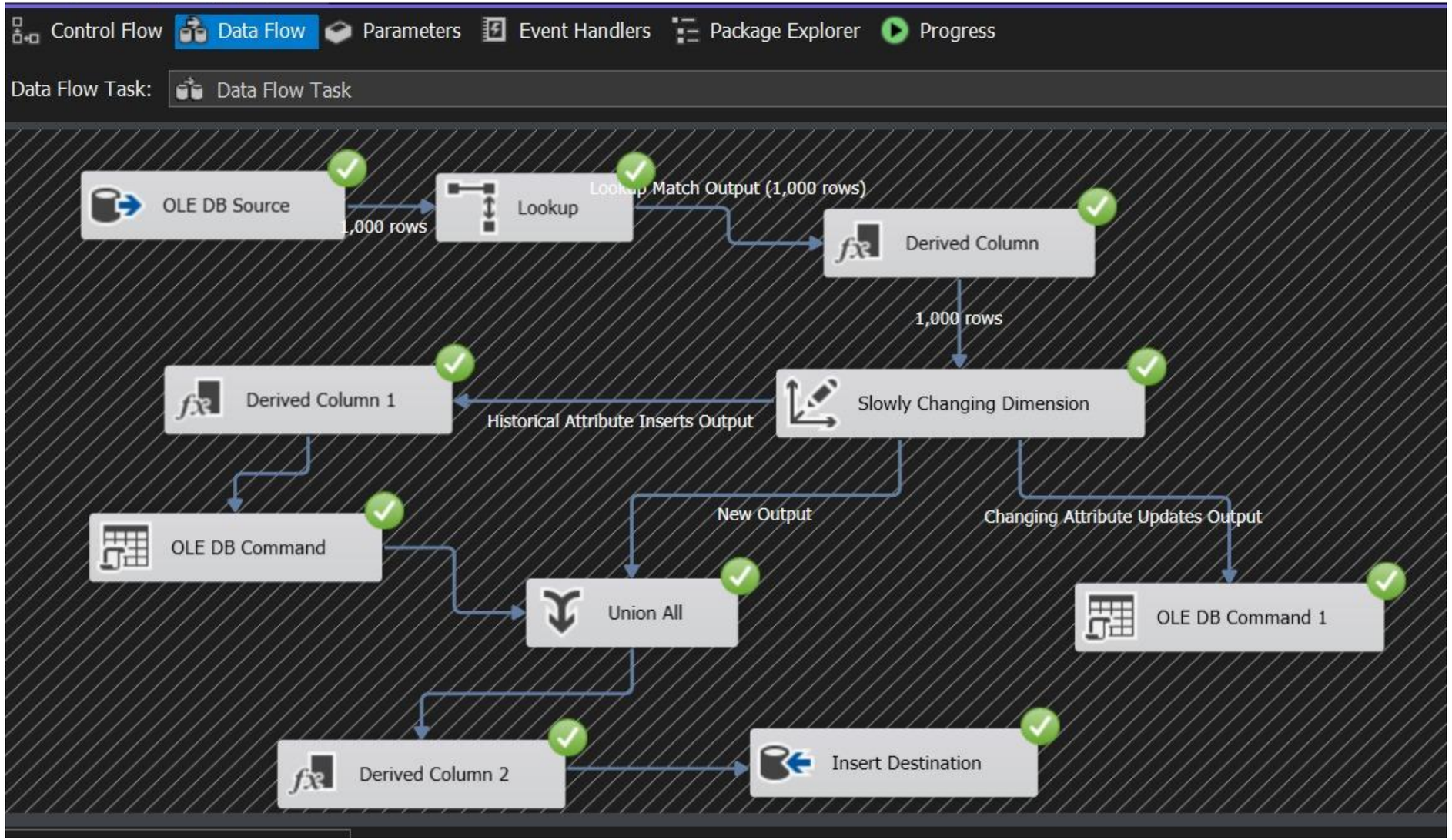
SQLSourceType	Direct input
SQLStatement	DELETE FROM FactStudent_Course;
IsQueryStoredProcedure	False
BypassPrepare	True



ETL | SSIS | Full Process



ETL | SSIS | DimStudent



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Reporting

SSRS

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Reporting

Exam Reporting Stored Procedures?

- Get Student info by DP nomber
  Returns student data given the department ID

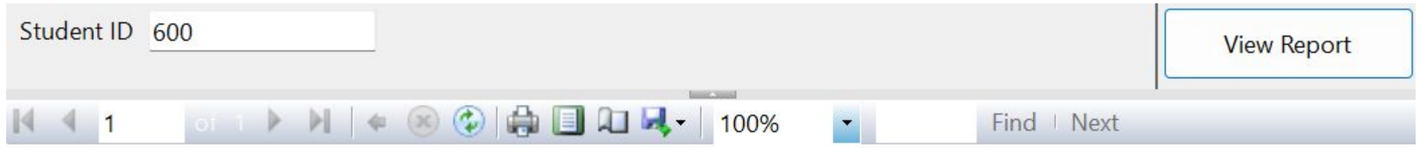
- Get the Grades by student ID

  Displays the student Grades givens Student ID

- Get Student Answers for Exam

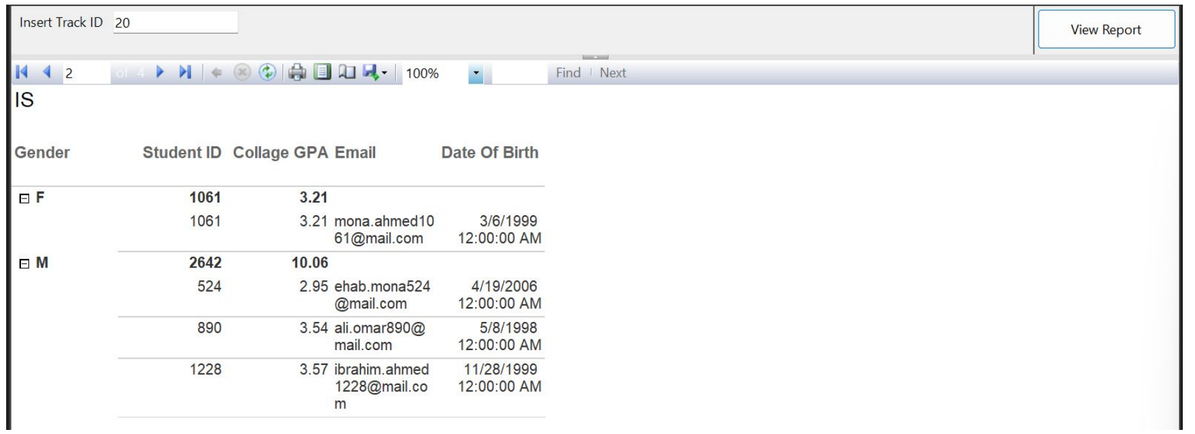
  Shows student-selected answers, option correctness, and timestamps

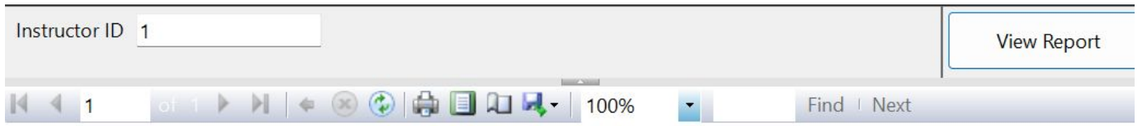
Reporting



Student Grades

Course Code	Grade	Course Name
MB37	61.67	Mobile Dev 37
PY15	68.18	Python Programming 15
PY62	78.07	Python Programming 62
PY82	64.77	Python Programming 82
UX53	84.13	UI/UX Design 53





Number of Students Per Course

Course Code	Instructor ID	studentnum
⊞ DV89	1	28
⊞ UX96	1	21

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Reporting

Exam Reporting Stored Procedures?

- **Get Topics by Course**
  Returns all topics related to a course using its code

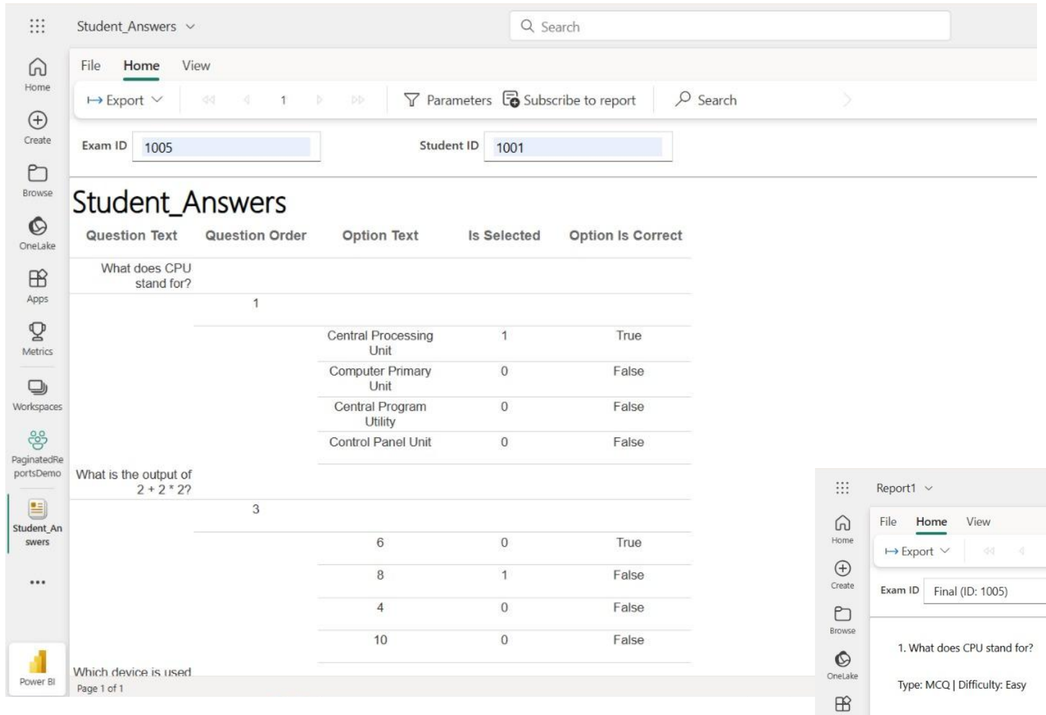
- **Get Exam Questions with Options**

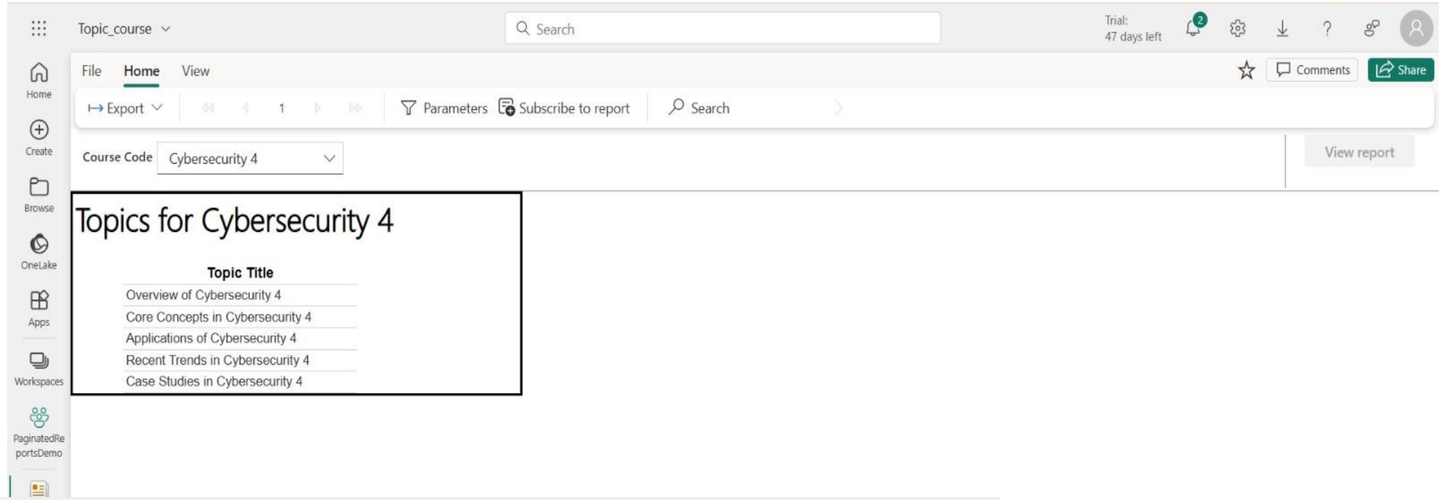
  Displays questions and their choices for a given exam

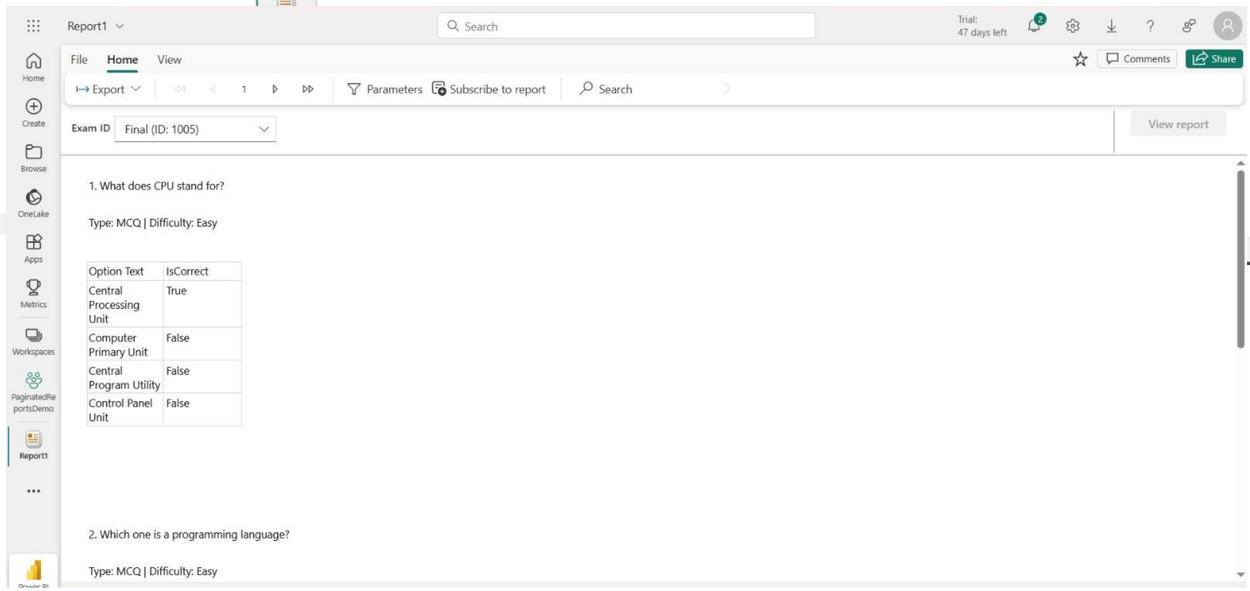
- **Get Student Answers for Exam**

  Shows student-selected answers, option correctness, and timestamps

Reporting


Student_Answers
Search
File Home View
Export 1 Parameters Subscribe to report Search
Exam ID 1005
Student ID 1001
Student_Answers
Question Text | Question Order | Option Text | Is Selected | Option Is Correct
What does CPU stand for? | 1 | Central Processing Unit | 1 | True
Computer Primary Unit | 0 | False
Central Program Utility | 0 | False
Control Panel Unit | 0 | False
What is the output of 2 + 2 * 2? | 3 | 6 | 0 | True
8 | 1 | False
4 | 0 | False
10 | 0 | False
Which device is used
Page 1 of 1


Topic_course
Search
File Home View
Export 1 Parameters Subscribe to report Search
Course Code Cybersecurity 4
View report
Topics for Cybersecurity 4
Topic Title
Overview of Cybersecurity 4
Core Concepts in Cybersecurity 4
Applications of Cybersecurity 4
Recent Trends in Cybersecurity 4
Case Studies in Cybersecurity 4


Report1
Search
File Home View
Export 1 Parameters Subscribe to report Search
Exam ID Final (ID: 1005)
View report
1. What does CPU stand for?
Type: MCQ | Difficulty: Easy
Option Text | IsCorrect
Central Processing Unit | True
Computer Primary Unit | False
Central Program Utility | False
Control Panel Unit | False
2. Which one is a programming language?
Type: MCQ | Difficulty: Easy

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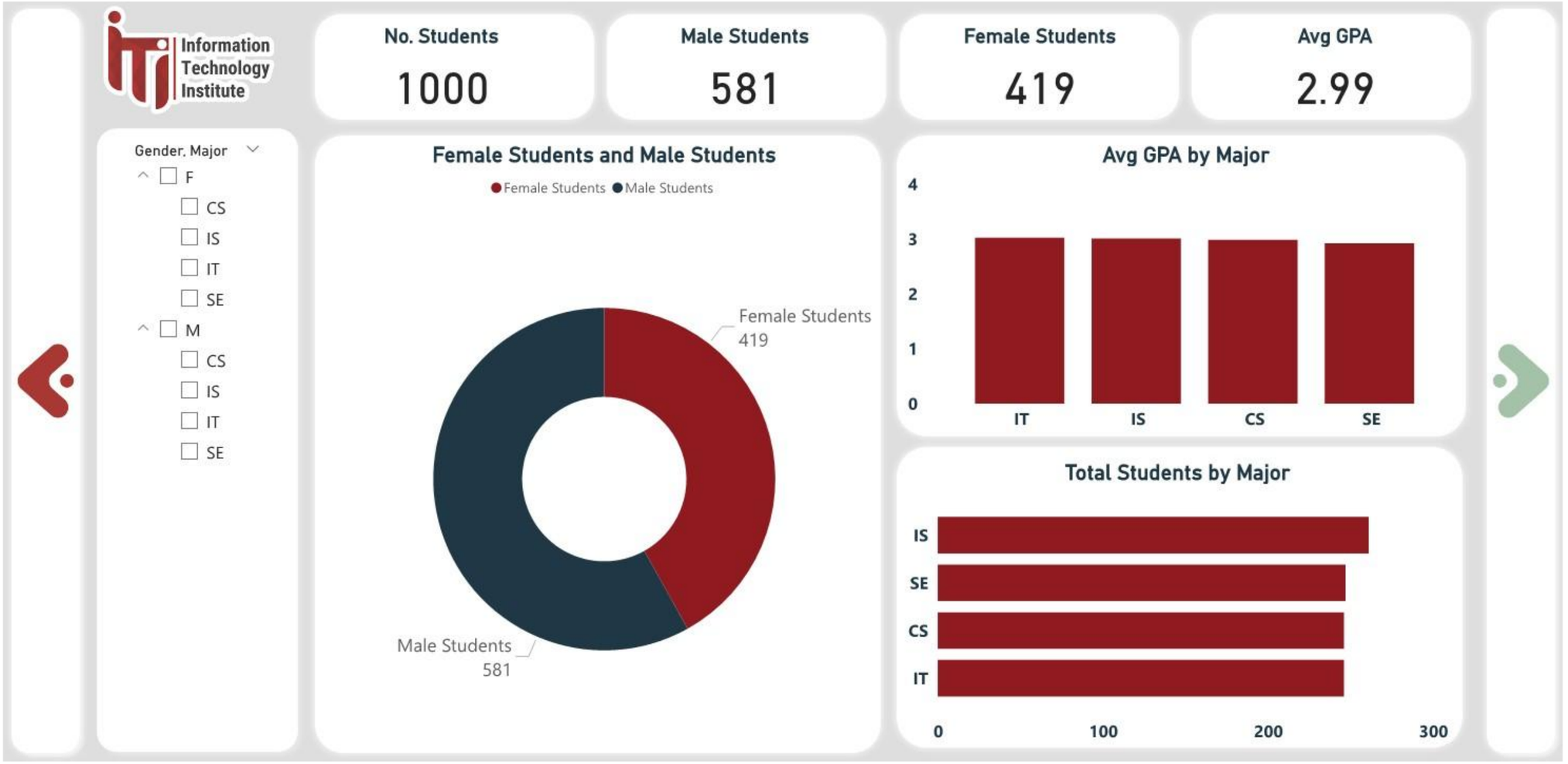
Analysis

Power BI

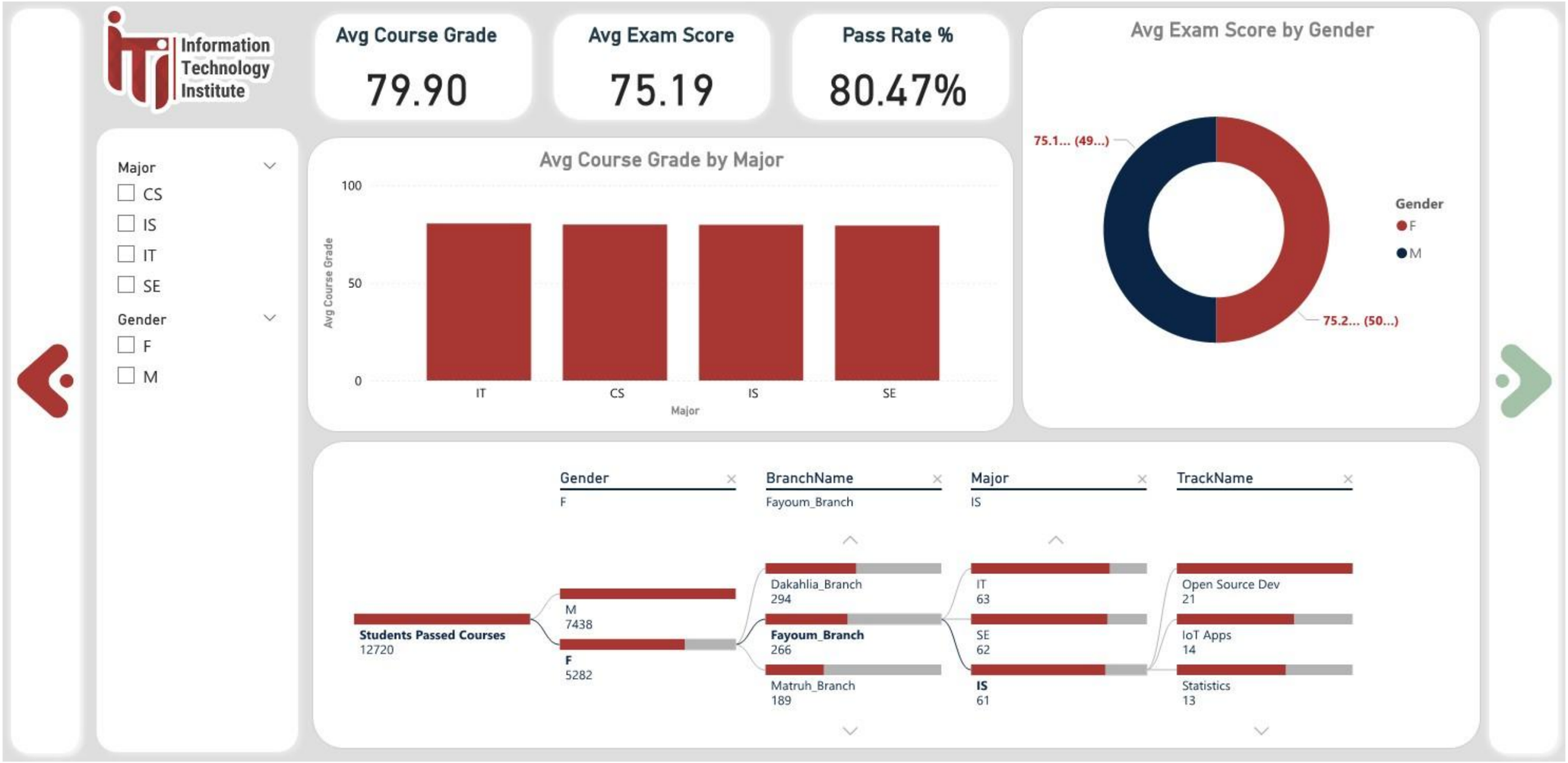
Power BI Dashboard

1. Student Overview Dashboard



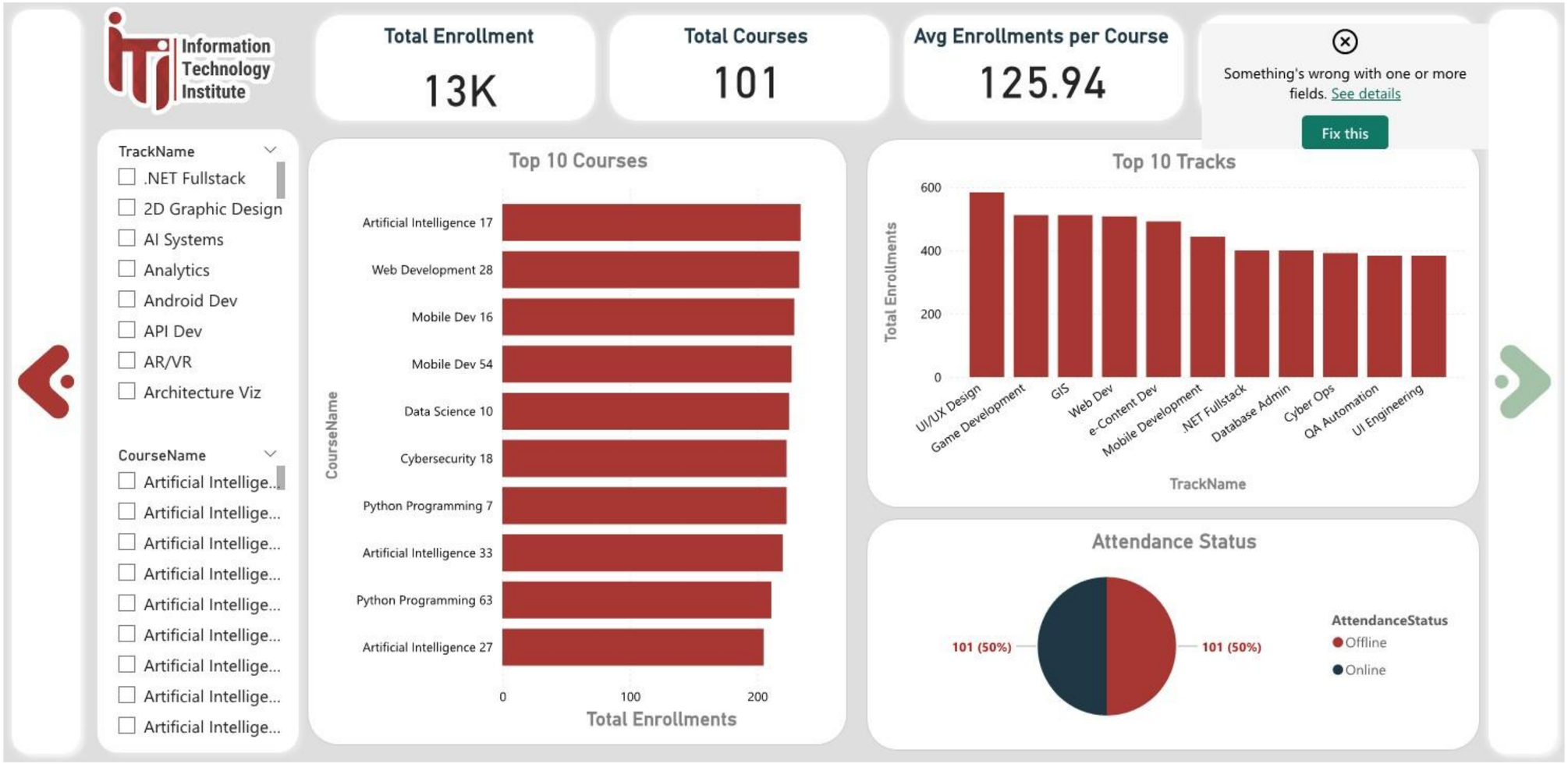
Power BI Dashboard

2. GPA by Track and Major



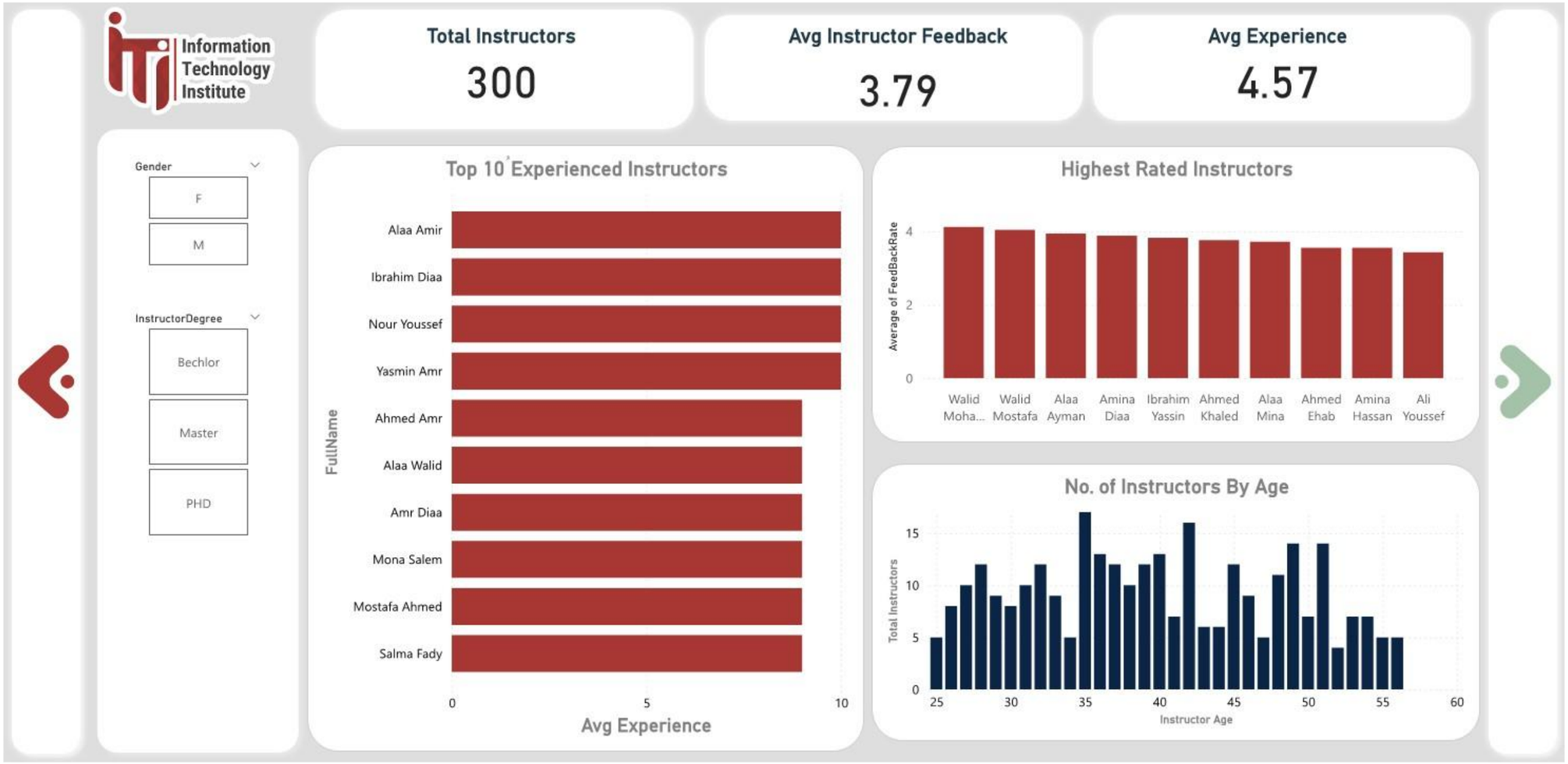
Power BI Dashboard

3. Course Enrollment Dashboard



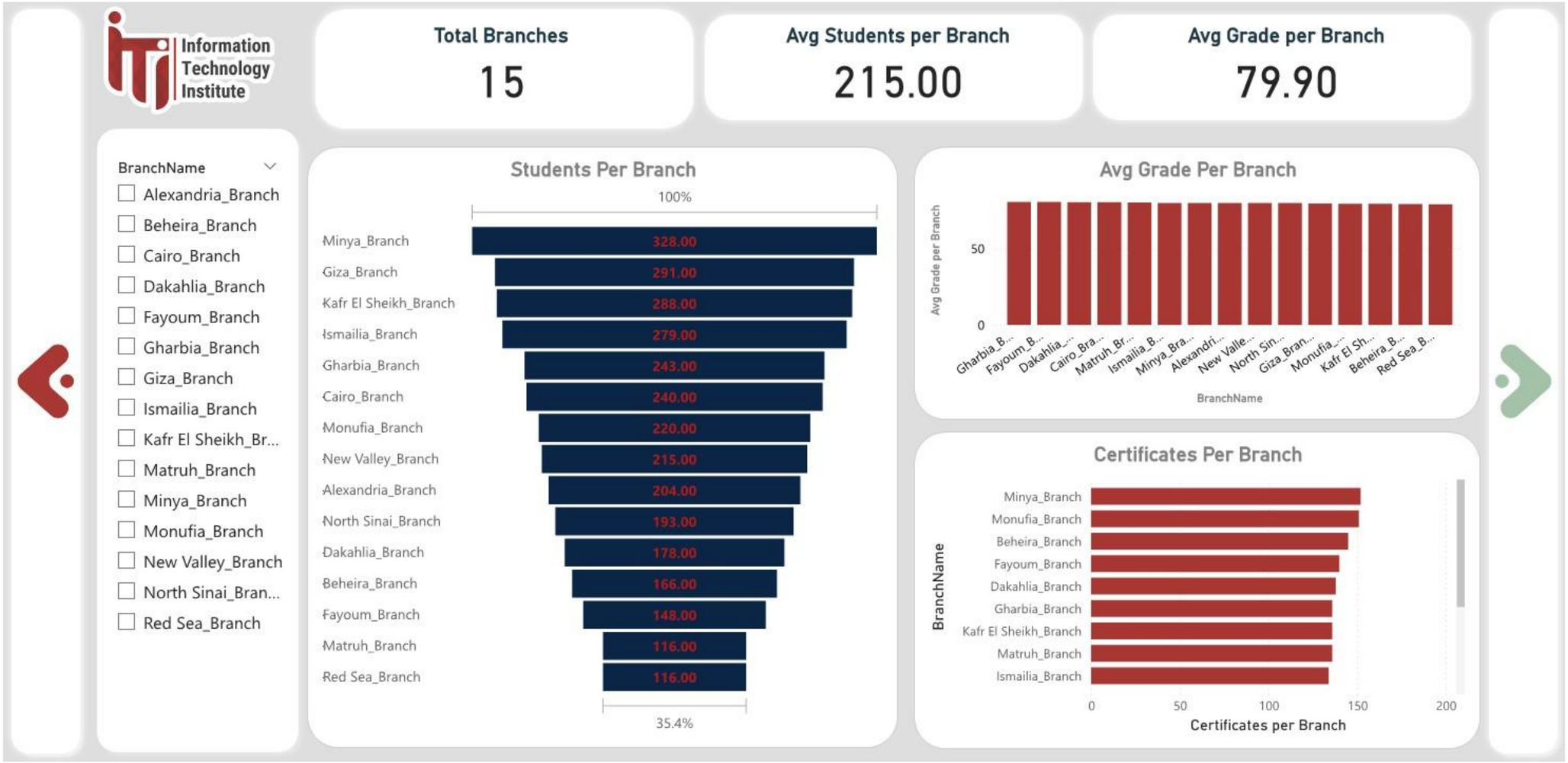
Power BI Dashboard

4. Instructor Insights



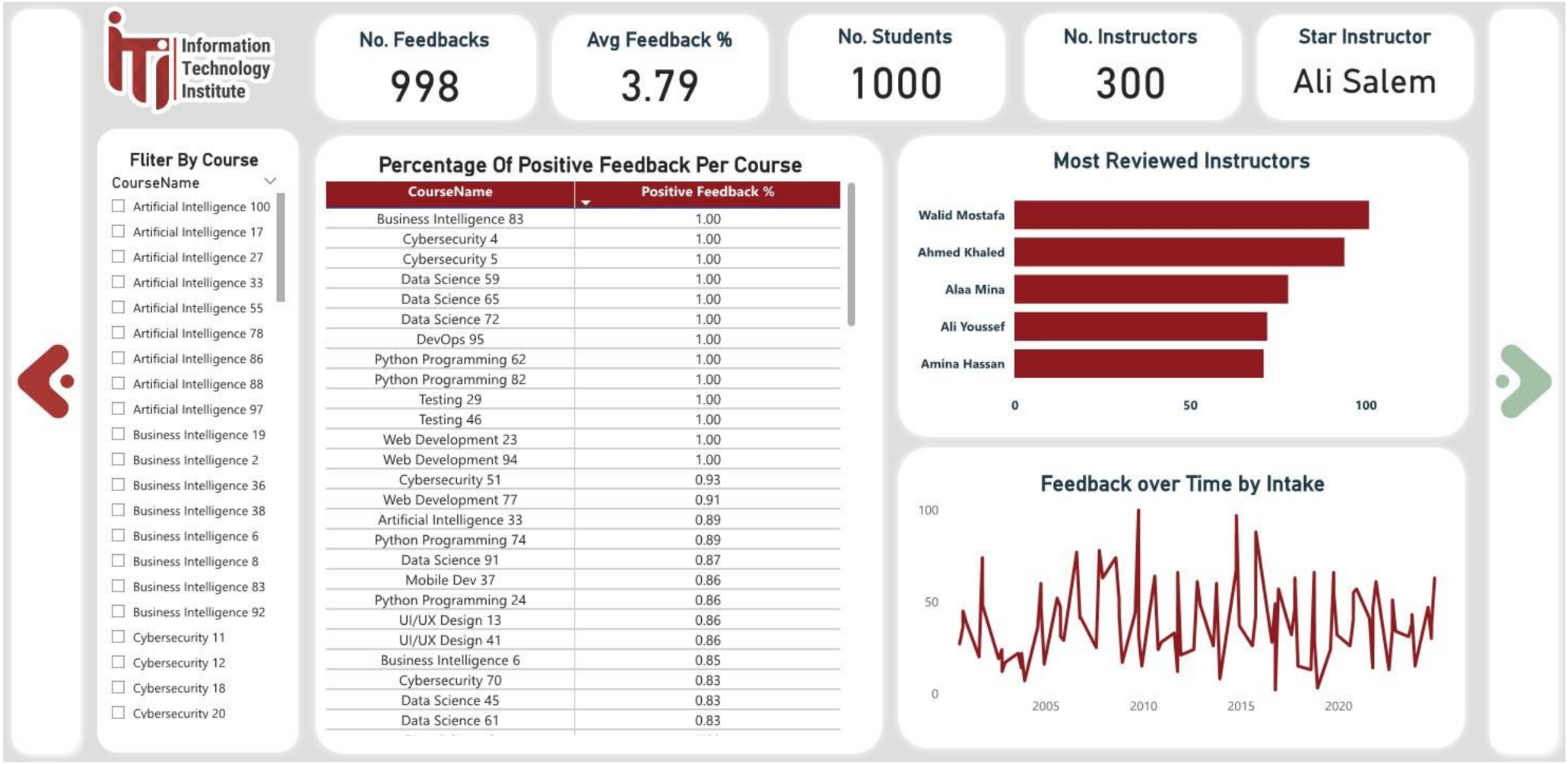
Power BI Dashboard

5. Branch Performance Dashboard



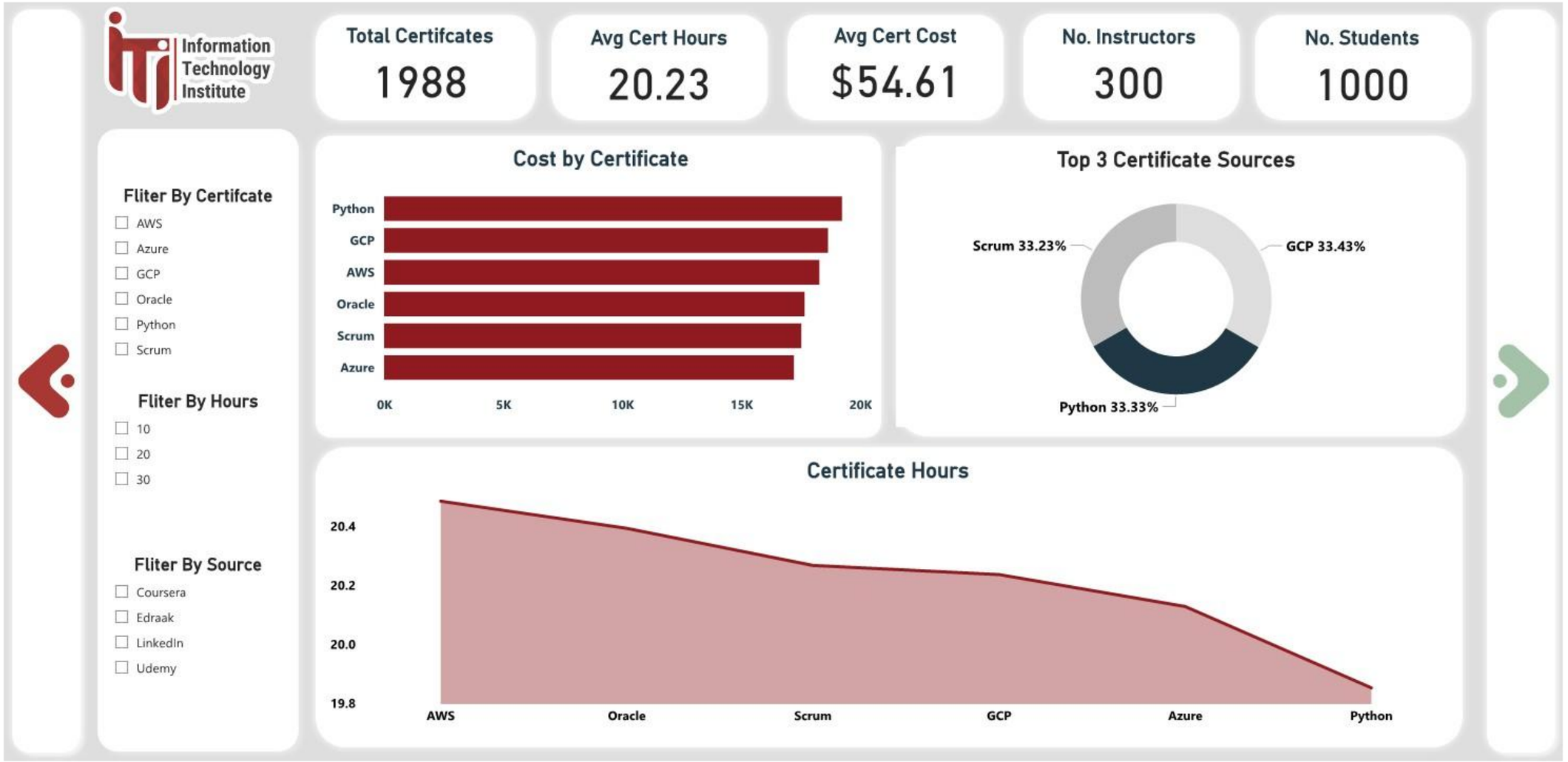
Power BI Dashboard

6. Feedback Dashboard



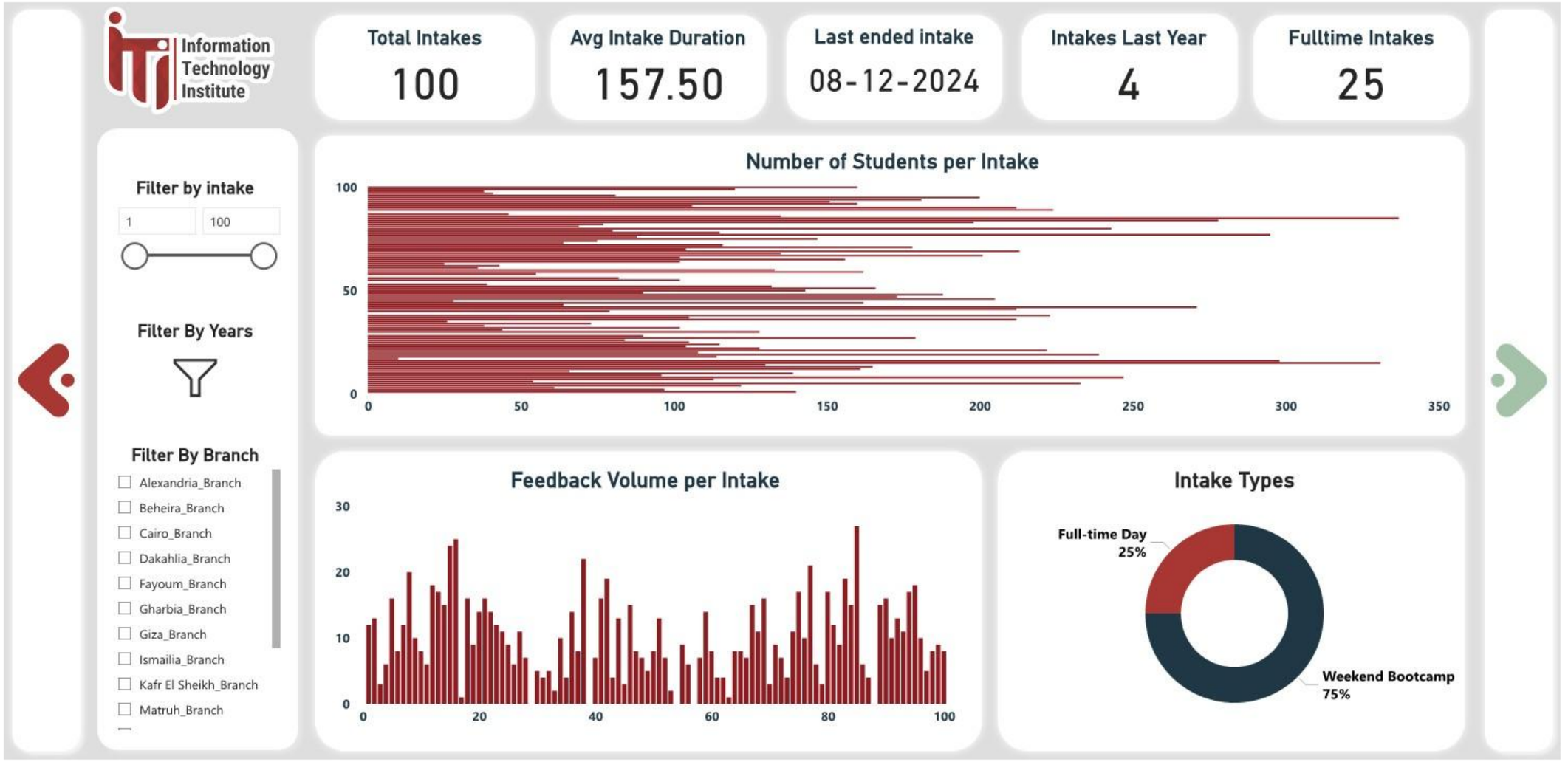
Power BI Dashboard

7. Certification Insights



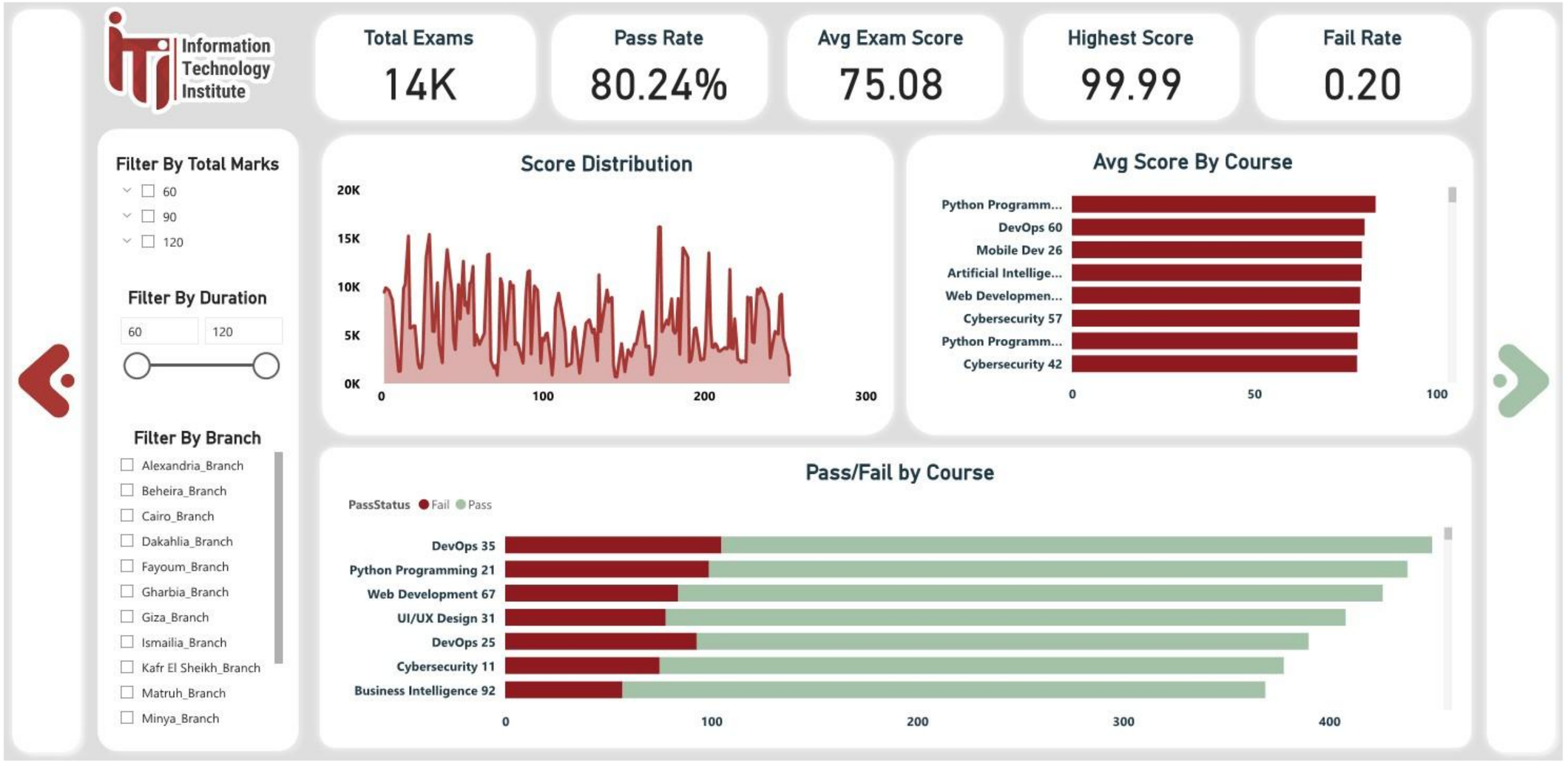
Power BI Dashboard

8. Intake Analysis



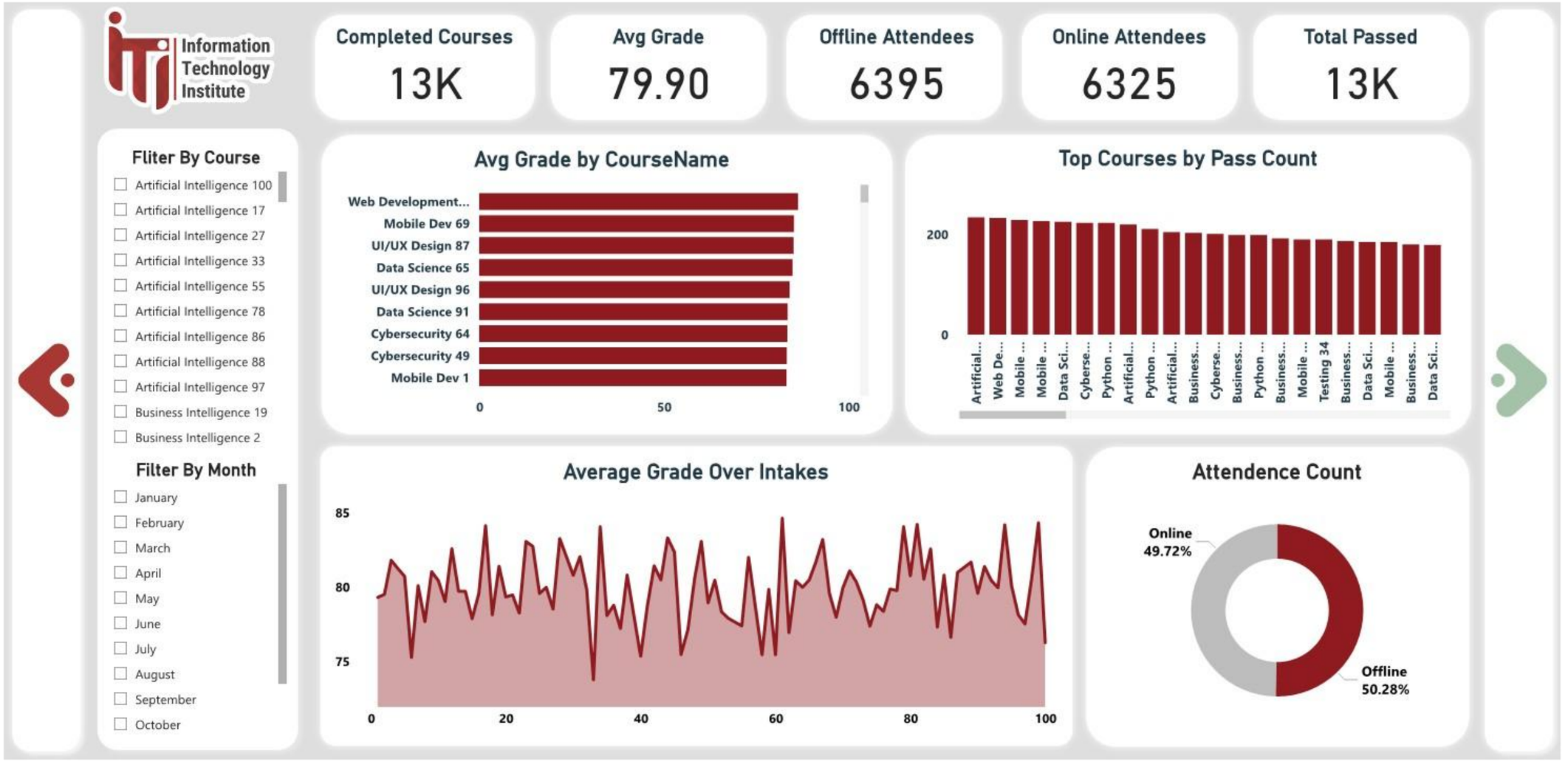
Power BI Dashboard

9. Exam Performance Dashboard



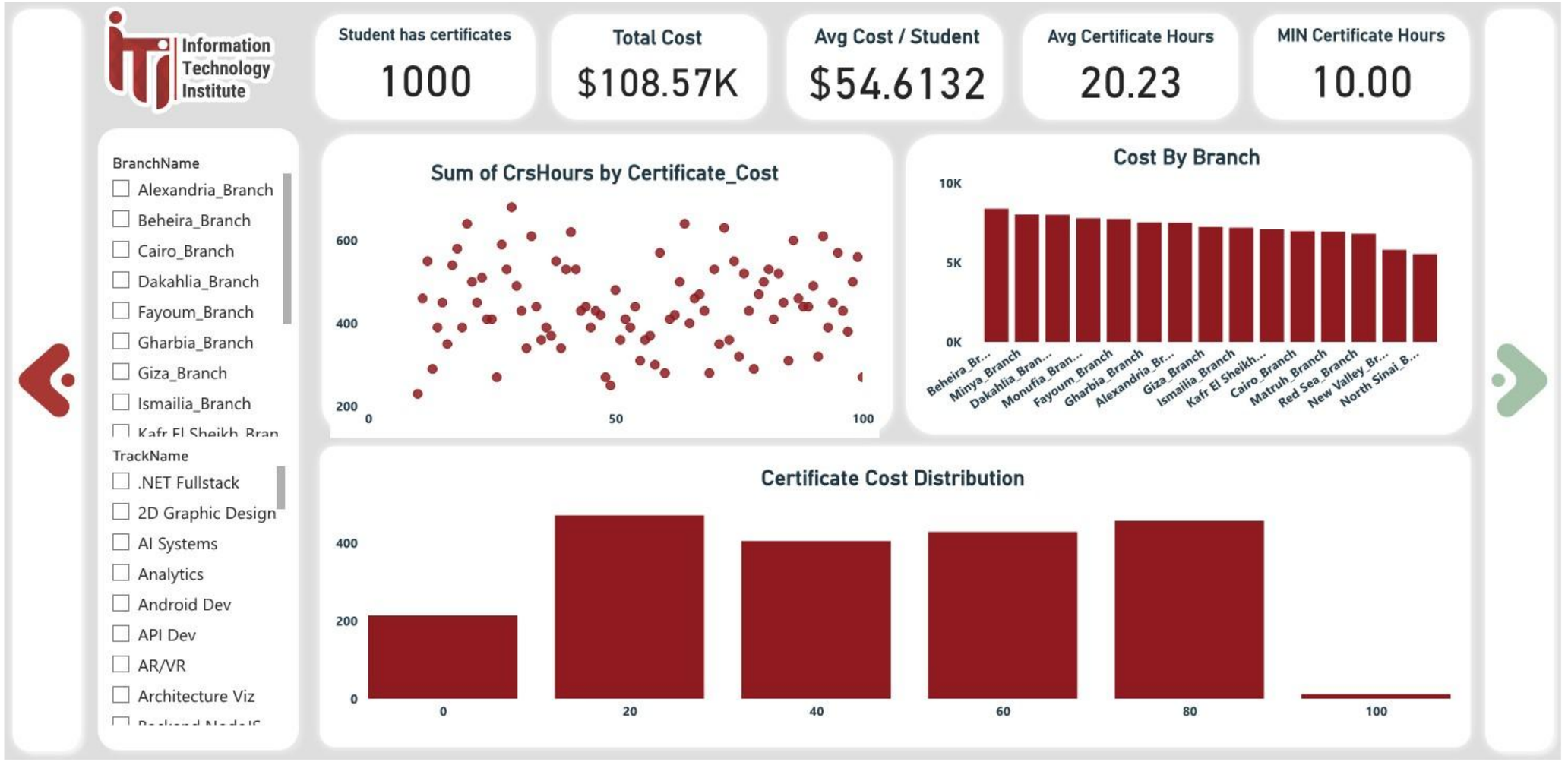
Power BI Dashboard

10. Course Completion



Power BI Dashboard

11.Student Certificate Summary

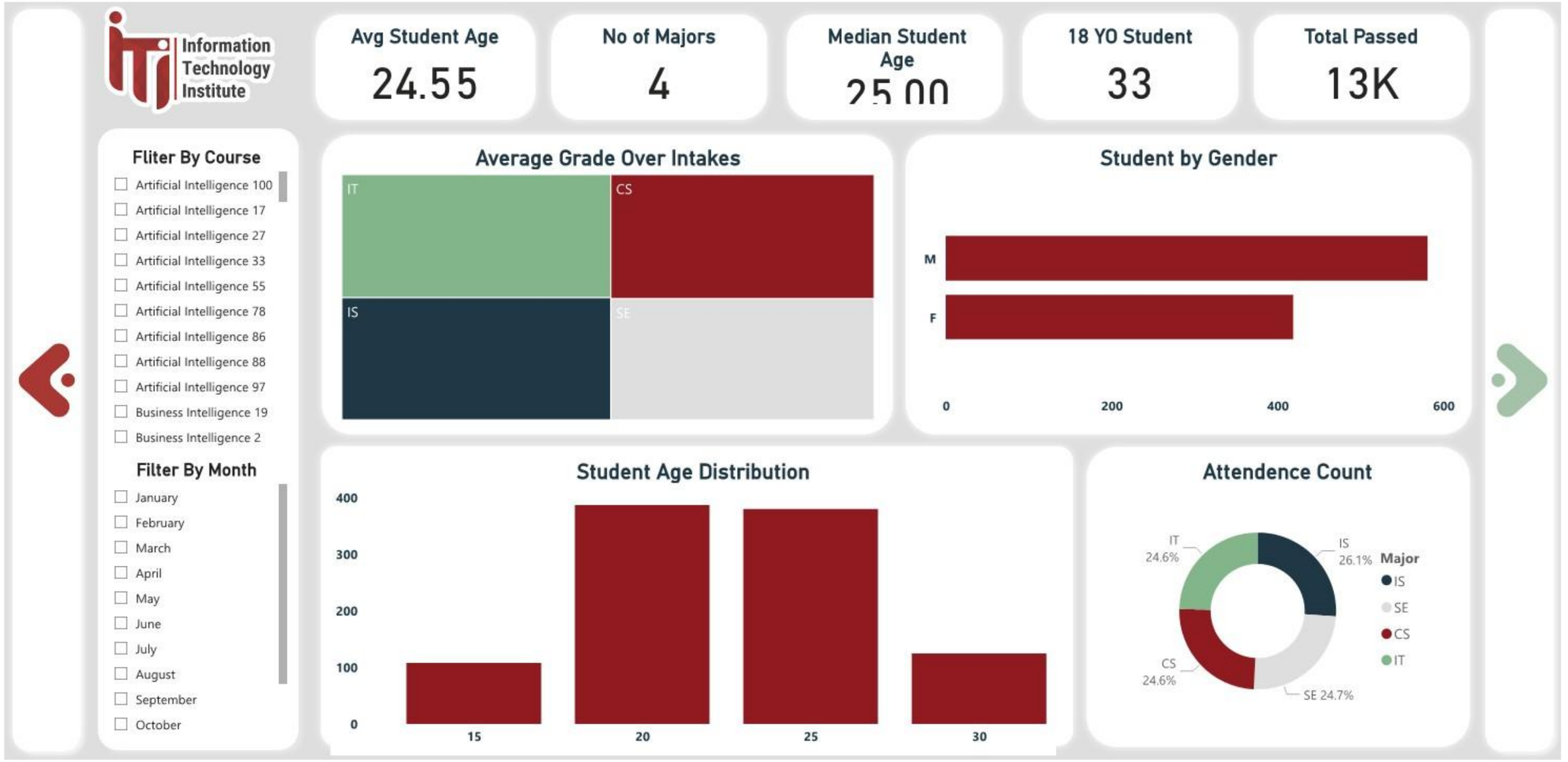


Power BI Dashboard

12.GPA Progression over Intake

Power BI Dashboard

13. Student Demographics

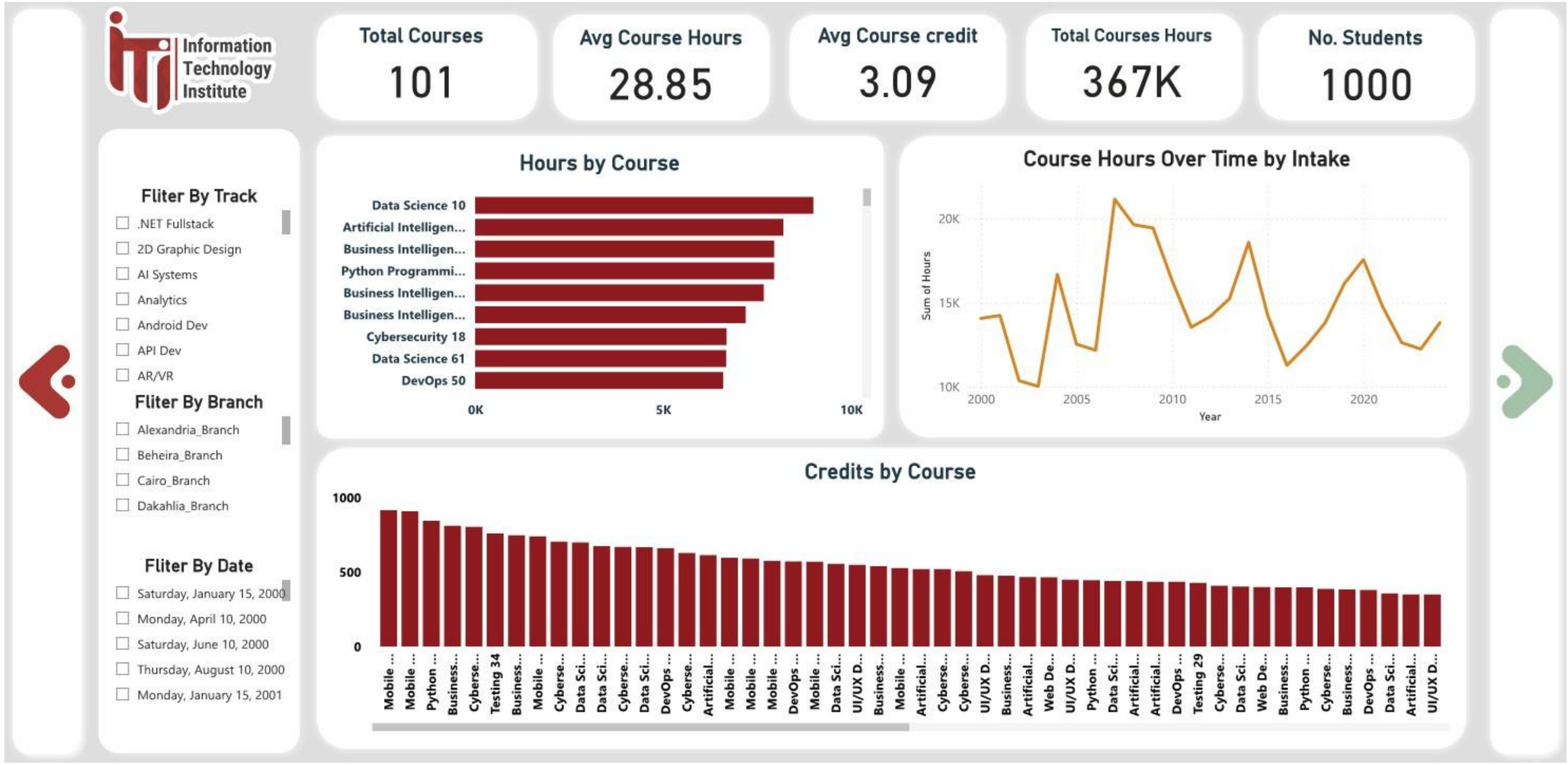


Power BI Dashboard

14. Certification Insights

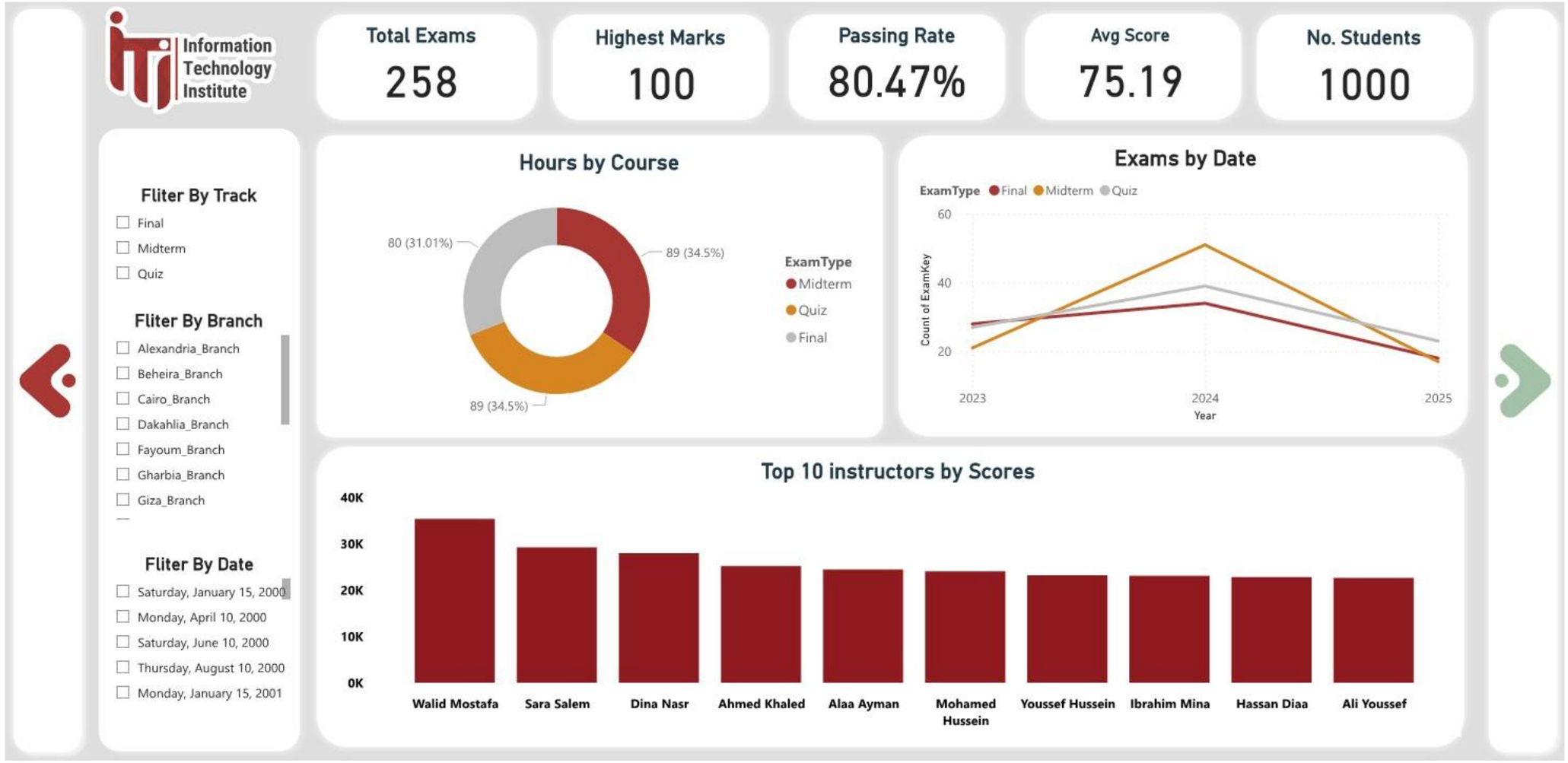
Power BI Dashboard

15. Student & course



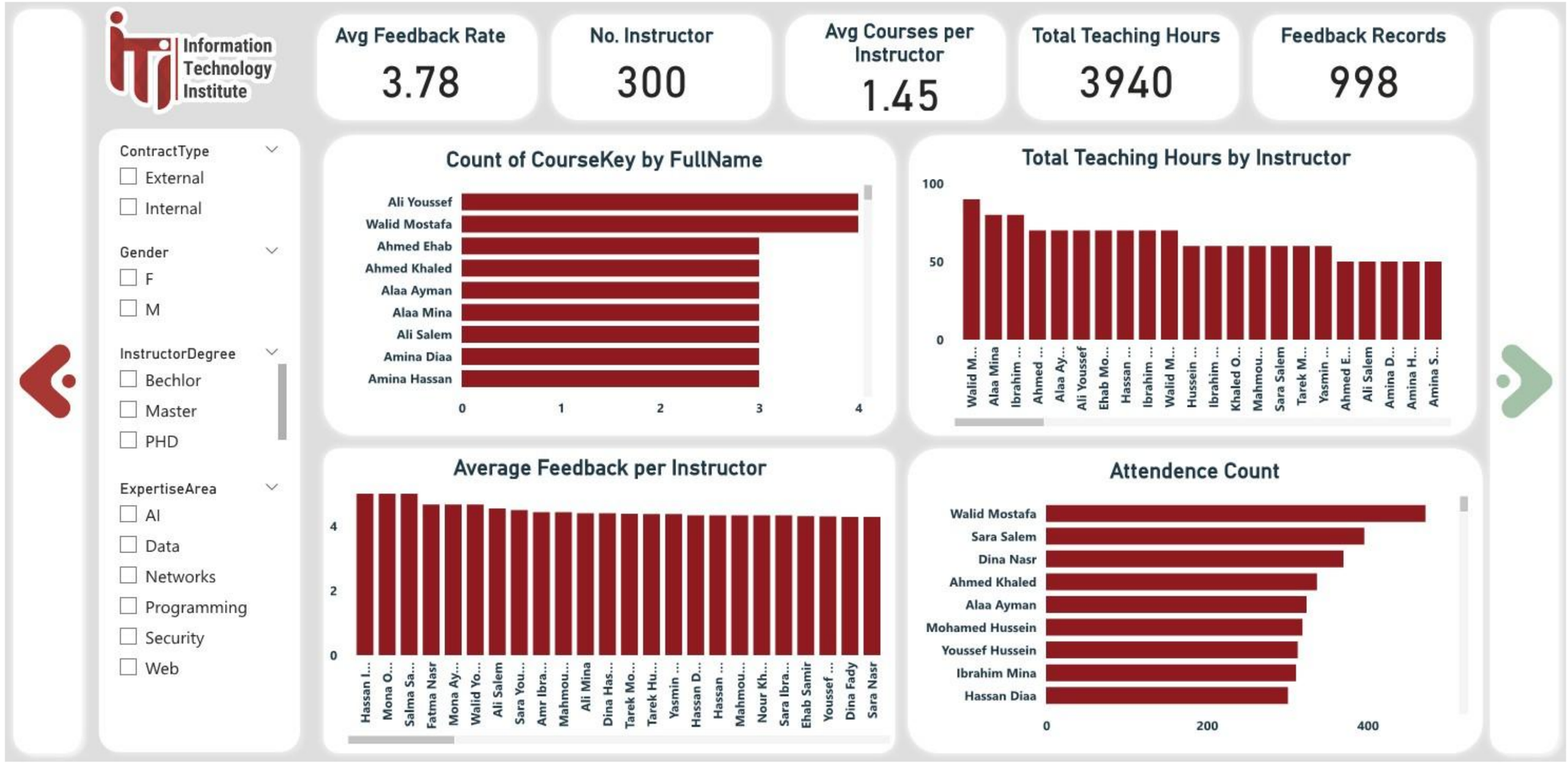
Power BI Dashboard

16.Exam



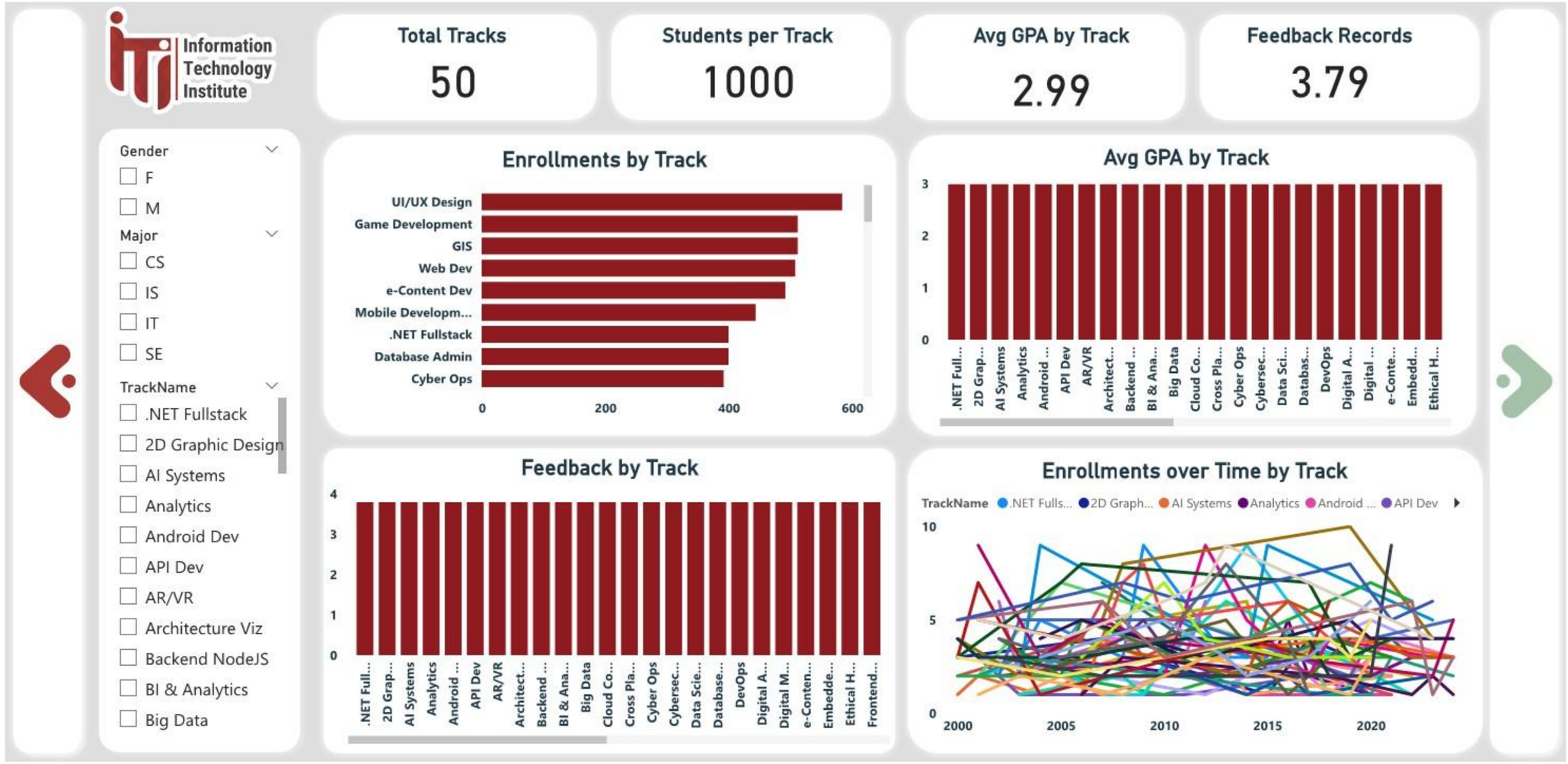
Power BI Dashboard

17. Instructor Load Dashboard



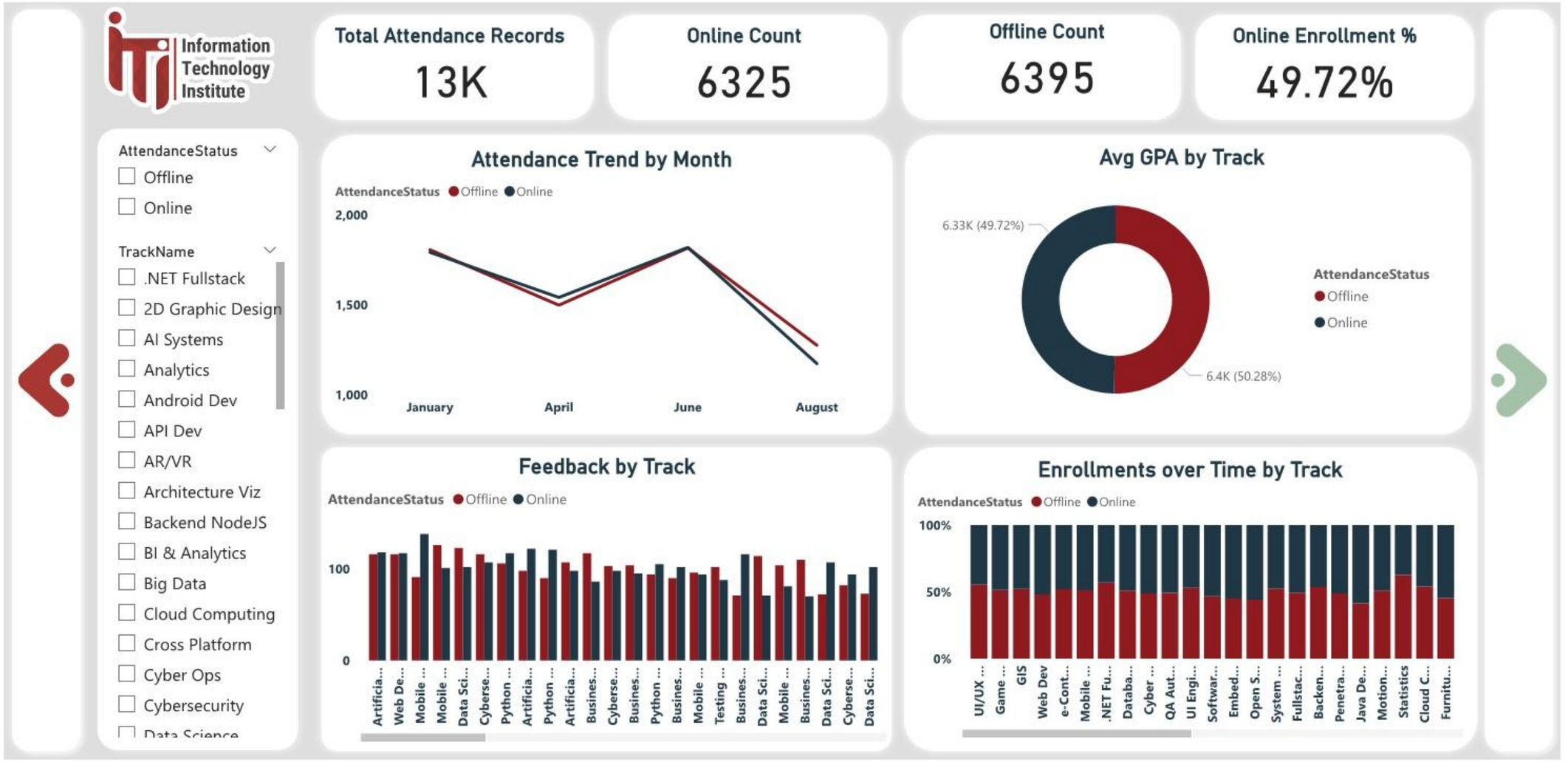
Power BI Dashboard

18. Track Popularity Dashboard



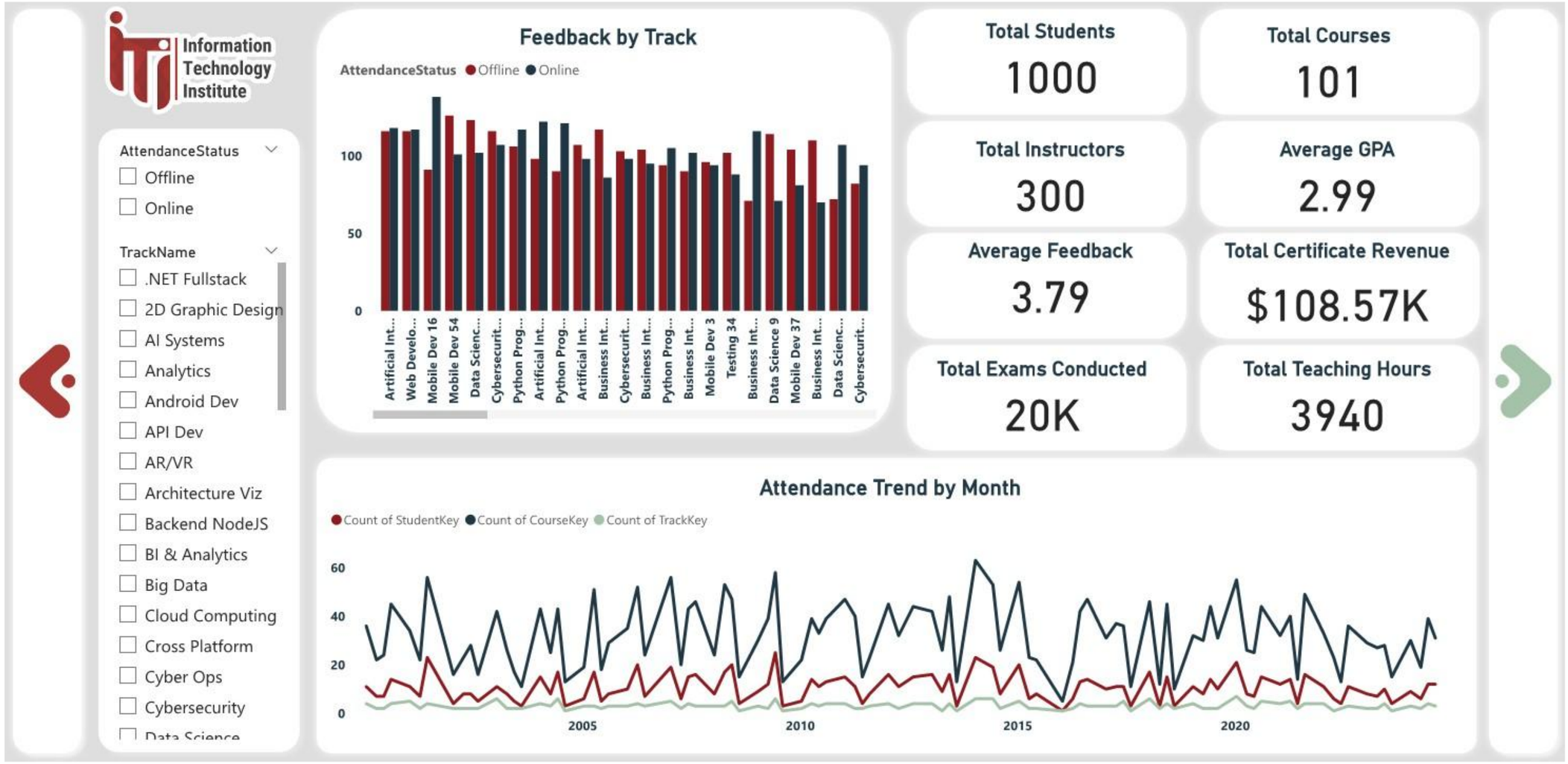
Power BI Dashboard

19. Attendance Trends Dashboard



Power BI Dashboard

20. Summary KPI Dashboard



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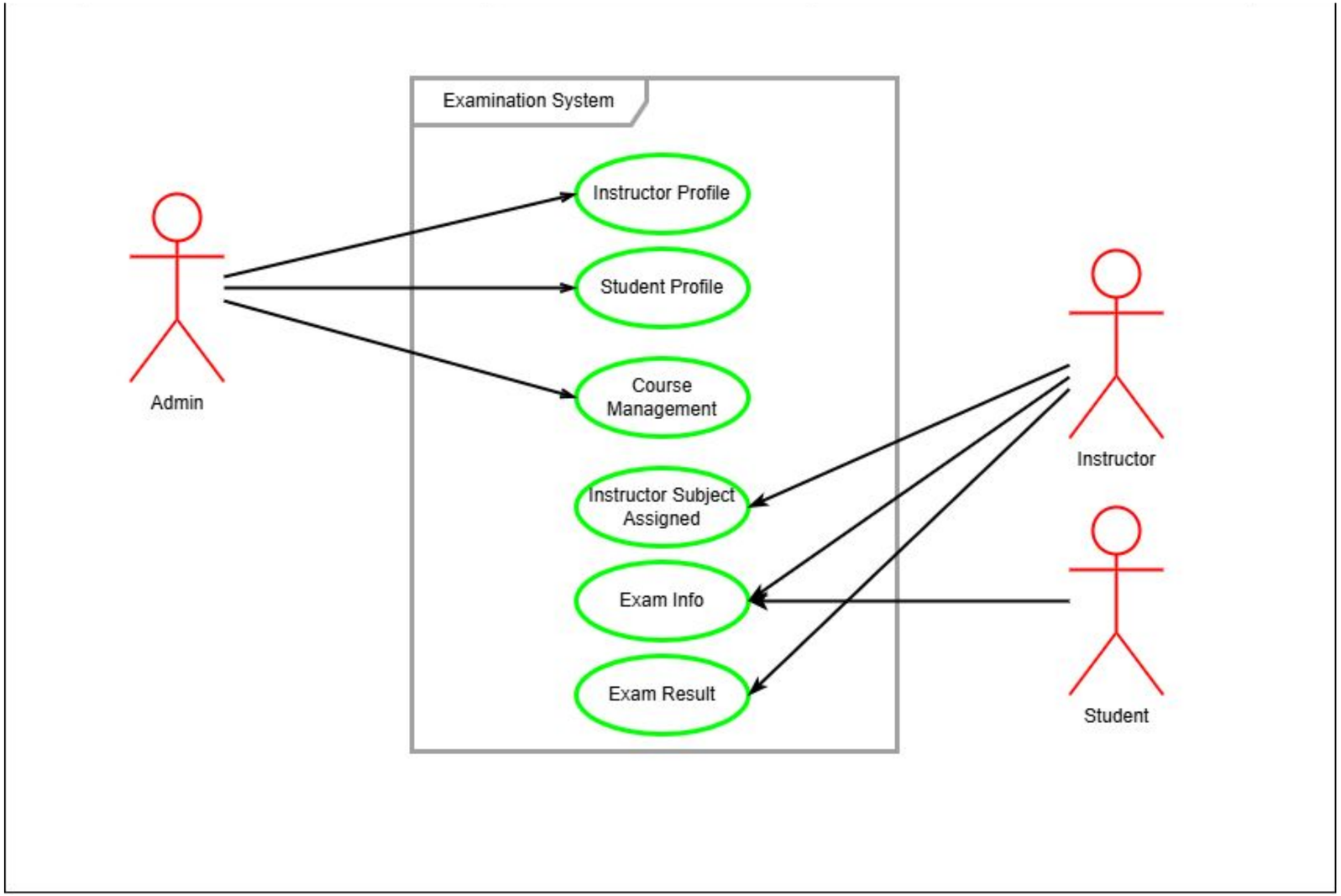
Application

Flet.dev | node.js

Application | Use case diagram



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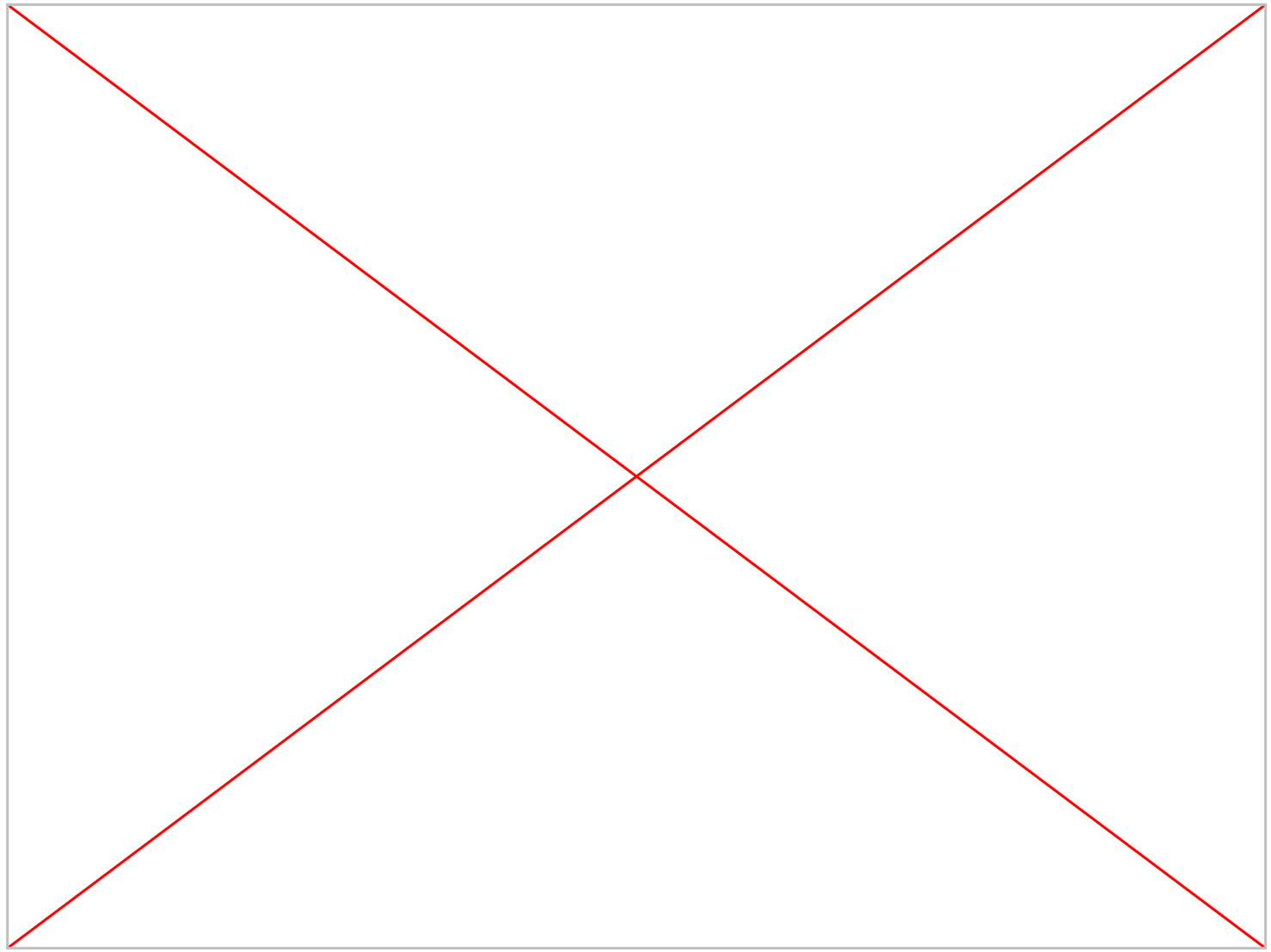
Application | Demo



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Application | Front-End

Technologies Used in Front-End

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Application | Back-End

Technologies Used in Backend

Application | Back-End

Backend Summary

We developed the backend of the **Examination System** using modern Node.js technologies. The backend is responsible for:

- ✅ Connecting to the **SQL Server database** using stored procedures
- ✅ Creating and managing **API endpoints** with **Express.js**
- ✅ Handling **user login, exams, questions, student answers, and results**
- ✅ Enabling external access and testing through **ngrok**
- ✅ Supporting **CORS** to allow frontend integration

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Conclusion

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Thank You!

Any Questions