

Examination System

ITI

Graduation Project
Presentation



Problem Statement



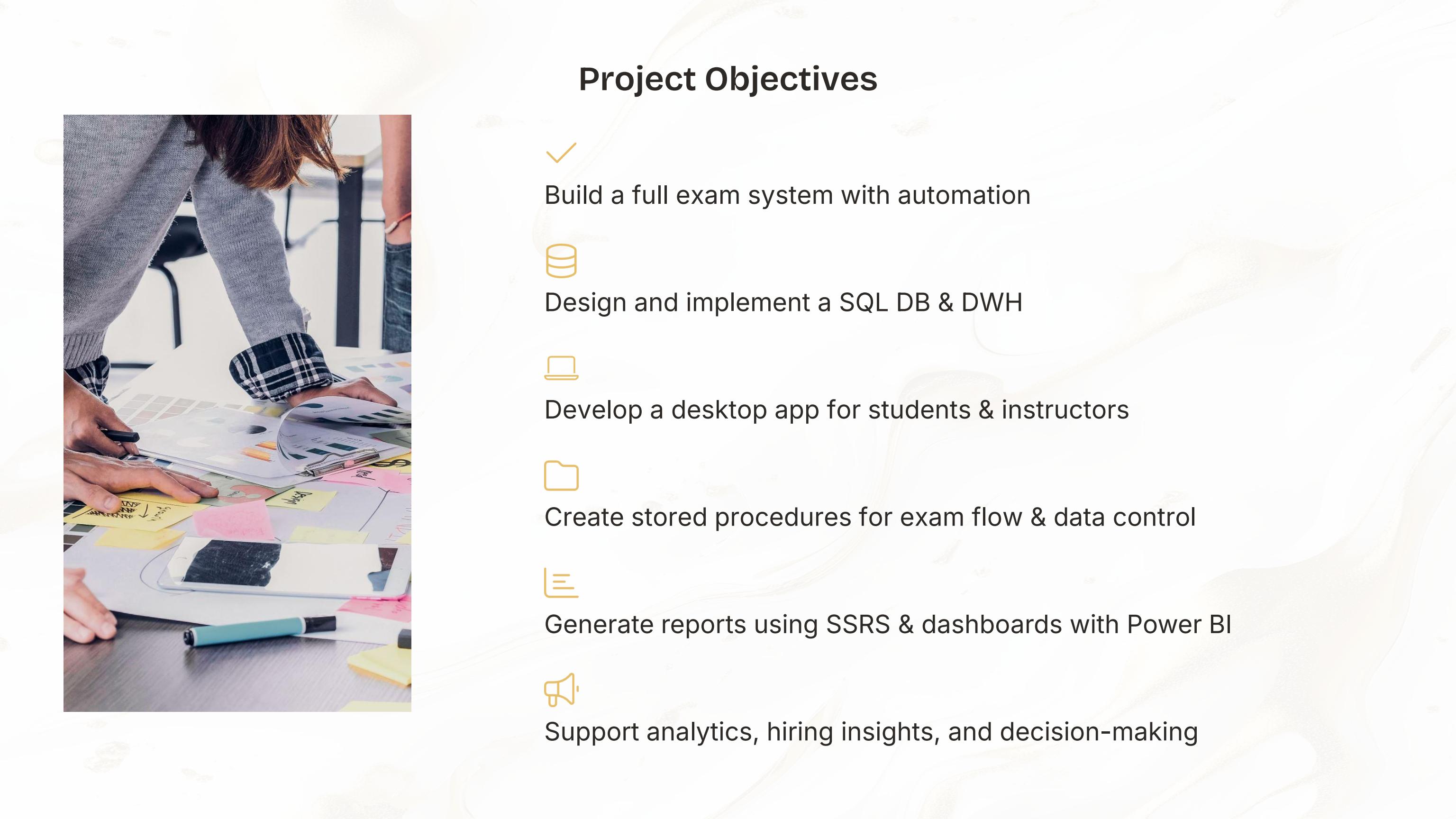
Manual exams are slow, error-prone,
and hard to scale



Institutions needs an automated
system for exams, grading, and reports



The goal: fast, accurate, and data-
driven exam management



Project Objectives



Build a full exam system with automation



Design and implement a SQL DB & DWH



Develop a desktop app for students & instructors



Create stored procedures for exam flow & data control

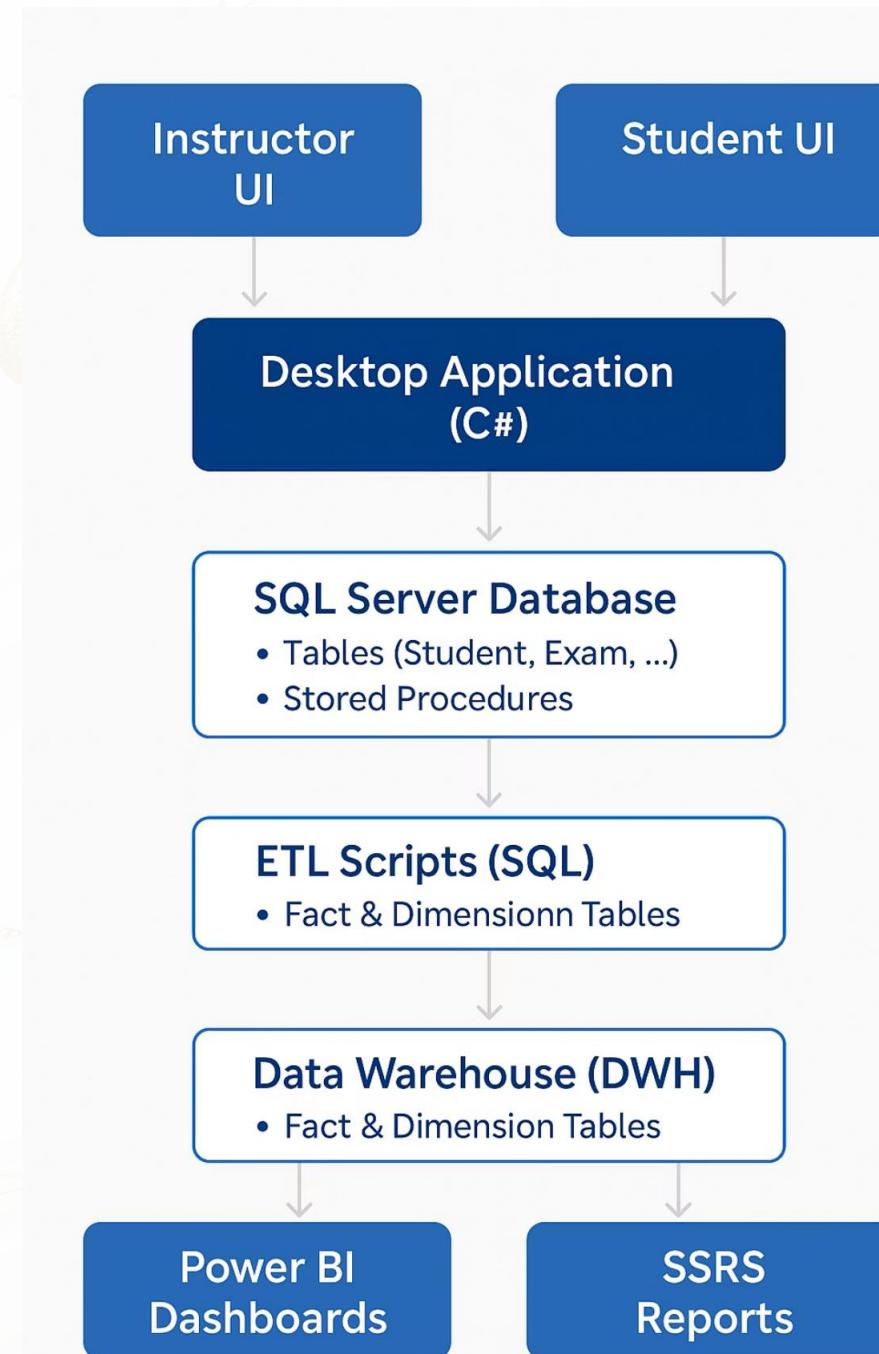


Generate reports using SSRS & dashboards with Power BI



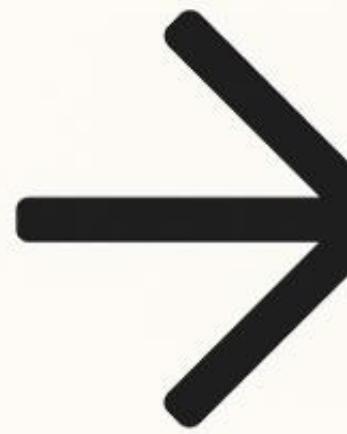
Support analytics, hiring insights, and decision-making

System Architecture



Features Overview

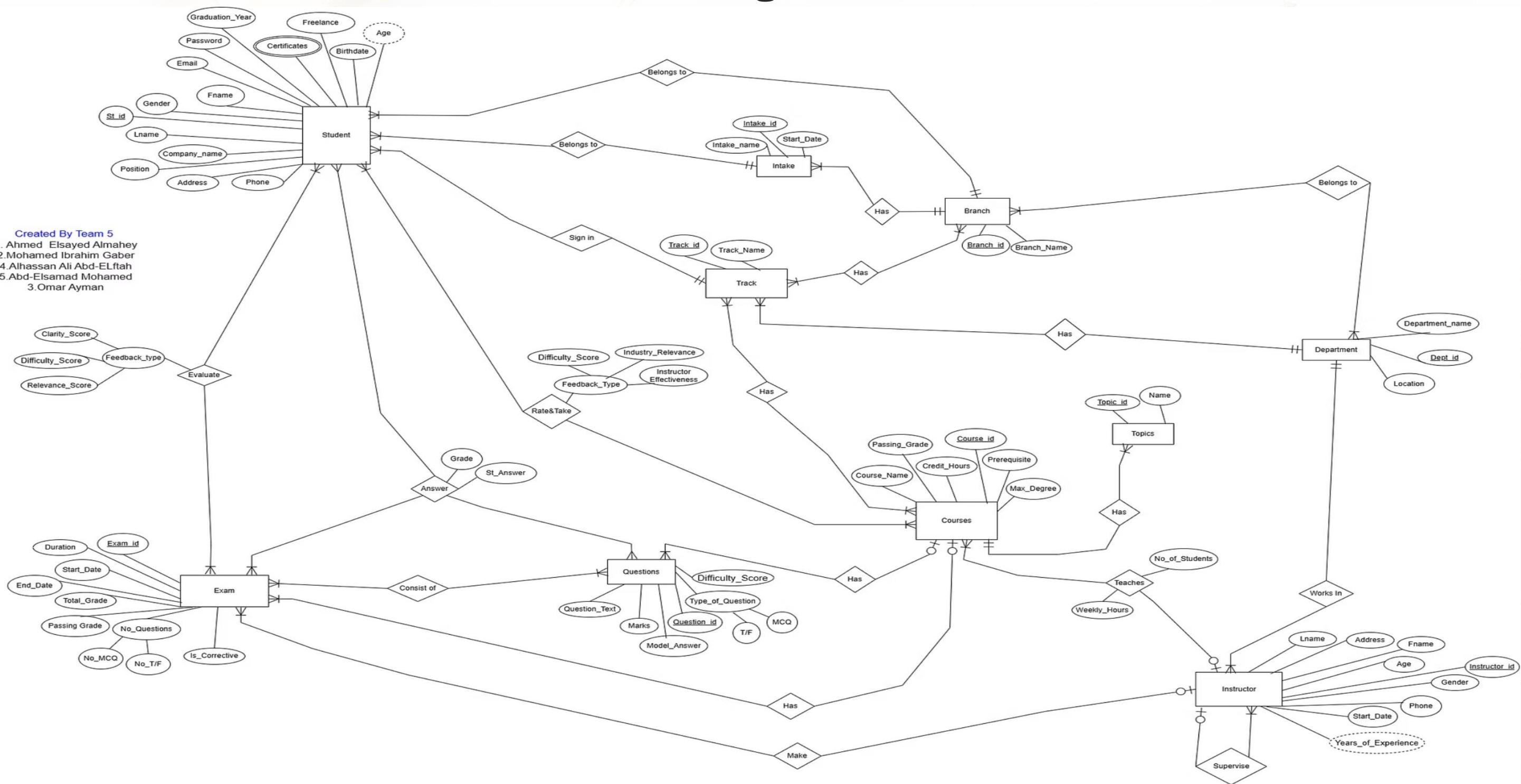
- Instructor can create exams (manual & random)
- Students can take online exams
- Auto-correction & grade calculation
- Stored procedures
- SSRS reports
- Power BI dashboards
- Desktop application (student/instructor)



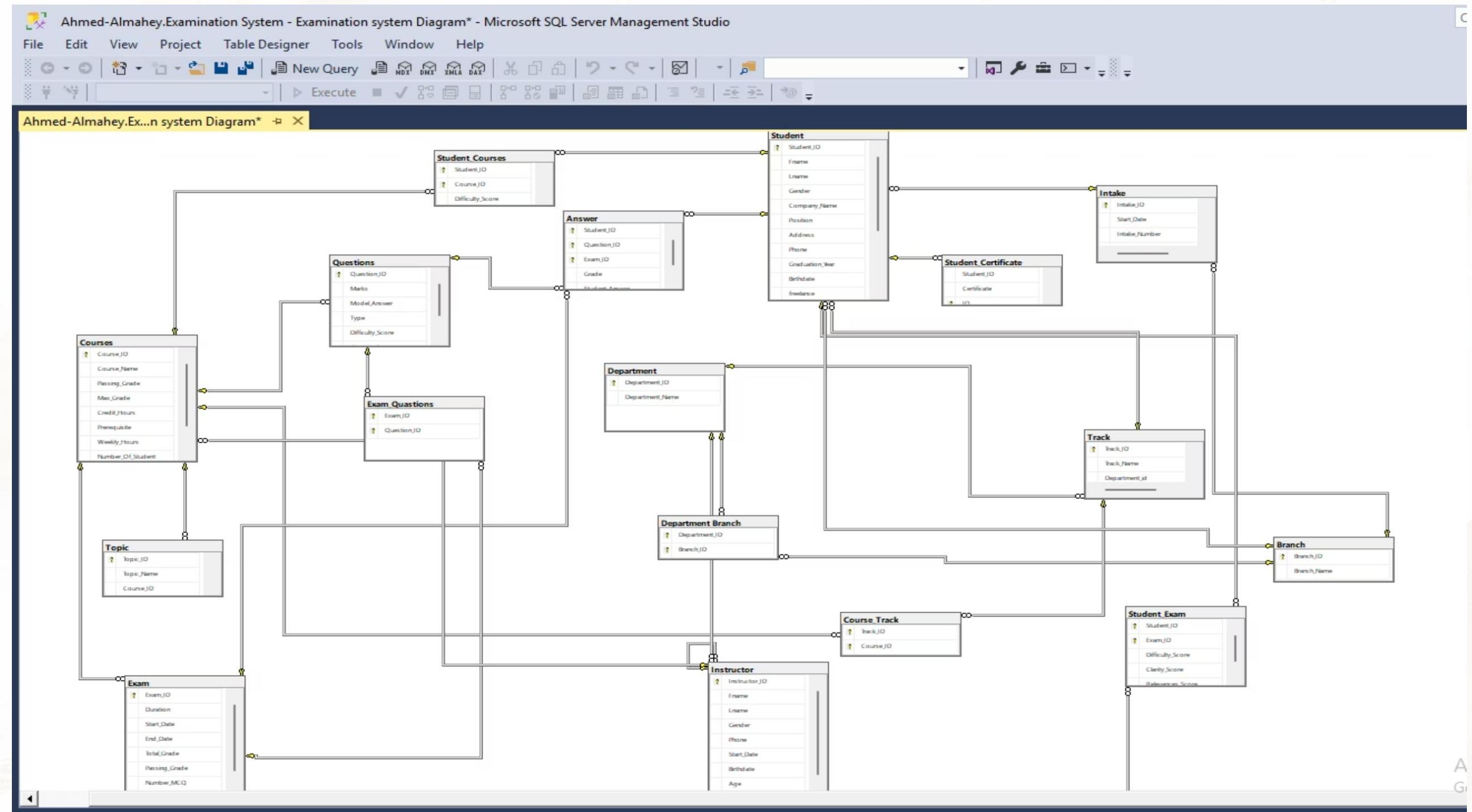
ERD & Database

[Database files in this link on github](#)

ERD Diagram



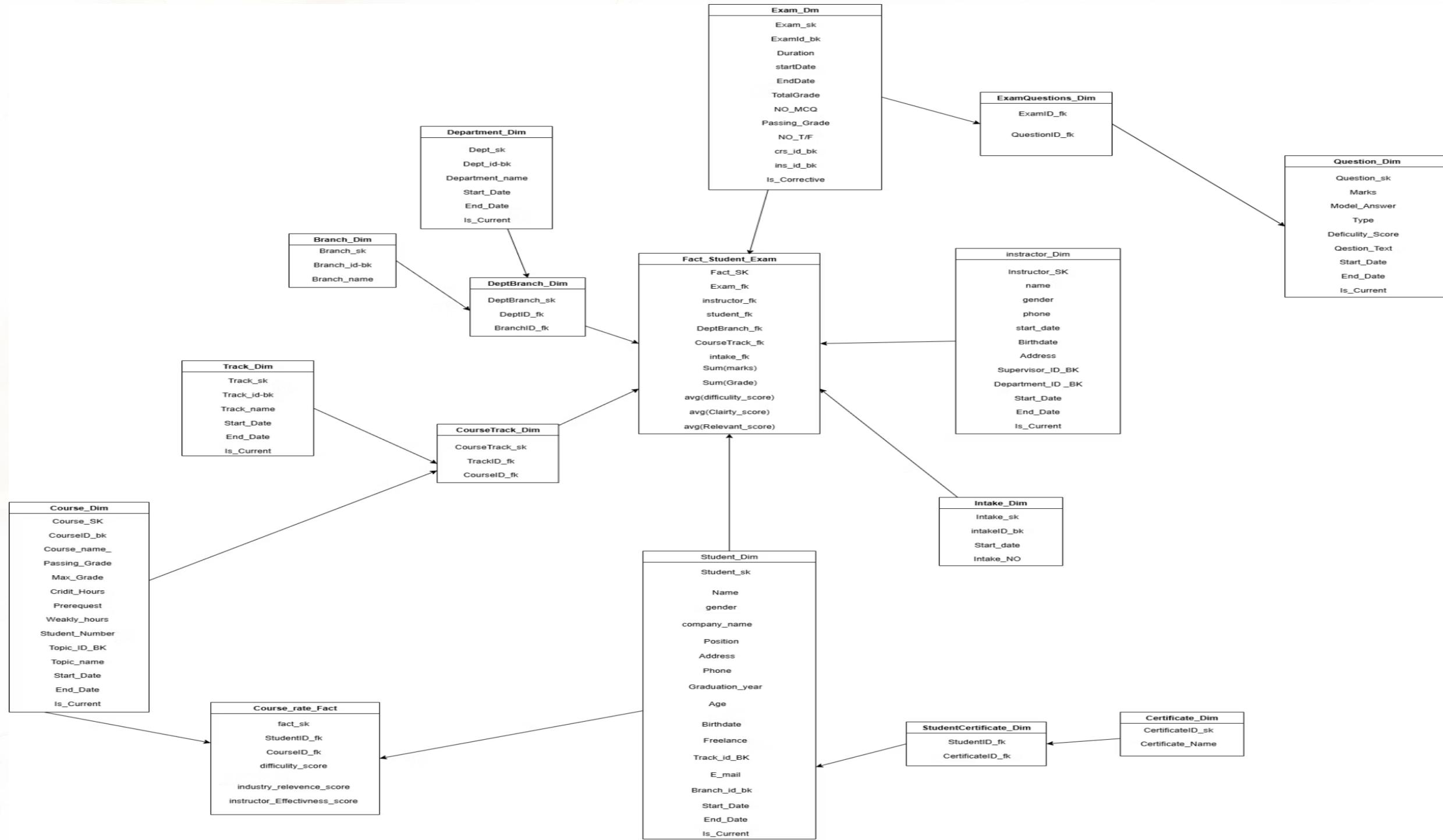
Database Schema



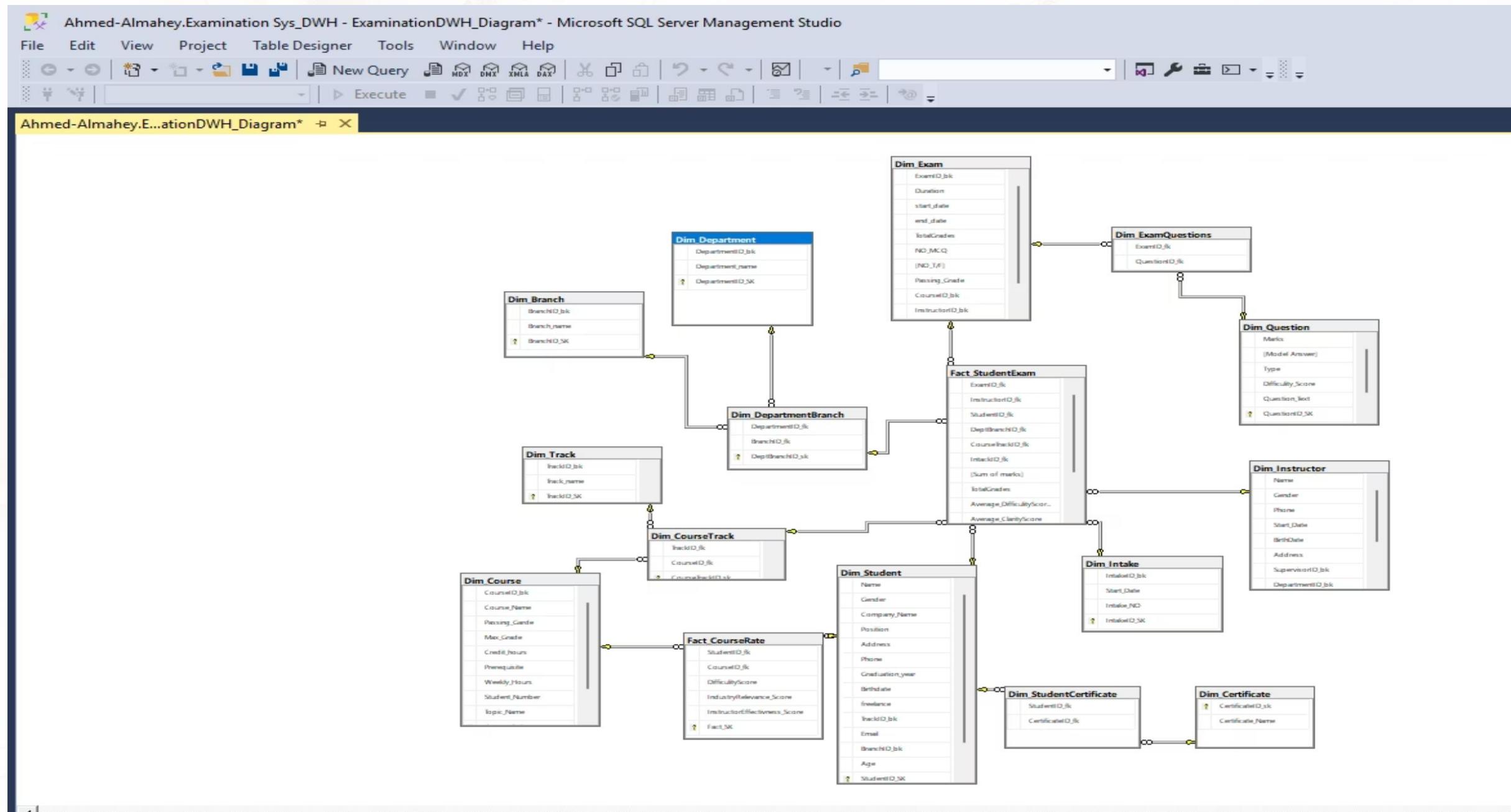


[Data Warehouse files on this link on github](#)

Data Warehouse Schema



Data Warehouse Schema



The DWH SQL Queries.sql - (local).Examination Sys_DWH (AHMED-ALMAHEY\DELL (62)) - Microsoft SQL Server Management Studio

File Edit View Query Project Tools Window Help

New Query MDX DMX XMLA DAX

Examination Sys_DWH Execute

The DWH SQL Quer...MAHEY\DELL (62) X

```
on q.QuestionID_bk = eq.Question_ID

--ETL for Fact_StudentExam

--Step1 Summarization of Answer table
insert into [Examination Sys_DWH].dbo.Fact_StudentExam(StudentID_fk,ExamID_fk,totalgrades)
select s.studentID_sk, e.examID_sk, sum(a.grade)
from [Examination System].dbo.Answer a join [Examination Sys_DWH].dbo.Dim_Exam e
on a.Exam_ID = e.ExamID_bk join [Examination Sys_DWH].dbo.Dim_Student s
on s.StudentID_bk = a.Student_ID
group by s.studentID_sk, e.examID_sk

-- Step2 Inserting the TotalMarks and Average_DifficultyScore
update f
set [Sum of marks] = agg.TotalMarks,
Average_DifficultyScore_FromInstructors = agg.avg_score
from
[Examination Sys_DWH].dbo.Fact_StudentExam f
join(
select e.examID_sk,sum(q.marks) as TotalMarks, avg(q.Difficulty_Score) as avg_score
from [Examination Sys_DWH].dbo.Dim_Question q join [Examination Sys_DWH].dbo.Dim_ExamQuestions eq
on q.QuestionID_SK = eq.QuestionID_fk join [Examination Sys_DWH].dbo.Dim_Exam e
on eq.ExamID_fk = e.ExamID_SK
group by e.ExamID_SK
) as agg
on f.ExamID_fk = agg.examID_sk

--step3 insert avg_difficultyscore , avg_clairtyscore, avg_relevancescore
UPDATE f
SET
    Average_ClarityScore = se.Clarity_Score,
    Average_DifficultyScore_FromStudents = se.Difficulty_Score,
    Average_RelevanceScore = se.Relevances_Score
FROM Fact_StudentExam f
JOIN Dim_Student s ON f.StudentID_fk = s.StudentID_SK
JOIN Dim_Exam e ON f.ExamID_fk = e.ExamID_SK
JOIN [Examination System].[dbo].Student_Exam se
    ON s.StudentID_bk = se.Student_ID
    AND e.ExamID_bk = se.Exam_ID

--Look up the instructorID_fk
update f
```

ETL Process (SQL-Based)

- Extracted data from operational system into snowflake schema (DWH)
 - Used INSERT, JOIN, and UPDATE logic to populate dimension & fact tables
 - Avoided SSIS — all transformation was done using native SQL scripts
 - Ensured data quality, relationships, and reporting readiness

Stored Procedures



CRUD: INSERT, UPDATE, DELETE, SELECT for all main tables



Random exam generation



Manual exam creation



Save student answers



Auto-correct & grade calculation



Assign students to exams

Dashboards & Reports

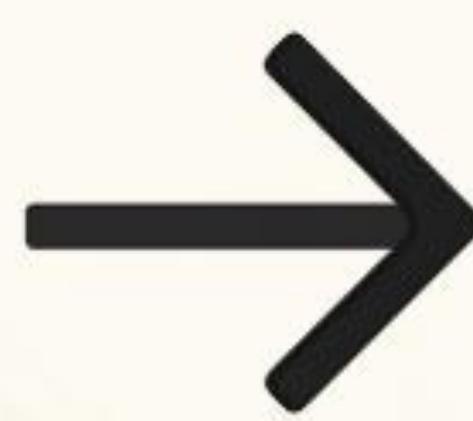
SSRS Reports

- Students by department
- Student grades by ID
- Instructor's courses + student count
- Course topics
- Exam questions & choices
- Exam + student answers

Power BI Dashboards

- 21+ dashboards (certificates, hiring, performance...)
- Hosted on Power BI Service
- Fully documented



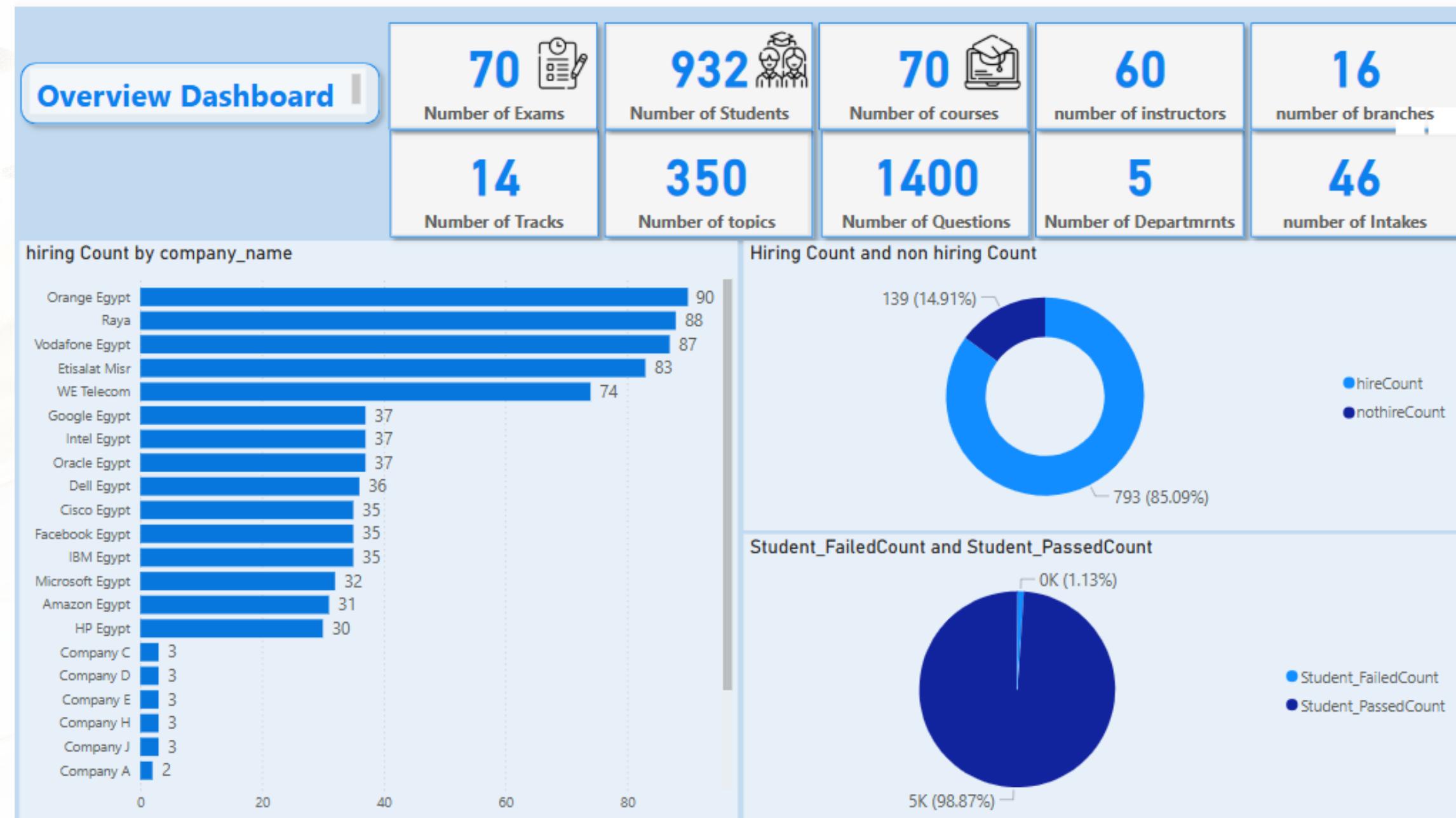


POWER BI DASHBOARDS

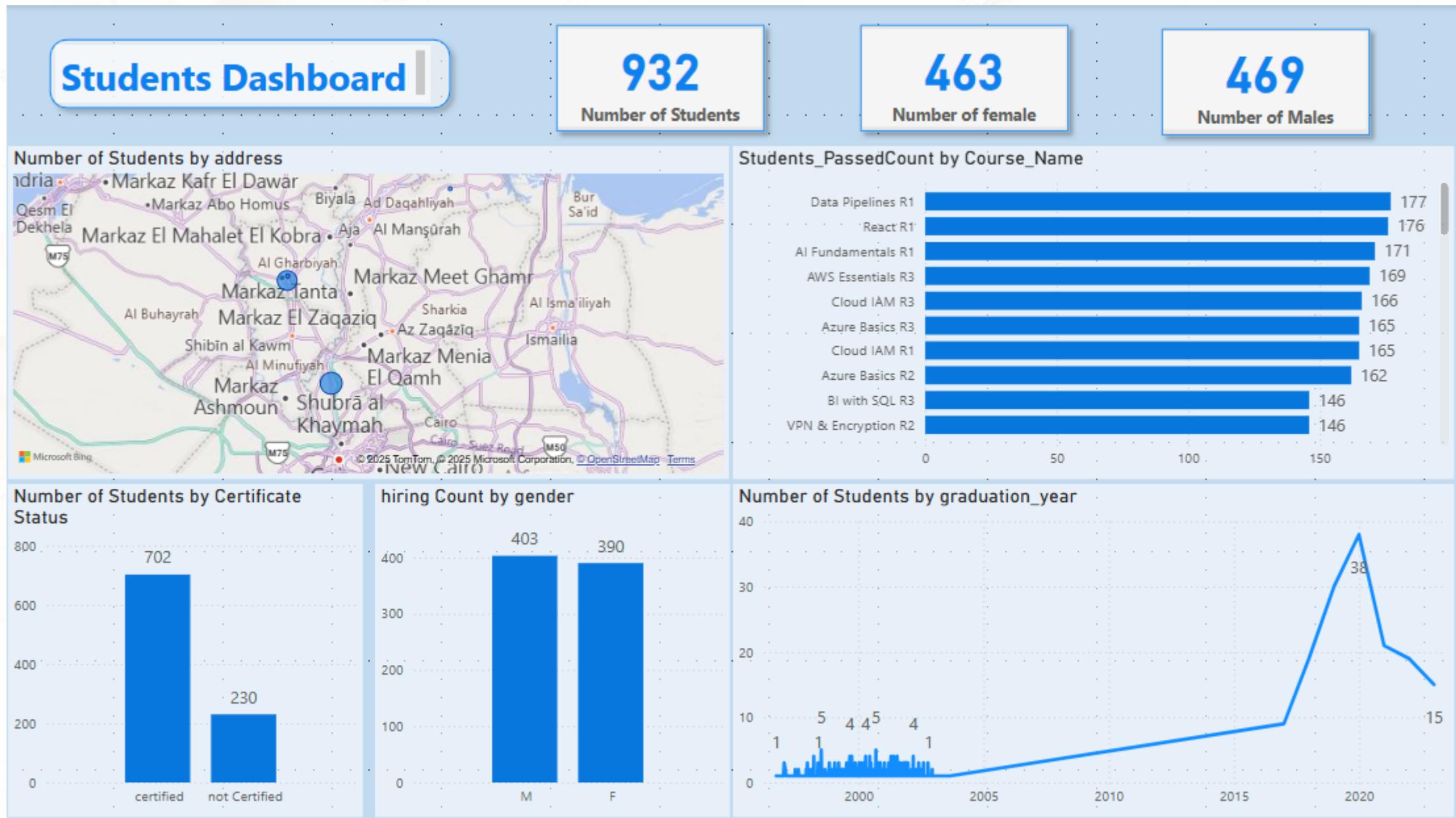
Power BI

The screenshot displays the Microsoft Power BI interface. On the left, the navigation pane shows various options: Home, Create, Browse, OneLake, Apps, Metrics, Monitor, Learn, Real-Time, Workspaces, Examination System ..., Examination Sys_Proje..., and Examination Sys_DWH The 'Home' option is selected, indicated by a green bar at the top of the list and a 'Home Selected' label above the main content area. The main content area features a blue header with the 'ITI Examination System' logo and four buttons: 'Overview', 'Student', 'Track', and 'Certificate'. To the right of the dashboard, the 'Information Technology Institute' logo is displayed, consisting of a large red stylized 'ITI' monogram next to the text 'Information Technology Institute'.

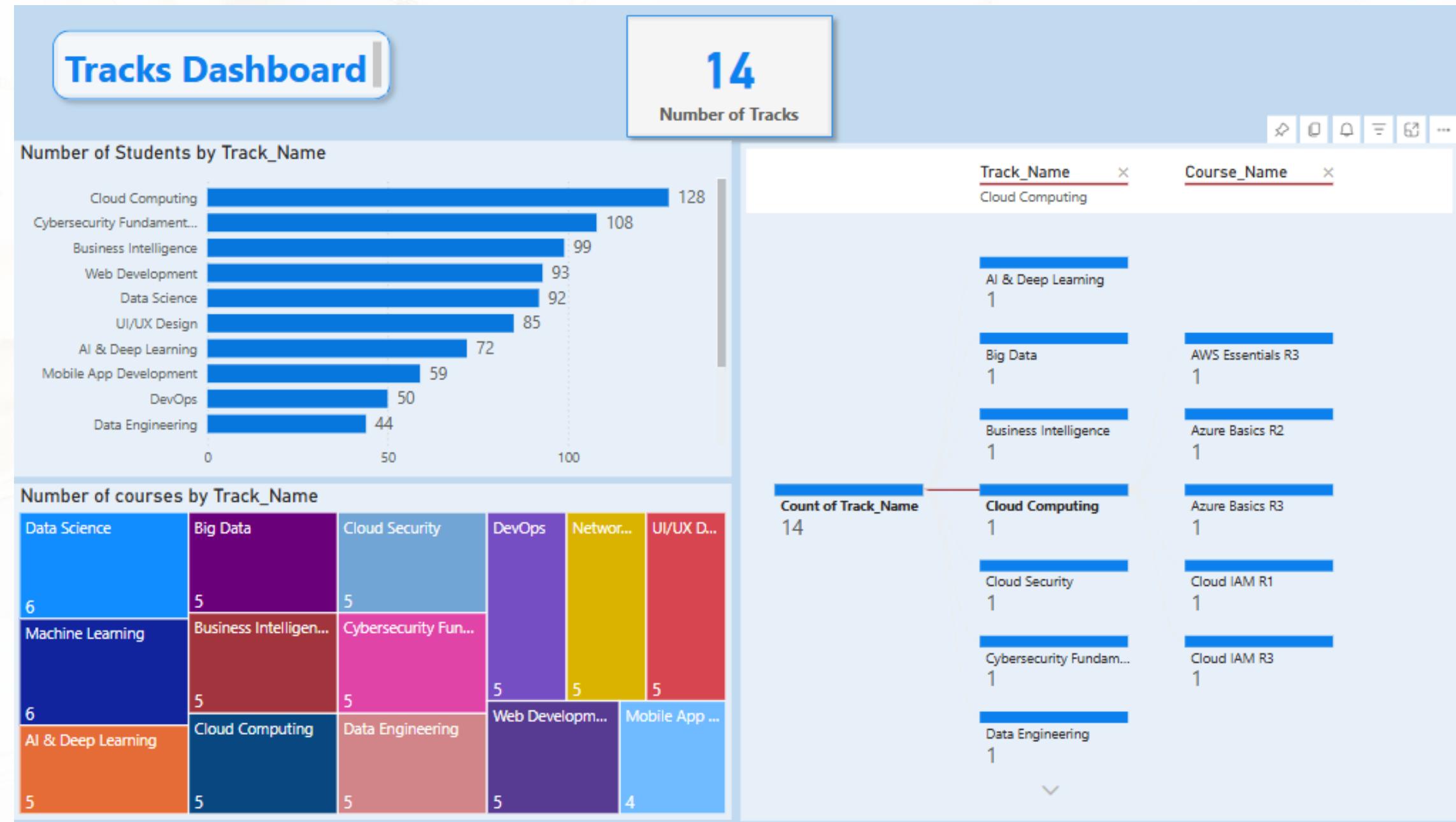
Power BI



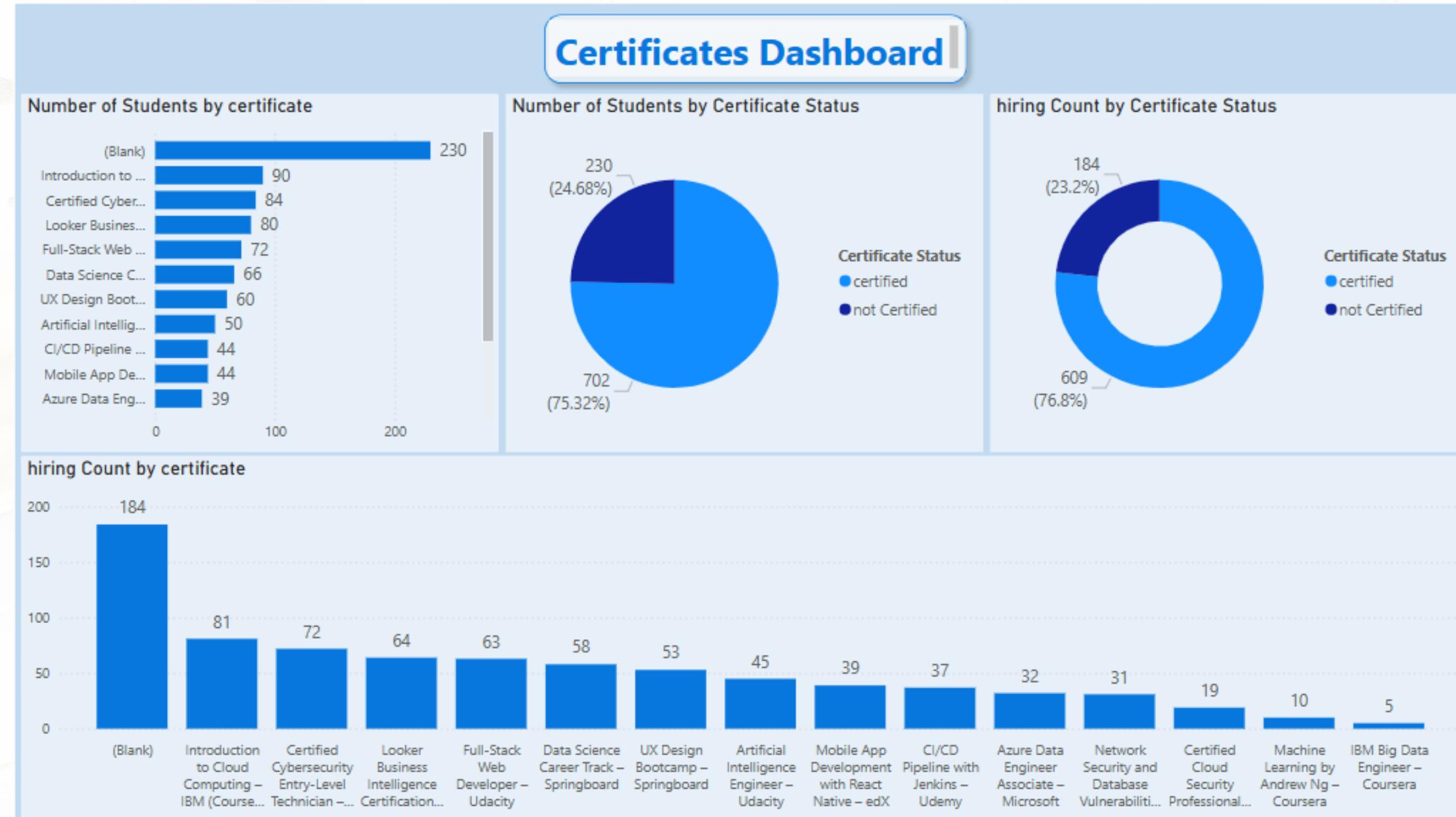
Power BI



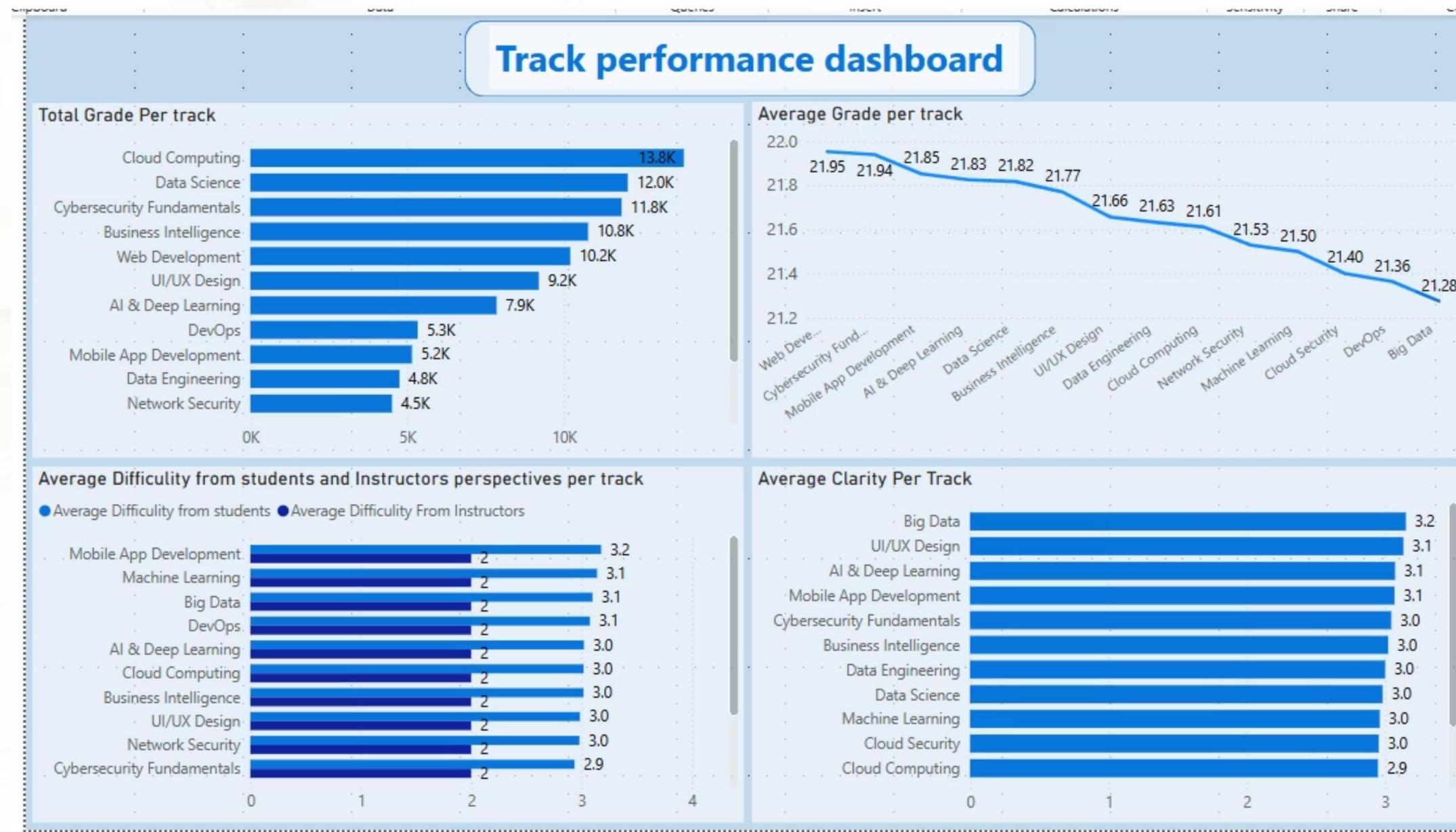
Power BI



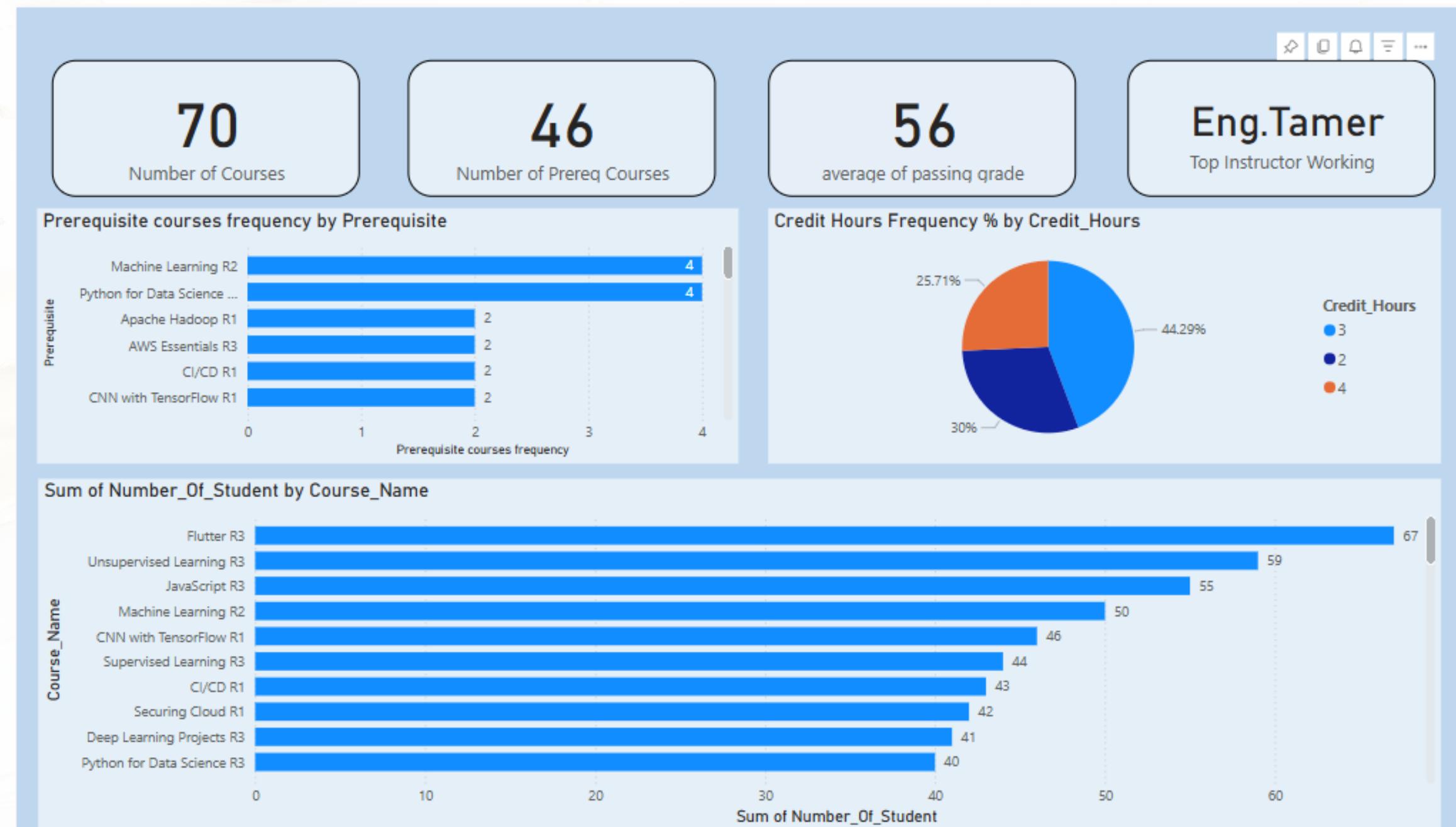
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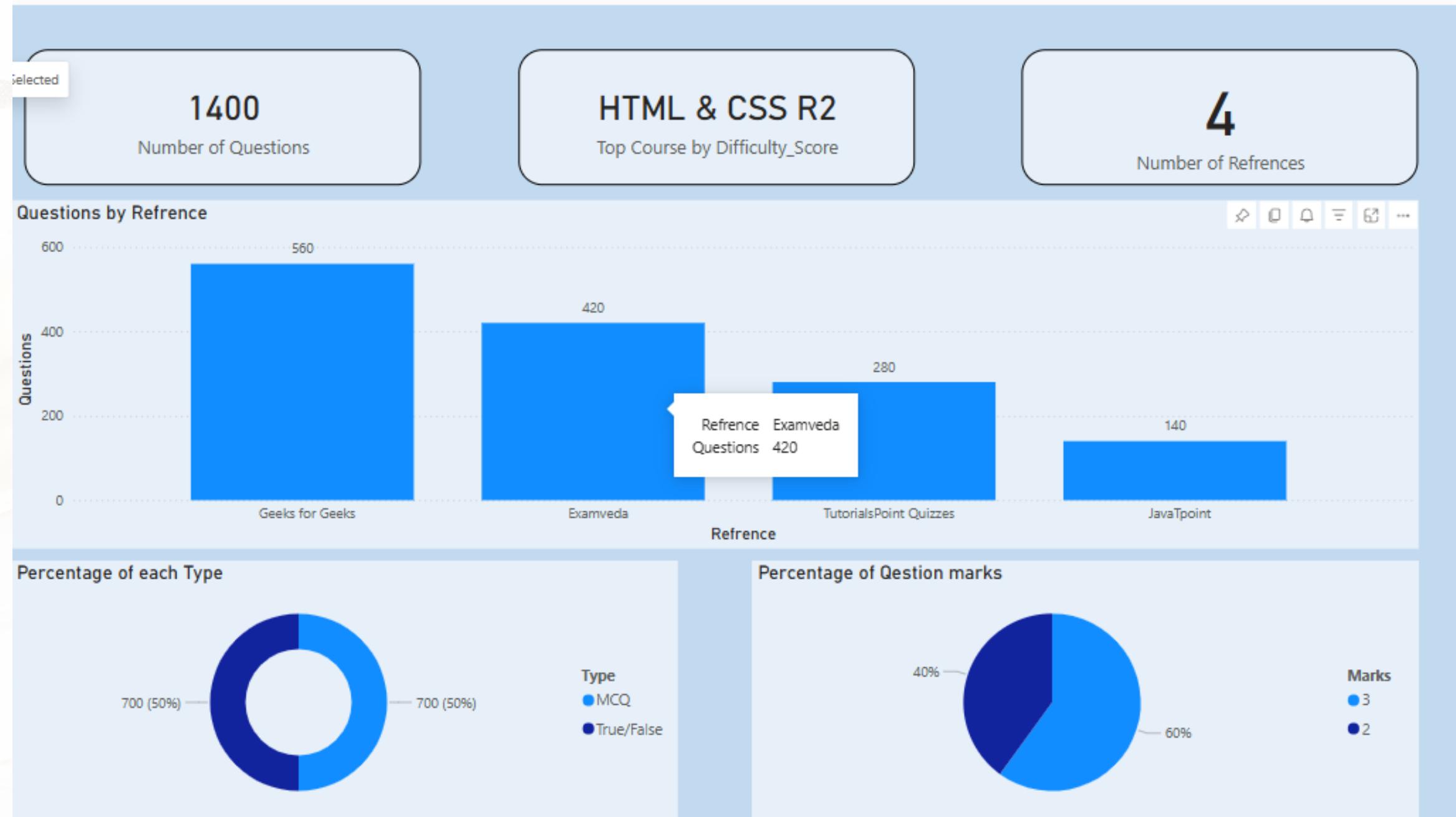
Power BI



Power BI



Power BI



Power BI

60

number of instructors

33.15

Average Age of Instructors

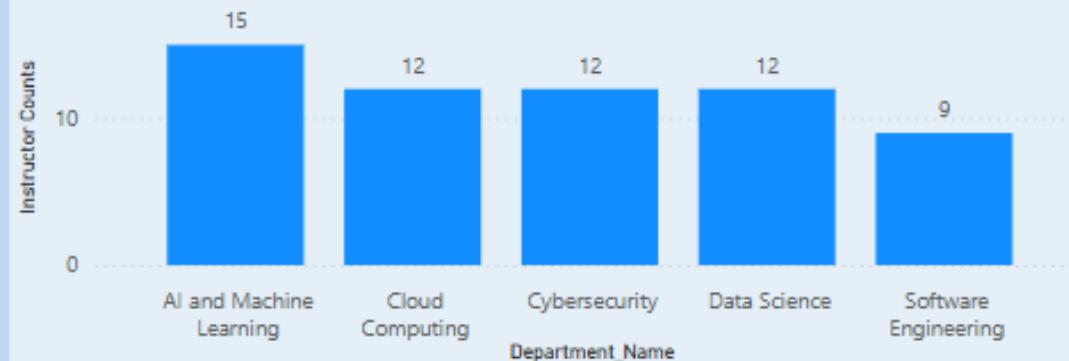
10

Number of SuperVisors

5

Number of Departments

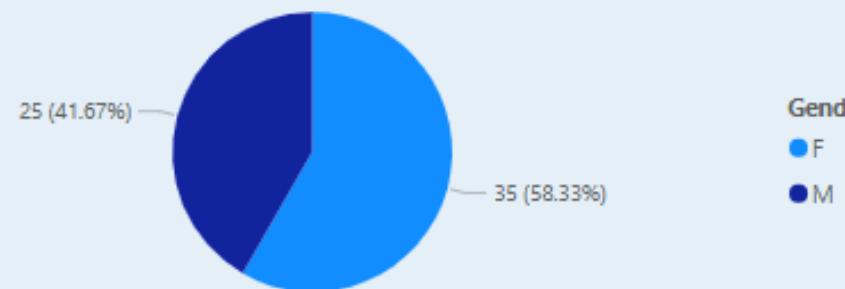
Instructor Counts by Department_Name



InstructorCount by Address



Percentage of instructor Gender



Average working Experience by Department_Name



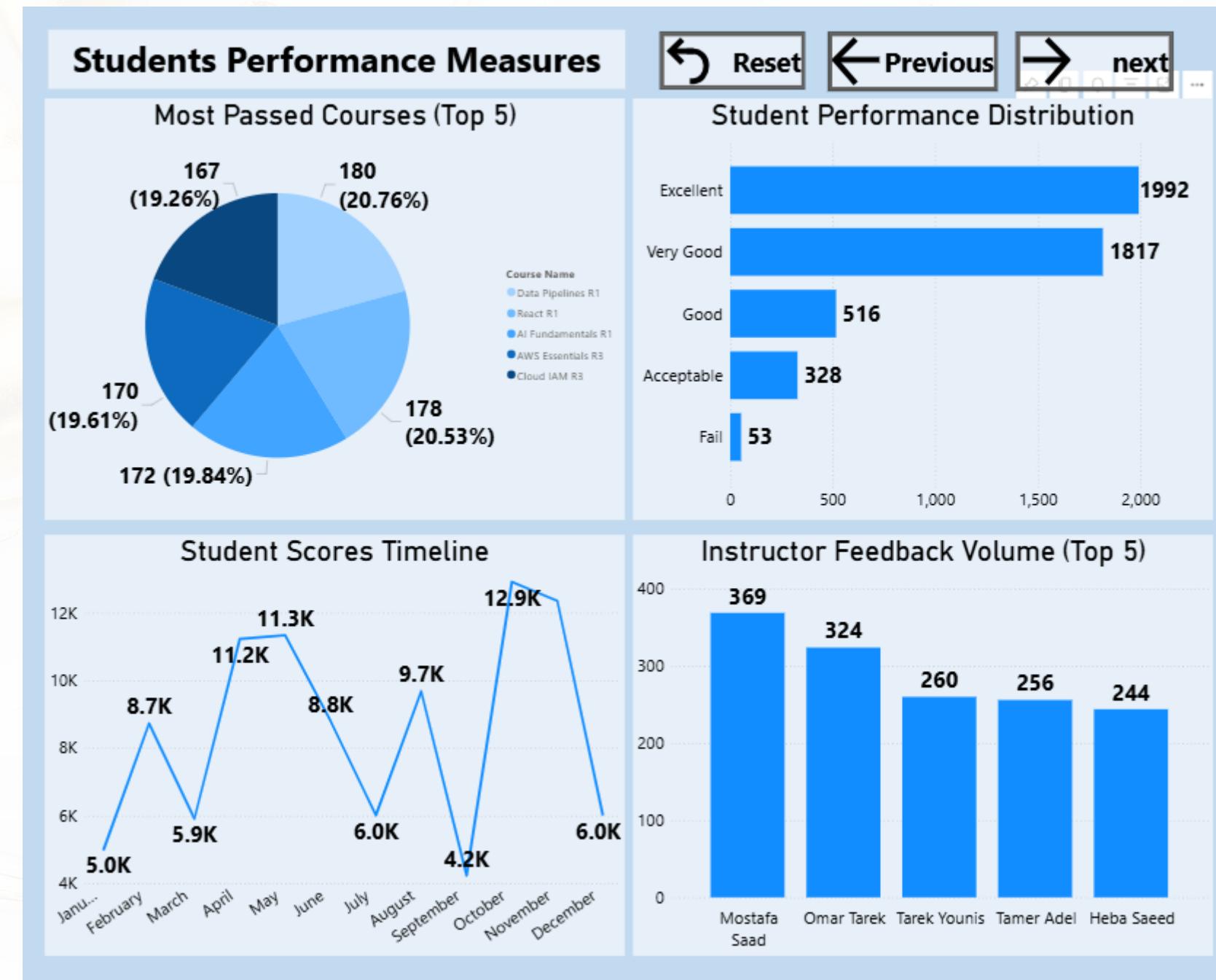
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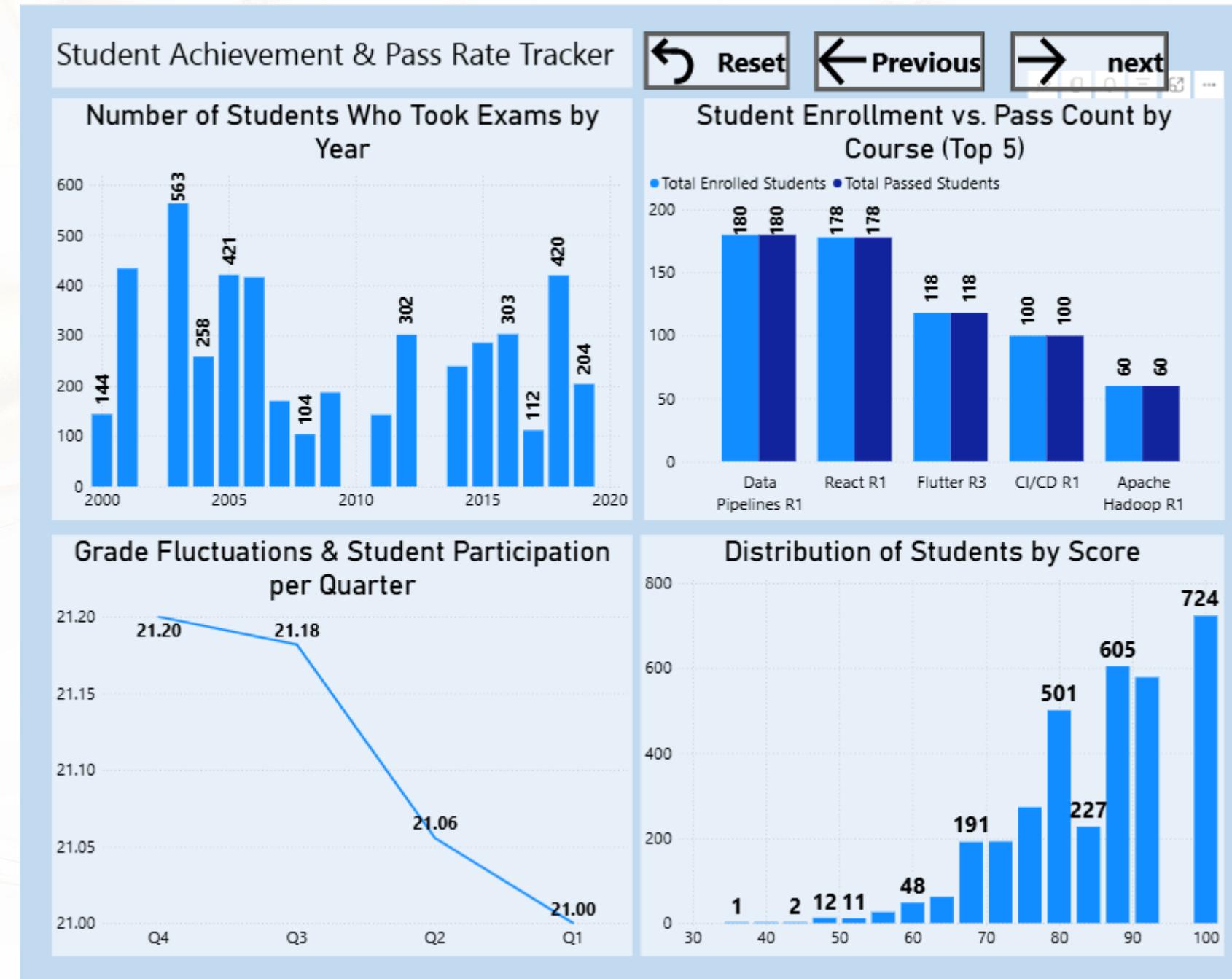
Power BI

Important Numbers		
Total Student	932	→ next
Total Departments	Total Tracks	Total Instructors
5	14	60
Total St For Top Department	Total St For Top Track	Total St For Top Instructor
287	128	369
Top Department	Top Track	Top Instructor
Software Engineering	Cloud Computing	Mostafa Saad
Total Courses	Total Topics	
70	350	

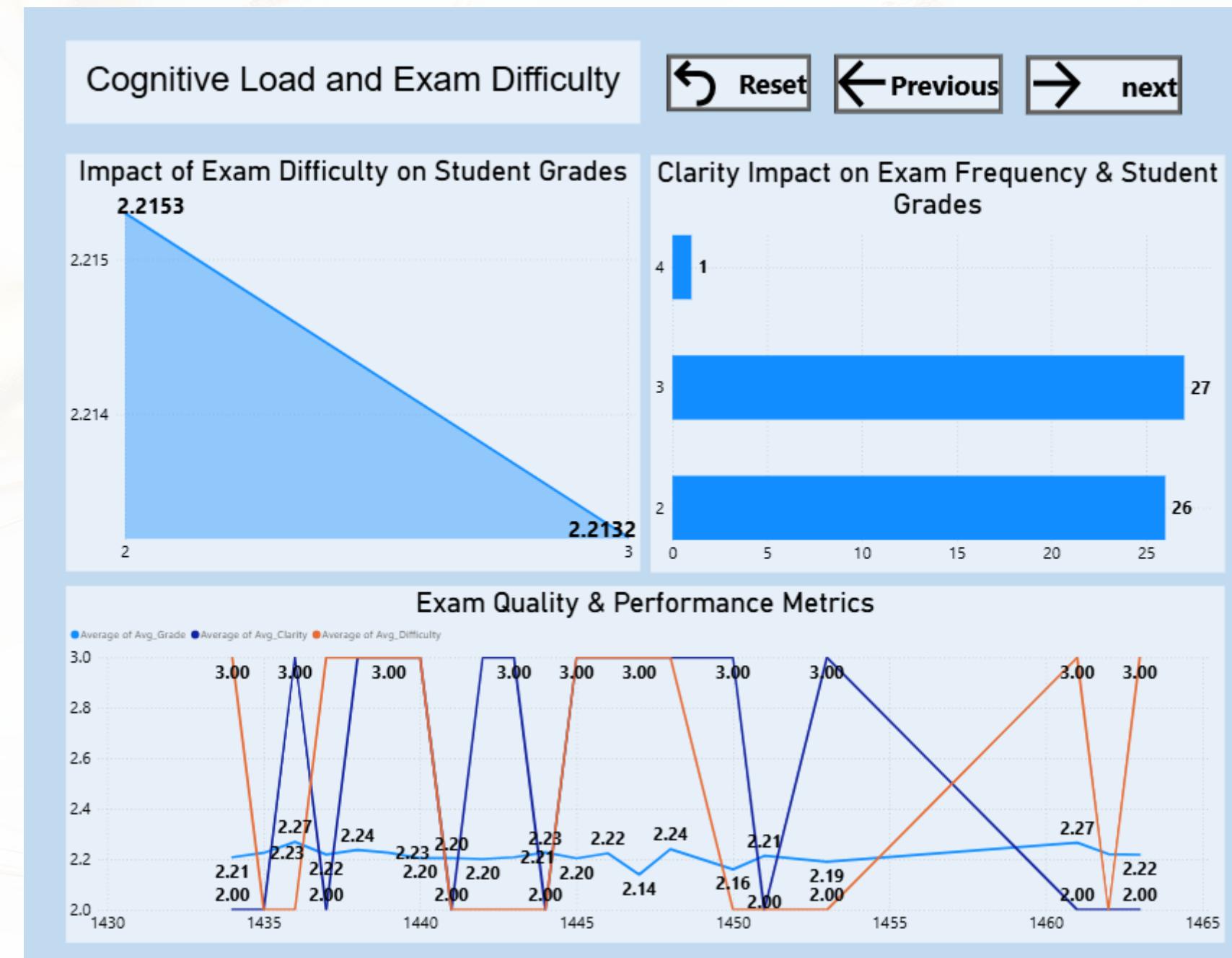
Power BI



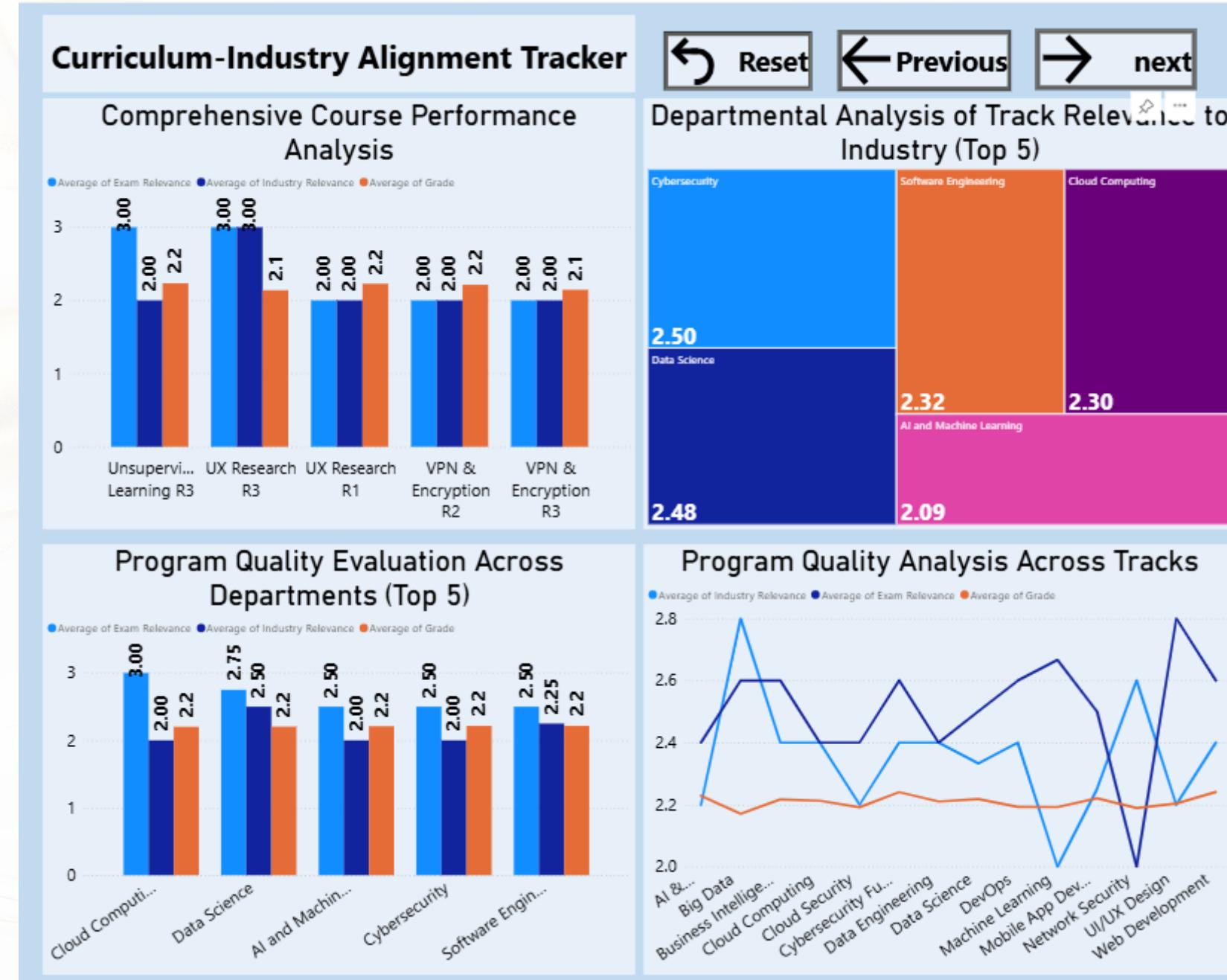
Power BI



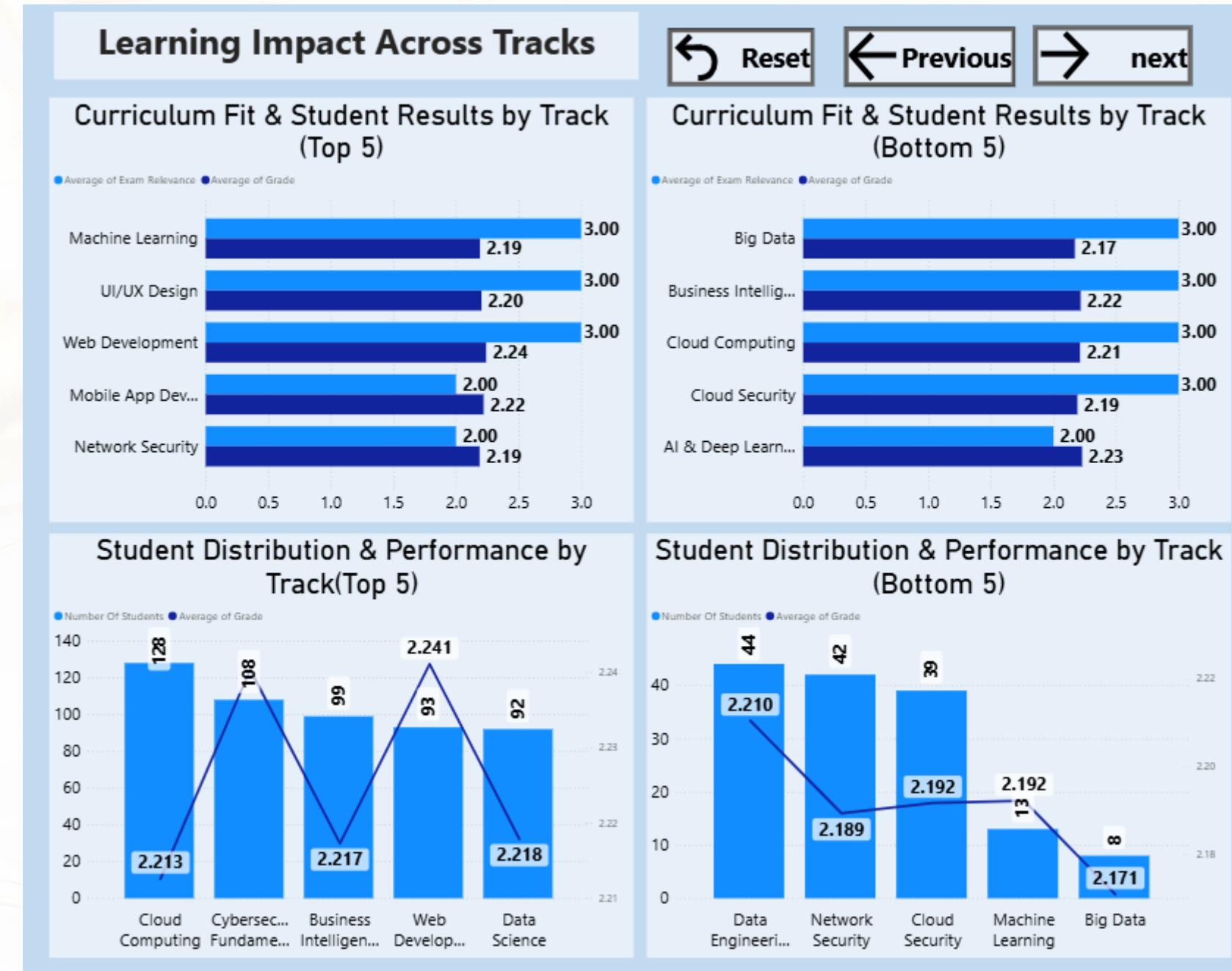
Power BI



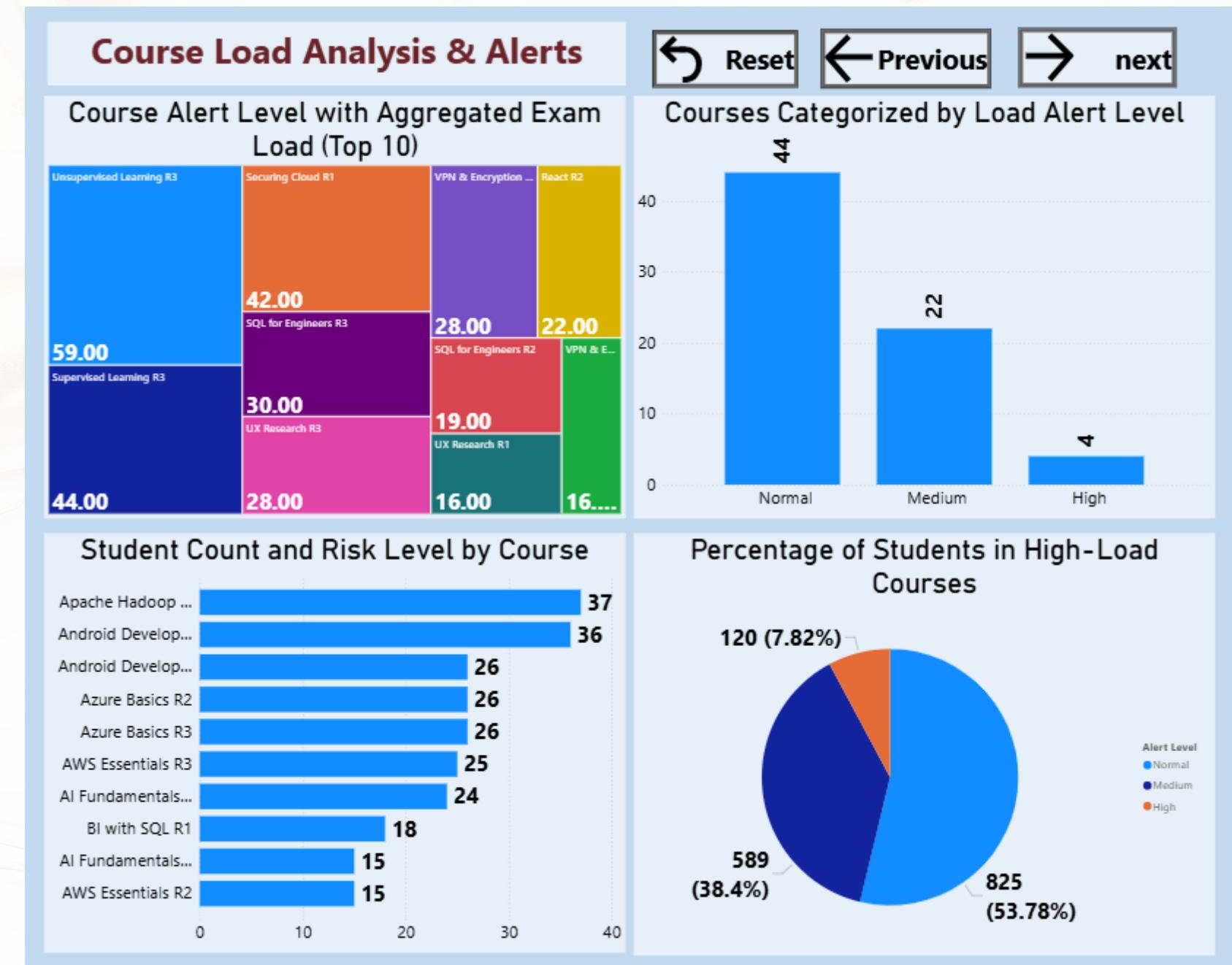
Power BI



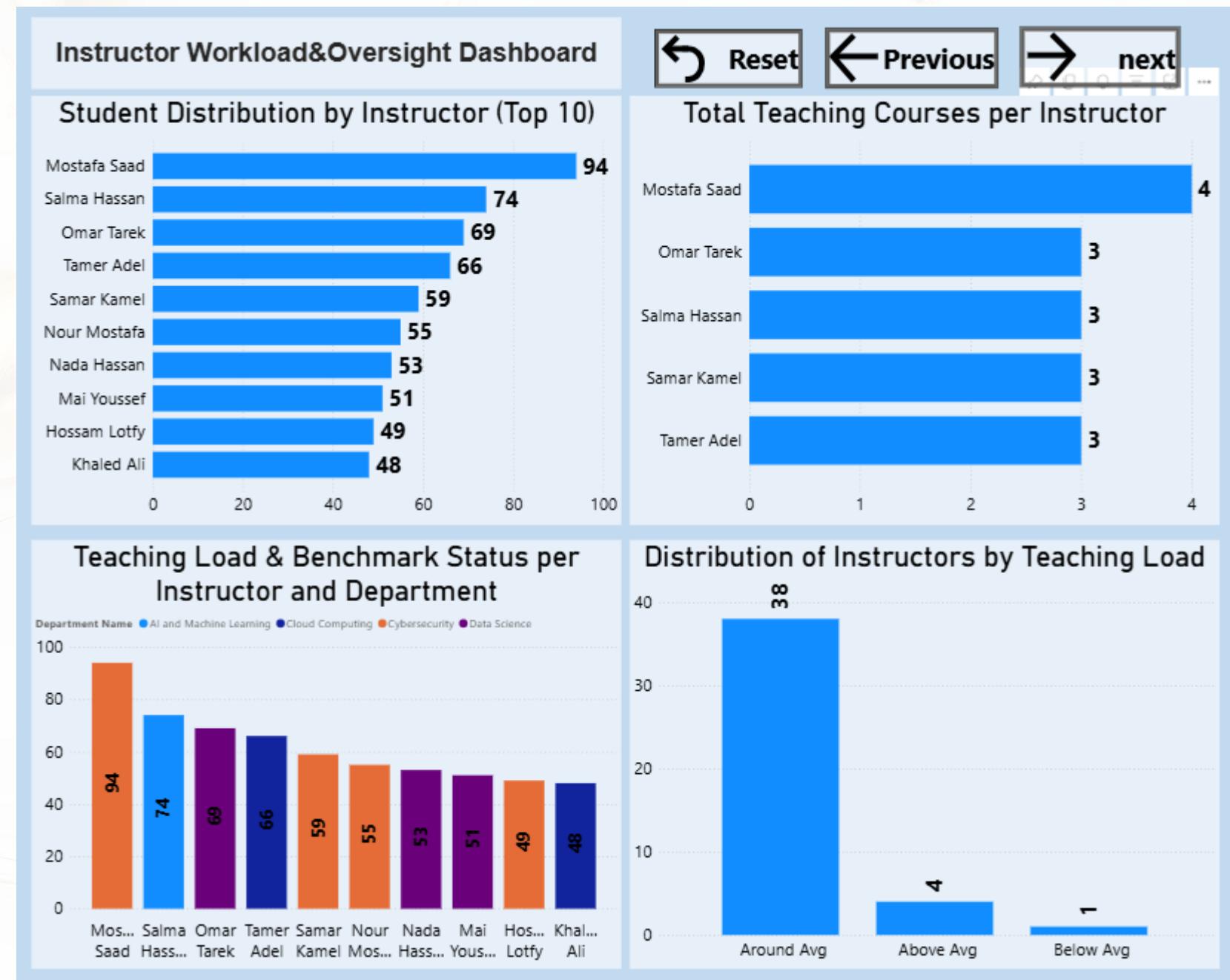
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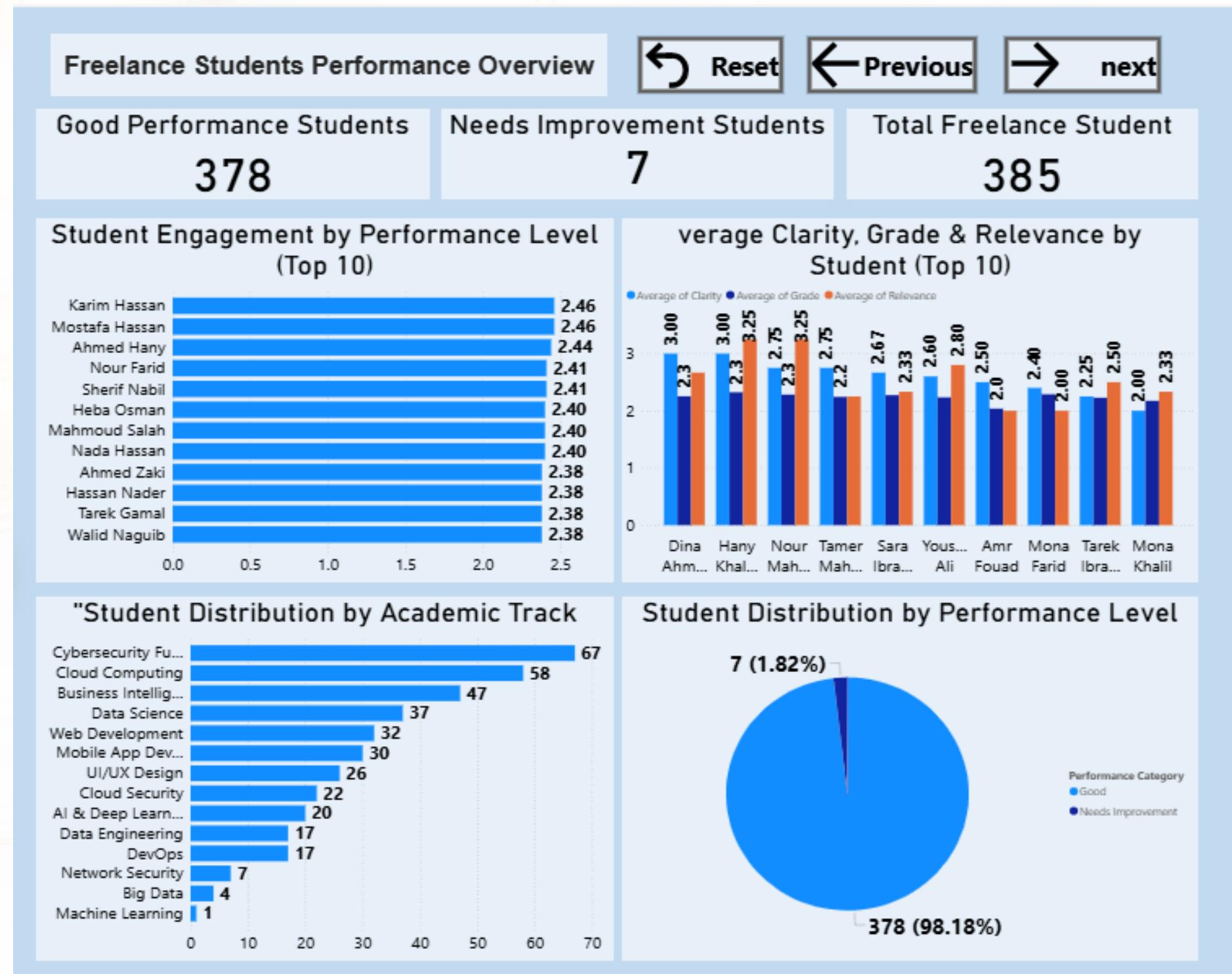
Power BI



Power BI



Power BI



Power BI



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Dashboard Overview:

Top navigation bar: Deselect all, AI Fundamentals R1, AI Fundamentals R3, All, All.

Metrics:

- Total Students: 932
- Total Credits Hours: 207
- Total Courses: 70
- Total Instructors: 60
- Total Exams: 46K

Table:

Fname	Lname	Gender	freelance	Student_Certificate	Sum of Courses_Industry_Relevance_Score	Sum of Cours
Adel	Mahmoud	M	False	CI/CD Pipeline with Jenkins – Udemy	1	
Adel	Mansour	M	False	Mobile App Development with React Native – edX	5	
Adel	Mohamed	M	False	CI/CD Pipeline with Jenkins – Udemy	6	
Adel	Nabil	M	False	Artificial Intelligence Engineer – Udacity	3	
Adel	Ramzy	M	False	Full-Stack Web Developer – Udacity	4	
Adel	Salah	M	False	Full-Stack Web Developer – Udacity	5	
Adel	Salah	M	False	Mobile App Development with React Native – edX	3	
Adel	Tawfiq	M	False	Certified Cybersecurity Entry-Level Technician – CompTIA	2	
Total					2766	

Bar Chart:

Course Title	Count
Python for Data Science	140
AWS Essentials R3	130
Intro to Cybersecurity R2	110
SQL for Engineers R2	100
HTML & CSS R2	95
Figma Basics R1	85
AI Fundamentals R1	70
Flutter R3	60
BI with SQL R3	50
Network Fundamentals R2	45
Azure Basics R2	40
Machine Learning R2	30
Apache Hadoop R1	20

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← All

932 Total Students

207 Total Credits Hours

70 Total Courses

60 Total Instructors

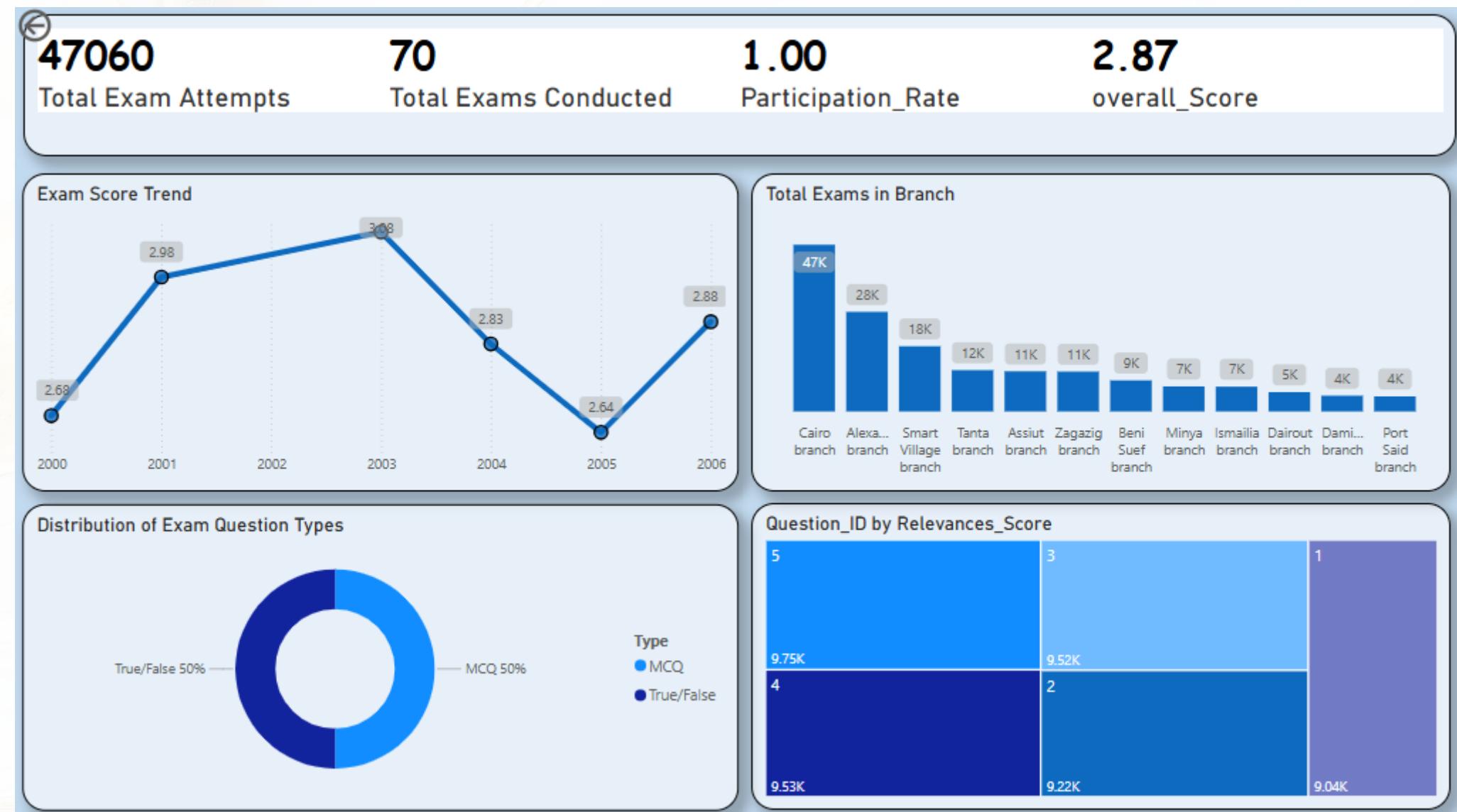
46K Total Exams

Course_Name	Number_Of_Student	Credit_Hours	Max_Grade	Passing_Grade	Weekly_Hou
AI Fundamentals R1	15	3	87	65	
AWS Essentials R2	15	4	93	52	
Figma Basics R2	15	4	92	55	
HTML & CSS R1	15	4	92	51	
Python for Data Science R3	15	2	93	50	
React R1	15	2	90	65	
Android Development R1	16	2	100	53	
Apache Hadoop R1	16	2	87	61	
Docker R3	16	4	100	50	
Flutter R3	16	3	80	50	
Neural Networks R2	16	3	88	55	
Power BI R1	16	4	96	63	
React R1	16	3	90	62	
UX Research R1	16	4	93	58	
VPN & Encryption R2	16	3	98	50	
CI/CD R1	17	4	81	51	
CNN with TensorFlow R1	17	4	86	58	

The chart displays the number of students enrolled in each course. The x-axis represents the count of students, ranging from 0 to 400. The y-axis lists the course names. The bars are blue, and the chart has a light gray background with vertical dashed grid lines.

Course	Students
Python for Data Science R3	400
AWS Essentials R3	380
Intro to Cybersecurity R2	350
HTML & CSS R2	320
SQL for Engineers R2	280
Figma Basics R1	250
AI Fundamentals R1	220
Flutter R3	180
Network Fundamentals R2	150
BI with SQL R3	120
Azure Basics R2	100
Machine Learning R2	50
Apache Hadoop R1	30

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23530
Total Exam Attempts

70
Total Exams Conducted

1.00
Participation_Rate

3.02
overall_Score

Total Exam Attempts by Year and Month

Exam_ID	Branch_Name	Sum of Passing_Grade	Sum of Total_Grade	Earliest Start_Date	Earliest End_Date	Max_Score
1434	Alexandria branch	15	25	12/23/2011 12:00:00 AM	12/28/2011 12:00:00 AM	
1434	Cairo branch	15	25	12/23/2011 12:00:00 AM	12/28/2011 12:00:00 AM	
1434	Smart Village branch	15	25	12/23/2011 12:00:00 AM	12/28/2011 12:00:00 AM	
1435	Alexandria branch	15	25	9/8/2018 12:00:00 AM	9/18/2018 12:00:00 AM	
1435	Cairo branch	15	25	9/8/2018 12:00:00 AM	9/18/2018 12:00:00 AM	
1435	Smart Village branch	15	25	9/8/2018 12:00:00 AM	9/18/2018 12:00:00 AM	

Branch_Name

All

Exam_ID

All

Exam Type

Branch Name	Count
Cairo branch	24K
Alexandria bra...	14K
Smart Village ...	9K
Tanta branch	6K
Assiut branch	6K
Zagazig branch	6K
Beni Suef bran...	4K
Minya branch	4K
Ismailia branch	4K
Dairout branch	3K
Damietta bran...	2K
Port Said bran...	2K

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Date: All

Course_Name: All

Instructor_Name: All

of courses: 54

Is this useful?

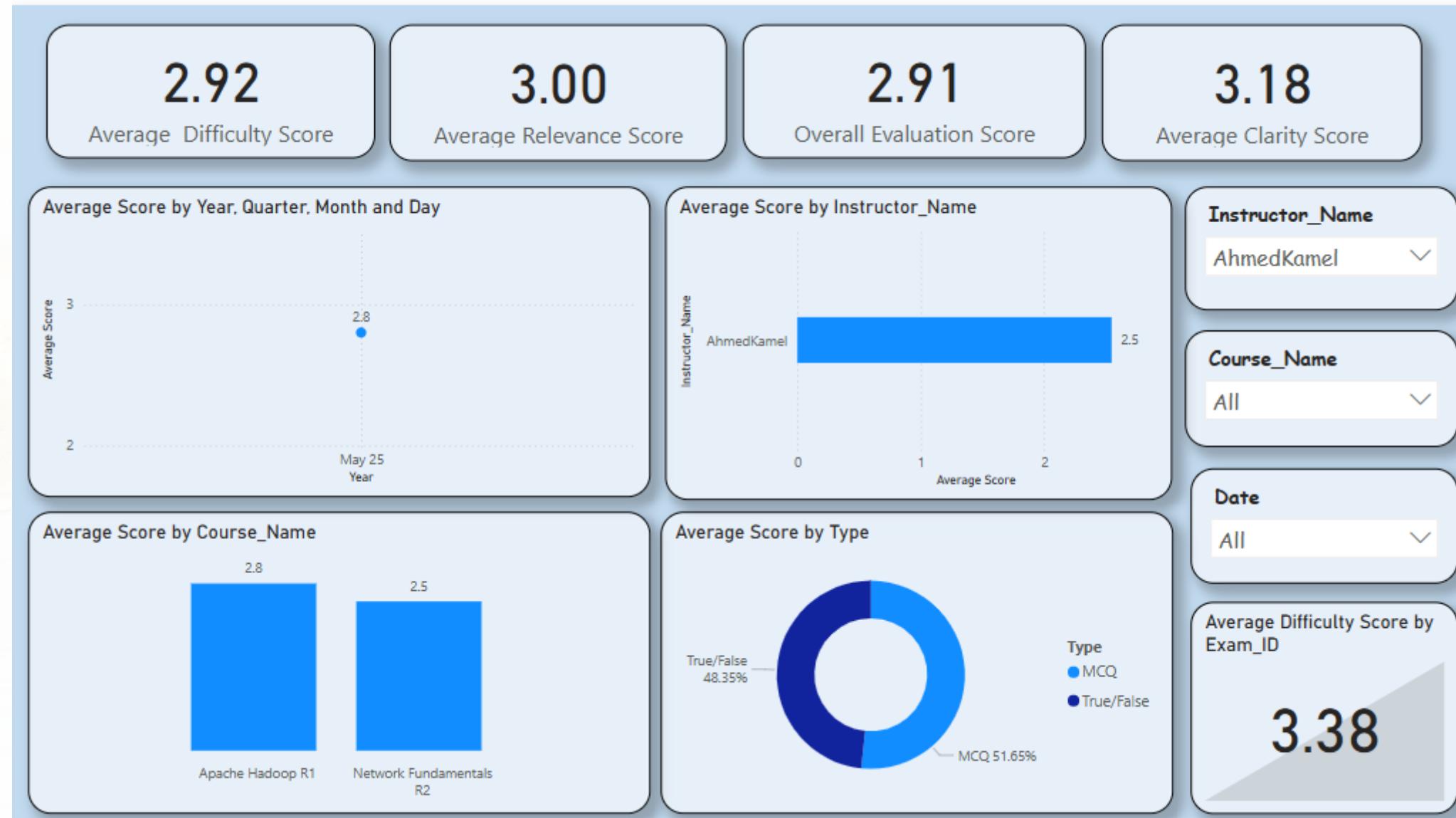
Course_Name	Average Difficulty Score	Average Clarity Score	Average Relevance Score	Average Score	Overall Evaluation Score
Unsupervised Learning R3	3.31	3.23	3.08	3.60	3.30
Supervised Learning R3	2.92	3.23	3.15	3.60	3.23
SQL for Engineers R2	2.96	3.09	3.39	3.30	3.19
UX Research R3	3.04	3.12	3.26	3.30	3.18
Figma Basics R1	3.02	3.13	3.14	3.40	3.17
Azure Basics R2	2.96	3.06	3.17	3.40	3.15

Average Difficulty Score by Question_ID

Student_Name	Course_Name	Type	Overall Evaluation Score	Average Score	Average Relevance Score	Average Clarity Score
AdelFarid	BI with SQL R3	MCQ	3.43	3.20	4.00	4.00
AdelFarid	BI with SQL R3	True/False	3.13	2.00	4.00	4.00
AdelFarid	CI/CD R1	MCQ	2.99	2.70	2.50	3.75
AdelFarid	CI/CD R1	True/False	2.94	2.50	2.50	3.75
AdelFarid	Docker R1	MCQ	2.68	2.20	4.50	2.50
Total			2.97	2.87	3.04	3.00

Overall Evaluation Score by Model_Answer

Power BI



Power BI

2.87
Average Score

54
Of Courses

47K
of Feedbacks

47K
of Questions Answered

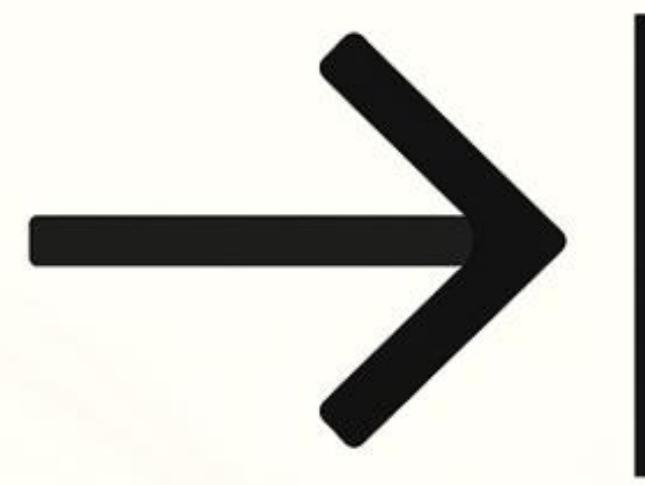
Student by Course

Course_Name	# of Students
React R1	178
AI Fundamentals R1	172
AWS Essentials R3	170
Azure Basics R2	167
Azure Basics R3	167
Cloud IAM R1	167
Cloud IAM R3	167
VPN & Encryption R2	150

Instructor's Score Trend Over Time

Year	Average Score
2001	2.50
2001.5	3.40
2002	2.60
2003	3.30
2004	2.90
2005	2.60
2005.5	3.50
2006	2.30
2006.5	1.90
2007	3.00

Exam_ID	Course_Name	Average Score	Average Clarity Score	Average Relevance Score	Ave
1434	HTML & CSS R2	3.40	2.73	2.89	
1435	JavaScript R2	2.80	2.92	3.14	
1436	React R1	1.90	3.03	3.09	
1437	Flutter R3	3.50	2.85	3.02	
1438	Android Development R1	2.50	3.19	2.71	
1439	Python for Data Science R1	3.00	3.06	2.91	
1440	Data Analysis R1	2.50	3.07	3.11	
1441	Machine Learning R2	2.90	2.74	2.86	
1442	Data Pipelines R1	2.90	3.13	3.03	
1443	SQL for Engineers R2	3.30	3.09	3.39	
1444	Power BI R3	3.00	2.83	2.92	
1445	BI with SQL R3	2.60	3.09	3.05	
1446	Figma Basics R1	3.40	3.13	3.14	
1447	UX Research R3	3.30	3.12	3.26	
1448	Intro to Cybersecurity R2	2.60	3.04	2.97	
Total		2.87	3.00	3.04	



**SSRS
REPORTS**

File Home View

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Course ID 1

Course Topics

Course Name	Topic Name
HTML & CSS R2	Ethics in AI
HTML & CSS R2	Supervised Learning
HTML & CSS R2	Unsupervised Learning
HTML & CSS R2	Neural Networks
HTML & CSS R2	Reinforcement Learning

Exam ID	Question ID	Question Text
1434	1	Which HTML tag is used to define an internal style sheet? A) style; B) css; C) script; D) link
1434	3	Which HTML attribute is used to define inline styles? A) class; B) style; C) font; D) id
1434	4	How do you insert a comment in a CSS file? A) // this is a comment; B) /* this is a comment */; C) ' this is a comment; D) # this is a comment
1434	5	Which CSS property controls the text size? A) font-style; B) text-size; C) font-size; D) text-style
1434	9	What is the default value of the position property? A) absolute; B) fixed; C) relative; D) static
1434	11	CSS can be added to HTML documents in three ways: inline, internal, and external. True or False?
1434	12	The <div> tag is used to define a section in an HTML document. True or False?
1434	15	You can apply multiple classes to a single HTML element. True or False?
1434	17	The <head> tag is used to display content on the web page. True or False?
1434	20	The tag inserts a horizontal line in HTML. True or False?

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1

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Student ID

1001

Exam ID

1434

Exam_Student

Question ID	Question Text	Marks	Model Answer	Student Answer
1	Which HTML tag is used to define an internal style sheet? A) style; B) css; C) script; D) link	3	A	B
3	Which HTML attribute is used to define inline styles? A) class; B) style; C) font; D) id	3	B	B
4	How do you insert a comment in a CSS file? A) // this is a comment; B) /* this is a comment */; C) ' this is a comment'; D) # this is a comment	3	B	B
5	Which CSS property controls the text size? A) font-style; B) text-size; C) font-size; D) text-style	3	C	C
9	What is the default value of the position property? A) absolute; B) fixed; C) relative; D) static	3	D	D
11	CSS can be added to HTML documents in three ways: inline, internal, and external. True or False?	2	True	True
12	The <div> tag is used to define a section in an HTML document. True or False?	2	True	True
15	You can apply multiple classes to a single HTML element. True or False?	2	True	True
17	The <head> tag is used to display content on the web page. True or False?	2	False	False
20	The tag inserts a horizontal line in HTML. True or False?	2	False	False

File Home View

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stud id 1001

Student grades in all courses

Full Name	Course	Total Grades
Ahmed Ali	HTML & CSS R2	88%
Ahmed Ali	JavaScript R2	92%
Ahmed Ali	React R1	92%
Ahmed Ali	HTML & CSS R1	88%
Ahmed Ali	JavaScript R3	84%

students information according to Department								
	Student ID	Full Name	Company Name	Email	Gender	Age	Is Freelance	Position
	1062	Yasmin Abdelrahman	Orange Egypt	yasmin.abdelra hman91@gmail.com	F	29	False	UX Researcher
	1748	Ahmed Adel	IBM Egypt	ahmed.adel09	M	25	True	Cloud Engineer
	1203	Kareem Adel	Etisalat Misr	kareem.adel23	M	30	True	DevOps Engineer
	1862	Karim Adel	IBM Egypt	karim.adel21@	M	30	False	Software Architect
	1897	Laila Adel	Google Egypt	laila.adel56@g	F	27	False	Software Developer
	1967	Laila Adel	Google Egypt	laila.adel126@	F	27	False	UX Designer
	1309	Mahmoud Adel	Raya	mahmoud.adel	M	29	True	DevOps Engineer
	1763	Nada Adel	Google Egypt	nada.adel106	F	25	True	Software Engineer
	1429	Salma Adel	WE Telecom	salma.adel403	F	29	False	UI/UX Designer
	1355	Hana Ahmed	Raya	hana.ahmed32	F	29	False	UI Designer
	1867	Laila Ahmed	Google Egypt	laila.ahmed26	F	27	False	Software Developer
	1562	Laila Ahmed	Google Egypt	laila.ahmed536	F	27	False	Software Developer
	2015	Sara Ahmed	Microsoft Egypt	sara.ahmed17	F	29	True	QA Specialist
	1036	Sara Alaa	Orange Egypt	sara.alaa36@g	F	27	True	Frontend Developer
	1001	Ahmed Ali	Vodafone Egypt	ahmed.ali01@	M	26	True	Frontend Developer
	1803	Ahmed Ali		ahmed.ali1@g	M	30	False	Software Engineering
	1090	Lamia Ali	Raya	lamia.ali119@	F	30	True	UX Researcher

File Home View

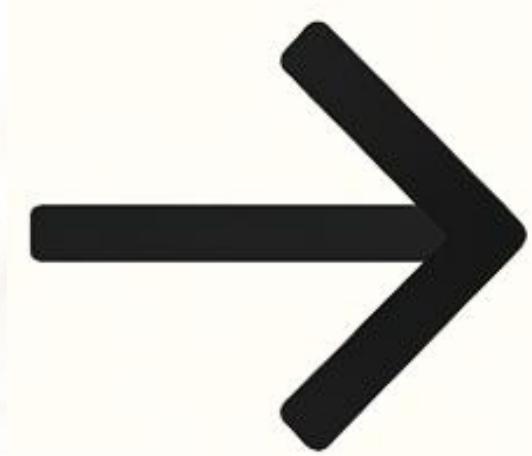
Export ↗ Parameters Subscribe to report Search

Instructor ID 14

Instructor Courses and the number of students

Course Name	Student Count
VPN & Encryption R3	42

The screenshot displays a Microsoft Power BI report interface. The main title of the report is "Instructor Courses and the number of students". Below the title, there is a table with two columns: "Course Name" and "Student Count". The table contains one row with the values "VPN & Encryption R3" and "42". On the left side of the screen, there is a vertical sidebar with several icons and their corresponding labels: Home (house icon), Create (plus sign icon), Browse (folder icon), OneLake (globe icon), Apps (grid icon), and Metrics (trophy icon). At the top of the screen, there is a navigation bar with tabs for "File", "Home" (which is underlined in green), and "View". Below the navigation bar, there are additional buttons for "Export" (with a dropdown arrow), "Parameters", "Subscribe to report", and "Search". A search bar is also present at the top. The overall layout is clean and professional, typical of a business intelligence tool like Power BI.



**DESKTOP
APP**

Desktop Application

Built with C# and Windows Forms

Role-based access: Instructor /
Student

Key functions: exam creation,
taking, correction, login

Login Page



Information
Technology
Institute

Welcome To the Login page

Email

Instructor

Login

password

Show

Student

Signup

Instructor Panel

The screenshot shows a web-based application titled "Instructor Panel". In the top left corner, there is a logo for "Information Technology Institute" (ITI) with the letters "iti" in red. In the top right corner, there is a red "Back" button. The main content area features a red header with the text "Welcome To Training manager User". Below the header are three red buttons with white text: "Show profile", "Add Instructor", and "Show Exam". The "Add Instructor" button has a blue border, while the other two have white borders.

Welcome To Training manager User

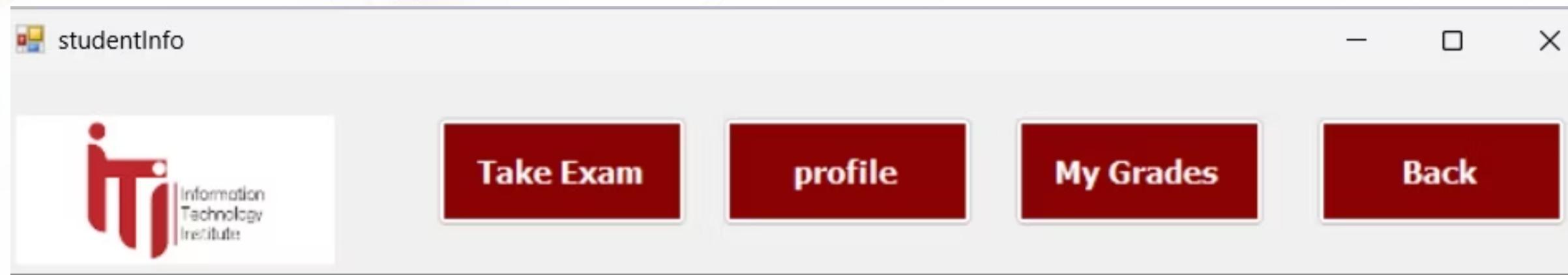
Show profile

Add Instructor

Show Exam

Back

Student Exam View



Quiz

Question_Text
▶ What does the 'useEffect' hook do? A) Add routing; B) Perform side effects; C) Render components; D) Manage props
How can you conditionally render in JSX? A) switch case; B) ternary operator; C) loop; D) if block
Which of the following manages the virtual DOM in React? A) React; B) Redux; C) Webpack; D) JSX
Which of these is a state management library? A) Next.js; B) JSX; C) Redux; D) Node.js
Which hook is used to get a reference to a DOM element? A) useMemo; B) useState; C) useReducer; D) useRef
React allows you to build reusable UI components. True or False?
React components must be class-based. True or False?
JSX is valid HTML. True or False?
useEffect runs after the component is mounted. True or False?
useState returns an array with a value and a function. True or False?
*

Course

React R1

Submit

Back

09:50

groupBox1

1. A B C D T F

groupBox5

5. A B C D T F

groupBox9

9. A B C D T F

groupBox2

2. A B C D T F

groupBox6

6. A B C D T F

groupBox10

10. A B C D T F

groupBox3

3. A B C D T F

groupBox7

7. A B C D T F

groupBox4

4. A B C D T F

groupBox8

8. A B C D T F

studentInfo

Information Technology Institute

Take Exam profile My Grades Back

	Student_ID	Fname	Lname	Gender	Company_Name	Position	Address	Phone
▶	1001	Ahmed	Ali	M	Vodafone Egypt	Frontend Developer	Cairo	01000000000

your Mark is 5 out of 25

OK

Course

React R1

Submit

Back

08:59

1. A B C D T F

2. A B C D T F

3. A B C D T F

4. A B C D T F

5. A B C D T F

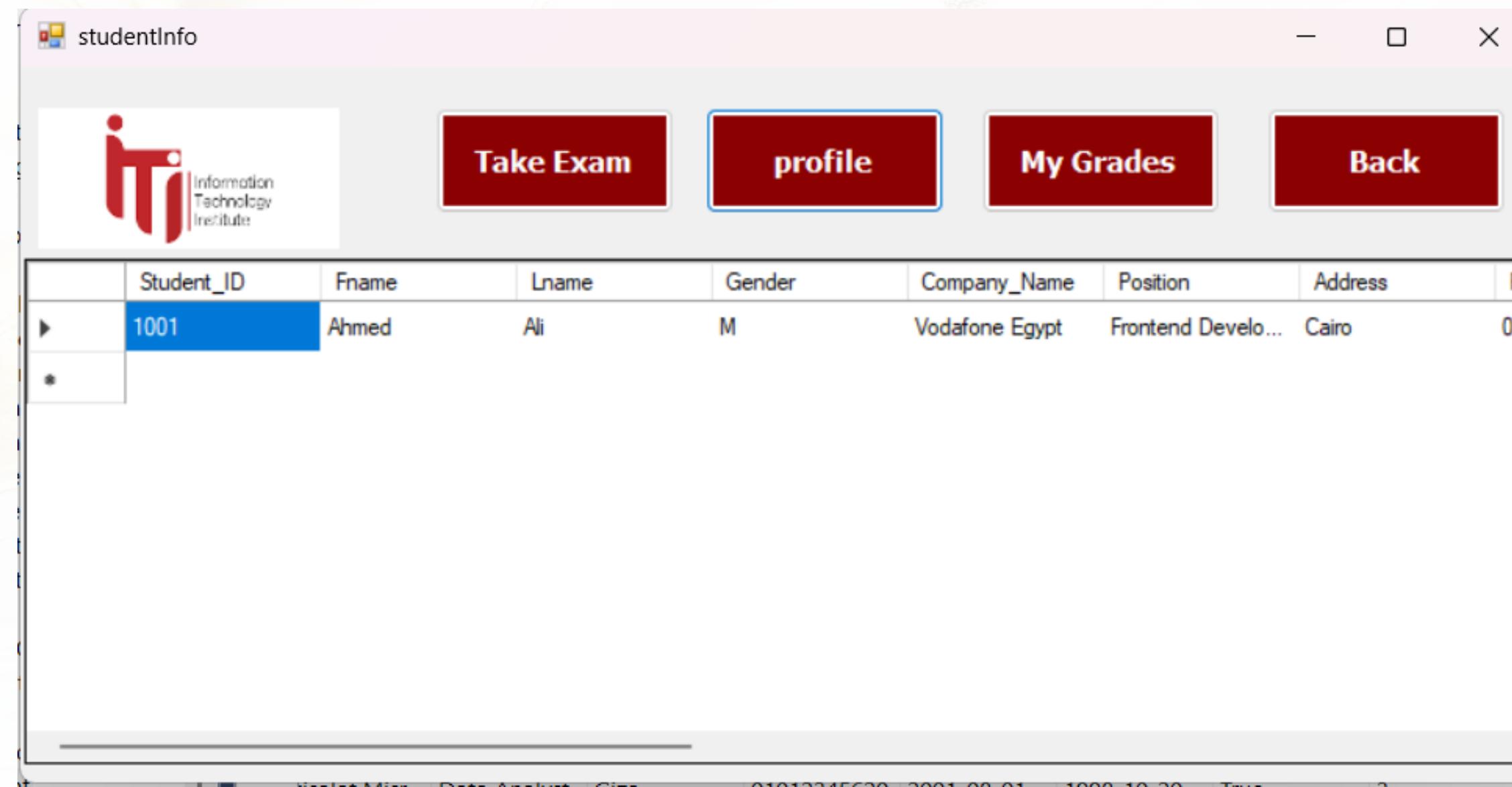
6. A B C D T F

7. A B C D T F

8. A B C D T F

9. A B C D T F

10. A B C D T F





Take Exam

profile

My Grades

Back

	Student_ID	Exam_ID	Marks
▶	1001	1434	2
*			

Form3



Welcome to Instructor Page !

Fname

Lname

Phone

Address

Birth_Date

Email Show

password Show

Dept_ID

Supervisor_ID

Insert

Gender

Male

Female



Information
Technology
Institute



Welcome to Student Page !

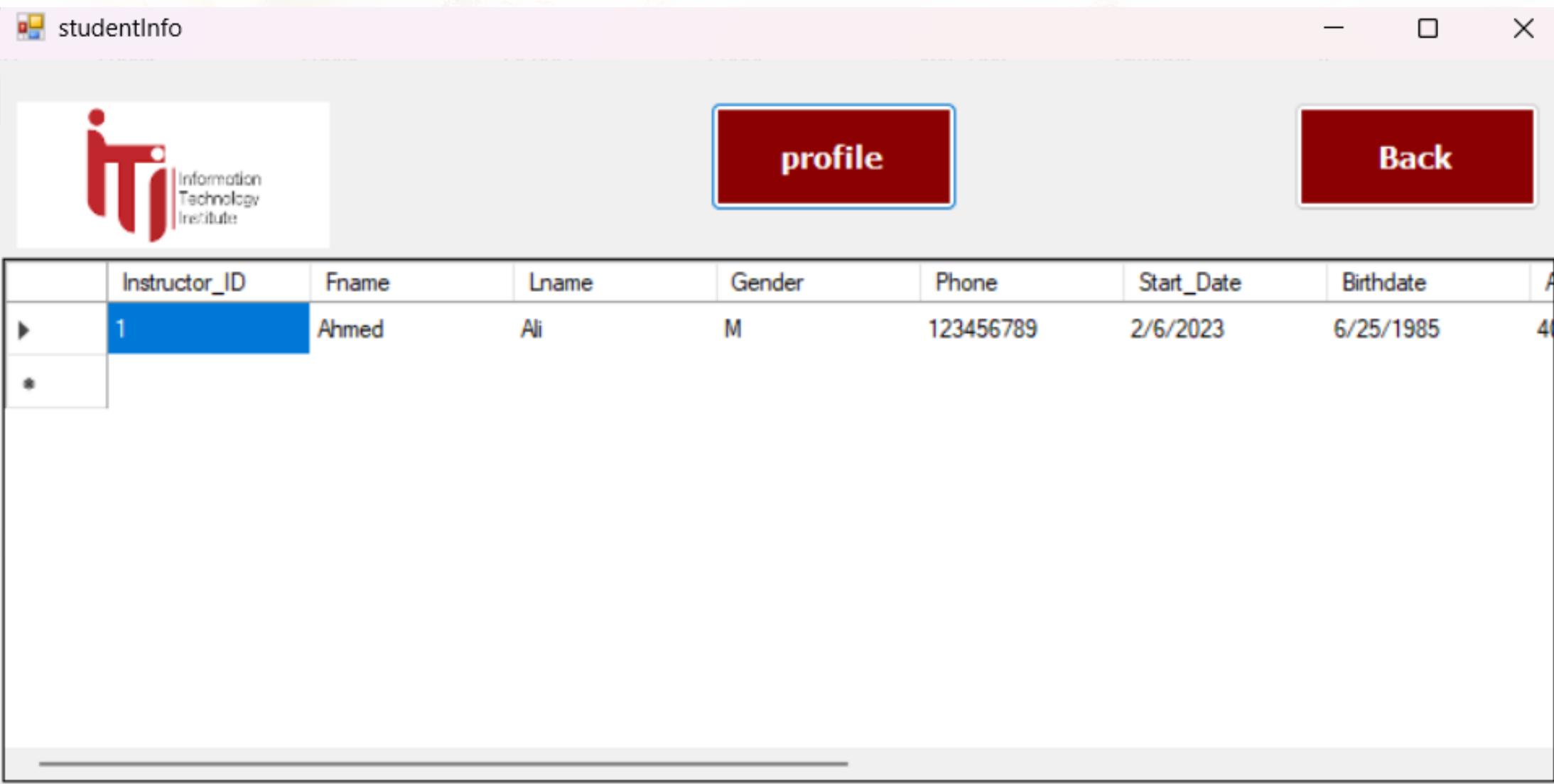
[Back](#)**Fname****Lname****Phone****Address****Email****password** Show**Birth_Date****Company_Name****Position****Track_Name** Show**Freelance_status** Done**Gender** Male Female[Signup](#)

exam

Course Name Back

Exam ID

	Question_Text
▶	Which tool is used to build data pipelines? A) Apache Airflow; B) TensorFlow; C) Flask; D) React
	What is a task in a pipeline? A) Chart; B) Data type; C) Dataset; D) Unit of execution
	Which database type is used in pipelines? A) Excel; B) Word; C) SQL; D) HTML
	Which function checks if a file exists in a pipeline? A) validate_file(); B) FileSensor; C) check_file(); D) DataWatcher
	What is the benefit of using pipelines? A) Automate workflows; B) Manual updates; C) Slower data handling; D) Store CSS files
	Data pipelines help automate data processing. True or False?
	DAGs define pipeline structure in Airflow. True or False?
	Scheduling is crucial in pipeline management. True or False?
	CSV files cannot be processed in data pipelines. True or False?
*	Airflow can retry failed tasks. True or False?



exam

Course Name Data Pipelines R1

Exam ID 1441

Back

	full name	Marks
▶	Ahmed Ibrahim	21
	Ahmed Saeed	21
	Ahmed Sami	18
	Ahmed Samir	19
	Ahmed Tarek	23
	Ahmed Youssef	22
	Aya Nabil	22
	Dina Ahmed	65
	Dina Fathi	20
	Dina Hassan	17
	Dina Saeed	22

Technology Stack

Layer	Tools & Technologies
Frontend	C# – Windows Forms
Backend	SQL Server – Stored Procedures
ETL	SQL Scripts (manual ETL)
DWH	Snowflake Schema in SQL Server
Reporting	SSRS
Analytics	Power BI – Power BI Service
Docs	ERD Draw.io, DB Dictionary, Dashboards

Challenges & Solutions

Challenge

Using SQL for ETL

Solution

Used native SQL for ETL to ensure flexibility and control.

Complex Snowflake schema with many joins

Wrote multi-step scripts to load dimension & fact tables

Too many stored procedures and logic

Organized procedures by function and role

20+ dashboards can't be shown in slides

Presented live and included full documentation

Conclusion



Built a complete exam system with automation & analytics



Developed reports with SSRS and Power BI



Focused on performance, accuracy, and usability



Used SQL, stored procedures, and Snowflake schema for data flow



Delivered a working desktop app



Any Questions?



Feel free to ask any question.



Thank you.