UMD Smith School Program Ranking

Project Name: Fearlessly Forward

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Introduction

This project was initiated with the objective of assisting the University of Maryland, particularly the Smith School of Business, in establishing a comprehensive database management system. The primary aim is to create a centralized platform for collecting, storing, and analyzing the rankings of various programs offered at the Smith School of Business.

Combining theoretical frameworks with practical implementation, it utilizes Microsoft SQL Server for database management and Lucidchart for structural design.

Pre-requisites

Microsoft SQL Server and Lucidchart

Contents

Description

The database management system designed for ranking programs at the Smith School of Business is focused on centralizing information, making it a single source for business program rankings and thereby streamlining data handling. It enhances efficiency and accessibility, ensuring that program rankings are easily accessible to students and faculty. The system supports informed decision-making by providing detailed data on program performance and trends. Additionally, it facilitates improved communication and coordination within the university community regarding program selections and updates. Finally, it maintains accurate and current records of program rankings, adhering to educational standards and regulations.

Data Sources

1. https://www.rhsmith.umd.edu/departments
2. https://www.rhsmith.umd.edu/programs
3. https://en.wikipedia.org/wiki/Robert_H._Smith_School_of_Business
4. https://www.rhsmith.umd.edu/news/new-smith-degree-tackle-big-data-expert-shortage-0
5. https://www.rhsmith.umd.edu/news/smith-school-welcomes-300-ms-students
6. https://en.wikipedia.org/wiki/Robert_H._Smith_School_of_Business
7. https://www.rhsmith.umd.edu/news/smith-school-welcomes-300-ms-students
8. https://www.investopedia.com/terms/r/robert-h-smith-school-of-business-university-of-maryland.asp
9. https://www.prnewswire.com/news-releases/maryland-smith-unveils-flex-mba-for-part-time-students-301224187.html
10. https://en.wikipedia.org/wiki/Robert_H._Smith_School_of_Business
11. https://en.wikipedia.org/wiki/Robert_H._Smith_School_of_Business
12. www.usnews.com
13. www.forbes.com
14. www.bloomberg.com
15. www.fortune.com
16. www.ft.com
17. www.topuniversities.com
18. www.economist.com

References

[1] Hoffer, Jeffrey A., Ramesh, V., & Topi, Heikki "Modern Database Management" : This book serves as a key reference for principles of database management, providing essential technical advice and established practices for database design and administration.

[2] Forbes, The Economist, and US News: These are the few publications that we referred to for providing ranking data for the University of Maryland's Smith School graduate programs, essential for the project's analysis.

[3] The University of Maryland's Official Website: The project relies on information from the university's official smith school grad programs platform for accurate and current details about its graduate programs.

Basic Structure

The basic structure and functionalities of a database management system for the University of Maryland's Smith School of Business program rankings. Key functionalities include:

In the database, functional dependencies play a crucial role in defining the relationships between different data elements. Certainly! Here are the functional dependencies in the database presented as bullet points:

 Program ID (prgId) determines:

- Program Name (prgName)
- Program Duration (prgDuration)
- Program Start Date (prgStartDate)
- Program Credits (prgCredits)
- Program Scholarship Availability (prgScholarship)

 Department ID (depId) uniquely identifies:

- Department Name (dpName)

 Website ID (webId) is linked to:

- Website Name (webName)
- Website Link (webLink)

Combination of Faculty Year (facYear) and Program ID (prgId) determines:

- Faculty Employment Rate (facEmployementRate)
- Student Intake (facStudentIntake)
- Tuition Fees (facTuitionFees)
- Average Salary (facAvgSalary)
- Student to Faculty Ratio (facStudentToFacultyRatio)

These dependencies ensure that the database maintains consistency and integrity in its data relationships.

Implementation

Testing the project:

This involves several key steps, ensuring that each aspect of the database system functions as intended and meets the project's objectives:

1. **Unit Testing**

This involves a thorough examination of each table, view, and stored procedure to ensure correctness in their structure and functionality. It's crucial to validate the data types, constraints, and indexes in each table to confirm they align with the design specifications. Additionally, testing each query for expected results and performance is vital to ensure that the system operates efficiently and accurately retrieves and manipulates data as intended. This step-by-step approach helps identify and rectify any issues at the most granular level of the database.

2. **Integration Testing**

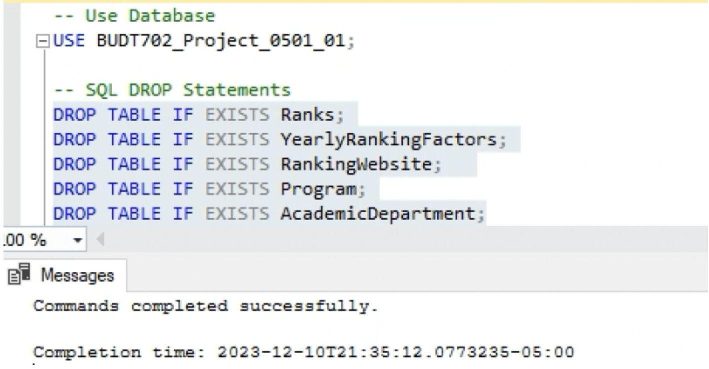
After completing unit testing, the next phase is integration testing. This stage involves examining the interactions between different parts of the database, particularly focusing on how tables relate and interact with each other. During integration testing, it's essential to verify the integrity of data as it moves across various tables and components of the system. This process ensures that data relationships are maintained correctly and that the integrated components work together seamlessly, allowing for accurate and consistent data processing throughout the entire database system. This step is crucial in confirming that the database functions cohesively as a unified whole.

3**. System Testing**

In this phase the focus shifts to verifying all key functionalities of the database system. This includes comprehensive testing of essential operations such as data insertion, updating, deletion, and retrieval. The goal here is to ensure that each of these functions performs as expected under various scenarios. This involves creating, modifying, and removing data in the database and then retrieving it to confirm that these operations are executed correctly and efficiently.

4. **Database Setup**

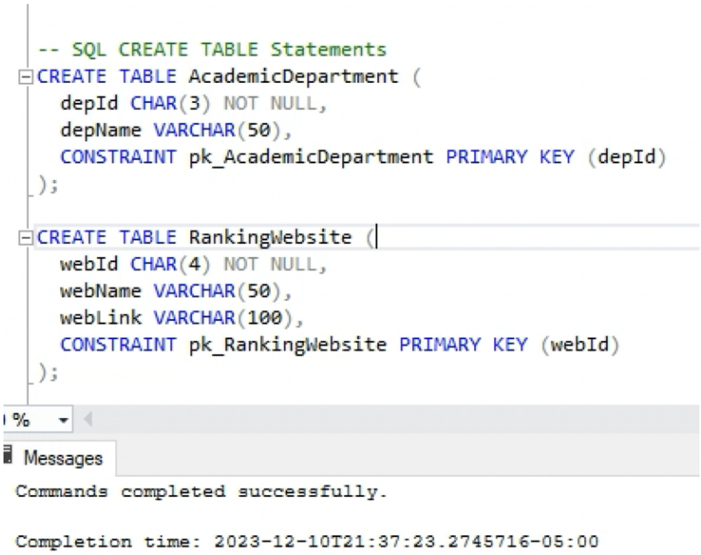
Dropping the Tables : Ensure to Drop the tables before creating them. To do this, execute the following SQL statements in the database - Project_0501_01



```
-- Use Database
USE BUDT702_Project_0501_01;

-- SQL DROP Statements
DROP TABLE IF EXISTS Ranks;
DROP TABLE IF EXISTS YearlyRankingFactors;
DROP TABLE IF EXISTS RankingWebsite;
DROP TABLE IF EXISTS Program;
DROP TABLE IF EXISTS AcademicDepartment;
```

```
Commands completed successfully.

Completion time: 2023-12-10T21:35:12.0773235-05:00
```

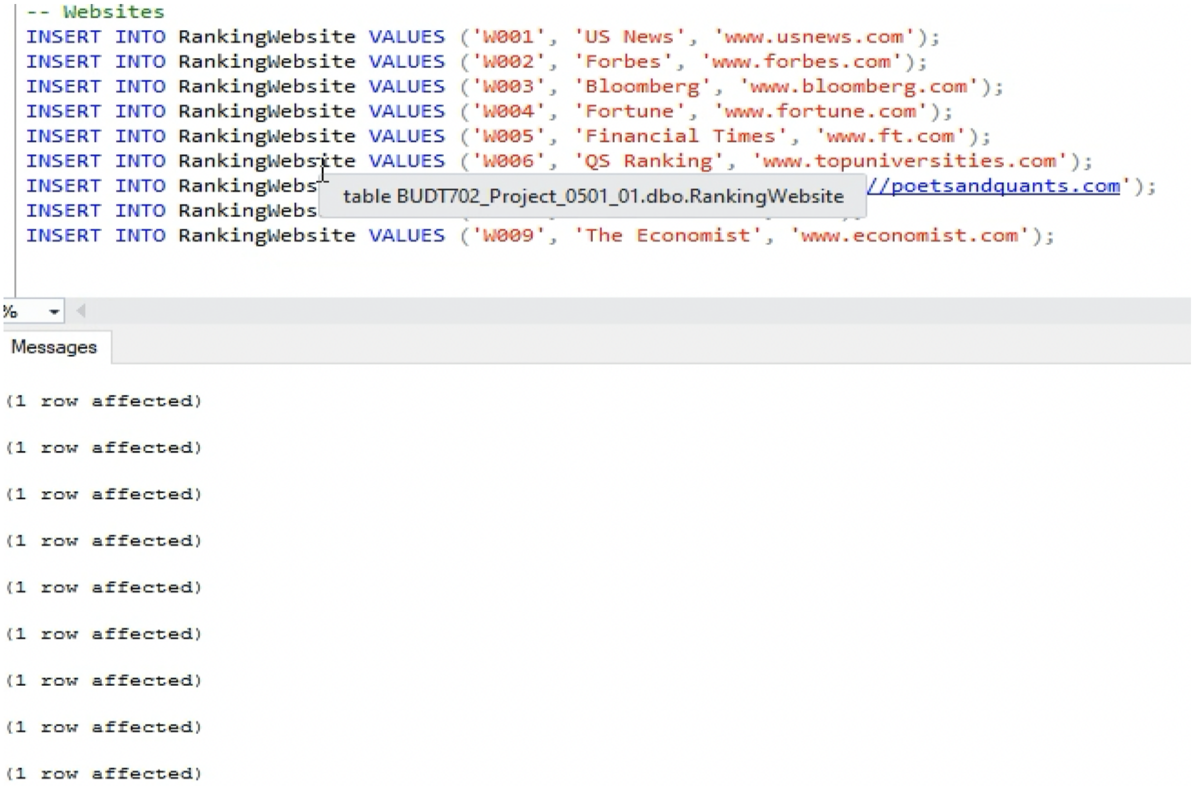
Creating the required tables : To create the tables we require for our analysis , execute the following SQL statements in the database.



```
-- SQL CREATE TABLE Statements
CREATE TABLE AcademicDepartment (
  depId CHAR(3) NOT NULL,
  depName VARCHAR(50),
  CONSTRAINT pk_AcademicDepartment PRIMARY KEY (depId)
);

CREATE TABLE RankingWebsite (
  webId CHAR(4) NOT NULL,
  webName VARCHAR(50),
  webLink VARCHAR(100),
  CONSTRAINT pk_RankingWebsite PRIMARY KEY (webId)
);
```

```
Commands completed successfully.

Completion time: 2023-12-10T21:37:23.2745716-05:00
```

Inserting the values into the tables : To insert the data into our tables, execute the following SQL statements in the database.

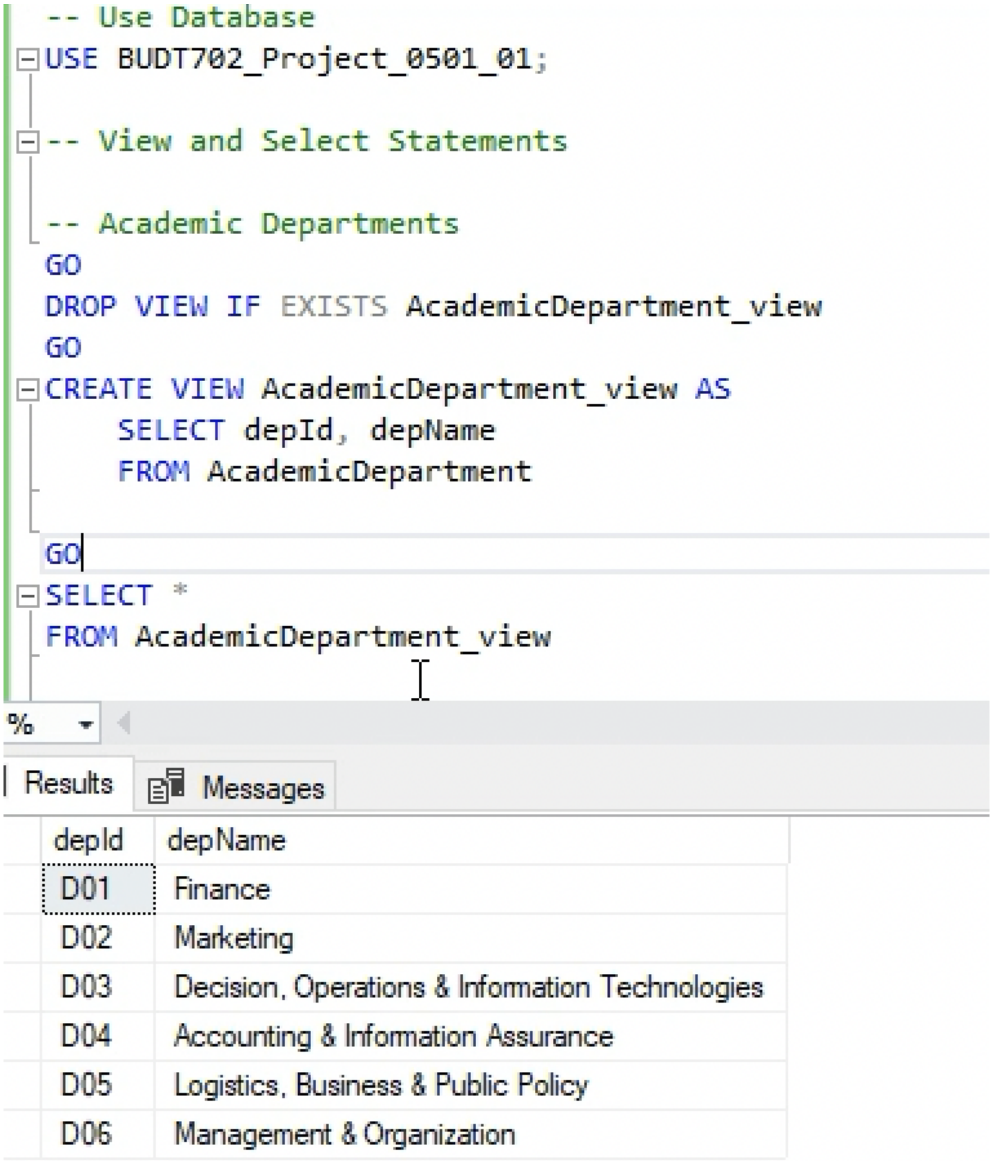


```
-- Websites
INSERT INTO RankingWebsite VALUES ('W001', 'US News', 'www.usnews.com');
INSERT INTO RankingWebsite VALUES ('W002', 'Forbes', 'www.forbes.com');
INSERT INTO RankingWebsite VALUES ('W003', 'Bloomberg', 'www.bloomberg.com');
INSERT INTO RankingWebsite VALUES ('W004', 'Fortune', 'www.fortune.com');
INSERT INTO RankingWebsite VALUES ('W005', 'Financial Times', 'www.ft.com');
INSERT INTO RankingWebsite VALUES ('W006', 'QS Ranking', 'www.topuniversities.com');
INSERT INTO RankingWebs                                  //poetsandquants.com');
INSERT INTO RankingWebs
INSERT INTO RankingWebsite VALUES ('W009', 'The Economist', 'www.economist.com');
```

```
(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)
```

5. **Verification**

Verifying the accuracy of our statements is crucial. To achieve this, we should run the SELECT statement for the specific table under review and then cross-check to ensure that the data is populated correctly. We create VIEW Statements first, and then SELECT.



```
-- Use Database
USE BUDT702_Project_0501_01;

-- View and Select Statements

-- Academic Departments
GO
DROP VIEW IF EXISTS AcademicDepartment_view
GO
CREATE VIEW AcademicDepartment_view AS
    SELECT depId, depName
    FROM AcademicDepartment

GO
SELECT *
FROM AcademicDepartment_view
```

depId	depName
D01	Finance
D02	Marketing
D03	Decision, Operations & Information Technologies
D04	Accounting & Information Assurance
D05	Logistics, Business & Public Policy
D06	Management & Organization

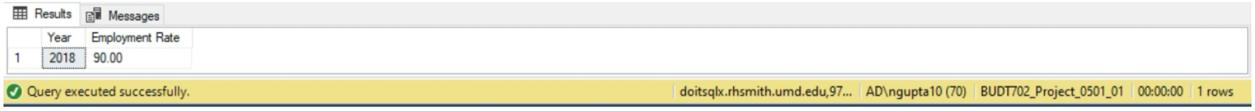
Validation (Business Queries)

Confirm that all documentation is an accurate representation of the system. This process involves examining the schema designs and executing the SQL statements.

Each of these steps is crucial in comprehensively evaluating the database system to ensure its reliability, efficiency, and user satisfaction. It's important to meticulously record all testing procedures, outcomes, and any identified problems for future reference and possible audit purposes.

What years of Full - time MBA had an employment rate greater than or equal to 90%?

```
GO
DROP VIEW IF EXISTS Year_EmploymentRate_view
GO
CREATE VIEW Year_EmploymentRate_view AS
        SELECT y.facYear AS  'Year', y.facEmploymentRate AS 'Employment Rate'
        FROM YearlyRankingFactors y
        WHERE y.facEmploymentRate >= 90
        AND y.prgId = (SELECT p.prgId FROM Program p
        WHERE p.prgName = 'Full-Time MBA')

GO
SELECT *
FROM  Year_EmploymentRate_view;
```

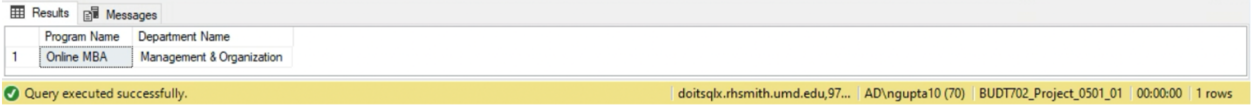


```
   Year   Employment Rate
1  2018   90.00
```

```
Query executed successfully.    doitsqlx.rhsmith.umd.edu,97...  AD\ngupta10 (70)  BUDT702_Project_0501_01  00:00:00  1 rows
```

What is the program and its department with the highest average starting salary in 2022?

```
GO
DROP VIEW IF EXISTS Program_HighestAverageSalary_view
GO
CREATE VIEW Program_HighestAverageSalary_view AS
        SELECT TOP 1 p.prgName AS  'Program Name',  d.depName AS  'Department Name'
        FROM Program p
        JOIN AcademicDepartment d ON p.depId = d.depId
        JOIN YearlyRankingFactors y  ON p.prgId = y.prgId
        WHERE y.facYear = 2022
        ORDER BY y.facAvgStartSalary DESC

GO
SELECT *
FROM Program_HighestAverageSalary_view;
```

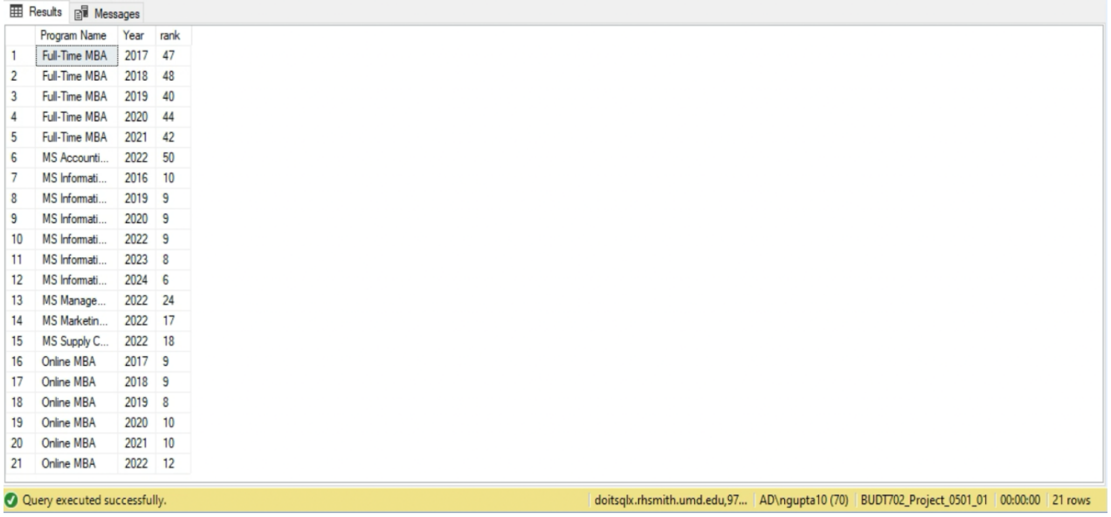


	Program Name	Department Name
1	Online MBA	Management & Organization

Query executed successfully. | doitsqlx.rhsmith.umd.edu,97... | AD\ngupta10 (70) | BUDT702_Project_0501_01 | 00:00:00 | 1 rows

List all programs rankings by a website and try to analyze trend across years

```
GO
DROP VIEW IF EXISTS Programs_Ranking_view
GO
CREATE VIEW Programs_Ranking_view AS
        SELECT p.prgName AS 'Program Name', y.facYear AS 'Year',
        r.rank
        FROM Program p
        JOIN YearlyRankingFactors y  ON p.prgId = y.prgId
        JOIN Ranks r ON y.prgId = r.prgId AND y.facYear = r.facYear
        JOIN RankingWebsite w ON r.webId = w.webId
        WHERE w.webName = 'US News'
        GROUP BY p.prgName, y.facYear, r.rank


GO
SELECT *
FROM Programs_Ranking_view;
```

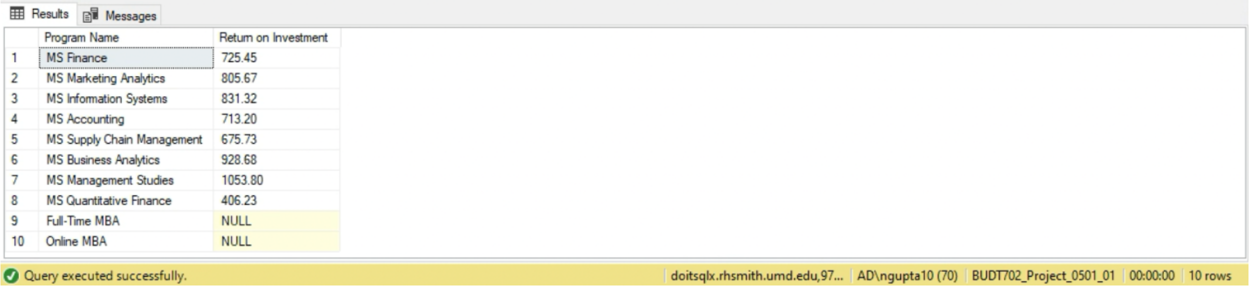


	Program Name	Year	rank
1	Full-Time MBA	2017	47
2	Full-Time MBA	2018	48
3	Full-Time MBA	2019	40
4	Full-Time MBA	2020	44
5	Full-Time MBA	2021	42
6	MS Accounti...	2022	50
7	MS Informati...	2016	10
8	MS Informati...	2019	9
9	MS Informati...	2020	9
10	MS Informati...	2022	9
11	MS Informati...	2023	8
12	MS Informati...	2024	6
13	MS Manage...	2022	24
14	MS Marketin...	2022	17
15	MS Supply C...	2022	18
16	Online MBA	2017	9
17	Online MBA	2018	9
18	Online MBA	2019	8
19	Online MBA	2020	10
20	Online MBA	2021	10
21	Online MBA	2022	12

Query executed successfully. | doitsqlx.rhsmith.umd.edu,97... | AD\ngupta10 (70) | BUDT702_Project_0501_01 | 00:00:00 | 21 rows

What is the return on investment for each program during 2022? (ROI = Employment rate * average starting salary * 10 / tuition fee * program length in years)

```
GO
DROP VIEW IF EXISTS Return_Inv_view
GO
CREATE VIEW Return_Inv_view AS
        SELECT p.prgName AS 'Program Name',
        CAST((y.facEmploymentRate * y.facAvgStartSalary * 10) /
        (y.facTuitionFees * p.prgDuration) AS DECIMAL(10,2)) AS 'Return on Investment'
        FROM Program p
        JOIN YearlyRankingFactors y ON p.prgId = y.prgId
        WHERE y.facYear = 2022

GO
SELECT *
FROM Return_Inv_view;
```



	Program Name	Return on Investment
1	MS Finance	725.45
2	MS Marketing Analytics	805.67
3	MS Information Systems	831.32
4	MS Accounting	713.20
5	MS Supply Chain Management	675.73
6	MS Business Analytics	928.68
7	MS Management Studies	1053.80
8	MS Quantitative Finance	406.23
9	Full-Time MBA	NULL
10	Online MBA	NULL

Query executed successfully. | doitsqlx.rhsmith.umd.edu,97... | AD\ngupta10 (70) | BUDT702_Project_0501_01 | 00:00:00 | 10 rows