

## **Brand Name: RankSmithers**

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### **Mission Statement:**

To deliver valuable data-driven insights to the Robert H. Smith School of Business by curating and analyzing graduate program rankings data obtained from various sources, thereby empowering the school with the required knowledge for improvement and optimization of its programs.

### **Mission Objectives:**

1. To enable efficient and optimized resource allocation by identifying and analyzing top-performing graduate programs at the Robert H. Smith School of Business
2. To provide insights on potential areas of improvement of graduate programs by offering historical perspectives of their performances and monitoring the evolution of their rankings.
3. To enable informed decision-making regarding the enhancement of program strengths by evaluating the influence of factors such as academic reputation and graduation rates on program rankings
4. To effectively organize and make use of faculty data in the database in order to improve the caliber of academic programs, research output, and the Robert H. Smith School's standing overall.

### **Business process:**

- GraduateProgram refers to the unique graduate-level programs offered by the Institution. Each graduate-level program has a unique graduate program ID and is required to store the program name, the category of the program, a short description about it, its duration, total fees of the program, total credits required for completion of the program and whether the program is stem designated or not.
- RankSource refers to the data source from which the rankings were obtained. Each source is described by a unique ID, name of the source, its description and a URL for the source.
- A Graduate program can have rankings from multiple sources. A Rank Source can rank multiple graduate programs of the university. Rankings are given to programs by different sources every year.
- Each member of the school's faculty is described by a unique ID, full name (recorded as first name, middle name and last name), joining date, current designation and any

research papers published by them. A faculty can teach different courses in multiple programs.

- The programs can be ranked on the basis of different criteria. Each criteria will have a unique identifier, name of the criteria, a description of what the criteria is and the weightage given to the criteria depending on source.

### **ER Schema:**

#### Entities, Attributes and Primary Keys:

GraduateProgram (**gradPrgID**, gradPrgName, gradPrgCategory, gradPrgDescription, gradPrgDuration, gradPrgFee, gradPrgCredits, stemDesignation)

RankSource( **rankSourceID**, rankSourceName, rankSourceDescription, rankSourceURL)

Faculty ( **facultyID**, facultyName, -facultyFirstName, -facultyMiddleName, -facultyLastName, facultyQualification, facultyJoiningDate, facultyDesignation, researchPapersPublished)

RankingCriteria ( **criteriaID**, criteriaName, criteriaDescription)

#### Relationships, Attributes, Degrees, Participating Entities and Constraints

Teaches(numberOfCourses) : binary relationship

1 Faculty to 1 or more graduate programs

1 Graduate program to 1 or more Faculties

Ranks(year,rank): binary relationship

1 Graduate Program to 1 or more RankSource

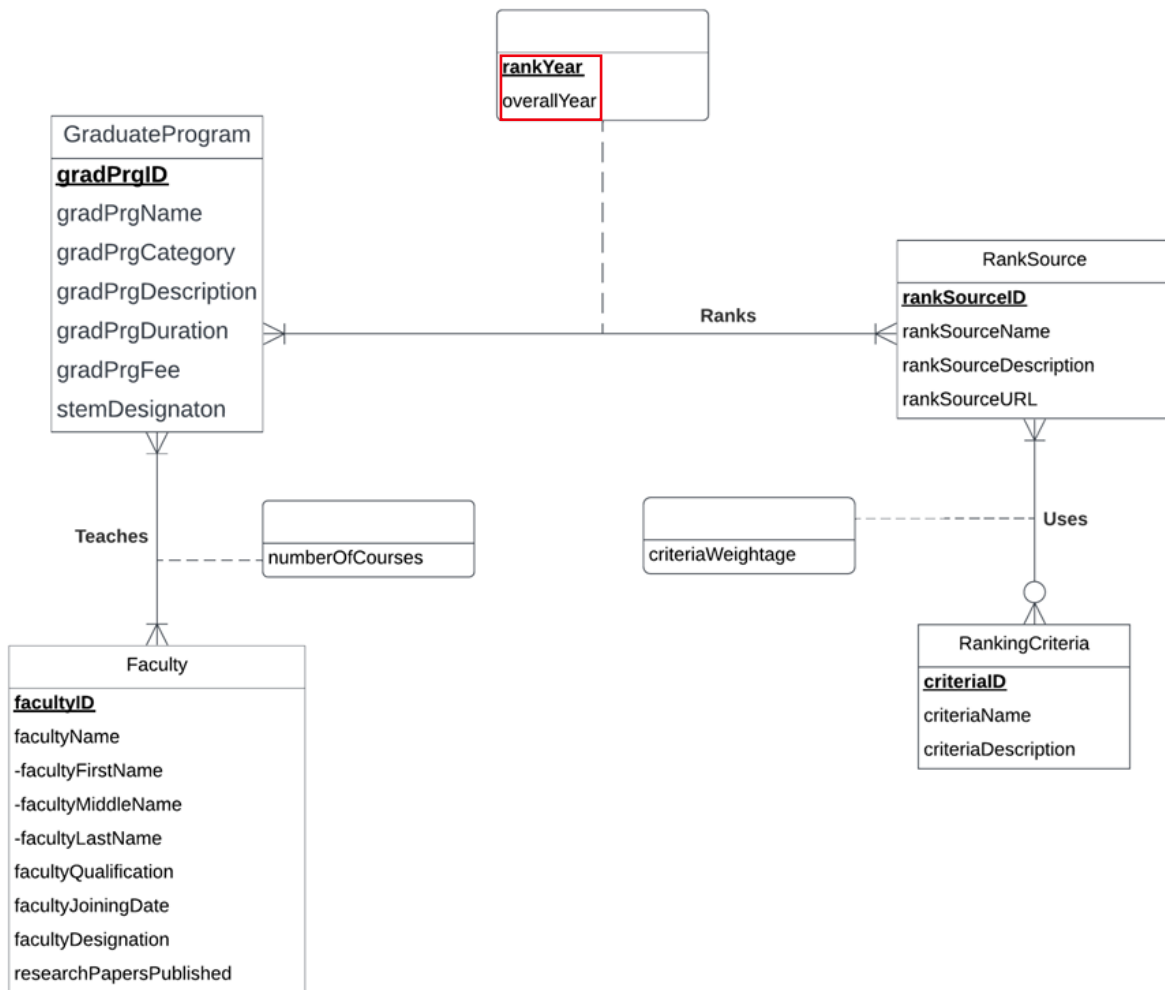
1 RankSource to 1 or more GraduatePrograms

Uses(criteriaWeightage): binary relationship

1 RankSource to 0 or more RankingCriteria

1 RankingCriteria to 1 or more RankSource

## ER Diagram:



## Relations:

GraduateProgram(gradPrgID, gradPrgName, gradPrgCategory, gradPrgDescription, gradPrgDuration, gradPrgFee, gradPrgCredits, stemDesignation)

RankSource (rankSourceID, rankSourceName, rankSourceDescription, rankSourceURL)

Faculty (facultyID, facultyFirstName, facultyMiddleName, facultyLastName, facultyQualification, facultyJoiningDate, facultyDesignation, researchPapersPublished)

RankingCriteria (criteriaID, criteriaName, criteriaDescription)

Ranks (gradPrgID, rankSourceID, rankYear, overallRank)

Teaches (gradPrgID, facultyID, numberOfCourses)

Uses (rankSourceID, criterialID, criteriaWeightage)

### **Functional Dependency**

gradPrgID → gradPrgName, gradPrgCategory, gradPrgDescription, gradPrgDuration, gradPrgFee, gradPrgCredits, stemDesignation

rankSourceID → rankSourceName, rankSourceDescription, rankSourceURL

facultyID → facultyName, facultyQualification, facultyJoiningDate, facultyDesignation, researchPapersPublished

criterialID → criteriaName, criteriaDescription

gradPrgID, rankSourceID, rankYear → overallRank

gradPrgID, facultyID → numberOfCourses

rankSourceID, criterialID → criteriaWeightage

- There are no multi-valued attributes in any of the tables. So the relations follow 1NF
- There are no partial dependencies across any of the relations and hence follow 2NF.
- No transitive dependency is there across relations. So the relations follow 3NF.

### **Business Rules**

[R1] When a faculty member teaches a number of courses across one or multiple graduate programs, the faculty details must not be deleted.

[R2] When a faculty member teaches a number of courses across one or multiple graduate programs, the faculty details must not be updated.

[R3] When a graduate program has different faculties teaching a number of courses, it cannot be deleted from the database.

[R4] When a graduate program has different faculties teaching a number of courses, the graduate program details cannot be updated.

[R5] When a rank source is deleted from the database, all the rank details from the source must be deleted.

[R6] When a rank source is updated from the database, all the rank details from the source must be updated.

[R7] When a graduate program is deleted from the database, the corresponding rank details from all the sources must be deleted.

[R8] When a graduate program details are updated in the database, the corresponding rank details from all the sources must be updated.

[R9] When a rank source is deleted from the database, delete all the ranking criteria weightages it uses from the database.

[R10] When a rank source is updated from the database, update all the ranking criteria weightages it uses from the database.

[R11] When a ranking criteria is used by ranking sources(s) for calculating ranks with specific weightage attached to it, the ranking criteria cannot be deleted.

[R12] When a ranking criteria is used by ranking sources(s) for calculating ranks with specific weightage attached to it, the ranking criteria cannot be updated.

**Referential Integrities:**

Relation	Foreign Key	Base Relation	Primary Key	Business Rule	Constraint: ON DELETE	Business Rule	Constraint: ON UPDATE
Teaches	facultyID	Faculty	facultyID	R1	NO ACTION	R2	NO ACTION
Teaches	gradPrgID	GraduateProgram	gradPrgID	R3	NO ACTION	R4	NO ACTION
Ranks	rankSourceID	RankSource	rankSourceID	R5	CASCADE	R6	CASCADE
Ranks	gradPrgID	GraduateProgram	gradPrgID	R7	CASCADE	R8	CASCADE
Uses	rankSourceID	RankSource	rankSourceID	R9	CASCADE	R10	CASCADE
Uses	criterialID	RankingCriteria	criterialID	R11	NO ACTION	R12	NO ACTION

**Sample Data:****1. GraduateProgram**

gradPrgID	gradPrgName	gradPrgCategory	gradPrgDescription	gradPrgDuration	gradPrgFee	gradPrgCredits	stemDesignation
GP001	Information Systems	MS	Covers a range of courses related to information systems, technology management, and business	18	70000	30	Yes
GP002	Business Analytics	MS	Covers fundamental principles of data analysis, including statistical methods, data visualization, and interpretation of results	18	65000	30	Yes
GP003	Marketing Analytics	MS	Covers basic principles of marketing analytics, including data collection, analysis, and interpretation for marketing purposes	18	60000	30	Yes
GP004	Supply Chain Management	MS	Introduces the basic principles and concepts of supply chain management, including the flow of goods, information, and finances across the supply chain.	24	62500	30	Yes
GP005	Business Administration	MBA	Prepare students for leadership roles in various industries by imparting a broad understanding of business concepts, strategic thinking, and management skills	24	90000	54	Yes
GP006	Accounting	MS	Ideal for those interested in problem-solving, applying an investigative mindset to challenges and addressing discrepancies in business finances.	18	63450	30	Yes

## 2. RankSource

rankSourceID	rankSourceName	rankSourceDescription	rankSourceURL
RS001	U.S. News & World Report	Provide rankings for a variety of fields, including business, law, engineering, education, and more	<a href="https://www.usnews.com/best-graduate-schools">https://www.usnews.com/best-graduate-schools</a>
RS002	QS World University Rankings	Rankings cover a variety of subjects, including business, engineering, social sciences, and more	<a href="https://www.topuniversities.com/qs-world-university-rankings">https://www.topuniversities.com/qs-world-university-rankings</a>
RS003	The Princeton Review	Reviews of graduate programs, often highlighting specific aspects such as academic quality, financial aid, and campus life	<a href="https://www.princetonreview.com/business-school">https://www.princetonreview.com/business-school</a>
RS004	Times Higher Education (THE) World University Rankings	Rankings consider factors such as teaching, research, international outlook, and industry income	<a href="https://www.timeshighereducation.com/world-university-rankings">https://www.timeshighereducation.com/world-university-rankings</a>
RS005	QS Business Masters Rankings	Provides rankings specifically for business master's programs	<a href="https://www.topuniversities.com/university-rankings/business-masters-rankings">https://www.topuniversities.com/university-rankings/business-masters-rankings</a>



### 3. Faculty

facultyID	facultyFirst Name	facultyMiddle Name	facultyLast Name	facultyQualification	facultyJoining Date	facultyDesignation	researchPapers Published
FAC001	John	NULL	Bono	EdD	03-10-01	Associate Academic Director, MS Information Systems	14
FAC002	Sujin	NULL	Kim	PhD	19-07-12	Associate Clinical Professor	12
FAC003	Woei-Jyh (Adam)	NULL	Lee	PhD	11-08-12	Associate Clinical Professor	18
FAC004	Siva	NULL	Viswanathan	PhD	05-01-01	Dean's Professor of Information Systems	16
FAC005	Tejwansh	Singh	Anand	PhD	20-08-21	Academic Director, MS in Information Systems	18

### 4. RankingCriteria

criteriaID	criteriaName	criteriaDescription
CR001	Academic quality	Quality of course content
CR002	Industry income	Range of income of graduating students
CR003	Research	Based on the quantity and quality of research papers published

## 5. Rank

gradPrgID	rankSourceID	rankYear	overallRank
GP001	RS001	2022	8
GP002	RS002	2023	10
GP003	RS003	2021	15

## 6. Teaches

gradPrgID	facultyID	numberOfCourses
GP001	FAC001	1
GP002	FAC002	1
GP001	FAC005	3
GP001	FAC003	1
GP002	FAC003	1
GP006	FAC003	1

## 7. Uses

rankSourceID	criterialID	criteriaWeightage
RS001	CR001	0.4
RS002	CR002	0.3
RS003	CR003	0.55