SEO Database

December 2022

Agenda

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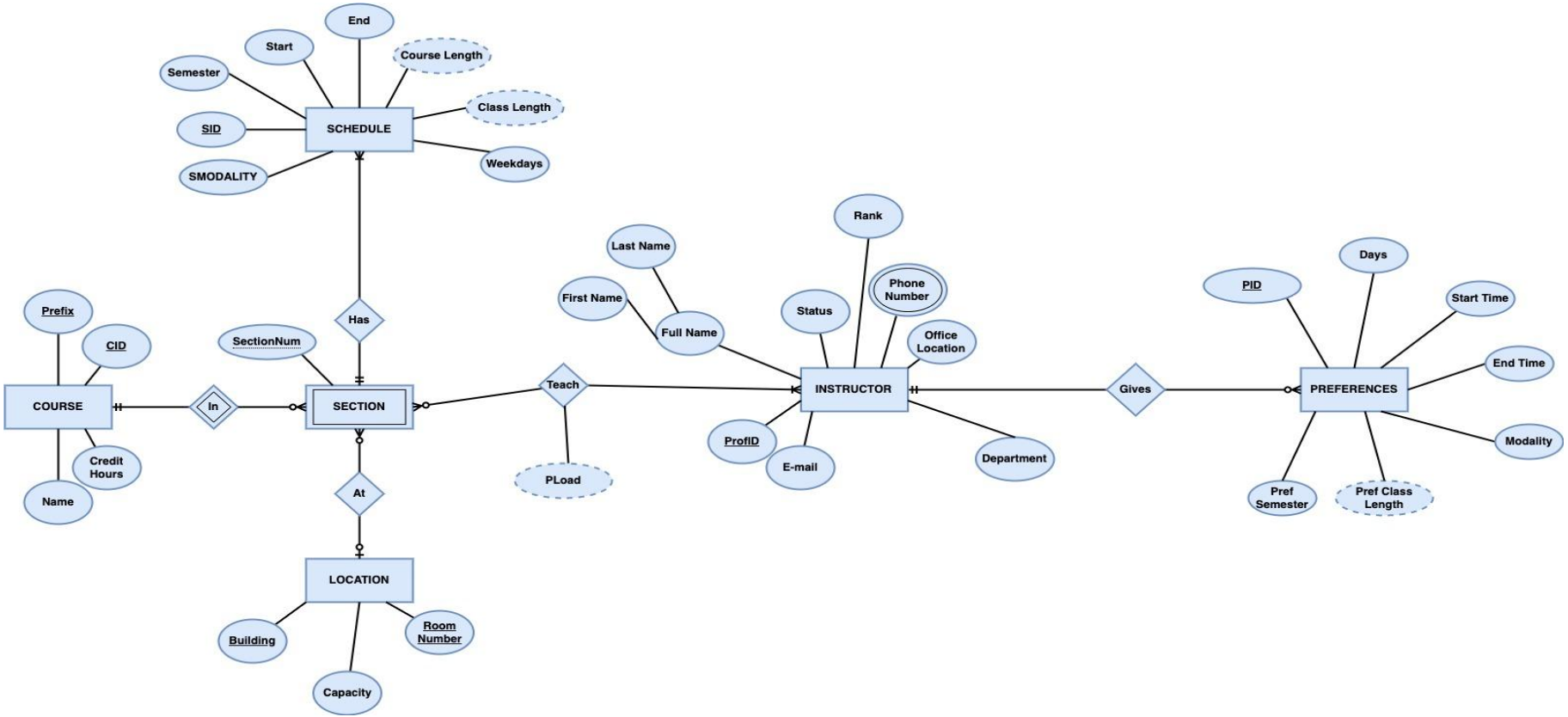
- ❏ Entity Relation Diagram
- ❏ Relational Schema Map
- ❏ Queries
- ❏ Visualizations
- ❏ Learnings/ Future Implementation
- ❏ Data Source

Database Outline

Current SEO (Strategy, Entrepreneurship, and Operations) department's **Manual Teaching Assignment Process** relies on spreadsheets, emails, and hallway conversations

- Cumbersome and manually intensive process on Excel
  - Scope for Errors
  - Time consuming task
  - Inability to make fast and accurate decisions
- Inefficient historical record-keeping system
- No collective resources database
- No way to track course load (contract amount of courses) or report on teachers to course/semester/year
- Recursive process
- No automation of entries

Entity-Relation Diagram (ERD)



Relational Schema Map

- **COURSE** (CID, PREFIX, CREDITHOURS, NAME)
- **SCHEDULE** (SID, SEMESTER, START, END, WEEKDAYS, CID [FK], PREFIX [FK], SECTIONNUM [FK]), BUILDING [FK], ROOMNUMBER[FK],SMODALITY)
- **LOCATION** (BUILDING, ROOMNUMBER, CAPACITY)
- **INSTRUCTOR** (PROFID, FIRSTNAME, LASTNAME, STATUS, RANK, OFFICELOC, EMAIL, PLOAD, DEPARTMENT)

  INSTRUCTORPHONENUM (PROFID [FK], PHONENUM)
- **PREFERENCES** (PID, DAYS, STARTTIME, ENDTIME, MODALITY, PREFSEMESTER ,PROFID [FK])
- **SECTION** (SECTIONNUM, PREFIX [FK], CID [FK], BUILDING [FK], ROOMNUMBER [FK])
- **TEACH** (SECTIONNUM [FK], PREFIX [FK], CID [FK], BUILDING [FK], ROOMNUMBER [FK], SID [FK], PROFID [FK])

Queries/Visualizations

PhD Students teaching more than one Course

- Tracks the courses taught by each PhD student.
  - Aids in tracking PhD student's requirements
- Balances courses taken and courses taught by PhD students
- Allows for historical-record keeping of courses taught by PhD students

```
SELECT FIRSTNAME,LASTNAME,RANK,
COUNT(DISTINCT name) as 'No. of Courses'
    from INSTRUCTOR natural join TEACH natural join COURSE
    where rank ='PhD'
    group by profid having count(name)>1
```

FIRSTNAME	LASTNAME	RANK	No. of Courses
Cynthia	Banks	PhD	3
David	Drake	PhD	2

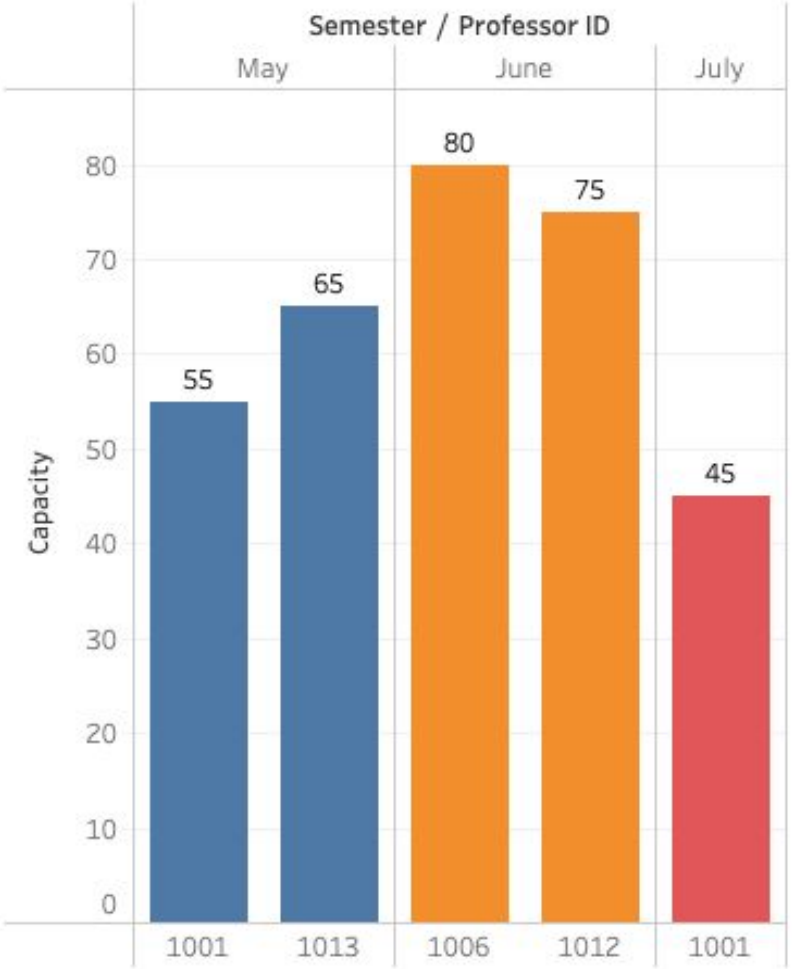
No. of Students an Instructor can teach across Semesters

- Manage course offerings and assignments
- Assuming the capacity of the classroom is full, could calculate the no. of students interested in a particular course by an instructor.
- Eg. below shows courses taught by Instructors over Summer
- Assists instructor to determine ideal number of teaching assistants

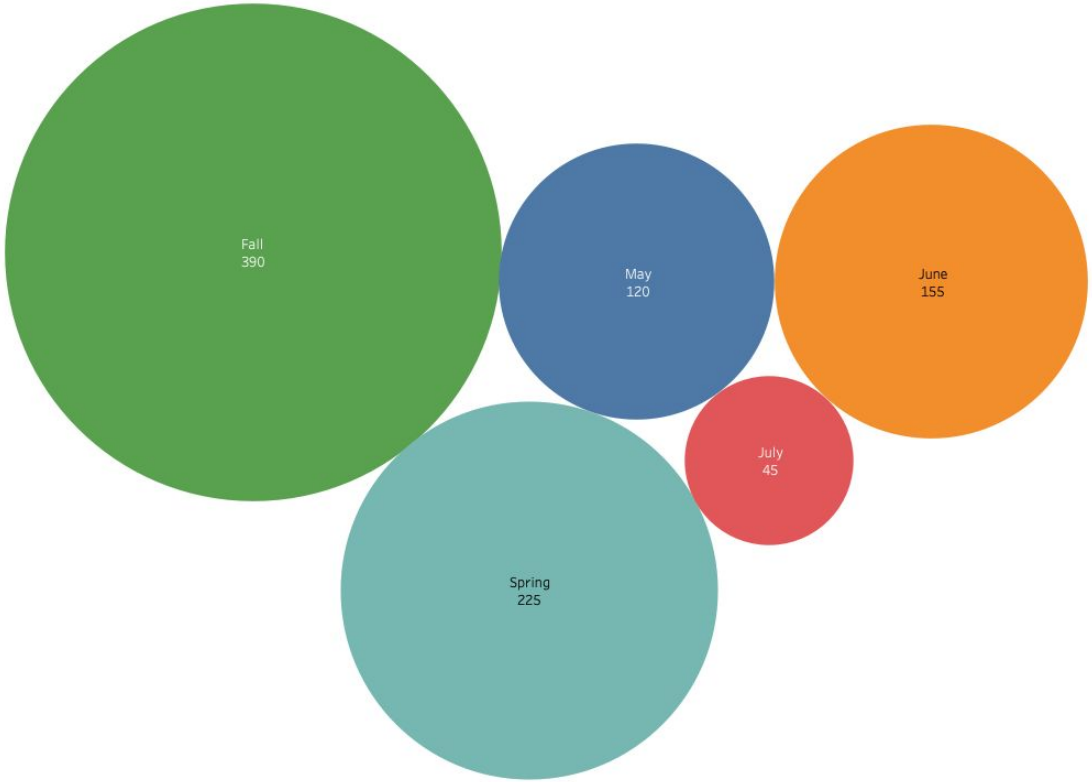
```
SELECT PROFID,FIRSTNAME,LASTNAME,
SUM(capacity) AS TOTALSTUDENTS,SEMESTER
from TEACH natural join LOCATION
natural join INSTRUCTOR natural join SCHEDULE
where semester IN ('May','June','July')
group by profid,semester
```

PROFID	FIRSTNAME	LASTNAME	TOTALSTUDENTS	SEMESTER
1001	Cynthia	Banks	55	May
1013	Thomas	Vance	65	May
1006	David	Drake	80	June
1012	Brandon	Fernandez	75	June
1001	Cynthia	Banks	45	July

Number of Students per Semester



Number of Students per Semester



Calculating the Course Load of Instructors

- Manage course assignments allowing to not over-utilize instructors
- Easily maintains record-keeping system to allow for reassignment
- Allow for fact-based conversation around an instructor's workload
- Eg. below shows the distinct ranked instructors with course load of at least 2

```
SELECT PROFID, FIRSTNAME, LASTNAME,
RANK,ROUND(SUM(credithours)/3,2) as "LOAD"
from INSTRUCTOR natural join TEACH
natural join COURSE
group by rank,profid
having round(sum(credithours)/3,2)>=2.00
```

PROFID	FIRSTNAME	LASTNAME	RANK	LOAD
1001	Cynthia	Banks	PhD	3.00

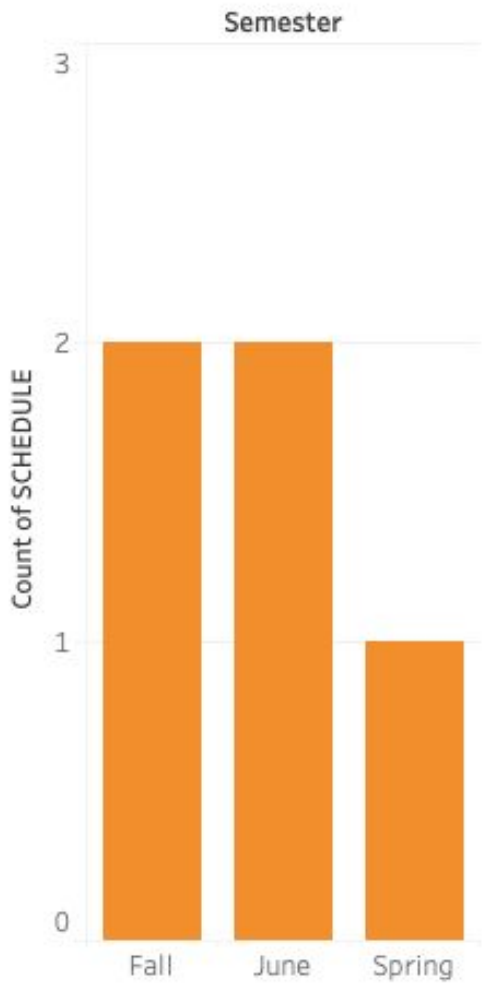
Number of Online vs. In-Person Classes

- Manage class modalities
- Anticipate the preferred modality of Instructors and schedule accordingly.
- Eg. below shows the no. of online classes being taught across different semesters.

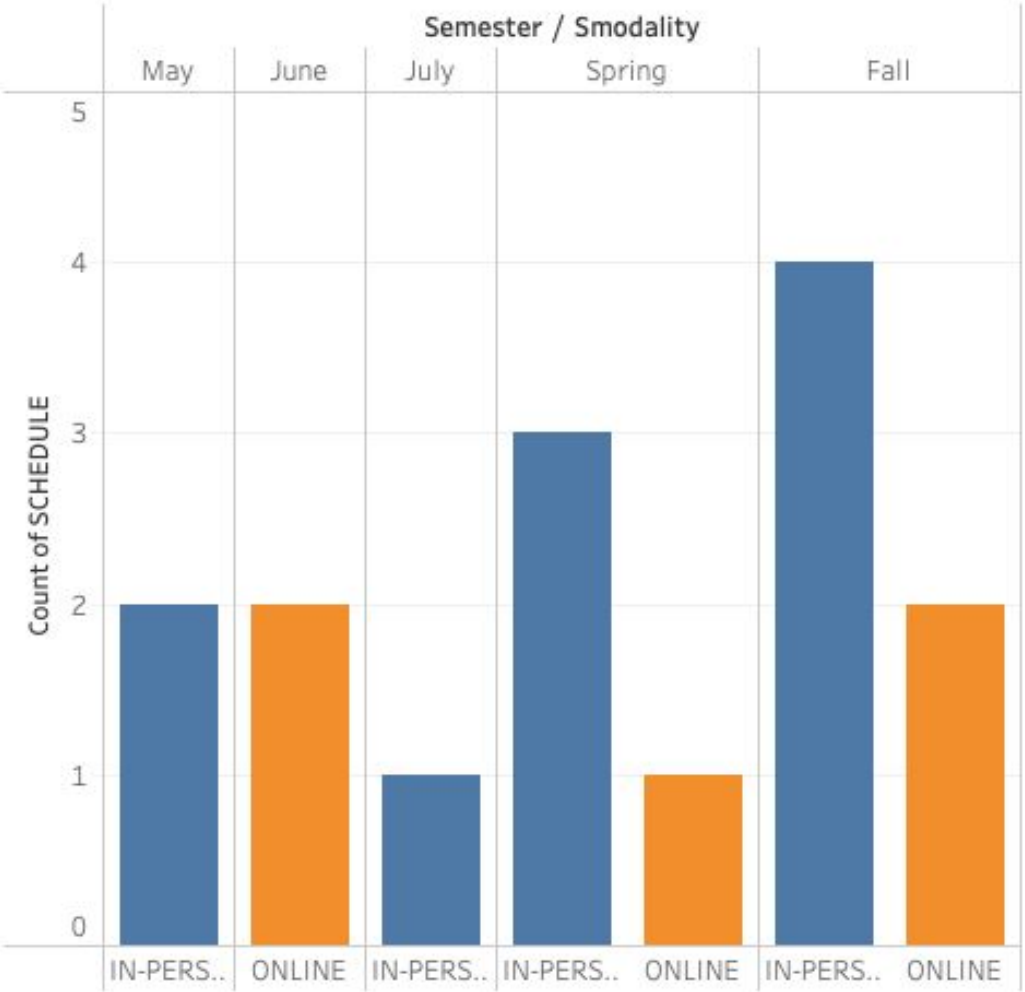
```
SELECT COUNT(*) AS "No. of classes",
SEMESTER,SMODALITY AS "Modality"
from TEACH natural join SCHEDULE
where smodality='ONLINE'
group by semester
```

No. of classes	SEMESTER	Modality
2	Fall	ONLINE
2	June	ONLINE
1	Spring	ONLINE

Number of Classes (Modality)



Number of Classes (Modality)



Instructor’s Preference vs. their Schedules

- Instructors can easily input their preferences and the process is not time consuming
- Process transparency regarding course offerings with instructor’s preferences
- Easily and accurately provides schedules for instructors

```
SELECT PROFID,CID AS "COURSE ID",PREFIX,
  CONCAT(
  (HOUR(endtime)-HOUR(starttime)),":",
  (minute(endtime)-minute(starttime))," hrs") as " PREFERRED CLASS LENGTH",
  CONCAT(
  (HOUR(end)-HOUR(start)),":",
  (minute(end)-minute(start))," hrs") as " SCHEDULED CLASS LENGTH",
  CONCAT(
  (month(end)-month(start)), " Month ",
  (day(end)-day(start))," Days") AS " SCHEDULED COURSE LENGTH ",
  WEEKDAYS AS "SCHEDULED DAYS" ,SEMESTER AS "SCHEDULED SEMESTER",SMODALITY
  from TEACH natural join PREFERENCES natural join SCHEDULE
  where prefsemester=semester and days=weekdays and start=starttime and end=endtime
```

PROFID ▲	COURSE ID ▲	PREFIX ▲	PREFERRED CLASS LENGTH ▲	SCHEDULED CLASS LENGTH ▲	SCHEDULED COURSE LENGTH ▲	SCHEDULED DAYS ▲	SCHEDULED SEMESTER ▲	SMODALITY ▲
1001	MSBX	5410	1:15 hrs	1:15 hrs	4 Month -7 Days	M/F	Fall	IN-PERSON
1001	MSBC	5070	2:0 hrs	2:0 hrs	0 Month 30 Days	T	July	IN-PERSON
1002	MSBX	5405	1:15 hrs	1:15 hrs	4 Month 0 Days	S	Spring	ONLINE
1007	MBAX	6410	2:0 hrs	2:0 hrs	4 Month -7 Days	M	Fall	IN-PERSON
1009	MSBC	5190	2:0 hrs	2:0 hrs	4 Month -7 Days	T	Fall	IN-PERSON
1010	MSBX	6840	2:0 hrs	2:0 hrs	4 Month 0 Days	T/TH	Spring	IN-PERSON
1011	CYBR	5300	2:0 hrs	2:0 hrs	4 Month -7 Days	M	Fall	IN-PERSON
1014	APRD	6342	1:0 hrs	1:0 hrs	4 Month 0 Days	W	Spring	IN-PERSON

Course Offerings

CID	Prefix	Name	Credith..
APRD	6342	Digital Advertising	2
CYBR	5010	Data Communications	3
	5300	Cybersecurity	3
MBAX	6410	Process Analytics	3
MSBC	5070	Survey of Business Analytics	3
	5180	Machine Learning in Python	3
	5190	Modern Artificial Intelligence: Introduction to AI for Business	3
	5490	BUAN Experiential Projects	1
	5680	Optimization Modeling	3
MSBX	5310	Customer Analytics	2
	5405	Structured Data Modeling/Analysis	1
	5410	Fundamentals of Data Analytics	3
	5415	Advanced Data Analytics	2
	5420	Unstructured and Distributed Data Modeling and Analysis	1
	6840	Supply Chain Analytics	1

Instructor Course Load

Profid	First Name	Last Name	Rank	
1001	Cynthia	Banks	PhD	3.000
1002	Xiaoshu	Bei	Tenure Track	0.667
1003	Janet	Bercovitz	Instructor	1.000
1006	David	Drake	PhD	1.333
1007	Earl	Young	Adjunct	1.000
1009	Bonnie	Mach	Adjunct	1.000
1010	Prashi	Atri	PhD	0.333
1011	Aidan	Price	Instructor	1.000
1012	Brandon	Fernandez	Tenure Track	0.333
1013	Thomas	Vance	Instructor	1.000
1014	Bryan	Flip	Instructor	0.667

Course Schedule

Profid	First Name	Last Name	Rank	Cid (Teach)	Prefix (Teac..	Sectionnum	Semester	Weekdays M	Weekdays M/F
1001	Cynthia	Banks	PhD	MSBC	5070	1	July		
					5180	3	May		
				MSBX	5410	1	Fall		8/22/2022 8:00:00 AM 12/15/2022 9:15:00 AM
1002	Xiaoshu	Bei	Tenure Track	MSBX	5405	1	Spring		
					5420	6	Fall		
1003	Janet	Bercovitz	Instructor	CYBR	5010	2	Fall		
1006	David	Drake	PhD	MSBX	5310	2	June	6/1/2022 8:30:00 AM 6/30/2022 10:00:00 AM	
					5415	8	Spring		
1007	Earl	Young	Adjunct	MBAX	6410	3	Fall		8/22/2022 10:00:00 AM

Data Source

For demonstration purposes, we have created our own data using people we knew as instructors and courses that we have taken throughout our time at CU Leeds School of Business.