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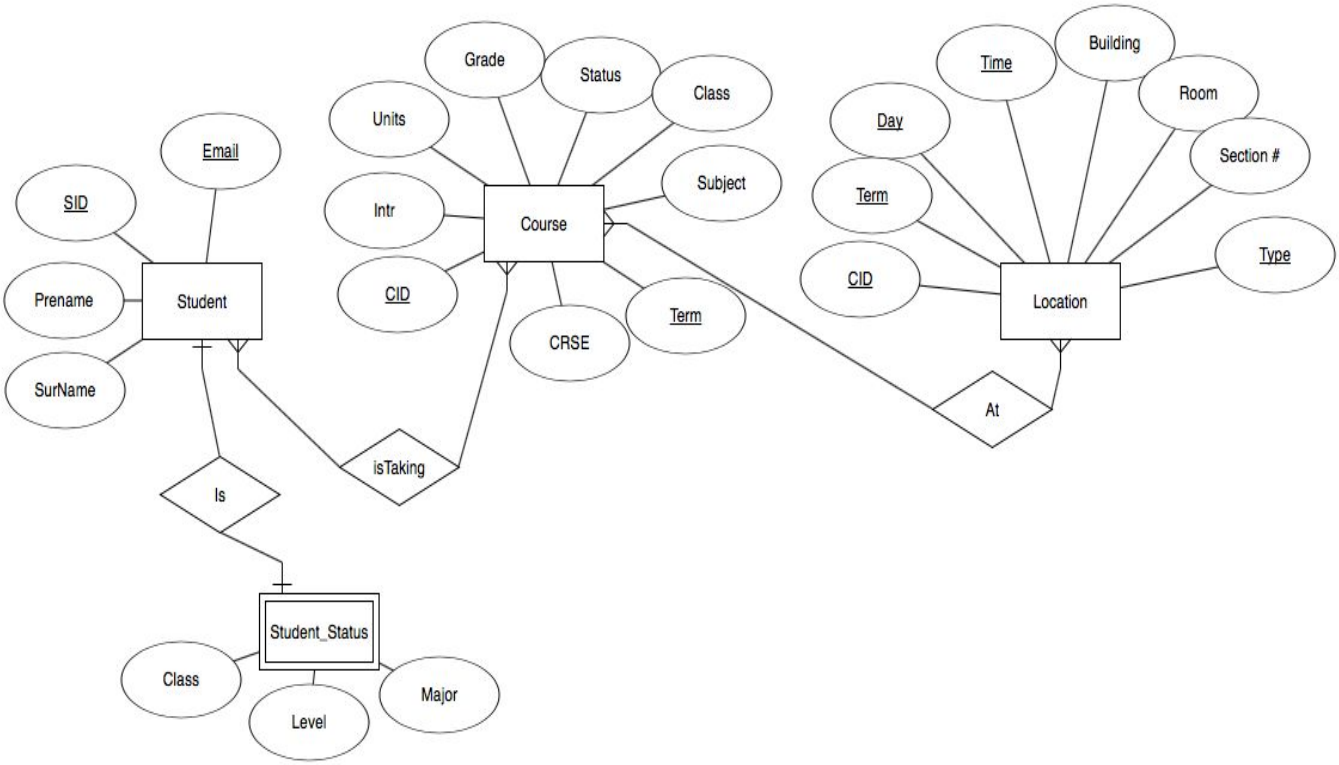

This is our initial ER diagram design before decomposition, where student status is a weak relation of student and shares a one-to-one relationship. On the other hand, student has a one-to-many relationship with enrollment, where one student can receive multiple grades from different courses but a single grade in a given course needs to be assigned to one specific Student. Student shares a many-to-many relationship with course, since a course can have many students and a student can take many courses. We translated that to a new relation called enrollment. Lastly, course and location share a many-to-many relationship since a course can be in many locations and a location can have many courses. We created a new relation called meeting which takes the keys from both course and location

Using the ER method:
Student(SID,Email,Prefname,Surname)
Student_Status(SID,Email,class,level,major)
Enrollment(CID,SID,Term,Grade,Status,Class)
Course(CID,Term,Crse,Subject,Instr,Units)
Meeting(CID, Term, Day, Type, Room, Building, Start, End,)
Location(CID,Term,Day,Type,Time,Building,Room,Section_num)
Email is a is a key not a primary key for Student

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After further decomposing the relations by BCNF algorithm, here are the relations and FDs hold. We also break units down to min units and max units to deal with variable units and time down to start and end time to deal with overlapping times.

Course(CID, Term, Subject, Min_Units, maxunits, Instructor, CRSE)
CID Term → Subject Min_Unit Max_Unit Instructor CRSE

Grade(SID, CID, Term, Status, Grade, Unit)
SID CID Term → Status Grade Unit

Meeting(CID, Term, Day, Room, Building, Start, End, Type)
CID Term Day Time → Room Building Type

RoomCap(Building, Room, Cap)
Building Room → Cap

Section(CID, Section, Term)
CID Term → Section

StudentClass(SID, Term, Class)
SID Term → Class

StudentInfo(SID, Email, Prefname, Surname)
SID → Email Prename Surname
Email → SID Prename Surname

StudentMajor(SID, Term, Major)
SID Term → Major

StudentType(Class, Level)
Class → Level

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(*number of students taking i units*)/(*number of students taking* $1-20$ *units*)

3A	
Units	Percentage
1	1.58
2	.41
3	1.67
4	45.43
5	3.09
6	1.29
7	1.98
8	12.6
9	3.64
10	1.54
11	1.99
12	13.92
13	5.6
14	1.83
15	.99
16	1.37
17	.74
18	.16
19	.09
20	.05

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3B	
Units	GPA
1	3.52
2	3.66
3	3.4
4	2.74
5	2.65
6	3.46
7	3.09
8	2.89
9	2.71
10	3.07
11	3.01
12	2.89
13	2.72
14	2.72
15	2.93
16	2.87
17	2.87
18	2.67
19	3.23
20	2.66

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3C	
Instructor	AverageGPA
O'donnell, Madison G.	3.95
Russo, Angel J.	3.95
Turner, Emily A.	1.7

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3D Letter Grade				
CRSE	EasiestInstructor	GPAofEasiest	HardestInstructor	GPAofHardest
101	Logan,Jackson J.	3.21	Diaz, Riley I.	2.21
102	Parsons, Mia E.	3.18	Parsons, Mia E.	3.18
103	Donaldson, Matthew C.	3.5	Moore, Isabella M.	2.8
104	Murphy, Melanie S.	3.27	Miller, Emma J.	1.95
105	Williams, Victoria M.	3.37	Adams, Emily G.	1.82
106	Dodson, Nicole M.	3.46	Whitehead, William A.	1.98
107	Edwards, Maya N.	3.14	Bates, Logan Q.	2.45
108	Olson, Jennifer D.	3.17	Green, Isabella M.	2
109	Parsons, Mia E.	3.33	Fisher, Caleb K.	3.04
110	Cobb, Sophie A.	3.54	Cobb, Sophie A.	3.54
111	Morris, Evan E.	3.96	Morris, Edvan E.	3.96

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3D Pass Rate		
CRSE	Instructor	PassRate
112	Perry, Katherine V.	100
112	Williams, Victoria M.	100
112	Fisher, Caleb K.	100
112	Morris, Evan E.	100
112	Olson, Jennifer D.	100
112	Cox, Ayden C.	100
113	Herring, Nathan L.	100
113	Morris, Evan E.	100
113	White, Sophia V.	100
113	Diaz, Michelle H.	86.67
114	Rutledge, Ashley B.	100
114	Sullivan, Jordan H.	100
114	Williams, Juan L.	100
114	Williams, Victoria M.	100
114	Battle, Gianna M.	100
114	Cox, Ayden C.	100
114	Cox, Jayden L.	100
114	Diaz, Michelle H.	100
114	Downs, Jesus C.	100
114	Herring, Nathan L.	100
114	Morris, Evan E.	100
114	Olson, Jennifer D.	100
114	Perry, Katherine V.	100

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3e		
Subject	Course	CID
ABC	101	26696
ABC	101	99952
ABC	104	79186
ABC	104	69416
ABC	104	72976
ABC	104	29801
ABC	104	83562
ABC	104	87956
ABC	104	13938
ABC	105	88991
ABC	105	95805
ABC	105	54893
ABC	105	96917
ABC	105	84348
ABC	105	47915
ABC	105	12099
ABC	105	79161
ABC	105	77260
ABC	106	76888
ABC	106	84699
ABC	106	85344
ABC	106	71147
ABC	106	49736
ABC	106	73369

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ABC	107	47739
ABC	107	67178
ABC	107	97830
ABC	107	74821
ABC	107	23980
ABC	108	38318
ABC	108	22134
ABC	108	45108
ABC	108	13725
ABC	201	57671
ABC	221	94521
ABC	221	62652
ABC	221	44715
DEF	103	71054
DEF	201	95869
DEF	201	33961
DEF	201	64497
DEF	201	49163
DEF	201	80495
DEF	201	36348
DEF	201	88867
DEF	201	36819
DEF	201	12585
DEF	201	52618
DEF	201	19942
DEF	201	27324

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DEF	201	69871
DEF	201	66502
DEF	214	38081
DEF	214	66663
DEF	229	14750
DEF	238	85512
DEF	238	49115
DEF	250	20678
DEF	250	79860
DEF	258	22387
DEF	258	90972
DEF	258	23004
DEF	258	21881
DEF	258	62399
DEF	258	46369
DEF	258	59900
DEF	258	98870
DEF	258	97239
DEF	292	55749
DEF	293	54889

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3F	
Major	GPA
O275	4
O113	4
O139	4
O151	4
O255	4
O100	4
O167	4
O169	4
O171	4
O176	4
O179	4
O193	4
O207	4
O221	4
O152	0
O263	0

(*number of students transferred into ABC and did not transfer in*)/(*number of ABC majors until the end*)

3G Part 1
%Transferred
22.08

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(*number of transfers into ABC from i major*)/(*number of students that transferred into ABC*)

3G Part 2	
Major	%ofTransfers
DEF2	12.96
OT16	12.28
DEF1	7.19
OT26	6.17
OT35	5.83

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5a.

*****ABC 203 Prerequisites*****
75% to 80% have taken
ABC 104 77.47
ABC 221 78.3
ABC 209 79.12

80% to 85% have taken

85% to 90% have taken

90% to 95% have taken
ABC 108 94.23

95% to 100% have taken
ABC 202 96.15

*****ABC 210 Prequisites*****
75% to 80% have taken
ABC 104 77.84
ABC 221 78.1

80% to 85% have taken

85% to 90% have taken

90% to 95% have taken
ABC 108 91.82
95% to 100% have taken
ABC 209 98.94

*****ABC 222 Prerequisites*****
75% to 80% have taken
ABC 106 79.24

80% to 85% have taken

85% to 90% have taken
ABC 104 85.4

90% to 95% have taken

95% to 100% have taken
ABC 108 97.2

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We used these resources to help design our database:

1. http://www.vertabelo.com/blog/technical-articles/how-does-database-design-help-organize-teachers-lessons-and-students
2. http://extranet.cccco.edu/Portals/1/TRIS/MIS/Left_Nav/DED/Chart.pdf
3. http://softwareengineering.stackexchange.com/questions/264944/designing-a-scalable-schema-for-college-database
4. http://www.c-jump.com/bcc/common/Talk/SQL/SQL_20_DBdesign/SQL_20_DBdesign.html#A01_0020_database_entities
5. http://www.postgresqltutorial.com/postgresql-python/create-tables/
6. http://stackoverflow.com/questions/403897/using-results-from-a-sql-query-in-a-python-program-in-another-sql-query
7. http://stackoverflow.com/questions/1759455/how-can-i-account-for-period-am-pm-with-datetime-strptime
8. http://stackoverflow.com/questions/29324824/python-convert-a-date-time-to-just-time
9. http://stackoverflow.com/questions/9044084/efficient-date-range-overlap-calculation-in-python
10. http://stackoverflow.com/questions/17106670/how-to-check-a-timeperiod-is-overlapping-another-time-period-in-java

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