

# Normalization

Database Development 2022  
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## What/Why

- ▶ Make data easier to work with as a HUMAN
- ▶ Make data easier to work with in SQL
- ▶ Reduce / remove redundant data
- ▶ Smaller tables are easier to understand and link
- ▶ Naming conventions
- ▶ Direct link between tables and associated data

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## Raw Data

- ▶ Generally in a spreadsheet format
- ▶ Multiple values in a field
- ▶ Duplicated rows and/or columns
- ▶ Missing data
- ▶ Patterns? What do you mean patterns???

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## Raw sample

Seat Number	Number of Stud Room	Class Time	Meeting Days	Instructor	Students
33	22	204 7:30-9:55	B	Hennrichsen	JJ Grant, Alan, Tyler P, ...
33	5	204 7:30-9:55	Both	Hennrichsen	Max, Chris, Mark, Masti, Stockton
33	28	204 11:30-1:55	A	Hennrichsen	Vlad, Chandler, Logan, ...
33	22	204 7:30-9:55	A	Hennrichsen	JJ Grant, Tyler C, Tyler P, Christina, ...
33	5	204 7:30-9:55	Both	Hennrichsen	Max, Chris, Mark, Masti, Stockton
33	28	204 11:30-1:55	B	Hennrichsen	Vlad, Max, Taylor, Zac, ...

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## 1NF

- ▶ Step 1 make the data atomic
- ▶ Step 2 remove repeating columns
- ▶ Step 3 remove repeating rows (rareish)
- ▶ Great time to start fixing column names

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## 1NF Sample

Section	Course #	Course name	Seat Number	Number of S	Room	Class Time	Meeting Day	Instructor	Student
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Hennrichsen	JJ
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Hennrichsen	Grant
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Hennrichsen	Alan
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Hennrichsen	Tyler P

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2NF

Step 1 Already in 1NF
Step 2 Remove/Resolve Partial dependencies

This means split data into tables (note the plural!)

Step 3 Identify candidate keys

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2NF Sample

courses				sections			
course key	Course Name	room	instructor	section key	course #	meet	

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3NF

Step 1 Already in 2NF
Step 2 Resolve transitive dependencies

Create combo tables to resolve many to many

Each cell/field directly links to the key for the row
All primary and foreign keys explicitly identified

(PK) and/or (FK) after field name in header

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