



1

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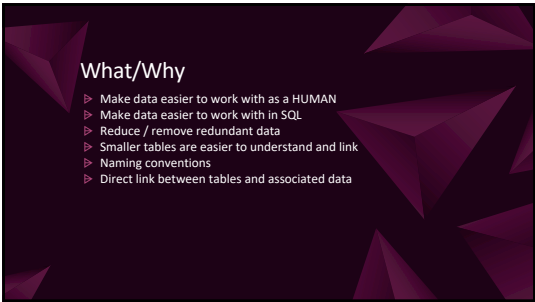
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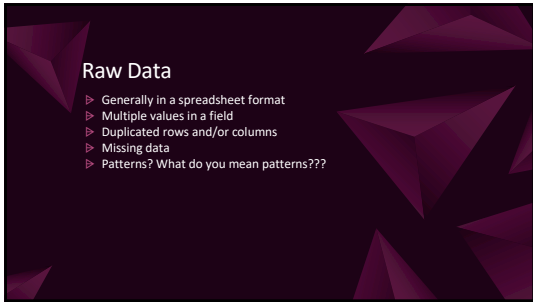
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Raw sample

Seat Number	Number of Seat Rows	Class Time	Meeting Days	Instructor	Students
33	22	204 7:30-8:55	B	Henrichsen	J.J. Grant, Alan, Tyler P. ...
33	5	204 7:30-8:55	Bath	Henrichsen	Max, Chris, Mark, Magi, Stashton
33	28	204 11:30-1:55	A	Henrichsen	Yves, Chendee, Logan
33	22	204 7:30-8:55	A	Henrichsen	J.J. Grant, Tyler G, Tyler P. Christine
33	5	204 7:30-8:55	Bath	Henrichsen	Max, Chris, Mark, Magi, Stashton
33	28	204 11:30-1:55	B	Henrichsen	Vicki, Max, Taylor, Zee, ...

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- Before Every Step
- Duplicate the current data to a new sheet in the spreadsheet document
  - Rename to the current process
  - Take notes about what you did between each step!!!!

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- 1NF
- Step 1 make the data atomic
  - Step 2 remove repeating columns
  - Step 3 remove repeating rows (rareish)
  - Step 4 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	Henrichsen	JJ
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Henrichsen	Grant
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Henrichsen	Alan
AM	CSIS 1410	Computer Programming	33	22	204	7:30-9:55	B	Henrichsen	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	section key	course #	seat

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3NF

➤ Step 1 Already in 2NF

➤ Step 2 Resolve transitive dependencies

➤ Create combo tables to handle many to many dependencies

➤ 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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3NF Sample

Category	Item	Price	Stock	Supplier	Location	Notes
Food	Apples	1.20	100	ABC	CA	
Food	Bananas	0.80	50	DEF	FL	
Food	Oranges	1.50	75	GHI	TX	
Food	Pears	1.10	60	JKL	NY	
Food	Strawberries	2.00	30	MNO	WA	
Food	Blueberries	2.50	20	PQR	OR	
Food	Raspberries	3.00	15	STU	AZ	
Food	Blackberries	3.50	10	VWX	CO	
Food	Elderberries	4.00	5	YZA	UT	
Food	Gooseberries	4.50	3	BCD	VT	
Food	Huckleberries	5.00	2	EFG	NH	
Food	Junberries	5.50	1	HIJ	ME	
Food	Kiwifruit	6.00	1	KLM	HI	
Food	Lemon-Lime	6.50	1	NOP	AK	
Food	Lemon	7.00	1	QRS	WY	
Food	Lime	7.50	1	TUV	DE	
Food	Apple	8.00	1	WXY	NE	
Food	Banana	8.50	1	ZAB	ND	
Food	Orange	9.00	1	BCD	SD	
Food	Pear	9.50	1	EFG	WV	
Food	Strawberry	10.00	1	HIJ	MT	
Food	Blueberry	10.50	1	KLM	RI	
Food	Raspberry	11.00	1	NOP	CT	
Food	Blackberry	11.50	1	QRS	MA	
Food	Elderberry	12.00	1	TUV	VT	
Food	Gooseberry	12.50	1	WXY	NH	
Food	Huckleberry	13.00	1	ZAB	ME	
Food	Junberry	13.50	1	BCD	HI	
Food	Kiwifruit	14.00	1	EFG	AK	
Food	Lemon-Lime	14.50	1	HIJ	WY	
Food	Lemon	15.00	1	KLM	DE	
Food	Lime	15.50	1	NOP	NE	
Food	Apple	16.00	1	QRS	ND	
Food	Banana	16.50	1	TUV	SD	
Food	Orange	17.00	1	WXY	WV	
Food	Pear	17.50	1	ZAB	MT	
Food	Strawberry	18.00	1	BCD	RI	
Food	Blueberry	18.50	1	EFG	CT	
Food	Raspberry	19.00	1	HIJ	MA	
Food	Blackberry	19.50	1	KLM	VT	
Food	Elderberry	20.00	1	NOP	NH	
Food	Gooseberry	20.50	1	QRS	ME	
Food	Huckleberry	21.00	1	TUV	HI	
Food	Junberry	21.50	1	WXY	AK	
Food	Kiwifruit	22.00	1	ZAB	WY	
Food	Lemon-Lime	22.50	1	BCD	DE	
Food	Lemon	23.00	1	EFG	NE	
Food	Lime	23.50	1	HIJ	ND	
Food	Apple	24.00	1	KLM	SD	
Food	Banana	24.50	1	NOP	WV	
Food	Orange	25.00	1	QRS	MT	
Food	Pear	25.50	1	TUV	RI	
Food	Strawberry	26.00	1	WXY	CT	
Food	Blueberry	26.50	1	ZAB	MA	
Food	Raspberry	27.00	1	BCD	VT	
Food	Blackberry	27.50	1	EFG	NH	
Food	Elderberry	28.00	1	HIJ	ME	
Food	Gooseberry	28.50	1	KLM	HI	
Food	Huckleberry	29.00	1	NOP	AK	
Food	Junberry	29.50	1	QRS	WY	
Food	Kiwifruit	30.00	1	TUV	DE	
Food	Lemon-Lime	30.50	1	WXY	NE	
Food	Lemon	31.00	1	ZAB	ND	
Food	Lime	31.50	1	BCD	SD	
Food	Apple	32.00	1	EFG	WV	
Food	Banana	32.50	1	HIJ	MT	
Food	Orange	33.00	1	KLM	RI	
Food	Pear	33.50	1	NOP	CT	
Food	Strawberry	34.00	1	QRS	MA	
Food	Blueberry	34.50	1	TUV	VT	
Food	Raspberry	35.00	1	WXY	NH	
Food	Blackberry	35.50	1	ZAB	ME	
Food	Elderberry	36.00	1	BCD	HI	
Food	Gooseberry	36.50	1	EFG	AK	
Food	Huckleberry	37.00	1	HIJ	WY	
Food	Junberry	37.50	1	KLM	DE	
Food	Kiwifruit	38.00	1	NOP	NE	
Food	Lemon-Lime	38.50	1	QRS	ND	
Food	Lemon	39.00	1	TUV	SD	
Food	Lime	39.50	1	WXY	WV	
Food	Apple	40.00	1	ZAB	MT	
Food	Banana	40.50	1	BCD	RI	
Food	Orange	41.00	1	EFG	CT	
Food	Pear	41.50	1	HIJ	MA	
Food	Strawberry	42.00	1	KLM	VT	
Food	Blueberry	42.50	1	NOP	NH	
Food	Raspberry	43.00	1	QRS	ME	
Food	Blackberry	43.50	1	TUV	HI	
Food	Elderberry	44.00	1	WXY	AK	
Food	Gooseberry	44.50	1	ZAB	WY	
Food	Huckleberry	45.00	1	BCD	DE	
Food	Junberry	45.50	1	EFG	NE	
Food	Kiwifruit	46.00	1	HIJ	ND	
Food	Lemon-Lime	46.50	1	KLM	SD	
Food	Lemon	47.00	1	NOP	WV	
Food	Lime	47.50	1	QRS	MT	
Food	Apple	48.00	1	TUV	RI	
Food	Banana	48.50	1	WXY	CT	
Food	Orange	49.00	1	ZAB	MA	
Food	Pear	49.50	1	BCD	VT	
Food	Strawberry	50.00	1	EFG	NH	
Food	Blueberry	50.50	1	HIJ	ME	
Food	Raspberry	51.00	1	KLM	HI	
Food	Blackberry	51.50	1	NOP	AK	
Food	Elderberry	52.00	1	QRS	WY	
Food	Gooseberry	52.50	1	TUV	DE	
Food	Huckleberry	53.00	1	WXY	NE	
Food	Junberry	53.50	1	ZAB	ND	
Food	Kiwifruit	54.00	1	BCD	SD	
Food	Lemon-Lime	54.50	1	EFG	WV	
Food	Lemon	55.00	1	HIJ	MT	
Food	Lime	55.50	1	KLM	RI	
Food	Apple	56.00	1	NOP	CT	
Food	Banana	56.50	1	QRS	MA	
Food	Orange	57.00	1	TUV	VT	
Food	Pear	57.50	1	WXY	NH	
Food	Strawberry	58.00	1	ZAB	ME	
Food	Blueberry	58.50	1	BCD	HI	
Food	Raspberry	59.00	1	EFG	AK	
Food	Blackberry	59.50	1	HIJ	WY	
Food	Elderberry	60.00	1	KLM	DE	
Food	Gooseberry	60.50	1	NOP	NE	
Food	Huckleberry	61.00	1	QRS	ND	
Food	Junberry	61.50	1	TUV	SD	
Food	Kiwifruit	62.00	1	WXY	WV	
Food	Lemon-Lime	62.50	1	ZAB	MT	
Food	Lemon	63.00	1	BCD	RI	
Food	Lime	63.50	1	EFG	CT	
Food	Apple	64.00	1	HIJ	MA	
Food	Banana	64.50	1	KLM	VT	
Food	Orange	65.00	1	NOP	NH	
Food	Pear	65.50	1	QRS	ME	
Food	Strawberry	66.00	1	TUV	HI	
Food	Blueberry	66.50	1	WXY	AK	
Food	Raspberry	67.00	1	ZAB	WY	
Food	Blackberry	67.50	1	BCD	DE	
Food	Elderberry	68.00	1	EFG	NE	
Food	Gooseberry	68.50	1	HIJ	ND	
Food	Huckleberry	69.00	1	KLM	SD	
Food	Junberry	69.50	1	NOP	WV	
Food	Kiwifruit	70.00	1	QRS	MT	
Food	Lemon-Lime	70.50	1	TUV	RI	
Food	Lemon	71.00	1	WXY	CT	
Food	Lime	71.50	1	ZAB	MA	
Food	Apple	72.00	1	BCD	VT	
Food	Banana	72.50	1	EFG	NH	
Food	Orange	73.00	1	HIJ	ME	
Food	Pear	73.50	1	KLM	HI	
Food	Strawberry	74.00	1	NOP	AK	
Food	Blueberry	74.50	1	QRS	WY	
Food	Raspberry	75.00	1	TUV	DE	
Food	Blackberry	75.50	1	WXY	NE	
Food	Elderberry	76.00	1	ZAB	ND	
Food	Gooseberry	76.50	1	BCD	SD	
Food	Huckleberry	77.00	1	EFG	WV	
Food	Junberry	77.50	1	HIJ	MT	
Food	Kiwifruit	78.00	1	KLM	RI	
Food	Lemon-Lime	78.50	1	NOP	CT	
Food	Lemon	79.00	1	QRS	MA	
Food	Lime	79.50	1	TUV	VT	
Food	Apple	80.00	1	WXY	NH	
Food	Banana	80.50	1	ZAB	ME	
Food	Orange	81.00	1	BCD	HI	
Food	Pear	81.50	1	EFG	AK	
Food	Strawberry	82.00	1	HIJ	WY	
Food	Blueberry	82.50	1	KLM	DE	
Food	Raspberry	83.00	1	NOP	NE	
Food	Blackberry	83.50	1	QRS	ND	
Food	Elderberry	84.00	1	TUV	SD	
Food	Gooseberry	84.50	1	WXY	WV	
Food	Huckleberry	85.00	1	ZAB	MT	
Food	Junberry	85.50	1	BCD	RI	
Food	Kiwifruit	86.00	1	EFG	CT	
Food	Lemon-Lime	86.50	1	HIJ	MA	
Food	Lemon	87.00	1	KLM	VT	
Food	Lime	87.50	1	NOP	NH	
Food	Apple	88.00	1	QRS	ME	
Food	Banana	88.50	1	TUV	HI	
Food	Orange	89.00	1	WXY	AK	
Food	Pear	89.50	1	ZAB	WY	
Food	Strawberry	90.00	1	BCD	DE	
Food	Blueberry	90.50	1	EFG	NE	
Food	Raspberry	91.00	1	HIJ	ND	
Food	Blackberry	91.50	1	KLM	SD	
Food	Elderberry	92.00	1	NOP	WV	
Food	Gooseberry	92.50	1	QRS	MT	
Food	Huckleberry	93.00	1	TUV	RI	
Food	Junberry	93.50	1	WXY	CT	
Food	Kiwifruit	94.00	1	ZAB	MA	
Food	Lemon-Lime	94.50	1	BCD	VT	
Food	Lemon	95.00	1	EFG	NH	
Food	Lime	95.50	1	HIJ	ME	
Food	Apple	96.00	1	KLM	HI	
Food	Banana	96.50	1	NOP	AK	
Food	Orange	97.00	1	QRS	WY	
Food	Pear	97.50	1	TUV	DE	
Food	Strawberry	98.00	1	WXY	NE	
Food	Blueberry	98.50	1	ZAB	ND	
Food	Raspberry	99.00	1	BCD	SD	
Food	Blackberry	99.50	1	EFG	WV	
Food	Elderberry	100.00	1	HIJ	MT	

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Beyond 3NF

➤ BCNF / 4NF / 5NF

➤ Special cases to handle less common data patterns

➤ Most 3NF tables you work with already meet BCNF+ standards

➤ Exercise in validating your data design

➤ Check your data design regularly

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