W tej chwili buzu olchela się z relazji: Mafia (Miasto, Gang, Proceder, Szef, Dochòd BOI). Windomo też, że zachodzą zakriności funkcyjne to: Gang → Szef, Szef → Dechéd, Proceder → BOI.

# G to BONF, )

## Atrybut: wartość w tabeli niebędącą kluczem (lub jego częścią)

## Funkcyina zależność:

In restance statutes through a functional dependency or a constraint between to set of attributes in a resistant norm a disclasse, in line the words, and technical appropriately a constraint streams be activated in an extraction. Others animate affect and set of attributes. Affect ACT is an extract the functionally determine. You've the ACT of a constraint stream of the technical activates and activates a

Student ID	Semester	Lecture	TA	
1234	6	Numerical Methods	John	
1221	4	Numerical Methods	Smith	
1234	6	Visual Computing	Bob	
1201	2	Numerical Methods	Peter	
1201	2	Physics II	Simon	

## BCNF - jak jest spełniony to nie ma redundancji (nie przechowujemy tych samych danych kilka razy)

BCNF (3, Snormal): https://en.wikipedia.org/wiki/Boyce%E29680

normal: https://en.wikipedia.org/wiki/Second\_normal\_form Inormal: https://en.wikipedia.org/wiki/First\_normal\_form

Pzykred:



## Prylibad

Tournament	Year	Winner	Winner's date of birth	
Indiana Invitational	1998	Al Fredrickson	21 July 1975	
Cleveland Open	1999	Bob Albertson	28 September 1968	
Des Moines Masters	1999	Al Fredrickson	21 July 1975	
Indiana Invitational	1999	Chin Masterson	14 March 1977	

eed to uniquely identify a row. That is, {Tournament, Year} is a candidate key for the table.

The breach of SNF occurs because the non-prime attribute (Winner's date of birth) is transitively dependent on the candidate key (Tournament, Year) through the non-prime attribute Winner. The fact that Winner's date of birth is functionally dependent on Winner makes the table vulnerable to logical inconsistencies, as there is nothing to stop the same person from being shown with different dates of birth on different records.

In order to express the same facts without violating 3NF, it is necessary to split the table into two:

## Tournament Year Winner Indiana Invitational 1998 Al Fredrickson Cleveland Open 1999 Bob Albertson Des Moines Masters 1999 Al Fredrickson

## Winner's dates of birth

Winner	Date of birth		
Chip Masterson	14 March 1977		
Al Fredrickson	21 July 1975		
Bob Albertson	28 September 1968		

I jak usaustho jest spetnione to jesuse BCNF (3,5 normal form)

## Definition [edt]

If a relational schema is in BCNF then all redundancy based on functional dependency has been removed, [4] although other types of redundancy may still exist. A relational schema R is in Boyce-Codd normal form if and only if for every one of its dependencies X — Y, at least one of the following

X → Y is a trivial functional dependency (Y ⊆ X),
 X is a superkey for schema R\_[5]

Relacja jest w postaci normalnej Boyce'a-Codda wtedy i tylko wtedy, kiedy każdy jej atrybut zależy funkcjonalnie tylko od jej klucza głównego.

Definition (Postać normalna Boyce-Codda, BENB) Relacja R ze zbiorem zakinhości funkcjinych F jest w postaci normalnej Boyce-Codda, jeśli dla każdej nietrywialnej zakinhości  $\alpha \rightarrow \beta$  ( $\alpha \cap \beta = 0$ ) kicho jest nadkluczenia.

Court Start time		End time	Rate type	
1	09:30	10:30	SAVER	
1	11:00	12:00	SAVER	
1	14:00	15:30	STANDARD	
2	10:00	11:30	PREMIUM-B	
2	11:30	13:30	PREMIUM-B	
2	15:00	16:30	PREMILIMA	

ining attribute Rate type – on which Court depends - (1) is neither a candidate key nor a superset of a candidate key and (2) Court is no subset of Rate type

Dependency Rate type --- Court is respected, since a Rate type should only ever apply to a single Court.

riote types			rough a monentige				
Rate type	Court	Member flag	Court	Start time	End time	Member flag	
AVER	1	Yes	1	09:30	10:30	Yes	
TANDARD	1	No	1	11:00	12:00	Yes	
REMIUM-A	2	Yes	1:	14:00	15:30	No	
REMIUM-B	2	No	2	10:00	11:30	No	
			2	11:30	13:30	No	
			2	15:00	16:30	Yes	

The following relation does not satisfy 2NF because:

- . There is a multi-attribute unique identifier: "Manufacturer" and "Model".
- · {Manufacturer country} is functionally dependent (predictable) on {Manufacturer}
- (Manufacturer country) is not part of a candidate key, so it is a non-prime attribute. (It is assumed that it is possible for two manufacturers in the sam country to make a toothbrush with the same model name, so (Manufacturer country, Model) is not a candidate key even though in the current table. the pair uniquely identify rows.)

  • (Manufacturer) is a proper subset of the (Manufacturer, Model) candidate key.

In other words, since (Manufacturer country) is a non-prime attribute functionally dependent on a proper subset of a candidate key, the relation is in violation of 2NF.

## Electric toothbrush models

Manufacturer	Model	Manufacturer country
Forte	X-Prime	Italy
Forte	Ultraclean	Italy
Dent-o-Fresh	EZbrush	USA
Brushmaster	SuperBrush	USA
Kobayashi	ST-60	Japan
Hoch	Toothmaster	Germany
Hoch	X-Prime	Germany

- 1. Remove the functionally dependent attributes in the partial dependencies of the first normal form relation. In this example, {Manufacturer country, is the functionally dependent attribute which will be remove
- Place those partial dependency-dependent attributes (i.e. (Manufacturer country)) in a relation where their corresponding determinant attributes are a candidate key (i.e. (Manufacturer)).

As seen below, (Manufacturer country) is removed from the original table

Manufacturer	Model
Forte	X-Prime
Forte	Ultraclean
Dent-o-Fresh	EZbrush
Brushmaster	SuperBrush
Kobayashi	ST-60
Hoch	Toothmaster
Hoch	X-Prime

mailulacturei	manufacturer country
Forte	Italy
Dent-o-Fresh	USA
Brushmaster	USA
Kobayashi	Japan
Hoch	Germany

4	11.30	10.00	LUEWIOW-D	
2	15:00	16:30	PREMIUM-A	

STANDARD	1	No	1	11:00	12:00	Yes
PREMIUM-A	2	Yes	1:	14:00	15:30	No
PREMIUM-B	2	No	2	10:00	11:30	No
			2	11:30	13:30	No

Mofie (Miesto, Gong Proceder, Seef, Dorhid, Roi)

Mafid Miasto, Gorg, Proceder) Zojscio (Proceder, loi)

Szefowie (Gongi Szef) Zaroblai (Szef, Dodnód)

zod.2/

zod.3/ 3. (0.5 pkt.) Czy is

2. (0.5 pkt.) Czy mimo tego, że baza (po Twoich modyfikacjach) jest w postaci
BCNF dostrzegasz w niej jeszcze jakąś oczywistą redundancję? Jaka jest jej
przyczyna?

MICSCIC

Tok - mofia wykonuje wszystlie

ise mozna fornounc po panpu

Mofio (Miosto, Conp., Proceder)

Teren Masto, Gong), Bronza (Gong, fraceder)

4. (0.5 pkt) Napisz zapytanie algebry relacji zwracające niepustą odpowiedź wtedy i tylko wtedy gdy w relacji Mafia naruszona jest zależność funkcyjna Proceder → ROI.

bede luce roine roi

Bedzie noruszona gdy d/a tego somego pocederu

σ Mafia1.proceder = Mafia2.proceder and Mafia1.roi != Mafia2.roi(Mafia1 x Mafia2)