

Database normalization

Databases 2022

Normalization (1/2)

- 1NF criteria
 - Primary key (no duplicated tuples)
 - No repeating groups
 - Atomic columns (cells have single value)
- 2NF criteria
 - Every non-trivial functional dependency either does not being with a proper subset of a candidate key or end with a prime attribute (no partial functional dependencies of non-prime attributes on candidate keys)

Normalization(2/2)

- 3NF
 - Every non-trivial functional dependency either begins with a super key or ends with a prime attribute (no transitive functional dependencies of non-prime attribute on candidate key)

1NF

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3 rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.

2NF

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3 rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

3NF

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION ID
1	Janet Jones	First Street Plot No 4	2
2	Robert Phil	3 rd Street 34	1
3	Robert Phil	5 th Avenue	1

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

SALUTATION ID	SALUTATION
1	Mr.
2	Ms.
3	Mrs.
4	Dr.

Exercise 1

- Given the following relation, decompose it into 1NF, 2NF and 3NF

orderId	date	customerId	customerName	city	itemId	itemName	quant	price
2301	23/02/2011	101	Martin	Prague	3786	Net	3	\$35,00
2301	23/02/2011	101	Martin	Prague	4011	Racket	6	\$65,00
2301	23/02/2011	101	Martin	Prague	9132	Pack-3	8	\$4,75
2302	25/02/2011	107	Herman	Madrid	5794	Pack -6	4	\$5,00
2303	27/02/2011	110	Pedro	Moscow	4011	Racket	2	\$65,00
2303	27/02/2011	110	Pedro	Moscow	3141	Cover	2	\$10,00

Exercise 1

- Once the relationship is normalized, create a query for each of the following requirements
 - Calculate the total number of items per order and the total amount to pay for the order.
 - Obtain the customer whose purchase in terms of money has been greater than the others

Exercise 2

- Given the relationship *loan_books*, it is requested to apply the normalization rules 1NF, 2NF and 3NF

school	teacher	course	room	grade	book	publisher	loanDate
Horizon Education Institute	Chad Russell	Logical thinking	1.A01	1st grade	Learning and teaching in early childhood	BOA Editions	09/09/2010
Horizon Education Institute	Chad Russell	Wrtting	1.A01	1st grade	Preschool,N56	Taylor & Francis Publishing	05/05/2010
Horizon Education Institute	Chad Russell	Numerical Thinking	1.A01	1st grade	Learning and teaching in early childhood	BOA Editions	05/05/2010
Horizon Education Institute	E.F.Codd	Spatial, Temporal and Causal Thinking	1.B01	1st grade	Early Childhood Education N9	Prentice Hall	06/05/2010
Horizon Education Institute	E.F.Codd	Numerical Thinking	1.B01	1st grade	Learning and teaching in early childhood	BOA Editions	06/05/2010
Horizon Education Institute	Jones Smith	Wrtting	1.A01	2nd grade	Learning and teaching in early childhood	BOA Editions	09/09/2010
Horizon Education Institute	Jones Smith	English	1.A01	2nd grade	Know how to educate: guide for Parents and	McGraw Hill	05/05/2010
Bright Institution	Adam Baker	Logical thinking	2.B01	1st grade	Know how to educate: guide for Parents and	McGraw Hill	18/12/2010
Bright Institution	Adam Baker	Numerical Thinking	2.B01	1st grade	Learning and teaching in early childhood	BOA Editions	06/05/2010

Exercise 2

- Once the relationship is normalized, create a query for each of the following requirements
 - Obtain for each of the schools, the number of books that have been loaned to each publishers.
 - For each school, find the book that has been on loan the longest and the teacher in charge of it.

Exercise 3

- Consider the following relation:
 - CAR_SALE(carNumber, dateSold, salespersonId, comimission, discount)
- Assume that a car may be sold by multiple salespeople, and hence {carNumber, salespersonId} is the primary key.
- Additional dependencies are:
 - dateSold → discount
 - salespersonId → comimission
- Answer the following question
 - Based on the given primary key, is this relation in 1NF, 2NF or 3NF?
 - Why or why not?
 - How would you successively normalise it completely?

See you next lab