Homework 3

Jacob Taylor Cassady

CECS 535: Introduction to Databases

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# Given relation R(A, B, C, D, E, F) give the key(s) of R and the normal form of R if the FDs are

AB -> CD

C -> E

D -> F

1. Keys: (A, B)
2. Normal Form: 2NF

A -> BCD

D -> EF

1. Keys: A
2. Normal Form: 2NF

A -> BC

D -> EF

1. Keys: (A, D)
2. Normal Form: 3NF

AB -> C

CD -> EF

1. Keys: (A, B, D)
2. Normal Form: 3NF

AB -> CD

D -> EF

C -> AB

1. Keys: (A, B, C)
2. Normal Form: 2NF

ABC -> D

ABC -> E

ABC -> F

1. Keys: (A, B, C)
2. Normal Form: 3NF

# 

## Give all the keys of activity

(customerid, partid)

## Decompose ACTIVITY into 3NF relations. Make sure the decomposition is lossless.

### Relations

CUSTOMER\_PART\_ID(customerid, partid, date, quantity, status)

CUSTOMER(customerid, fname, lname)

CUSTOMER\_ADDRESS(address, zip)

PART(partid, price, material, color)

### Dependencies

customerid, partid -> date, quantity, status

customerid -> fname, lname, address

address -> zip

partid -> price, material, color

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|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | A9 |
| C2 | B21 | A2 | B23 | B24 | A5 | A6 | B27 | B28 | B29 |
| C3 | A1 | A2 | A3 | A4 | B35 | B36 | B37 | B38 | B39 |

### TRY customer-id -> name,address

A1 -> B37 A7

A1 -> B38 A8

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | A9 |
| C2 | B21 | A2 | B23 | B24 | A5 | A6 | B27 | B28 | B29 |
| C3 | A1 | A2 | A3 | A4 | B35 | B36 | **A7** | **A8** | B39 |

### TRY address -> zip

A8 -> B39 A9

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | A9 |
| C2 | B21 | A2 | B23 | B24 | A5 | A6 | B27 | B28 | B29 |
| C3 | A1 | A2 | A3 | A4 | B35 | B36 | A7 | A8 | **A9** |

### TRY product-id -> color,size

A2 -> B35 A5

A2 -> B36 A6

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | A9 |
| C2 | B21 | A2 | B23 | B24 | A5 | A6 | B27 | B28 | B29 |
| C3 | A1 | A2 | A3 | A4 | **A5** | **A6** | A7 | A8 | A9 |

Since the final row is filled with Ai values, the decomposition has the lossless join property.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | B19 |
| C2 | A1 | B22 | B23 | B24 | B25 | B26 | B27 | B28 | A9 |
| C3 | A1 | A2 | A3 | A4 | A5 | A6 | B37 | B38 | B39 |

### TRY customer-id -> name,address

A1 -> B37 A7

A1 -> B38 A8

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | Zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | B19 |
| C2 | A1 | B22 | B23 | B24 | B25 | B26 | A7 | A8 | A9 |
| C3 | A1 | A2 | A3 | A4 | A5 | A6 | **A7** | **A8** | B39 |

### TRY address -> zip

A8 -> B39 A9

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | customer-id | product-id | date | time | color | size | name | address | Zip |
| C1 | A1 | B12 | B13 | B14 | B15 | B16 | A7 | A8 | B19 |
| C2 | A1 | B22 | B23 | B24 | B25 | B26 | A7 | A8 | A9 |
| C3 | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | **A9** |

Since the final row is filled with Ai values, the decomposition has the lossless join property.

# 

## Keys: pid

## Decompose PRODUCT into 3NF relations. Make sure the decomposition is lossless.

### Relations

PRODUCT(pid, pname, pmfr, type)

PRODUCT\_MANUFACTURE(pmfr, pname, warehouse-origin, discount)

MANUFACTURE\_PRICE(pmfr, type, price)

### Dependencies

pid -> pname, pmfr, type

pmfr, pname -> warehouse-origin, discount

pmfr, type -> price

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## Keys: (Tool-id, client-id, day)

## Decompose RENTAL into 3NF relations. Make sure the decomposition is lossless.

### Relations

TOOL(tool-id, toolname)

CLIENT(client-id, address)

TOOL\_CLIENT\_PRICE(tool-id, client-id, price)

TOOL\_CLIENT\_DAY\_RENTAL(tool-id, client-id, day, length-rental)

### Dependencies

tool-id -> toolname

client-id ->address

tool-id, client-id -> price

tool-id, client-id, day -> length-rental

# 

## Relations

### Subscriber(NAME, Address, email)

### Subscribes(NAME, TITLE, since)

### Agent(ID, Address, Name, Commission)

### Manages(ID, TITLE)

### Magazine(TITLE, Phones, Publisher, Editors)