# Normalization of Rentals

## Analysis:

Primary key: PID\_HID

Determined FDs:  PID -> PN, HID-> HZ, HID -> HC, HID -> HS, HZ -> HC

Minimal cover: PID\_HID -> S, PID -> PN, HID-> HZ, HID -> HC, HID -> HS, HZ -> HC

Other Keys: None

Normal form: 2NF

Decomposition: RENTALS\_PID\_HID\_S, RENTALS\_PID\_PN, RENTALS\_HID\_HZ, RENTALS\_HID\_HC, RENTALS\_HID\_HS, RENTALS\_HZ\_HC

## Table: RENTALS\_PID\_HID\_S

Columns: PID, HID, S

Key: PID\_HID

FDs: PID\_HID  -> S

Normal forms:

* Since all FDs are key FDs, the table is BCNF
* Since the keys are a superkey, each independent key combination can be treated as a single column and therefore the table is in 4NF

## Table: RENTALS\_PID\_PN

Columns: PID, PN

Key: PID

FDs: PID -> PN

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: RENTALS\_HID\_HZ

Columns: HID, HZ

Key: HID

FDs: HID -> HZ

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: RENTALS\_HID\_HC

Columns: HID, HC

Key: HID

FDs: HID -> HC

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: RENTALS\_HID\_HS

Columns: HID, HS

Key: HID

FDs: HID -> HS

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: RENTALS\_HZ\_HC

Columns: HZ, HC

Key: HZ

FDs: HZ -> HC

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

NormalizationofCoffees

Analysis:

Primary key: DID\_HID\_CID

Determined FDs: DID -> DN, DID -> DS, CID -> CN, CID -> CM

Minimal cover: DID\_HID\_CID -> DID\_HID\_CID,  DID -> DN, DID -> DS, CID -> CN, CID -> CM

Other Keys: None

Normal form: 1NF

Dcomposition: COFFEES\_DID\_HID\_CID, COFFEES\_DID\_DN, COFFEES\_DID\_DS, COFFEES\_CID\_CN, COFFEES\_CID\_CM

## Table: COFFEES\_DID\_HID\_CID

Columns: DID, HID, CID

Key: DID\_HID\_CID

FDs: None

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has the three column, MVDs were sought resulting in the following MVD: DID -> -> HID, DID -> -> CID; the table is therefore NOT in the 4NF and must be decomposed.

Decomposition: COFFEES\_DID\_HID, COFFEES, DID\_CID

## Table: COFFEES\_DID\_HID

Columns: DID, HID

Key: DID\_HID

FDs: None

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the table is too small for MVDs, the table is in 4NF

## Table: COFFEES\_DID\_CID

Columns: DID, CID

Key: DID\_CID

FDs: None

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the table is too small for MVDs, the table is in 4NF

## Table: COFFEES\_DID\_DN

Columns: DID, DN

Key: DID

FDs: DID -> DN

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: COFFEES\_DID\_DS

Columns: DID, DS

Key: DID

FDs: DID -> DS

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: COFFEES\_CID\_CN

Columns: CID, CN

Key: CID

FDs: CID -> CN

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: COFFEES\_CID\_CM

Columns: CID, CM

Key: CID

FDs: CID -> CM

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

# Normalization of Projects

Analysis:

Primary key: ID\_PID\_SID

Determined FDs: ID -> MID, ID -> MN, SID -> SN, SN -> SID, MID -> MN, MN -> MID

Minimal cover: ID\_PID\_SID -> PN, ID\_PID\_SN -> SID, ID -> MID, MID -> MN

Other Keys:  None

Normal form: 3NF

Dcomposition: No decomposition needed

NormalizationofCustomers

Analysis:

Primary key:  CID

Determined FDs: CZ -> CC

Minimal cover: CID -> CS\_CNR\_CZ\_CC\_EID, CID -> CN, CZ -> CC

Other Keys: None

Normal form: 2NF

Dcomposition: CUSTOMERS\_CID\_CS\_CNR\_CZ\_CC\_EID, CUSTOMERS\_CID\_CN, CUSTOMERS\_CZ\_CC

## Table: CUSTOMERS\_CID\_CS\_CNR\_CZ\_CC\_EID

Columns: CID, CS, CNR, CZ, CC, EID

Key: CID

FDs: CID -> CS\_CS\_CNR\_CZ\_CC\_EID

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: CUSTOMERS\_CID\_CN

Columns: CID, CN

Key: CID

FDs: CID -> CN

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF

## Table: CUSTOMERS\_CZ\_CC

Columns: CZ, CC

Key: CZ

FDs: CZ -> CC

Normal forms:

* Since all FDs are key FDs, the table is in BCNF
* Since the key has a single column, the table is in 4NF