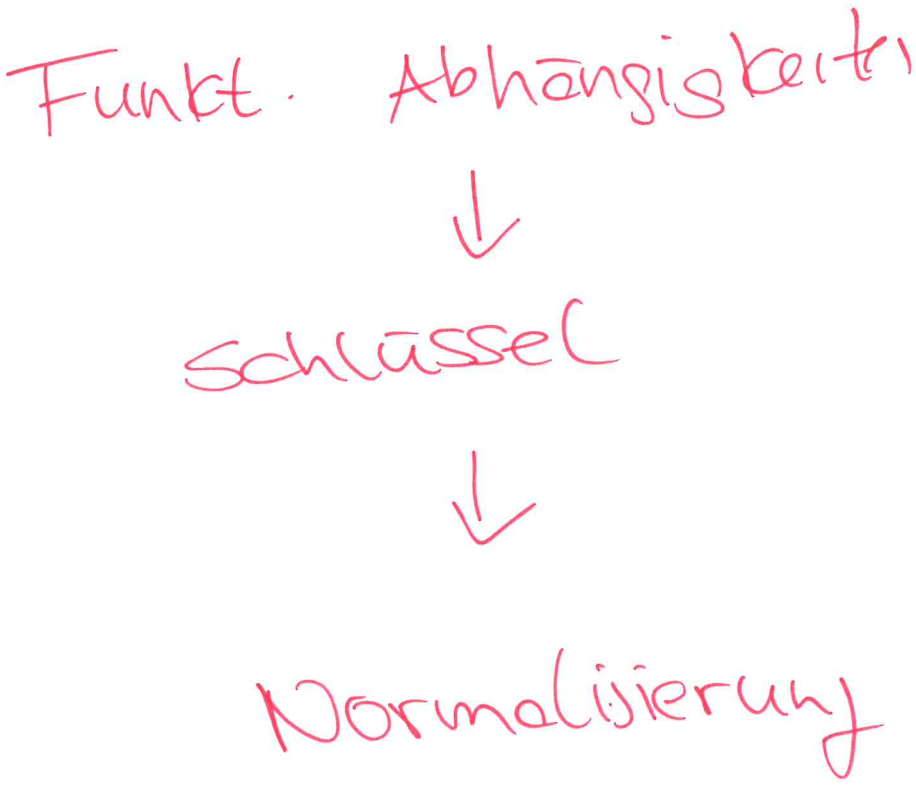

Funkt. Abhängigkeiten
Schlüssel
Normalisierung

$R(a, b, c, d)$

$\{a\}^+ = \{a, c\}$

$\{b\}^+ = \{b\}$

$\{a\}^+ = \{a, b, c\}$

$a \to c$

$b \to c$

$\{d\}^+ = \{d\}$

$a \to b$ ✓

$\leftarrow b \Rightarrow c$ ✓

$\leftarrow a \Rightarrow c$ ✗

$\leftarrow ab \Rightarrow c$

$\leftarrow d \Rightarrow b$

$d \Rightarrow db$

$d \Rightarrow d$

$d \Rightarrow b$

Kanonische Überd.

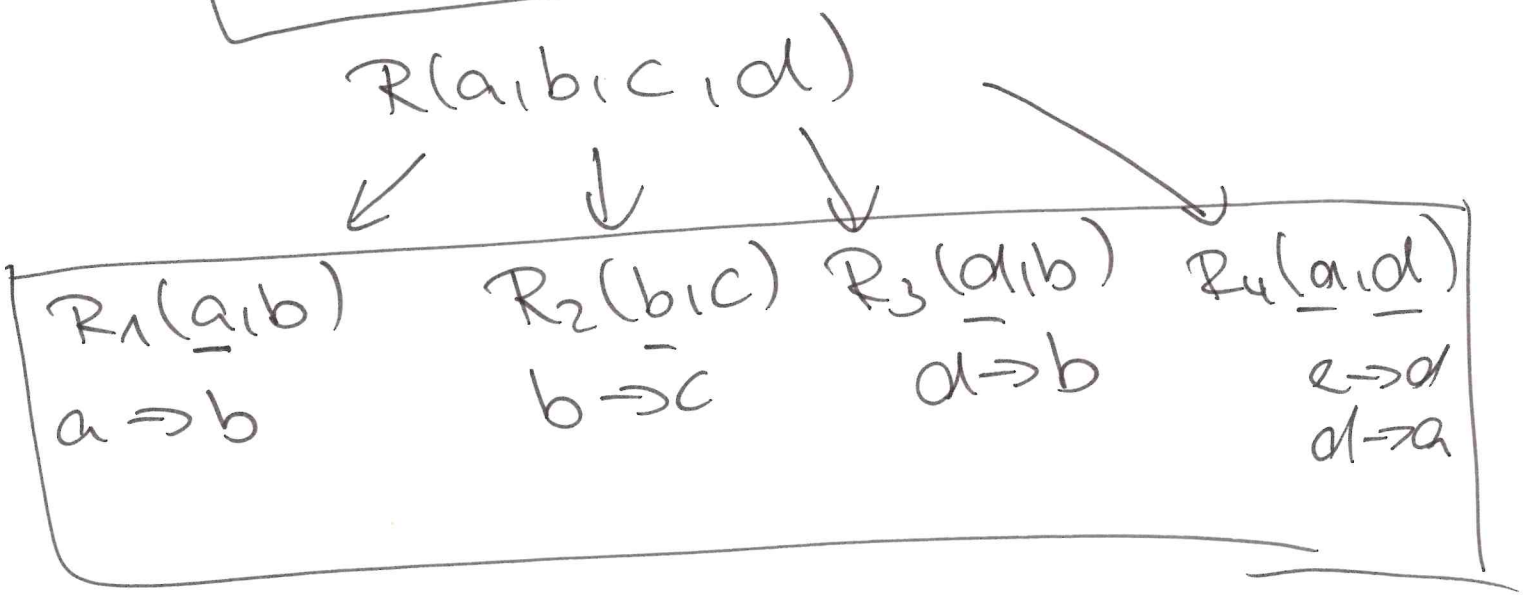
⇒ mögl. kleine Menge finden

① Triviale rausschr. + Doppelte

② (links) mehrdy Singleton kürzbar sind

③ FDs rausschr.

Transformation of Relation in 3NF



3NF

$R(a, b, c, d)$

FDs: $a \to b$

$b \to c$

$d \to b$

Schlüssel: $\{a, d\}$

Schlüssel prime ~~Attr.~~ a, d

$\{a\}^+ = \{a, b, c\}$

$\{b\}^+ = \{b, c\}$

$\{c\}^+ = \{c\}$

$\{d\}^+ = \{d, b, c\}$

① check alle FDs ob linke Seite Schlüssel(t) oder rechte Seite prim

Ⓘ $a \to b$

↳ nicht in 3NF

$\{a, b\}^+ = \{a, b, c\}$

$\{a, c\}^+ = \{a, c, b\}$

$\{a, d\}^+ = \{a, b, c, d\} \in$ Superschlüssel = Kandidatenschl.

$\{b, c\}^+ = \{b, c\}$

$\{b, d\}^+ = \{b, d, c\}$

$\{a, d\}^+ = \{c, d, b\}$

$\{a, b, c\}^+ = \{a, b, c\}$

Superschl. $\Rightarrow \{a, b, d\}^+ = \{a, b, d, c\}$

$\Rightarrow \{a, c, d\}^+ = \{a, c, d, b\}$

$\{b, c, d\}^+ = \{b, c, d\}$

Schlüssel: {PNr, MNr}

FDs: PNr → Name, FS, BNr ⇒ X

BNr → BName

MNr → SName, Semester, SWohn

3NF → Test

R_1 (<u>PNr</u>, Name, FS, BNr)

R_2 (<u>BNr</u>, BName)

R_3 (<u>MNr</u>, SName, Semester, SWohn)

R_4 (<u>PNr</u>, <u>MNr</u>)

$R(A, B, C)$

$A \to B$ $\quad$ $B \to C$

$\{A\}^+ = \{A, B, C\}$

$\{B\}^+ = \{B, C\}$

$\{C\}^+ = \{C\}$

$\{A, C\}^+ = \{A, C, B\}$

$\{A, B\}^+ = \{A, B, C\}$

$\{B, C\}^+ = \{B, C\}$

Superschlüssel: $\{A\}$, $\{A, C\}$, $\{A, B\}$

Kandidatenschlüssel: $\{A\}$

BCNF? $\quad A \to B$ ✓ $\quad B \to C$ ✗

$\{B\}^+ = \{B, C\}$

<<Halle>>

$R_1(\underline{B}, C)$

$B \to C$

Schlüssel $\{B\}$

<<$R_2 - R_1$ + (. Seite>>

$R_2(\underline{A}, B)$

$A \to B$

Schlüssel $\{A\}$

3NF?

3NF

$R_1(A, B)$ $R_2(B, C)$

$R(A, B, C, D, E, F)$

$A \to BC$ $\quad E \to AB$ $\quad CD \to BEF$

$C \to DA$ $\quad F \to CD$

BCNF

Schlüssel:

$\{A\}^+ = \{A, B, C, D, E, F\}$

$\{B\}^+ = \{B\}$

$\{C\}^+ = \{C, D, A, B, E, F\}$

$\{D\}^+ = \{D\}$

$\{E\}^+ = \{A, B, C, D, E, F\}$

$\{F\}^+ = \{C, D, B, E, F, A\}$

$\{B, D\} - \{B, D\}$

Kandidatenschlüssel:

$\{A\}, \{C\}, \{E\}, \{F\}$

BCNF ✓

3NF ✓

stadtl(Ort, Bland, PLZ, E)

① Ort, Bland → E
② PLZ → Bland
③ Bland → PLZ

Schlüssel:

{PLZ}⁺ = {PLZ, Bland}
{Bland}⁺ = {Bland, PLZ}
{Ort}⁺ = {Ort}
{E}⁺ = {E}

{Ort, Bland}⁺ = {Ort, Bland, E, PLZ}
{Ort, PLZ}⁺ = {Ort, PLZ, Bland, E}
{Ort, E}⁺ = {Ort, E}
{Bland, E}⁺ = {Bland, PLZ, E}
⋮

Kandidatenschlüssel:

{Ort, Bland}, {Ort, PLZ}

Prim Attribute:

Ort, Bland, PLZ

3NF

① → ✓
② → ✓
③ → ✓

BCNF

① ✓

② X

MP → Blood

$\{MP\}^+ = \{MP, Blood\}$

$S_1(\underline{MP}, \underline{Blood})$ MP → Blood, Blood → MP

$S_2(\underline{Ort}, E, \underline{MP})$ Ort, MP → E