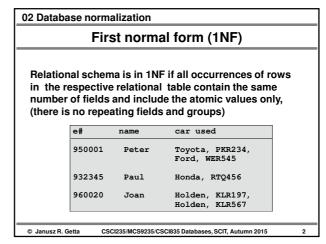
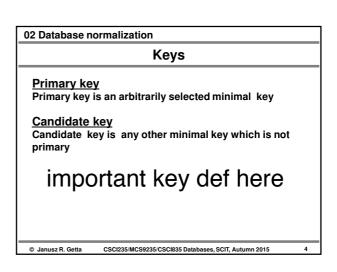
http://www.rlvision.com/blog/method-for-determining-candidate-keys-and-highest-normal-form-of-a-relation-based-on-functional-dependencies/



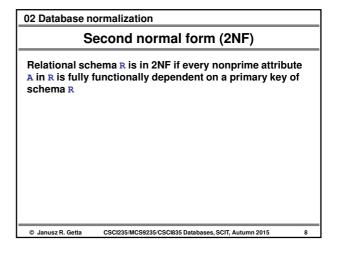


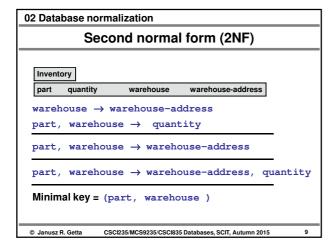


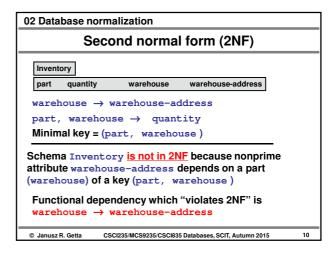
Functional dependencies and keys Let R = (A₁, ..., A_n) be a relational schema (a header of relational table) and let X, Y be nonempty subsets of R such that X ∪ Y = R (1) If X → Y is valid in R then X is a key (!!!) (2) If X is a key then X → Y is valid in R

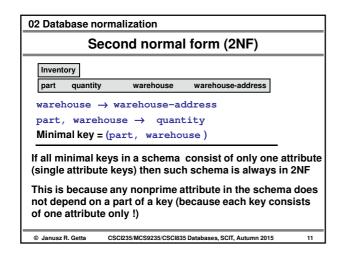
02 Database normalization	
Attributes	
Prime attribute Prime attribute is an attribute from relational schema R which is a member of at least one candidate key in R Nonprime attribute Nonprime attribute is an attribute which is a not prime	
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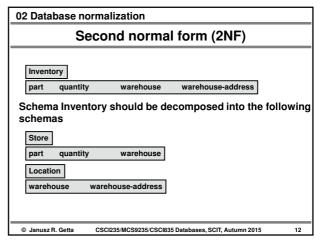
Full and partial functional dependencies Full functional dependency Full functional dependency is a functional dependency X → Y such that removal of any attribute A from X causes that (X-A) → Y Partial functional dependency Partial functional dependency Partial functional dependency is a functional dependency which is not full

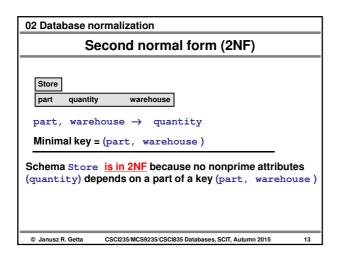


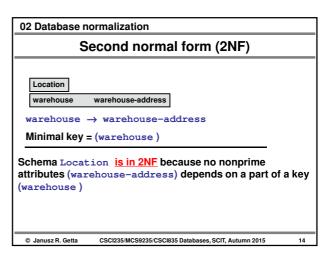


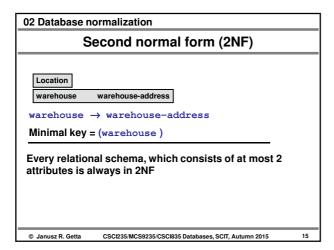


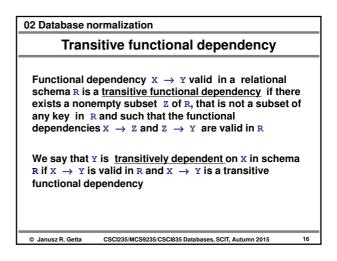




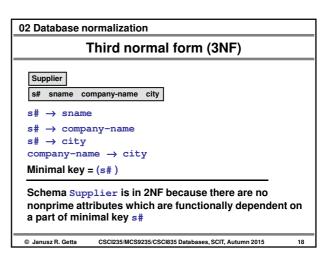


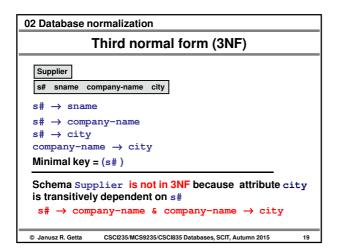


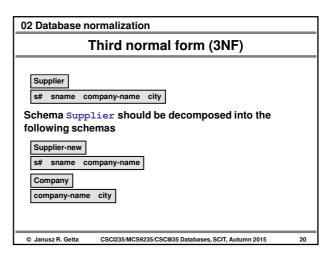


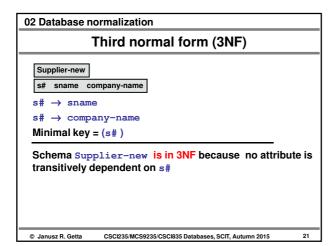


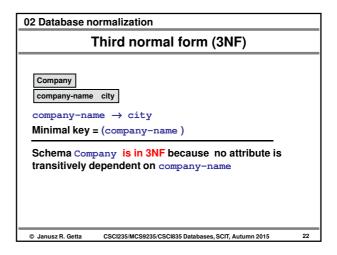
Third normal form (3NF) Relational schema R is in 3NF if it is in 2NF and no nonprime attribute of R is transitively dependent on the primary key © Janusz R. Getta CSCI235/MCS9235/CSCI835 Databases, SCIT, Autumn 2015 17











Third normal form (3NF)

Company

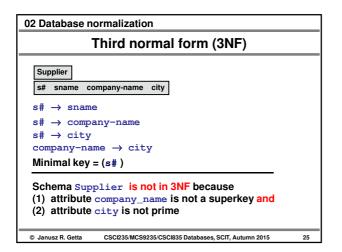
company-name city

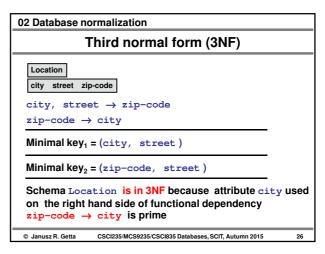
company-name → city

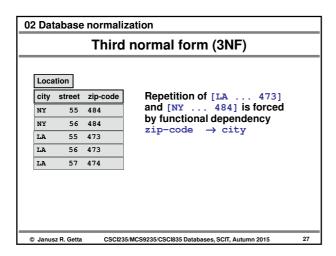
Every relational schema, which consists of at most 2 attributes is always in 3NF

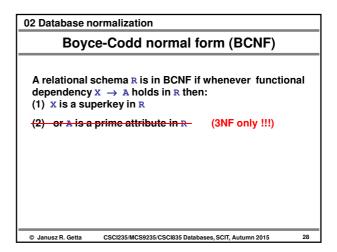
Third normal form (3NF)

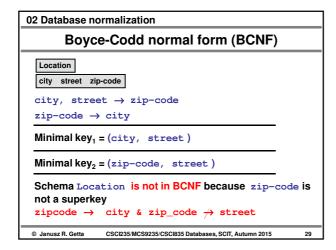
Alternative definition
A relational schema R is in 3NF if whenever a functional dependency X → A is valid in R then either:
(1) X is a superkey in R, or
(2) A is a prime attribute in R

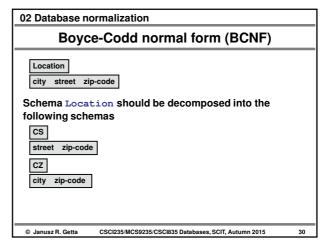


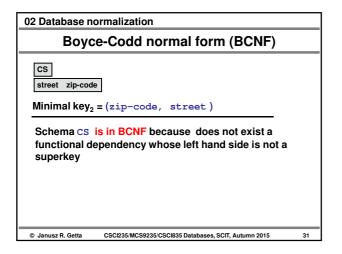


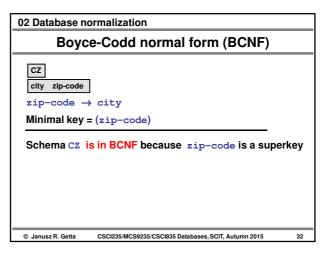


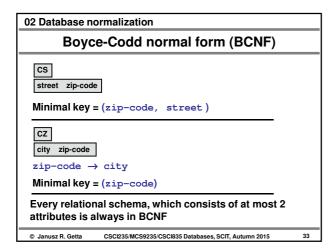


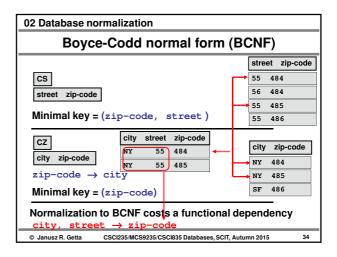




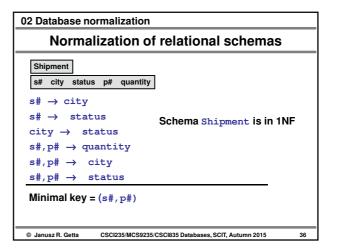


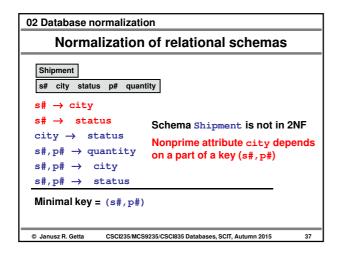


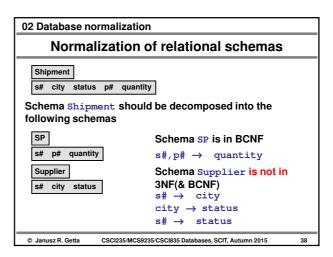


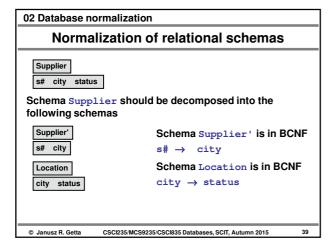


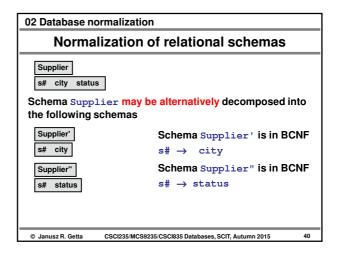
 $\begin{tabular}{ll} \hline \textbf{Normalization of relational schemas} \\ \hline \textbf{R} &= \{ & \textbf{A}_1, & \dots, & \textbf{A}_n \} \\ \hline \textbf{Identify all functional dependencies} \\ \hline \textbf{Use functional dependencies to derive all minimal keys} \\ \hline \textbf{Use functional dependencies and minimal keys to identify the highest normal form satisfied by R} \\ \hline \textbf{Decompose R into the schemas in BCNF (3NF)} \\ \hline \end{tabular}$











References Elmasri R., Navathe S. B., Fundamentals of Database Systems, chapters 10.3,10.4,10.5 R. Ramakrishnan, J. Gehrke Database Management Systems, chapters 19.2, 19.3