PERANCANGAN BASIS DATA LANJUT

TUJUAN PEMBELAJARAN

- MENGENAL KARAKTERISTIK BASIS DATA YANG BAIK
- MENGENAL VARIAN DALAM PERANCANGAN BASIS DATA
- MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK
- MENERAPKAN NORMALISASI

KARAKTERISTIK BASIS DATA YANG BAIK

- STRUKTUR BASIS DATA (TABEL-TABEL DAN RELASI ANTAR TABLE) YANG LEBIH KOMPAK.
- STRUKTUR MASING-MASING TABEL YANG LEBIH EFISIEN DAN SISTEMATIS
- KEBUTUHAN RUANG PENYIMPANAN DATA YANG LEBIH EFISIEN
- SEMAKIN KECIL (EFISIEN) UKURAN TABEL, MAKA SEMAKIN CEPAT OPERASI BASIS DATA YANG DILAKUKAN
- EFISIENSI TERSEBUT DITANDAI DENGAN REDUDANSI YANG OPTIMAL DAPAT MENINGKATKAN INTEGRITAS DATA
- TIDAK ADA AMBIGUITAS DATA DI SEMUA TABLE DALAM BASIS DATA.

VARIAN DALAM PERANCANGAN BASIS DATA

- ATRIBUT TABLE
  1. KEY DAN ATRIBUT DESKRIPTIF
  2. ATRIBUT SEDERHANADAN ATRIBUT KOMPOSIT
  3. ATRIBUT BERNILAI TUNGGAL DAN ATRIBUT BERNILAI BANYAK
  4. ATRIBUT HARUS BERNILAI DAN NILAI NULL
  5. ATRIBUT TURUNAN

VARIAN DALAM PERANCANGAN BASIS DATA

- VARIAN ENTITAS
  1. ENTITAS KUAT/BEBAS (STRONG EMTITY SETS)
  2. ENTITAS LEMAH (WEAK ENTITY SETS)
  3. SUB ENTITAS

VARIAN DALAM PERANCANGAN BASIS DATA

- VARIAN RELASI
  1. RELASI TUNGGAL (UNARY RELATION)
  2. RELASI MULTI ENTITAS (N-ARY RELATION)
  3. RELASI GANDA (REDUNDANT RELATION)

VARIAN DALAM PERANCANGAN BASIS DATA

- SPESIALISASI DAN GENERALISASI
- AGREGASI

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- ENTITAS KUAT/BEBAS
- RELASI SATU KE SATU

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- RELASI SATU KE BANYAK
- RELASI BANYAK KE BANYAK

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- ENTITAS LEMAH DAN SUB ENTITAS

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- RELASI TUNGGAL

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- RELASI MULTI ENTITAS

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- SPESIALISASI DAN GENERALISASI

MENGENAL TRANSFORMASI MODEL DATA KE BASIS DATA FISIK

- AGREGASI

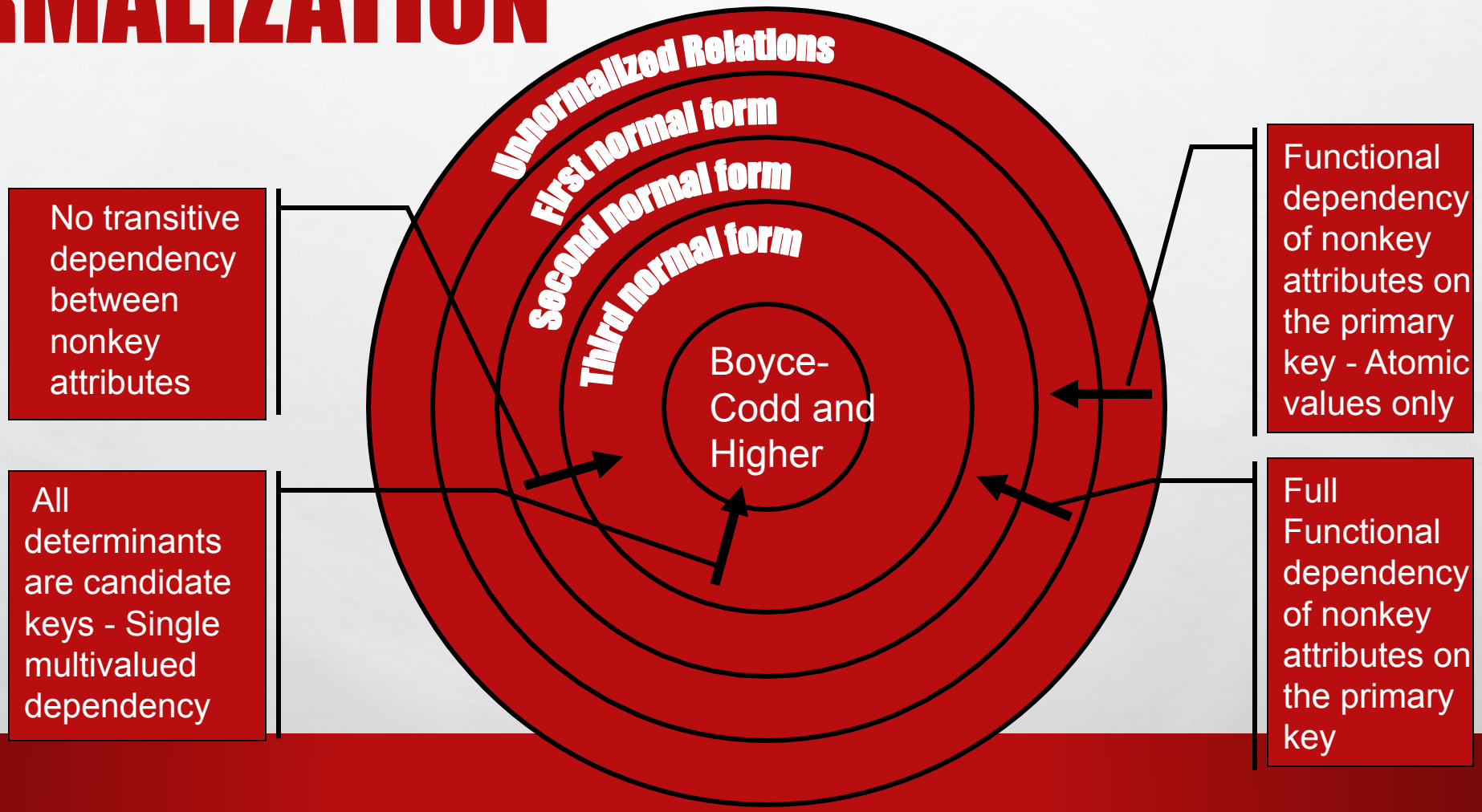
NORMALIZATION

- NORMALIZATION THEORY IS BASED ON THE OBSERVATION THAT RELATIONS WITH CERTAIN PROPERTIES ARE MORE EFFECTIVE IN INSERTING, UPDATING AND DELETING DATA THAN OTHER SETS OF RELATIONS CONTAINING THE SAME DATA
- NORMALIZATION IS A MULTI-STEP PROCESS BEGINNING WITH AN "UNNORMALIZED" RELATION
  - HOSPITAL EXAMPLE FROM ATRE, S. *DATA BASE: STRUCTURED TECHNIQUES FOR DESIGN, PERFORMANCE, AND MANAGEMENT.*

NORMAL FORMS

- FIRST NORMAL FORM (1NF)
- SECOND NORMAL FORM (2NF)
- THIRD NORMAL FORM (3NF)
- BOYCE-CODD NORMAL FORM (BCNF)
- FOURTH NORMAL FORM (4NF)
- FIFTH NORMAL FORM (5NF)

NORMALIZATION



UNNORMALIZED RELATIONS

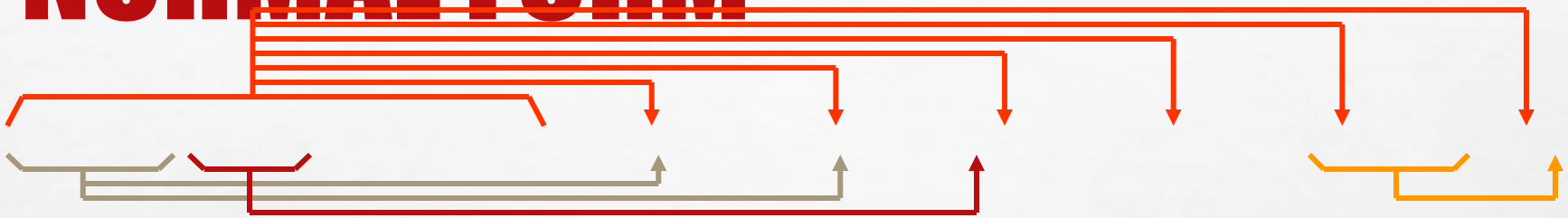
- FIRST STEP IN NORMALIZATION IS TO CONVERT THE DATA INTO A TWO-DIMENSIONAL TABLE
- IN UNNORMALIZED RELATIONS DATA CAN REPEAT WITHIN A COLUMN

UNNORMALIZED RELATION

FIRST NORMAL FORM

- TO MOVE TO FIRST NORMAL FORM A RELATION MUST CONTAIN ONLY ATOMIC VALUES AT EACH ROW AND COLUMN.
  - NO REPEATING GROUPS
  - A COLUMN OR SET OF COLUMNS IS CALLED A CANDIDATE KEY WHEN ITS VALUES CAN UNIQUELY IDENTIFY THE ROW IN THE RELATION.

FIRST NORMAL FORM



SECOND NORMAL FORM

- A RELATION IS SAID TO BE IN SECOND NORMAL FORM WHEN EVERY NONKEY ATTRIBUTE IS FULLY FUNCTIONALLY DEPENDENT ON THE PRIMARY KEY.
  - THAT IS, EVERY NONKEY ATTRIBUTE NEEDS THE FULL PRIMARY KEY FOR UNIQUE IDENTIFICATION

SECOND NORMAL FORM

SECOND NORMAL FORM

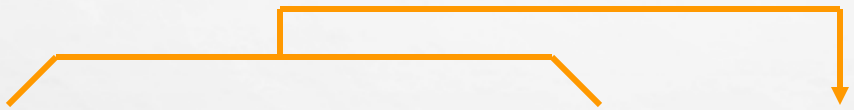
SECOND NORMAL FORM

THIRD NORMAL FORM

- A RELATION IS SAID TO BE IN THIRD NORMAL FORM IF THERE IS NO TRANSITIVE FUNCTIONAL DEPENDENCY BETWEEN NONKEY ATTRIBUTES
  - WHEN ONE NONKEY ATTRIBUTE CAN BE DETERMINED WITH ONE OR MORE NONKEY ATTRIBUTES THERE IS SAID TO BE A TRANSITIVE FUNCTIONAL DEPENDENCY.
- THE SIDE EFFECT COLUMN IN THE SURGERY TABLE IS DETERMINED BY THE DRUG ADMINISTERED
  - SIDE EFFECT IS TRANSITIVELY FUNCTIONALLY DEPENDENT ON DRUG SO SURGERY IS NOT 3NF

THIRD NORMAL FORM

THIRD NORMAL FORM



BOYCE-CODD NORMAL FORM

- MOST 3NF RELATIONS ARE ALSO BCNF RELATIONS.
- A 3NF RELATION IS NOT IN BCNF IF:
  - CANDIDATE KEYS IN THE RELATION ARE COMPOSITE KEYS (THEY ARE NOT SINGLE ATTRIBUTES)
  - THERE IS MORE THAN ONE CANDIDATE KEY IN THE RELATION, AND
  - THE KEYS ARE NOT DISJOINT, THAT IS, SOME ATTRIBUTES IN THE KEYS ARE COMMON

BCNF RELATIONS

FOURTH NORMAL FORM

- ANY RELATION IS IN FOURTH NORMAL FORM IF IT IS BCNF *AND* ANY MULTIVALUED DEPENDENCIES ARE TRIVIAL
- ELIMINATE NON-TRIVIAL MULTIVALUED DEPENDENCIES BY PROJECTING INTO SIMPLER TABLES

FIFTH NORMAL FORM

- A RELATION IS IN 5NF IF EVERY JOIN DEPENDENCY IN THE RELATION IS IMPLIED BY THE KEYS OF THE RELATION
- IMPLIES THAT RELATIONS THAT HAVE BEEN DECOMPOSED IN PREVIOUS NF CAN BE RECOMBINED VIA NATURAL JOINS TO RECREATE THE ORIGINAL RELATION.

NORMALIZATION

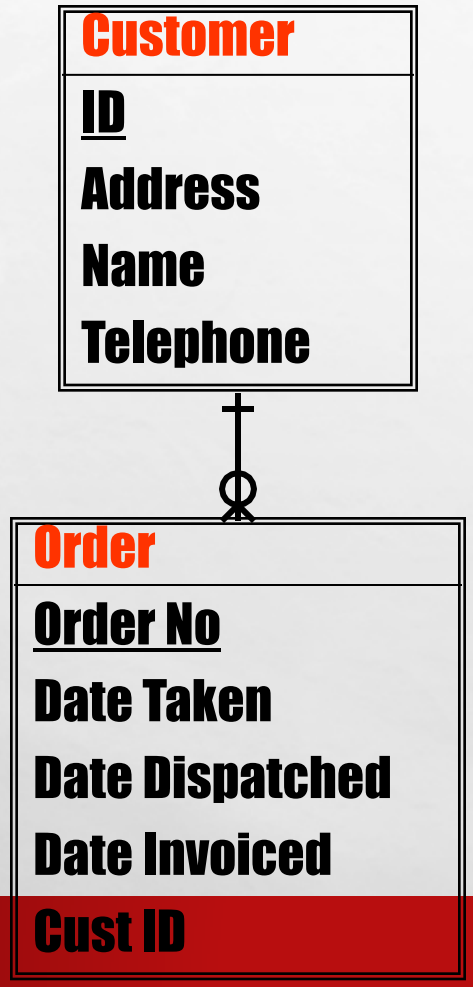
- NORMALIZATION IS PERFORMED TO REDUCE OR ELIMINATE INSERTION, DELETION OR UPDATE ANOMALIES.
- HOWEVER, A COMPLETELY NORMALIZED DATABASE MAY NOT BE THE MOST EFFICIENT OR EFFECTIVE IMPLEMENTATION.
- “DENORMALIZATION” IS SOMETIMES USED TO IMPROVE EFFICIENCY.

DENORMALIZATION

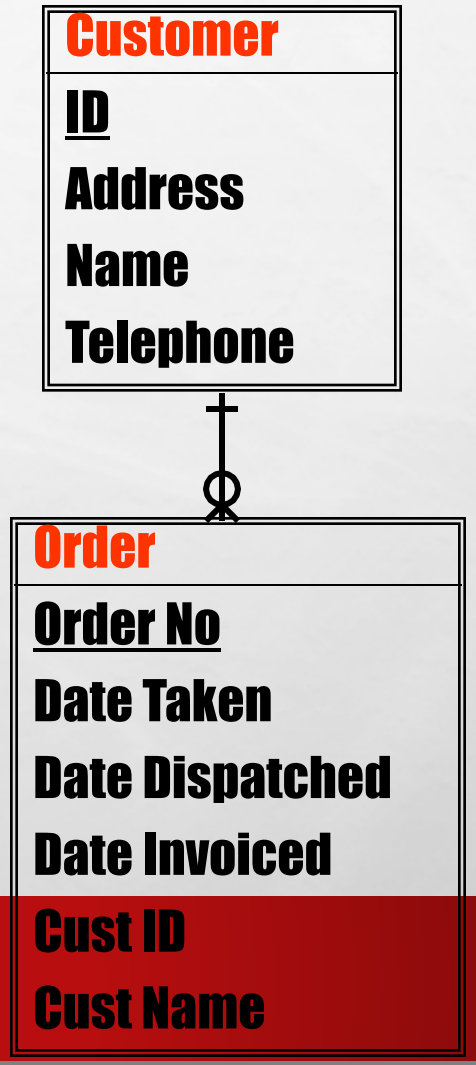
- USUALLY DRIVEN BY THE NEED TO IMPROVE QUERY SPEED
- QUERY SPEED IS IMPROVED AT THE EXPENSE OF MORE COMPLEX OR PROBLEMATIC DML (DATA MANIPULATION LANGUAGE) FOR UPDATES, DELETIONS AND INSERTIONS.

DOWNWARD DENORMALIZATION

Before:



After:



UPWARD DENORMALIZATION