

3NF CONSULTING, INC.

Hudson River Psychiatric Center and 3NF Consulting, Inc.

present

**Developing Cross-Departmental
Database Applications**

with the

HRPC Patient and Staff Management System

Ward/Unit

Design

Doctors

- Group the analysis results into collections of attributes and then form entities.
- Normalize those entities (tables)
 - We first need to identify the functional dependencies **within** the entities so we know how to decompose large tables into normalized smaller ones.

Medical
Records

Patients

Staff

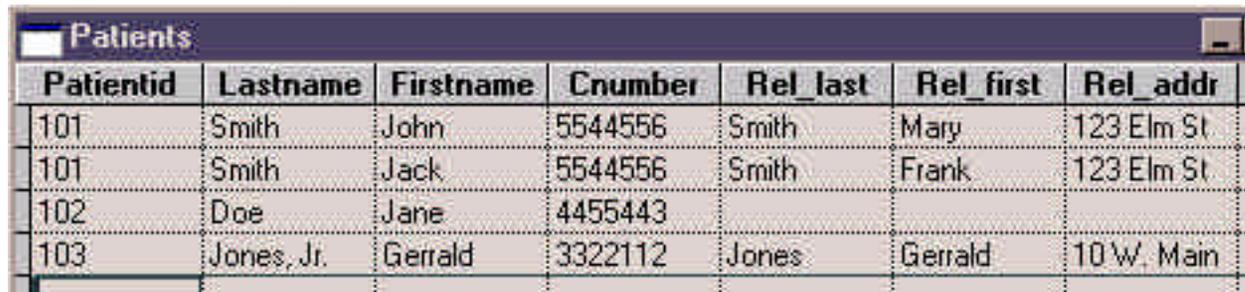
Design

- Determine the functional dependencies within the tables
 - patientId --> C number, name, gender, DOB, ward/unit, Medicaid number, etc.
 - Note: patientID **does not** functionally determine relative values because there can be many relatives per patient.
 - staffId --> name, position, shift, FTE, seniority date, tier, etc.
 - Note: staffID **does not** functionally determine URC values.

Design

- Unnormalized Patient attributes

Unnormalized patients table with relatives



Patientid	Lastname	Firstname	Cnumber	Rel_last	Rel_first	Rel_addr
101	Smith	John	5544556	Smith	Mary	123 Elm St
101	Smith	Jack	5544556	Smith	Frank	123 Elm St
102	Doe	Jane	4455443			
103	Jones, Jr.	Gerrald	3322112	Jones	Gerrald	10 W. Main

Problems

Duplicate person record needed to store both relatives

Inconsistent first names for the same person

We cannot delete Gerrald Jones, Jr.'s relative without deleting Gerrald himself

Design

- Decompose by functional dependencies and their determinants to form normalized tables

Normalized Patients table and Relatives table

← There is still a problem here.

Patients			
Patientid	Lastname	Firstname	Cnumber
101	Smith	John	5544556
102	Doe	Jane	4455443
103	Jones, Jr.	Gerrald	3322112

Relative				
Patientid	Relativeid	Rel_last	Rel_first	Rel_addr
101	R01	Smith	Mary	123 Elm St
101	R02	Smith	Frank	123 Elm St
103	R03	Jones	Gerrald	10 W. Main

Tables broken up by similar items and related with a common key (PatientID). PatientID is the primary key of the Patients table. It's a foreign key in the Relative table which lets us connect relatives to patients.

Design

- Identify the primary key for each table
 - definition: an attribute (column) or collection of attributes that uniquely identifies every row in the table.
- Associate the tables with foreign key-primary key relationships.
 - definition: an attribute or collection of attributes in one table which must exist in another table or be null.

Design

- Normal forms
 - Measure of the degree of normalization of your database
 - More normalized = Higher data integrity
 - Higher data integrity = LESS ERRORS
 - Third normal form is the goal of every database

Design

Third Normal Form:

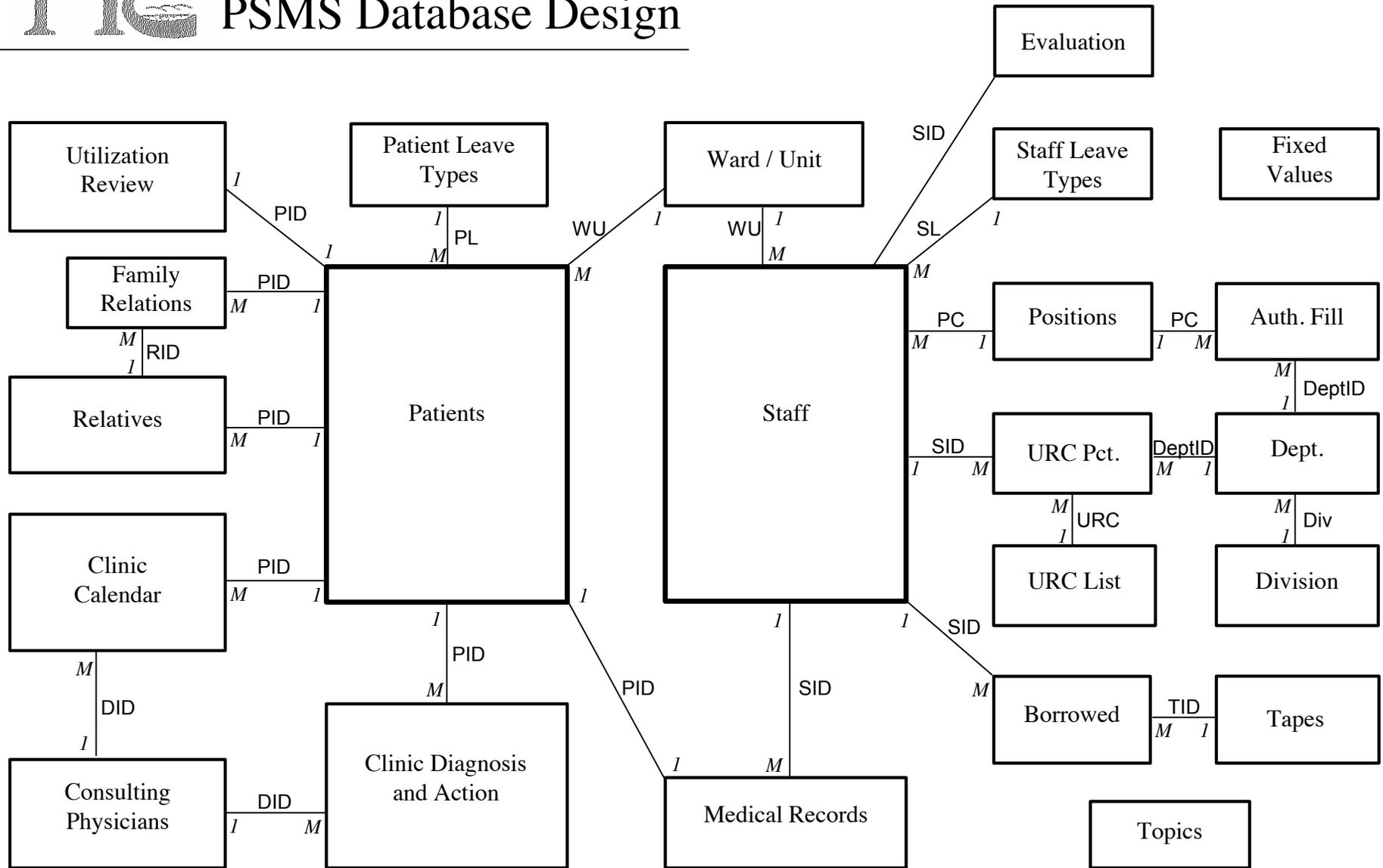
**All attributes (columns)
are dependent on the key,
the whole key, and nothing
but the key. (So help me,
Codd!)**

Design

- Relationships and E-R diagrams
 - Document the relationships between the tables (which are represented through your primary and foreign keys) with an Entity-Relationship diagram.
 - Rectangles for the entities (tables)
 - Lines for the relationships
 - Labels on the lines to document the primary key / foreign key links



PSMS Database Design



Design

- Check constraints
 - Used to enforce legal data entry values
 - In a SQL create table statement:
 - `Shift varchar(7) default 'Day'`
`check (Shift='Day' or`
`Shift='Evening' or Shift='Night')`
- Iterations and changes
 - Filters back to earlier design steps.
 - Applications are never done, they're just due.