Database Essentials
for Healthcare Finance Professionals

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Learning Objectives

- Understand the different data types that can assigned.
- Understand the basics of database tables and relationships.
- Understand how to retrieve data from a database system.

Defining Data

- Specific for each field or column in a table.
- Set the type and size of data.
- Helps to provide data integrity and consistency.

Data Types

Text

Numbers

Date & Time

Boolean

Binary

Text

When to Use Text

- Any combination of letters, numbers, or symbols
- Numbers that won't be used in calculations
  - Social Security Numbers
    - 123456789
  - Medical Record Numbers
    - 0123456789
  - HCPCS/CPT Codes
    - 00520
    - J9041

Numbers

- Integer
  - Natural/Whole numbers
  - Can be positive or negative
  - Example - Quantity
- Decimal
  - Defined precision - total digits
  - Defined scale - digits to right of decimal
  - Example - Money

Date & Time

- Date (YYYY-MM-DD)
- Time (hh:mm:ss.nnn AM/PM)
- Datetime (YYYY-MM-DD hh:mm:ss.nnn AM/PM)
  - Admission/Discharge

Boolean

- 1 or 0
- Yes or No
- True or False

- Active or Inactive CDM Number
- Billable or Non-billable Supply

Binary

- Used to store large amounts of data including:
  - Very Long Text Strings - when you copy & paste a resume or cover letter into a job application website.
  - Media - pictures, audio, video, etc.
  - Files - PDFs, Excel, etc.

1500

HEALTH INSURANCE CLAIM FORM

APPROVED BY NATIONAL UNIFORM CLAIM COMMITTEE 08/05

PICA

PICA

1. MEDICARE (Medicare #) / MEDICAID (Medicaid #) / TRICARE CHAMPUS (Sponsor's SSN) / CHAMPVA (Member ID#) / GROUP HEALTH PLAN (SSN or ID) / FECA BLK LUNG (SSN) / OTHER (ID)	1a. INSURED'S I.D. NUMBER (For Program in Item 1)	
2. PATIENT'S NAME (Last Name, First Name, Middle Initial)	3. PATIENT'S BIRTH DATE MM | DD | YY SEX M F	4. INSURED'S NAME (Last Name, First Name, Middle Initial)
5. PATIENT'S ADDRESS (No., Street)	6. PATIENT RELATIONSHIP TO INSURED Self Spouse Child Other	7. INSURED'S ADDRESS (No., Street)
CITY / STATE	8. PATIENT STATUS Single Married Other Employed Full-Time Student Part-Time Student	CITY / STATE
ZIP CODE / TELEPHONE (Include Area Code) ( )		ZIP CODE / TELEPHONE (Include Area Code) ( )
9. OTHER INSURED'S NAME (Last Name, First Name, Middle Initial)	10. IS PATIENT'S CONDITION RELATED TO:	11. INSURED'S POLICY GROUP OR FECA NUMBER
a. OTHER INSURED'S POLICY OR GROUP NUMBER	a. EMPLOYMENT? (Current or Previous) YES NO	a. INSURED'S DATE OF BIRTH MM | DD | YY SEX M F
b. OTHER INSURED'S DATE OF BIRTH MM | DD | YY SEX M F	b. AUTO ACCIDENT? YES NO PLACE (State)	b. EMPLOYER'S NAME OR SCHOOL NAME
c. EMPLOYER'S NAME OR SCHOOL NAME	c. OTHER ACCIDENT? YES NO	c. INSURANCE PLAN NAME OR PROGRAM NAME
d. INSURANCE PLAN NAME OR PROGRAM NAME	10d. RESERVED FOR LOCAL USE	d. IS THERE ANOTHER HEALTH BENEFIT PLAN? YES NO If yes, return to and complete item 9 a-d.

A. Text	B. Integer	C. Decimal	D. Datetime	E. Date
F. Time	G. Boolean	H. Binary		

Databases

Online Transaction Processing (OLTP)

- Operations
- Production
- Realtime Processing
- Normalized

Online Analytical Processing (OLAP)

- Reporting
- Data Warehouse
- Batch Processing
- Pre-summarized
- Big Data

Database Design

- Normalization
- Tables
- Data Relationships
  - One to One
  - One to Many
  - Many to Many

Normalization

Separating data into the smallest useful parts.

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Normalization

Bradley (Brad) C. Adams, CPA

Field Name	Value	Data Type
First Name	Bradley	Text
Last Name	Adams	Text
Middle Name	C.	Text
Preferred Name	Brad	Text
Suffix	CPA	Text

Normalization

1301 Medical Center Drive
The Vanderbilt Clinic Suite 4605
Nashville, TN 37232

Field Name	Value	Data Type
Address 1	1301 Medical Center Drive	Text
Address 2	The Vanderbilt Clinic Suite 4605	Text
City	Nashville	Text
State	TN	Text
Postal Code	37232	Text

Tables

Field Name	Data Type
First Name	Text
Last Name	Text
Middle Name	Text
Preferred Name	Text
Suffix	Text
Title	Text
Department	Text
Company	Text

Field Name	Data Type
Address 1	Text
Address 2	Text
City	Text
State	Text
Postal Code	Text
Phone	Text
E-mail	Text

Primary Keys

- Uniquely identify a record
- Can not be repeated or duplicated
- Commonly a sequential integer unique only to that database
- Can be a combination of fields

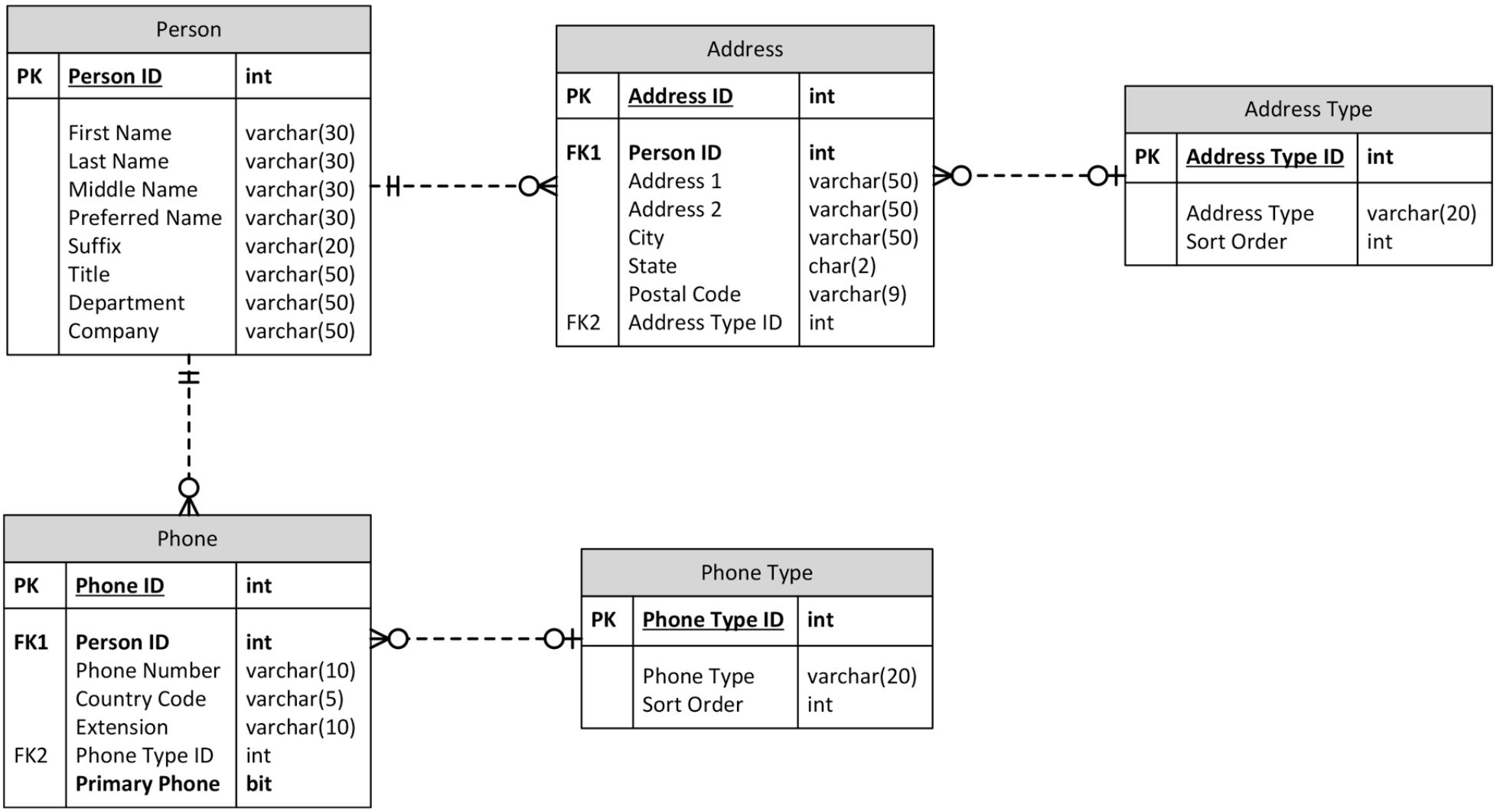
Field Name	Data Type
Unique Identifier (PK)	???
First Name	Text
Last Name	Text
Middle Name	Text
Preferred Name	Text
Suffix	Text
Title	Text
Department	Text
Company	Text

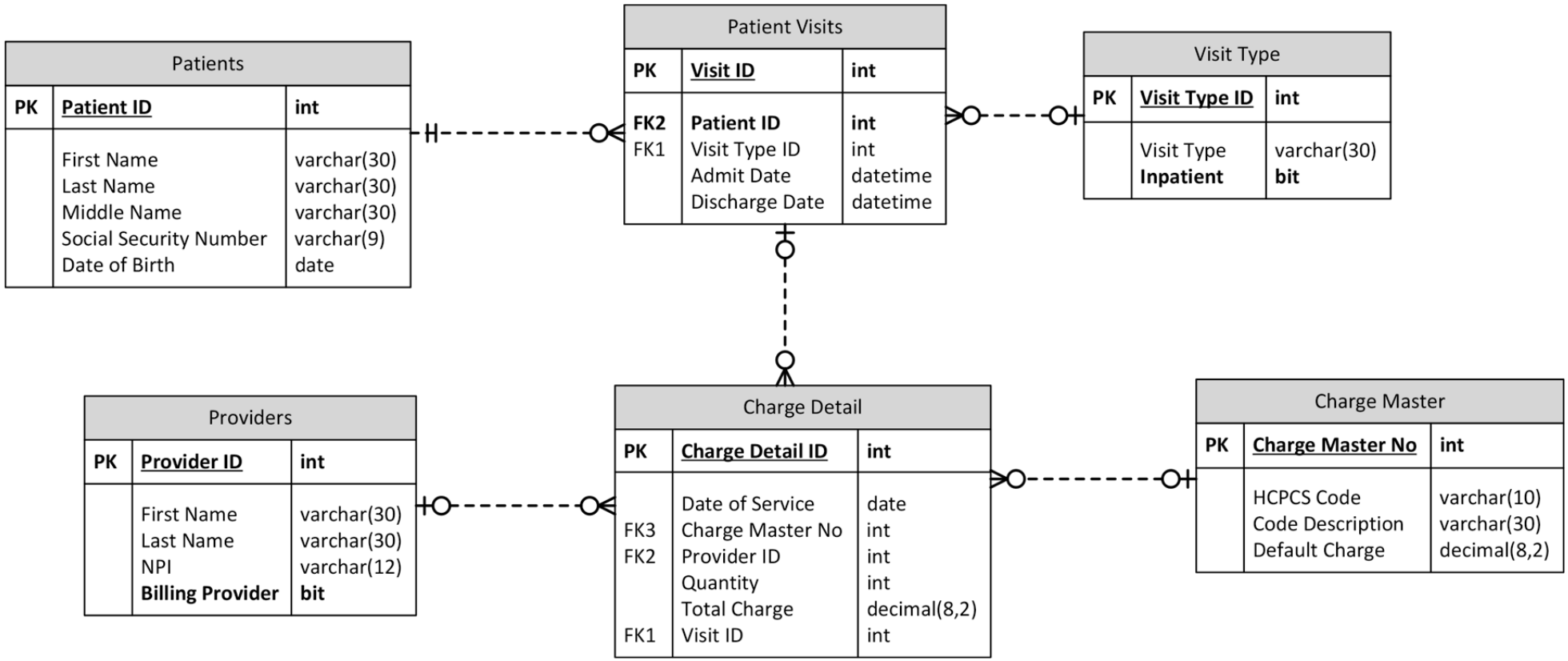
Good or Bad

- Phone Number
- Employee ID (auto generated)
- Social Security Number
- HCPCS Code
- Patient ID *and* Date of Service
- Clinic ID

Data Relationships

- One to Many or Zero to Many
  - Primary Care Provider - A patient can have one and only one PCP; a PCP can have many patients
- One to One and Zero to One
  - Spouses - you can none or one and only one spouse and that spouse can have only one spouse
- Many to Many
  - Patients - A patient can have many providers and a patient can have many providers


Person
PK
Person ID
int
First Name
varchar(30)
Last Name
varchar(30)
Middle Name
varchar(30)
Preferred Name
varchar(30)
Suffix
varchar(20)
Title
varchar(50)
Department
varchar(50)
Company
varchar(50)
Address
PK
Address ID
int
FK1
Person ID
int
Address 1
varchar(50)
Address 2
varchar(50)
City
varchar(50)
State
char(2)
Postal Code
varchar(9)
FK2
Address Type ID
int
Address Type
PK
Address Type ID
int
Address Type
varchar(20)
Sort Order
int
Phone
PK
Phone ID
int
FK1
Person ID
int
Phone Number
varchar(10)
Country Code
varchar(5)
Extension
varchar(10)
FK2
Phone Type ID
int
Primary Phone
bit
Phone Type
PK
Phone Type ID
int
Phone Type
varchar(20)
Sort Order
int


Patients
PK
Patient ID
int
First Name
Last Name
Middle Name
Social Security Number
Date of Birth
varchar(30)
varchar(30)
varchar(30)
varchar(9)
date
Patient Visits
PK
Visit ID
int
FK2
FK1
Patient ID
Visit Type ID
Admit Date
Discharge Date
int
int
datetime
datetime
Visit Type
PK
Visit Type ID
int
Visit Type
Inpatient
varchar(30)
bit
Providers
PK
Provider ID
int
First Name
Last Name
NPI
Billing Provider
varchar(30)
varchar(30)
varchar(12)
bit
Charge Detail
PK
Charge Detail ID
int
Date of Service
FK3
Charge Master No
FK2
Provider ID
Quantity
Total Charge
FK1
Visit ID
date
int
int
int
decimal(8,2)
int
Charge Master
PK
Charge Master No
int
HCPCS Code
Code Description
Default Charge
varchar(10)
varchar(30)
decimal(8,2)

Database Actions

- Insert a Record - creating or adding a new row
- Delete a Record - removing a row
- Update a Record - changing the value of one or more fields in a record
  - The database will acutally delete the existing record and insert a new one with the same primary key value
- Select a Record - retrieve a record or records from the database

Structured Query Language (SQL)

- Pronounced *Sequel* or *See-Quill*
- (Mostly) common syntax used to perform database actions.
- Often created in the background by a drag-and-drop Graphical User Interface (GUI)

Select

SELECT <Field Names separated by a comma>

FROM <Table Name>

SELECT First Name, Last Name, Title, Department, Company

FROM Persons

Criteria (Where)

SELECT <Field Names separated by a comma>

FROM <Table Name>

WHERE <Field Name> **=** <value>

SELECT First Name, Last Name, Title, Department, Company

FROM Persons

WHERE Last Name **=** Adams

Criteria (Where)

Exact Match	= (Equals)
Partial Match	Like
Range	Between
Inequality	> >= <= <
List of Values	In

Wild Cards

Multiple Characters

- %
- *

Single Character

- _ (underscore)
- ? (question mark)

Criteria (Where)

SELECT First Name, Last Name, Title, Department, Company

FROM Persons

WHERE Last Name **Like** %Adam%

Criteria (Where)

SELECT Charge Master Number, Quantity, Total Charge

FROM Charge Detail

WHERE Date of Service **BETWEEN** 4/1/2013 **AND** 4/30/2013

Aggregation

SELECT Field Names, **Aggregate Function**(Field Name)

FROM Table Name

GROUP BY (Field Names that aren't part of the aggregate)

SELECT Charge Master Number, SUM(Quantity), SUM(Total Charge)

FROM Charge Detail

GROUP BY Charge Master Number

Select
(from multiple tables)

SELECT <Field Names separated by a comma>

FROM <Table Name 1> **INNER JOIN** <Table Name 2>

ON <Field from Table 1> = <Field from Table 2>

SELECT HCPCS Code, Quantity

FROM Charge Detail **INNER JOIN** Charge Master

ON Charge Master No = Charge Master No

Indexes

- Created on fields where are frequenly used as conditions in select statements.
- Helps to improve speed of data returned and reduce system load.
- Can include additional information which is often requested with a specific criteria.
- Automatically created on primary keys in most database systems.