Database and Data Modeling Concepts

Database and Data Modeling Concepts

Who I am: Joseph Gohlke (Ben's dad)

Education: UCF, BS Computer Science

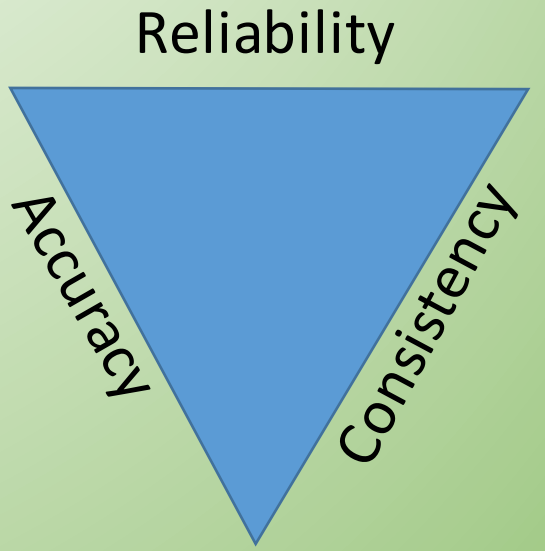
Experience: almost 30 years in industry

- 10+ years - Telephone Billing, mostly writing DB access jobs
- 5 years - other
- 15 years – DOD, Military simulation

Database and Data Modeling Concepts

Why have a Database?

- Data Persistence
- Data Integrity
  - Transaction Scope (Atomic Transactions)
    - Commit
    - Rollback (bank – money transfer from account to account)
- Locking/Semaphores
- Multi-user data access/update



Database and Data Modeling Concepts

- What is a database?
  - Files
  - Running Application
- What is a database made up of:
  - Schema – Owner
  - Database Objects
    - Tables
    - Columns
    - Unique Constraints
    - Primary Keys
    - Foreign Keys, No orphans
      - Creating a child with no parent
      - Deleting a parent that has children
    - Indexes – mostly for Performance

Database and Data Modeling Concepts

Structured Query Language (SQL)

Originally based upon relational algebra and tuple relational calculus, SQL consists of a data definition language and a data manipulation language. The scope of SQL includes data insert, query, update and delete, schema creation and modification, and data access control. Although SQL is often described as, and to a great extent is, a declarative language (4GL), it also includes procedural elements.

Definition from Wikipedia

Database and Data Modeling Concepts

Table:

IRON_YARD_ORL_USER_ACCESS

USER_NAME	String
LAST_LOGIN	Date

USER_NAME	***LAST_LOGIN***
jgohlke	July 5, 2015
bgohlke	July 6, 2015

Database and Data Modeling Concepts

```
select USER_NAME from IRON_YARD_ORL_USER_ACCESS;

     USER_NAME
     -----------
     jgohlke
     bgohlke

select USER_NAME, LAST_LOGIN from IRON_YARD_ORL_USER_ACCESS;

     USER_NAME   LAST_LOGIN
     ----------- -----------
     jgohlke     July 5, 2015
     bgohlke     July 6, 2015
```

Database and Data Modeling Concepts

1st Normal Form – Domain of the attribute is atomic and each value is only 1 item

Each attribute is dependent on the full key of the table.
No attribute is dependent on a subset of the full table key.

Master Record – Iron Yard Guest Contact

Key	***Sex***	***Eye Color***	***Hair Color***	***Height***
Joseph Gohlke	Male	Blue	Gray	6'1"

Database and Data Modeling Concepts

1st Normal Form Cont'

For a US phone number, 10 digits in the format 3-3-4

No storing phone numbers like:

"407-730-3483, 407-205-1234"

If you need to model a 1:N relationship where a given master record has more than 1 phone number, it would look like:

- Child Record – Iron Yard Guest Phone Numbers

Master Key	***Phone***	***Phone Type***
Joe Gohlke	407-730-3483	Mobile
Joe Gohlke	407-123-4567	Office

Database and Data Modeling Concepts

2nd Normal Form – non-prime attributes not repeated (plus 1st NF)

Not like this:

Child Record – Iron Yard Guest Phone Numbers

Master Key	***Phone***	***Nickname***
Joseph Gohlke	407-730-3483	Joe
Joseph Gohlke	407-123-4567	Joe

Database and Data Modeling Concepts

2nd Normal Form Cont'

Like this instead:

Master Record – Iron Yard Guest Contact

Key	***Sex***	***Eye Color***	***Hair Color***	***Height***	***Nickname***
Joseph Gohlke	Male	Blue	Gray	6'1"	Joe

Database and Data Modeling Concepts

3rd Normal Form – attributes are related to key

No transitive dependencies (plus 2nd NF)

Not like this:

Child Record - Classes

Key	***Class Code***	***Class Name***
Joseph Gohlke	DB1001	Database Concepts
Joseph Gohlke	DB1002	Data Modeling

Database and Data Modeling Concepts

3rd Normal Form Cont'

Child Record - Office

Key	***Class Code***
Joseph Gohlke	DB1001
Joseph Gohlke	DB1002

Class Code	***Class Name***
DB1001	Database Concepts
DB1002	Data Modeling

No storing non-key data twice!

Database and Data Modeling Concepts

- Slide deck available at:
- https://github.com/jgohlke/TIY_DBA_Concepts
- Email: jgohlke@gmail.com