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

Reliability

Accuracy

Consistency
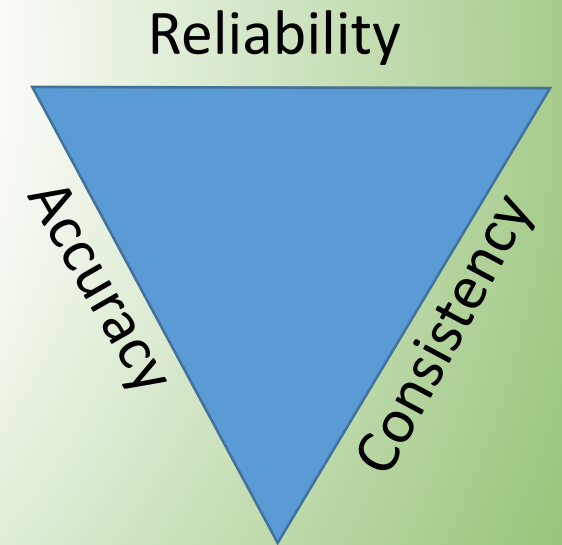
Database and Data Modeling Concepts

- *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

ORACLE

Database and Data Modeling Concepts

Key

Data Modeling

Where to put all the bits?

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

Phone Number: 407-730-3483 ?

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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

Name	*Phone Number*
Joseph Gohlke	407-730-3483

Key   Attribute

For a phone number, 10-digits in the format 3-3-4. Database rules enforce structure.

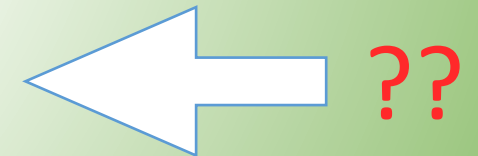Attribute is "atomic"…meaning it is only 1 thing, it is not divisible

Database and Data Modeling Concepts

1st Normal Form Cont'

If Joe gets some office space, has a home office and a cell phone, then where to put the other phone numbers?

407-730-3483   407-205-1234   407-205-3241

Name	Phone Numbers
Joseph Gohlke	407-730-3483, 407-205-1234, 407-205-3241

⬅ ??

Is the attribute value atomic?

Database and Data Modeling Concepts

1st Normal Form Cont'

Name	Phone Numbers
Joseph Gohlke	407-730-3483, 407-205-1234, 407-205-3241
Ben Gohlke	(407)730-7878;407-123-5643
John Smith	302.345.6521,201.593.8429,506.987.6532
Locksmith	888-POP-LOCK
Jane Smith	4078647483,,4076845385

Not like this.

Why?

You tell me.

Who wants to write a program to find the business phone number?

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1st Normal Form Cont'

Key

Name	Phone Number Type	Phone Number
Joseph Gohlke	Home	407-730-3483
Joseph Gohlke	Work	407-205-1234
Joseph Gohlke	Mobile	407-205-3241
Locksmith	Work	888-767-5625
Jane Smith	Mobile	407-864-7483

Like this.

The attribute is dependent on the full key of the row. The values are atomic.

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2nd Normal Form
— **non-prime attributes not repeated**
— **Plus 1 NF**

Parent Record –
Iron Yard Guest
Guest Lecturers

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

Child Record
– Iron Yard
Guest Contact
- Phone
Numbers

Name	Phone Number Type	Phone Number
Joseph Gohlke	Mobile	407-730-3483
Joseph Gohlke	Office	407-123-4567

Database and Data Modeling Concepts

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

Where to put a nickname like "Joe"?
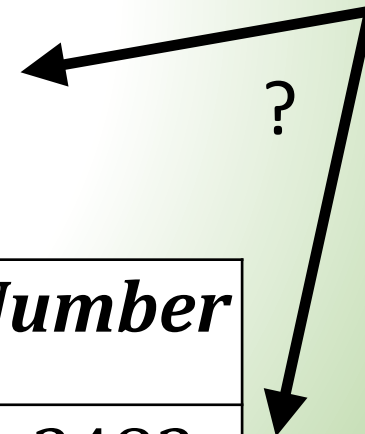
Name	Sex	Eye Color	Hair Color	Height
Joseph Gohlke	Male	Blue	Gray	6'1"

?

Name	Phone Number Type	Phone Number
Joseph Gohlke	Mobile	407-730-3483
Joseph Gohlke	Office	407-123-4567

Database and Data Modeling Concepts

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

Like this?

Name	Phone Number Type	Phone Number	Nickname
Joseph Gohlke	Mobile	407-730-3483	Joe
Joseph Gohlke	Office	407-123-4567	Joe

Is the attribute value (non-prime) repeated?

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Database and Data Modeling Concepts

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

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

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3rd Normal Form

    - Attributes are related to key

    - No transitive dependencies

    - Plus 2nd NF

A "transitive dependency" is a value that has a dependent relationship to another value and that value is related to the key.

Database and Data Modeling Concepts

3rd Normal Form cont'

Attributes are related to key, No transitive dependencies (plus 2nd NF)

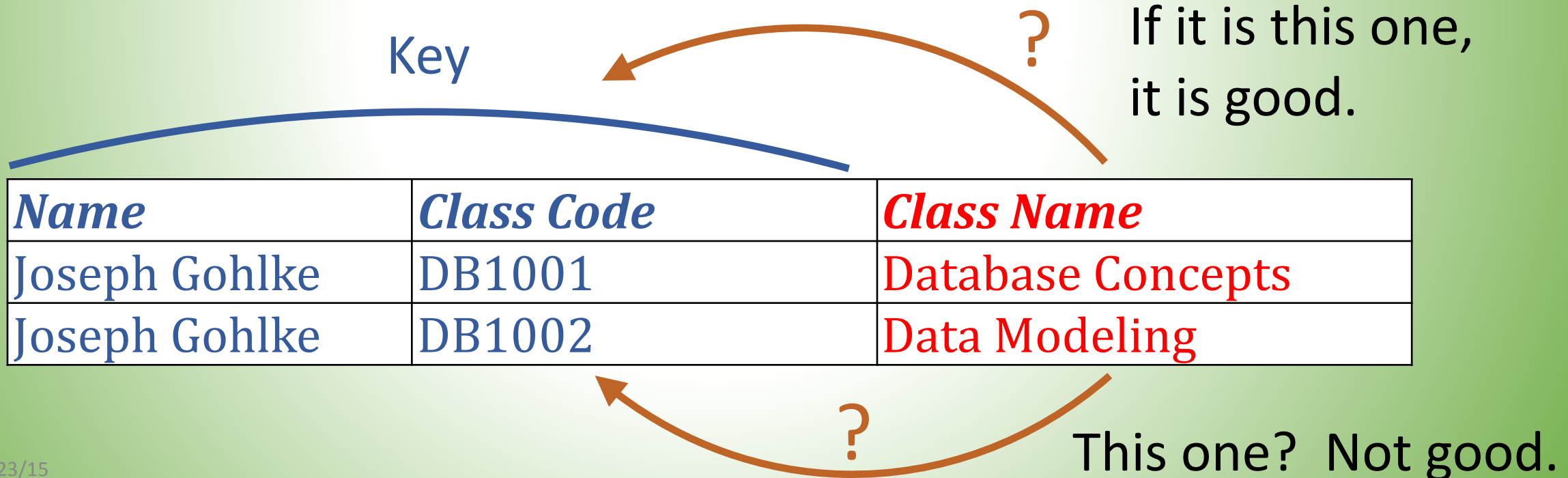| Class Code	Class Name
DB1001	Database Concepts
DB1002	Data Modeling

Where to put a guest contact lectures?

Database and Data Modeling Concepts

3rd Normal Form cont'

Attributes are related to key, No transitive dependencies (plus 2nd NF)

Which one is the dependency?

Key

? If it is this one, it is good.

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

? This one? Not good.

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3rd Normal Form Cont'

Child Record

- Contact Lectures

Key

Class Code	Class Name
DB1001	Database Concepts
DB1002	Data Modeling

Child Record

- Guest Contact Lectures

Key

Name	Class Code
Joseph Gohlke	DB1001
Joseph Gohlke	DB1002

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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*