

I. THE RELATIONAL MODEL

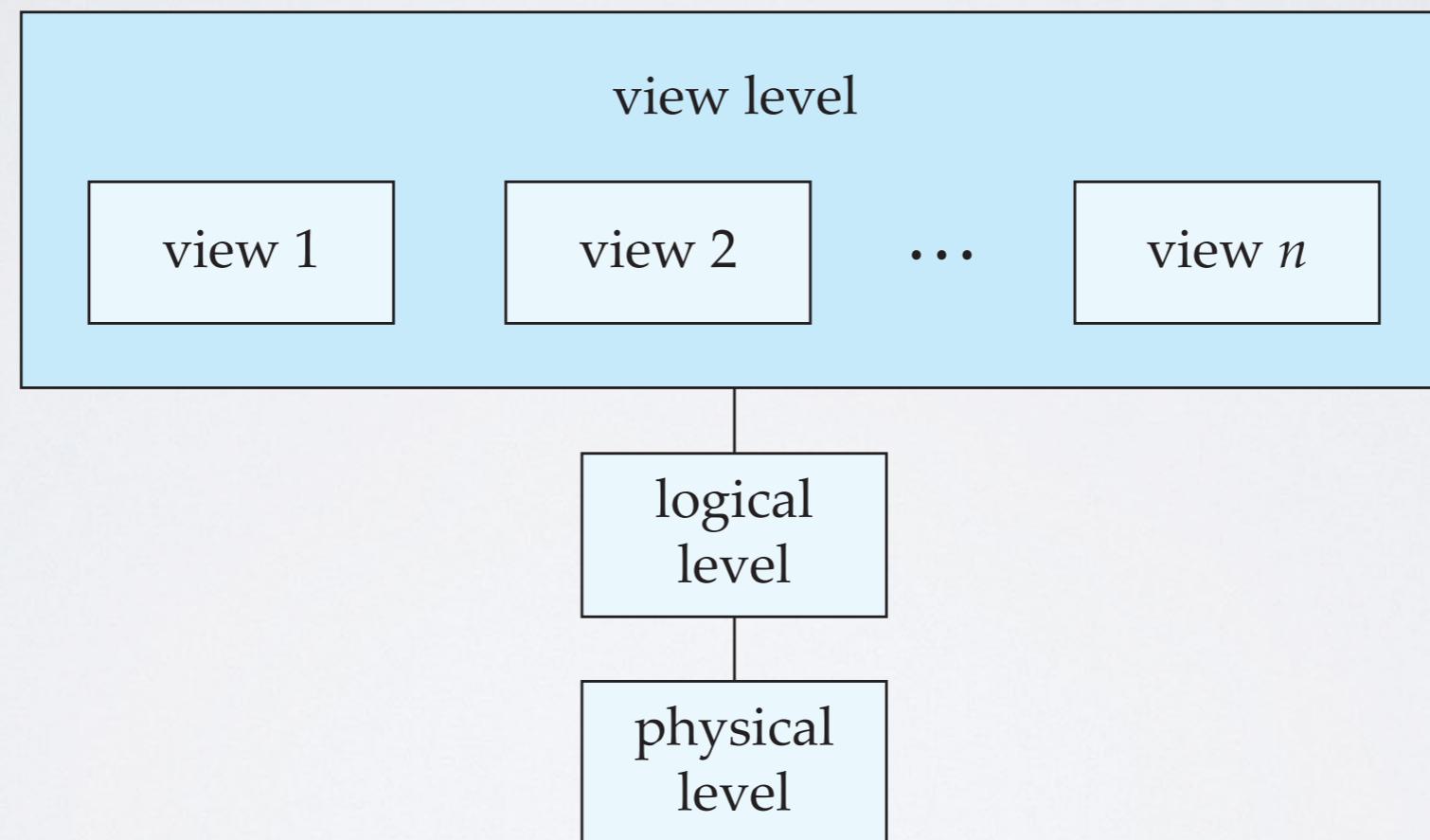
CSC 350

WHAT ARE THE PURPOSES OF
A DATABASE SYSTEM?

PURPOSES

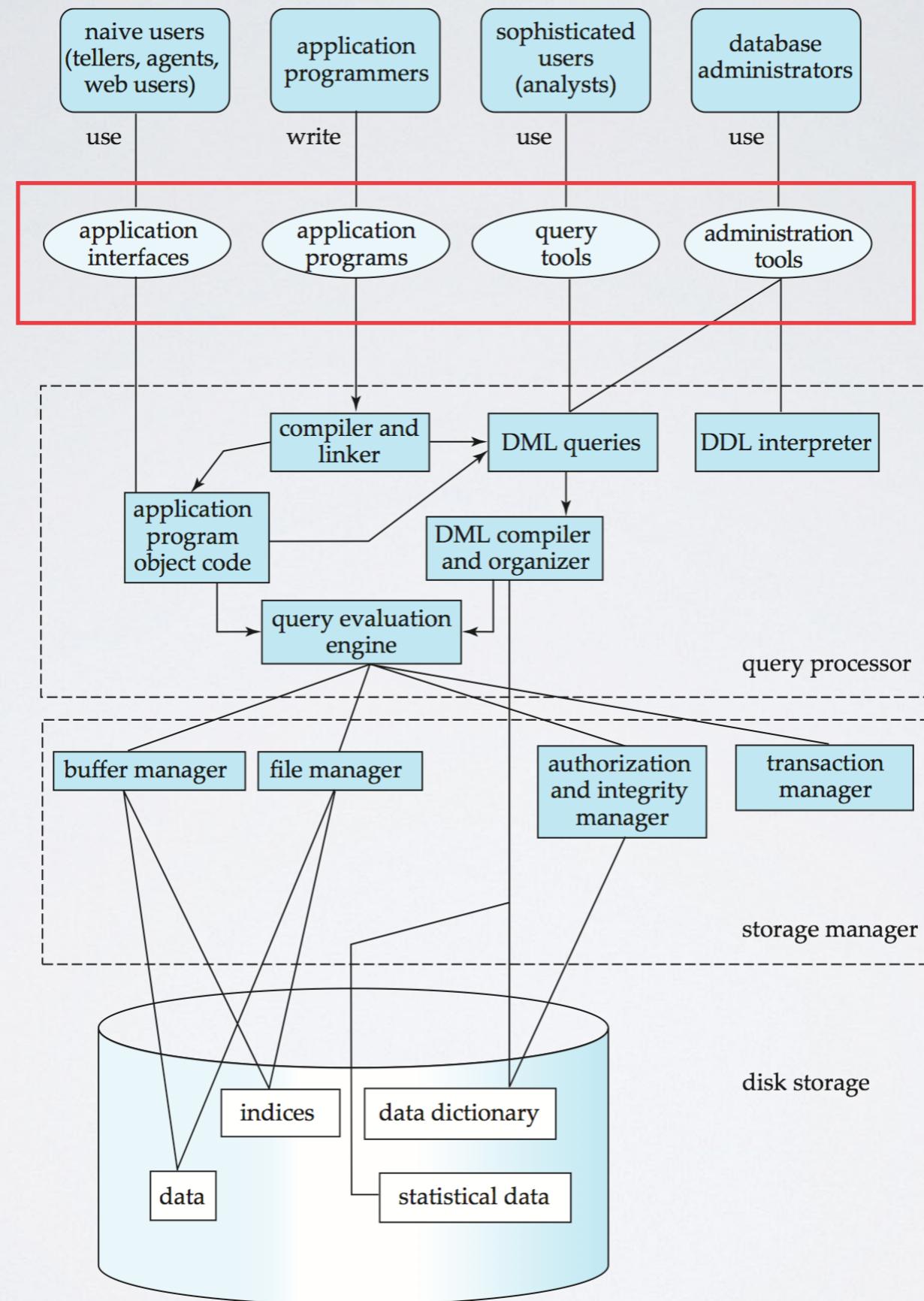
- Store large bodies of information
- Abstract away the details of how that data is stored.
- Provide a way to access and manipulate the data.
- Provide a way to secure the data.

LEVELS OF ABSTRACTION



Logical Level

Abstraction



Physical Level

DATA DEFINITION LANGUAGE

```
CREATE ROLE myuser WITH LOGIN PASSWORD 'secret';
```

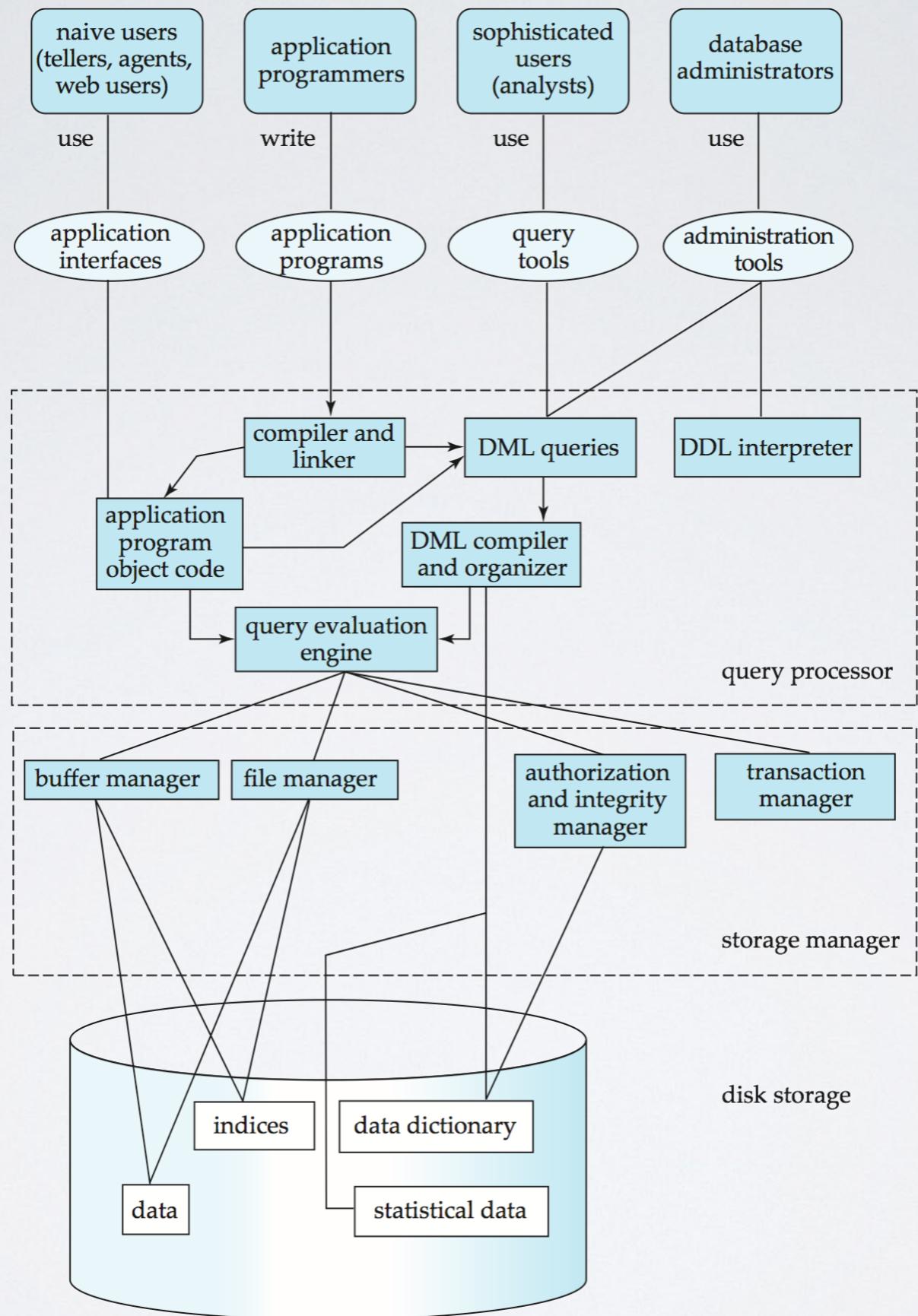
```
CREATE DATABASE food;
```

A language for specifying the database schema and other properties of the data.

DATA MANIPULATION LANGUAGE

```
SELECT name, age FROM users;
```

A language that allows users to access or manipulate data.



RELATIONAL MODEL

“tuple” or “row”

“attributes” or “columns”

<i>ID</i>	<i>name</i>	<i>dept_name</i>	<i>salary</i>
22222	Einstein	Physics	95000
12121	Wu	Finance	90000
32343	El Said	History	60000
45565	Katz	Comp. Sci.	75000
98345	Kim	Elec. Eng.	80000
76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
58583	Califieri	History	62000
83821	Brandt	Comp. Sci.	92000
15151	Mozart	Music	40000
33456	Gold	Physics	87000
76543	Singh	Finance	80000

“table” or “relation”

RELATIONAL MODEL

<i>ID</i>	<i>name</i>	<i>dept_name</i>	<i>salary</i>
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Domain: Set of values allowed for each attribute.

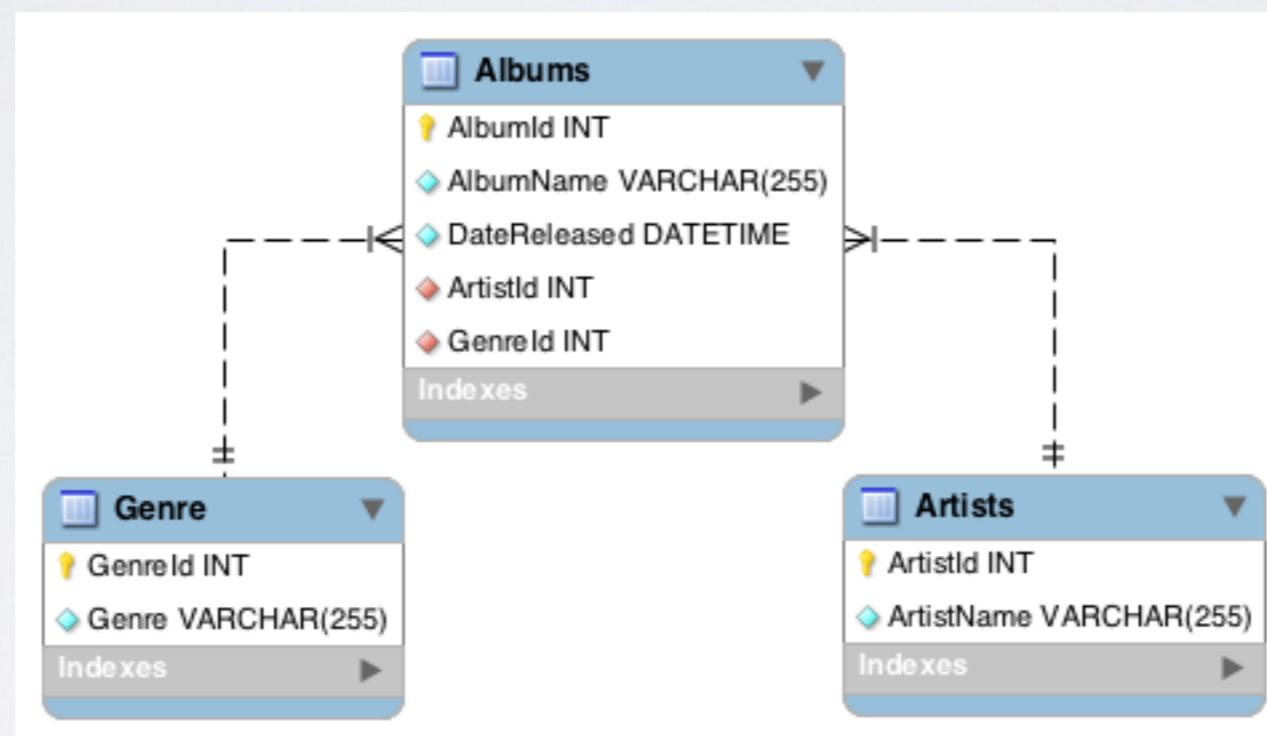
Null Value: Nothing, Doesn't Exist, Unknown

Null $\neq 0$

Null $\neq ""$

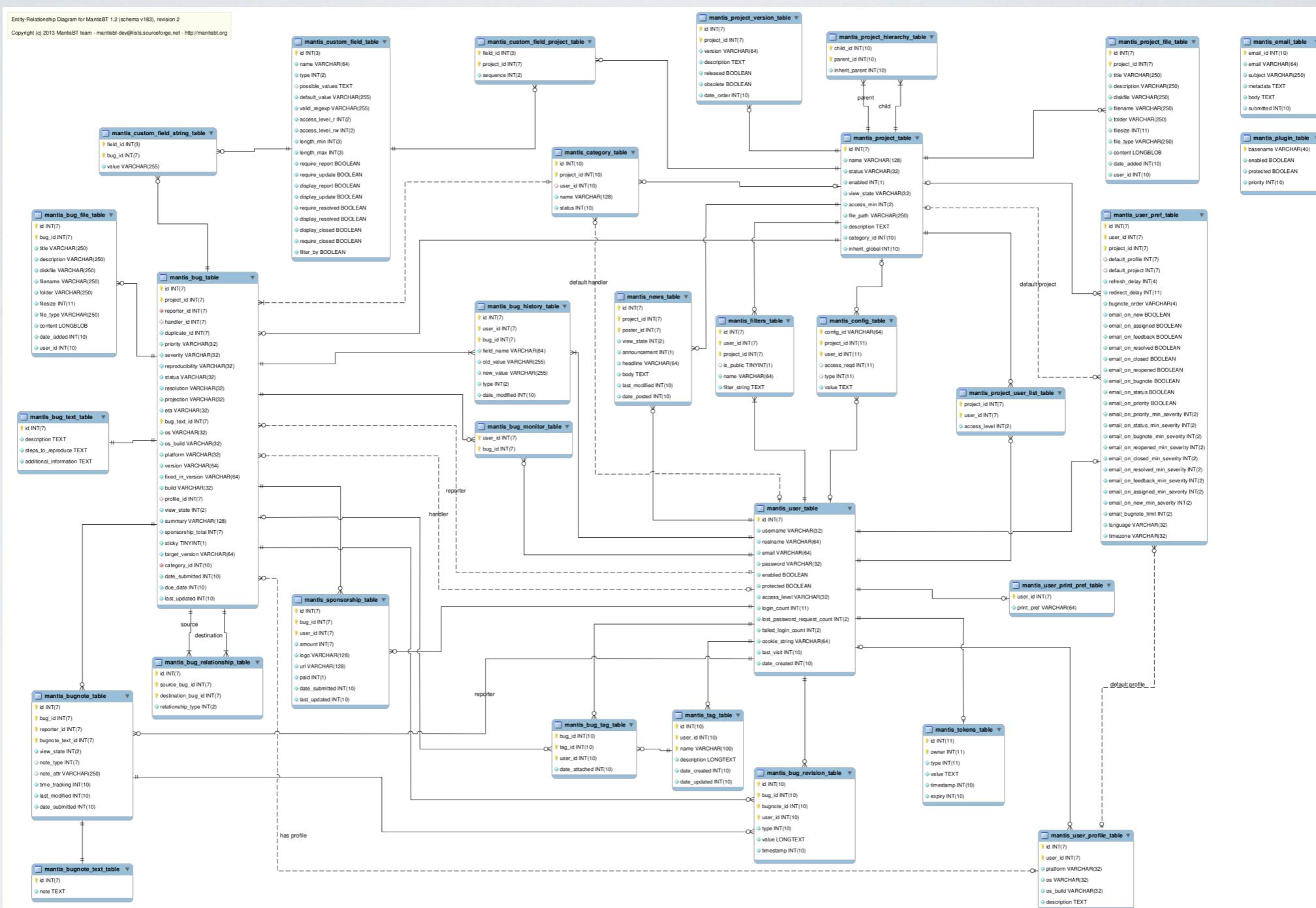
DATABASE SCHEMA

The logical design of the database.



A simple schema

DATABASE SCHEMA



A complex schema

RELATION KEYS

Superkey: A unique identifier for a tuple.

Candidate Key: A minimal superkey.

Primary Key: A candidate key chosen by the designer to be the primary method of identifying tuples within a relation.

InventoryID	VIN	Year	Make	Model	Price
12	abc	2001	Honda	Odyssey	2500
14	ab4	2002	Honda	Odyssey	3000
24	ab2	2002	Honda	Odyssey	3500
29	ccd	2003	Toyota	Sienna	4000

SK: {VIN, Year, Make, Model, Price}, {VIN, Year}, {InventoryID, Price}, etc...

CK: {VIN}, {InventoryID}

PK: {InventoryID}

RELATION KEYS

InventoryID	VIN	Year	Make	Model	Price
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24	ab2	2002	Honda	Odyssey	3500
29	ccd	2003	Toyota	Sienna	4000



ServicelD	InventoryID	Operation
1	12	Wash
2	12	Oil Change
3	14	Wash
4	24	Wash
4	24	Replace Tires

Foreign Key: A key that points to another relation.

DESIGN A TEST DRIVE DATABASE

InventoryID	VIN	Year	Make	Model	Price
I2	abc	2001	Honda	Odyssey	2500
I4	ab4	2002	Honda	Odyssey	3000
24	ab2	2002	Honda	Odyssey	3500
29	ccd	2003	Toyota	Sienna	4000

Rules:

1. Store customer name and a unique ID for the customer
2. Store which customer drove which cars.
- 3. Minimize data duplication.**

RELATION KEYS

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24	ab2	2002	Honda	Odyssey	3500
29	ccd	2003	Toyota	Sienna	4000

Customer ID	Name
1	Bob
2	Joe
3	Sally

Customer ID	InventoryID
1	12
1	14
2	12
2	14
2	24
3	24
3	29