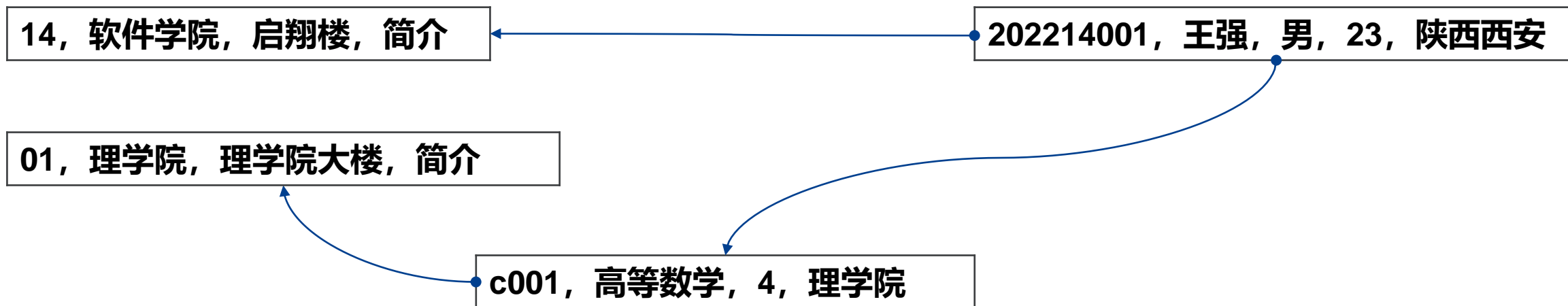


关系模型基本概念

讲解人：陆伟 教授

关系模型起源

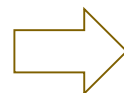
如何表达现实世界中的数据以及数据与数据之间的联系？



层次模型



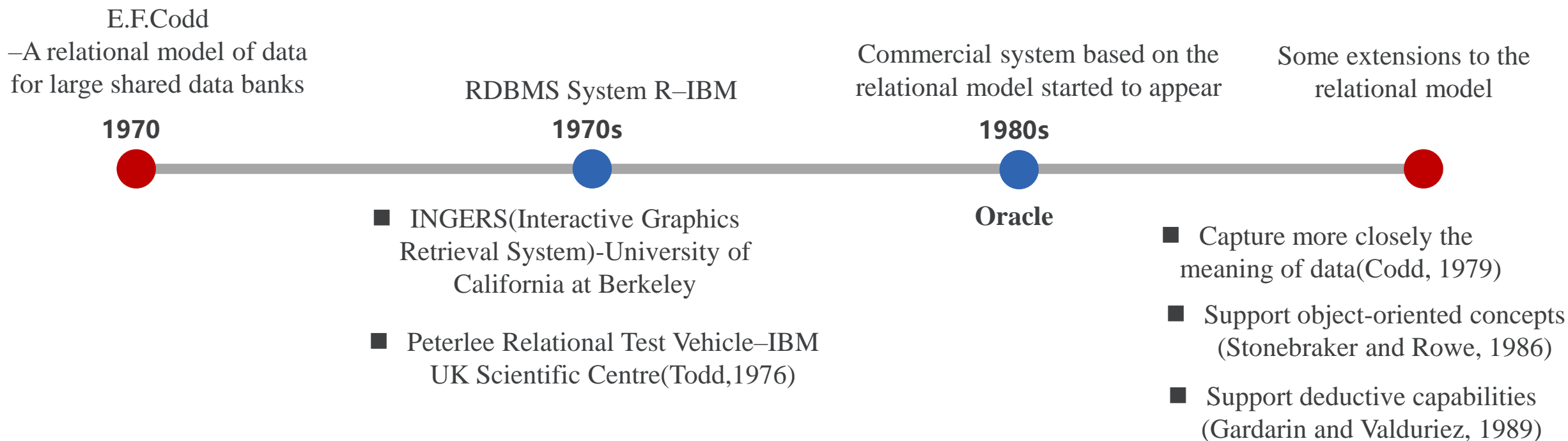
网状模型



关系模型

参考阅读：[大数据管理系统现状与趋势](#)

关系模型起源



关系模型特征-数据结构

数据结构(Data Structure)

- The relational model is based on the mathematical concept of a **relation**, which is physically represented as a table.
- The relational data structure are principally based on set theory and predicate logic from mathematics.

关系

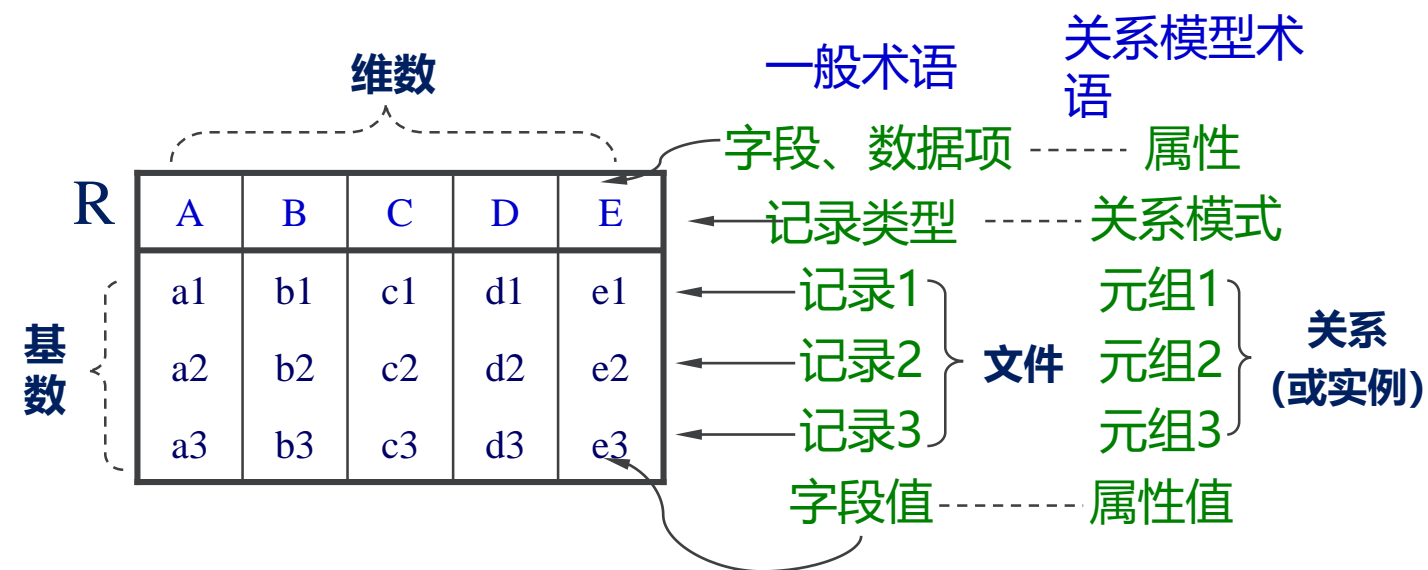
- A relation is a **table** with columns and rows.
- Mathematical definition -- Any subset of n -tuples from the Cartesian product of n sets is a relation on the n sets.

注: Cartesian product

Let D_1, D_2, \dots, D_n be n sets. Their Cartesian product is defined as:

$$D_1 \times D_2 \times \dots \times D_n = \{(d_1, d_2, \dots, d_n) \mid d_1 \in D_1, d_2 \in D_2, \dots, d_n \in D_n\} \quad \prod_{i=1}^n D_i$$

关系模型特征-数据结构



Properties of Relation:

- A relation must be a finite set.
- The order of attributes has no significance
- The values of an attribute are homogeneous
- The order of tuples has no significance
- Each cell of the relation contains exactly one atomic (single) values
- Each tuple is distinct

关系模型特征-数据结构

关系中的码或键 (Key)

- 超码(Super key): An attribute, or set of attributes, that uniquely identifies a tuple within a relation
- 候选码(Candidate key): A super key such that no proper subset is a superkey within a relation
- 主码(Primary key): The candidate key that is selected to identify tuples uniquely within a relation. How to select the primary key?
- 辅码(Alternate key): A candidate key that is not selected to be the primary key
- 外码(Foreign key): An attribute, or set of attributes, within one relation that matches the candidate key of some (possibly the same) relation

关系模型特征-数据结构

关系模式(Relation Schema)的表示

Give the name of the relation followed by the attribute names in parentheses.
Usually underline the primary key

Student (sNo, sName, sSex, sAge, sDept)

Course (cNo, cName, cPNo, cCredit)

SC (sNo, cNo, score)

关系模型特征-完整性约束

关于空值Null的含义

- Null represents a value for an attribute that is currently unknown or is not applicable for this tuple.
- Null can cause implementation problems because the relational model is based on predicate calculus, which is a two-valued or Boolean logic.
- The incorporation of nulls in the relational model is a contentious issue.

R	A	B	C	D	E
	a1	王二	男	18	e1
	a2	张三	女		e2
	a3	李四		21	e3

关系模型特征-完整性约束

实体完整性(Entity integrity)

- In a base relation, no attribute of a primary key can be null.

参照完整性(Referential integrity)

- If a foreign key exists in a relation, either the foreign value must match a candidate key value of some tuple in its home relation or the foreign key value must be wholly null.

用户定义完整性(Enterprise constraints)

- Additional rules specified by the users or database administrators of a database.
- Example `CHECK(age>=16)`

学生

学号	姓名	性别	年龄
001	张三	男	18
?	李四	男	?
003	钱多多	?	21

学号	姓名	性别	年龄	隶属学院
001	张三	男	18	01
002	李四	男	?	02
003	钱多多	?	21	?

代号	名称	地址	电话
01	软件		
02	计算机		

关于本讲内容



祝各位学习愉快!

感谢观看！

讲解人：陆伟 教授