WEEK 2

THE IMPORTANCE OF KEYS IN RELATIONS

STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - Explain the importance of key attributes in relations (tables)
  - Given a relation/table, identify if the key attribute(s), if it exists.
  - Determine if the insertion of a new tuple will cause a key constraint to fail.
  - Identify the following types of keys: ***Primary Key, Foreign Key, Candidate Key, Super Key***

KEYS AND KEY CONSTRAINTS

- **Key(s)** → combination of attributes (or a single attribute) that can be used to enforce that no 2 tuples can be identical.

QUESTION: What is the key of this table?

this is the unique value.

SSN

SSN	LastName	FirstName
34	Simpson	Homer
56	Simpson	Marge
78	Smithers	Marge
99	Simpson	Homer

Answer: Likely just SSN but it could also be:

- **SSN and FirstName OR**
- **SSN and LastName OR**
- **SSN and FirstName and LastName**

key could be a combination of attributes.

NOTE: Could NOT be just LastName OR just FirstName or LastName and FirstName

QUESTION: How about this table?

LastName	FirstName
Simpson	Homer
Simpson	Marge
Smithers	Marge
Simpson	Homer

No key, nothing makes the rows unique!

LastName AND FirstName would make each row unique, so key could be: LastName, FirstName

QUESTION: What if we changed the last record to have a last name of Smithers rather than Simpson, then what could be a key in this particular snapshot of the database? (although, not a good one!)

LastName + FirstName.

QUESTION: How about this table?

Attribute1	Attribute2	Attribute3
a1	b1	c1
a1	b2	c1
a2	b1	c2
a2	b2	c2

Answer: Could be →

- **Attribute1 and Attribute2 OR**
- **Attribute2 and Attribute3 OR**
- **Attribute1 and Attribute2 and Attribute3**

- **SuperKey:** any set of attributes that enforce that no tuples are alike
- **Candidate Key:** sometimes a table will have 2 possible things that could be of them is a candidate
  Also must superkey
  within the erkey"

SSN	LastName	FirstName
34	Simpson	Homer
56	Simpson	Marge
78	Smithers	Marge
99	Simpson	Homer

QUESTIO that is a superkey ndidate key:

- **Primary K** uples in the relation (si out to be **composite** gether)
- **Foreign K** n one relation that match ssibly the same) relation

Attribute1	Attribute2	Attribute3
a1	b1	c1
a1	b2	c1
a2	b1	c2
a2	b2	c2

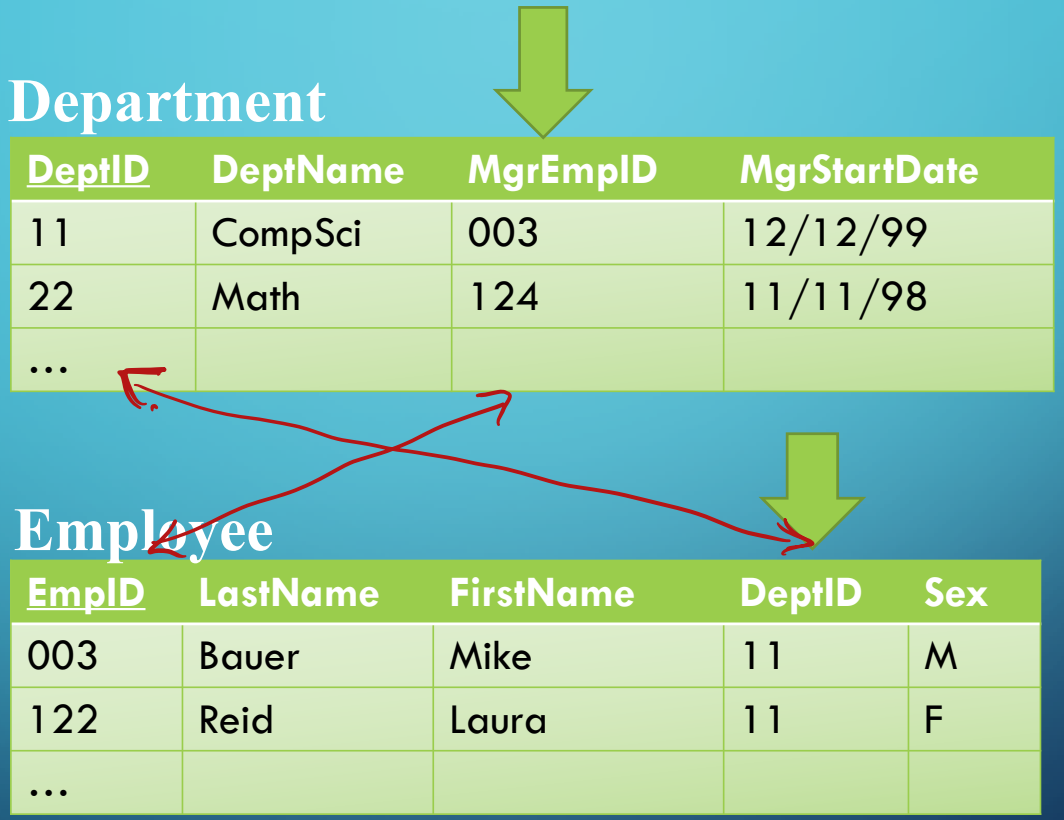
Candidate key: A1 + A2 OR
A2 + A3

Superkey: A1 + A2 OR
A2 + A3 OR
A1 + A2 + A3.

primary key is the key we picked as the references, it could be a composit key. and it is always a candidate key.

Foreign key is a key that is used in more than one table.

QUESTION: What are foreign keys in this situation:



Department

DeptID	DeptName	MgrEmpID	MgrStartDate
11	CompSci	003	12/12/99
22	Math	124	11/11/98
…			

Employee

EmpID	LastName	FirstName	DeptID	Sex
003	Bauer	Mike	11	M
122	Reid	Laura	11	F
…				

For the following table:

QUESTION: Give 3 Superkeys: LicenseNum OR EngineSerialNum OR LicenseNum and Make

QUESTION: Give 2 Candidate Keys: LicenseNum, EngineSerialNum

QUESTION: Give 1 Primary Key: EngineSerialNum

It depend on the design of the database.

LicenseNum	EngineSerialNum	Make	Model	Year
Ont ABBC 123	AB12	Ford	Jeep	96
Ont XED 444	CD11	Olds	LaSabre	98
Que ABC 123	AE12	Ford	Mustang	98
Que ABD 111	AE23	Olds	Cutlass	96
Ont ABCD 111	SE12	Honda	Civic	95
NS ABC 22	SE67	Ford	Mustang	98

KEY CONSTRAINTS

- Keys MUST be **UNIQUE**
- Primary Key must be **NON NULL** (Also called the ***Entity Integrity Constraint***)
- Most DBMS enforce both of the above constraints

these constraints works in a single table.

Both of the above constraints (and domain constraints) are on individual tables (just one table).

There are also constraints (in the next topic) are on relationships between tables.