



Keys, Foreign and Domestic



Keys

- Informally, a key is a set of attributes which uniquely define rows in a table
- Actually, this is a super key
- A key is a super key with the condition that it is minimal
 - If you remove any of the attributes, it is not longer a superkey
- A key is also known as a candidate key



The Primary Key

- A table will have one primary key
- It is the chosen candidate key
 - It may be totally arbitrary which one gets chose, but you need to choose one
- Foreign keys reference primary keys
 - More on this in a moment
- When in doubt, make an auto incrementing integer the primary key



An Example

Eid	SSN	Fname	Lname	Phone	Address	Salary	StartDate	Dept
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- Candidate keys
 - Eid?
 - SSN?
 - (SSN, Dept)?
 - (SSN, StartDate, Dept)?
 - (Fname, Lname)?
- It all depends!
 - Just use an auto incrementing int

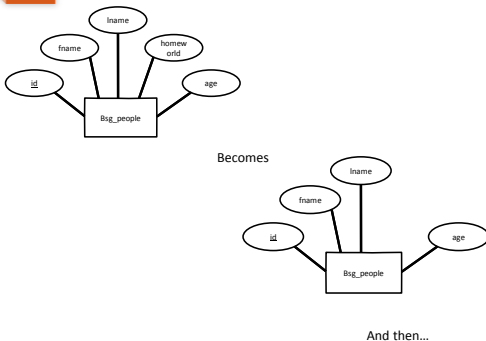


Foreign Keys

- Foreign keys are used in relationships
- 1-to-Many or a Many-to-Many relationship
- 1 to 1 typically get combined into a single entity
- A foreign key constraint says that an attribute can only contain values that are the primary key of a specified table

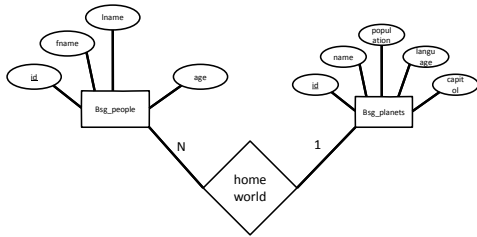


Foreign Keys in ER Diagrams





Foreign Keys in ER Diagrams Cont.



The Tables

Foreign Key Reference

id	Fname	Lname	Homeworld	Age
0	William	Adama	2	61
1	Lee	Adama	2	30
2	Laura	Roslin	2	NULL
3	Kara	Thrace	2	NULL

id	Name	Population	Language	Capitol
1	Gemenon	2800000000	Old Gemenese	Oranu
2	Caprica	4900000000	Caprican	Caprica City



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Foreign Keys in Tables

bsg_cert_people	
cid	pid
3	1
1	1
3	2

bsg_cert	
id	title
0	Raptor
1	Viper
2	Mechanic
3	Command

bsg_people				
id	Fname	Lname	Homeworld	Age
0	William	Adama	2	61
1	Lee	Adama	2	30
2	Laura	Roslin	2	NULL
3	Kara	Thrace	2	NULL



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Behavior of Foreign Keys

- So what happens when foreign keys are in place
- Illegal adds
 - Try to add a row or update a row and include a non-existent foreign value
 - Flat out rejected
- But it gets more complicated



Changes to Existing References

Existing Reference

cid	pid
3	1
1	1
3	2

id	title
0	Raptor
1	Viper
2	Mechanic
3	Command

- What if we delete the “viper” row or change its ID? What happens in the bsg_cert_people table?



More Complex Foreign Key Changes

- Two conditions that can break relationships
 - UPDATE
 - DELETE
- Three Possible Outcomes
 - NO ACTION
 - Rejects the attempt to change (update/delete) the referenced row
 - CASCADE
 - Propagate the changes to the referencer
 - SET NULL
 - Sets the referencer to a NULL value



Changes to Existing References

CASCADE

cid	pid
3	1
1 4	1
3	2

id	title
0	Raptor
1 4	Viper
2	Mechanic
3	Command

SET NULL

cid	pid
3	1
1 NULL	1
3	2

id	title
0	Raptor
1 4	Viper
2	Mechanic
3	Command



Example, Continued

NO ACTION

cid	pid
3	1
1	1
3	2

id	title
0	Raptor
1	1 Viper
2	Mechanic
3	Command

NOPE! Try something that does not break the database next time.



Syntax to Create This

```
CREATE TABLE `bsg_cert_people` (
  `cid` int(11) NOT NULL,
  `pid` int(11) NOT NULL,
  PRIMARY KEY (`cid`,`pid`),
  FOREIGN KEY (`cid`) REFERENCES `bsg_cert` (`id`),
  FOREIGN KEY (`pid`) REFERENCES `bsg_people` (`id`)
) ENGINE=InnoDB;
```

- **FOREIGN KEY (`cid`) REFERENCES `bsg_cert` (`id`)**
 - This means that the value in the 'cid' column in bsg_cert_people MUST BE IN the 'id' column of bsg_cert