Database Schema Design

Organizing Data

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Phase 1: Day 11

Database Schema Design

- Capturing state, not behavior
- Designing connections between tables

State and Behavior

```
class OrangeTree
  def initialize
    @age = 5
    @height = 5
    @oranges = produce_oranges
  end

  def produce_oranges
    Array.new(3) { Orange.new }
  end
end
```

```
class Orange
  def initialize
    @diameter = rand(2..4)
  end
end
```

State and Behavior

```
orange_tree = OrangeTree.new

=> #<OrangeTree 0x007fe1f1a4fb20
     @age=5,
     @height=5,
     @oranges=[#<Orange:0x007fe1f1a4faa8 @diameter=2>,
               #<Orange:0x007fe1f1a4fa80 @diameter=4>,
               #<Orange:0x007fe1f1a4fa58 @diameter=3>]>
```

Temporary State

- We create objects to hold data
- Data is lost when our program has finished executing

Temporary State Problems

- What if we want to use the current state later?

Temporary State Problems

- What if we want to use the current state later?

  Mega Man vs. Mega Man II

Persistant State

- To keep current state we need to save the data

Persistant State

- Where to save it?

Persistant State

- Where to save it?

  CSV
  Database

Databases

- Like object-oriented programming, databases model the data in real world systems

Databases and Ruby

- How do objects in databases relate to Ruby?

Databases and Ruby

Modeling State	
Ruby	Database
Classes	
Instances of classes	
Instance variables	

Databases and Ruby

Modeling State	
Ruby	Database
Classes	Tables
Instances of classes	
Instance variables	

Databases and Ruby

Modeling State	
Ruby	Database
Classes	Tables
Instances of classes	Rows
Instance variables	

Databases and Ruby

Modeling State	
Ruby	Database
Classes	Tables
Instances of classes	Rows
Instance variables	Fields

Schema Design

```
orange_tree = OrangeTree.new

⇒ #<OrangeTree 0x007fe1f1a4fb20
     @age=5,
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               #<Orange:0x007fe1f1a4fa80 @diameter=4>,
               #<Orange:0x007fe1f1a4fa58 @diameter=3>]>
```

Schema Design

orange_trees
id
created_at
updated_at

oranges
id
created_at
updated_at

Schema Design

orange_trees
id
created_at
updated_at

oranges
id
created_at
updated_at

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
created_at
updated_at

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
created_at
updated_at

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
diameter
created_at
updated_at

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
diameter
created_at
updated_at

Schema Design

- What is the relationship between orange trees and oranges?

Schema Design

- What is the relationship between orange trees and oranges?

  An orange tree has many oranges.

Schema Design

- What is the relationship between orange trees and oranges?

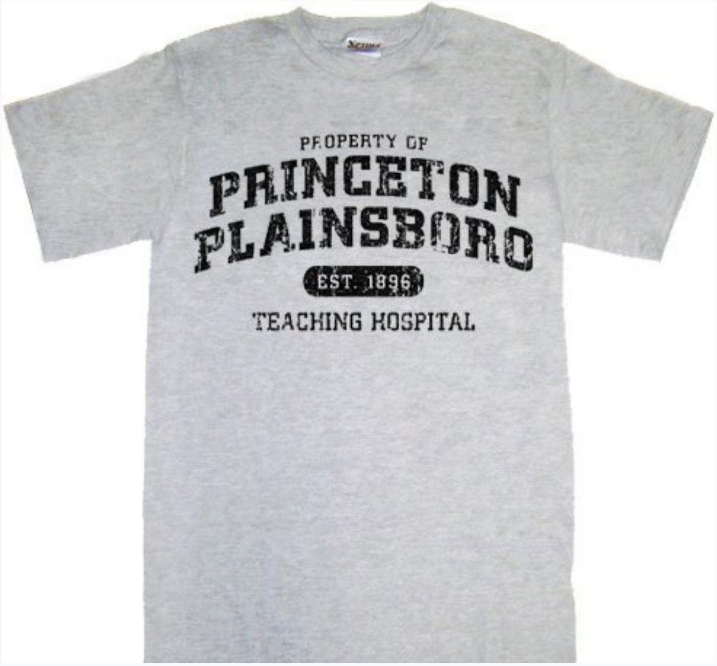
An orange tree has many oranges.
An orange belongs to an orange

Schema Design

- How to link between tables?

Schema Design

- How to link between tables?



Schema Design

- Primary key: unique identifier table field

Schema Design

- Foreign key: another table's unique identifier

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
diameter
created_at
updated_at

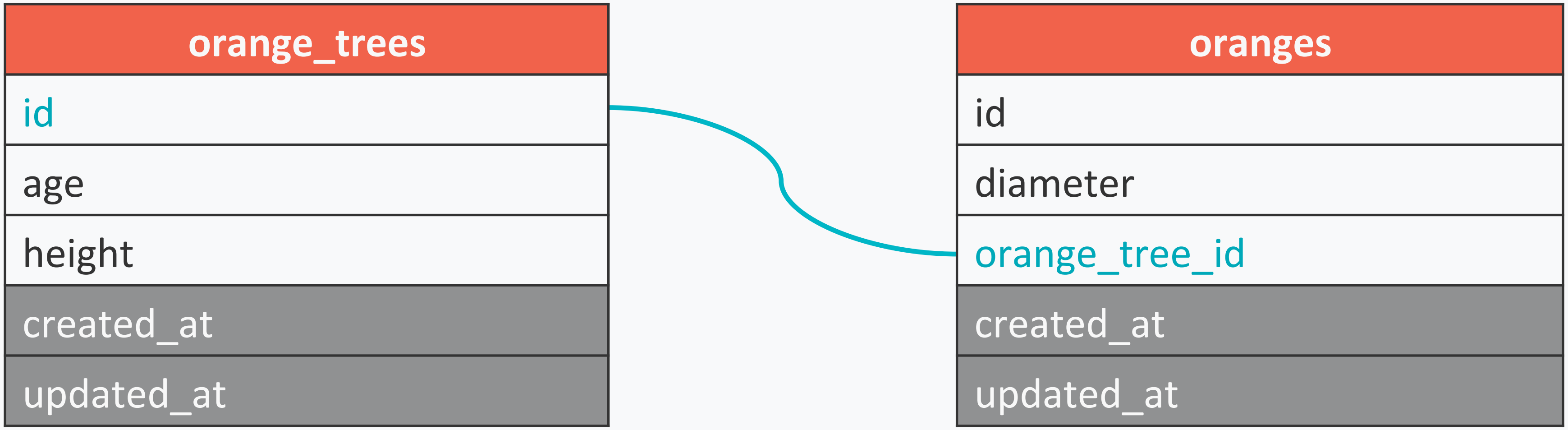
- Where does the foreign key go?

Schema Design

orange_trees
id
age
height
created_at
updated_at

oranges
id
diameter
orange_tree_id
created_at
updated_at

Schema Design



orange_trees
id
age
height
created_at
updated_at

oranges
id
diameter
orange_tree_id
created_at
updated_at

Schema Design

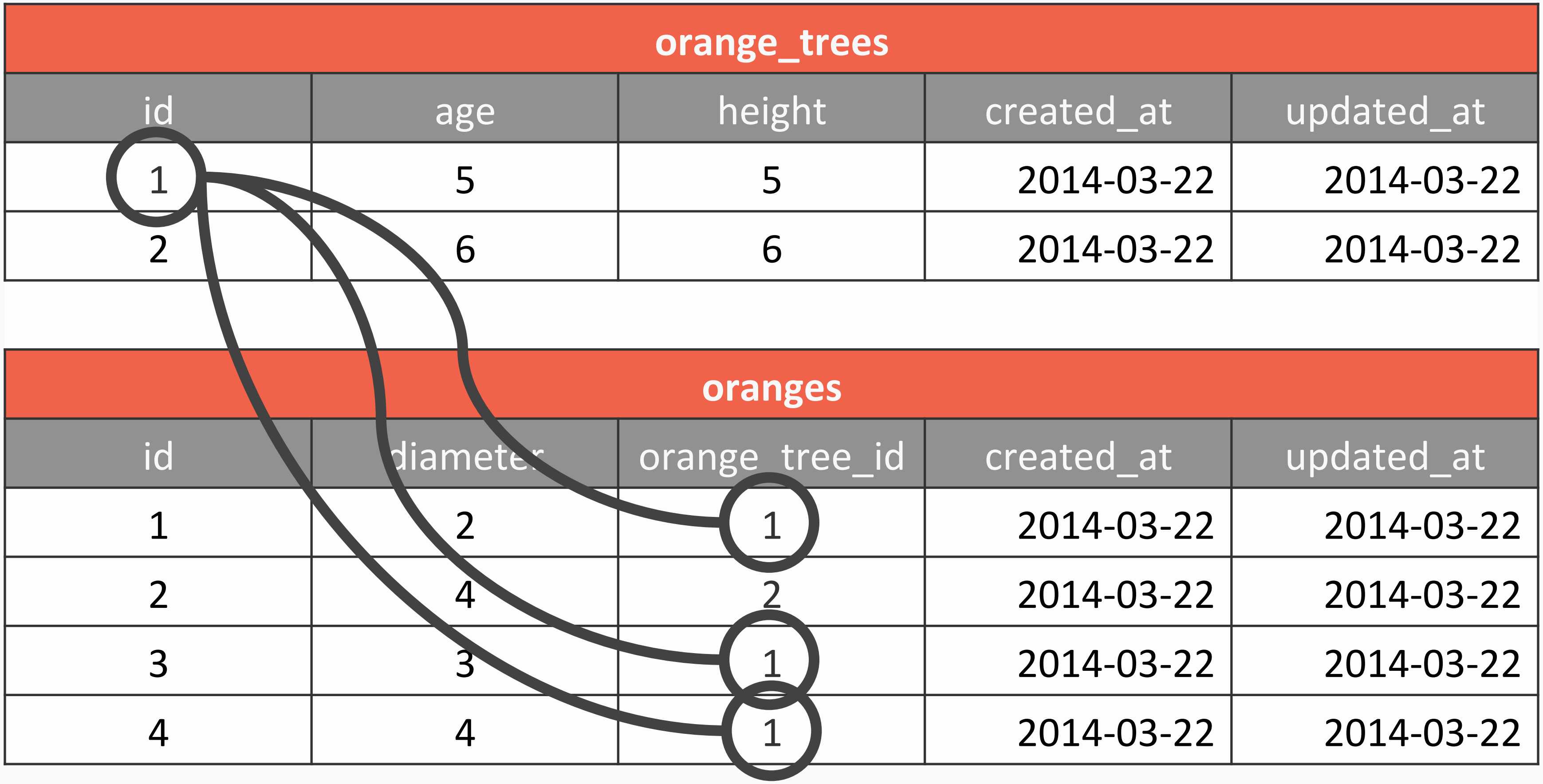
orange_trees

id	age	height	created_at	updated_at
1	5	5	2014-03-22	2014-03-22
2	6	6	2014-03-22	2014-03-22

oranges

id	diameter	orange_tree_id	created_at	updated_at
1	2	1	2014-03-22	2014-03-22
2	4	2	2014-03-22	2014-03-22
3	3	1	2014-03-22	2014-03-22
4	4	1	2014-03-22	2014-03-22

Schema Design



orange_trees

id	age	height	created_at	updated_at
1	5	5	2014-03-22	2014-03-22
2	6	6	2014-03-22	2014-03-22

oranges

id	diameter	orange_tree_id	created_at	updated_at
1	2	1	2014-03-22	2014-03-22
2	4	2	2014-03-22	2014-03-22
3	3	1	2014-03-22	2014-03-22
4	4	1	2014-03-22	2014-03-22