CSE 199: UB Seminar (Fall 2026) - Data management

Lecture 2: Network Model & DBTG

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Data model

- Data modeling is about
  - How do we logically represent the data and their relationships

- Example: the Internet Movie Database (IMDb)
  - Stores data about entities such as
    titles (movies/tv series/…), (production) companies, casts, etc.
    - Each type of entity is associated with similar types of data
      - title: name, production year, genre, …
      - companies: name, country,…
  - What kind of relationships can there be among the entities?
    - Example: Movie “Titanic” was produced by 20th Century Fox, Paramount Pictures, Lightstorem Entertainment, LCI Seguros, Baja Studios [link]
  - **What else? Let’s brain storm.**

Common relationship between entities

- Many-to-many, e.g.,
  - [title] produced by [company]
- One-to-many, e.g.,
  - [cast_member] casted in [title]
- One-to-one, e.g.,
  - [student] owns [UB email account]
- “is a”, e.g.,
  - [actor/actress] is a [cast_member]
  - [director] is a [cast_member]
- And more…

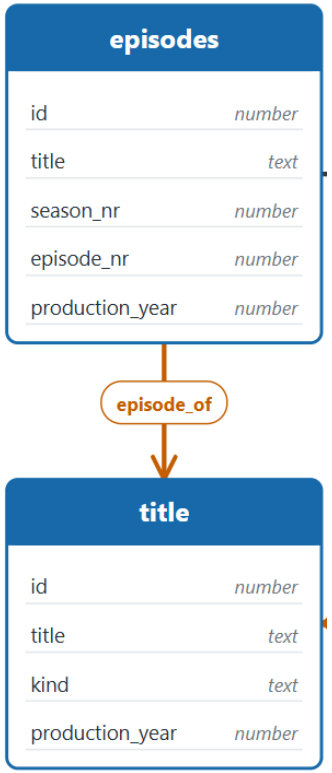
DBTG model

- Entity => data structure (main topics in CSE 250)
  - In network model, each type of entity is represented by a flat record structure

33460	"6Teen"	"tv series"	2004
3645059	"Elena et les hommes"	"movie"	1956
4615374	"Vanishing Son IV"	"tv movie"	1994

DBTG model (cont'd)

- DBTG only models one kind of relationship: one-to-many
  - "DBTG set" (not to be confused with set as in mathematics)
  - models an owner-member relationship
    - you can give each DBTG set a name



episode_of

33461	"2-4-1"	3	9	2007
33463	"A Crime of Fashion"	2	24	2006
33467	"Another Day at the Office"	3	10	2007
214701	"Citizens' Assembly"	1	4	2011
214703	"Date Night"	1	1	2011

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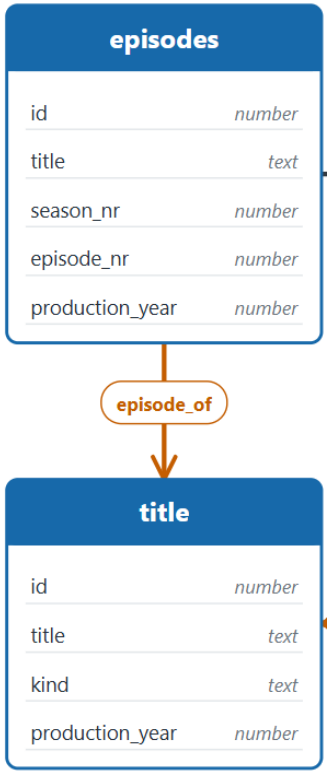
- A record cannot have >=2 owners within the same DBTG set
- A record can have any number of members within the same DBTG set
- A record can appear in multiple different DBTG sets



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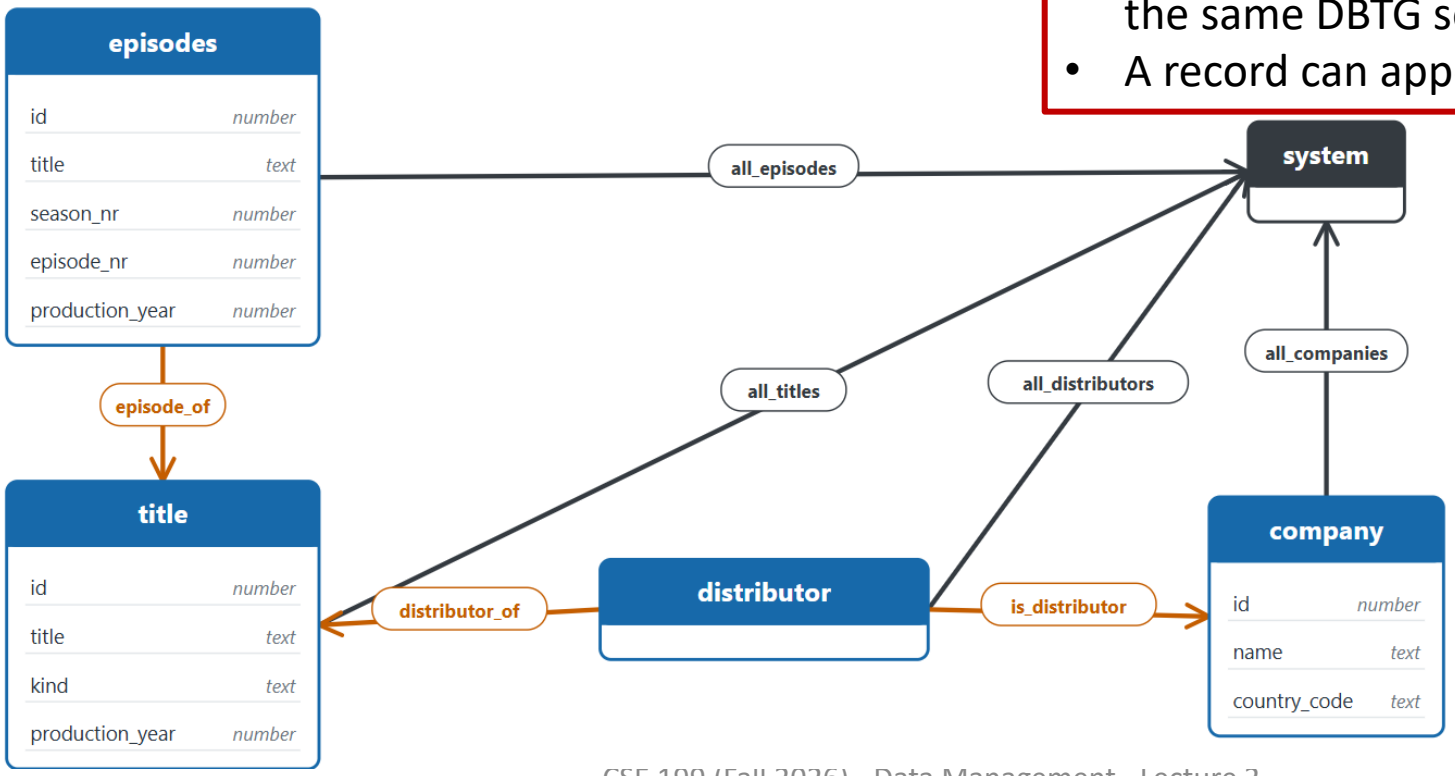
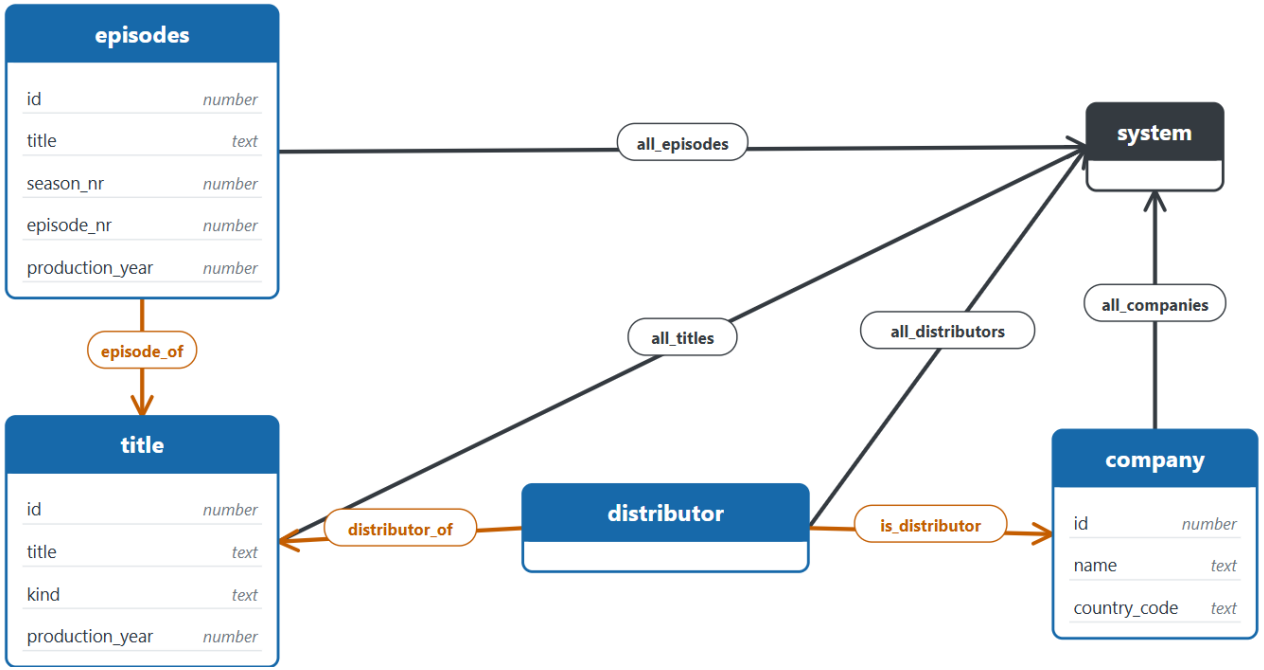


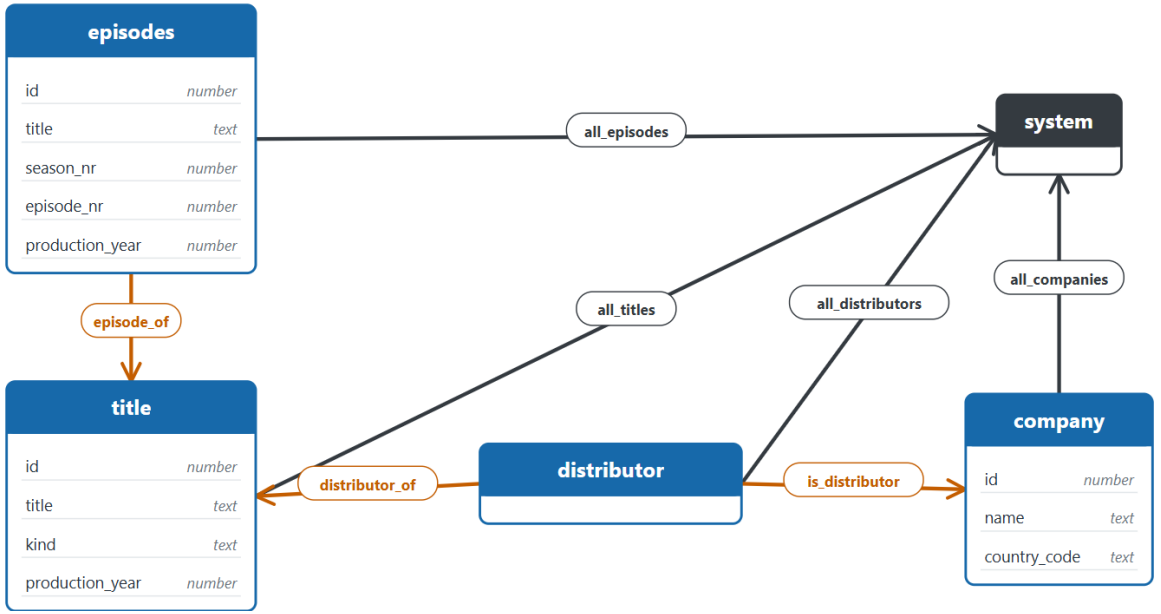
Navigating DBTG database using DBTG commands

- Navigating through DBTG database requires you to follow the links
  - As a programmer, imagine you're pointing a few "lasers" to some records
    - "Program state" - in memory and you can use immediately
  - Records are in a "pile" -- you have to find it and fetch it to know what it is about
    - "database instance" - on disk and you must "get" it to find the data inside



DBTG query example

- Find all episodes of At Home with Julia
  1. Find the title (record) with a title (name) of “At Home with Julia”
  2. Find the first episode (record) that is an episode of the title in 1.
     a. Find the next episode (record) that is an episode of the title in 1.
     b. Get and print the episode (record).
     c. Repeat 2(a), 2(b) until there is no next.



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214700	"At Home with Julia"	"tv series"	2011

DBTG query example

- Find all episodes of At Home with Julia
  1. `title.title := "At Home with Julia"; find any title using title;`
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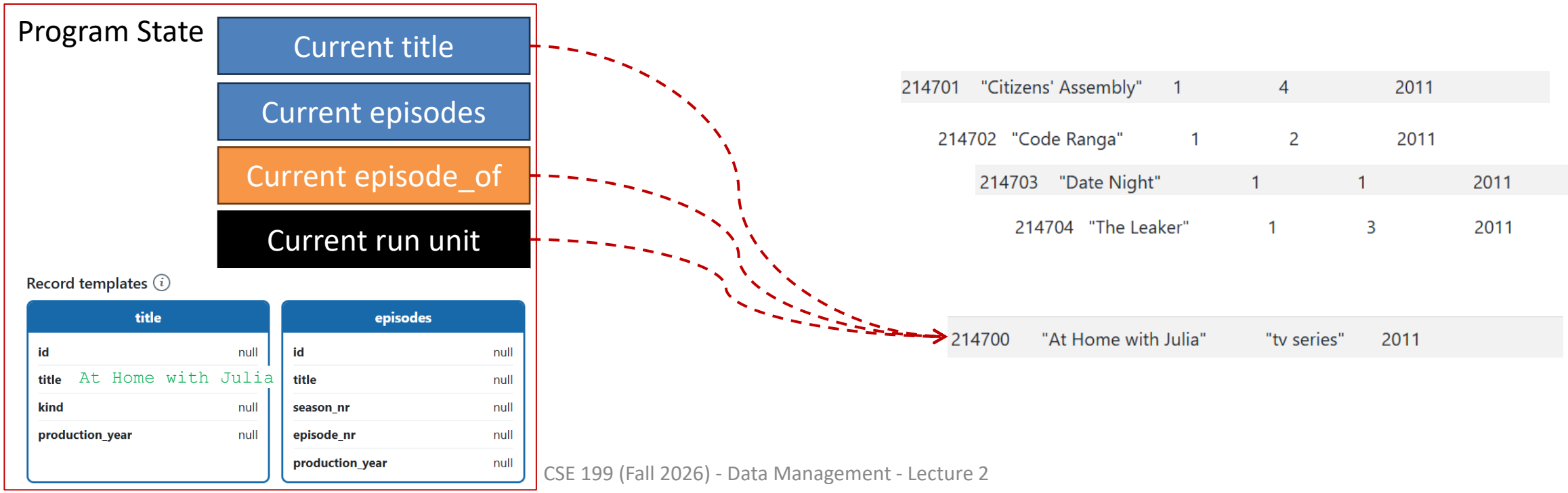

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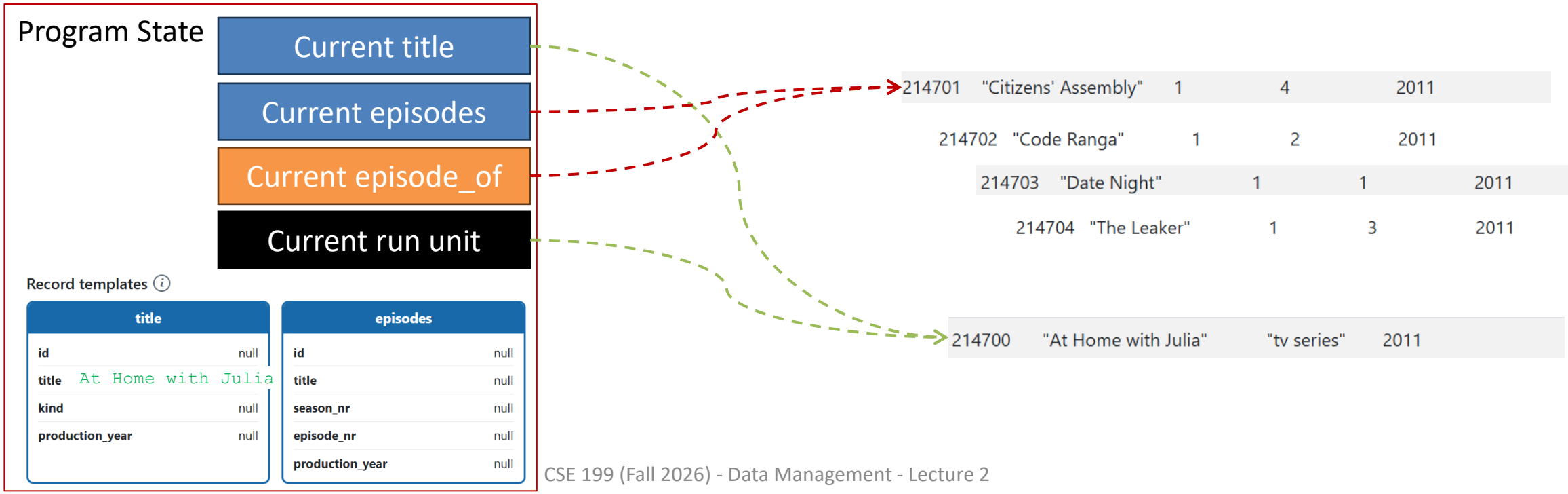

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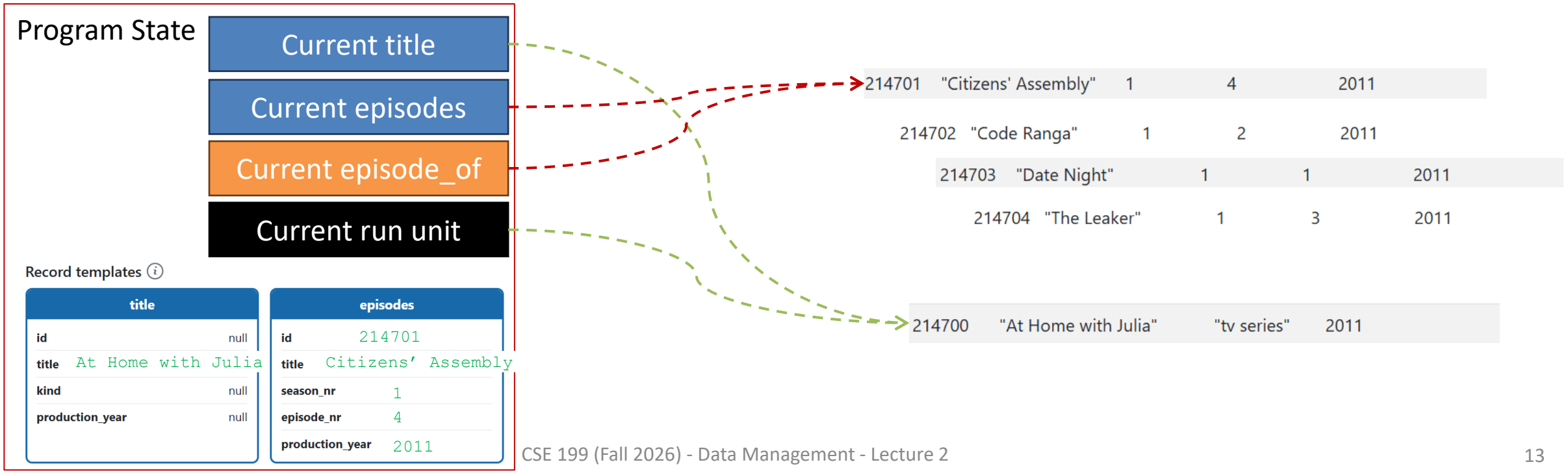

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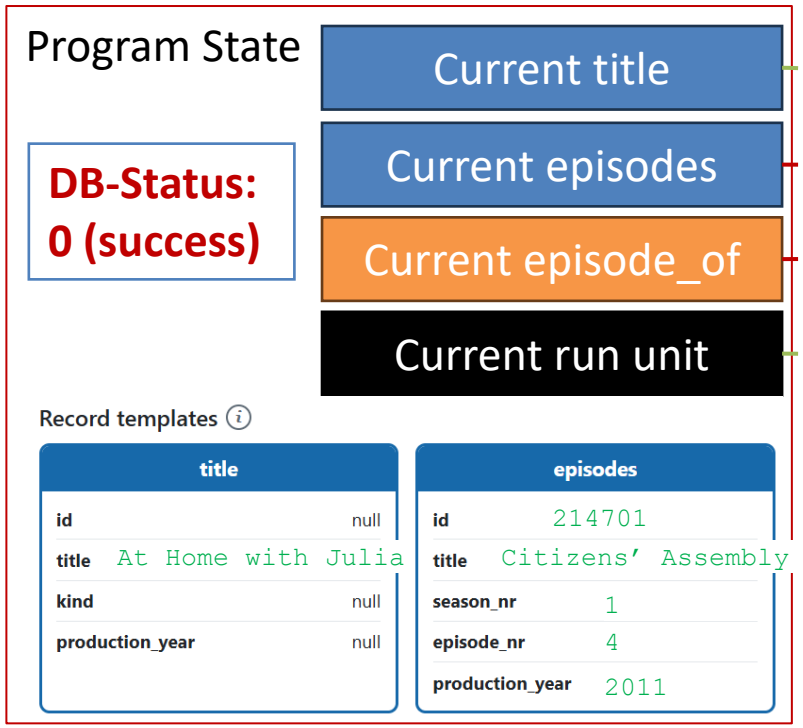
How do we know we found something?



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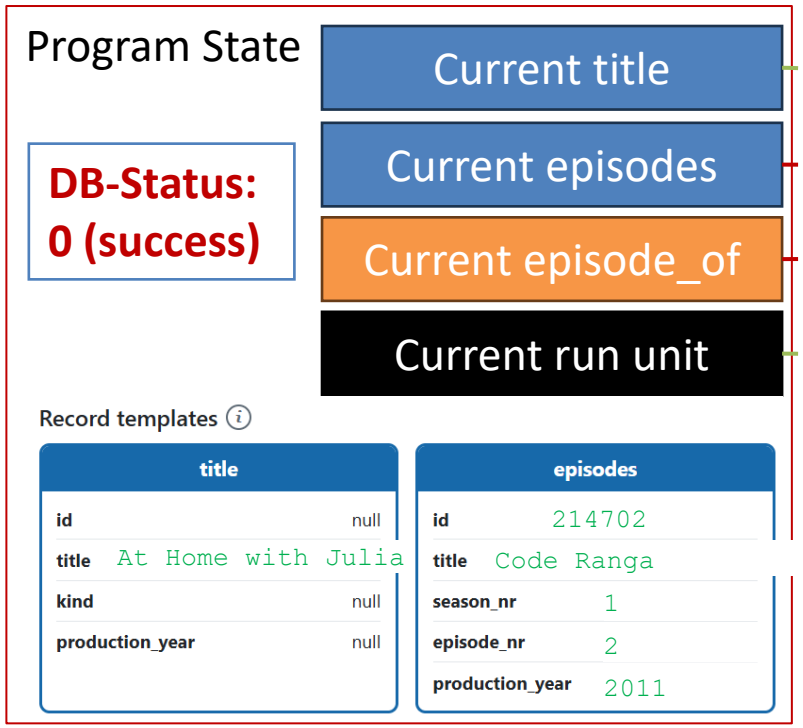

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fast forward for a few iterations…

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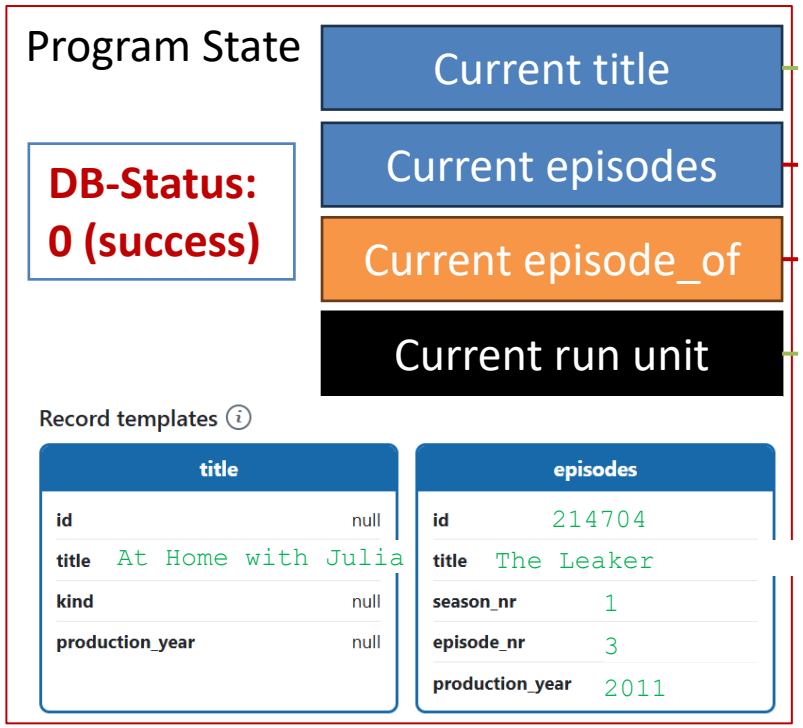

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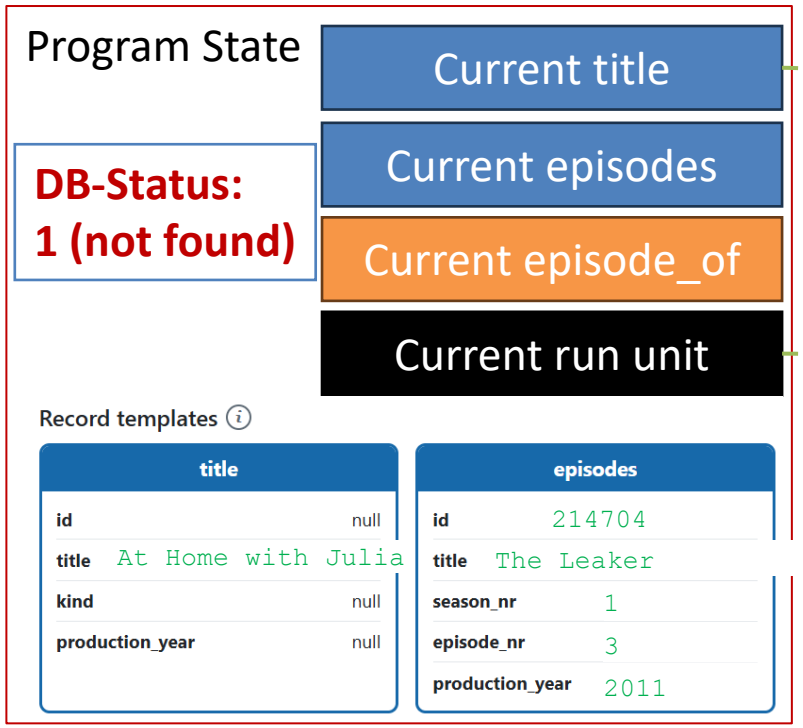

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The end

DBTG Commands

- A few more commands we have not covered.
  - How do we find all titles that are tv series?

```
title.kind := "tv series"
find any/duplicate title using kind;
```

  - How do we find all titles with no restrictions?

```
find first/duplicate title within all_titles;
```

  - How do we find the tv series that an episode belongs to? i.e., navigating from member to owner

```
find owner within episode_of;
```

Try it yourself in this week's recitation.

Quiz time

- Submit your answer in tophat.