ORMs and ERDs, OMG! Forward and Reverse Engineering Databases With Django's ORM and Migration Tools

Abe Kazemzadeh

SCALE23x, Pasadena, CA
abe.kazemzadeh AT stthomas DOT edu

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Outline

Motivation

- I teach mainly proprietary databases (Oracle), but I like to use open source tools
- I saw parallels between forward and reverse engineering features in ER diagram tools and Django
  - E.g. Oracle Data Modeler, MySQL Workbench, DBeaver, Erwin
  - makemigrations/migrate and inspectdb in Django
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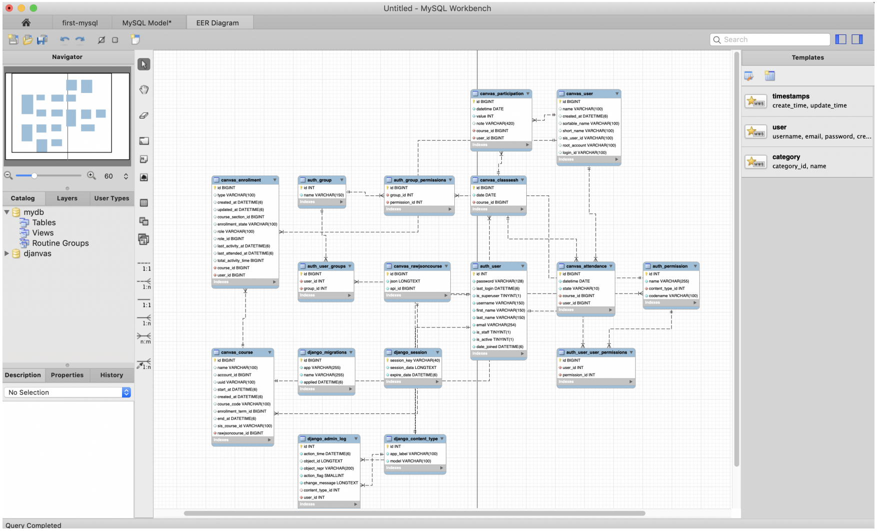

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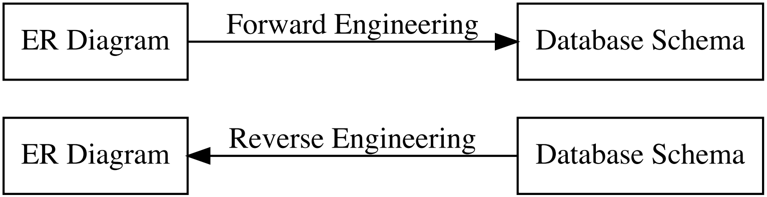

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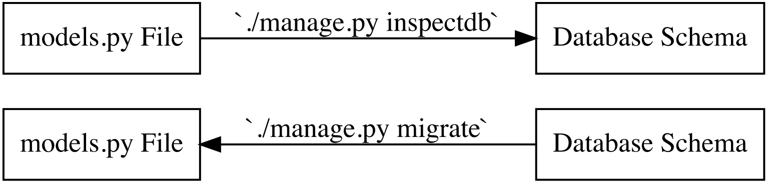
Django InspectDB and Migration



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- Describe and compare/contrast forward and reverse engineering to Django's migrations and inspectdb commands
- Give a tutorial example with MySQL workbench and Django
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- Show an alternative to ER diagramming using Django and Python's UML generation tool, `pyconvert` (from pylint package)
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Overview

Outline

Terminology

- SQL: Structured Query Language, how to talk to databases
  - DDL: data definition (creating table structure)
  - DML: data manpulation (selecting/updating/deleting)
- ER diagram: visualize databases, node ≡ table, edge≡foreign key relationship between tables
- Logical design vs relational design: is a many-to-many relationship shown as an edge or as an intersection/association table
- Forward engineering: convert/export an ER diagram into a database schema (CREATE TABLE statements)
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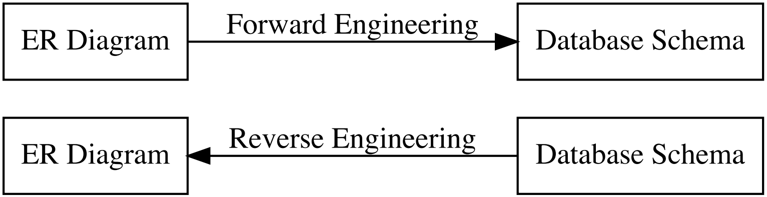

Examples

- DBeaver
- MySQL Workbench
- Oracle Data Modeler (free but not open source)
- Erwin (not free or open source)

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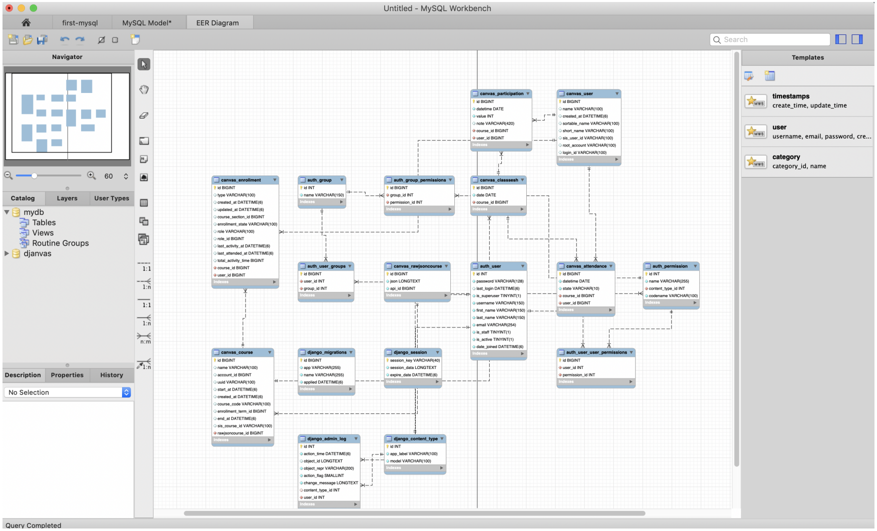

Pros and Cons of ER Diagram Fwd/Rev Engineering

Pros

- Visual representation
- GUI
- Management of Detail
- Ease for beginners
- May or may not be integrated in a DB IDE

Cons

- Tools often specfic to DBs
- Fwd/rev engineering features not always available
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- We will be considering a part of Django, the ORM (object relational mapper)
- This component deals with mapping objects, defined in Python code, to a relational database

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Django Migrations

- Roughly equivalent to forward engineering
  - But includes version info, data/DML in addition to schema/structure/DDL

Django Inspect DB

- Roughly equivalent to reverse engineering

Pros and Cons of Django ORM Migrations/Inspectdb

Pros

- Cross-database support
- Django is designed to be used as a library
- Command-line scripting support
- Does more than just fwd/rev engineering schemas/DDL

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Forward Engineering

- ER use-case: database architecture to SQL
- Django use-case: normal Django usage
    - Django manages SQL

Reverse Engineering

- ER use-case: visualize database structure
- Django use-case: convert existing DB structure to python code (model.py classes)
  - Django does not manage SQL (managed=False in the model)

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- We saw how we can use Django to convert between SQL and Python code
- We discussed different ERD software

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