```
import os
import time
import pandas as pd
 import requests
from sqlalchemy import create_engine, text
from dotenv import load_dotenv
 # Load environment variables
API_KEY = os.getenv('OMDB_API_KEY')
if not API_KEY:
    raise ValueError("OMDB_API_KEY not found in .env file")
engine = create_engine('sqlite:///movie_pipeline.db')
def extract_csv_data():
      """Extract data from CSV files."""
movies_df = pd.read_csv('movies.csv')
ratings_df = pd.read_csv('ratings.csv')
return movies_df, ratings_df
def fetch_omdb_data(title):
      """Fetch additional data from OMDb API."""
url = f"http://www.omdbapi.com/?t={title}&apikey={API_KEY}"
response = requests.get(url)
      if response.status_code == 200:
   data = response.json()
   if data.get('Response') == 'True':
                  return {
                         im {
    'director': data.get('Director', 'Unknown'),
    'plot': data.get('Plot', 'Unknown'),
    'box_office': data.get('BoxOffice', 'Unknown')
      return None # Movie not found
def transform_data(movies_df, ratings_df):
      Transion and entrich data. # Clean movies data movies data movies_df['year'] = pd.to_numeric(movies_df['title'].str.extract(r'\((\d{4})\))', expand=False), errors='coerce') movies_df['title'] = movies_df['title'].str.replace(r'\s*\(\d{4}\)', '', regex=True) movies_df['genres'] = movies_df['genres'].str.replace(r'\,',')
      # Enrich with API data
enriched_movies = []
      for _, row in movies_df.iterrows():
             api_data = fetch_omdb_data(row['title'])
if api_data:
                   row = row.copy()
                   row.update(api_data)
             else:
                  row['director'] = 'Unknown'
row['plot'] = 'Unknown'
row['box_office'] = 'Unknown'
             # Feature engineering: Add decade
if pd.notna(row['year']):
   row['decade'] = f"{(row['year'] // 10) * 10}s"
             else:
                   row['decade'] = 'Unknown
             enriched_movies.append(row)
             time.sleep(1) # Rate limit handling
      enriched movies df = pd.DataFrame(enriched movies)
      ratings df['timestamp'] = pd.to datetime(ratings df['timestamp'], unit='s')
       return enriched_movies_df, ratings_df
def load_data(movies_df, ratings_df):
      """Load data into the database with engine.connect() as conn:
             # Load movies (check for existence)
for _, row in movies_df.iterrows():
                   conn.execute(query, row.to_dict())
             # Load ratings (check for existence via primary key)
for _, row in ratings_df.iterrows():
                   query = text("""

INSERT OR IGNORE INTO ratings (userId, movieId, rating, timestamp)
VALUES (:userId, :movieId, :rating, :timestamp)
                  conn.execute(query, {
   'userId': row['userId'],
   'movieId': row['movieId'],
   'rating': row['rating'],
                         'timestamp': row['timestamp'].timestamp() # Convert to int
            conn.commit()
     __name__ == "__main__":
print("Starting ETL pipeline...")
movies_df, ratings_df = extract_csv_data()
movies_df, ratings_df = transform_data(movies_df, ratings_df)
      load_data(movies_df, ratings_df)
print("ETL pipeline completed!")
```