The University of Texas at Austin
Hildebrand Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

MAY 8, 2020

CS 327E ELEMENTS OF DATABASES: PROJECT FINAL PRESENTATION

VAXONOMICS

VEE LEE KOH AND NOAH PLACKE
The University of Texas at Austin

PROJECT OVERVIEW

Primary Dataset :

- Vaccine Adverse Event Reporting System (VAERS) 2018 by CDC
    - Adverse Events, Vaccines, and Symptoms

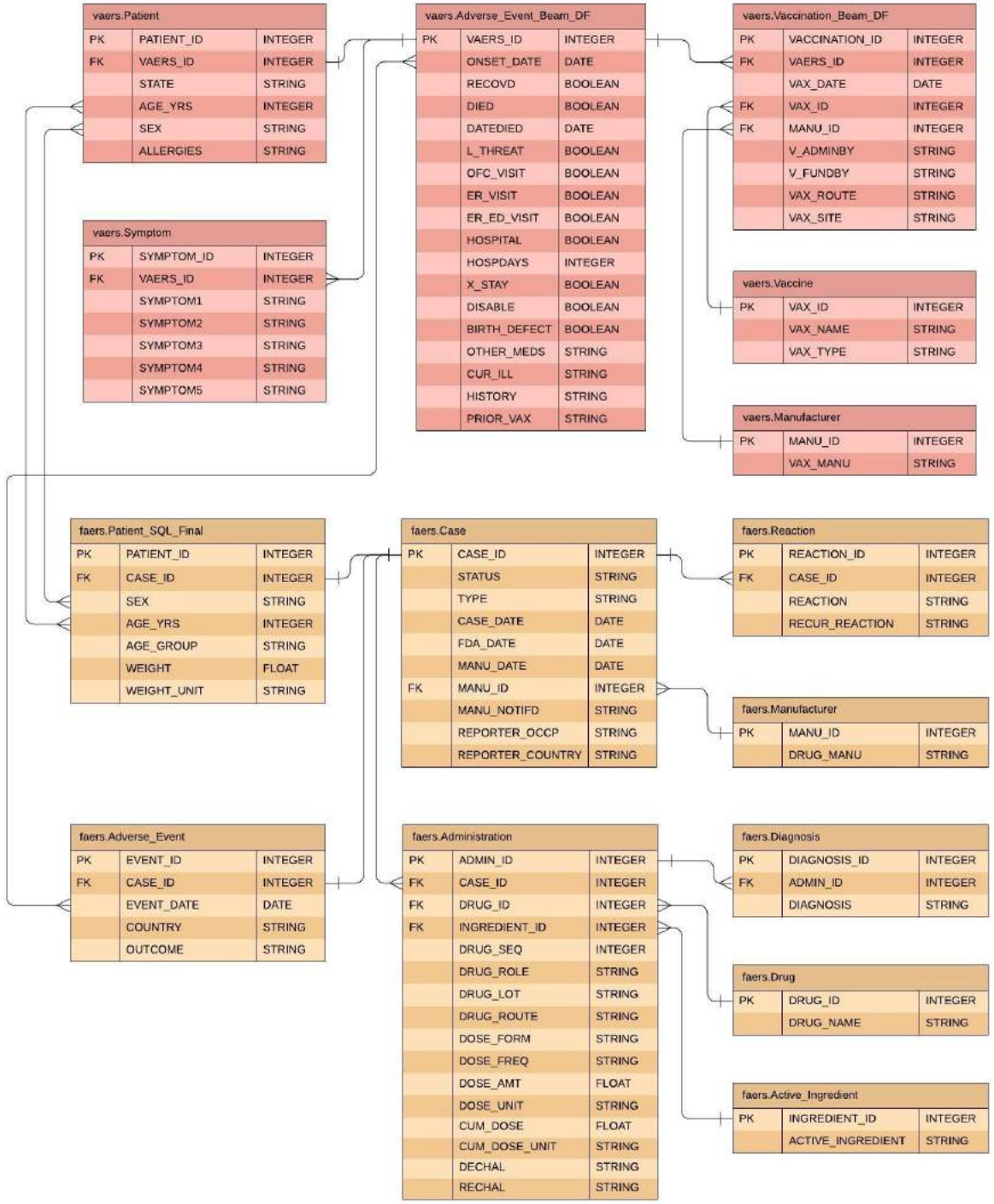
Secondary Dataset :

- FDA Adverse Event Reporting System (FAERS) Q4 2018 by FDA
    - Demographics, Drugs, Reactions, Outcomes, and Diagnosis

***Goal of Project** :*

- Investigate if there is correlation between adverse events and attributes of patients, vaccines, drugs, or external factors

MODELED TABLES ERD



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Beam Transforms on VAERS Dataset

***Adverse Event Table** :*

- Convert String attributes into Booleans
    - Recovered and Birth defect
- Standardize values of Boolean attributes
    - Died, Life threatening, Hospitalized, ER visit, Disabled, etc.

***Vaccination Table** :*

- Standardize unknown values of String attributes

```python
class FormatRECOVDFn(beam.DoFn):
  def process(self, element):
    # Process to convert RECOVD attribute into boolean
    # Attribute type will be changed to boolean in schema
    event_record = element

    # get RECOVD attribute
    recovd = event_record.get('RECOVD')

    # print current RECOVD values
    print('Current RECOVD: ', recovd)

    # Convert RECOVD value into None if Unknown (U)
    if recovd == 'U':
        recovd = None
    # Convert RECOVD value into True if Yes (Y)
    elif recovd == 'Y':
        recovd = True
    # Convert RECOVD value into False if No (N)
    elif recovd == 'N':
        recovd = False

    # print new RECOVD values
    print('New RECOVD: ', recovd)

    # update advserse event records
    event_record['RECOVD'] = recovd

    # return advserse event records
    return [event_record]
```

ParDo Transform for ‘Recovered’ attribute

SQL Transforms on FAERS Dataset

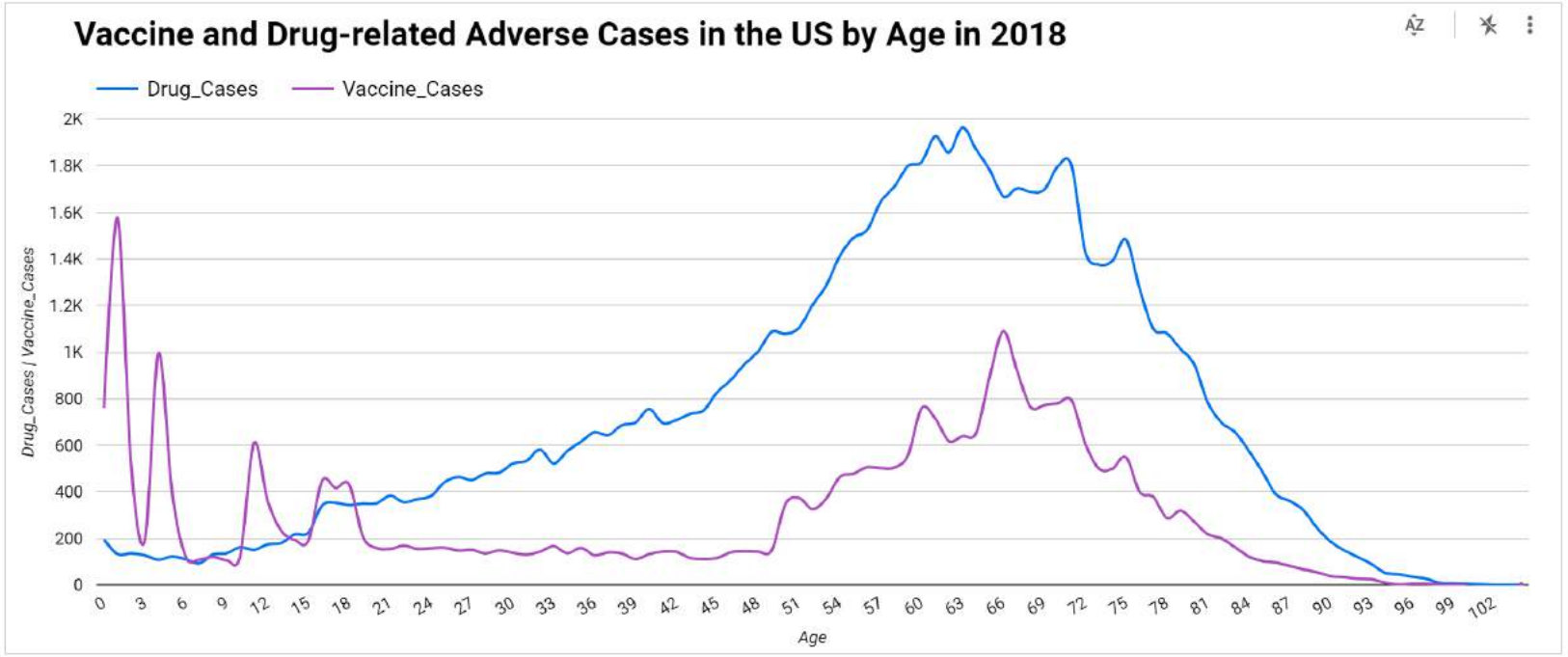
***Patient Table** :*

- Standardize **age** values into a single unit
    - Intermediate tables : Convert decades, months, weeks, days, and hours into years
    - Final table : Union all tables
    - Check if all records retained

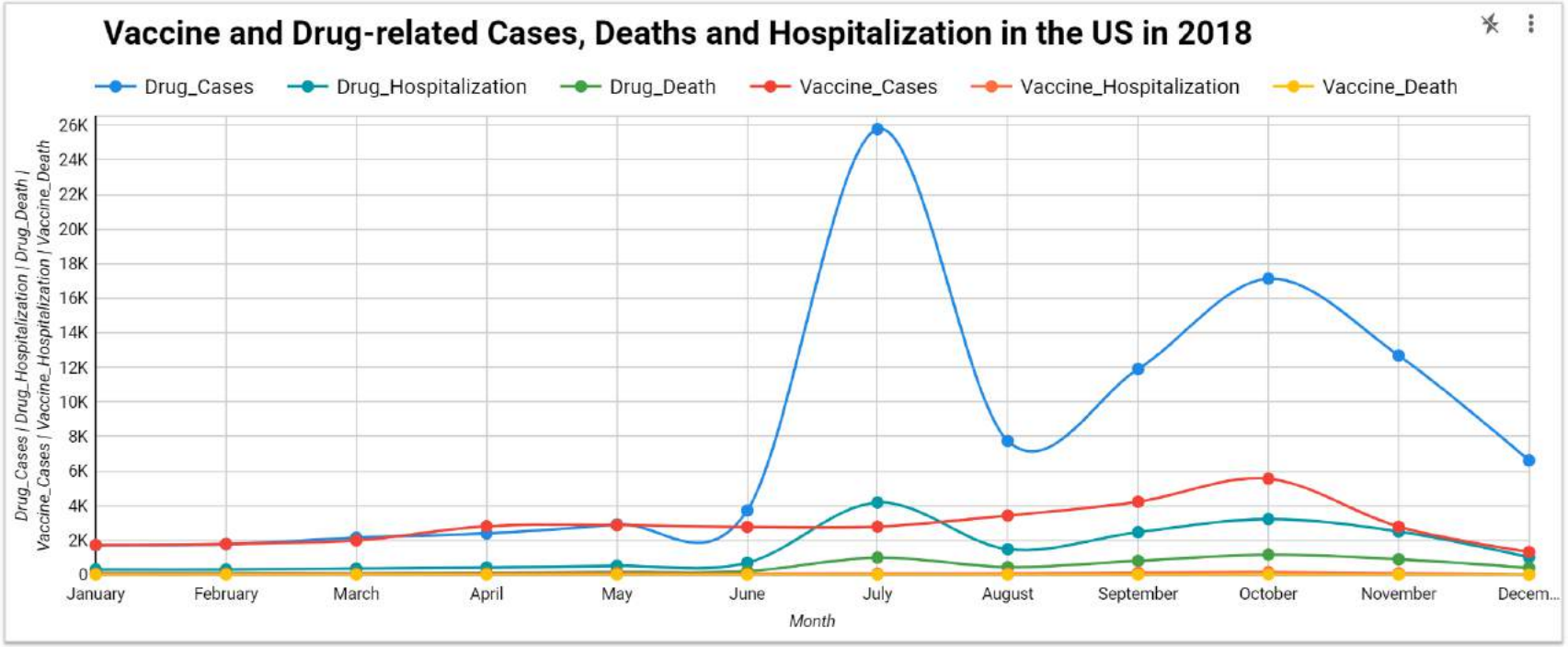
Cross - Dataset Queries

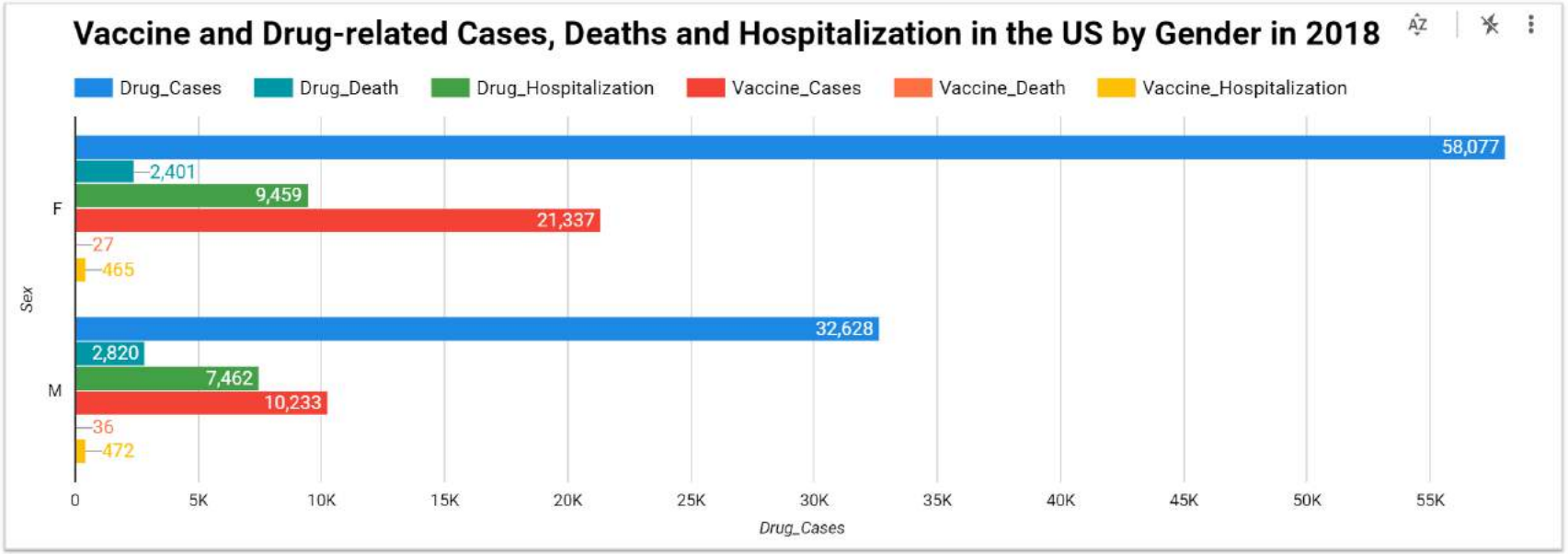
Joining Datasets *:*

- Full Outer Join : Vaccine and drug-related adverse events by **age**
- Inner Join : Adverse events, deaths and hospitalizations by **month**
- Inner Join : Adverse events, deaths and hospitalizations by **gender**



CROSS - DATASET VISUALS





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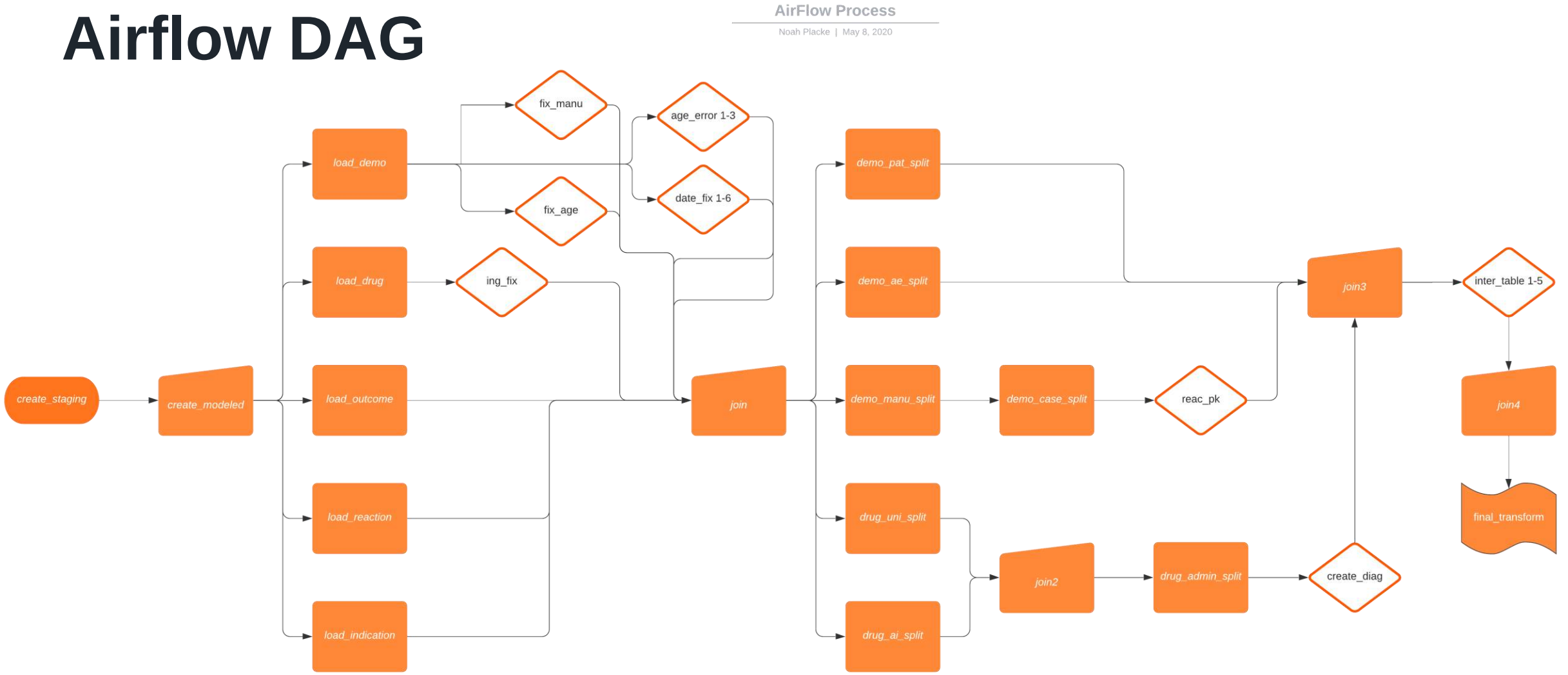
Airflow DAG


AirFlow Process
Noah Placke | May 8, 2020
fix_manu
age_error 1-3
load_demo
date_fix 1-6
fix_age
load_drug
ing_fix
create_staging
create_modeled
load_outcome
join
load_reaction
load_indication
demo_pat_split
demo_ae_split
demo_manu_split
demo_case_split
reac_pk
join3
inter_table 1-5
join4
drug_uni_split
join2
drug_admin_split
create_diag
drug_ai_split
final_transform

Future Improvements to Solution

***Data Required for Better Solution** :*

- Residential states of patients → Assess insurance coverage & healthcare quality by state
- Disease data → Join datasets by disease and count adverse events
- Standardize manufacturer names → Join datasets by manufacturer

THANK YOU!