TRANSFORMACIÓN DE DATOS AL MODELO DE DATOS OMOP-CDM

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More than 20 years teaching

open data - open source – open science

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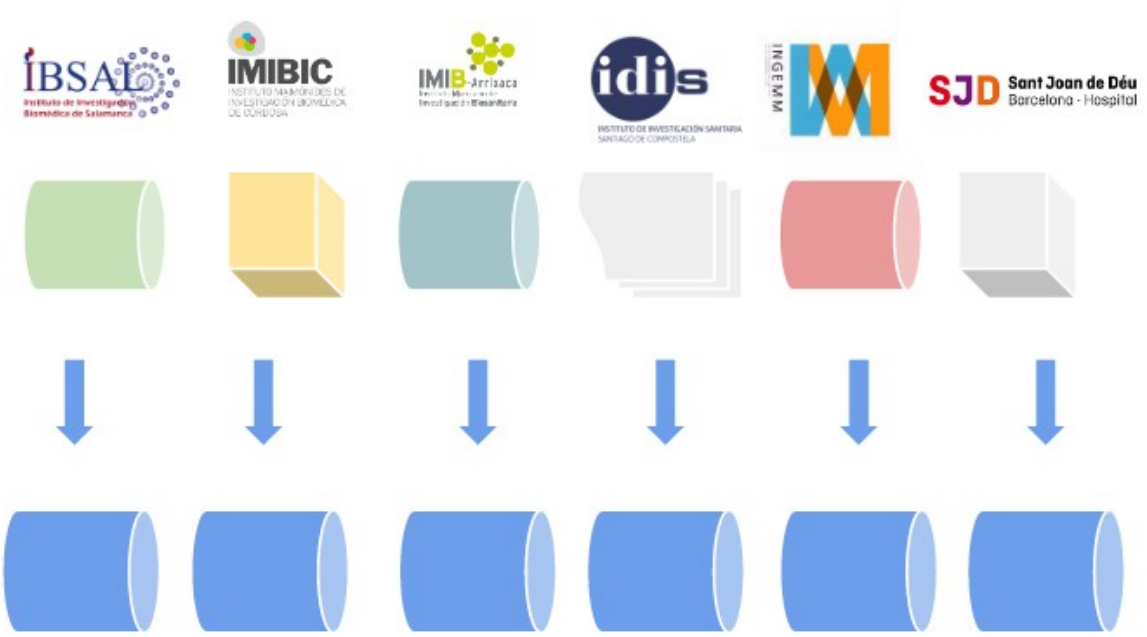
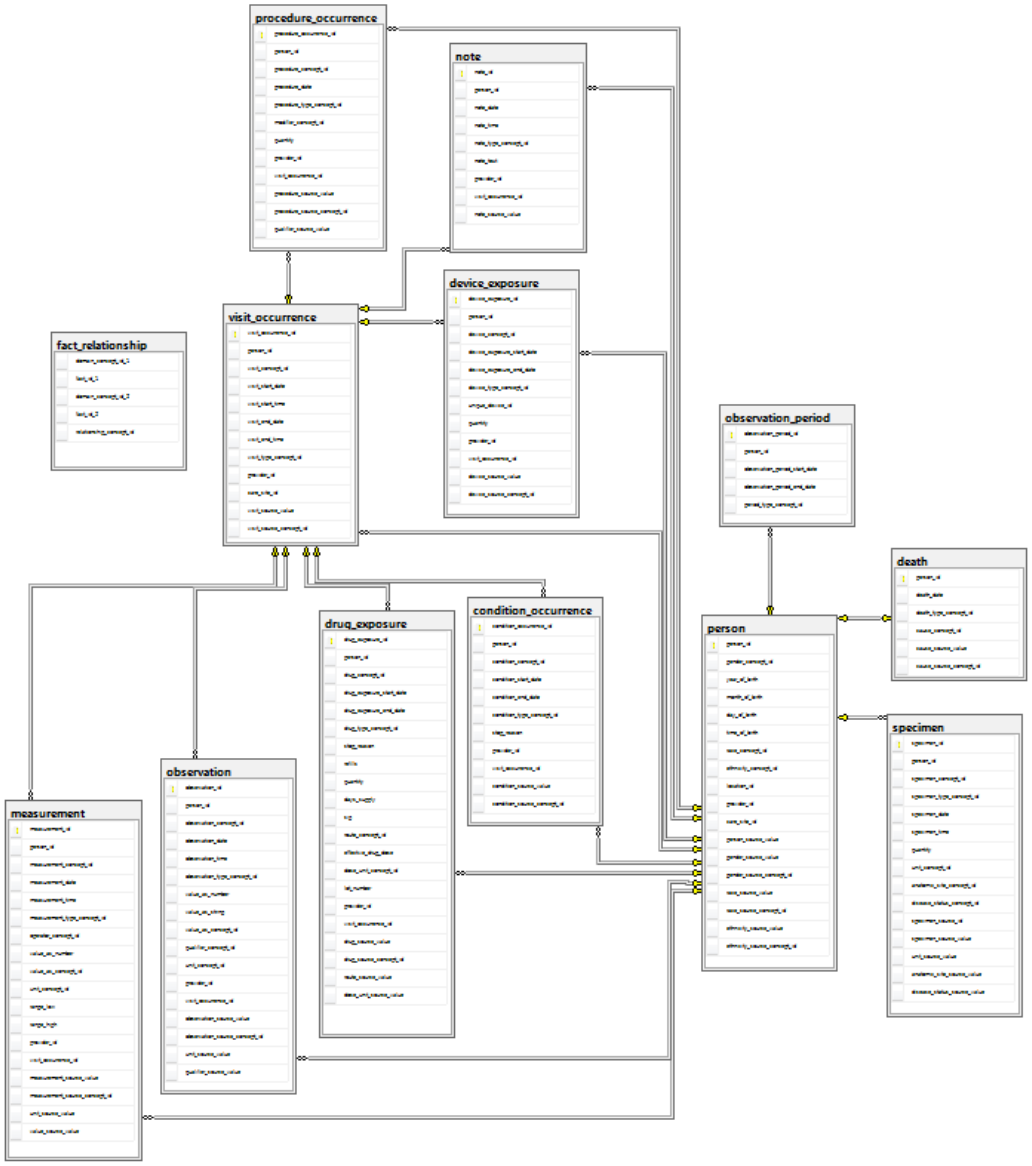
Barcelona Supercomputing Center
Centro Nacional de Supercomputación

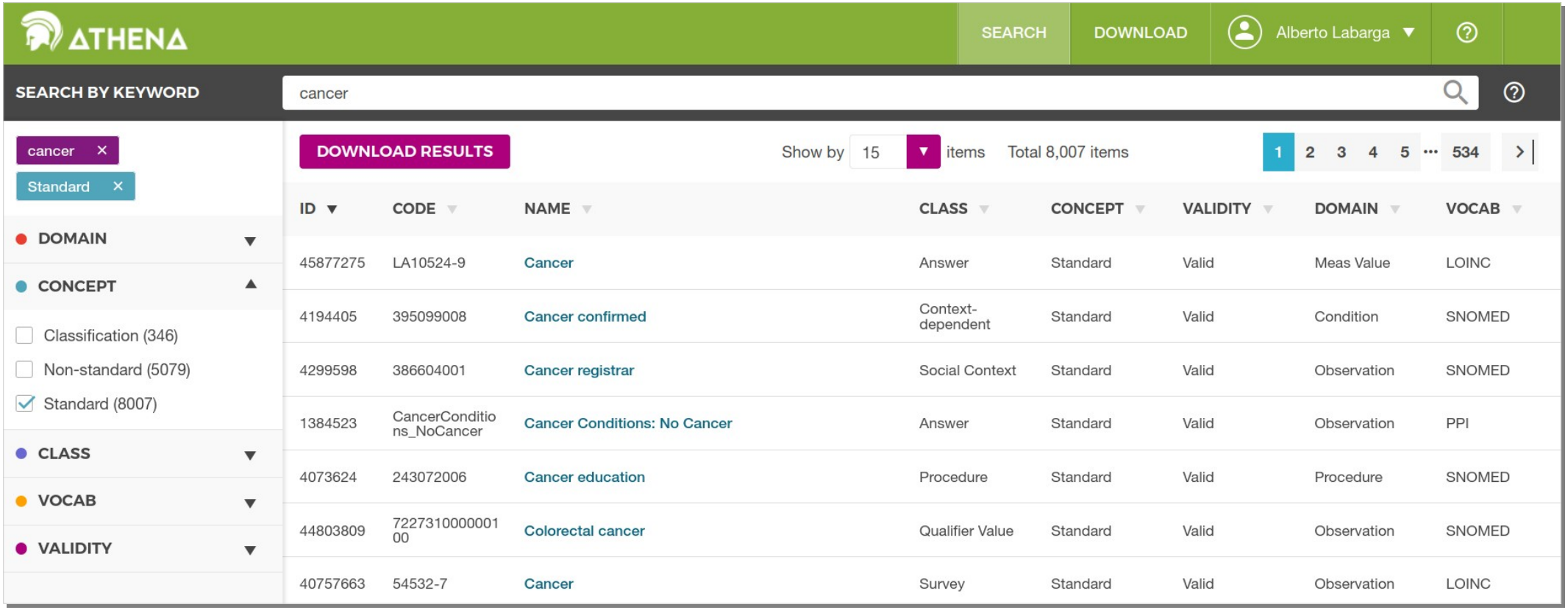

IBSAL
Instituto de Investigación Biomédica de Salamanca
IMIBIC
IMIB-Arrixaca
idis
INGEMM
SJD Sant Joan de Déu Barcelona · Hospital

OHDSI

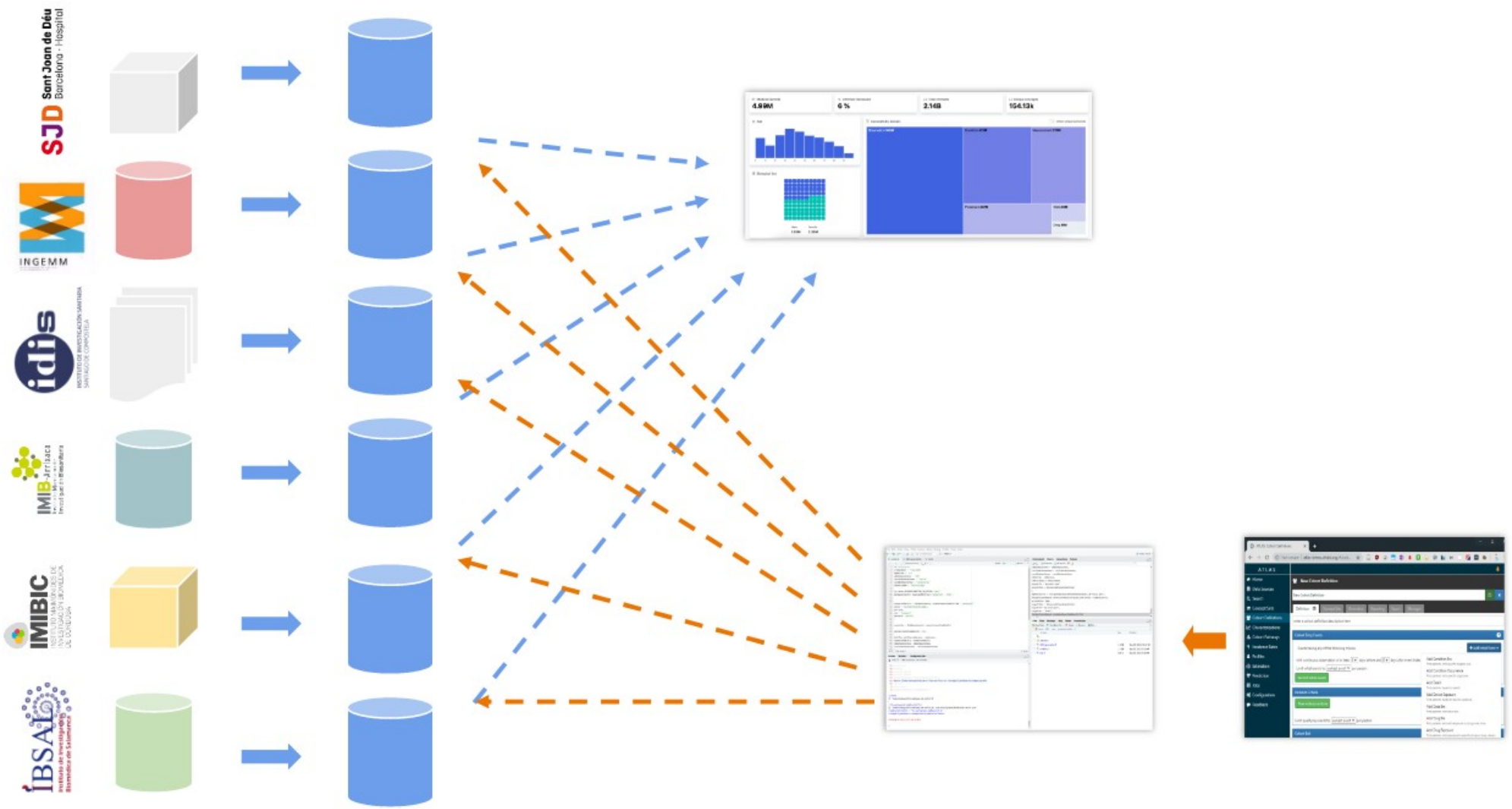
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS



https://ohdsi.github.io/CommonDataModel/



https://athena.ohdsi.org


Sant Joan de Déu
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Chapter 6 Extract Transform Load

Chapter leads: Clair Blacketer & Erica Voss

6.1 Introduction

In order to get from the native/raw data to the OMOP Common Data Model (CDM) we have to create an extract, transform, and load (ETL) process. This process should restructure the data to the CDM, and add mappings to the Standardized Vocabularies, and is typically implemented as a set of automated scripts, for example SQL scripts. It is important that this ETL process is repeatable, so that it can be rerun whenever the source data is refreshed.

Creating an ETL is usually a large undertaking. Over the years, we have developed best practices, consisting of four major steps:

1. Data experts and CDM experts together design the ETL.
2. People with medical knowledge create the code mappings.
3. A technical person implements the ETL.

Extract

Source-specific routines to pull selected data from an external system.

Transform

Business logic specific to your organization to serve an analytics or operational use case.

Load

Destination specific routines to push data where it is going to be consumed.

Extract

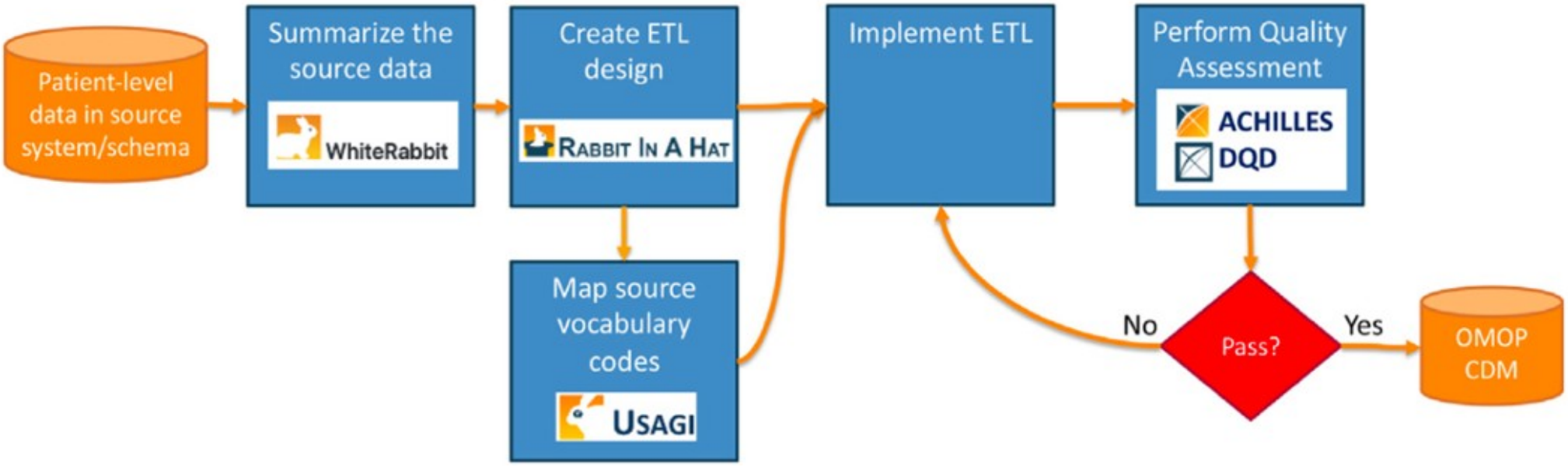
General-purpose routines to pull selected data from a source.

Load

General-purpose routines to push raw data where it is going to be consumed.

Transform

Business logic specific to your organization to serve an analytics or operational use case with SQL / dbt / ...


Patient-level data in source system/schema
Summarize the source data
WhiteRabbit
Create ETL design
RABBIT IN A HAT
Map source vocabulary codes
USAGI
Implement ETL
Perform Quality Assessment
ACHILLES
DQD
Pass?
No
Yes
OMOP CDM

White Rabbit scans source data & creates a csv report on the source data

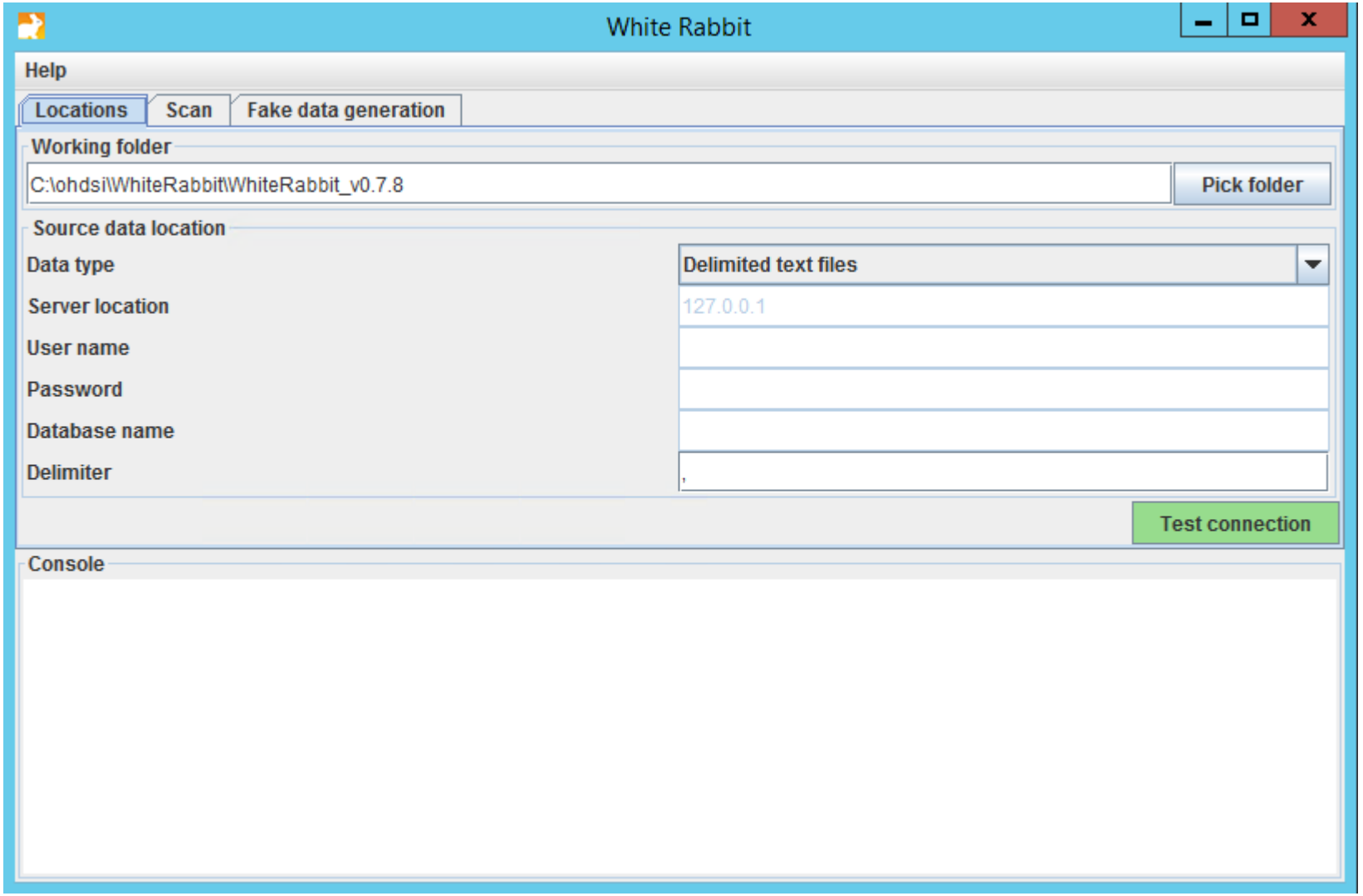
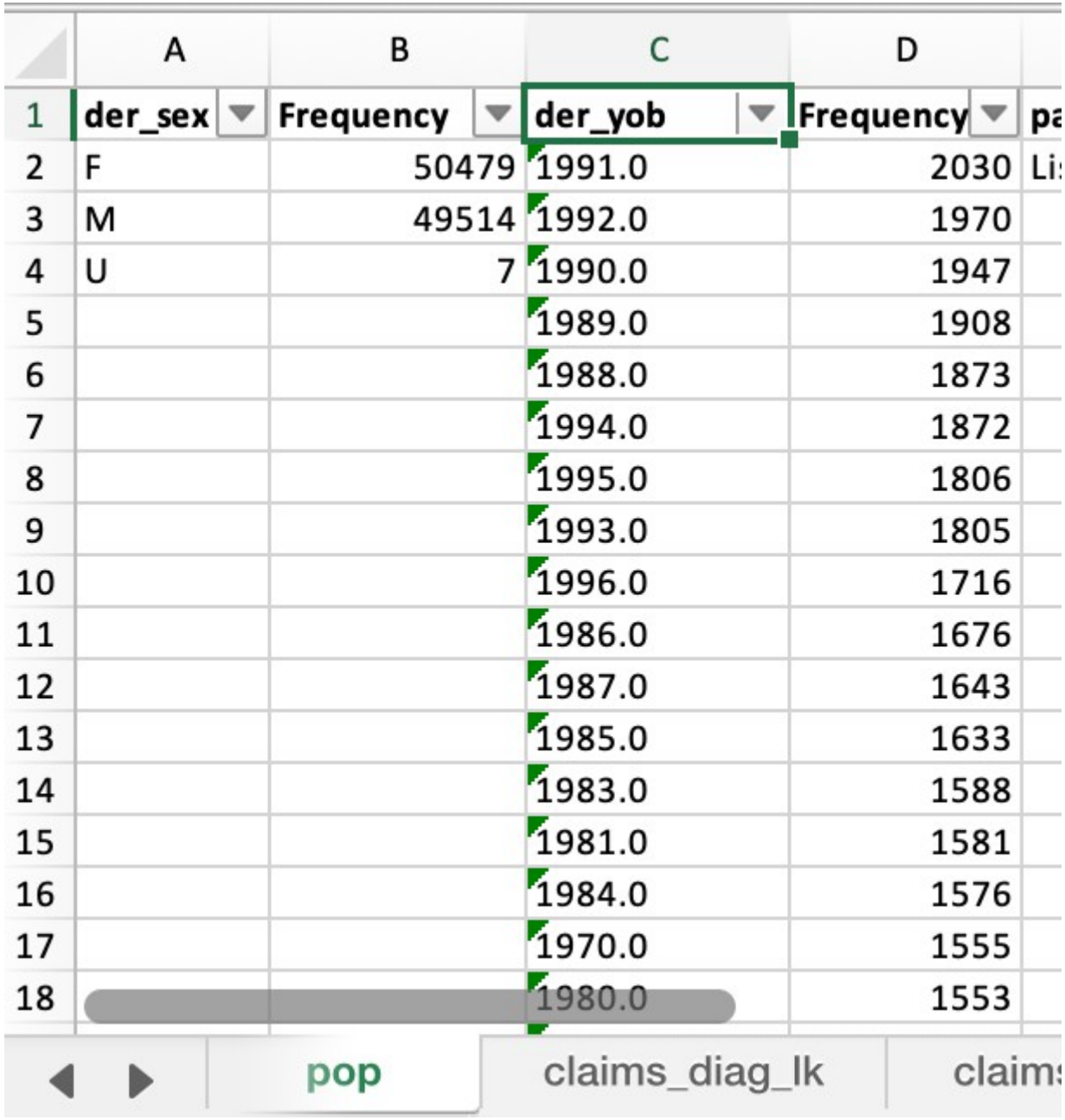


Table	Field	Description	Type	Max length	N rows
pop	der_sex		character	1	16374539
pop	der_yob		double pre	6	16374539
pop	pat_id		character	64	16374539
pop	pat_hash_id		character	16	16374539
pop	pmtx_flag		numeric	1	16374539
pop	anon_ims_pat_id		character	11	16374539
pop	pat_region		character	2	16374539
pop	pat_state		character	2	16374539
pop	pat_zip3		character	3	16374539
pop	grp_indv_cd		character	1	16374539
pop	mh_cd		character	1	16374539
pop	enr_rel		character	2	16374539
pop	temp_col1		character	0	16374539
pop	temp_col2		character	0	16374539
pop	load_row_id		bigint	9	16374539
claims_diag_lk	person_source_valu		character	64	2992046684
claims_diag_lk	event_start_date		date	10	2992046684

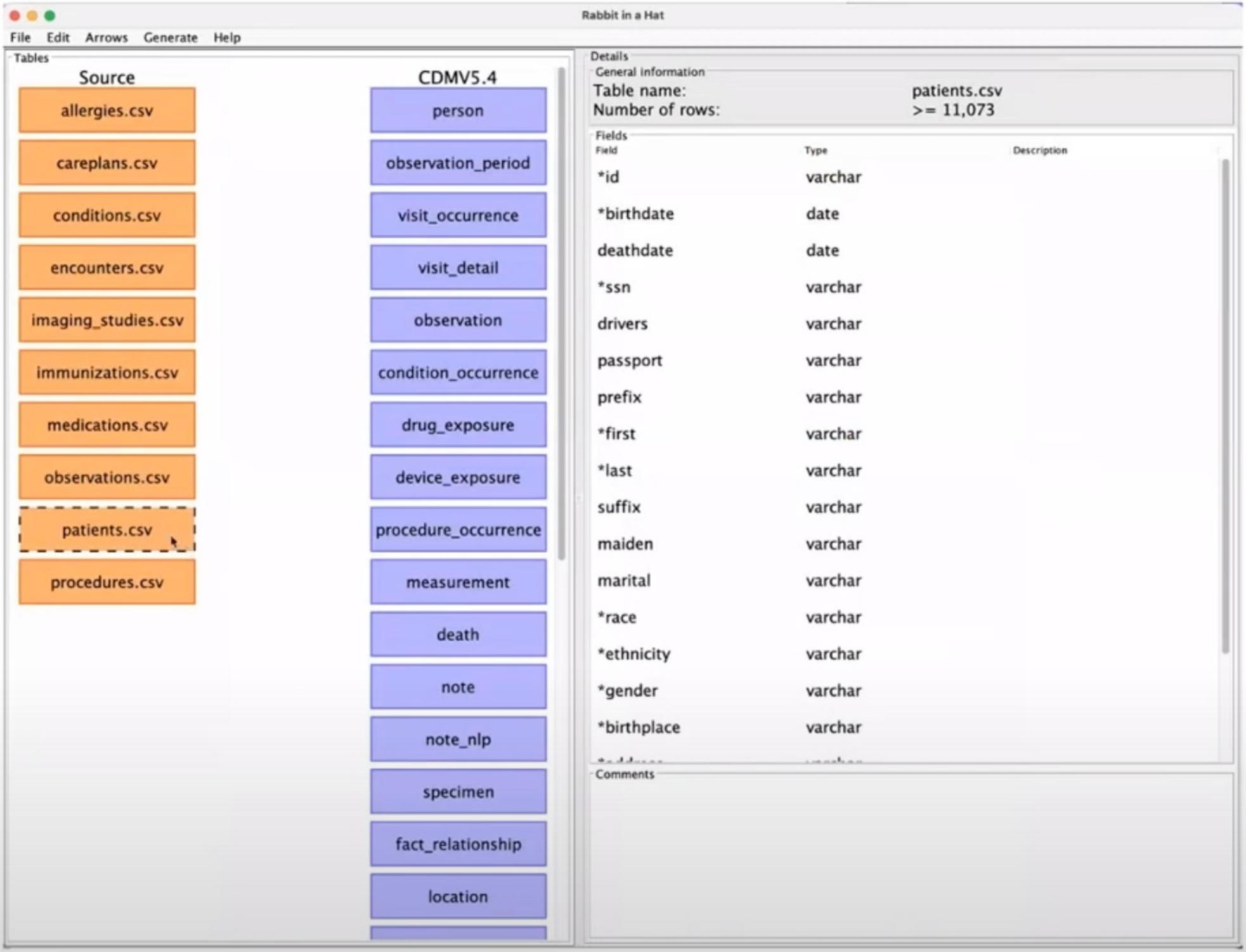


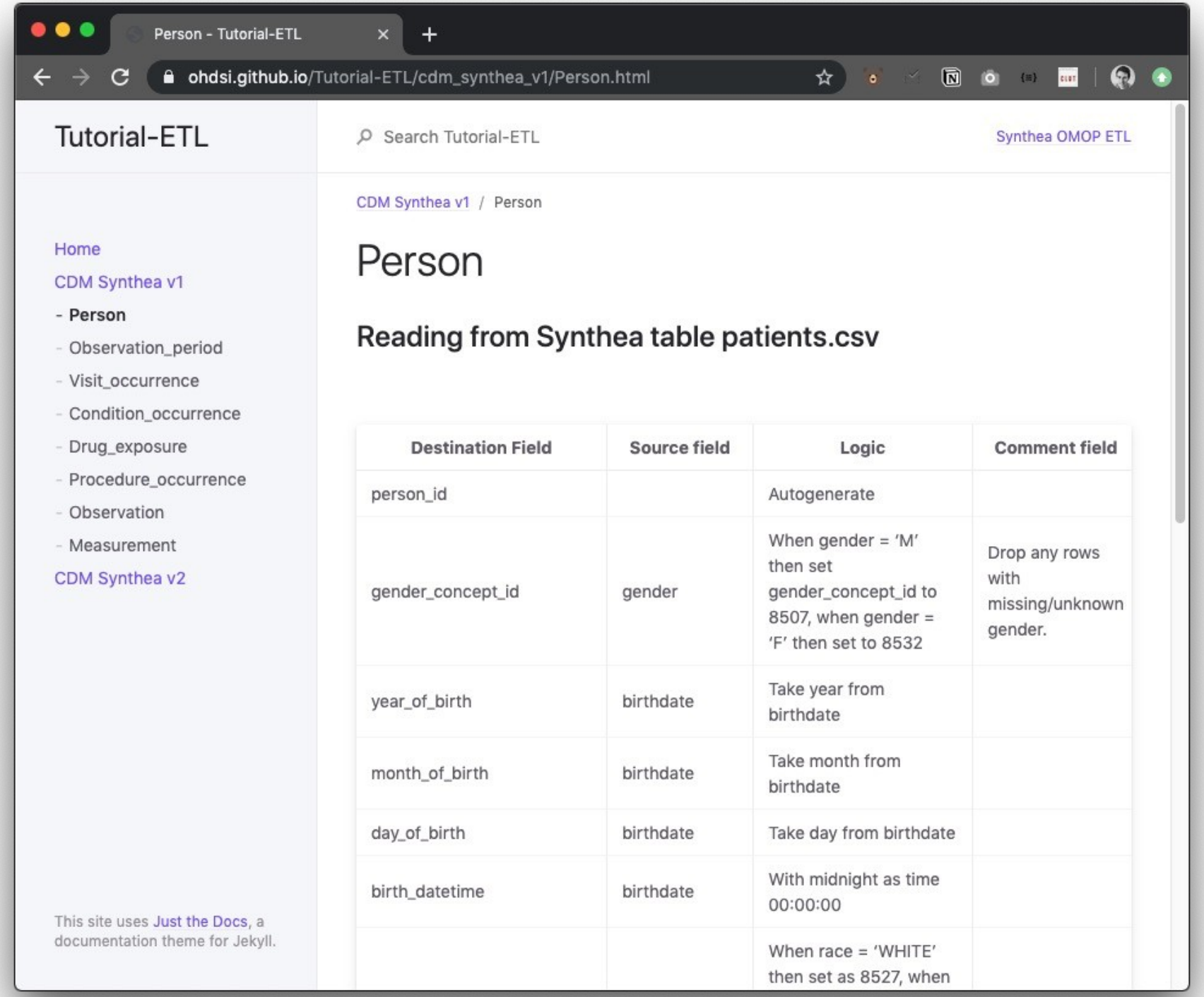
	A	B	C	D	
1	der_sex	Frequency	der_yob	Frequency	pa
2	F	50479	1991.0	2030	Li
3	M	49514	1992.0	1970	
4	U	7	1990.0	1947	
5			1989.0	1908	
6			1988.0	1873	
7			1994.0	1872	
8			1995.0	1806	
9			1993.0	1805	
10			1996.0	1716	
11			1986.0	1676	
12			1987.0	1643	
13			1985.0	1633	
14			1983.0	1588	
15			1981.0	1581	
16			1984.0	1576	
17			1970.0	1555	
18			1980.0	1553	

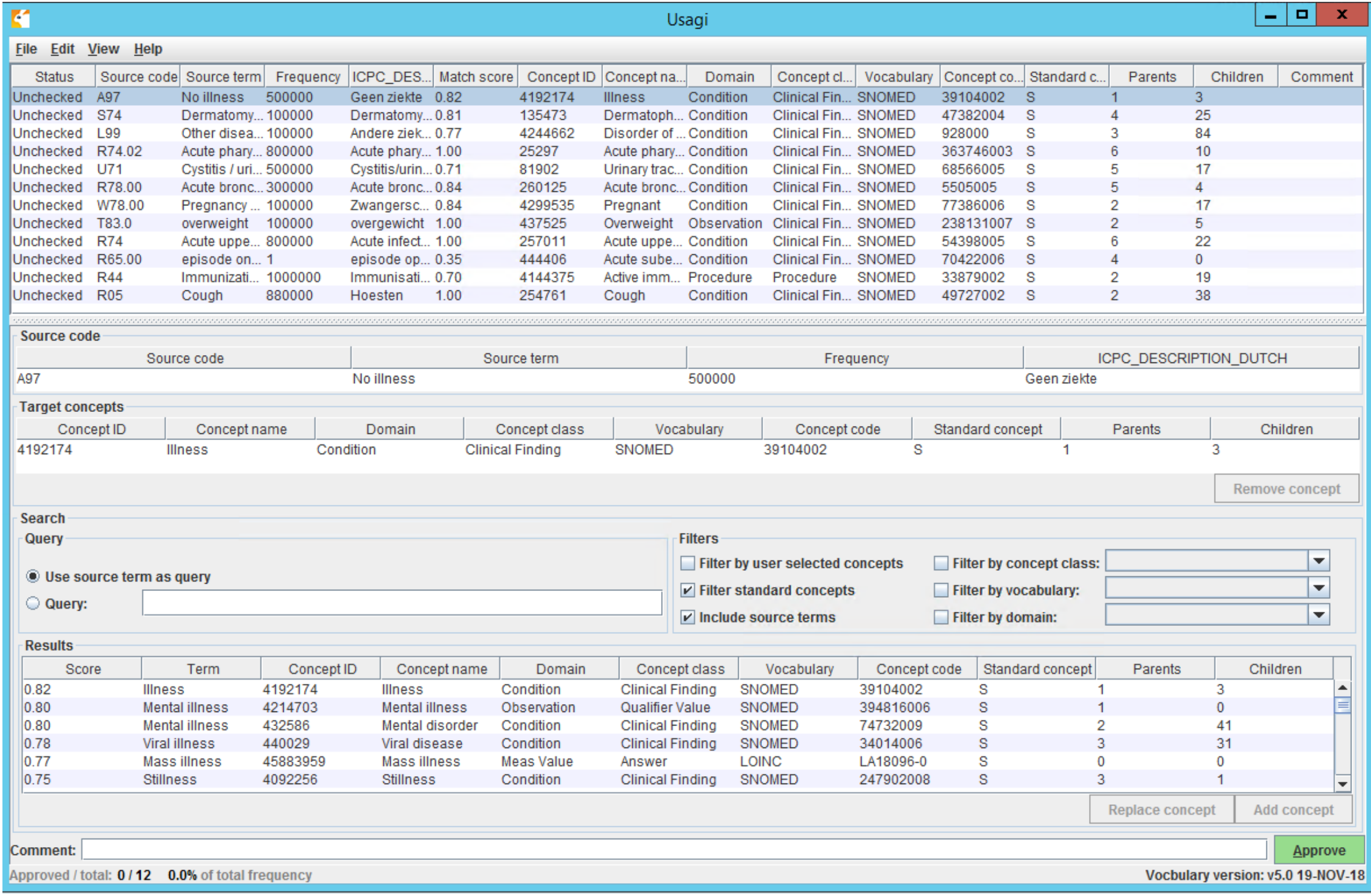
pop claims_diag_lk claims

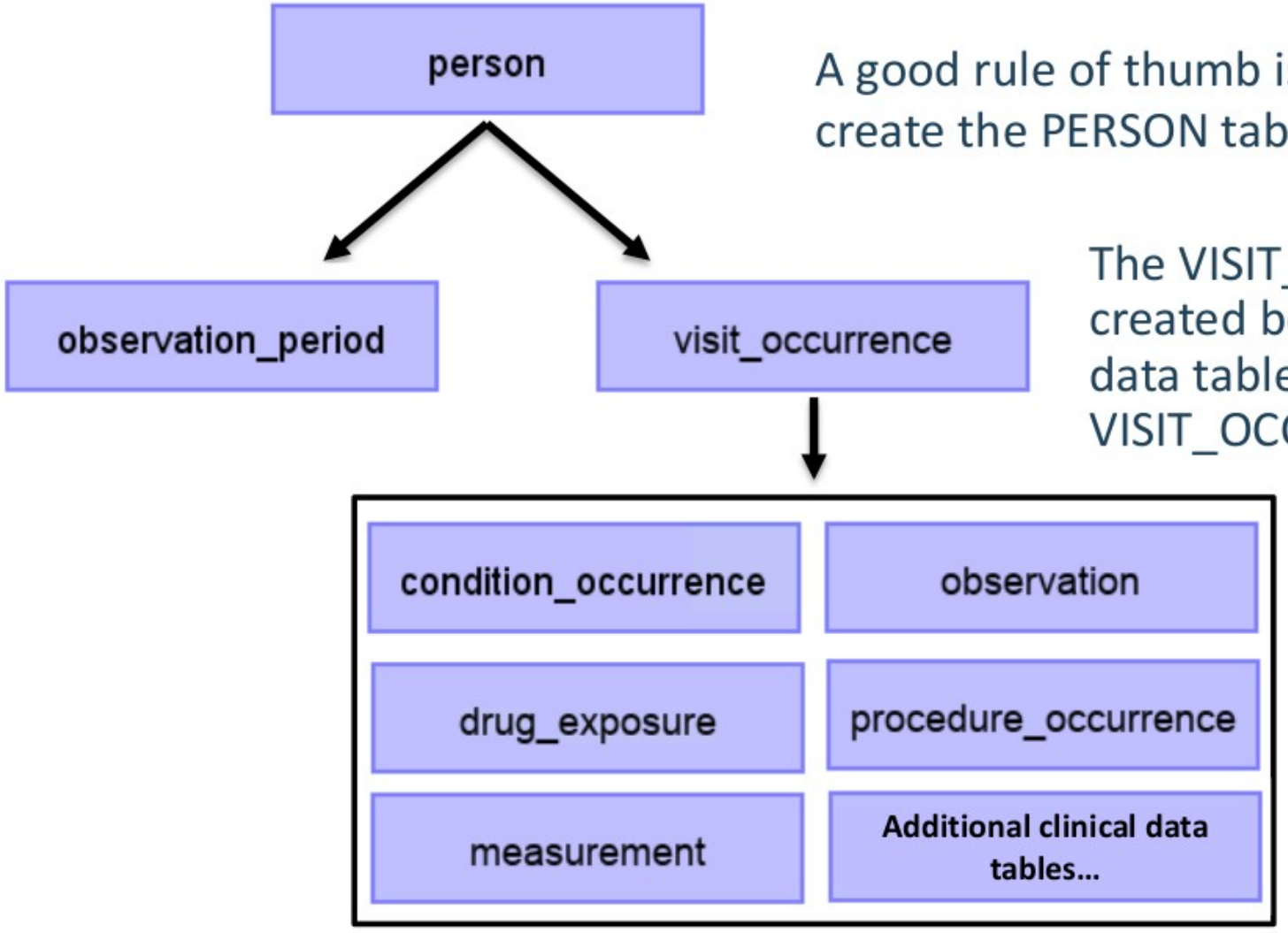
Read and display a White Rabbit scan document

• Provides a graphical interface to allow a user to connect source data to CDM tables


Rabbit in a Hat
File Edit Arrows Generate Help
Tables
Source
allergies.csv
careplans.csv
conditions.csv
encounters.csv
imaging_studies.csv
immunizations.csv
medications.csv
observations.csv
patients.csv
procedures.csv
CDMV5.4
person
observation_period
visit_occurrence
visit_detail
observation
condition_occurrence
drug_exposure
device_exposure
procedure_occurrence
measurement
death
note
note_nlp
specimen
fact_relationship
location
Details
General information
Table name: patients.csv
Number of rows: >= 11,073
Fields
Field Type Description
*id varchar
*birthdate date
deathdate date
*ssn varchar
drivers varchar
passport varchar
prefix varchar
*first varchar
*last varchar
suffix varchar
maiden varchar
marital varchar
*race varchar
*ethnicity varchar
*gender varchar
*birthplace varchar
Comments

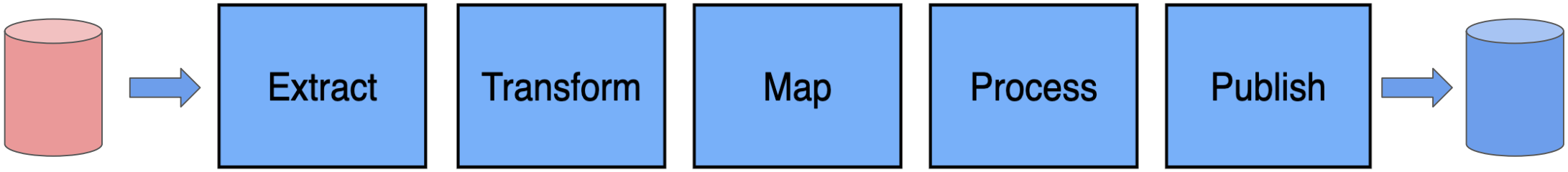

Person - Tutorial-ETL
ohdsi.github.io/Tutorial-ETL/cdm_synthea_v1/Person.html
Tutorial-ETL
Search Tutorial-ETL
Synthea OMOP ETL
Home
CDM Synthea v1
- Person
- Observation_period
- Visit_occurrence
- Condition_occurrence
- Drug_exposure
- Procedure_occurrence
- Observation
- Measurement
CDM Synthea v2
This site uses Just the Docs, a documentation theme for Jekyll.
CDM Synthea v1 / Person
Person
Reading from Synthea table patients.csv
Destination Field
Source field
Logic
Comment field
person_id
Autogenerate
gender_concept_id
gender
When gender = 'M' then set gender_concept_id to 8507, when gender = 'F' then set to 8532
Drop any rows with missing/unknown gender.
year_of_birth
birthdate
Take year from birthdate
month_of_birth
birthdate
Take month from birthdate
day_of_birth
birthdate
Take day from birthdate
birth_datetime
birthdate
With midnight as time 00:00:00
When race = 'WHITE' then set as 8527, when


Usagi
File Edit View Help
Status Source code Source term Frequency ICPC_DES... Match score Concept ID Concept na... Domain Concept cl... Vocabulary Concept co... Standard c... Parents Children Comment
Unchecked A97 No illness 500000 Geen ziekte 0.82 4192174 Illness Condition Clinical Fin... SNOMED 39104002 S 1 3
Unchecked S74 Dermatomy... 100000 Dermatomy... 0.81 135473 Dermatoph... Condition Clinical Fin... SNOMED 47382004 S 4 25
Unchecked L99 Other disea... 100000 Andere ziek... 0.77 4244662 Disorder of ... Condition Clinical Fin... SNOMED 928000 S 3 84
Unchecked R74.02 Acute phary... 800000 Acute phary... 1.00 25297 Acute phary... Condition Clinical Fin... SNOMED 363746003 S 6 10
Unchecked U71 Cystitis / uri... 500000 Cystitis/urin... 0.71 81902 Urinary trac... Condition Clinical Fin... SNOMED 68566005 S 5 17
Unchecked R78.00 Acute bronc... 300000 Acute bronc... 0.84 260125 Acute bronc... Condition Clinical Fin... SNOMED 5505005 S 5 4
Unchecked W78.00 Pregnancy ... 100000 Zwangersc... 0.84 4299535 Pregnant Condition Clinical Fin... SNOMED 77386006 S 2 17
Unchecked T83.0 overweight 100000 overgewicht 1.00 437525 Overweight Observation Clinical Fin... SNOMED 238131007 S 2 5
Unchecked R74 Acute uppe... 800000 Acute infect... 1.00 257011 Acute uppe... Condition Clinical Fin... SNOMED 54398005 S 6 22
Unchecked R65.00 episode on... 1 episode op... 0.35 444406 Acute sube... Condition Clinical Fin... SNOMED 70422006 S 4 0
Unchecked R44 Immunizati... 1000000 Immunisati... 0.70 4144375 Active imm... Procedure Procedure SNOMED 33879002 S 2 19
Unchecked R05 Cough 880000 Hoesten 1.00 254761 Cough Condition Clinical Fin... SNOMED 49727002 S 2 38
Source code
Source code Source term Frequency ICPC_DESCRIPTION_DUTCH
A97 No illness 500000 Geen ziekte
Target concepts
Concept ID Concept name Domain Concept class Vocabulary Concept code Standard concept Parents Children
4192174 Illness Condition Clinical Finding SNOMED 39104002 S 1 3
Remove concept
Search
Query
Use source term as query
Query:
Filters
Filter by user selected concepts
Filter standard concepts
Include source terms
Filter by concept class:
Filter by vocabulary:
Filter by domain:
Results
Score Term Concept ID Concept name Domain Concept class Vocabulary Concept code Standard concept Parents Children
0.82 Illness 4192174 Illness Condition Clinical Finding SNOMED 39104002 S 1 3
0.80 Mental illness 4214703 Mental illness Observation Qualifier Value SNOMED 394816006 S 1 0
0.80 Mental illness 432586 Mental disorder Condition Clinical Finding SNOMED 74732009 S 2 41
0.78 Viral illness 440029 Viral disease Condition Clinical Finding SNOMED 34014006 S 3 31
0.77 Mass illness 45883959 Mass illness Meas Value Answer LOINC LA18096-0 S 0 0
0.75 Stillness 4092256 Stillness Condition Clinical Finding SNOMED 247902008 S 3 1
Replace concept
Add concept
Comment:
Approve
Approved / total: 0 / 12 0.0% of total frequency
Vocbulary version: v5.0 19-NOV-18



A good rule of thumb is to always create the PERSON table first

The VISIT_OCCURRENCE table must be created before the standardized clinical data tables as they all refer to the VISIT_OCCURRENCE_ID


Extract
Transform
Map
Process
Publish

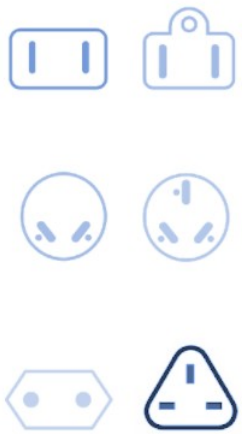
Extract

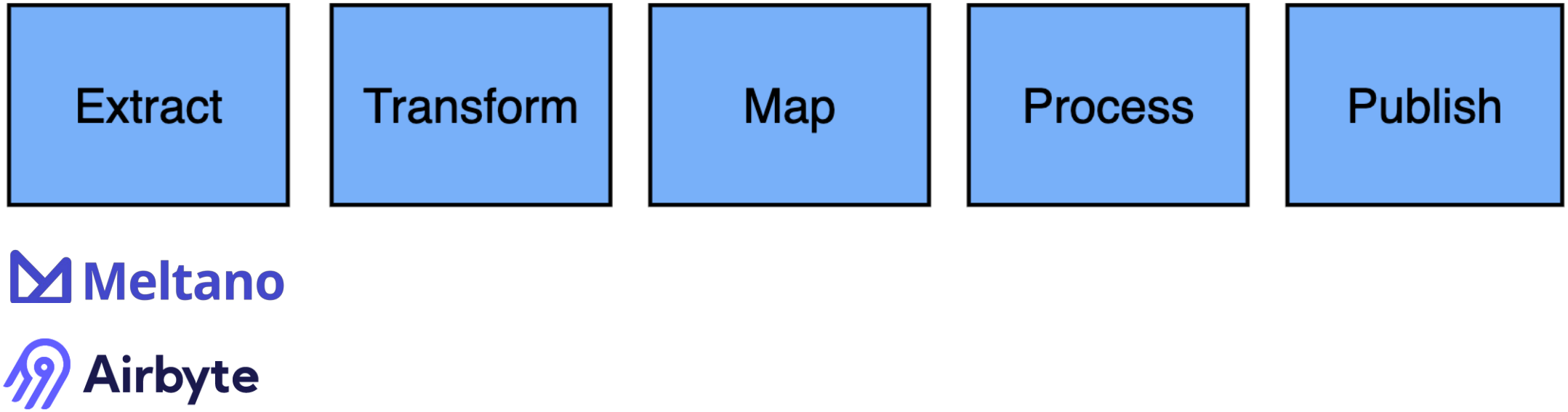
Transform

Map

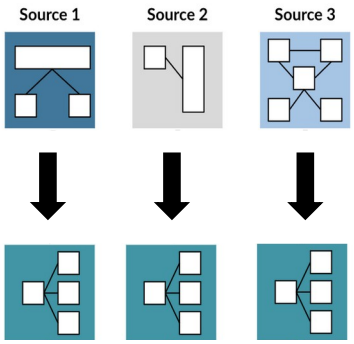
Process

Publish




Extract
Transform
Map
Process
Publish
Meltano
Airbyte

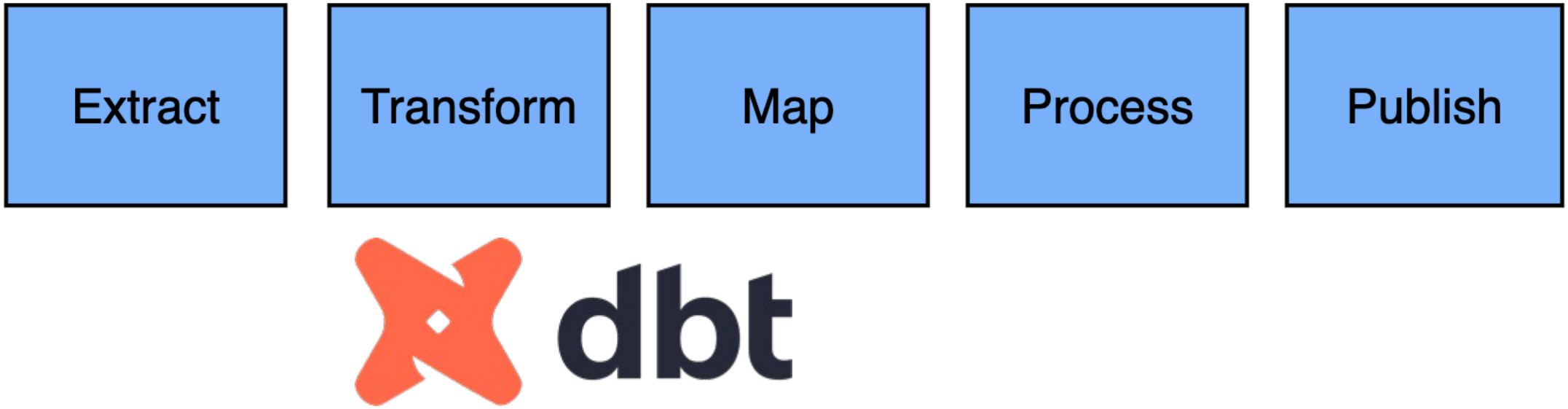
Extract | Transform | Map | Process | Publish

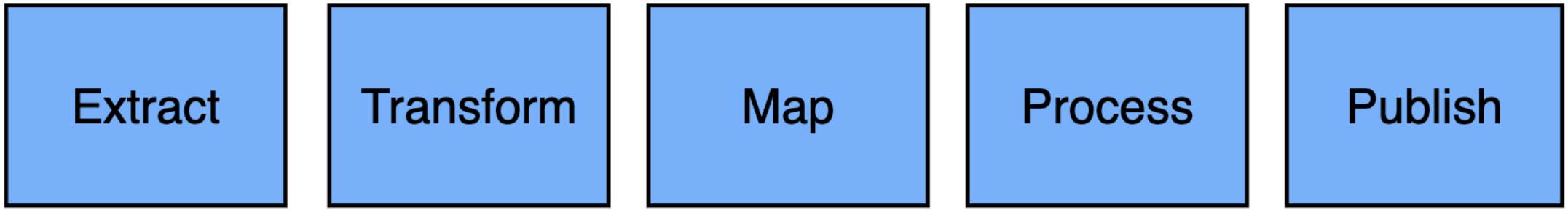


Esquema de datos común

La misma estructura de base de datos

[Observational Medical Outcomes Partnership (OMOP) CDM]


Extract
Transform
Map
Process
Publish
dbt




```
select
    {{ create_id_from_str('"Id"::text')}} AS person_id,
    {{ gender_concept_id ('"GENDER"') }} AS gender_concept_id,
    date_part('year', "BIRTHDATE"::DATE)::INT AS year_of_birth,
    date_part('month', "BIRTHDATE"::DATE)::INT AS month_of_birth,
    date_part('day', "BIRTHDATE"::DATE)::INT AS day_of_birth,
    "BIRTHDATE"::TIMESTAMP AS birth_datetime,
    {{ race_concept_id('"RACE"') }}  AS race_concept_id,
    {{ ethnicity_concept_id('"ETHNICITY"') }} AS ethnicity_concept_id,
    NULL::INT AS location_id,
    NULL::INT AS provider_id,
    NULL::INT AS care_site_id,
    "Id"::VARCHAR(50) AS person_source_value,
    "GENDER"::VARCHAR(50) AS gender_source_value,
    0 AS gender_source_concept_id,
    "RACE"::VARCHAR(50) AS race_source_value,
    0 AS race_source_concept_id,
    "ETHNICITY"::VARCHAR(50) AS ethnicity_source_value,
    0 AS ethnicity_source_concept_id
from patients
where "BIRTHDATE" is not null -- Don't load patients who do not have birthdate and sex (change variable
names if necessary)
      and "GENDER" is not null
  return go(f, seed, [])
}
```

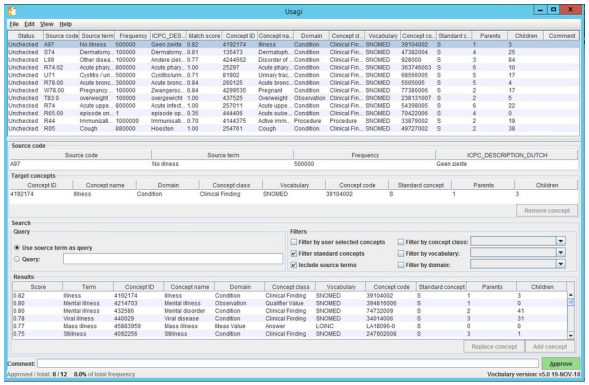
Extract

Transform

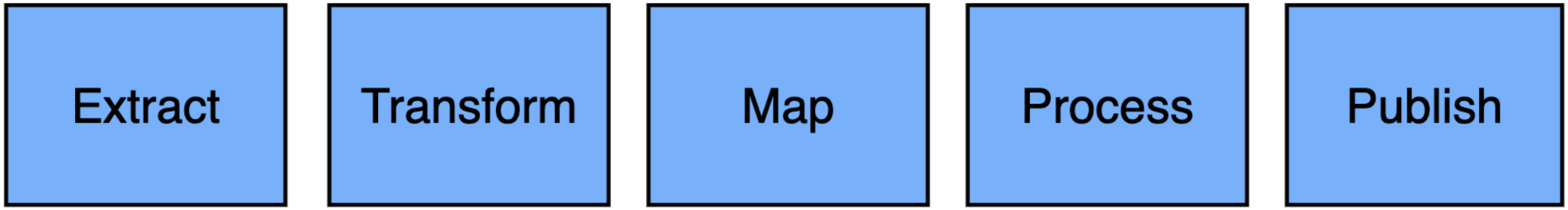
Map

Process

Publish

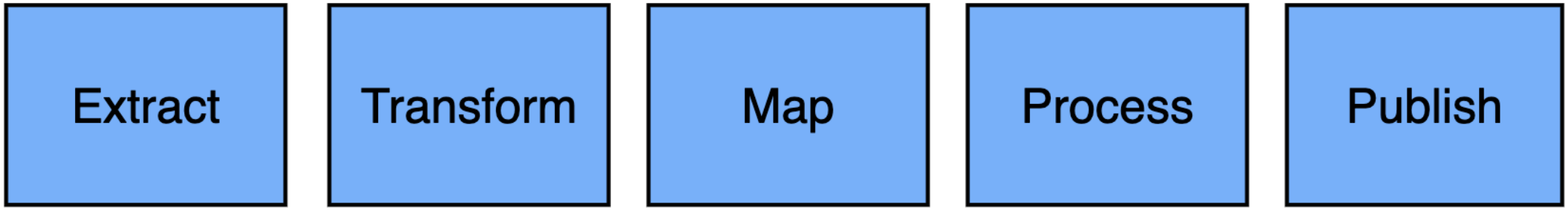


USAGI



El paciente acude con su madre Pepita **PER** con la que vive en Calle Córcega 23 **LOC** efiriendo dolor abdominal.

El paciente acude con su madre Lucía **PER** con la que vive en Calle Londres **LOC** efiriendo dolor abdominal.



Acude con dolor abdominal derecho de 2 días de duración. Pauta de vacunación completa.

Finding *dolor abdominal.*

Spatial Concept *derecho.*

Temporal Concept *2 días, duración.*

Therapeutic or Preventive Procedure *vacunación.*

Qualitative Concept *completa.*

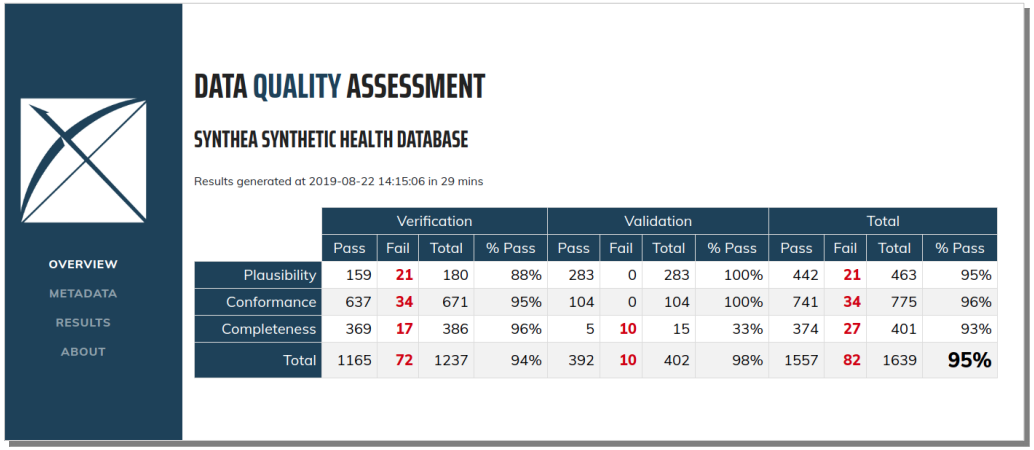
Extract

Transform

Map

Process

Publish



OVERVIEW
METADATA
RESULTS
ABOUT

DATA QUALITY ASSESSMENT

SYNTHEA SYNTHETIC HEALTH DATABASE

Results generated at 2019-08-22 14:15:06 in 29 mins

	Verification				Validation				Total			
	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass
Plausibility	159	21	180	88%	283	0	283	100%	442	21	463	95%
Conformance	637	34	671	95%	104	0	104	100%	741	34	775	96%
Completeness	369	17	386	96%	5	10	15	33%	374	27	401	93%
Total	1165	72	1237	94%	392	10	402	98%	1557	82	1639	**95%**

Extract

Transform

Map

Process

Publish