Identifying a Common Data Model approach for veterinary medical records

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Introduction

- Observational Medical Outcomes Partnership (OMOP) and Systematized Nomenclature of Medicine (SNOMED) are terminologies commonly used to encode human medical record data
  - Allow for modeling/surveillance of diseases, biomarkers, etc.

- Veterinary medical records typically lack an encoding process

Objectives:

- Align a human medical record database structure to veterinary records using OMOP's Common Data Model
- Enhance One Health and translational medicine concepts through established encoding and modeling procedures that allow for collaborative and large-scale research

Relational Databases

Databases used to store medical records are relational, meaning they consist of a variety of tables containing different pieces of information from each record.
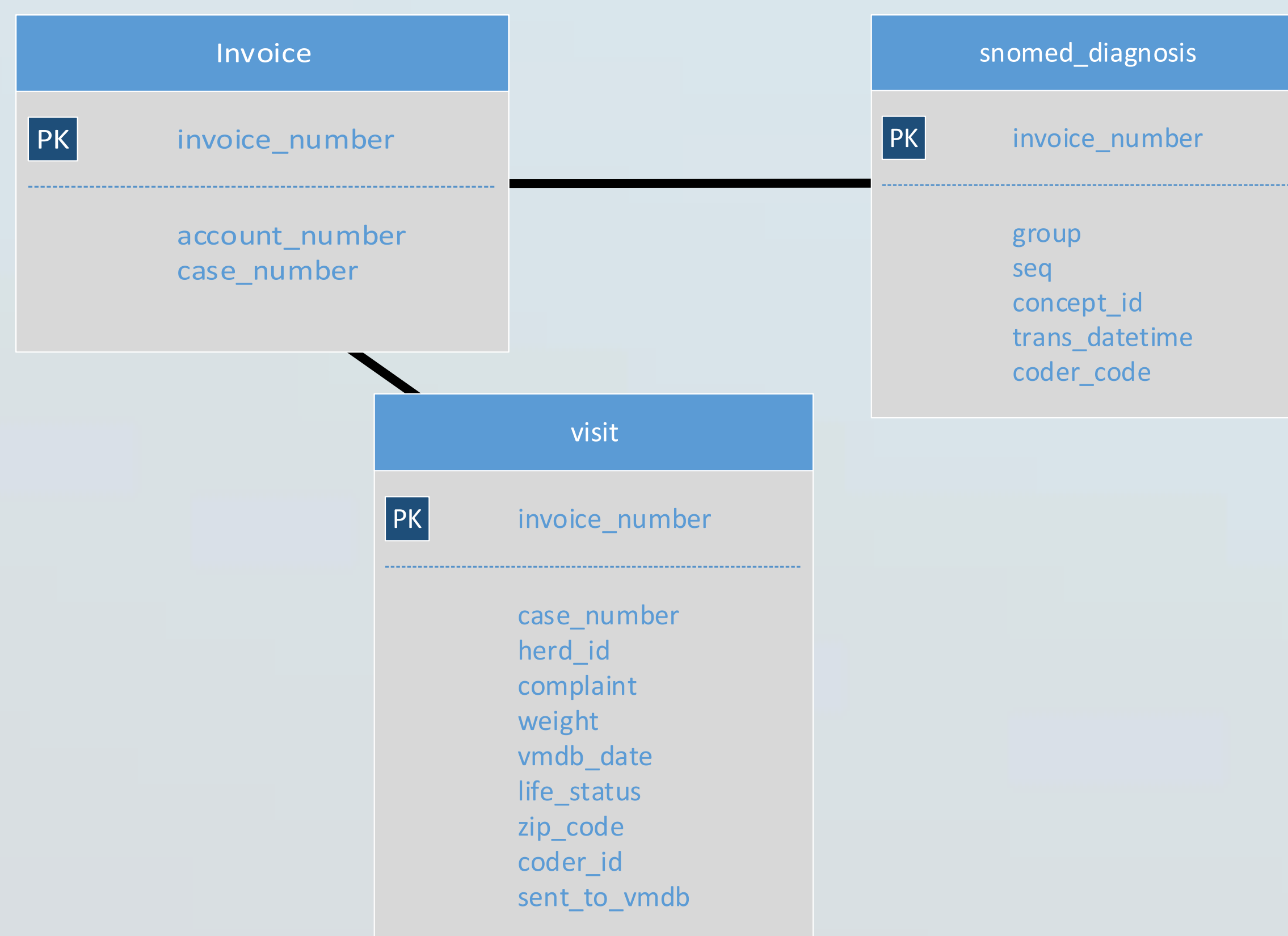
Figure 1. Data are stored in tables where each row is identified by a unique primary key. Primary key ensures that each row within a table is distinct, with no duplicate entries. Foreign key ties a given row from one table to a certain row in another table. The field "invoice_number" is the primary key in the *Invoice* table (unique to each row) and a foreign key in the *Visit* and *snomed_diagnosis* tables. A given invoice can be linked to its corresponding information for a certain hospital visit as well as SNOMED-encoded diagnoses from the invoice.

Current SNOMED Encoding

Description	Data Type	Comment	XML Tag
Accession	numeric	Institutional specific numeric for unique visit or accession	accession_num
VMDB Institutional Code Number	char	VMDB assigned Institution Number	inst_id
Transaction Type	char	A for add, D for Delete, C for Correction, O for add and overwrite of patient signalment not visit data	trans_type
Medical Record	char	A institutional unique string not over 25 characters	pat_no
Species	numeric	SNOMED concept id (required if breed not included)	species
Breed	numeric	SNOMED concept id	breed
Date of Birth	Date/Time	Time Optional (When unknown leave blank)	date _of_birth
Gender	char	Institutional specific codes will be converted to standard VMDB codes.	gender
Animal ID	char	Microchip, tattoo Maximum of 50 characters	animid
Chip Type	char	AVID, HomeAgain, etc.	chip_type
Postal Code	char	US zip code or Canadian Postal Code	postal_code
Country	char	ISO 3166-1 Country Codes, Only for non-US postal codes	country_code
Weight	numeric		weight_value
Unit of Measure	char		weight_unit
Admit Date	Date/Time	yyyymmdd:hhmm (required)	admit_dt
Discharge Date	Date/Time	yyyymmdd:hhmm (required)	discharge_dt
Discharge Clinician	char	Institutional specific code	clinician
Institutional (Internal) Diagnosis ID #	char	Must be unique to the institution, never change, may be retired	snomed_group inst_dx_id
Discharge status	char	0=alive, 5=died, 6=euthanized, 7=discharged and referred	discharge_disposition
SNOMED Concept	numeric	SNOMED Concept id	snomed
Recheck	char	0=Initial Diagnosis, 1=Recheck	recheck
Suspect	numeric	0=Confirmed diagnosis, 1=Suspect or Probable	suspect

Figure 2. The Veterinary Medical Database (VMDB) has been collecting and sharing SNOMED-encoded data from US veterinary teaching hospitals since 1964. The CSU Veterinary Teaching Hospital contributes to this database regularly. Employees use a SNOMED terminology browser to select diagnosis and procedure codes applicable to each record. Encoded data is put into a structured XML format and sent to VMDB. The XML format is specified by the VMDB. A similar process is used to extract data for the Common Data Model.

OMOP Common Data Model

Standardized Vocabularies entity-relationship diagram
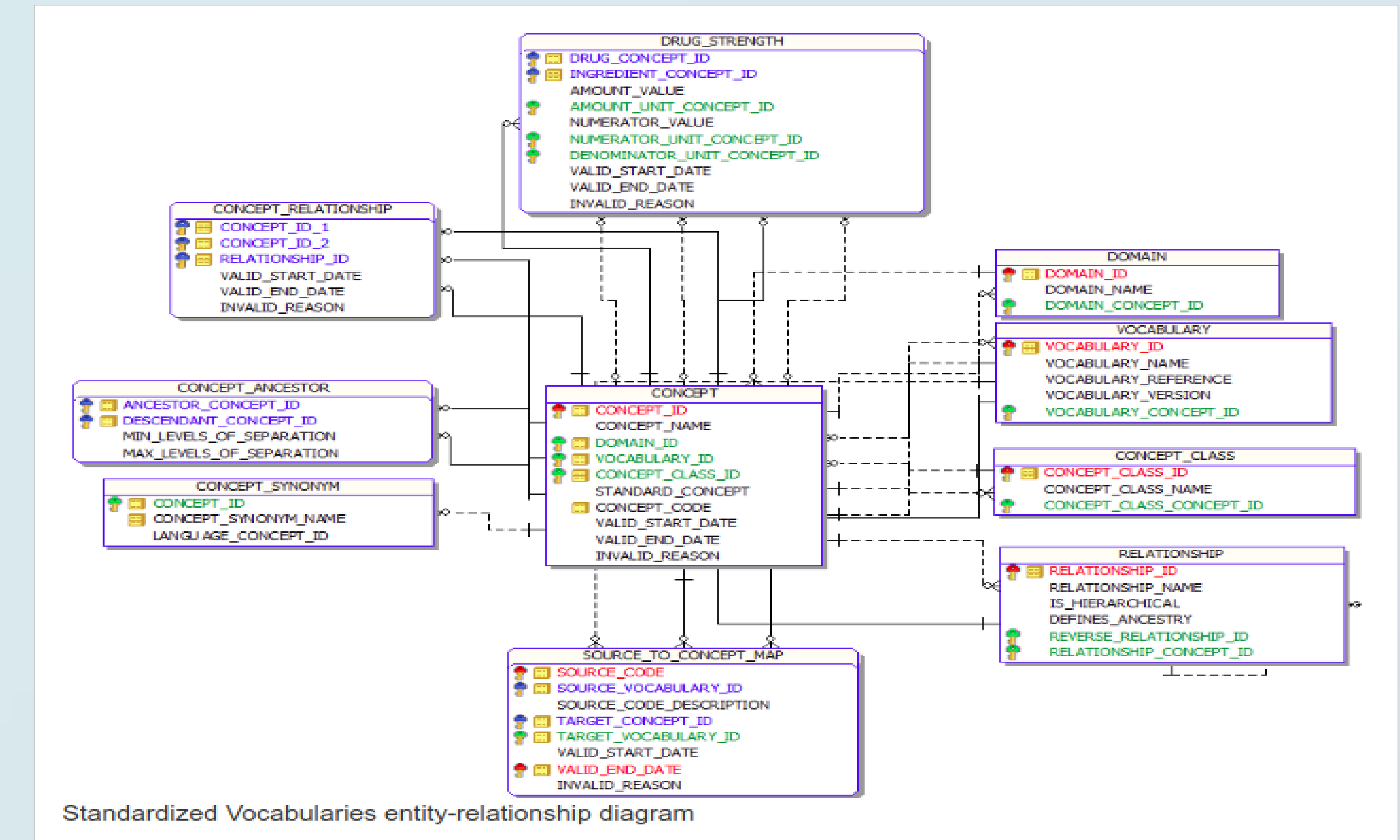
Figure 3. The Common Data Model defines the structure, tables and fields required to store medical records in a standardized format. It follows a relational database structure and provides a framework that can be filled in using data originating from a wide variety of encoding vocabularies including SNOMED and many others.

Future Directions

- Extensions to model/vocabularies for veterinary-specific terminologies
  - Diagnoses, breed, sex, species, microchip, etc.
- Lessons learned from VMDB
  - What works and what doesn't?
- Data targets: what data to collect?
- Ensuring consistency from and between contributors
- Development of use cases to demonstrate power of the network
- Data autonomy and ownership
  - Protecting sensitive/identifiable information
- Workshop in January 2018

Acknowledgements