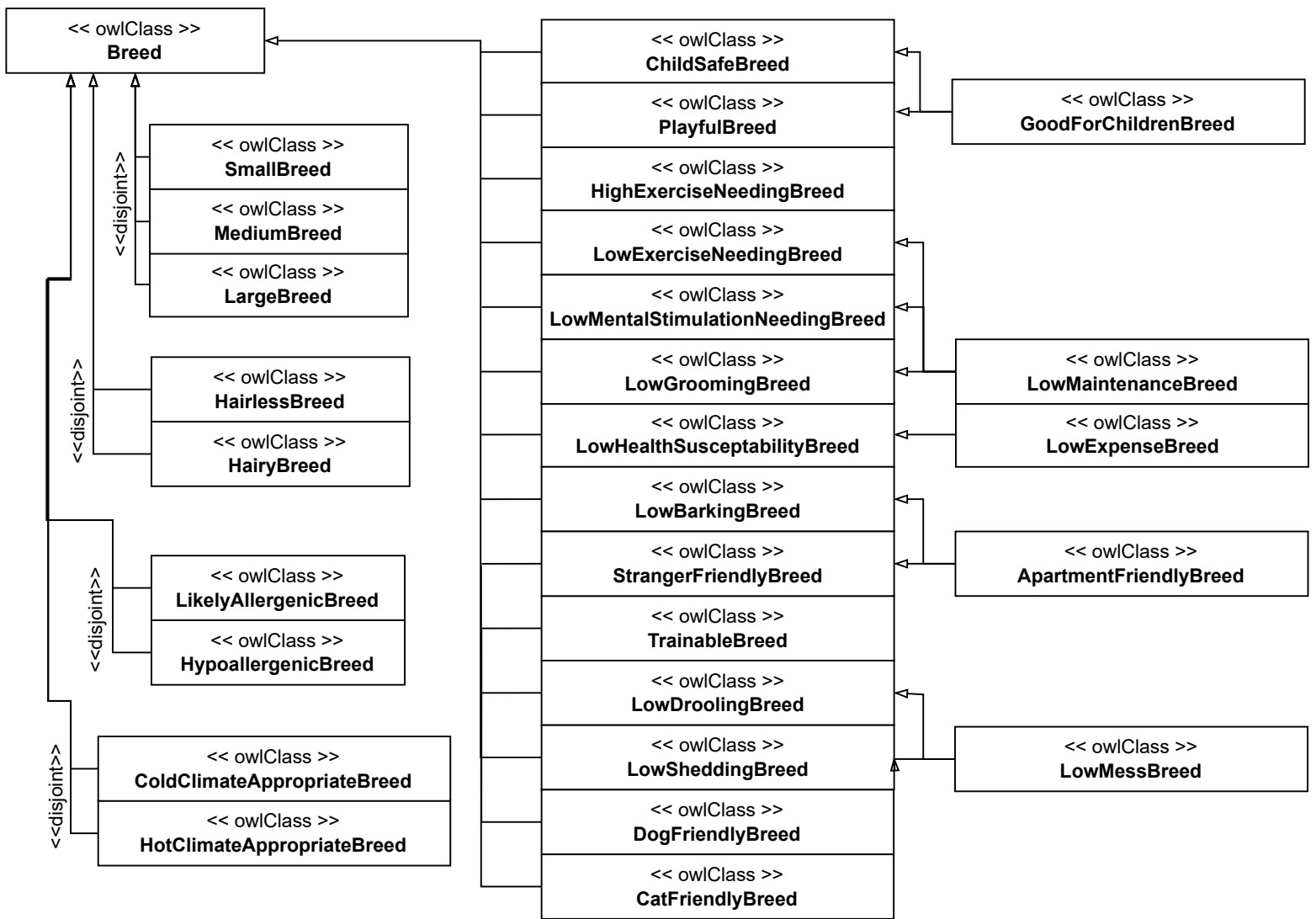
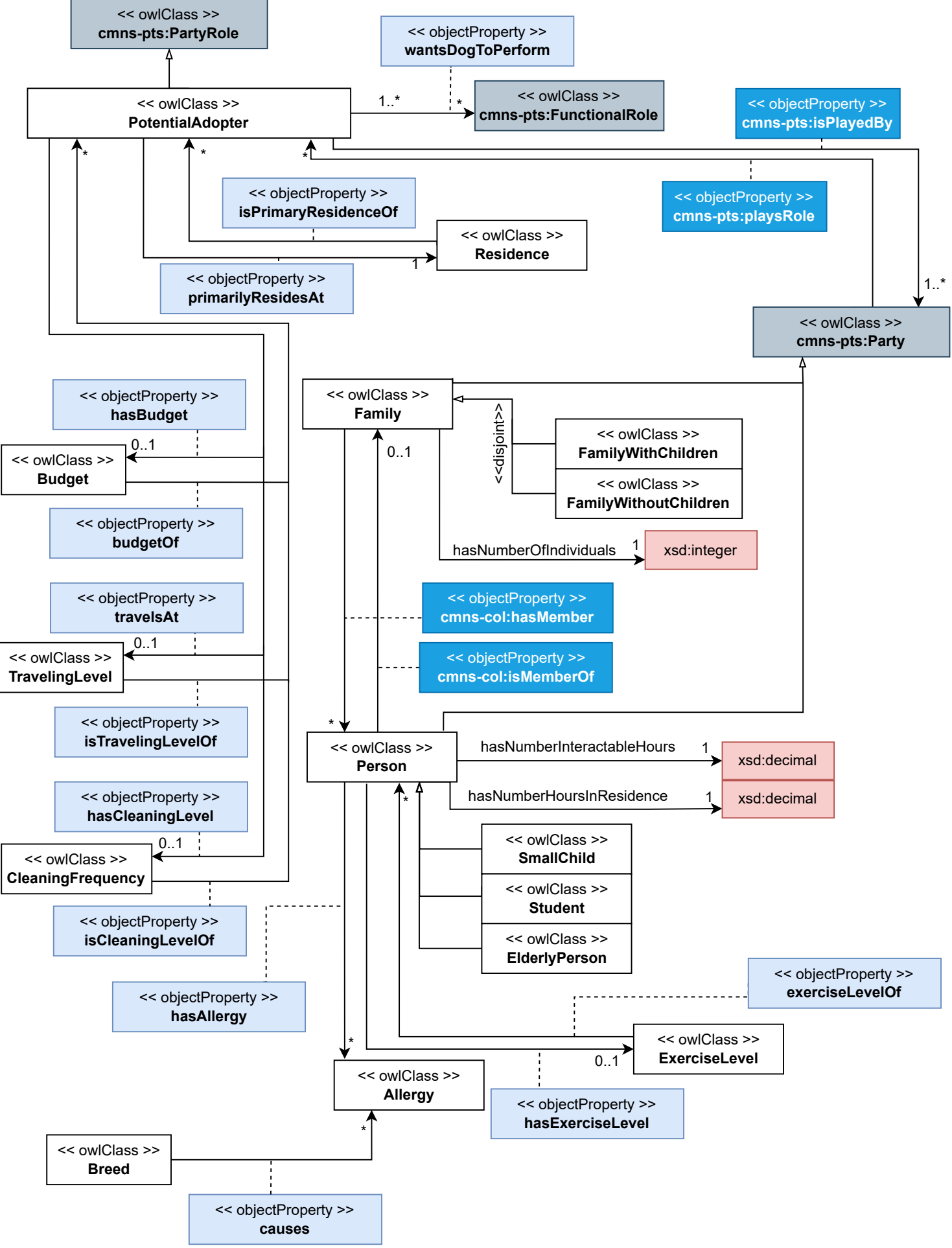


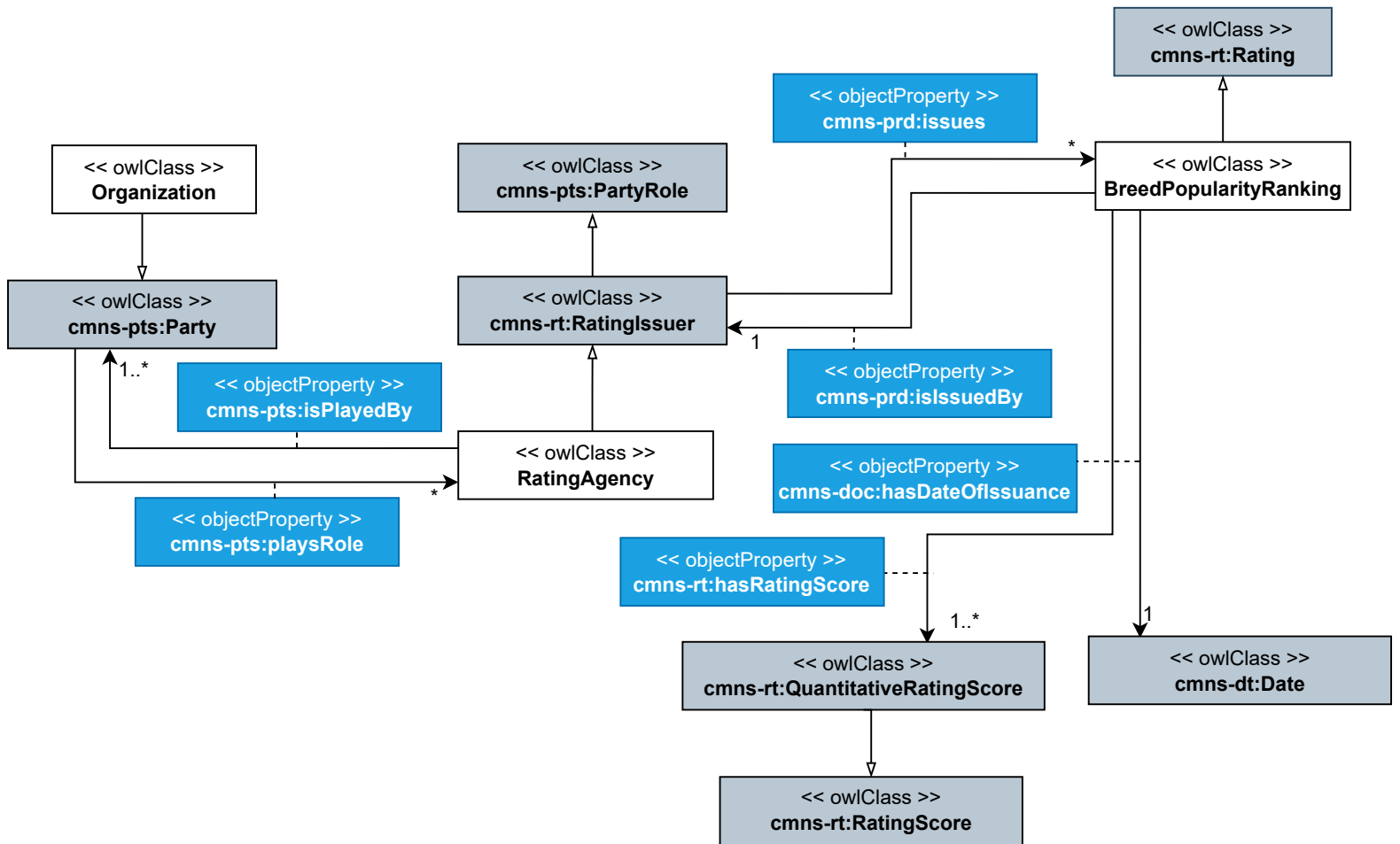
While every dog is unique, those that are the same breed share many characteristics. Breeds tend to look very similar and often act in similar ways as well. We consider physical characteristics such as weight (included in breed physical profile), behavioral characteristics such as playfulness (included in breed characteristic profile), and extrinsic characteristics such as popularity. Some characteristics such as coat type and coat length are used to infer other aspects of the breed, such as if it's hot or cold tolerant. Other relations, such as a breed's relation to an allergy, allow us to determine whether a breed is considered hypoallergenic. The allergy that we were most concerned about was an allergy to dog dander or fur, which is an instance in our system. We also consider some characteristics of breeds that the owl system considers optional, such as if an adopter has a preferred color of dog. Many of these are considered breed aspects since they describe the tendencies of the breed as a group.



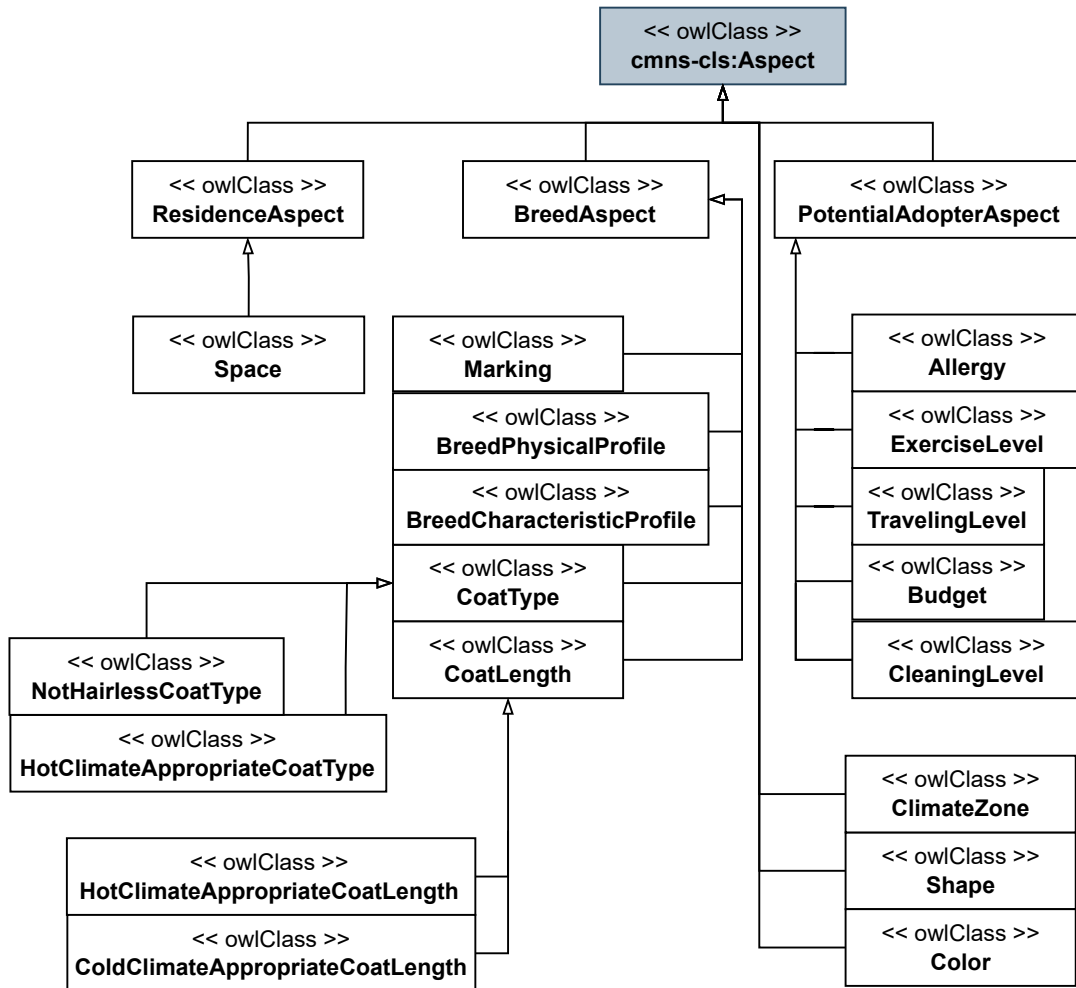
In order to match specific breeds with potential adopters, we created multiple defined subclasses of breeds. Some of these are disjoint so help with reasoning speed (hypoallergenic vs. likely allergenic) and others are disjoint because their definitions do not allow for overlap (cold climate appropriate vs. hot climate appropriate). Since each of these subclasses are defined, they can be inferred from a breed's relation to various breed aspects. Every breed will be inferred to be either hypoallergenic or likely allergenic, and either hairy or hairless.



The diagram on the previous page shows how we model potential adopters. We chose the name 'potential adopter' because while they may want to adopter a new dog, they have not done so yet and may change their mind. Potential adopter is a role that either a family or an individual can play. Some aspects are related to the individual adopter/members of the adopter family, such as exercise level, while others are related to the party that is playing the role of potential adopter, such as budget. We separated those families that included children under 5 years old from those that do not. People may be small children, students, or elderly. People may also have an allergy, but we consider the entire party having a single primary residence that a dog would spend most of its time.

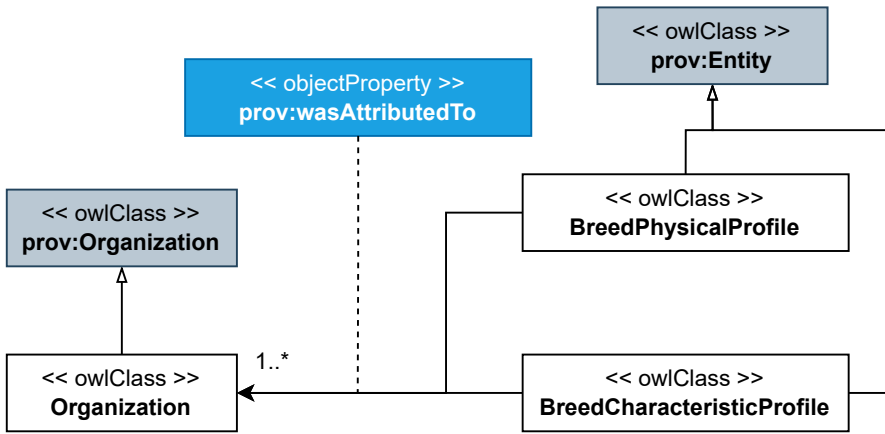


Since we could not objectively model cuteness, we modeled popularity rankings as a proxy. Popularity is not based just on how cute people find a dog, since dogs may also be popular because they are easy to care for and have a lot of information available on them, but dogs that are largely considered 'ugly' are less likely to be popular. We reuse the Commons Ratings ontology to model this. Due to scope we only include rankings from the AKC in 2021, with the smaller rankings (1st, 2nd) being more popular than larger rankings (40th, 41st).



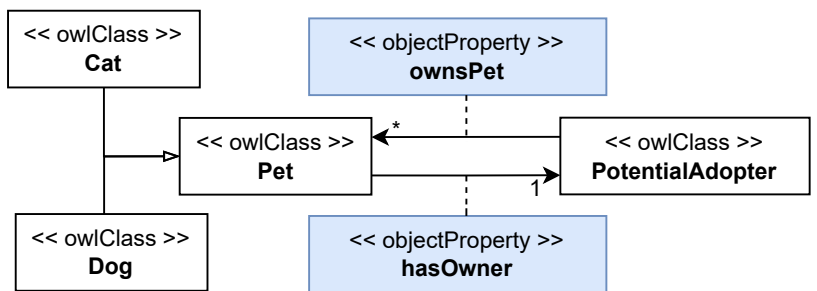
We have organized the entities that characterize other entities as shown. The main categories are those that characterize breeds and those that characterize potential adopters. Additionally some aspects have subclasses that were created for reasoning purposes.

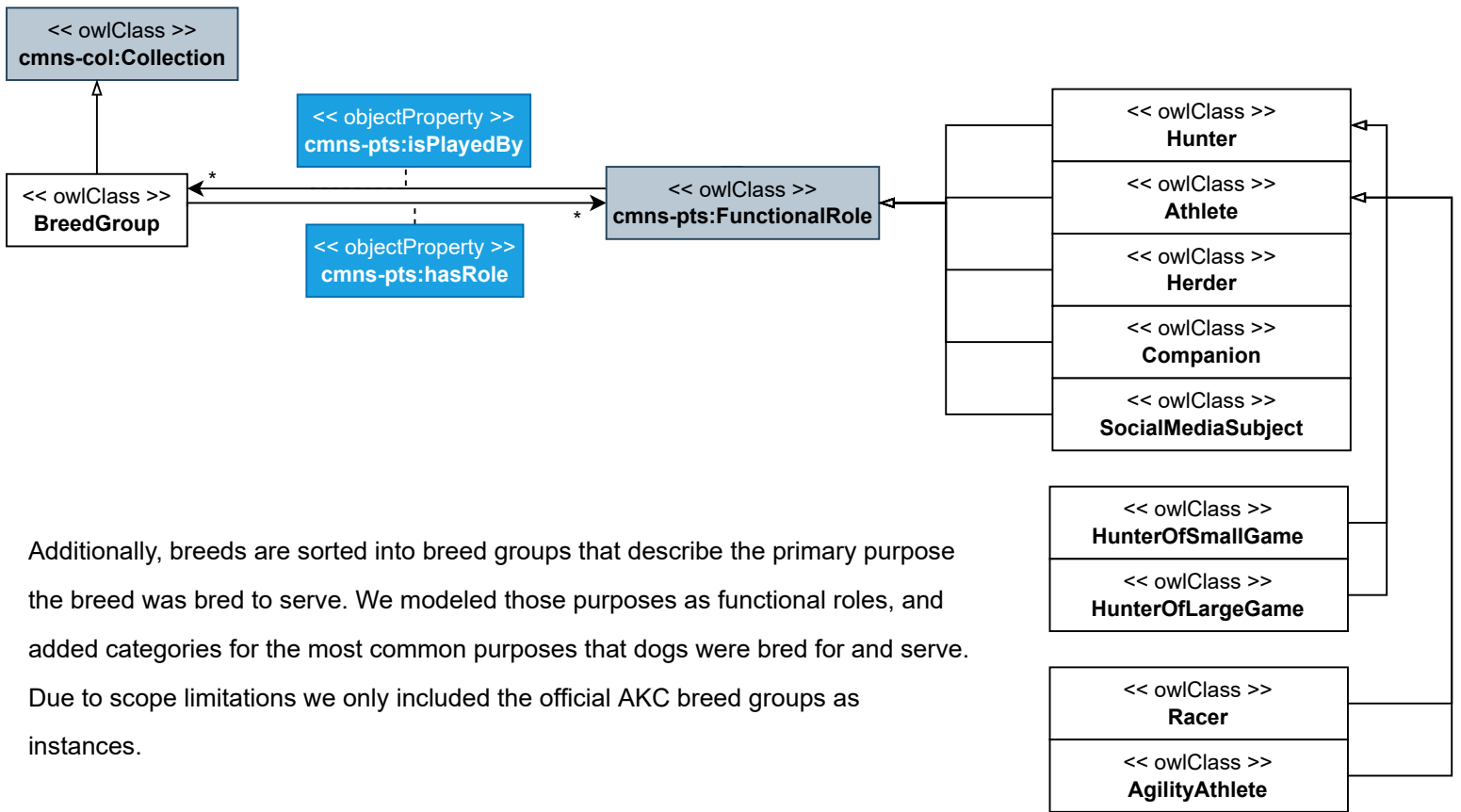
The coat type and coat length instances are the AKC categories. Budget, exercise level, and cleaning level are instantiated as high, medium, and low. Travel level is instantiated as frequent, intermittent, rare, and never. The only allergy currently in the system is a dog allergy, and we have included a selection of the AKC colors, markings, and shapes.



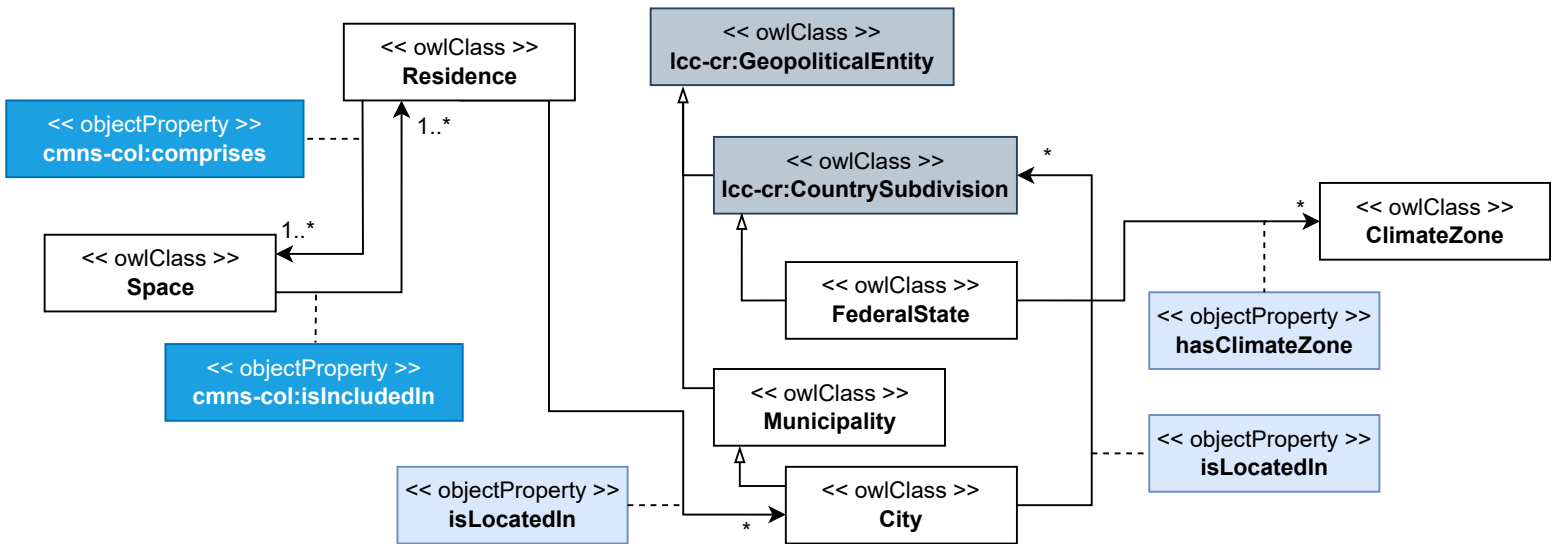
It is important to track provenance throughout any system. Since many organizations give the same breed different characteristics at different levels this is especially important for us. Breeds often have several profiles so the system can relate breeds to as many characteristics as possible. We use PROV-O to attribute physical and characteristic profiles to the organization that provided those profiles.

Since any new dog to a household would need to get along with any pets already in the household, we model that using the relation shown. Currently we only model cats and dogs, since cat-friendliness and dog-friendliness are commonly ranked characteristics for breeds.

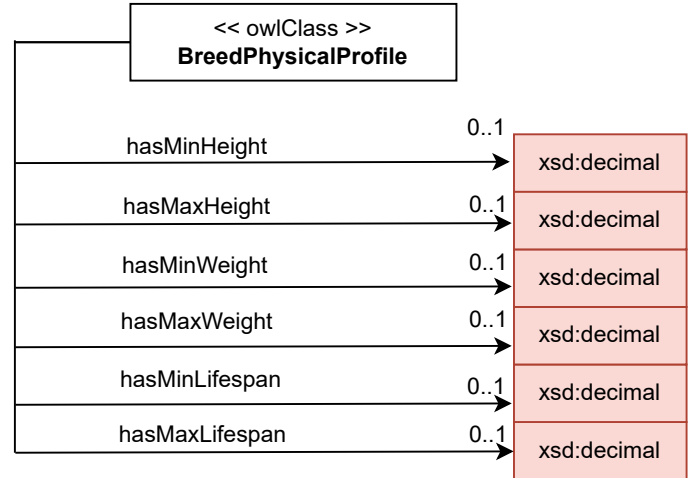
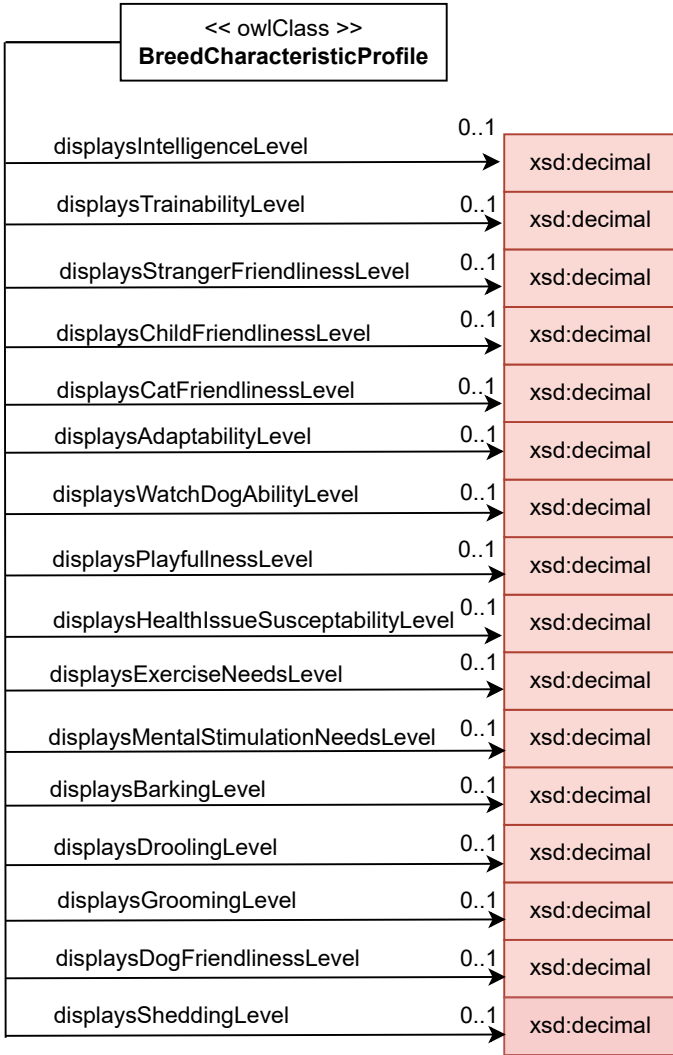




Additionally, breeds are sorted into breed groups that describe the primary purpose the breed was bred to serve. We modeled those purposes as functional roles, and added categories for the most common purposes that dogs were bred for and serve. Due to scope limitations we only included the official AKC breed groups as instances.

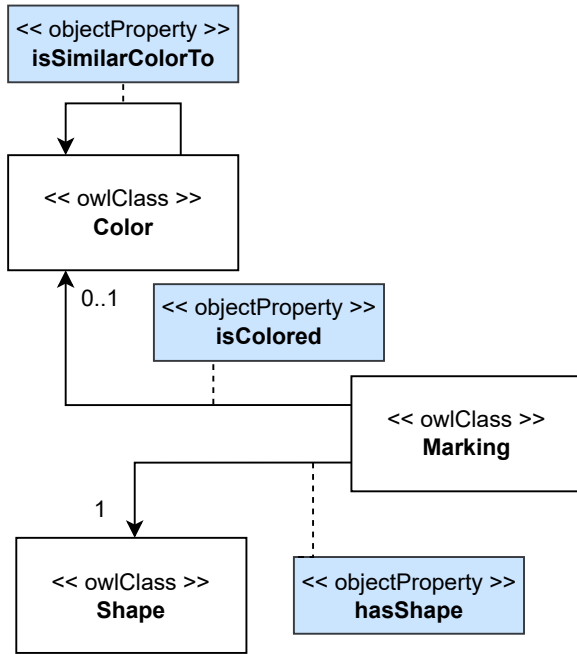


We model the location the adopter lives at in order to recommend breeds that are well-suited to the environment. While temperature-controlled homes do make this less of a requirement, we still consider it important since the dog will likely spend some time outside. We use the IECC climate zones to model average temperature of a US state. Since our scope is only the US, every area has at least one climate zone assigned by the IECC.



Each of these profiles are sets of data properties that describe a breed. Each object property in the breed characteristic profile is a value between 0 and 1 that indicate how much a breed embodies that characteristic. For example, a characteristic given 1/5 stars is given a value of 0.2, and 5/5 stars is given a value of 1.0. The values in a breed physical profile have no upper limit, but should be positive and min values should be lower than max values. Not every profile may include every object property, which is why a breed may have several characteristic or physical profiles.

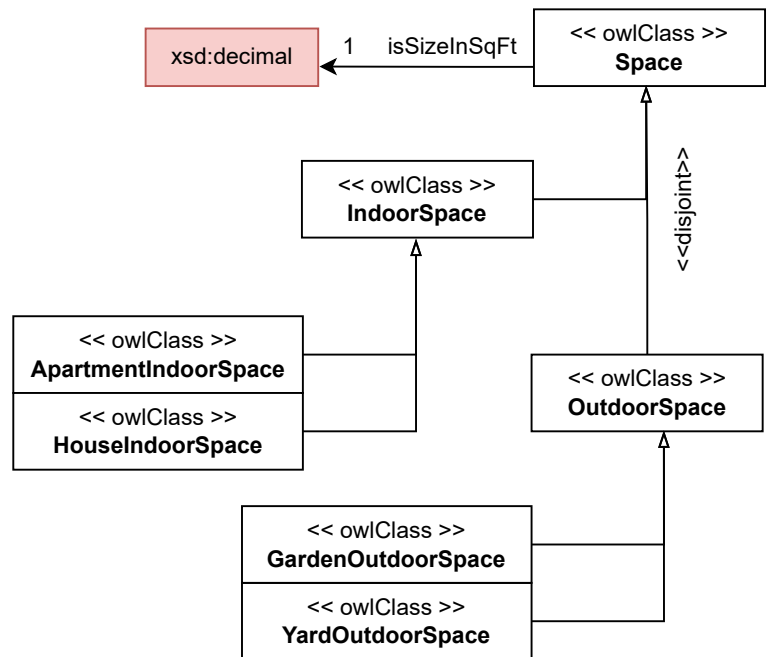
For the purpose of modeling, only one profile needs to contain a specific object property value for the system to consider the breed to have that value. For example, if only 1 of 2 characteristic profiles has a 'displays playfulness level' of at least 0.5 then the system will consider the breed to be playful. Since this has the potential to be contradictory, queries can be written to only consider profiles that are attributed to organizations that are trusted.



Because some potential adopters have a preference for the colors and markings of their dog, we model those in our system. We only include official AKC colors and marking shapes as instances in our system, though due to the volatile nature of of the AKC's official numerical codes we do not include those.

Each residence is comprised of at least one space, which may be either indoor or outdoor. Spaces that are covered but not temperature controlled, such as patios or screen-in porches, are considered outdoor spaces. We also consider the size of spaces.

We model this so that dogs in apartments are apartment friendly and that breeds that need lots of exercise are not limited by a lack of appropriate outdoor spaces.



Prefixes

cmns-col = <https://www.omg.org/spec/Commons/Collections/>

cmns-pts = <https://www.omg.org/spec/Commons/PartiesAndSituations/>

cmns-cls = <https://www.omg.org/spec/Commons/Classifiers/>

cmns-rt = <https://www.omg.org/spec/Commons/Ratings/>

cmns-dt = <https://www.omg.org/spec/Commons/DatesAndTimes/>

cmns-prd = <https://www.omg.org/spec/Commons/ProductsAndServices/>

cmns-doc = <https://www.omg.org/spec/Commons/Documents/>

lcc-cr = <https://www.omg.org/spec/LCC/Countries/CountryRepresentation/>

prov = <http://www.w3.org/ns/prov#>

xsd = <http://www.w3.org/2001/XMLSchema/>