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1. Introduction

The International Union for the Conservation of Nature (IUCN) is one of the world's oldest conservation organizations. The IUCN Red List of Threatened Species is widely accepted as the standard for analyzing the status of species all around the globe. This list is not only impactful in the development of new environmental policies to protect endangered species but is also a wonderful tool full of information about all species whether they be extinct, threatened, or non-threatened. Some of the important data captured by the IUCN's list includes a species' relative risk of extinction (Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), and Data Deficient (DD)), native countries, as well as unique taxonomical IDs and Linnaean classifications (Kingdom, Phylum, Class, Order, Family, Genus, Species) of every species. The proposed database enterprise is intended to be used for marine mammals specifically. These creatures are highly intelligent and are facing extinction due to climate change, hunting, accidental death in fishing traps, and their low rates of reproduction. The utilization of this data will aid in the protection of these species.

2. ER Diagram

The figure below shows the ER diagram of the IUCN Red List Category Database for Marine Mammals (IUCNMM).
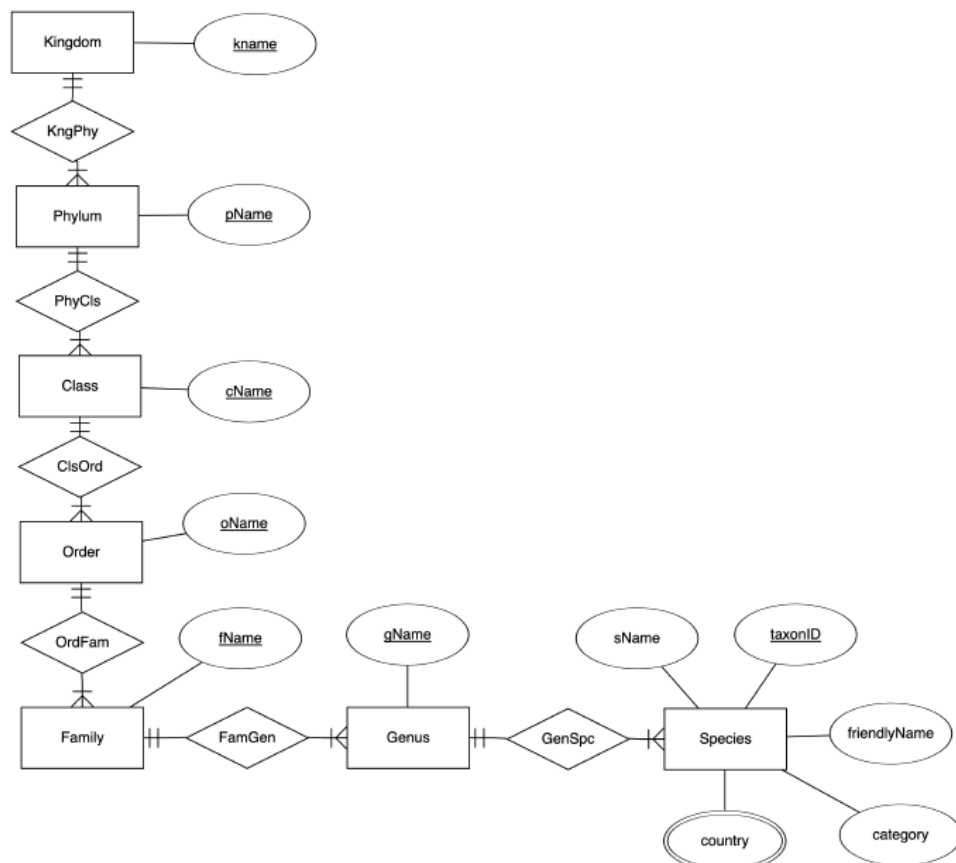
3. Requirements Description

The IUCN Red List Category Database for Marine Mammals (IUCNMM) is useful in the classification and analysis of endangered, extinct, and unthreatened species worldwide. The IUCNMM Database stores information pertaining to the taxonomical classification, ID, Red List category, and country of origin of all known marine mammals.

- The taxonomical classification of marine mammals is captured using the standard Linnaean classification system. The names of the kingdom, phylum, class, order, family, genus, and species are all recorded for each animal in the database. Each parent group is made up of many subsets. For instance, a class is made up of many orders. This relationship is consistent all the way down to the species, which is the most specific unit of classification. Also, each subset can only be a member of one parent group. Using the previous example, an order can only be a member of one class. This rule is consistent throughout the database.

- Every species has its own unique taxonomic ID, as well as a 'friendly name' to identify them. The 'friendly name' is the binomial nomenclature of the given species and is made up of its genus and species. Each species also contains records of its native country. It is important to note that some species are native to many different countries. Thus, each country the species is found in is stored in the database alongside that species' taxonomical ID.

- Each species also has a category, which corresponds to one of the eight Red List categories set forth by the IUCN.

4. ER Diagram Uncaptured Constraints

The following is a list of constraints that are not captured by the ER diagram of IUCNMM:

- An animal must, by definition, be a member of the domain 'Eukarya'. Domain exists above kingdom and is not included in the database.

- All animals in this database must be marine mammals.

- For the 'friendly name', proper binomial nomenclature formatting should be used with an uppercase genus name and lowercase species name for data consistency.

5. Relational Schema: Syntax Summary and Table Details

kingdom(<u>kName</u>)

phylum(<u>pName</u>, kName)

      foreign key (kName) references kingdom(kName)

class(<u>cName</u>, pName)

      foreign key (pName) references phylum(pName)

order(<u>oName</u>, cName)

      foreign key (cName) references class(cName)

family(<u>fName</u>, oName)

      foreign key (oName) references order(oName)

genus(<u>gName</u>, fName)

      foreign key (fName) references family(fName)

species(<u>taxonID</u>, sName, friendlyName, category, country, gName)

      foreign key (gName) references genus(gName)

country(<u>taxonID, country</u>)

Table Name	Attribute	Description
kingdom	<u>kName</u>	Kingdom name
phylum	<u>pName</u>	Phylum name
	kName	Parent kingdom name
class	<u>cName</u>	Class name
	pName	Parent phylum name
order	<u>oName</u>	Order name
	cName	Parent class name
family	<u>fName</u>	Family name
	oName	Parent order name
genus	<u>gName</u>	Genus name
	fName	Parent family name
species	<u>taxonID</u>	Unique taxonomic ID number
	sName	Species name
	friendlyName	Common name (*Genus species*)
	category	Red List Category (EX, EW, CR, EN, VU, NT, LC, DD)
	country	Native country/countries of species
	gName	Parent genus name
country	<u>taxonID</u>	Unique taxonomic ID number
	<u>country</u>	Native country/countries of species