Group #17 - "And Yet it Compiles"
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Database Project Proposal

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DATABASE URL

http://flip3.engr.oregonstate.edu:5668/

EXECUTIVE SUMMARY

Most of the changes that have occurred since the inception of the project have been minor changes to design of UI/clarity of webpages. More significant changes include:

- Fleshing out the scope of the project more thoroughly. This includes adding more concrete values and details as to how the database would be used and what kind of volumes it would handle.
- Changing the naming conventions for all tables for consistency and renaming intersection tables for clarity. The original tables and attributes had a mix of camel case and snake case that could cause some headaches when trying to query the database. Intersection tables 'resume items' and 'personnel log' were also somewhat abstract and made understanding the M:M relationships overly complicated.
- Allowing the faction attribute across several tables to be nullable. This would have caused issues in the situation that a world, ship or person was added that was neutral in their political affiliations.
- Removing the attribute *leader* from the factions entity because it was a foreign key and when implemented, caused table creation to become circular.
- Adding an *acronym* attribute to the factions entity to help minimize errors in SELECT queries.
- Changing the datatype of the *worlds* entity's *population* attribute from INT to BIGINT; INT was too small to contain the appropriate values.
- Breaking up the *worlds* entity's *name* attribute into *name* and *location*.
- Setting the *people* entity's *last_name* attribute to NOT NULL.
- Updating all tables with foreign key references to set null on delete. Had not originally planned for the situation in which an entry in a table that was a foreign key to another was deleted so this was a major issue we ran into when implementing the DB.

PROJECT OUTLINE

TITLE
TYCHO STATION SURVEILLANCE DATABASE

OVERVIEW & PROBLEM-TO-BE-SOLVED

Tycho Station is a space station dedicated to ship-building that houses over 15,000 spacefarers. It is also (covertly) home to the *Outer Planets Alliance* (OPA) branch run by Fred Johnson. The OPA itself is made up of roughly 100 million belters, individuals who have lived most of their lives in space without the influence of gravity. In fact, of the entire belter population, at least 50 million are reported to be politically active members of the OPA!

Currently, the OPA's main goal is to obtain independence from the governments of Earth and Mars. In order to facilitate this, Tycho Station keeps meticulous records regarding the comings-and-goings of the galaxy. Their surveillance database records information about people working on registered ships, their skills, and their connection to other political factions. Users of the database need to be able to modify, add, and delete entries from the database to reflect various world events.

The OPA has made it a priority to record data about both its own citizens and those of the factions opposing belter independence: Earth and Mars. Earth, which is run by the *United Nations* (UN), is responsible for over 30 billion citizens, including 1 billion citizens living on the planet's moon. The UN claims to have over 100 million active troops and, at 250,000 warships, they have the largest fleet in the Sol system. Mars, which is run by the *Martian Congressional Republic* (MCR), claims roughly 9 billion citizens. Via mandatory military service and technological advancements, the MCR manages to hold its own against Earth; they boast a military arm of over 75 million troops and 100,000 warships.

Tycho Station's database could, potentially, contain information about >40 billion inhabitants and >300,000 ships; however, the OPA tends to prioritize collecting data about those considered politically significant. Of the politically significant players, roughly 100 leaders and 10 ships are deemed truly influential.

DATABASE OUTLINE

<u>people</u>: details those of interest to Tycho station

<u>Attributes</u>:
- person_id: int, auto_increment, unique, not NULL, PK
- first_name: varchar, not unique, not NULL
- last_name: varchar, not unique, not NULL
- homeworld: world_id, not unique, not NULL, FK
- faction: faction_id, not unique, can be NULL, FK
- living: boolean, not unique, not NULL

<u>Relationship</u>:
- people:worlds - M:1
  - One person has one homeworld, each homeworld can have many people
- people:factions - M:1
  - A faction has many people, but one person belongs to only one faction
- people:ships - M:M connected via the people_ships intersection table
  - A person can work on many ships and a ship may have many employees

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<u>ships</u>: records details about ships owned by various factions

<u>Attributes</u>:
- ship_id: int, auto_increment, unique, not NULL, PK
- name: varchar, unique, not NULL
- class: varchar, not unique, not NULL
- type: varchar, not unique, not NULL
- faction: faction_id, not unique, can be NULL, FK

<u>Relationship</u>:
- ships:factions - M:1
  - A ship has only one faction, but factions may have multiple ships
- ships:people - M:M implemented via the people_ships intersection table
  - A person can work on many ships and a ship may have many employees

worlds: details the worlds and inhabited colonies of the Sol system

Attributes:
- world_id: int, auto_increment, unique, not NULL, PK
- name: varchar, unique, not NULL
- location: varchar, unique, not NULL
- population: int, not unique, not NULL
- faction: faction_id, not unique, can be NULL, FK
- designation: varchar, not unique, can be NULL

Relationship:
- worlds:people - 1:M
  - One person has has one homeworld, each homeworld can have many people
- worlds:factions - M:1
  - One faction may control many homeworlds but one homeworld has only one controlling faction

skills: details common skills and specialties utilized by spacefarers

Attributes:
- skill_id: int, auto_increment, unique, not NULL, PK
- skill: varchar, not unique, not NULL

factions: catalogues the political groups present within the Sol system

Attributes:
- faction_id: int, auto_increment, unique, not NULL, PK
- name: varchar, not unique, not NULL

Relationships:
- factions:people - 1:M
  - People belong to only one faction, but a faction can have many people

INTERSECTION TABLES

<u>people_ships</u>: connecting table linking people to ships

<u>Attributes</u>:
- person_ship_id: int, auto_increment, unique, not NULL, PK
- passenger: person_id, int, not unique, not NULL, FK
- ship: ship_id, not unique, not NULL, FK to ship

<u>Relationships</u>:
- ships:people - M:M implemented using the people_ships intersection table
  - A person can work on many ships and a ship may have many employees

<u>people_skills</u>: connecting table linking people to skills
*** NOTE: This table technically exists in our DB, but does not include any management options
<u>Attributes</u>:
- person_skill_id: int, auto_increment, unique, not NULL, PK
- individual: person_id, not unique, not NULL, FK
- skill: skill_id, not unique, not NULL, FK

<u>Relationships</u>:
- people:skills - M:M relationship is implemented using the people_skills intersection table
  - A person may have multiple skills and a skill may belong to many people

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ER DIAGRAM

** NOTE: people_skills technically exists in the DB, but does not include any management options
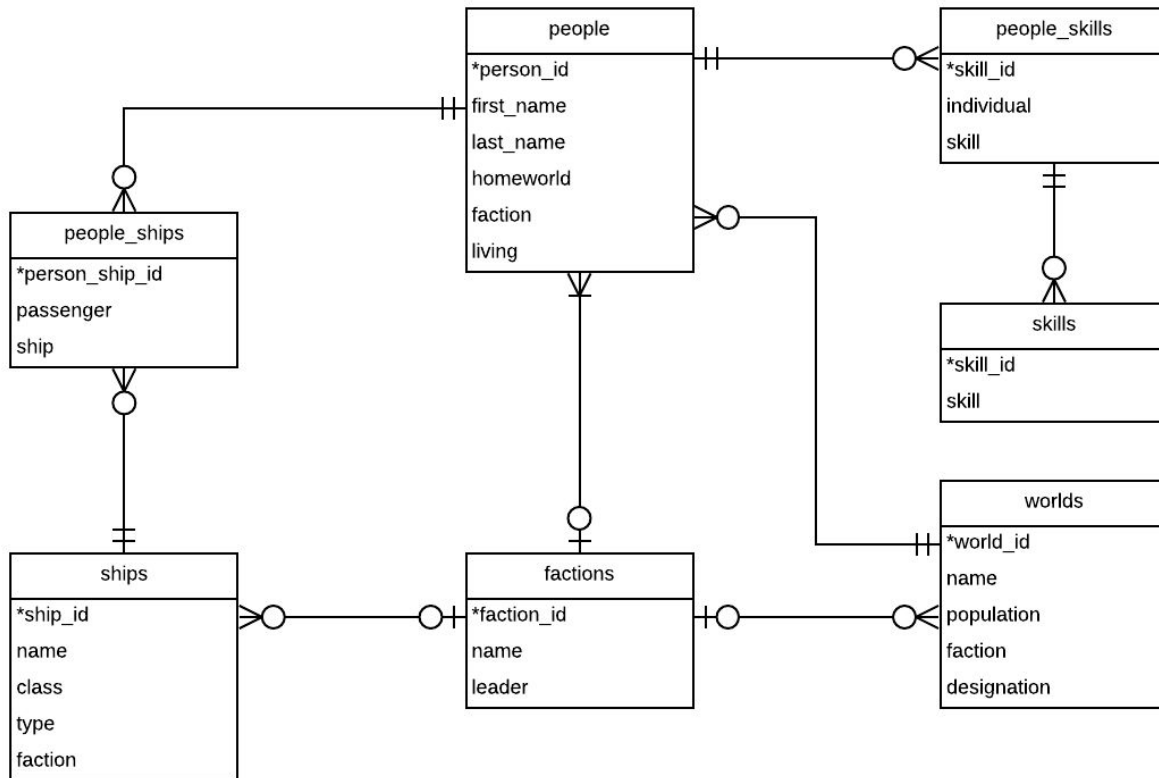
SCHEMA

This first schema includes two M:M relationships where one has no implemented management options.

people

[PK] person_id	first_name	last_name	[FK] homeworld	[FK] faction	living

worlds

[PK] world_id	name	location	population	[FK] faction	designation

factions

[PK] faction_id	name	acronym

ships

[PK] ship_id	name	class	type	[FK] faction

people_ships

[PK] person_ship_id	[FK] passenger	[FK] ship

skills

[PK] skill_id	name

people_skills*

[PK] person_skill_id	[FK] individual	[FK] skill
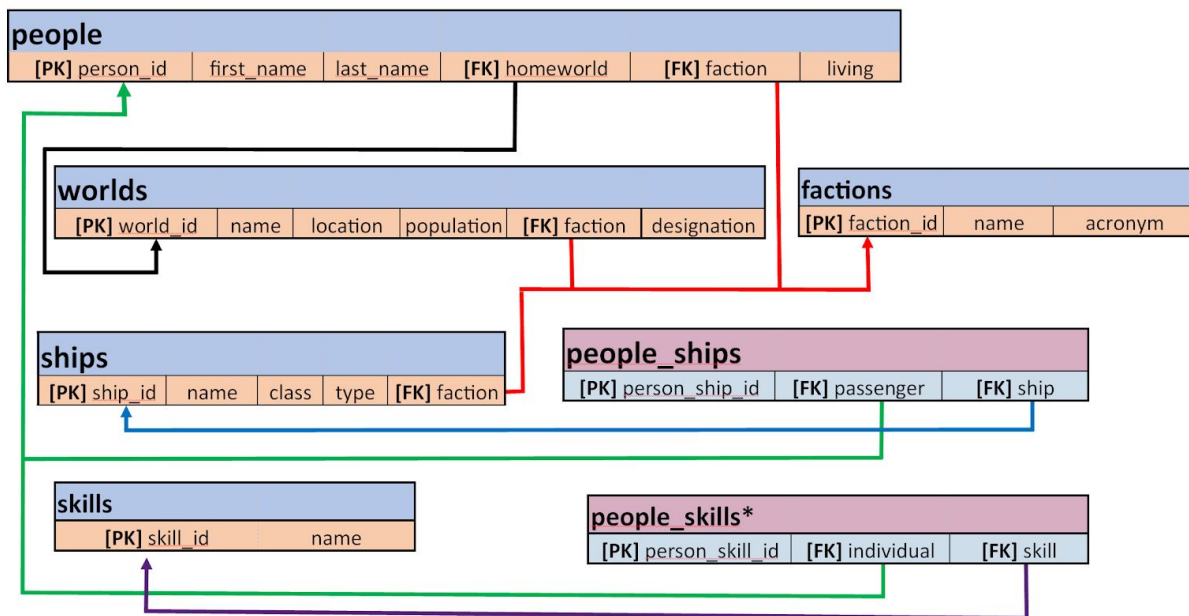
* Please note, since only one M:M relationship must be implemented for this project, there are no management options implemented for this entity.

UI SCREENSHOTS

READ/BROWSE/DISPLAY ‖ CREATE/INSERT/ADD NEW ‖ DELETE - PERSON

EDIT/UPDATE - PERSON

SEARCH/FILTER PASSENGERS BY SHIP

SEARCH/FILTER SHIPS BOARDED BY INDIVIDUAL

READ/BROWSE/DISPLAY **||** CREATE/INSERT/ADD NEW **||** DELETE - SHIPS

EDIT/UPDATE - SHIP & PASSENGERS TO SHIPS

READD/BROWSE/DISPLAY || CREATE/INSERT/ADD NEW || DELETE - WORLDS

Tycho Station Surveillance System   HOME   PEOPLE ▾   SHIPS ▾   WORLDS   FACTIONS   SKILLS

Worlds

Name	Location	Population	Governing Body	Resident Designation	
Ganymede	Sol Va	0	NULL ▾	Belter	ADD
Venus	Sol II	0	United Nations		EDIT ✖
Earth	Sol III	30000000000	United Nations	Earther	EDIT ✖
Luna	Sol IIIa	10000000000	United Nations	Earther	EDIT ✖
Mars	Sol IV	10000000000	Mars Congressional Republic	Martian	EDIT ✖
Belt	(Sol IV, Sol V)	100000000	Outer Planets Alliance	Belter	EDIT ✖
Jupiter	Sol V	45000000	United Nations	Belter	EDIT ✖
TEST	Yes Land	-6	NULL	Belter	EDIT ✖

EDIT/UPDATE - WORLDS

Tycho Station Surveillance System   HOME   PEOPLE ▾   SHIPS ▾   WORLDS   FACTIONS   SKILLS

Edit World

Name	Location	Population	Governing Body	Resident Designation	
Venus	Sol II	0	United Nations		SAVE

READ/BROWSE/DISPLAY || CREATE/INSERT/ADD NEW || DELETE - FACTIONS

EDIT/UPDATE - FACTION

READ/BROWSE/DISPLAY || CREATE/INSERT/ADD NEW || DELETE - SKILLS

EDIT/UPDATE - SKILLS