Data and Applications Monsoon 2022 - HW1

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1 Introduction to Mini World

Across all the Marvel Cinematic Universe Avengers movies, particularly Endgame, we come across various tools that have been used by prominent characters. The Universe of Discourse in our homework focuses on these tools, such as relics, weapons and technologies.

2 Purpose of Database

The database will track all tools with their owners, known locations, prominent users, victims and so on. The database also has relationships to identify conflicts, allies, and other constructs between groups of individuals and hence, can be used to predict the overall effect of the tools.

3 Users of Database

The database, subject to separate views for different entities, can be used by characters such as Tivan the Collector, Thanos, and so on, and also by entities such as the Avengers, the Kree, the Chitauri, etc. to access information about the tools to acquire, utilize or destroy.

4 Applications of Database

The database could be accessed by the following alliances and groups as follows :

Sanctums (sorcerers of the Kamar Taj) - to protect Earth from mystical forces, Avengers - to be wary about individuals with the means and tools to cause destruction, Thanos and allies - to look for tools such as the Infinity Stones to achieve their goals, Tivan the Collector - to collect, Asgardians - To maintain a view of all tools that they own, Wakandans - To maintain records of all technologies that they possess and so on. Alliances could also check their allies' possessions appropriately.

5 Database Requirements

5.1 Assumptions

The applications will be subject to the canonical descriptions as provided in the movie. No entity will be able to access information .

We aren't restricting ourselves to objects that have screen time in Avengers: Endgame, and are also including objects that are related to the ones that do.

We also assume that all mainstream characters entities can be uniquely identified by their names.

We include characters without screen time, or those that cannot be uniquely identified, such as parents of a character or founders of a thing as attributes.

5.2 Strong Entity Types

- Characters such as Thor Odinson

  Attributes - Name (Primary Key), Parents (multi-valued attribute), Introduction Movie, Birth Year, Status (Alive/Dead/Incapacitated/Unknown), Age (Derived Attribute), Species (Multi-valued attribute)

- Alliances (groups) such as Avengers

  Attributes - Name (Primary Key), Leaders (multi-valued attribute), Founders (multi-valued attribute), Foundation Year, Age (Derived attribute)

- Location such as Titan

  Attributes - Address (composite attribute with sub-attributes as Name, Planet , Solar System, Quadrant) (Primary Key), Status (Existing/Destroyed/Unknown), Creators (multi-valued attribute)

- Relics as Infinity Stones

  Attributes - Name (Primary key), Creators (multi-valued attribute), Status (Existing/Destroyed/Unknown), Creation Year, Nature (Corrupting/Docile/Sentient/etc.)

5.3 Weak Entity Types

- Generic Weapons such as blasters

  Attributes - Name (Partial Key)

- Technology such as AI

  Attributes - Name (Partial Key)

5.4 Relationship Types

Serial Number	Relationship	Participating Entities	Degree	Salient Features	(min, max) constraint
1	A character POSSESSES a relic	Character, Relic	2		Character:(0,N), Relic:(0,1)
2	A character POSSESSES a technology	Character, technology	2	Identifying Relationship	Character:(0,N), Technology:(0,N)
3	A character POSSESSES a weapon	Character, Weapon	2	Identifying Relationship	Character:(0,N), Weapon:(0,N)
4	A relic is USED on a character	Relic, Character	2		Relic:(0,N), Character(0,N)
5	A technology was INVENTED by a character at Location	Technology, Character	3	Degree $\rangle$ 2	Technology:(1,N), Character:(0,N), Location:(0,N)
6	A weapon is USED on a character	Weapon, Character, Location	2		Weapon:(0,N), Character:(0,N)
7	A character is ASSOCIATED with an alliance	Character, Alliance	2		Character:(0,N), Alliance:(1,N)
8	An alliance is ALLIED with an alliance	Character, Alliance	2	Self Relationship	Alliance:(0, N)
9	A character STAYS at location	Character, Location	2		Location:(0,N), Character:(1,N)
10	A relic was FOUND at location BY character	Relic, Location, Character	3	Degree $\rangle$ 2	Relic:(1,N), Location:(0,N), Character:(0,N)
11	A relic is a TYPE of a weapon with historical significance MADE using a technology	Relic, Weapon, Technology	3	Degree $\rangle$ 2	Relic:(0,N), Technology:(0,N), Weapon:(0,N)

5.4.1 Cardinality Ratios/ Participation Constraint / (min,max)

Included under "Constraints" in the aforementioned table. If min $\rangle$0, then it indicates complete participation.

5.4.2 Relationship attributes

We have:
Numbers 1. 2. 3 - time of acquiring, time of losing
Number 4, 5, 6, 9, 10, 11 - timestamps

6 Functional Requirements

6.1 Modifications

- Update the current possessor of a tool
- Add a victim of a relic
- Update state of an alliance or a character (dissolved, dead, etc.)
- Update the most recent location where a tool was found
- Add a new ally for an alliance

6.2 Retrievals

- Find characters associated with a particular relic.
- View organization members.
- View character information i.e location, organisation etc.
- View entity information w.r.t a particular status.
- Find characters associated with weapon/technology and vice-versa.
- Find relationship between two characters.
- Find locations associated with a relic/character.
- Find current possessor of a relic.
- View count of different entity sets associated with mini-world.

7 Summary

The development of this database allows users to store data in a structured form and then access it, making it easier to manage the data related to the tools used in the Avengers: Endgame movie, including their owners, known locations, notable users, victims, allies, and so forth.

We can also give various users personalised views thanks to this database, hence providing multiple user interface.

The database also contains relationships that allow us to recognise rivalries, allies, and other constructs between groups of people. As a result, we can use the database to forecast the overall impact of the tools.