Asian Institute of Technology
Final Examination
August 2021

Course: AT82.02 Data Modeling and Management	Total score: 25%
Date: Wednesday 1 December 2021	Time: 09:00-12:00 (3 hours)

Exam Instructions

- This examination is Open-Book. Number of pages: 3, Number of Questions: 1.
- Mobile phones, PDAs, tablets and other communication devices **are prohibited**.
- **Be concise!**

Case Study: National Metaverse Museum (NMM)

You are a member of an exciting and a pioneering project to launch the first national metaverse museum of your country which gives a virtual museum experience to all online visitors around the world.

The metaverse museum collects many types of online museum objects including cultural objects, arts and even science and technology artifacts. Online visitors can view the museum objects in 3D format as well as their descriptive details, such as titles, keywords, descriptions, object types as well as other specific attributes describing different objects, such as artist/creator, material (iron, gold, wood, porcelain, etc.), dimensions (height, width, depth), production date, production place, art style, country of origin, etc. Note that different types of objects may have different descriptive attributes.

Visitors of the museum must register to the NMM and can search/browse objects based on the object attributes that they are interested in, such as types, year, style, country, artist name, etc. In addition, visitors can also browse objects based on the physical location of the museum. Thus, for example, visitors can search and browse objects related to Japan, produced during the period of 1600-1699 and made of gold; another example is to browse all objects that are physically displayed at the Bangkok Art and Culture Center.

Visitors can also "like" an object or give comments on an object they virtually view. This way, NMM can use the like and comment history to understand visitor interests on museum objects based on their profiles.

Figure 1: Examples of museum objects

Refer to the given Case Study to answer Question 1. For any missing details, explicitly state necessary assumptions or conditions you make. Make your assumptions rational and practical.

1. (25 points) Consider the following three data models: relational, document and graph. **Compare** the three data model(s) to understand which one is **more/less appropriate** for managing data and for implementing the queries/operations of the given case study. Explain in terms of:
    a. (10 points) Data modeling and data structure,
    b. (10 points) Query and operational supports,
    c. (5 points) Transaction processing and data consistency.

    When possible, include proper diagrams, sample data and the implemented queries/operations.

-- End of Exam Paper --