1–28 Reread the definitions for data and database in this chapter

Database management systems only recently began to include the capability to store and retrieve more than numeric and textual data. What special data storage, retrieval, and maintenance capabilities do images sound, video, and other advanced data types require that are not required or are simpler with numeric and textual data?

Solution：

Large Storage Space: These data types are bigger in size and need more storage space.

Complex Structures: They require more complex ways to store and organize the data, not just simple tables.

Special Retrieval Methods: Finding and accessing these types of data can be more complex, sometimes needing advanced search techniques.

Compression and Decompression: Multimedia files often need to be made smaller for storage and then expanded again for use.

Streaming for Audio/Video: These files may need to be sent in real–time, like in video streaming.

Data Integrity: Making sure the data stays correct and consistent, especially when edited or moved, is more challenging.

Higher Security: These data types often need stronger protection due to their sensitive nature.

Handling Different Formats: They come in various formats, so the database should be able to work with different file types.

1–29. Table 1–1 shows example metadata for a set of data items. Identify three other columns for these data (i.e., three other metadata characteristics for the listed attributes) and complete the entries of the table in Table 1–1 for these three additional columns

TABLE 1-1 Example Metadata for Class Roster

Data Item					Metadata	
Name	Type	Length	Min	Max	Description	Source
Course	Alphanumeric	30			Course ID and name	Academic Unit
Section	Integer	1	1	9	Section number	Registrar
Semester	Alphanumeric	10			Semester and year	Registrar
Name	Alphanumeric	30			Student name	Student IS
ID	Integer	9			Student ID (SSN)	Student IS
Major	Alphanumeric	4			Student major	Student IS
GPA	Decimal	3	0.0	4.0	Student grade point average	Academic Unit

Solution：

Data Item	Required	Update Frequency	Default Value
Course	Yes	Each semester	None
Section	Yes	Each semester	None
Semester	Yes	Each semester	Current
Name	Yes	As needed	None
ID	Yes	Once	None
Major	No	Change of major request	Undeclared
GPA	No	End of each semester	0.0

1–30. In the section "Disadvantages of File Processing Systems," the statement is made that the disadvantages of file processing systems can also be limitations of databases, depending on how an organization manages its

databases. First, why do organizations create multiple databases, not just one all-inclusive database supporting all data processing needs? Second, what organizational and personal factors are at work that might lead an organization to have multiple, independently managed databases (and, hence, not completely follow the database approach)?

Why do organizations create multiple databases, not just one all-inclusive database supporting all data processing needs?

Solution：

Different Needs: Different departments have specific requirements that a single database might not meet effectively.

Performance: A single database for everything can become slow and inefficient.

Security: Separate databases can offer better control over sensitive data.

Factors leading to multiple, independently managed databases include:

Departmental Autonomy: Departments might prefer to control their own data.

Budget Limits: It can be expensive to develop and maintain a large, single database.

Lack of Planning: Sometimes, multiple databases exist due to a lack of coordinated planning.

Change Resistance: Employees may resist moving to a new, unified system.

Fast Business Changes: Rapid changes in business needs can lead to quick, independent database solutions.

1–38. Consider your business school or other academic unit as a business enterprise.

a. Define several major data entity types and draw a preliminary enterprise data model (similar in notation to figure 1–3a).

b. Would your business school or academic unit benefit from a multi–tiered architecture for data management? Why or why not?

Major data entity types:

Student: This entity would represent individuals enrolled in the school.

Course: This entity would detail the courses offered by the school.

Instructor: This entity would represent the faculty or staff teaching the courses.

Enrollment: This entity would represent the association between students and the courses they are enrolled in.

Department: This entity would represent the various academic departments within the school.
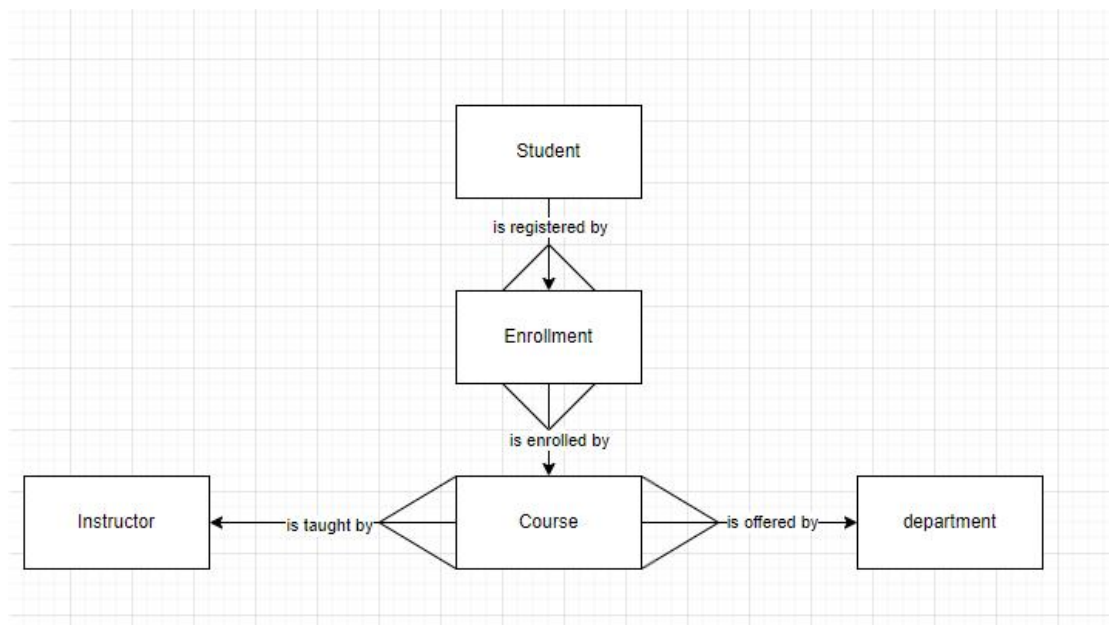
A business school or academic unit would indeed benefit from a multi-tiered architecture for data management due to the following reasons:

1. Scalability: Accommodates growth in student numbers, course offerings, and data processing needs without requiring a complete system overhaul.

2. Security: Data such as student records and grades can be managed more securely in a tiered system, with access controlled at every level.

3. Modularity: Each department can manage its own data and system upgrades with minimal impact on other school systems.

4. Specialization: Different layers can be optimized for different functions such as data storage, business logic, or user interface, thus improving overall performance.