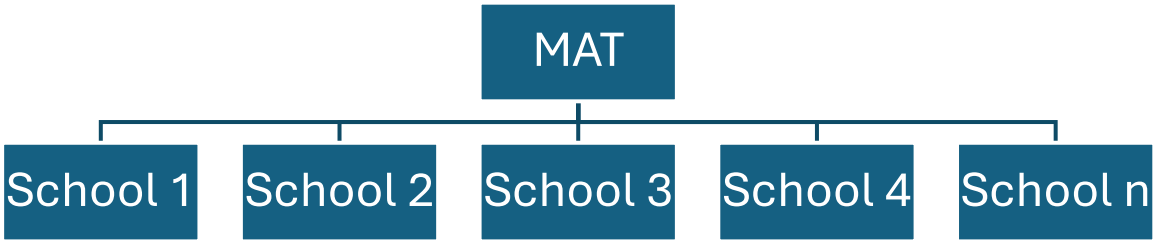
Unit3 : Data Structures Reflection

Formative Activity	Think about an online system which you use on a daily basis. Consider how it might operate at the back-end using data structures

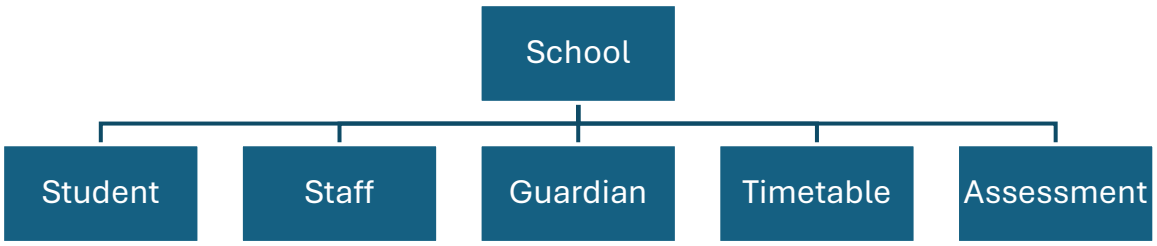
Arbor is the online system considered for this reflection. Arbor is a school Management Information System (MIS). This contains data for pupils who are enrolled at a school. Schools can be grouped together to form a muti-academy trust (MAT). Arbor provides access to the data via an online portal. Depending on the user permissions, data can be viewed or extracted at either a school or MAT level.

Figure 1: Data Structure for MAT MIS System



Each Individual School MIS holds data using an object orientated paradigm. Each school has a number of objects as shown below:

Figure 2: Data Structures for a School MIS



Each of the school objects have a set of attributes. For example, a Student Object may have the following attributes:

Figure 3: Student Object

Student		Type
Institution	Unique Reference Number (URN) for the school	Integer
UPN	Unique Pupil Number for the pupil. Note this is text not a number	String
Last Name	Name	String
First Name	Name	String
Sex	Male or Female	Character (M/F)
SEND Status	None (N); School Action (K); Education and Health Care Plan (EHCP)	Character (N/K/E)
FSM	Eligibility for Free School Meals	Boolean
Ethnicity	Text from DfE list	String
Attendance	Number of sessions (am/pm) divided by possible sessions	Percentage
Assessment	Assessment Object to consider school assessment and external examinations	Object
Behaviour	Behaviour object recording awards, behaviour instances and exclusions	Object

At a high level, the data structures can be best views as trees or simple tables for the objects themselves. Most users of the system only need a basic understanding of data structures. However, it is important to consider how the data could be represented for other stakeholders such as developers or central government.

Developers need to understand precisely how the data fits together. This moves from informal representation of data structures to a UML model. Central government need to conduct termly pupil census and ensure and this means that there must be standardisation of data formats and fields. The DfE produce guidelines for MIS providers to ensure that this is smooth and that data ca be ported from one school another via Common Transfer Files in XML format. This underlines the importance of clarity and communication between multiple stakeholders when considering larger and complex data sets.

References

Arbor (2025) Knowledge Base Index. Available at: Knowledge Base Index (Accessed 17th July 2025)

DfE (2024) Complete the school census. Available at: Complete the school census - Data items 2024 to 2025 - Guidance - GOV.UK (Accessed 17th July 2025)

Wang et al (2023), "Explainable Story and Visualization for Learning Data Structure Concepts," *2023 5th International Conference on Computer Science and Technologies in Education (CSTE)*, Xi'an, China, 2023, pp. 326-329, doi: 10.1109/CSTE59648.2023.00063.