

Data Structures Reflection

Read Wang et al (2023). Think about an online system which you use on a daily basis. Consider how it might operate at the back-end using data structures. This will inform our discussion during next week's seminar.

Online System: School Student Database

I use our school's student information system daily. It handles enrolment, attendance, grades, timetables and communication. After reading the article on using explainable stories and visualisation to teach data structures, I considered how these structures apply to the system I use.

1. Stack

The system might use a stack when tracking actions like viewing recent student records. This allows staff to go back to the last viewed page. A real-world example, as described in the article, is how web browsers use stacks. My own comparison is the stack of plates in our refectory, last plate on, first plate off. This matches the Last In, First Out principle of a stack.

2. Queue

The database could use queues for handling processes like sending messages or generating multiple reports. Requests are processed in order. A real-life example is a queue at the bank or shops, first person in is served first. This mirrors the First In, First Out nature of a queue.

3. Hash Table (Dictionary)

Used for quick lookup of student data using a unique ID. For example, entering a student's ID instantly brings up their profile. This improves speed and efficiency.

4. List (Array)

Used to store all student records in a class or year group. The system can loop through this list to calculate attendance rates or grades.

5. Tree

Likely used to organise students by performance or year group. For example, a binary search tree could allow fast sorting and searching of student marks.

6. Graph

Used for modelling relationships, such as timetables. It can help ensure no class overlaps for students or staff.