

### **Unit 3 Seminar Preparation: Data Structures Reflection**

**Student Name:** Lauren Pechey

**Module:** Software Engineering Project Management

**Activity:** Reflection on Back-End Data Structures in an Online System

For this activity, I considered Instagram, an online system I use daily, and how it might operate at the back-end using data structures, informed by Wang et al. (2023).

Instagram must efficiently store and retrieve posts for each user (Saravanan et al., 2020). Likely structures include linked lists for chronological posts and hash tables for quick user lookups, enabling seamless scrolling and fast feed updates.

Followers and following relationships form a graph structure, with users as nodes and follows as edges (Biabla et al., 2023). This allows recommendations and influencer analysis using graph algorithms. For search and hashtags, tries or prefix trees support fast string matching, while hash maps link hashtags to posts for rapid retrieval (Vidoni et al., 2022).

Temporary content like stories is best managed with queues, ensuring proper order and timely expiration, with priority queues potentially used for engagement-based prioritization (Levine et al., 2024). Likes, comments, and notifications use dynamic arrays or linked lists to maintain order and support efficient updates.

Understanding these back-end data structures helps me appreciate how Instagram handles large data volumes efficiently. Visualizing and selecting appropriate structures, as highlighted by Wang et al. (2023), is essential for performance, scalability, and user experience.

## References

- Biabla, S. E., et al. (2023). 'Proposed Ethical Framework for Software Requirements Engineering', *IET Software*, 17(4), pp. 526–537.
- Levine, S., et al. (2024). 'Resource-Rational Contractualism: A Triple Theory of Moral Cognition', *The Behavioral and Brain Sciences*, pp. 1–38.
- Saravanan, T., et al. (2020). *Comparative Analysis of Software Life Cycle Models*.
- Vidoni, M., Codabux, Z. and Fard, F. H. (2022). 'Infinite Technical Debt', *The Journal of Systems and Software*, 190, pp. 111336.
- Wang, X., et al. (2023). *Explainable Story and Visualization for Learning Data Structure Concepts*.  
5th International Conference on Computer Science and Technologies in Education, pp. 326-329.