Debate: Microservices and Microkernels

Ahead of this discussion, it is critical to highlight that microservices and microkernels serve two distinct purposes, former being an application architecture pattern and latter – software design pattern, but they have overlapping characteristics. In microservices multiple independent services communicate with each other via APIs, whereas for microkernels functionality is split between a core system and plugins, where communication must still pass through the core/kernel.

Overall, I agree with the statement posed in the forum heading. Microservices are building up to be the norm and a level of maturity has already been met in the industry (Soldani et al., 2018). Microkernels, however, have been around since 1970's and continue to be utilised to this date. Particular importance is placed on security, with many arguing microkernels are more secure (Biggs et al., 2018). Sel4 for example, is widely used in systems where high security and high performance are equally as necessary, such as defence, automotive and medical sectors, amongst others (seL4, 2025). The key principle microkernel architectures follow is the minimality principle, which is "a direct consequence of the principle of least privilege, according to which all components should have only the privileges absolutely needed to provide the needed functionality" (Redox, n.d.).

References:

Biggs, S., Lee, D. and Heiser, G., 2018, August. The jury is in: Monolithic OS design is flawed: Microkernel-based designs improve security. In *Proceedings of the 9th Asia-Pacific Workshop on Systems* (pp. 1-7).

Redox (n.d.) Microkernels. The Redox Operating System. Available from: https://doc.redox-os.org/book/microkernels.html [Accessed 22 January 2025]

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Soldani, J., Tamburri, D.A. and Van Den Heuvel, W.J., 2018. The pains and gains of microservices: A systematic grey literature review. *Journal of Systems and Software*, *146*, pp.215-232.