Andrew S. Tanenbaum created the microkernel architecture operating system in 1987, for which its target audience was university students. It was a paid OS until 2000, when it was relicensed and released for free.

A microkernel architecture consists of a core system, with multiple plug-in components, which are stand alone units that provide specialized processing and individual features. The advantage to using this architecture, is better testability, deploy ability and improved fault isolation.

Linus Torvalds created and released the Linux operating system in 1991. This OS was open source and therefore free to use and utilized a monolithic architecture. Linux is still widely in use today, mostly in smartphones (Android), Smart devices (Samsung TVs running Tizen) and in vehicle infotainment systems (Tesla, Audi, Mercedes Benz). It is also in use in googles Chromebook range. Advantages to using this system are that development is simple, deployment is easier, and scalability is better.

When comparing the two types of architecture, I found that significant faults in the monolithic structure, is that an error anywhere along the process may render the entire project unusable, as well as requiring a completely new deployment when performing an update. Conversely, testing with microkernel architecture is more difficult, as well as complexity in deployment.

A security analysis by Biggs et al, found that microservices have inbuilt internal protection boundaries to prevent intrusion. Their research showed that 96% of critical Linux exploits would not reach a critical level, 57% of exploits would be a low severity with a majority of exploits being eliminated in a microkernel system (Biggs, Lee, & Heiser, 2018).

Due to these security issues and the fact that monolithic structures are unsuitable for rapid software development, many business are migrating to microservice architecture (Ponce, Marquez, & Astudillo, 2019). Gos et al compared the efficiency of the two systems, and found that with a lower number of requests, the monolithic structure was faster, but as the number of requests became larger, microservices comfortably outpaced the monolithic structure (Gos & Zabierowski, 2020).

To conclude, I do not think we can write of monolithic structures yet, but I do think that microservices will be the more frequently used structure in the future, as such I agree with the opening statement.

Biggs, S., Lee, D., & Heiser, G. (2018). The Jury is in: Monolithic OS design is flawed: Microkernel-based designs improve security. *Proceedings of the 9th Asia-Pacific Workshop on Systems, APSys 2018*. https://doi.org/10.1145/3265723.3265733

Gos, K., & Zabierowski, W. (2020). The Comparison of Microservice and Monolithic Architecture. *2020 IEEE 16th International Conference on the Perspective Technologies and Methods in MEMS Design, MEMSTECH 2020 - Proceedings*, (June), 150–153. https://doi.org/10.1109/MEMSTECH49584.2020.9109514

Ponce, F., Marquez, G., & Astudillo, H. (2019). Migrating from monolithic architecture to microservices: A Rapid Review. *Proceedings - International Conference of the Chilean Computer Science Society, SCCC, 2019-November*. https://doi.org/10.1109/SCCC49216.2019.8966423