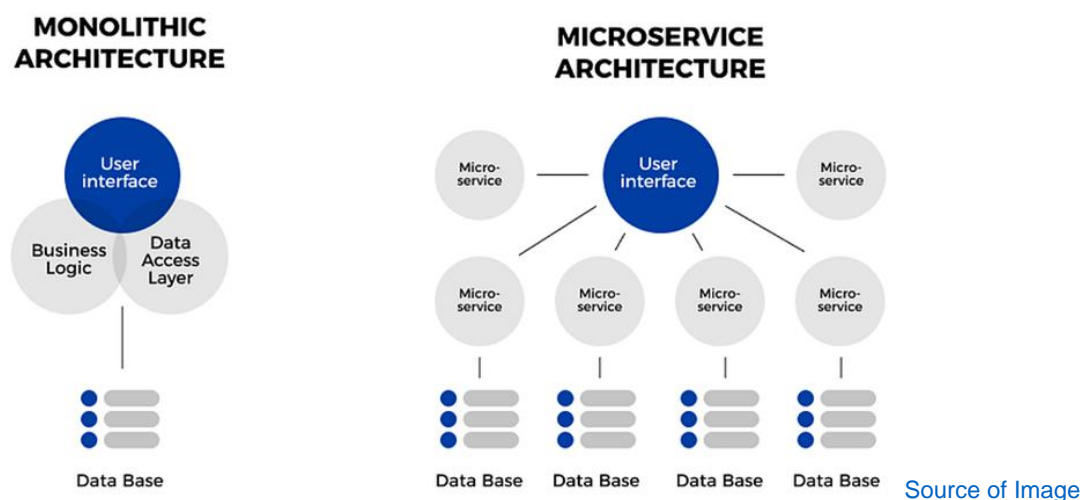


## Unit 12: The Great Tanenbaum-Torvalds Debate Revisited

### 1. Recommend a strategy around which methodology to adopt: monolithic or microservices.

According to Hidayat (2020), monolithic architecture is an older application development method that tightly binds all components into a single unit. Although this approach has advantages like more straightforward implementation and deployment, it also has significant drawbacks such as difficulty updating, reduced performance, and increased complexity as the application grows. On the other hand, the microservice architecture is a more modern approach where each feature is built separately and communicates with other components through HTTP rest or message bus. Although it is more complex than the traditional monolithic architecture, it offers benefits such as easy maintenance, scalability, and security. However, this approach requires automation, has high service dependencies, and can be time-consuming to design.



Monolithic applications are built as a single, self-contained unit. All of the application's code and data are bundled together into a single deployment artefact. This makes monolithic applications relatively easy to develop and deploy, but they can be challenging to scale and maintain as they grow larger and more complex (Harris, N.D.).

Microservices architectures, on the other hand, is a software architecture pattern where an application comprises small, independent, and loosely coupled services. Each microservice has a specific function and communicates with others through APIs, leading to better scalability, flexibility, resilience, development speed, and maintainability (Oraclecloud, N.D.).

Which methodology to adopt depends on several factors. As explained by Blockhuys (2023), monolithic architecture is still relevant today, especially for small teams and early-stage projects. It's easy to develop, test, and deploy and shared resources lead to better performance. Monolith is a good choice for proof of concept and manageable complexity. Starting with a monolith is suitable for small founding teams, building a proof of concept, or when there is foreseeable scale and complexity. However, monolithic applications can become more challenging to maintain, inefficient to test, and lack agility as they grow. They can also result in a single point of failure and are not suited for specialisation or scaling.

Microservices architecture is a way to structure applications as individual, loosely coupled services that can be updated, deployed, tested, and scaled independently (Blockhuys, 2023). By standardising contracts via business-oriented APIs, users don't notice any changes made in the backend. This approach offers several benefits, such as maximal agility, speed, and scalability, making it easier to scale and add new capabilities to large applications with multiple modules and user journeys. However, to start with microservices, a team with some experience in microservices or distributed design is crucial.

After considering the information provided, I strongly suggest implementing a microservices architecture.

## **2. Provide evidence to support your recommendation.**

The evidence supporting my recommendation for implementing a microservices architecture is as follows based on the ideas of Ajeenkya (2022):

Firstly, according to a study by Netflix, microservices architectures can scale up to 10 times more effectively than monolithic architectures. This means that they can handle an increased amount of traffic without sacrificing performance or reliability.

Secondly, a study by Uber shifted from a monolithic structure to a microservices architecture to improve speed, quality, and fault tolerance. Global standards were set to ensure all 1300 microservices were of the highest quality.

Lastly, a study by Amazon found that microservices architectures can be developed and deployed up to 50% more quickly than monolithic architectures. This is because each service can be developed and tested independently, which allows for greater flexibility and efficiency.

Microservices architecture has proven to be a valuable tool for mobile app development, providing long-term benefits for startups and small businesses. Several companies, such as Spotify, Coursera, Google, Amazon, Twitter, and Netflix, have successfully implemented microservices architectures.

Techno Brains (2021) states that embracing this architecture can help enterprises face complexity and compete on an equal playing field. Although microservices architectures may present some challenges, such as complexity in development and maintenance, their benefits often outweigh these challenges, especially for large and complex applications.

### **3. Explain how faceted data approaches work.**

Facets are a helpful tool for inspecting datasets to see the connections between various features and ensure no unexpected or missing values exist (Yufeng, 2018).

Faceted search is a widely adopted approach in specialised search engines such as e-commerce and e-tourism. Facets refer to the attributes or metadata that define the content collection and allow users to navigate the information space. While facet ranking is a critical component, it is often not examined in isolation. In a comprehensive study, Ali et al. (2023) employed systematic literature search methods, filtering criteria, author tracking, and citation analysis to survey publications on this topic.

Therefore, the term "big data" refers to the expanding volume, variety, and intricacy of digital information accessible on the internet. This poses fresh prospects and obstacles for research, development, and policy across various fields. To sort and examine knowledge, including big data, scholars employ facet analysis (Shiri, 2014).

Faceted data approaches are often used in search and discovery applications, such as e-commerce websites and product catalogues. They can also explore and analyse data in other domains, such as scientific research and business intelligence (Ali et al. 2023).

According to Lang's (2023) explanation, the faceted data approach can be demonstrated through shopping for shoes on an e-commerce website. In this case, the website uses a faceted data approach to organise its shoe inventory based on various factors, including size, brand, price range, product category, and subcategory. To begin the search, the user can filter the results by selecting a price range. From there, the user can refine the results by choosing other facets such as brand, colour, size, and material. As the user selects different facet values, the website will update the

search results in real-time, making it easy to find the perfect pair of shoes quickly and effortlessly.

Faceted data allows for non-linear exploration of data, personalised search experiences, discovery of new items, and creation of personalised experiences. It is a powerful tool for organising and exploring data, improving user experiences in search and discovery, data analysis, and business intelligence.

## References:

Hidayat, T. (2020). *Micro Services Versus Monolithic Architecture. What Are They?* [online] Javan Cipta Solusi. Available at: <https://medium.com/javanlabs/micro-services-versus-monolithic-architecture-what-are-they-e17ddc8d3910>.

Harris, C. (N.D.). *Microservices vs. monolithic architecture*. [online] Atlassian. Available at: <https://www.atlassian.com/microservices/microservices-architecture/microservices-vs-monolith>.

Oraclecloud (N.D.). *Microservices*. [online] Available at: <https://docs.public.oneportal.content.oci.oraclecloud.com/en-us/iaas/Content/cloud-adoption-framework/microservices.htm>.

Blockhuys, M. (2023). *Monolith vs Microservices: choosing the right architecture for your organization | SQLI*. [online] Available at: <https://www.sqli.com/nl-en/insights/blog/monolith-vs-microservices-choosing-right-architecture-your-organization>.

Ajeenkya, S. (2022). *Microservices: Architecture and Case Study from Various Organizations*. [online] Available at: <https://www.linkedin.com/pulse/microservices-architecture-case-study-from-various-suryawanshi/>.

Techno Brains (2021). *Best Technologies To Build Microservices Architecture and its Key Advantages*. [online] TechnoBrains. Available at: <https://technobrain.io/technologies-to-build-microservices-architecture/>.

Yufeng, G. (2018). *Visualize your data with Facets*. [online] Medium. Available at: <https://towardsdatascience.com/visualize-your-data-with-facets-d11b085409bc>.

Ali, E., Caputo, A. & Jones, G.J.F. (2023). A Comprehensive Survey of Facet Ranking Approaches Used in Faceted Search Systems. *Information*, [online] 14(7), p.387. doi:<https://doi.org/10.3390/info14070387>.

Shiri, A. (2014). Making sense of big data: A facet analysis approach. *KO KNOWLEDGE ORGANIZATION*, 41(5), pp.357-368.

Lang, L. (2023). *Search That Converts: A Complete Guide to Ecommerce Faceted Search*. [online] Constructor. Available at: <https://constructor.io/blog/ecommerce-faceted-search/>.