6: Horizontal vs Vertical scaling

What is scaling?

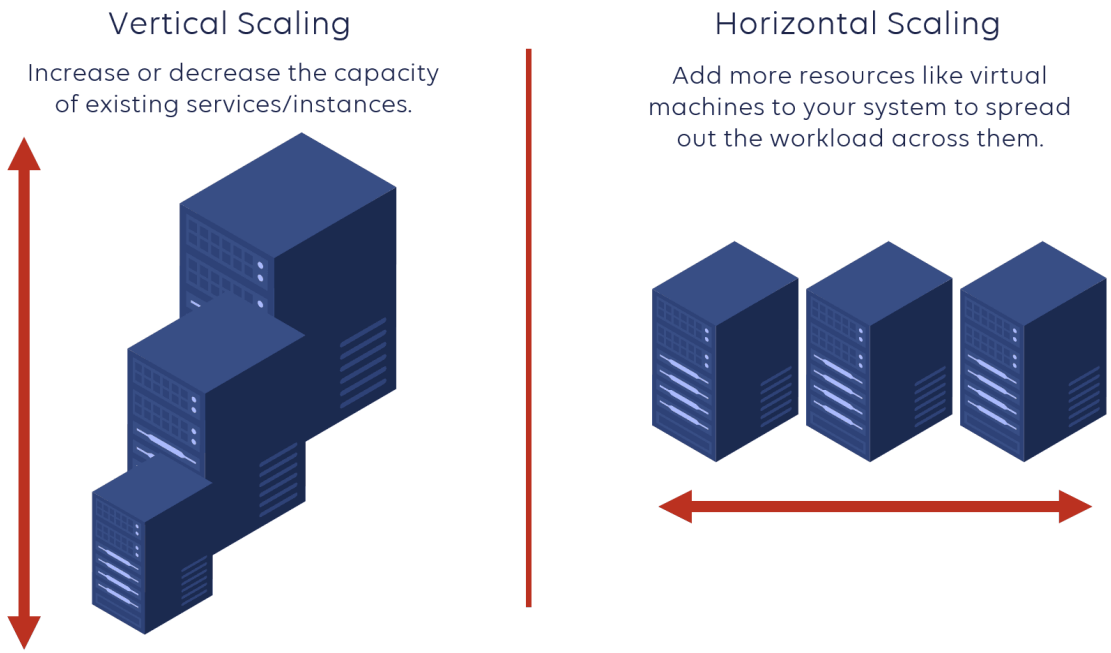
Analogy: Let’s take an example of vehicles. A small car might be able to comfortably seat four people, but if you need to transport more people, you might need a larger vehicle like a van or a bus. Similarly, a computer system that is designed to handle a small amount of data or traffic might be sufficient for a small business, but a larger company with more users and data will likely require a more powerful and scalable system.

Hence, scaling is the ability of systems to handle growing load (in terms of traffic, requests etc.).

Remember how our cbse website used to go down on the day of results? That’s because it wasn’t able to scale as the load increased.

Why is scaling important?

To prevent slowdowns, errors, failures or complete shutdowns. By ensuring that systems are able to scale, we can ensure that they will continue to function effectively and efficiently, even as their workloads grow



What is vertical scaling?

Vertical scaling is like working out your single muscle. In computer science, vertical scaling is when you add more and more processing power and memory to a single system.

What are the advantages of vertical scaling?

1. Easier to implement
2. Cheaper than horizontal scaling when workloads are less

What are the disadvantages of vertical scaling?

1. Expensive
2. Because all of the resources are contained within a single computer, the system can only be scaled up to the limits of that particular machine. This means that there is a limit to how much the system can be scaled, and once that limit is reached, the only option is to replace the entire computer with a more powerful one. This can be expensive and time-consuming.
3. More vulnerability to failure as there is just one system

What is horizontal scaling?

Here we add more muscles or more computers.

As a mechanical engineer, here’s an analogy: Horizontal scaling might be a factory that is trying to increase its production capacity. Instead of upgrading a single production line with more efficient equipment, the factory might choose to add more production lines to increase overall output. This would be similar to horizontal scaling, where the workload is distributed across multiple computers rather than being handled by a single, more powerful machine.

What are the advantages of horizontal scaling?

It allows unlimited capacity. Hence, makes it a good option for systems with a high level of demand or that are expected to grow rapidly.

Additionally, horizontal scaling can be more expensive than vertical scaling, particularly for systems with low or moderate workloads. This is because it involves the additional cost of purchasing and maintaining multiple computers.

What are the disadvantages of horizontal scaling?

Complex to manage as requires dealing with multiple computers