Primary cloud-based service offerings. (SaaS, PaaS, IaaS, FaaS, On-Prem)

When comparing the different cloud-based service offerings there are currently five options that I could find that are regularly used. To start there is On-prem, this is the most expensive option as the company needs to provide all the servers, storage, networking, management and maintenance. This makes it expensive and time-consuming to manage, but on the upside, it is highly secure, available when the company needs it, and can be fixed / have issue resolved as fast as the employees can fix it. The rest of the options that follow have one major downside that does not affect the On-Prem version and that is when something goes down or there is an issue with the provider there is nothing that the customer can to other than wait for service to be restored.

The other four types of offerings are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Function as a Service (FaaS). IaaS is the most basic of the cloud hosted service models. This provides resources such as networking, storage, and servers over the internet. This means that the configuration and management are the responsibility of the customer but the hardware, or what would have been, (upgrades, replacement, maintenance, and so on) is the responsibility of the provider. This option allows for the greatest level of control over what the resources will do. This service tends to be the most expensive as the billing is dependent on the resources used (compute, storage, networking) along with any extra services purchased alongside the primary services.

Next is PaaS, which provides a platform for developers to develop, run, and test applications without needing to manage the underlying infrastructure. This allows developers to test apps and such more frequently with less setup overhead than re imaging servers and configuring the specifics of the hardware (CPU, ram, memory, disk partitioning, OS install). This service is usually charged as a pay-per-use, subscription model, or a flat fixed monthly fee.

The third of the four option is SaaS, this service provides applications over the internet making it easy for users to access the applications they need anywhere. This includes examples such as Office 365, Salesforce, Google Workspace, Adobe Suite, and so on. SaaS allows customers to subscribe to the productivity applications that their users need without having to host the software themselves, manage individual licenses manually, or worry about the infrastructure needed to run the software. This service is usually charged via some form of monthly or yearly subscription per user.

Lastly there is FaaS, which is a cloud service model to let users run code without the need for server management. The idea is that users upload code to the service provider where it is then run on demand. This makes for an ideal environment for rapid testing of code and development in a code focused environment. This kind of service usually charges based on lines of code run.

Links:

Top 3 Cloud Provider Services

The top three Cloud service providers are Amazon Web Services (AWS), Microsoft Azure (Azure), and Google Cloud Platform (GCP). All three of the listed companies offer IaaS, SaaS, PaaS, and FaaS along with Databases, NoSQL, Object Storage, file storage, archive storage, and data warehousing. The main difference between the three comes in the specialty service that they offer GCP is the only service without a game development service and end user computing (virtual desktops) service. AWS is also the only service provider to offer a robotics focused service (AWS RoboMaker). As for the pricing, it depends on what a customer decides to use along with extra services and support that determine the cost of the service. Azure is consistently more expensive than the other two options while AWS and GCP go back an forth depending on the low vs high resource systems. The major difference in pricing structure is that AWS and azure require a one to three year commitment while GCP offers a discount if users sign up with the commitment while not requiring it. Other than that AWS has three payment options, all up front, no upfront, and partial upfront payments while Azure requires all upfront and GCP has no upfront cost for service.

How virtualization is used in modern data centers, and the primary hypervisor software used in those environments.

In modern data centers there are three main hypervisors used and those are VMware’s vSphere, Microsoft’s Hyper-V and Citrix XenServer. In the modern datacenters that I have worked in the primary uses of virtualization have been to create larger server clusters. These clusters are large groupings of servers with large quantities of RAM and usually powerful dual CPUs that relate to large storage arrays attached. This allows for the creation of powerful server clusters. These clusters are then used to host virtual servers that perform different tasks. One such task I have seen setup is the creation of virtual desktops that can be dynamically created and assigned with prepopulated applications for users. In this kind of application for a company at a self-hosted datacenter Xen server was used as it was a cheap option with an open-source codebase. Microsoft Hyper-V is used in windows-based environments to create an entirely Windows based server cluster. vSphere is used in production environments where uptime is most important and when customers would like to have support contracts where service techs can come out and troubleshoot the server cluster. Another use is the division of massive clusters of computing resources that are then divided into smaller chunks that can be rented to scientists to process massive quantities of data (tens of petabytes) that is the result of scientific research. In this kind of environment they use a custom hypervisor OS called the Tri-Lab Operating System Stack (TOSS) that is based on Red hat Linux and is specifically designed for use in high performance computing clusters.

Cloud based service offerings Links:

<https://www.quora.com/What-is-the-difference-between-PaaS-IaaS-SaaS-and-FaaS-in-cloud-computing-Do-they-all-use-the-same-underlying-infrastructure-of-servers>

<https://redmonk.com/rstephens/2023/04/11/iaaspricing2022/>

<https://www.qovery.com/blog/the-hidden-costs-of-paas-everything-you-should-know/>

Top 3 cloud providers Links:

<https://cloud.folio3.com/blog/aws-vs-azure-vs-gcp-cloud-cost-comparison/>

<https://www.effectivesoft.com/blog/cloud-pricing-comparison.html#pricing-models>

<https://www.bmc.com/blogs/aws-vs-azure-vs-google-cloud-platforms/>

virtualization is used in modern data centers Links:

<https://en.wikipedia.org/wiki/TOSS_(operating_system)>

<https://www.nas.nasa.gov/hecc/resources/pleiades.html>

<https://www.actualtechmedia.com/io/top-5-enterprise-type-1-hypervisors/>