hmmm

1.2 High-Performance Computing

For many years, HPC systems emphasize the raw speed performance. The speed of HPC systems has increased from Gflops in the early 1990s to now Pflops in 2010. This improvement was driven mainly by the demands from scientific, engineering, and manufacturing communities. For example, the Top 500 most powerful computer systems in the world are measured by floating-point speed in Linpack benchmark results. However, the number of supercomputer users is limited to less than 10% of all computer users. Today, the majority of computer users are using desktop computers or large servers when they conduct Internet searches and market-driven computing tasks.

1.3 High-Throughput Computing

The development of market-oriented high-end computing systems is undergoing a strategic change from an HPC paradigm to an HTC paradigm. This HTC paradigm pays more attention to high-flux computing. The main application for high-flux computing is in Internet searches and web services by millions or more users simultaneously. The performance goal thus shifts to measure high throughput or the number of tasks completed per unit of time. HTC technology needs to not only improve in terms of batch processing speed, but also address the acute problems of cost, energy savings, security, and reliability at many data and enterprise computing centers. This book will address both HPC and HTC systems to meet the demands of all computer users.

distributed and parallel computing

ANSWER

In this answer, we will explore the differences between parallel and distributed computing, as well as their respective advantages and trade-offs.

Parallel computing involves multiple processors working on different tasks concurrently, with the goal of speeding up a computational task. It typically takes place on a single computer with multiple processors, and can utilize either shared memory or distributed memory systems javatpoint.com. Parallel computing can increase CPU utilization and improve performance, as well as provide fault tolerance, since the failure of one CPU does not impact the functionality of the other CPUs javatpoint.com.

Distributed computing, on the other hand, involves multiple autonomous computers working together on a single task, often across a network. Each computer in a distributed system has its own private memory, and communication between computers is achieved through message passing en.wikipedia.org. Distributed computing is commonly used for scalability, resource sharing, and efficient completion of computational tasks javatpoint.com.

There are several key differences between parallel and distributed computing:

- Parallel computing focuses on dividing tasks among multiple processors, whereas distributed computing divides tasks among multiple computers javatpoint.com.
- In parallel computing, processors communicate via a bus, while in distributed computing, computers communicate via a network javatpoint.com.
- Parallel computing is typically limited to a single computer, while distributed computing takes place across multiple computers blog.purestorage.com.

- Parallel computing systems are less scalable than distributed computing systems, as the memory of a single computer can only handle so many processors at once blog.purestorage.com.

- Parallel computing is often used for scientific computing and improving computer performance, while distributed computing is used for resource sharing and scalability blog.purestorage.com.

Regarding which approach is better, it depends on the specific use case. If the primary goal is to increase computational power and work in a highly analytics-based field, parallel computing may be the better choice. However, if scalability, resilience, and resource sharing are the main objectives, distributed computing might be more suitable blog.purestorage.com.

In summary, parallel and distributed computing are two distinct approaches to carrying out computational tasks, with parallel computing focusing on concurrency and performance, while distributed computing emphasizes scalability and resource sharing. The choice between them depends on the specific requirements and goals of the application.

What is Cloud Computing Reference Model?

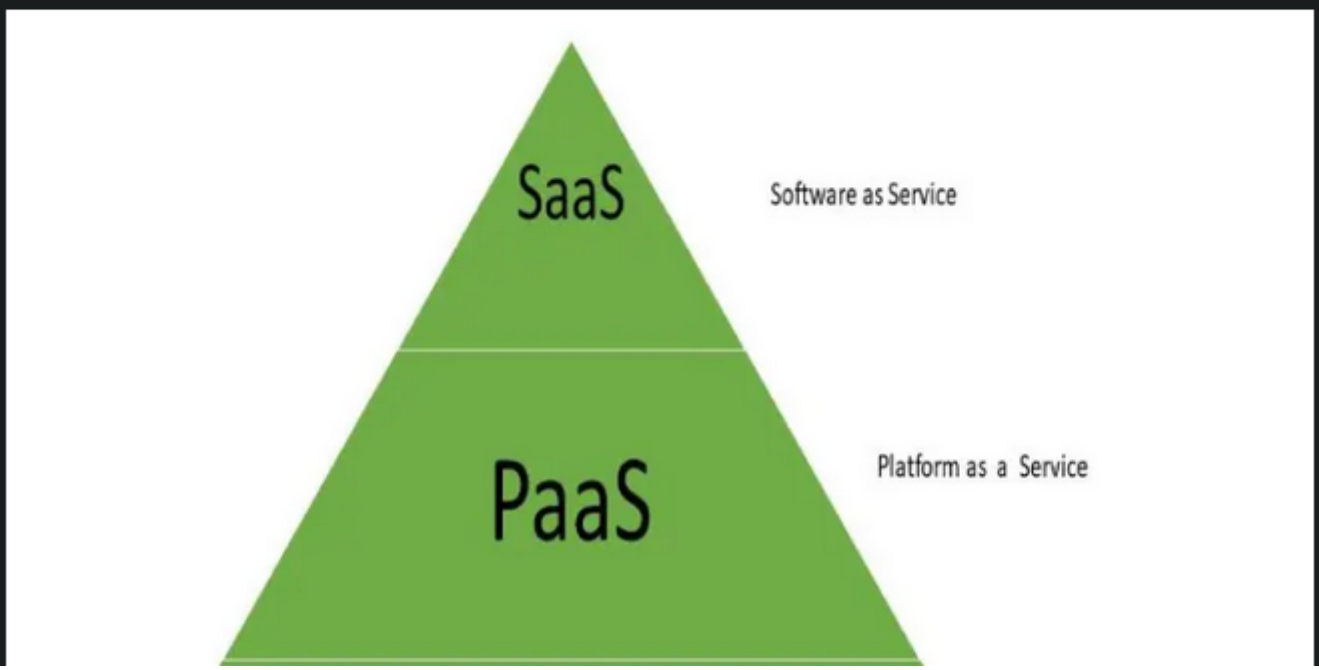
The cloud computing reference model is an abstract model that divides a cloud computing environment into abstraction layers and cross-layer functions to characterize and standardize its functions. This reference model divides cloud computing activities and functions into three cross-layer functions and five logical layers.

Each of these layers describes different things that might be present in a cloud computing environment, such as computing systems, networking, storage equipment, virtualization software, security measures, control and management software, and so forth. It also explains the connections between these organizations. The five layers are the Physical layer, virtual layer, control layer, service orchestration layer, and service layer.

Cloud Computing reference model is divided into 3 major service models:

1. Software as a Service (SaaS)
2. Platform as a Service (PaaS)
3. Infrastructure as a Service (IaaS)

The below diagram explains the cloud computing reference model:



What is a Cloud Computing Stack?

Cloud computing can be described as a stack that is formed by layers, similar to a cake. Those layers will be built using cloud computing services, servers, and components, which can leverage several different clouds forming a single application stack. The network stability and scalability of the stack will determine its resilienc and high availability.

Let's get more familiar with the types of cloud stack components and concepts that are common in the cloud world.

Software as a Service

Software as a Service is providing a piece of technology (usually a software) that can be consumed as a serv — for example, GitHub source control. You could choose to host and manage Git source control on-premises you could use GitHub's hosted source control.

One of the new variations of "Software as a Service" is "Data as a Service."

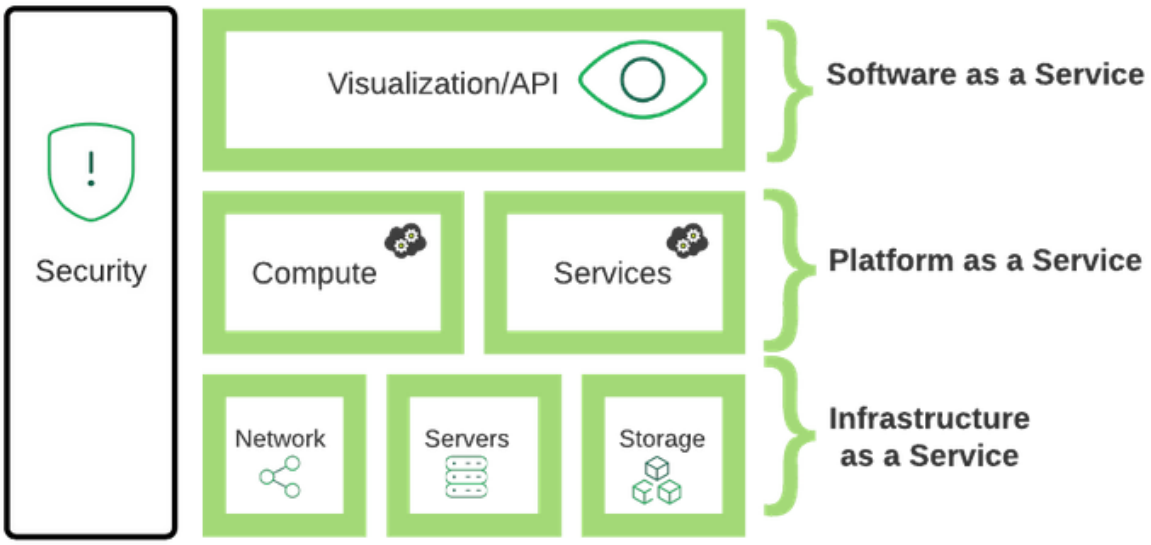
Data as a Service

Data as a Service combines a few software services to form a data platform.

MongoDB Atlas is a data platform with different services to provide a single holistic solution for your data requirements. This type can power the different stack layers focusing on data processing/storing and visualization.

Platform as a Service

In some cases, users will choose one of the cloud computing types for the entire application stack. However, in other cases, they might use any of the types to form the application stack, which is common in the microservices world.



Cloud Computing Stack

multi-tenancy in cloud computing

ANSWER

Multi-tenancy is a software architecture where a single software instance can serve multiple, distinct user groups, such as in Software-as-a-service (SaaS) offerings. In cloud computing, multitenancy can also refer to shared hosting, in which server resources are divided among different customers [1]. This architecture enables a single instance of an application to be shared among multiple organizations or users, and is applied only to SaaS. Multi-tenancy is an important concept of Cloud Computing, where multiple customers of a cloud vendor share the same computing resources but the data of each Cloud customer is kept totally separate and secure. For instance, multiple people can store their money in the same bank, but every customer's asset is totally different, and one customer cannot have access to the other customer's money and account. Different customers are not aware of each other's account balance and details, ensuring data security and privacy for all tenants [0] [2] [3].