

A Survey on Service-Oriented Network Virtualization Software Defined Networking for Cloud Computing

Vatsal Mishra¹ and Dr. Manjula R²

School of Computing Science and Engineering, VIT University, Vellore - 632014, Tamil Nadu, India.

¹ORCID: 0000-0001-8818-733X

Abstract

Organize virtualization is the path to the present and future accomplishment of appropriated processing. In this article, we clear up key purposes behind virtualization and rapidly illuminate a couple of the frameworks organization developments that have been delivered starting late or are being made in various measures bodies. The huge part that frameworks organization plays in Cloud preparing requires a comprehensive vision that licenses merged control, organization, and change of both frameworks organization and figuring resources in a Cloud area, which prompts to a meeting of frameworks organization and Cloud enlisting. Compose virtualization is being gotten in both communicate correspondences and the Internet as a key quality for the bleeding edge sorting out. Virtualization, as a potential engaging impact of huge changes in both trades and handling spaces, is depended upon to traverse any boundary between these two fields. Advantage Oriented Architecture (SOA), when associated in framework virtualization, engages a Network-as-a-Service (NaaS) perspective that may gigantically empower the union of frameworks organization and Cloud figuring.

Keywords: Software Defined Networking, Virtualisation, Network-as-a-Service, Cloud Computing

INTRODUCTION

The Internet has realized virtualization of all parts of our life. Today, our workplaces are virtual, we search in every way that really matters, get virtual guideline, redirection is all virtual, and clearly, a lot of our figuring is virtual. The key enabling operator for all virtualizations is the Internet and diverse PC arranging developments. By chance PC sorting out itself must be virtualized. A couple of new models and developments have been made for framework virtualization. This article is an investigation of these developments.

Starting late the utilization of SOA in framework virtualization has pulled in wide eagerness from both insightful group and industry. But different noteworthy

research works have been appropriated they are at this moment scattered over various fields in the composition, including communicate correspondences, PC sorting out, Web organizations, and Cloud figuring. In this article we show a broad audit on the latest progressions in organization masterminded framework virtualization for supporting Cloud enlisting, particularly from a perspective of framework and Cloud converging through NaaS. Specifically, we first present the SOA rule and review late research progress on applying SOA to support orchestrate virtualization in both communicate correspondences and the Internet. By then we show an arrangement of framework Cloud converging in light of organization masterminded framework virtualization and give a survey on key advances for recognizing NaaS, for the most part focusing on best in class of framework organization delineation, revelation, and association. We also discuss the troubles procured by framework Cloud meeting to these headways and research openings available in these regions, with a might want to fortify the examination gathering's eagerness for this creating interdisciplinary field.

A champion among the most basic late advances in the field of information development is Cloud enlisting. Circulated registering is a broad scale passed on preparing perspective that is driven by economies of scale, in which a pool of separated, virtualized, intensely adaptable figuring limits and organizations are passed on demand to external customers over the Internet. A particular foundation of Cloud figuring lies in the virtualization of various enlisting resources, which is fundamentally an impression of honest to goodness limits from essential physical resources. Arranging accept a critical part in Cloud figuring. Cloud benefits customarily address remote transport of preparing resources, as often as possible by method for the Internet. This is especially huge without trying to hide Cloud circumstances where customers get organizations from an untouchable Cloud provider. From an organization provisioning perspective, Cloud organizations contain preparing limits gave by Cloud structure and additionally correspondences limits offered by the Internet. Frameworks organization is moreover a key part to give data trades in Cloud server ranches and furthermore among server

ranches spread at different regions. Comes to fruition gained from late survey on Cloud enlisting execution have exhibited that frameworks organization execution essentially influences the way of Cloud organizations, and when in doubt data trades transform into a bottleneck that purposes of constraint Clouds from supporting first class applications. In this way, frameworks with Quality of Service (QoS) limits transform into a basic component for unrivaled Cloud figuring. For example, an unrivaled application utilizes the Cloud establishment for securing and taking care of an extensive game plan of data with an essential on the best organization response delay (the day and age that the application needs to sit tight to get occurs afresh from the Cloud after it starts transmitting data to the Cloud). This application may use the limit furthest reaches of Amazon S3 (Simple Storage Service) and the enrolling capacity gave by Amazon EC2 (Elastic Compute Cloud). Remembering the ultimate objective to make the Cloud organizations available to the application, the central framework system ought to in like manner give arrange organizations to transmitting data from the application to the S3 virtual plate, supporting data trades between the virtual circle and the EC2 virtual machine (Amazon EC2 and S3 servers may be arranged at different land regions that are related by method for the Internet), and passing on dealing with comes to fruition back to the application. Thusly, the organization offered to the Cloud customer (this application) is essentially a bit of both Cloud and framework organizations. In order to meet the organization defer essential of the application, sufficient measure of frameworks organization resources (e.g. trayynsmission information transmission and bundle sending limit). The basic part that frameworks organization plays in Cloud enlisting requires a widely inclusive vision of both preparing and frameworks organization resources in a Cloud area. Such a fantasy requires basic framework structure to be opened and introduced to upper layer applications in Clouds; in this way enabling joined organization, control, and streamlining of figuring and frameworks organization resources for Cloud advantage provisioning. This prompts to a union of frameworks organization and Cloud figuring structures toward a composite framework Cloud advantage provisioning system. In light of the versatile nature of frameworks organization advances and traditions, presentation of framework functionalities in a Cloud space is quite recently conceivable with legitimate consideration and virtualization of frameworks organization resources. Of course, media transmission and frameworks organization systems are standing up to the trial of rapidly making and passing on new limits and organizations for supporting the distinctive necessities of various figuring applications.

Enter changes are required in the Internet configuration to allow heterogeneous frameworks organization structures to exist together and facilitate for supporting an extensive variety of usages. A promising philosophy that the frameworks organization ask about gathering takes for tending to these

troubles is virtualization of frameworks organization resources; particularly decoupling organization provisioning from framework establishment and revealing concealed framework functionalities through resource pondering and virtualization. Such an approach overall is delineated by the term orchestrate virtualization, which is depended upon to be a key property without limits sorting out perspective.

As a potential enabling specialist of critical changes in both figuring and trades regions, virtualization is required to traverse any boundary between these two fields that by and large live extremely isolated and enable a converging of frameworks organization and Cloud enlisting. Orchestrate virtualization in a Cloud circumstance allows a widely inclusive vision of both enlisting and frameworks organization resources as a lone collection of virtualized, intensely provisioned resources for composite framework Cloud advantage provisioning. Union of frameworks organization and Cloud preparing is most likely going to open up an enormous field of opportunities to the IT business and grants the front line Internet to give correspondence acts and additionally extraordinary enlisting organizations. Distinctive communicate interchanges and Internet master associations around the world have starting at now showed a great deal of excitement for giving Cloud organizations in light of their framework establishment. For example, AT&T has pushed its Cloud plan that offers a broad assortment of enormous business encouraging and Cloud figuring services¹. Verizon has furthermore started offering attempt Cloud figuring organizations in light of its Verizon Cloud Platform².

Union of frameworks organization and Cloud figuring can be seen from vertical and level estimations. In the vertical estimation, resources and functionalities in framework establishment are opened and revealed through a hypothetical virtualization interface to upper layer works in the Cloud, including resource organization modules and distinctive capacities with regards to offering Cloud organizations. In the even estimation, Cloud server cultivates that offer enlisting limits and framework establishment that give data correspondences join into a composite framework Cloud advantage provisioning structure. In both estimations, such a union enables joined organization, control, and change of frameworks organization and what's more figuring resources in a Cloud circumstance. Some specific issues must be tended to for comprehension converging among frameworks organization and Cloud figuring. Key necessities for framework Cloud blending join frameworks organization resource pondering and prologue to upper layer applications and composed endeavors among heterogeneous structures over the frameworks organization and figuring spaces. Thusly a crucial research issue is to develop the framework for supporting convincing, versatile, and adaptable relationship among key players in an assembled frameworks organization and Cloud preparing environment, including frameworks organization and enlisting establishment providers,

frameworks organization and figuring pro associations, and distinctive applications as the customers of composite framework Cloud organizations. Advantage Oriented Architecture (SOA), when associated in both framework virtualization and Cloud figuring, offers a promising approach to manage engaging the framework Cloud union. SOA gives convincing auxiliary principles to heterogeneous system blend. Fundamentally advantage presentation empowers virtualization of figuring structures by encapsulating system resources and limits as organizations and gives a free coupling coordinated effort part among these organizations. SOA has been comprehensively grasped in Cloud enrolling through the perfect models of Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software as-a-Service (SaaS). Applying SOA in the field of frameworks organization supports encapsulation and virtualization of frameworks organization resources as SOA-pleasant framework organizations. Advantage arranged framework virtualization engages a Network-as a-Service (NaaS) perspective that grants sort out structure to be revealed and utilized as framework organizations, which can be shaped with enlisting organizations in a Cloud area.

A marvelous measure of research attempts have been made on key developments for NaaS, including framework advantage portrayal, exposure, and piece. These works are driven in various fields scattered across over communicate correspondences, PC sorting out, Web benefits, and scattered preparing. But some correlated reviews have been appropriated, The circumstances focus on a particular field, either media transmission organizations or Web organizations/scattered enrolling structures.

WHY VIRTUALIZE?

There are many reasons why we need to virtualize resources. The five most consistent reasons are:

A Sharing:

When an advantage is excessively enormous for a lone customer, it is best to partition it into various virtual pieces, much the same as the case with today's multi-focus processors. Each processor can run various virtual machines (VMs), and each machine can be used by a substitute customer. The same applies to fast associations and broad cutoff plates.

B. Isolation:

Multiple customers sharing a benefit may not trust each other, so it is basic to give confinement among customers. Customers using one virtual part should not have the ability to screen the activities or interfere with the activities of various customers. This may apply paying little respect to the likelihood that assorted customers have a place with a comparative relationship since different divisions of the affiliation (e.g., back and planning) may have data that is mystery to the workplace.

C. Aggregation:

If the advantage is too little, it is possible to build up a broad virtual resource that carries on like an immense resource. This is the circumstance with limit, where a far reaching number of sensible touchy plates can be used to make up endless tried and true stockpiling.

D. Dynamics:

Often resource necessities change brisk on account of customer adaptability, and a way to deal with reallocate the advantage quickly is required. This is less complex with virtual resources than with physical resources.

E. Ease of organization:

Last yet likely the most basic reason behind virtualization is the straightforwardness of organization. Virtual devices are less requesting to supervise in light of the way that they are modifying based and reveal a uniform interface through standard reflections.

The diagrammatic representation of evolution of virtualization is as shown

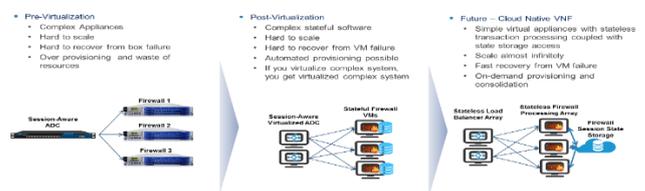


Figure 1: Advantageous virtualization evolution

VIRTUALIZATION IN COMPUTING

Virtualization is not another thought to PC scientists. Memory was the first among the PC parts to be virtualized. Memory was an exorbitant part of the main PCs , so virtual memory thoughts were made in the 1970s. Study and connection of various page substitution counts was an outstanding examination subject then. Today's PCs have to a great degree progressed and different levels of putting away for memory. Limit virtualization was a trademark next walk with virtual plates, virtual moderate circle (CD) drives, inciting to dispersed stockpiling today. Virtualization of desktops achieved thin clients, which realized basic abatement of capital and likewise operational utilization, over the long haul provoking to virtualization of servers and circulated processing.

PC frameworks organization is the channels of preparing, and like pipes in each and every delightful building, frameworks organization is the best approach to substantial parts of the segments offered by new figuring structures. Virtualization in frameworks organization is moreover not another thought. Virtual stations in X.25-based media transmission frameworks and each and every following framework allow various

customers to share a tremendous physical channel. Virtual neighborhood (VLANs) allow different agencies of an association to grant a physical LAN to restriction. In like manner, virtual private frameworks (VPNs) allow associations and agents to use open frameworks with a comparative level of security they acknowledge in their private frameworks. Regardless, there has been imperative reestablished eagerness for framework virtualization stimulated mainly by disseminated processing. A couple of new standards have been delivered and are being made. Programming described sorting out (SDN) furthermore helps in framework virtualization. These late standards and SDN are the subjects of this article. We discuss a couple generally framework virtualization developments. Programming portrayed frameworks organization is inspected in detail. Our own specific research on open application transport using SDN is delineated.

NETWORK VIRTUALIZATION

A PC orchestrate starts with a framework interface card (NIC) in the host, which is related with a layer 2 (L2) sort out (Ethernet, WiFi, et cetera.) partitions. A couple L2 mastermind segments may be interconnected by method for switches (a.k.a. frameworks) to outline a L2 compose, which is one subnet in a layer 3 (L3) organize (IPv4 or IPv6). Distinctive L3 frameworks are related by method for switches (a.k.a. entries) to outline the Internet. A lone server ranch may have a couple L2/L3 frameworks. A couple server homesteads may be interconnected by method for L2/L3 switches. Each of these framework portions — NIC, L2 organize, L2 switch, L3 frameworks, L3 switches, server ranches, and the Internet ought to be virtualized. There are distinctive, frequently fighting, measures for virtualization of a couple of these fragments. A couple of new ones are being delivered. Right when a VM moves beginning with one subnet then onto the following, its IP address must change, which convolutes guiding. It is extraordinary that IP areas are both locators and system identifiers, so when a structure moves, its L3 identifier changes. Despite each one of the headways of compact IP, it is out and out less hard to move systems inside one subnet (inside one L2 range) than between subnets. This is by virtue of the IEEE 802 areas used as a piece of L2 frameworks (both Ethernet and WiFi) are system identifiers (not locators) and don't change when a structure moves. In this way, when a framework affiliation crosses distinctive L2 frameworks by method for L3 switches, it is often charming to make a virtual L2 mastermind that navigates the entire framework. In a free sense, a couple IP sorts out together appear as one Ethernet mastermind.

THE SERVICE-ORIENTED ARCHITECTURE

The organization presentation rule infers that the method of reasoning required to deal with a broad issue can be better

created, finished, and directed, if it is crumbled into a social affair of more diminutive and related pieces, each of which addresses a stress or a specific part of the issue. Advantage Oriented Architecture (SOA) enables solitary units of justification to exist independently yet not disengaged from each other. Inside SOA, these units are known as organizations. SOA gives a fruitful response for arranging computational resources transversely over heterogeneous structures to support diverse application necessities. SOA is a designing inside which all limits are portrayed as free organizations with invokable interfaces that can be gotten described progressions to shape business frames. SOA can be considered as a rationale or perspective for sorting out and utilizing organizations and limits that may be under the control of different ownership spaces. Essentially SOA enables virtualization of various preparing resources in kind of organizations and gives a versatile collaboration part among organizations.

An organization in SOA is a module that is autonomous (i.e., the organization keeps up its own particular states) and stage free (i.e., interface to the organization is self-ruling of its execution arrange). Organizations can be delineated, circulated, found, composed, and modified through standard interfaces and illuminating traditions. All organizations in SOA are self-ruling of each other and organization operations are viewed as murky by outside organizations, which guarantees that external parts neither know nor mind how organizations play out their abilities. The advances giving the looked for helpfulness of the organization are stayed behind the organization interface. A key segment of SOA is vaguely coupled correspondence among heterogeneous structures in the building. The expression "coupling" demonstrates the level of dependence any two structures have on each other. In vaguely coupled affiliation, structures require not know how their assistants go ahead or are executed, which licenses systems to interface and team up more energetically. In this way, free coupling of heterogeneous structures gives a level of versatility and interoperability that can't be facilitated using routine strategies for building significantly consolidated, cross-organize, between zone correspondence circumstances.

Diverse components of SOA consolidate reusable organizations, formal contract among organizations, advantage consideration, advantage autonomy, advantage discoverability, and organization composability. These components make SOA an extraordinarily convincing building for heterogeneous structure compromise with resource virtualization to support arranged application essentials. Notwithstanding the way that SOA can be completed with different advancements, Web organizations give a favored area to recognizing SOA. A Web advantage has an interface that portrays a collection of operations that are framework open through regulated XML educating. A Web organization is depicted using a standard, formal XML thought, called its organization delineation. It covers each one

of the unobtrusive components essential to speak with the organization, including message positions, transport traditions, and territory. The interface covers the execution inconspicuous components of the organization, allowing it to be used self-sufficiently of its use. This enables Web organizations based systems to be vaguely coupled, fragment arranged, with cross-development executions. Key segments of a Web advantage based utilization of SOA join authority association, advantage go-between/registry, and organization customer. The basic operations required in the coordinated effort among these segments are organization depiction dispersion, advantage disclosure, and organization legitimate/get to. Moreover, advantage piece is also a basic operation for meeting customers' organization essentials. A pro association makes its organization open in the structure by dispersing an organization depiction at an organization registry. Advantage exposure, consistently performed by a delegate, is the strategy that responds to a customer request finding an organization that meets demonstrated criteria. Various organizations may be made into a composite organization to meet the customer's essentials.

SOFTWARE DEFINED NETWORKING

Programming described frameworks organization is the latest miracle in frameworks organization headways. All parts of the frameworks organization industry, including framework equipment vendors, Internet master associations, cloud pro communities, and customers, are managing or reckoning distinctive parts of SDN. This portion gives a graph of SDN. SDN involves four improvements:

1. Division of the control and data planes
2. Centralization of the control plane
3. Programmability of the control plane
4. Standardization of utilization programming interfaces (APIs).

SEPRATING OF CONTROL AND DATA PLANE

Arranging traditions are consistently coordinated in three planes: data, control, and organization. The data plane includes the significant number of messages that are delivered by the customers. To transport these messages, the framework needs to do some housekeeping work, for instance, finding the most concise way using L3 guiding traditions, for instance, Open Shortest Path First (OSPF) or L2 sending traditions, for instance, Spanning Tree. The messages used hence to exist are called control messages and are essential for framework operation. Additionally, the framework executive may need to screen development bits of knowledge and the state of various frameworks organization equipment. This is done through framework organization. Organization, yet basic, is not exactly the same as control in that it is optional and is routinely not proficient for little frameworks, for instance,

home frameworks. One of the key headways of SDN is that the control should be disconnected from the data plane. The data plane contains sending the bundles using the sending tables orchestrated by the control plane. The control method of reasoning is detached and realized in a controller that prepares the sending table. The switches execute data plane (sending) reason that is gigantically streamlined. This lessens the multifaceted nature and cost of the switches in a general sense. The figure shows the block diagram for the Software defined networking architecture with separate data and control plane.

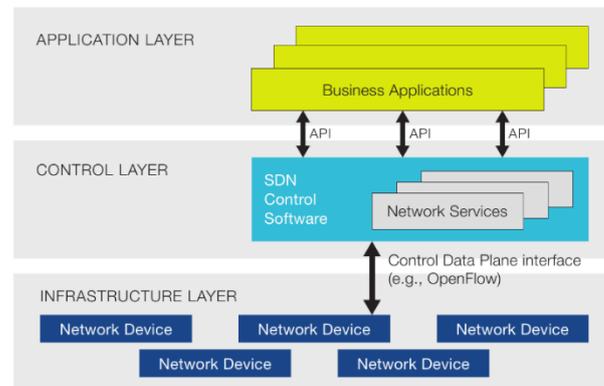


Figure 2: SDN Architecture with separate control and data plane interface

CHALLENGES AND RESEARCH OPPORTUNITIES

Advantage creation accept a central part in arranging frameworks organization and figuring resources for enable the organization arranged framework Cloud blending. Neglecting the wide audit on Web advantage association and engaging exploration progress for framework advantage game plan, advantage creation for NaaS in a met frameworks organization and Cloud figuring environment is still an open issue defying challenges in various perspectives; thusly offering diverse entrancing subjects for future research.

Union between the future Internet and Cloud preparing really prompts to a ultra extensive scale facilitated frameworks organization and enlisting environment. Consequently, adaptability transforms into a fundamental essential for organization association segments proposed for such circumstances, in light of the perhaps immeasurable number of organizations (both framework and Cloud organizations) required in structures. Free coupling among organizations, a key component of SOA, expect a gigantic part in flexible organization manifestations by cutting down dependence between organization sections. Yet comprehensively examined, arranging around coupled pieces including a ultra tremendous number of taking an intrigue organizations is still an open test. It is not yet clear how to solidify the necessities to make different organizations, keep up end-to-end QoS, and keep the whole association coupling level as low as could be normal considering the present situation. Heterogeneity is a

particularly troublesome issue to network profit synthesis for framework Cloud joining. Sorting out in a Cloud circumstance usually contains heterogeneous framework organizations gave by different self-decision Internet spaces. Besides, organizations offered to end customers contain organizations gave by both Cloud structure to figuring/stockpiling and framework establishment for data exchanges. In this way, a key some portion of NaaS for Cloud figuring is organization association among enlisting and frameworks organization organizations. In this way, advantage association must be recognized in a route self-sufficient of the use purposes of enthusiasm of each included organization part. In any case, starting not very far in the past research on organization piece has been coordinated autonomously in the scopes of Web organizations and frameworks organization, each of which has its own particular segments and necessities that incite to different specific approaches. Framework and Cloud converging through the NaaS perspective brings for traverse these two territories toward a general association structure in which particular sorts of organizations, including both frameworks organization and preparing organizations, are composed to meet Cloud advantage essentials. This transforms into a goal and testing issue for future research.

CONCLUSION

The imperative part that frameworks organization plays in Cloud enlisting requires a sweeping vision that licenses joined organization, control, and progression of both frameworks organization and preparing resources in a Cloud circumstance, which prompts to a converging of frameworks organization and Cloud figuring. Sort out virtualization is being grasped in both communicate interchanges and the Internet as a key trademark for the front line arranging. Virtualization, as a potential engaging impact of critical changes in both exchanges and enrolling spaces, is depended upon to defeat any issues between these two fields and enables a meeting of frameworks organization and Cloud preparing. The Service-Oriented Architecture (SOA) offers an effective compositional administer for structure coordination and has been gotten in Cloud advantage provisioning. The review displayed in this article about late progress in telecom and Internet advantage provisioning demonstrates that SOA has been comprehensively associated as a key part to acknowledge framework virtualization. In this way, SOA, when associated in both Cloud preparing and framework virtualization, may fundamentally support the meeting of frameworks organization and Cloud figuring through the Network-as-a-Service (NaaS) perspective.

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