Application of Enterprise System in Cloud Networking Platform

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Abstract

When it comes to hosting line-of-business apps in the cloud, companies nowadays confront several obstacles. There is a concerted effort to look at the present challenges with cloud computing solutions for enterprise resource systems in the sectors. Using the newest technologies such as mobile computing, SaaS, and Cloud Computing, this research study examines the creation of Low-Cost ERP Solution for Indian Industries on Mobile. Index Items are things like business systems. As a result of the lack of control over cloud network services, many of these issues are compounded by the inability to provide adequate security or performance assurances, or to flexibly install middle boxes.

Keywords: *Enterprise, Cloud computing, SaaS, Enterprise information systems, Mobile ERP*.

1. INTRODUCTION

Enterprise systems and sectors are evolving at a rapid pace, necessitating the use of highly specialised solutions. Industrial issues are very difficult to solve and need a significant investment of time and resources. Another issue in the sector is a lack of experience and abilities. Such a solution may be found in enterprise resource management (ERM). ERP system adoption in industry is a time-consuming and complex undertaking that leads to significant system modifications. ERP installation projects come with a number of hazards that need to be taken into account by organisations if they are to succeed. This study's goal is to devise a process for putting in place Mobile ERP solutions. Case studies and potential solutions to challenges encountered during Mobile ERP adoption are part of the research. It's fascinating to see how the study has been updated to include cloud solutions as part of the current business solutions. Since qualitative information had to be gathered, the technique was inspired by the qualitative research method.

ERP software helps a company's operational administration while also saving money for its consumers. ERP users gain more economically than non-users. Enterprise Resource Planning Systems (ERPs) oversee the management of all data and information resources in businesses. This data is housed in centralized data warehouses that are accessible to everyone. As a result, information has become a precious asset for businesses, and accessing all of the data in an organization's IT system in real time is critical. This is where ERP system mobility comes in. Cloud computing infrastructure and software as a service (SaaS) allow us to operate more efficiently while paying less. In this case, cloud computing infrastructure is only an operating system virtualization web service interface.

2. LITERATURE REVIEW

Lise Arena et. al. (2020) As cloud computing markets evolve, this article aims to offer readers with a better knowledge of software business provider strategy. An historical content analysis of SAP's discourse based on a longitudinal case study shows that there have been four major phases of adaption since 2009. When looking at cloud-based ERP systems, the examination of these four time periods shows that there was an initial better technology (HANA) available on the ERP market. According to this theory of development, SAP's approach is shifting away from being tightly controlled over its technical environment and toward being more flexible, with alternatives like Platform-as-a-Service (PaaS) and Infrastructure- as-A-Service (IoT) mode. According to a study of SAP's discourse, partnerships with third parties are becoming more important to the company in order to combat the notion of a lock-in impact.

Rashid Nazir et. al. (2020) Cloud computing is a new industry that has emerged in the Internet age in recent years. High-performance computing is advancing quickly, and the technology has moved from grid computing to cloud computing, allowing users to pay as they go for computer resources. Because cloud apps are critical to a cloud organization's service delivery, cloud service providers built applications that allow users to quickly use cloud services while maintaining high quality of service (QoS). Using cloud computing as an example, this article examines the various cloud computing models, deployment options, and application kinds, including their respective levels of dependability and security. Finally, a list of open research questions is supplied for future use.

Weiqiao Zhu (2019) This paper combined the extended TOE framework and RBV model with the existing problems of the railway enterprise information system in the cloud computing environment to establish a cloud computing research model for the railway enterprise, extract the main factors affecting the adoption, and make some assumptions about this. A cloud-pipeline-terminal security defence system was developed, as was a cloud computing security architecture, and support for many levels of capability for railroad enterprise information systems were included in this work.

Pavel Vitliemov (2018) A new generation manufacturing IT platform for "smart manufacturing" is expected to be enabled by the demand for mass customization, as well as the convergence of technologies that include advancements in connected factory automation, robotic production, additive fabrication, mobile production, cloud computing and the definition of digital 3D products. One of the Smart manufacturing technology stacks is cloud computing, which is a service delivery paradigm that's giving manufacturers new options. Rather than focusing on smart equipment, the Industrial Internet of Things (IIoT) and Industry 4.0, this article explains what "Smart manufacturing" really means and analyses how cloud computing might assist in achieving Smart Manufacturing objectives such as optimising industrial operations.

Mohamed A. Abd Elmonem et. al. (2016) ERP (Enterprise Resource Planning) solutions provide several advantages and features to the whole business. Data sharing and information transmission between all business divisions, both within and outside of the firm, are made possible by ERP systems for the enterprise. In many ways, sharing data and information across divisions in an organisation helps the company accomplish its many goals. Cloud computing is an internet-based computing architecture that offers scalability, stability, and always-on availability, all at a cheap cost to users. While ERP cloud implementation and operation have their share of obstacles and challenges, the benefits far outweigh these disadvantages. A systematic literature review (SLR) research approach is used in this work to examine the advantages and disadvantages of putting ERP systems on the cloud.

3. EXPERIMENT SETUP

A cloud testbed of five physical hosts linked to five network switches, as seen in Figure 6, was used to set up and evaluate CloudNaaS. Four of the five hosts may be utilised to deploy virtual machines, with the fifth (Host5) being used to execute controller services (i.e., cloud controller and network controller each within a different VM). HP Procurve 6400 switches with 20 1Gbps ports are used in the five programmable network devices.

There was no large-scale testbed to examine the effect of the suggested improvements on network controller performance, so we created a simulator. Different network events and messages exchanged between the cloud controller and network devices are emulated by the network controller in our simulations (e.g., the control messages sent to the network controller by the switches when a link failure occurs or when the switch is powered on). In addition, we simulate the cloud controller's user policy files and the corresponding communication matrix sent to the network controller. To keep things simple, the network controller continues to act as normal, placing VMs where they are needed and calculating the number of flow table entries needed for each switch based on that placement. Thus, we may study network controller performance in large-scale settings without being bound by the size and topology of our lab testbed. On an Ubuntu 10 computer operating at 2.40GHz with 4GB of RAM, we test the network controller.

Network Controller Performance

Afterwards, we check the network controller's capacity to create and manage several virtual networks in an enormous cloud data centre on a massive scale.

Impact of Placement

The number of QoS requests that may be met and the quantity of state in the network are all determined by where VMs are placed. This section explores the advantages of thoughtful VM placement. Using OpenNebula and Eucalyptus as benchmarks, we compare our bin-packing heuristic to the existing cloud systems' default placement method. VMs are distributed round robin among physical hosts using the striping technique by default on both platforms. Our findings are limited to the deployment of big interactive and batch services (Lg) on the standard DC topology, as well as a mix of small, medium, and large interactive and batch services (Eq) due to space limits. We found comparable results when using the Fat-Tree topology.

To begin, we look at how placement affects the network's capacity to meet the various QoS demands imposed by the various applications. As shown in Figure 1, the optimum placement technique can accept a portion of the ideal number of virtual network segments. When only small and medium-sized interactive apps are operated in the cloud, both placement techniques meet all QoS criteria, as shown in the figure. The default placement method is unable to meet one or more of the network QoS criteria given by the virtual network segment when only large-sized services are deployed, however our placement strategy can fulfil all demands when ignorant placement approaches deny only 10% of requests.

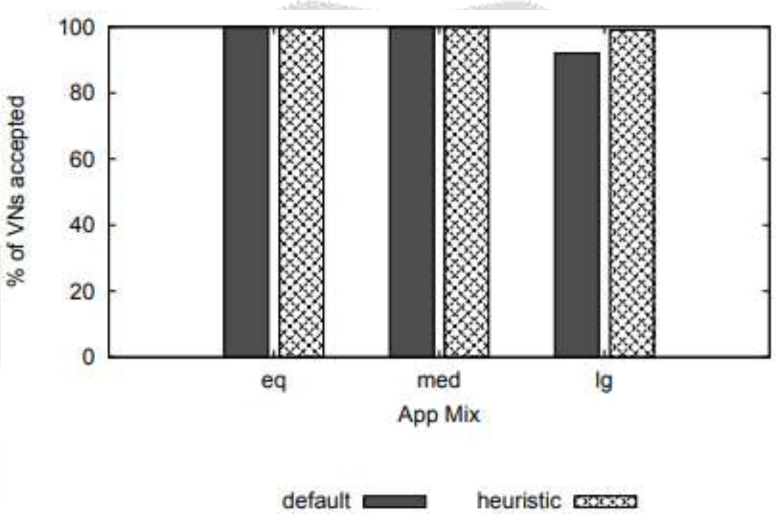

Figure 1: Number of virtual network segments successful sup-ported by CloudNaaS under the bin-packing and the default placement strategies as a percentage of those supported by an optimal placement strategy.

For each request, the pathways between interacting VMs are shown in Figure 2 to assess the impact on performance of the various placement strategies. We only display the results for big interactive apps to keep things simple. With our placement method, we see that the pathways are often shorter: Ninety-nine percent of the pathways generated by the heuristic have less than two connections, suggesting that these paths never leave the ToR. This approach results in longer pathways and, as a consequence, lower application performance because of the increased contact with cross traffic that emerges from it.

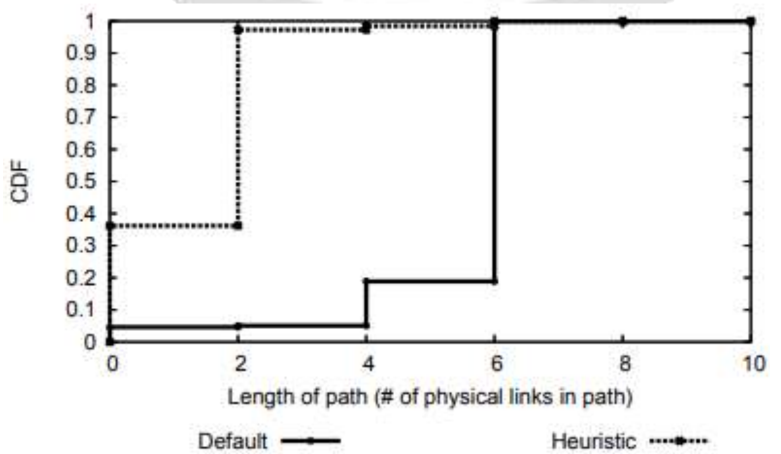

Figure 2: Length of paths, in # of links, between different VMsunder different VM placement strategies

Virtual Network Computation

To begin, we look at the amount of time it takes to establish a variety of complex, interconnected programmes. Think about how many virtual machines and virtual networks and rules there are in a 3-tier application. The canonical tree, we suppose, is interconnected.

Using our placement algorithm, we can "pack" as many large interactive application instances as possible onto the physical hosts, as shown in Figure 3. Figure 3 shows how much time it takes to simultaneously instantiate network services for as many as 270K VMs, spread across nearly 16K instances of the large interactive application. Calculating the relevant flow table entries and network routes takes time. Flow table entries must be installed by the controller in the proper switches, which takes time that we haven't seen in our trials but should be under 10ms per entry. We can see from the graph that the 270K VMs in the cloud instantiate their virtual network services in a total time of roughly 120s. This lag is negligible when compared to the whole provisioning time, which includes the provisioning of virtual machines. Provisioning 20 tiny virtual machine instances on Amazon EC2 may take up to 180 seconds, and this time increases as more instances are launched. Other reference apps, application mixes, and the Fat-Tree interconnect have comparable scaling qualities, too (omitted for brevity).

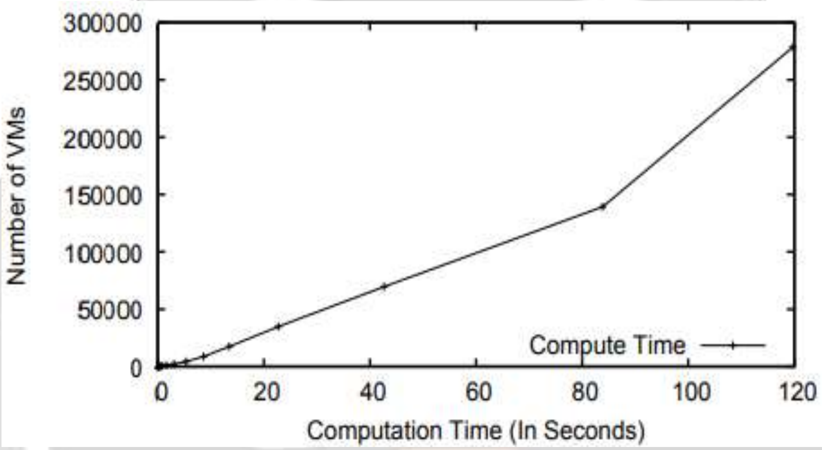

Figure 3: Virtual network segment computation time for Largeinteractive applications on a tree topology with 30K hosts.

Failure Handling

Virtual networks must be remapped and reinstalled when data centre components like connections, switches, or hosts fail. These studies test the network controller's ability to restore working virtual networks in different-sized data centres when individual components fail. To keep things simple, we'll use a network architecture with three tiers of nodes and a lot of huge interactive application instances.

When anything goes wrong in our system, a link, switch, or host will be randomly picked to be the culprit. In order to send the configuration state to the devices, we time CloudNaaS' network controller. Because the device polling frequency limits the time it takes to get failure messages, we disregard it. We also ignore the time it takes to install state in the device, which is considered to be less than 10ms.

To obtain a distribution of re-computation times, we conduct each experiment around 150 times.

Link and Switch Failures. The network controller is triggered to deprovision pathways that utilise the failed connection and reprovision them on other links, allowing us to better understand the effect of link failures. With and without precomputation and caching, we compare link recovery times. For the biggest cloud with 270K virtual machines, recovery time is 2 seconds on average and under 10 seconds in the worst scenario, as shown in Figure 4. We saw a 0.2-second median recovery time for the biggest cloud when using caching and precomputation. There is an order of magnitude difference between the recovery times for device failures (which aren't represented here due to space limitations) and those for connection failures (which are). We've discovered that by include the edge switches in the precomputation process, we can get the recovery time for all connections and devices down to 0.2 seconds or less (Cache look-up time). However, this will need additional cache RAM being allocated.

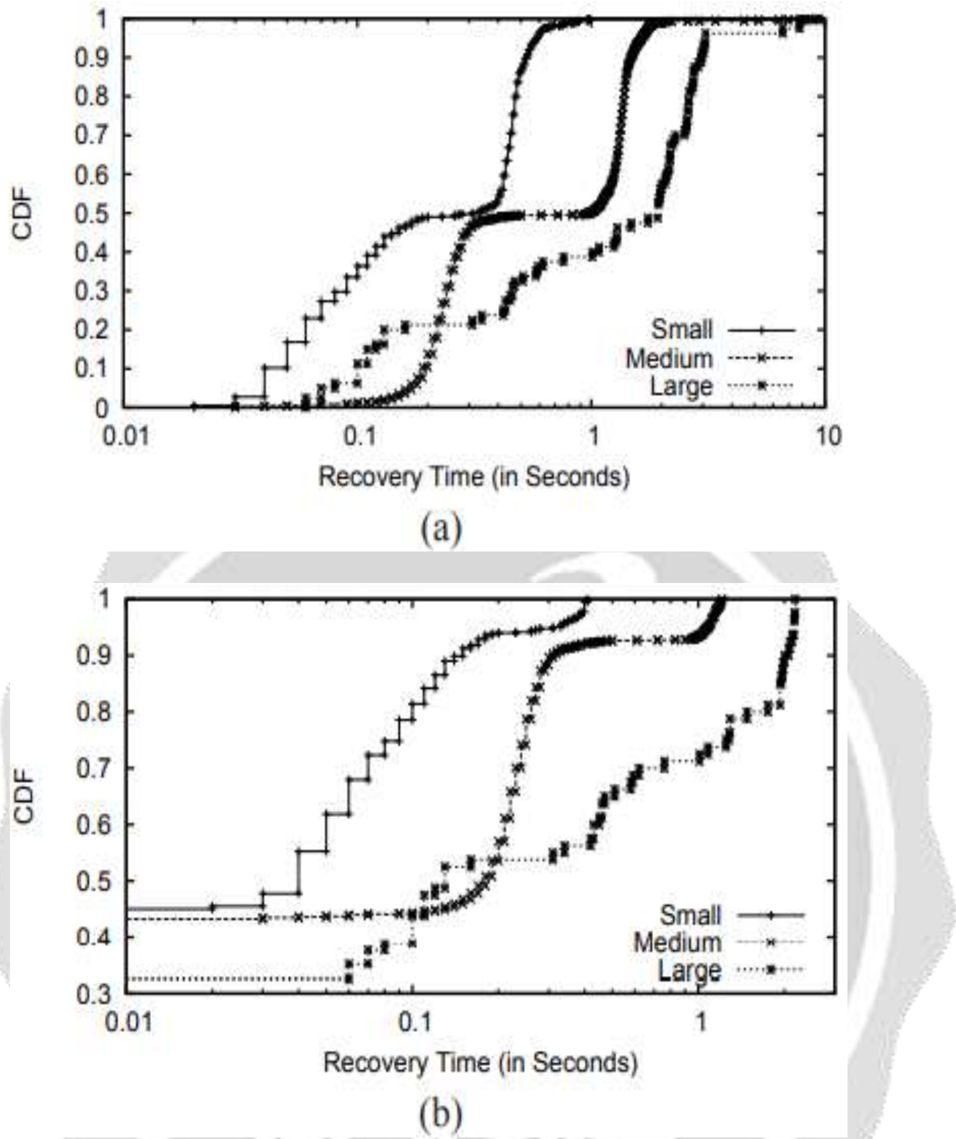

Figure 4: Virtual network segment recomputation time underlink failures for large interactive applications on a tree topology with 30K hosts. (a) Without caching and precomputation (b) With caching and precomputation of core and aggregation devices

Host Failures. It is common practise in our research with host failures to choose and remove a failed host based on a random number generator. The cloud controller is notified, and it updates the VMs' states and notifies the network controller, which then remaps the related virtual networks accordingly. This can be seen in Figure 5, which illustrates how long it takes the network controller to complete this task compared to provisioning. To remap instead of provisioning, you just look anything up in some data structure and then send a suitable control message to the relevant switches.

4. ADDITIONAL CONSIDERATIONS

There are some extra considerations in this section for a cloud network services platform that is more comprehensive. Because we don't go into depth about how these extra services will be implemented in this small area, they should be saved as research topics for the future.

OpenFlow Programmable Devices: Openflow switches are being used as programmable devices in our present prototype. Our architecture, on the other hand, is not dependent on the OpenFlow software and API. For the reasons previously indicated, programmable devices have an impact on the configuration instructions created, how they are sent to the devices, and how their effects are reversed. In any case, we think that programmable devices will have physical constraints regardless of the kind chosen.

OpenFlow platforms also have the benefit of being simple to set up in comparison to other programmable devices. Many device makers, including as Cisco, HP, and NEC, have created firmware patches that convert standard data centre switches into Open Flow devices. Because of these firmware modifications, we anticipate that many existing cloud service providers may simply adapt and deploy our current version of CloudNaaS.

Managing Cloud Network Services: There are many primitives and network services presented in this article that are largely concerned with the data plane, such as traffic separation and middleboxes and quality of service (QoS). To monitor and administer the cloud virtual network in the same way as they might do in a conventional data centre, business tenants need a number of extra services. We may, for example, utilise the CloudNaaS framework to enable users to connect virtual network devices to monitoring, reporting, and logging functionalities. The management data may be processed and made accessible as a continuous feed, or uploaded to a cloud-based management tool that allows users to see how the virtual network activities are running. It's obvious that careful optimization is required to protect network data privacy and to keep the cost of collecting and transmitting management data to a minimum.

WAN Extension: The wide-area network (WAN) is normally not under control of cloud providers, but improved network services that extend from cloud to WAN would benefit apps, especially those that require to interface with enterprise-side service. This would be especially true for cloud applications. This might be accomplished by connecting the cloud-based virtual network to an ISP or overlay network provider that cooperates. It is possible to add additional primitives to the CloudNaaS framework that identify non-cloud endpoints for integration. WAN acceleration, deduplication, and encryption are all examples of services that may be provided through an overlay channel that the network controller negotiates.

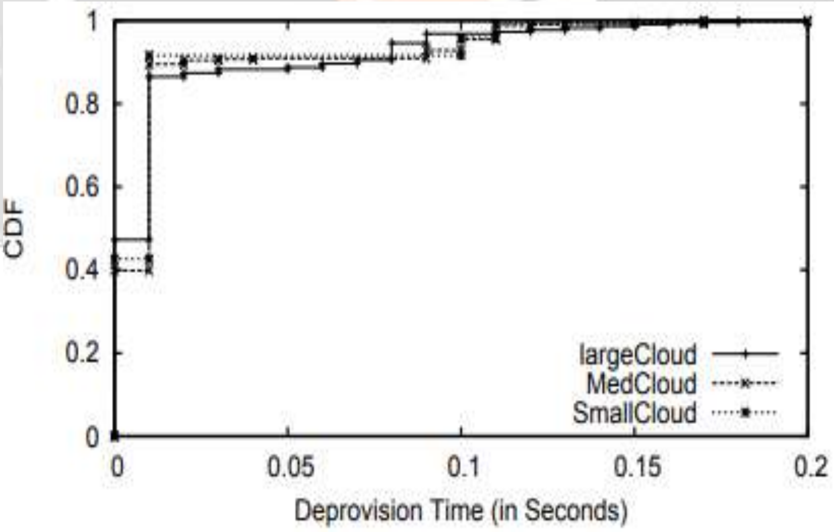

Figure 5: Virtual network deprovision time under host failures for large interactive applications on a tree topology with 30K hosts.

5. CONCLUSION

It was our idea to use the network services required by production corporate apps to operate on IaaS clouds on CloudNaaS, which is a service platform that lets tenants do just that. In our lab testbed using commercial OpenFlow-enabled network devices, we proved the adaptability of CloudNaaS in supporting a variety of network operations in the cloud. Using various different situations, we demonstrated how easy it is to specify and install features like VLAN-based isolation, service differentiation, and middlebox interposition. As a result of our tests, we found that CloudNaaS holds up well under load, even when provisioning requests are high. VM placement and forwarding table aggregation improvements let us demonstrate how the cloud's physical hosts and network devices might be better used, allowing the cloud to grow to accommodate many different enterprise-level apps.

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