

Sky Computing – The Futuristic Computing

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ABSTRACT

Over few years cloud computing has evolved and matured to create favorable conditions for innovating better cloud applications called Sky Computing. The idea of Sky Computing can bring about reduction in overall costing of managing and operating IT Infrastructure rather than using rented resources. Currently companies such as Yahoo, Google and Amazon maintain huge databases can adopt Sky Computing for reducing cost for software's managing these large databases. Amalgamation of multiple clouds into one large cloud can be called Sky Computing or higher version of cloud computing can be called as Sky Computing. Sky Computing architecture creates a large infrastructure by utilizing resources from numerous cloud providers. This type of infrastructure provides high performance parallel to computing.

Keywords: Cloud Computing, Cloud Applications, High Performance Computing, Sky Computing, Hadoop, Infrastructure-as-a-service (IAAS), ViNe, Tiny Vine

I. INTRODUCTION

Cloud Computing has open doors to probabilities for new cloud based application which can reduce the overall costing of IT Infrastructure and software's controlling huge databases can be called as Sky Computing. Sky Computing can be defined is an upcoming prototype dealing with progressively prearranging resources from scattered domains impersonating multiple Cloud Computing environments [10]. Sky Computing creates huge infrastructure by using resources implemented on multiple types of clouds such as Public Cloud, Private Cloud, Hybrid Cloud and Community Cloud [4] [7].

Sky Computing is a powerful platform which aggregates and shares resources within the combined cloud infrastructure. Sky providers are purchasers of cloud providers. Sky Computing utilizes services which are not used in individual clouds. Sky Computing creates transparency between multiple clouds similar to a single cloud transparency [6]. In this paper authors have described Sky Computing current shortcomings and strengths. Section II of provides information on Sky Computing and proposed architecture of Sky Computing. This research paper, section III furnishes information on ViNe and Tiny ViNe routing and benefits on implementing these tools. Current work on Sky Computing and various analysis on application with Sky Computing have been elaborated in Literature Review section. Section V, finally concludes the research paper with future study.

II. SKY COMPUTING

Sky Computing is merger of multiple clouds in one mega cloud which collaboratively process data and provides easy and fast results. Sky Computing simultaneously utilizes applications and resources across independent clouds. Sky Computing, consolidates the next level of SAAS (Software as a Service) and last

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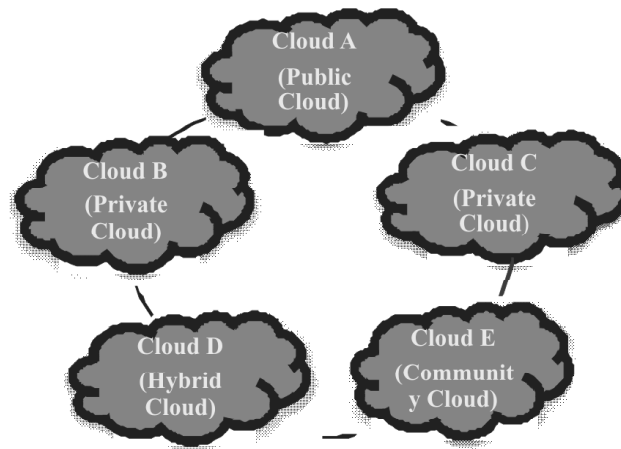


Figure 1: Sky Computing

level of IAAS (Infrastructure as a Service). Sky Computing allows distribution and scheduling of resources for requested tasks [2] [7] [8].

Researchers have proposed the following Sky Computing Architecture:

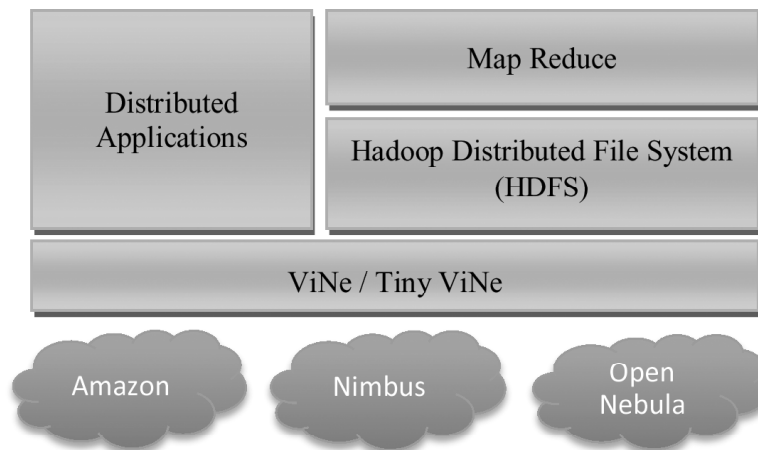


Figure 2: Sky Computing Architecture

Figure 2 provides a graphical representation of Sky Computing Architecture and various components of Sky Computing which makes it highly powerful platform. Sky Computing on base level utilizes cloud providers (IAAS Providers) such Amazon, Nimbus and Open Nebula for resource management [2] [3][10]. Next layer is routing layer or the connectivity layer in which ViNe and Tiny ViNE is used for routing and providing all-to-all connectivity. Top most layer contains Map Reduce for analyzing data and Hadoop Distributed File System (HDFS) for file distribution. Distributed Applications across all clouds are also components of the top layer of Sky Computing. Utilization of Sky Computing architecture has its benefits and shortcomings also.

2.1. Benefits of Sky Computing

- Single Network background: Sky Computing provides compatibility among all sites on multiple clouds creating all-to-connectivity.
- Single Security background: Sky Computing provides security and management between all entities.

- Sky Computing it provide connectivity between each node of cloud which is equivalent to local cluster [2].

2.2. Challenges/Shortcomings of Sky Computing

- Inter-Cloud Resource Management & Creation: Managing resources/applications of individual clouds and proper load balancing is a challenge in Sky Computing Infrastructure. Every Virtual Machine (VM) in the cloud environment has a specific role; hence configuration of VM to adapt to the new role is a big Challenge.
- Inter-Cloud Communication Efficiency: The main challenge in Sky Computing is to establish relationship between the different entities of cloud computing. Sky Computing faces issues to establish communication between different clouds and distributed the task in dynamically and efficient powerful way [11].
- Inter-Cloud Standardization and Network Security: Main issue is different administration and network security of each cloud. Hence internal routing between high numbers of intermediate nodes is generated and later Sandboxing disables data link layer communication which stops use of VM as router [2] [3] [4] [5].

III. VINE AND TINY VINE ROUTING

Sky Computing architecture adopts ViNe as the routing tool. Virtual Machine running ViNe Software can be called as ViNe Router (VR). ViNe is virtual network which works on IP –overlay which provides facilities for communication among virtual machines spread across multiple clouds. ViNe is based on network routing software which is based on cloud infrastructure. ViNe is a virtual overlay network which provides connectivity between the different administrative domains on multiple sites, reducing cost and provides high performance. ViNe uses data link layer due to which creates communication between nodes and VR. Figure 3 provides graphical elaboration of intercloud ViNe routing and Vine Router in multiple clouds infrastructure [1] [6] [8] [10].

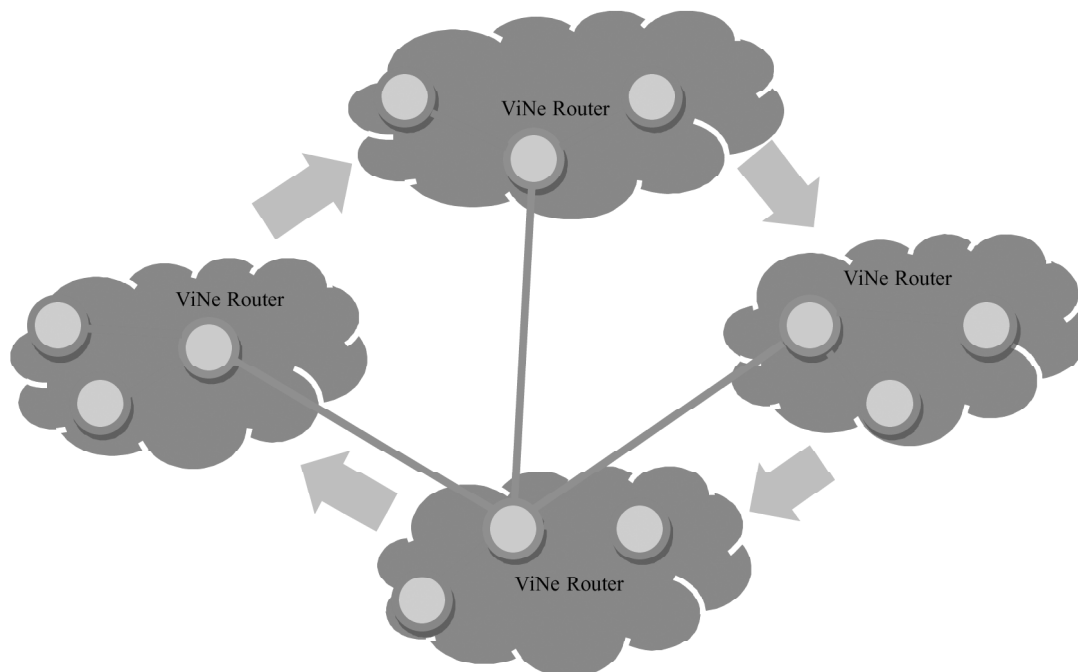
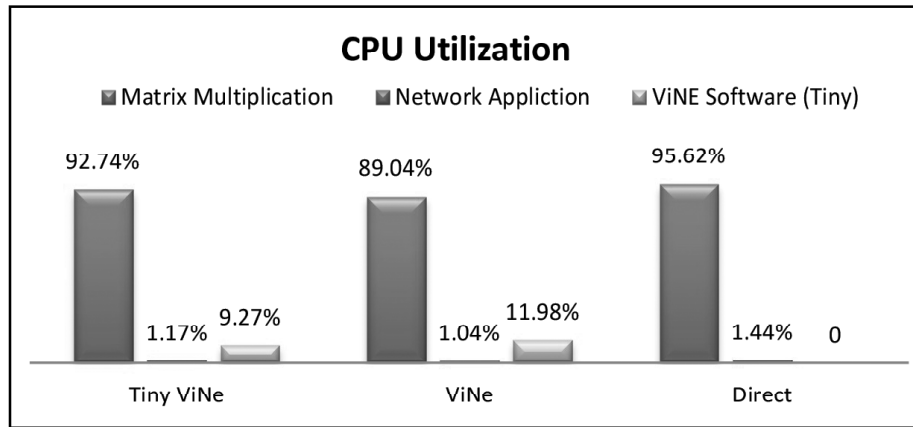


Figure 3: ViNe Routing

Tiny ViNe is an extension of ViNe, providing communication through UDP tunnels from host to VR. Tiny ViNe does not implement complex network which are easy to use and simple to run. Tiny ViNe utilizes IP address assigned by provides to make it easy to implement for the user. Nodes which run Tiny Vine software are known as Tiny VR. Tiny VR transmits the intercepted packets in secure way by encapsulation and decapsulation in UDP tunnel. Tiny ViNe reduces the data processing time [6] [8].



Graph 1: CPU Utilization (Interference on other applications) [8]

Implementation of ViNe and Tiny ViNe with Sky Computing will provide high performance computing and faster connectivity among multiple clouds.

IV. LITERATURE REVIEW

Researchers have described Sky Computing and various components related to Sky Computing revealing better performance of Computing.

Andre Monteiro, Joaquim Pinto, “Sky Computing: Exploring the aggregated Cloud Resources - Part I” describe Sky Computing as the layer above Cloud Computing, using of Sky Computing. Further authors have discussed about Cloud Management and proposed Architecture of Sky Computing. Analysis on Cloud Computing Management Middle layer testing with DeltaCloud API and various API drivers support DeltaCloud [7].

Andre Monteiro, Joaquim Pinto, “Sky Computing: Exploring the aggregated Cloud Resources - Part II” provides information on evolution of Clouding Computing and using of High Performance Application on cloud. Implementation and development of proposed Sky Computing Architecture. Analysis and study on various layers of proposed architecture. Graphical and theoretical analysis on popular Infrastructure as a Service (IAAS) providers. Findings on Sky Computing Architecture with benefits and shortcomings [3].

Pierre Riteau, “Sky Computing on the Future Grid and Grid 5000 with Nimbus” this paper defines the meaning of Sky computing and various techniques to manage large scale data on distributed cloud environment. Different approaches which are helpful to adopt architecture of sky computing. Analysis on Nimbus architecture is explained in this research study. Various Experiments with Sky Computing are showcased in this research study [1].

Pierre Riteau “Sky Computing Challenges, Large Scale Experiments and Research Directions” furnishes information on Cloud and components related to clouds such as IAAS, SAAS and PAAS. Authors have elaborates on Sky Computing and various benefits of Sky Computing. Problems and Challenges in adopting Sky Computing are explained in this research study with graphical representation of these challenges [2].

Jose Fortes “Sky Computing When Multiple Cloud Become One” this research paper portrays information on Cloud computing and Cloud Ecosystems. Multi cloud systems and Management tools are discussed in this research. Sky Computing and various challenges of Sky Computing are described in this paper. Information on Routing tools such as ViNe and Tiny ViNe is elaborated and comparison with normal routing is provided by authors [5].

Katrizyna Keahey, Mauricio Tsugawa, Andrea Matsunaga, Jose A.B.Fortes “Sky Computing” imparts information on Cloud Computing and IAAS. Information on creating a Sky Computing domain and a trusted networking environment is delivered by this research study. Meta Cloud architecture is explained by the authors using example of three cloud providers to create a meta cloud. This research paper furnishes analysis on implementation of various applications and tools such as Haoop, ViNe, Blast on Multiple Clouds creating a Sky Computing Infrastructure.

V. CONCLUSION

Sky Computing is a higher version of cloud computing which combines multiple cloud entities in one infrastructure to improve efficiency. Sky Computing communicates information between multiple clouds in a secure and faster way. Sky Computing Architecture defines ways to provide secure transmission along with faster processing. Routing Tools such as ViNE and Tiny ViNe can be utilized with Sky Computing which improves security and provides easy access to information across clouds. Sky Computing utilizes various application to analyze data and appropriate results which are user friendly. High Performance Computing with Cloud computing can be adopted under Sky Computing architecture will reduce the processing time. Sky Computing will increase virtualization and reduce the IT infrastructure cost for corporate companies. Sky Computing is provides higher configuration and scaling power in lower costing. Sky Computing can be best used for E-commerce facilities. In future we will work on the technical aspects of SAAS, PAAS and Hadoop with Sky Computing.

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