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The Efficacy of Integrating Various Technological Systems into the Management of Smart TV Station DataCentres

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Abstract: When one thinks of computing, they almost immediately radiate towards the billions upon billions of information that is floating through the air via waves, as it passes through one medium to the next. It is also conceivable that the transfer of this information is often times without hindrance, however, with the proliferation of information within this digital age, it is almost common place to hear of servers or storage sites having crushed. Enter the datacentre. The datacentre is the main storage centre in which servers for information storing are housed. Over the last decade, datacentres have ballooned to become the core of the technological landscape. The biggest of them to date have massive numbers of servers running across a plethora of machines while running various distributary channels of applications. With applications being written in cognizance of locality of the datacentre, the unavoidable channelling to the many different machines, due to the enormous computations distributed to them, may lead to the slowness of the network and such distribution of information. This is indication that as the datacentres continue to increase in size and capacity, the difficulty in managing them also increases. This has thus put or has the potential to put the information and functionality grid under threat of imploding with disastrous consequences. Thus solutions that will parallel this expansion in the size of data distribution as well as the datacentre storage sizes, are needed.

Keywords: SmartTV datacentres, datacentre management, efficiency, Cloud Computing, Internet of Things, VoIP, AI, Automated Systems

1. INTRODUCTION

This research therefore is undertaken to recommend the efficacy of the use of some of the current technological advancements that exist in better managing the flow of data from the datacentre to the intended recipients of such information on their various devices. Specifically, the research seeks to focus on the advent and growth of the smart TV phenomenon, especially as technology has grown in the last decade and changed the way we view TV. However, behind the scenes lies the issue of the enormous datacentres that this growth has created and the 'nightmare' of the manageability of them. Of discussion in this research will the integration of the VoIP tool in the seamless flow of information from the datacentres to the devices as impending destinations. This VoIP tool cannot, however, just be infused into network administration in abstract. The research will further focus on how elements such as Cloud computing as a virtual storage, Artificial Intelligence (AI), the Internet of Things (IoT) and Automation of the system, can be utilised in enabling the integration of VoIP in managing and administering the ever fast paced increase of datacentres.

It is hoped, and thus is the intention of the author that this research provides for further discourse to the academic technological sector as well as the practical technological policy sphere regards the management, functionality as well as the applicability of methods that can be recommended to bolster the efficiency of smart TV station datacentres. It is here I consider the literature in brief.

2. LITERATURE REVIEW

In the early 2000's, a shift in technological advancements began to be witnessed within the TV and broadcasting industries around the world. This shift was when TV transferred from the analogous system of broadcasting to the more elaborate digital broadcasting (Watanabe et al, 2003). This paved the way for the advent of smart TV's as we know them today (Lee & Kim, 2013). Lee & Kim (2013)

further note that in the 2012 period alone, over 80 million Smart TV's were sold worldwide with projections of an even bigger and wider number and reach in the future. The authors further note that Smart TV's are no longer viewed as just devices for the screening of news and just other TV programming, but transcend the broader scale of other facets of day–to-day application such as entrepreneurship, learning and for working purposes.

Further, the enormous potential for integration into other IT advancements cannot be downplayed (Lee & Kim, 2013). This transition and growth has inevitably led to more information being transmitted (Villars et al, 2011) with the further inevitability of the increase in data storage facilities. In 2010 over 1 zettabytes (ZB) of data was created with a 2014 projection of 7ZB (7 trillion gigabytes) being made (Villars et al, 2011), indicating a staggering rate of data production as has not been witnessed before. The proliferation of this data has created a demand for enormous central storage spaces for its proper management and distribution. Contextually, in 2007 research indicates that 6.1 exabytes (EB) of storage space were installed globally with the figure in 2010 increasing to 16.4EBs and an even bigger 79.8EBs of storage space by 2014 (Villars et al, 2011).

The challenges in the past for most organizations had been the enablement of speedier and more transactions. Current challenges include the quicker and large distribution of this information especially from cloud based systems to the devices through which it is accessed by users. Future challenges may encompass the eco-sustainability and more efficient methods of utilising all this information (Villars et al, 2011). This is the quagmire faced by most IT system managers, Smart TV stations included. What then are the information technological tools that may aid in better managing datacentres such as a Smart TV station?

3. INFORMATION TECHNOLOGICAL PLATFORMS

3.1 Cloud Computing

With such statistics ranging from 1.15 billion Facebook users (and more than 60 000 servers), just under 2 billion videos viewed daily on YouTube and inquiries processed on Google in the range of 1.2 billion (with more than 1 million servers and plans of increasing this number to more than 10 million), it is incomprehensible how such gargantuan data can be stored and still be managed and distributed at the rate at which it is currently (Lin, 2008). Just the processing alone would require more than one device. The storing of all this in formation necessitates the investing in building large scale datacentres which consume large amounts of energy, generally cost more (such as Microsoft's 499 million US dollar investment at one point), produce quite a lot of heat and may require expertise and regular maintenance (Lin, 2008).

One way of alleviating most of these challenges was the introduction of Cloud Computing. The cloud has been described as;

> *Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Lin, 2008. p - 35).*

Identifiable cloud elements are then the self-service at your convenience ability, accessing a broad network of information, the ability to pool various resources together amongst other characteristics (Lin, 2008). The cloud makes provision for entire applications and other necessities such as hardware as well. Ranging from Public type clouds to the Private (entity based) clouds, these may run multiple tasks for the end users such as hosting applications,

the storage and back-up of data, delivering content, e-commerce, the hosting of the media and indeed Smart TV station applicability.

The main benefits of cloud computing is that more services can be leveraged for the end user by the providers with much less hardware to achieve this thus pointing towards a cost saving measure. These may include the provision of virtual machines with different capacities and capabilities as well as migration and over committal of these resources to no detriment of the user (Velte et al, 2010), specific configuration to that particular user thus keeping the information isolated (Lin, 2008)

Issues of concern would may be the unpredictability of performance, especially in instances of outages, transferability to other cloud storage if need be, issues surrounding the security of the data, the scalability of the cloud particularly the storage and boot time (Velte et al, 2010). Next I consider the Internet of Things.

3.2 The Internet of Things

The Internet of Things (IoT) basically refers to the number of technological devices that currently exist and whose functionality is based, connected or dependant on the global internet (Taazaa, 2019). A number of technological trends have made IoT possible in recent developments. Firstly, embedded platforms have become much more powerful with microcontrollers basically being pushed out by the more multi-tasked enabled CPU's. This is because microcontrollers can no longer meet the requirements needed for the upkeep and run rate that CPU's can provide such as operating system (OS) hosting, compatibility with popular tech system protocols to mention a few (Taazaa, 2019).

Secondly, a massive wave of software ecosystems with developers in tour of developing OS's and protocols, have basically pushed off mainstream OS's such as QNX and VxWorks while challenging the bigger brands such as Windows and Linux. This was mainly due to the fall out to the popularity of hardware requirements that the big players offered while newer protocols with limitations only specific towards these new players were being written (Taazaa, 2019). Thirdly, the development of wireless communication has witnessed an increase in the accessibility of the internet and information through it even for the lower powered devices without a noticeable cost increase on that device. The WiFi has even become faster. All these trends are then gelled together by a fourth element of cloud computing (basically as already discussed above) (Taazaa, 2019).

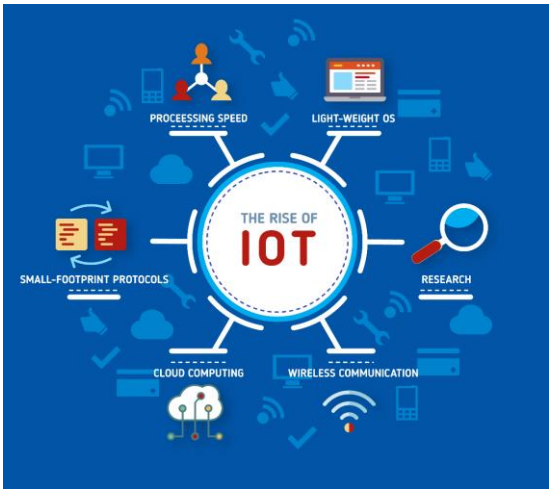

Figure 1: A basic representation of IoT trends (source; Taazaa, 2019)

3.3 Artificial Intelligence (AI)

Artificial Intelligence (AI) can at best be described as the simulated human intelligence that is embedded in machines such as computers and in how they process information (TechTarget, 2019). Such processing will mainly require the acquisition of data, the machine then using the set rules to evaluate such data or information to achieve desired results of application and then finally the ability of the machine to self-correct itself in the event of misdiagnosed information (TechTarget, 2019). In our present case

machine vision application would be the suited fit for AI application.

With rapid recent developments especially in the demand for multi-media content, the processing of algorithms associated with programmes running these has created a large consumption of computing and storage (Lu et al, 2015). The solutions have been the drive towards cloud computing and associated tech tools that will make the management and necessity of large datacentres both much more efficient and less costly for IT managers globally. The basic solution may lie in creating a hybrid cloud storage and management system which will integrate both private and public datacentres (DC's) (Lu et al, 2015).

The basic process will involve the renting of resources from public DC's with the creation of virtual machines (VM's) for use and distribution to end users and the possibility of replicating this process across multiple geo-locations for the ease and cost effectiveness of using these resources (Lu et al, 2015). The further yardstick of creating a monitoring and corrective programme that will monitor and manage private servers as well as the VM's under the public DC's especially for latency issues that may be experienced. This process will include the writing of specific algorithms that will monitor the dynamic requests made by users at the same time monitoring the cloud in deriving better scaling for the information under that cloud storage (Lu et al, 2015). This is the AI arm of the system.

3.4 Automated Systems

From the perspective of datacentre management as well as cloud computing spaces, can be noted the existence of various service providers to service the various clientele with different services and policies price-wise. This understandably creates challenges for system administrators in being able to create value provisions for the clients and interlinking the different service providers into one seamless service (Son, 2013). Further, allocating resources from the same service providers, should such be preferred is not a guarantee as the fundamentals of cloud computing are such that they are flexible in managing such resources. Datacentres may exceed their capacity and thus the provision of any further resources becomes curtailed as new VM's may also not be formulated (Son, 2013).

In order to avoid this typical system crush, an automated programme may be designed that will employ the advancements of AI integrated into the DC online system which will enable the for the selection of the most suitable service providers for clients of that service, and on gazetted commands, will manage these resources from such service providers and further create new VM's from then when the system picks a need for it (Son, 2013).

3.5 The VoIP System

The Voice over Internet Protocol (VoIP) system is best described as a virtual telephone line. With the advent of the VoIP tech system, it has enabled the transmission of various conversations wirelessly over the internet (Fayyaz et al, 2016). With its rapid growth as a preferred form of internet communication, VoIP has had significant influences on the way communication is headed into the future. Its popularity over conventional methods of communication make it an assist to be integrated into such management policy decisions as the SmartTV station management. Low costs are the main pull factor for the popularity of the VoIP technology (Fayyaz et al, 2016). A plethora of other uses for the VoIP system such as the transmission of data or media of various sizes is a further motivator for the integration of the system.

Of interest is the Quad-play technology which basically allows for the transmission of video services, voice, data and surveillance services over the internet through utilising VoIP and allowing this content to be channelled through a single network (Fayyaz, 2016). Having

originally been designed to transmit just voice communication, the technology has evolved to such heights that main stream businesses as well as small scale one, now depend on the VoIP system for their main communication needs (Fayyaz, 2016). Writing algorithms into the datacentre system with a set-up of commands and a system that will recognise commands as imputed to it either verbally or through the introduction of certain pictures or media content, must be the end goal for the efficient management of the datacentre under the SmartTV station.

4. CONCLUSION

What we have explored so far in brief schematic form are the possibilities of turning one of the most energy consuming products today which is the datacentre, into one of the most sustainable and eco-friendly technological products while transmitting for us the much needed information. The possibility of reducing the SmartTV station's datacentres may be high with the integration of systems expounded above, either as singular or multiple form. This will enhance the capabilities of the managers of such entities and thus providing better content at much better clarity and speeds. Because the technology already exits, it will be upon the completion of this and other various research works on the matter that will basically assist in policy considerations as the efficacy on the reliance of these and other technological systems comes into question.

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