Efficient and secure Big Data delivery in Cloud Computing

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Abstract

Big Data (BD) is a new technology which rapidly growing in the telecommunications sectors, especially in the contemporary field of wireless telecommunications. Another technology that grows rapidly in the field of wireless telecommunications is Cloud Computing (CC). CC concerns an infrastructure where data storage and processing take place outside of the user's device. Both of them face security and privacy issues in their function. In order to improve them and to optimize their privacy and security issues conducted the present survey. In this paper, we survey BD and CC technology and their basic characteristics, with a focus on the security and privacy issues of both technologies. Specifically, we try to combine the functionality of the two technologies (i.e BD and CC) with the aim to examine the frequent features, and also to discover the benefits related in security issues of their integration. Concluding, we present a new method of an algorithm that can be used for the purpose of improving Cloud Computing's security through the use of algorithms that can provide more privacy in the data related to Big Data technology. At the end, there is a survey about the challenges of the integration of BD and CC related to their security level.

Keywords
Algorithm, Big Data, Cloud Computing, Delivery, Security, Privacy; Quality of Services, Quality of Experience

1. INTRODUCTION

A new popular term known as Big Data technology, used in order to describe the astonishingly accelerated growth of the amount of data (data volume) of structured and unstructured form. It is a broad term for data sets so large or complex that conventional data processing applications are not adequate. Seldom, it also relates to a certain size of data set. Precision in big data could result in more confident decision making, and better decisions may lead to an increased operational efficiency, reduced costs, and minimized risk [1]. Regarding this, we realize that the BD is now equivalently important both for business and internet. This occurs because additional information results in a more precise analysis [2].

The real issue is not that you have acquired huge amounts of data, but whether it has any value or not. Auspiciously, anticipating that the organizations would be in a position receiving information from any source, utilize the relevant data and analyze it in order to get quick answers, we will achieve the following: 1) to reduce costs, 2) to reduce time, 3) to develop new products and to optimize their offerings, 4) to make smarter judgments.

Furthermore, a new generation of services, concerning the concept of the "cloud computing", has emerged in recent years aimed at providing accessibility to information and the data from everywhere at any time, so limiting or removing the need for hardware equipment. The recent years, Cloud Computing services compose one of the major areas in the world of competition among the giant companies in the field of IT and software, like Google, Amazon and Microsoft, which are struggling to get an advantageous position, in this promptly developing industry [3] [4]. By the term "mobile cloud" referring in a general concept to in two prospects [5]: a) infrastructure based, and b) ad-hoc mobile cloud. In the prospect of infrastructure based mobile cloud, the infrastructure of the hardware is still static and delivers services to the mobile users. Additionally cloud is salutary for computing and

storage [6] [7], the conventional offload computation techniques could not be used for the smartphones in a direct line since these techniques are in general energy-unaware and bandwidth limited [8] [9].

Also, a few examples contain the restrictions of communication capabilities, processing, energy and storage. Such inadequacies exhort us to fuse the technology of CC and Big Data. As an upcoming technology, CC integrates a large number of technologies in order to maximize capacity and performance of the current infrastructure [10].

In recent years, there is a standard of highly efficient video coding, acquainted as HEVC, which is the most recent compression standard. HEVC has an official approvement in January 2013 and became the successor of the H.264/MPEG-4 or AVC standard. The data used by the HEVC could also be characterized as Big Data because of their large volume [11]. The basic aim of HEVC standard is the fact that there is a presentation of significantly better compression performance compared to the recent existent standards. This could be in the range of 50% bit rate abatement in almost the same video quality, comparing with H.264/MPEG-AVC standard [12]. Thus, the HEVC design created in order to accord extremely high quality streaming media, even though the low-bandwidth networks, since it consumes only the half bandwidth, compared to AVC [13].

Multiple goals in the field of high-quality video coding could be achieved by the new HEVC design. Some of those are the coding productiveness, the data loss springiness and the ease of transport system integration [14]. The main target of HEVC standard is to increase the data compression by 50% over the prior technology of H.264, while maintaining the same image quality at the charge of computational cost. HEVC standard provides several conformations modes, based on the application scheme, for computational complexity, efficiency, processing delay, parallelization and error resilience techniques. Furthermore, a video sequence have been coded with HEVC is typically apportioned into small intervals known as GOP (Group of Pictures) [12].

This paper divided into six sections. In Section 2 there are reviews of the related research, and theoretical references to two technologies we deal with in this paper (Big Data and Cloud Computing). Section 3 surveys the Big Data technology and its key characteristics and Section 4 surveys the Cloud Computing technology and its key features. Section 5 illustrates the integration of the Big Data technology and the CC technology, and surveys some of their advantages. Finally, Section 6 elaborates on the conclusions of our study.

2. RELATED REVIEW

For the purpose of this paper we study and analyze previous studies in the field of Big Data technology and Cloud Computing and we examine existing work proposed both in the literature and on the Internet. Below presented the papers we have studied with their main objective.

To begin with, there are several works for the Cloud Computing Technology. An exploration of the possibilities solutions to offer a trustworthy CC environment presented in [15]. Then, the [16] proposes a data encryption model which protects the privacy and security of the data before they are uploaded in the cloud. The key consideration dealt in the proposal of [16] is the encryption schema in order to secure data with the aim to make it unintelligible for all. Regarding to [16], using AES for security over data is of great importance as it offers a variety of benefits such as less memory consumption and less computation time. Furthermore, a survey of the MCC was given in [17], which has the purpose to help general readers that have a survey of MCC with focus on its definition, its architecture and its applications. Also, it was presented the issues, the existing solutions and the approaches of them in [17]. Finally, [17] suggest the future research directions of the MCC technology. The [18] provides a thorough overview of MCC investigation, while highlighting the unique concerns in mobile cloud computing. Furthermore, a taxonomy count on the key problems in

the area of mobile cloud computing and a discussion about the different methods that have been taken to tackle this issues were presented in [18]. At the end, there is a conclusion with a critical analysis of possibilities which have not yet fully met, and address directions for the future work. In [18] it was detailed the security issues which result because of the very nature of CC. Furthermore, the [19] presents the newly born solutions that presented in its literature in order to counter the security issues. Also, a brief view of security vulnerabilities in the MCC is highlighted. Finally, it presented the discussion on the open problems and future work directions. At the end, regarding the cloud computing technology, the [20] offers a study on cloud computing and appropriate algorithms for balancing the load. Also, it was given comparison between those algorithms on different properties of them. According the [20], the ACO is the best algorithm for balancing the load. Concluding the first part of related review, there is study about BD technology.

As already mentioned, the main purpose of this work is the operation of Big Data technology through the technology of Cloud Computing. At the beginning, the [21] presents a survey on the big data and cloud computing, with the importance to promote the research and development activities in the field of the big data and the cloud computing. At the end, the [21] presents a method for storing the data on cloud using the cloudsim package. Thereinafter, through [22] the authors gave a discussion about the Big Data using cloud computing. Also, in [22] explained how people adopt cloud as Cloud Technologies Mature. Furthermore, the authors gave an explanation of how Big Data and cloud is responding for user's request as Cloud and Big Dara a compelling combination. In [23] the authors discuss on the effects of data processing and analyzing big healthcare data on CC environment. The [23] suggest the use of the Hadoop, which is a framework that could process a large amounts of data sets on distributed environment, and also it can be deployed on CC environment to process the big healthcare data. Then, the [23] shows a research that focuses on the two key concepts, BD and CC, and some of the problems and possibilities which are inherent with the deployment of CC and BD services. Through this study is shown which security challenges is among the most prominent problem in CC and BD services. Finally, after there is a consideration about some of the problems related to BD and CC, a number of solutions were suggested by [24] towards improving the two key concepts that will go a long way in increasing the adoption rate of CC by organizations. The [25] explores the contemporary methods in the field of BD using cloud resources and how the medium-sized enterprises (MSEs) can take advantage of these technological methods. Finally, the results of [25] will benefit MSEs in identifying and exploring possible opportunities and moreover make clear the challenges in influencing BD. At the end, the [26] nominate a cloud-assisted differentially private video composition system which is count on allocated online learning, in order to handle privacy and other problems. Also, as regards as the sparsity and heterogeneity of big social media data, the authors of [26] propose an innovative "geometric differentially private" model, that could minimize the performance loss. Finally, the simulation which used in [26] displays the proposed algorithms exceed a number of existing methods and retain a delicate balance between the total reward and privacy preserving level.

Table 1 lists the findings and the concepts examined in each paper.

Year	Author	Problems	Solutions
2010	H. Takabi et al **[15]**	• Specific characteristics worsen security & privacy challenges of Cloud Computing.	• Examines the possibilities of offering a trustworthy Cloud Computing environment.
2011	H. T. Dinh et al **[17]**	• Detonating growth of mobile applications & resurgent of CC concept is considered advancement in mobile services.	• A survey of MCC, with focus on its definition, architecture & applications.
2012	N. Fernando et al **[18]**	• Intrinsic problems (e.g. resource scarcity, frequent disconnections) hinter the usage of mobile computing in its full scale.	• Categorizes the major issues in MCC & discusses different methods to solve these issues. • Careful examination of problems which have not yet been addressed & put forward ideas for future research.
2013	Sachdev & M. Bhansali **[16]**	• The bigger the number of cloud users the most frequent the malicious activity in the cloud. • Highly safe and persistent services needed.	• A data encryption model which protects the privacy and security of the data before they are uploaded in the cloud.
2015	M. Ali et al **[19]**	• Third-party cloud services have more deficiencies and more vulnerable to security threads. • Sharing the users' data outside the administrative control.	• Examines and shortly analyzes both internal and external security problems in the Mobile Cloud Computing.
2015	S. Bhavani et al **[20]**	• Load balancing is one of the cloud's issues. • A reduction in the response time and optimization of the resource utilization can be achieved balancing the load.	• The best algorithm for balancing the load is Ant Colony Optimization.
2015	S. Sathya & R. Avinash **[22]**	• How people adopt cloud as Cloud Technologies Mature.	• An explanation of how BD and cloud responds for user's demand as a compelling combination.
2015	S. Rallapalli et al **[23]**	• The healthcare organizations face the critical challenge to analyze big data. • Large amounts of data cannot be processed through conventional systems.	• Hadoop: An application which could prepare huge amounts of data in distributed environment could be deployed on cloud environment to prepare the big amount of healthcare data.
2016	O. Awodele et al **[24]**	• Security challenges are the most serious in cloud & big data services. • Issues of service level agreement.	• Shipping disk drives to cloud computing. • Use of Data mining techniques. • Use of Access control techniques.
2016	N. R. Vajjhala & E. Ramollari **[25]**	• Contemporary methods in the field of big data using cloud resources. • How the SMEs can take advantage of these technological trends.	• Cloud computing offers an alternative to SMEs shifting the burden of providing and maintaining expensive infrastructure to cloud service providers.
2016	P. Zhou et al **[26]**	• The increased usage of social media has created a new period, that of the big data. • Privacy of users' contexts & video service sellers' repositories, that are remarkably sensitive & of important commercial value.	• An innovative "geometric differentially private" scheme, that could minimize the performance loss.
2016	A. A. Gnana Singh et al **[21]**	• Promote the research and development activities in the field of the big data and the cloud computing.	• A method for storing the data on cloud using the cloudsim package.

Table 1: Mapping problems against referenced solutions.

3. BIG DATA

Due to its scale is much larger, big data could be defined that is a more complicated world. Big data sets advanced analytic techniques in which operate on, that called BD Analytics. Therefore, BD analytics is divided in two things, BD and analytics, in addition how those two have teamed up in order to establish one of the most profound methods in business intelligence (BI) today. The best way in order to discover better use of data through modern application (e.g. identifies the best suppliers, understand sales seasonality) [27].

3.1. Big Data Characteristics

The amount of data in storage usually characterizes the most definitions of big data. Instead of size there are also other important attributes that matters in big data such as data variety and data velocity. The three Vs of big data (fig. 1), which are volume, variety, and velocity, make

up an inclusive definition. More specifically, each one of the three Vs has its own specializations for analytics [27] [28].

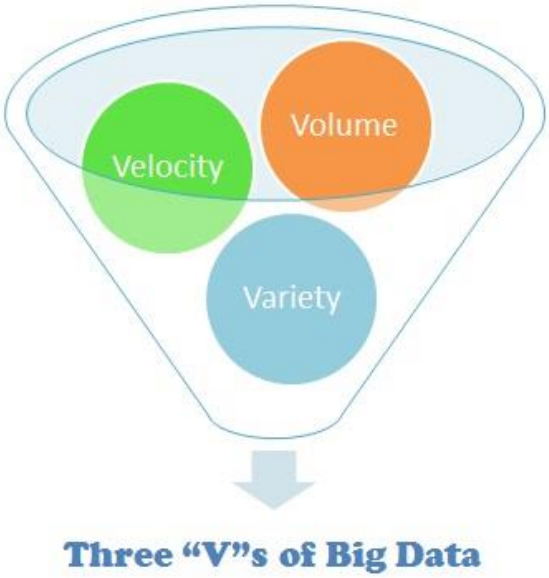


Figure 1: The Three Vs of Big Data.

Big Data Volume

The amount of data that is available for an organization and additionally it is not necessary for the organization to own all of the data that can access it, could be defined as the Data Volume. Regard that data volume goes up; the value of different data records would reduce in symmetry to age, type, richness, and quantity between other factors [27] [28].

Big Data Velocity

Various attributes such as the speed of data creation, agglomeration and streaming are related to the term of Data Velocity. The e-Commerce has fast increase the speed and richness of data calculated for various business transactions. The management of Data velocity is much more than a bandwidth problem; it is additionally an ingest problem (extract-transform-load) [27] [28].

Big Data Variety

The plenty of the data depiction, like text, audio, video, etc., consist the Data Variety. Important challenges which could be lead to an analytic sprawl are represented by non-aligned data structures, irreconcilable data formats and inconsequent data semantics [27] [28].

3.2.Applications of Big Data

In recent years, the number of mobile phone subscriptions outreaches the 4 billions all over the world, and about 2 billion people have access to the internet [29]. Between the past twenty years, about a 1 billion people throughout the world became a member of the middle class, and as an outgrowth more people are considered as literate, leading to information progress [30] [31].

Predictable & Efficient

Applications of BD importantly go up the quantity of real-time and workload-intensive transactions through the huge amounts of different data transferred. The supporting network which connects the hyperscale server architectures, insisting of thousands of nodes which in

turn include various processors, might be enough to make certain this data can move rapidly and efficiently [32-34].

Holistic Network

Regarding the optimization of network performance, it is important which it takes place through the BD domain considered in the connection with the more conventional undertaking infrastructure. A holistic network approach provides some advantages as the Multitenancy, the ability to reduce duplicate costs and to leverage network staffing expertise, and finally the ease of network provisioning [32-34].

Network Partitioning

Without additional cost and complexity the division which was enabled by logical separation. Furthermore, different tasks may also need to be isolated by the use of hard partitioning on the Ethernet switch. Regarding this the tasks are totally divided at the level of data plane. For instance, the separation of the data plane could be important in order to comply with regulations and privacy needs [32-34].

Scale Out

The ability of "junior science projects" (projects of BD which may begin small) to "Scale Out" could guarantee a seamless devolution as projects grow in size and number. In addition to this, an important issue to the same degree is that network performance and ease of management remain constant as the cluster scales [32-34].

Unified Ethernet Fabrics

By influencing various paths into the network, and constantly determining the most efficient route, Unified Ethernet Fabrics empowers full link utilization. A perfect scalability could be provided by the Unified Ethernet Fabrics, since the virtual chassis architectures offer access to various switches and, simultaneously, manage them as a unique device. Moreover, by this design might be offered a predictable any-to-any latency and bandwidth for traffic between servers through the BD cluster [32-34].

3.3.Big Data Security & Privacy

New challenges and standards developed and created in data security issues through the development and the use of BD technology. This creates a growing need for further research on security technologies in order to be able to handle the huge amount of data and to ensure effective. Technologies in order to secure data are slow when applied to large amounts of data.

Regarding the Table 2 we could conclude that even the most efficient algorithms give an encryption rate of 64.3MB/s [32-34]. Thus, in the sector of BD technology, in which the need of large amounts of data needs to be transferred we could observe an important bottle neck for encryption like huge amounts of data. This is harmful to the nature of BD that have real time processing and outcomes.

The flowcharts of the algorithms which have been studied in this paper are presented in Table 3 and Table 4 [32-34].

Algorithm	*Key length*	*Megabytes processed*	*Block size*	*Rounds*	*Time taken*	*MB per second*
Blowfish	32-448 bits	256	64 bits	16	3,976	64,386
DES	56 bits	128	64 bits	16	5,998	21,340
3-DES	56, 112 or 168 bits	128	64 bits	48	6,159	20,783
AES	128, 192 or 256 bits	256	128 bits	10, 12 or 14	4,196	61,010
RSA	1025 – 4096 bits	300	512 bits	1	1175,783	10,900

Table 2: Encryption Rates of popular Algorithms.

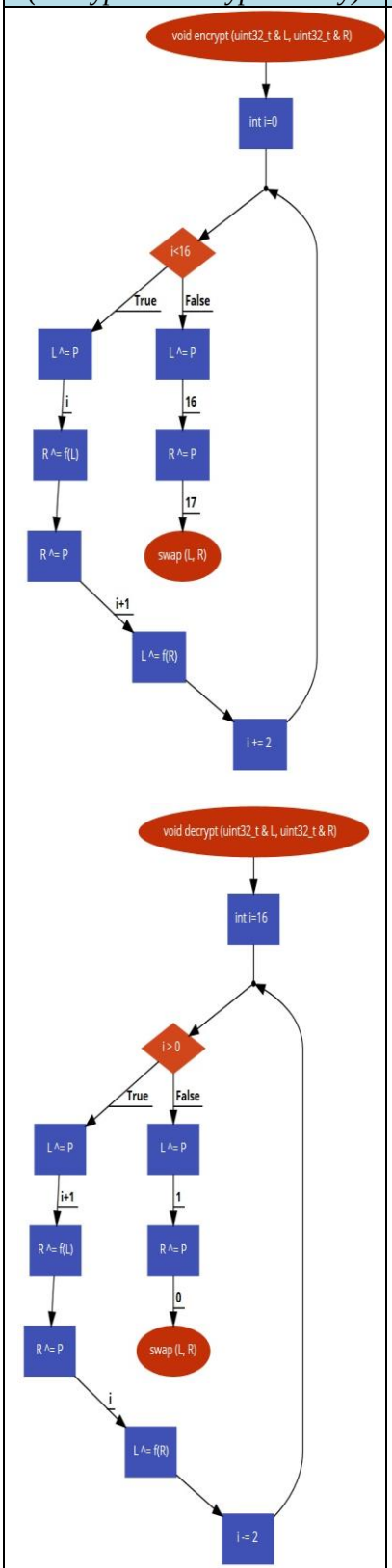
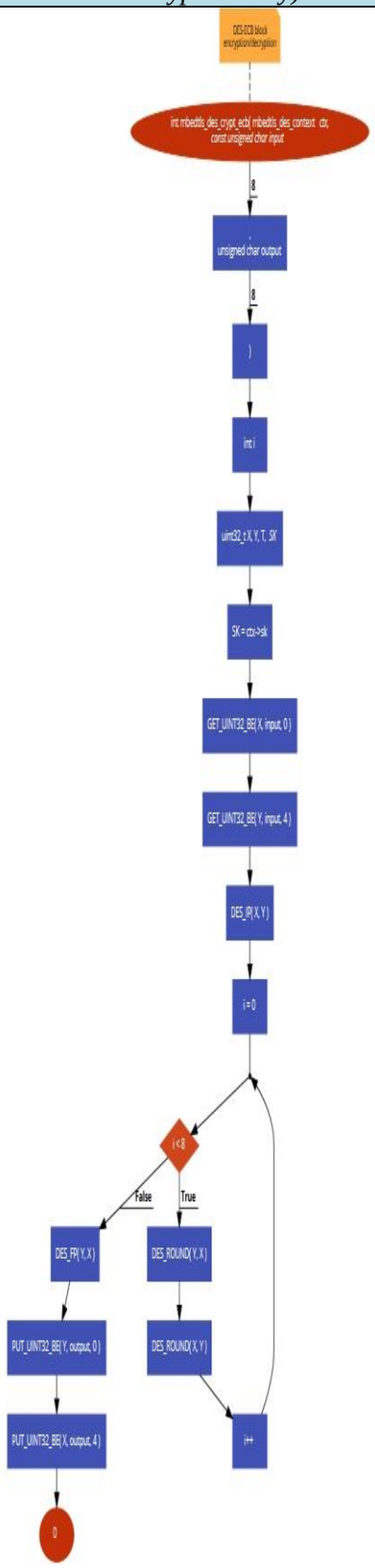
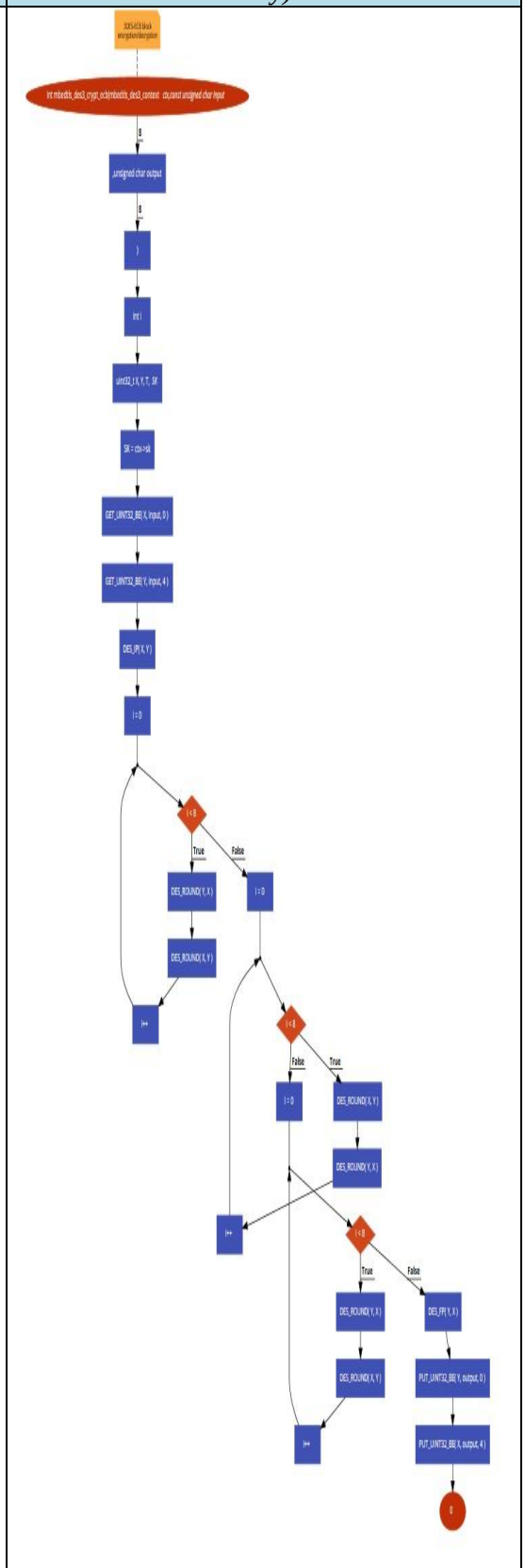
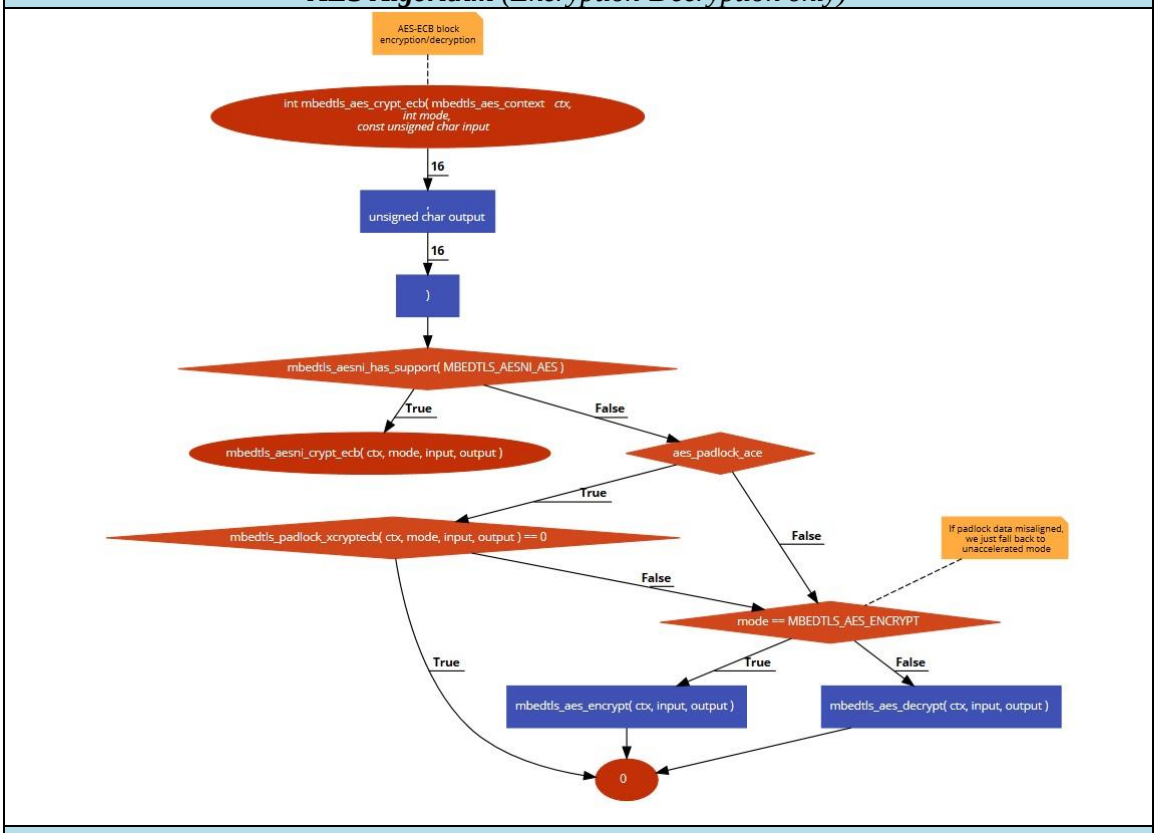
Blowfish Algorithm *(Encryption-Decryption only)*	***DES Algorithm*** *(Encryption-Decryption only)*	***3-DES Algorithm*** *(Encryption-Decryption only)*
		

Table 3: Blowfish, DES & 3DES Algorithms (part of their code).

AES Algorithm *(Encryption-Decryption only)*



RSA Algorithm *(Encryption-Decryption only)*

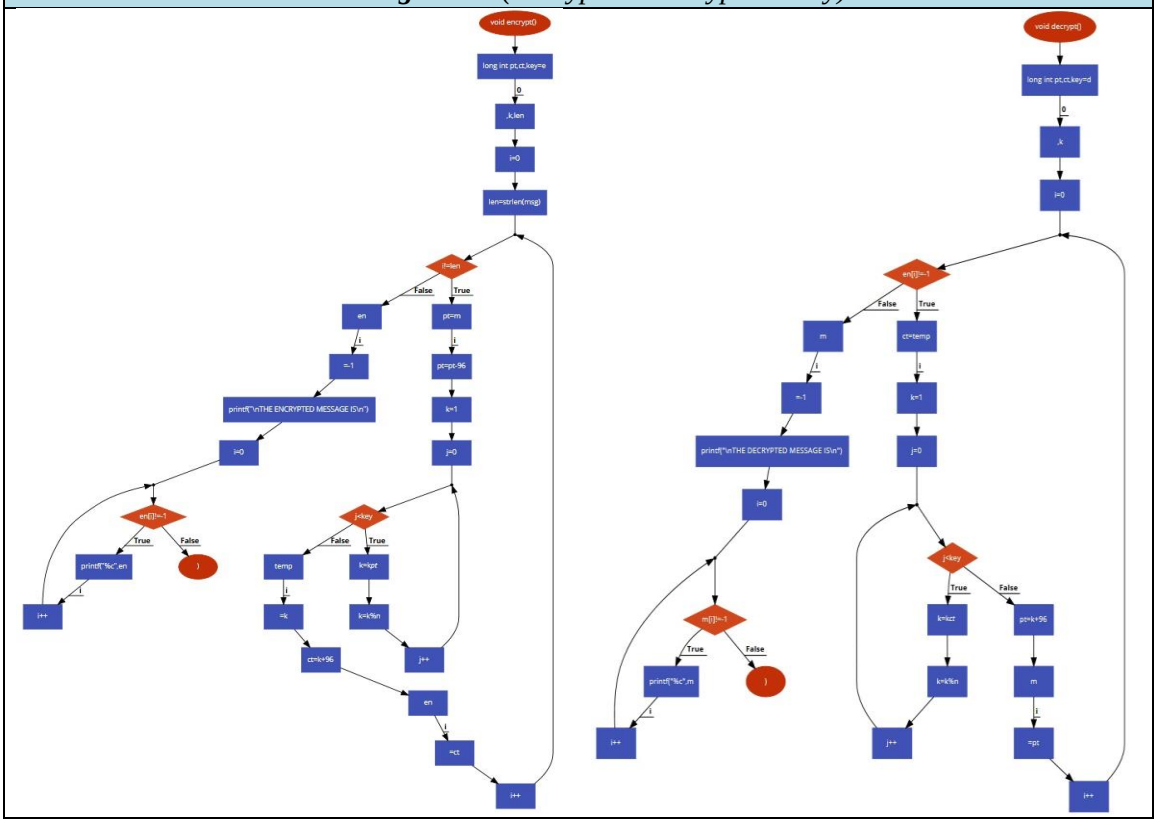


Table 4: AES & RSA Algorithms (part of their code).

4. CLOUD COMPUTING

Computing, storage, services, and applications over the Internet is provided by CC. The integration of CC technology with mobile devices in order to make the mobile devices resource-full in terms of computational power, memory, storage, energy, and context awareness, is defined as MCC (fig. 2). This technology is the result of interdisciplinary methods integrating MC with CC. So, this transdisciplinary domain is additionally mentioned as MCC [35] [36].

Figure 2: Cloud Computing Technology.

4.1.Cloud Computing Features

As all technologies, so the CC technology has some features which determine its function. These characteristics are analyzed and outlined consequently.

Storage over Internet

The technology framework which uses Transmission Control Protocol/Internet Protocol (TCP/IP) networks in order to link servers and storage devices and with the aim to accommodate storage solution deployment could be defined as Storage over Internet. This technology is also publicly recognized as Storage over Internet Protocol (SoIP) [33] [34] [37].

Service over Internet

The most important aim of the Service over Internet is to be devoted to facilitate customers throughout the world with the aim to transform aspirations through achievements by harnessing the Internet's efficiency, speed and ubiquity [33] [34].

Applications over Internet

The programs which produced to make useful operations of a present manual task, or virtually anything, and that perform their operation on the cloud server through an internet connection as well as the conventional model of a program which need to be installed and operate on a local computer are the Cloud Applications, or as scientific known, Applications over Internet [32-34].

Energy Efficiency

The path of managing and restraining the increase in energy consumption could be defined as Energy Efficiency. For instance, when a Compact Florescent Light (CFL) bulb uses less energy (1/3 to 1/5) than an incandescent bulb to generate the same quantity of lights, the Compact Florescent Light (CFL) is considered to be more energy efficient [32-34].

Computationally Capable

The technology of the MCC enables all the services of computational clouds that are influencing the computationally strenuous and omnipresent mobile applications. So, a system is admitted as computationally capable as long as it achieves the needs, to offer us the results we want, by progressing the correct calculations [33] [34].

4.2.Disadvantages of Cloud Computing

CC has a number of trade offs which need to be minimized over the years with the aim to reach a better and more ideal use.

Security

Security is one major issue of the MCC technology. In MCC technology must be considered that all the sensitive information could be surrendered to various third-party cloud service providers. Therefore, regarding to this when someone need to rely information to a cloud provider must be absolute sure that the provider will keep the information totally safe [38] [39].

Connectivity

A critical and vital issue of MCC is Internet connection. The user must be certain with the choice of a good and reliable internet provider [40].

Performance

The performance of the MCC is another primary issue. A number of users need to feel that the performance of services is good enough as in native applications [41] [42].

Latency (Delay)

Latency, or as also known Delay, is defined as the time involved in offloading the computation and getting back the results from the adjacent infrastructure or cloud, in the field of MCC.

Privacy

When a user adopts MCC a major bottleneck which could be considered is privacy. Hence, in order to gain consumers reliance in the MC, the application models may support application progress with privacy protection, and unrestricted authentication mechanisms [39] [43].

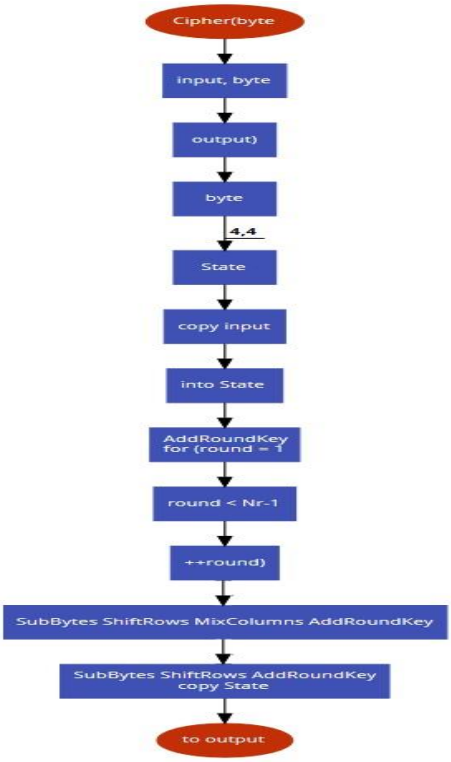
4.3.Cloud Computing Security Model

In order to offer secure communication through the network, encryption algorithm plays an important role. It is a valuable and fundamental mechanism for the protection of the data. Encryption algorithm converts the data into scrambled form with the use of “a key” and only the user have the key to decrypt the data. Regarding the researches that have been made, an important encryption technique is the Symmetric key Encryption. In this key encryption method, in order to encrypt and decrypt the data only one key is used. In this encryption technique the most used algorithm is the AES [44] [45] [46].

In order to replace the DES algorithm NIST recommended a new encryption standard which is the AES (Advanced Encryption Standard) algorithm. The AES algorithm block ciphers. AES used a number of keys in order to encrypt and decrypt, with length of 128, 192,

or 256 bits, but as a default the key length is 256 bits. Depending to the key size the AES algorithm encrypts the data blocks of 128 bits in 10, 12 and 14 rounds. Additionally, AES has been tested with attention for a huge number of security applications [47] [48] [9].

AES algorithm considered as better than others for a number of reasons, which is follows [47] [49]:



- ✓ A very good software performance resulted by AES's innate parallelism facilitates efficient use of processor resources.
- ✓ Fast key set up time & good key agility provided by AES.
- ✓ AES is suitable for limited space environments instead of the less memory requirements for implementation.
- ✓ AES is protected by the no serious weak keys.
- ✓ Key and block sizes which are greater than 128 bits are supported by the AES.
- ✓ AES is currently protected by linear and differential cryptanalysis attacks.

Additionally, there is an important encryption technique from the Asymmetric key Encryption. Instead of Symmetric key encryption, two keys, one private and one public, is used in the Asymmetric key encryption. The private key is used for the decryption and the public key is used for encryption [44] [45].

5. Big Data In Cloud Computing

In order to be able for every user to manage and process big amounts of data everywhere and every time a new challenge created. This challenge is to use BD in CC. Regarding to the related research and by surveying the two technologies we reached that through this integration there are new challenges generated.

Cloud Computing	*Storage over Internet*	*Service over Internet*	*Applications over Internet*	*Energy Efficiency*	*Computationally Capable*
Volume		**X**	**X**	**X**	
Velocity	**X**		**X**	**X**	**X**
Variety		**X**	**X**		**X**

Table 5: Contributions of Big Data in Cloud Computing.

Table 5 exhibits the key characteristic of the two technologies (CC and BD) which have been studied and used in order to use them for the experimental proposal. Based on the study conducted, the key characteristic of BD technology which contributes more with the

characteristics of CC technology is Velocity. Velocity contributes four from the five key characteristics of CC. Also, another thing that we can observe from Table 5 is that the characteristic Applications over Internet contributed from all the key characteristics of BD.

Figure 3: Big Data in Cloud Computing

Thereafter, an important issue in the integration BD in CC is Security of data stored in the cloud (fig. 3). A large number of security issues come through the CC technology. This would be as a result of the fact that it encompasses a number of technologies which might contain networks, operating systems, etc. Therefore, security problems of these systems and technologies subsist in CC. The security problems related to CC devices and environments.

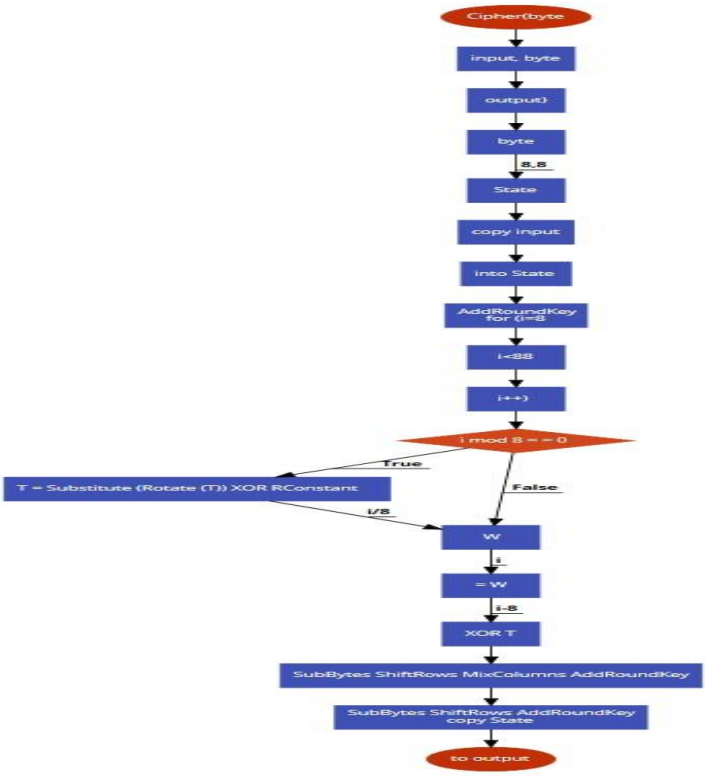
Regarding the BD security issues, they are overblown by the three key features of BD that are the three Vs (volume, variety, velocity).

Big Data Applications	**Security**	**Connectivity**	**Performance**	**Latency (Delay)**	**Privacy**
Predictable & Efficient	**X**		**X**	**X**	**X**
Holistic Network	**X**	**X**	**X**		**X**
Network Partitioning	**X**		**X**	**X**	**X**
Scale Out	**X**	**X**			**X**
Unified Ethernet Fabrics	**X**	**X**	**X**		**X**

Table 6: Contribution of Big Data Applications by Cloud Computing trade offs.

Table 6 lists the BD Applications and how they contributed by the CC trade offs. Affirming the earlier study, we can observe that Security and Privacy are the CC's trade offs which contribute more the BD Applications. In contrast, Latency is the CC's trade off which contributes less the BD Applications. Based on these conclusions, we can confirm that we must propose a new model which strives to improve the issues of Security and Privacy.

Relying on this study in encryption algorithms of two technologies we propose a new part of flowchart model related to the original AES flowchart. This model of AES flowchart uses the original key consists of 256 bits/16 bytes which are demonstrated as a matrix of 8x8.



Considering the benefits of the security models and algorithms of BD and CC technologies we can observe that we can have a beneficial use of integration those two technologies.

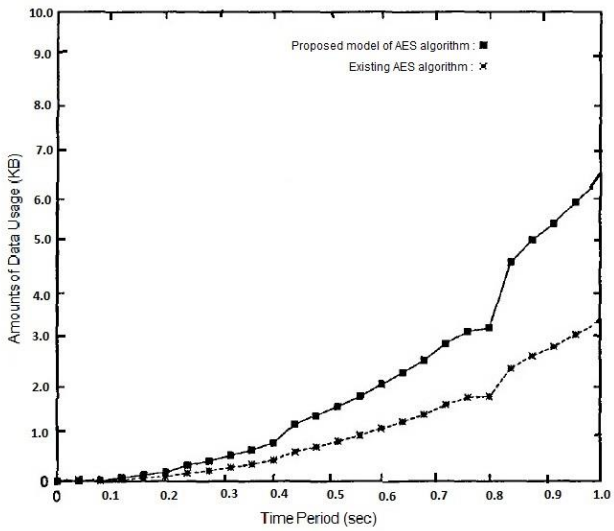


Figure 4: Security level of encryption algorithms of measurement used for the study of AES model algorithm.

Figure 4 shows, the measurements that have been through time. As we can observe by this figure the more often is the combined use of the algorithms, the higher level of security of the data usage we get every time. The upper line represents our proposed flowchart-model of AES algorithm and the other (down line) represents the existing AES algorithm.

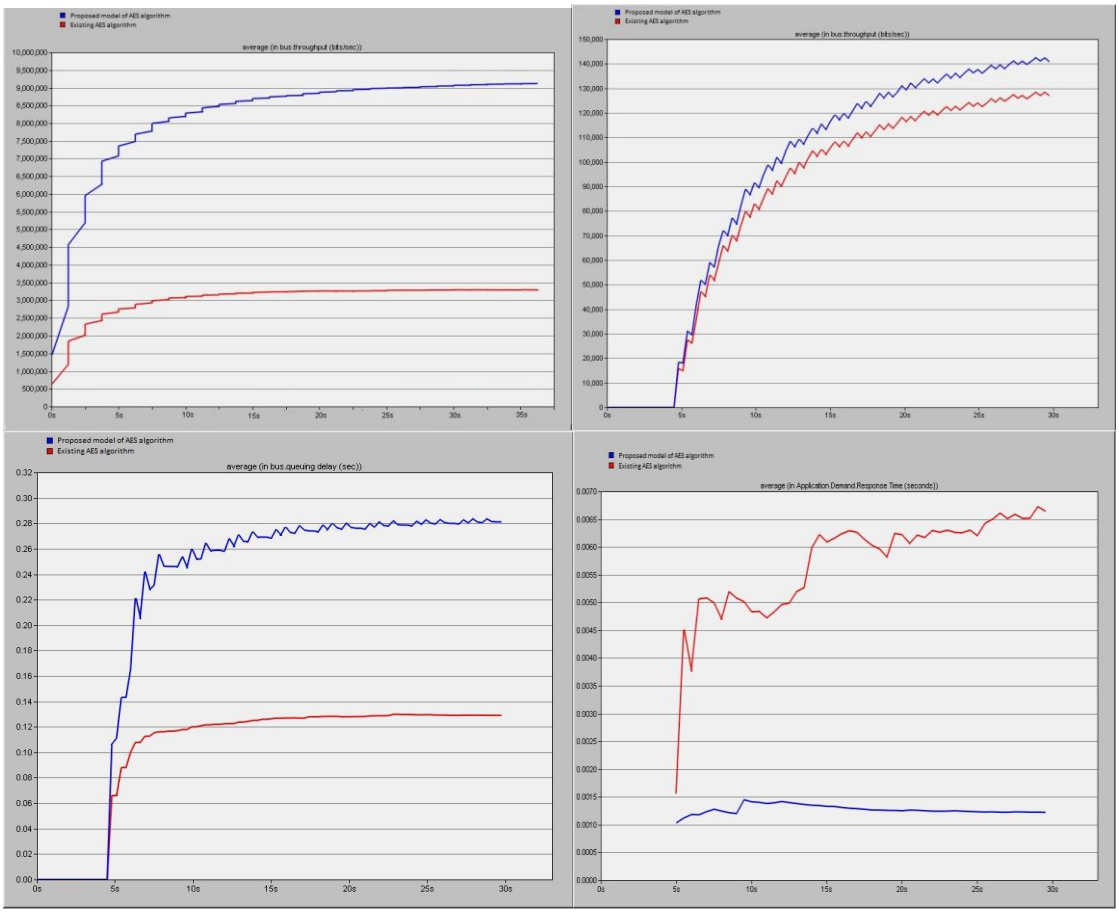


Figure 5: Security level of encryption algorithms of measurement used for the study of AES model algorithm (bits per seconds).

Figure 5 demonstrates the measurements that have been through time regarding the different amount of bits used. As we can observe by those figures represented in Figure 5, the more often is the combined use of the algorithms, the higher level of security of the data usage we get every time. The blue line represents our proposed model of AES algorithm and the red represents the existing AES algorithm.

6. CONCLUSION

The CC technology provides many possibilities, but in addition to this places quite a lot of restrictions as well. This technology mentions to an infrastructure where both the data storage and processing occur outside of the user's device. In this paper, we survey BD and CC technology and their basic characteristics, with a focus on the security and privacy issues of both technologies. Moreover, we have tried to combine the functionality of the two aforementioned technologies (i.e BD & CC) with the aim to examine the frequent characteristics, and moreover to discover the benefits related in security issues of their integration.

The main goal of this paper is to try to combine the functionality of the BD and CC technologies with the aim to examine the frequent characteristics, and also to discover the benefits related in security issues of their integration. This could be take place by the presentation of a new method of an algorithm that can be used for the purpose of improving CC's security through the use of algorithms that can provide more privacy in the data related to BD technology. Moreover, we survey the security challenges of the integration of those technologies. This can be the field of future research on the integration of those two technologies, and why not to have a huge improvement of their security and privacy issues in order to have a better use of them.

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