THE EXPERT SYSTEMS ANALYSIS USING THE CONCEPT OF BIG DATA AND CLOUD COMPUTING SERVICES

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Abstract: *This paper presents the general characteristics of expert systems for process data analysis in real time and secure information systems using Cloud computing and Big Data technologies. The cyber security in cyber war must be redefined considering the collisions of IT&C with the informational risk.*
Keywords: *Big Data, Cloud computing, IOT, analysis, cyber security*

INTRODUCTION

The IT&C companies promise significant changes according to technology trends in2015.Research Divisions of big companies (IBM Research, Dell research, CISCO research) show the following trends: IT security, Cloud Computing, Big Data, IOT (Internet of Things), expert systems (Figure 1). These concepts bring about significant changes from how to use PCs to accessing business data.

In this paper there are described the ways in which Cloud computing and Big Data technologies have a convergence point in order to provide an efficient cost report [2]. Cloud computing is a boost for developed data analysis, based on models such as Analytics-as-a-Service (AAAS).

This paper is accomplished using platforms offered by big corporations. According to the performed analysis in real time on these platforms, the positive effects of Cloud computing and Big Data will be revealed.

Figure 1. IT&C Tehnologies 2015

The expert systems analysis regarding information security consists of collecting the information for detailed requirements they have to accomplish.
According to recent research(research divisions: IBM, CISCO,

Dell), an expert system is a computer program designed to simulate some forms of human reason and able to manage a significant amount of specific information. The most important features of these systems are data bases (knowledge) and the specific method of reasoning algorithm. According to IBM research (http://www.research.ibm.com/),a system solution developed on Cloud computing platform is IBM Blue mix.

Big Data presume an avalanche of information in cyberspace, summing up the data regarding the analysis volume, velocity, variety and reliability. This concept has appeared to support companies for product efficient delivery and for guiding them to make better decisions.

A substantial increase for data analysis in real-time is circumscribed by IOT theories, which are effective if they are provided to users in real time. IOT has a preventive approach that will take into account all stages of an attack before, during and after it occurred. The concept of digital security architecture introduces a multitude of variations regarding integrating IT/IOT and a new perception on applications. CISCO patented the application Cisco Security IOT Grand Challenge. This protects against threats [16].

The modern and computerized society from cyberspace, based on Internet and Cloud computing architecture, is an accomplished fact, but it neglects the borders of cyber war. Computer security concept has spread where verPCs, Internet and IT & Cinfrastructure exist.

Nowadays, the companies are interested in this trend and use the data in real time for multiple needs: applications of expert systems, information security risk analysis and technology. A new trend in cyber security is the development of Cloud computing, covering a wide range of computing services and processes, the data being provided to users regardless of their position in the network and geographic location [7].

THE ANALISYS OFEXPERT SYSTEM AND BIG DATA IN REAL TIME

Data analysis and decision making in real time characterize the modern computerized society. The complex and required process of analysis provides all necessary information flow, and the concept of Big Data highlights the state of data chaos. Technology is the foundation and support for this remarkable process.

According to Romanian Information Service (SRI, https://www.sri.ro/analiza-intelligence.html) the analysis is a filtration, connection and interpretation data process, collected from open or secret sources. Data analysis involves a cycle of data processing, such as collection, preparation, processing and maintenance of data [8].

In terms of security, the Special Telecommunications Service (STS, http: //www.stsnet.ro/) uses incidents and vulnerabilities real time analysis, consisting of examining all the evidence for available information, assigned to an incident or event.

IBM research proposes several types of analysis: descriptive, diagnostic, predictive and prescriptive [12]. Descriptive analysis is one of the most used types of analysis by corporations. Diagnosis analysis begins during the descriptive phase and extends in predictive analysis. It is the type of analysis that identifies the source of problems, allows to obtain new data and to explore them. Predictive analysis uses data mining techniques, text analysis and predictive modeling to predict future actions [11]. Prescriptive analysis uses predictive models and localization rules.

Big Data is generated by the informational chaos in cyber society, and it is being produced by each digital process. This concept is necessary because of the multitude of information sources that generate data with significant speed, volume and variety [13]. To extract valuable information from the data flow, it requires optimal processing power and data analysis in real time.

All stages of the development of an expert system begin with extended analysis. Achieving real-time analysis phases is due to the use of IT&C technologies cyberspace, one of which is Cloud computing.

Theoretically, the concept of Big Data has emerged at the same time with Cloud computing technology to manage information flow [10].

Both technologies, Big Data and Cloud computing continue to evolve. Cloud computing is a maturation process and service providers have tried to extend the concept.

Data analysis leads to transition from a volume of unrelated information to concrete information, managed in real time. According to Intel and other IT corporations' studies, there was an increase of analytics concept, process in which a computer analyzes the information using mathematical methods versus a useful model/template [2].

The big IT&C organizations consider Cloud computing structure as a support for considerable and rising data base projects. Cloud computing provides efficiency in terms of costs and supports Big Data analysis applications technologies that can continuously increase the turnover [2].

In cyber space data are becoming increasingly important. Typical issue "What data should we store?" is preceded by "What can we do with this data?"Companies are trying to unlock the hidden and unused data, and then to deliver competitive advantages.

The actual real data and Big Data concept value is the result of the analysis models. Laborious quantitative models are used, such as machine learning, neural networks, robotics, computational mathematics and artificial intelligence. Their aim is to explore data, to uncover interdependencies and to develop expert systems based on Cloud computing services. Figure2 shows computer-based analysis services based on Cloud computing architecture.
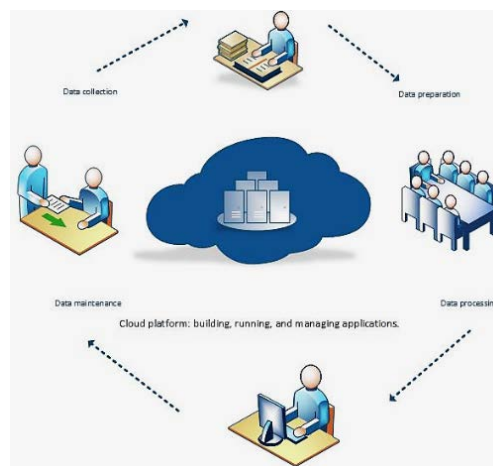

Figure 2. Data analysis in real time

BIG DATA AND CLOUD COMPUTING SYSTEMARHITECTURE

The Big Data concept maps on Cloud computing architecture; Cloud was created to manage the massive, dynamic and complex cyber-level data volume in recent years. Big Data analysis is an opportunity for companies to design the structure where, it apparently does not exist and it allows massive resources processing for significant data migration [2].

The term of Cloud computing has emerged in telecommunications, when providers have begun to use private virtual network (VPN) for data communication. The definition of Cloud, provided by National Institute of Standards and Technology(NIST) is: "*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* [20]". With Cloud, several applications can be delivered as services over the Internet, reducing overall costs (Figure 4).

Through this technology, IT&C companies can manage and deliver faster, stable and secure services. In terms of the existing network architecture, Cloud computing is complex and secure. Its architecture improves the old Internet structure through management, resource saving, high computing power and increased security [9].
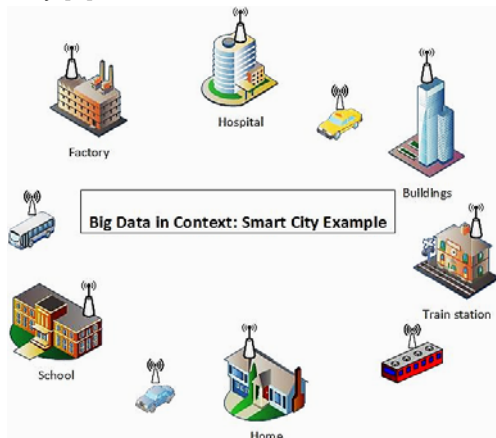

Figure 3. Big Data in Context:Smart City

With virtualization, Cloud computing architecture replaced the limited hardware model and the result consists of unlimited theoretical resources. By combining Big Data technologies and Cloud computing architecture significant benefits for IT&C companies reveal.

In terms of architecture, Cloud computing systems can be divided in to two components, front-end and back-end. These components are connected to each other through the Internet network. The front-end component is the client (user) who can view the back-end system.

By delivery mode, Cloud computing is classified as follows: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). A Cloud Software as a Service application eliminates the need to install and run applications on the user's system. Platform as a Service provides a computing platform using Cloud architecture, offering all required applications which operate on this platform. IaaS infrastructure provides the necessary architecture as a service, the client does not need to buy servers, data center or network resources.

By the implementation way, there are Public Cloud, Private Cloud, Hybrid Cloud and Community Cloud. Public Cloud allows users to use interface and web browser. Private Cloud is used within an organization, being able to manage information security. Hybrid Cloud is a combination of Public Cloud and Private Cloud. This model has a Private Cloud linked to one or more external services. Community Cloud is built and supplied by several organizations in common.

Cloud computing systems architecture has several advantages over the old infrastructure of the Internet: easy management, cost reduction, uninterrupted Services, Disaster Management and Green Computing.

IT&C companies from worldwide are implementing Cloud-based architecture called Cloud Foundry open source project. Cloud Foundry Community supports Cloud computing technology worldwide in order to provide quality and innovation for users.

In the following, corporations that implemented Cloud Computing technologies for informational development are shown.

A practical example is IBM, which provides Cloud based on an open source platform. The platform is called IBM Blue mix (Figure 5).

Cisco shows specific Cloud management services for enterprise customers, called Cisco Intelligent Automation Cloud.

Telekom is a telecommunications company that offers loud computing services with a multitude of already integrated benefits, such as pre-installed applications, antivirus protection, access to services from any location, stored data security and free apps.
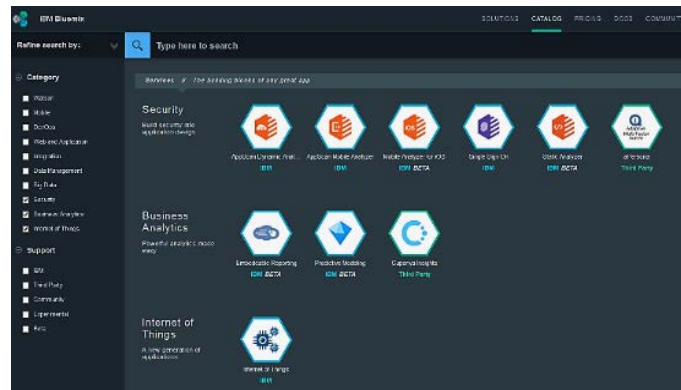
Figure 4. Cloud architecture

These companies provide support regarding the security of Cloud computing technology. Most cloud platforms provide almost all services and information technologies.

Figure 5. IBM Bluemix

For data analysis an account was created on a Cloud computing platform, which allows the view of the services catalog, offered by IT&C

corporations. To assess multiple benefits offered by these technologies and architectures a Cloud computing platforms scenario test was created. According to the test, it can be observed how user requirements are mapped with current technology. The benefits of applications integration with the services can be seen in Figure 6.
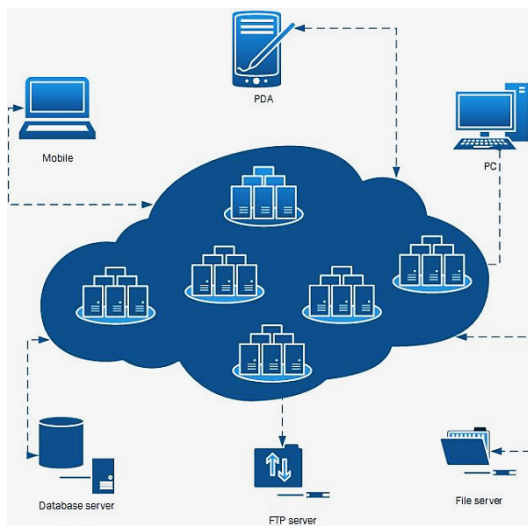

Figure 6. Cloud platform services

Companies and users who want to use Cloud computing can choose the package and the services as needed. In terms of architecture, they are secure and they offer the possibility to build secure applications. Platforms have integrated specific information applications in order to provide security: software testing web-server, anti-malware, encryption applications, traffic monitoring and vulnerability scanners.

CONCLUSIONS AND PERSPECTIVES

By implementing the current technologies (IT security, Cloud Computing, Big Data, IOT and expert systems) within organization, there results a proper environment for analysis and development. Combining conceptual models of Big Data and Cloud Computing favors IT expert systems and worthless-considered data analysis.
Looking ahead, Cloud computing and Big Data have become one of the most discussed topics in recent years, and information systems analysis is an important factor in shaping business decisional systems. Using the solutions presented in the paper offers significant advantages. After analysis, the interpretation of significant data flow can be performed continuously and in real time.
Organizations use data analysis as a connection process from confidential sources and for interpretation of incidents and vulnerabilities in real time. The concept of Big As shown in Figure 3, data in the context of a smart city requires a massive flow of data that contains information in the digital environment: Intelligent City (Smart building sensors, smart grid sensors, Pollution sensors), Intelligent Hospital (Sensors on ambulance, medical imaging Portable service) and Intelligent Factory (Industrial automation sensors, Smart meter).
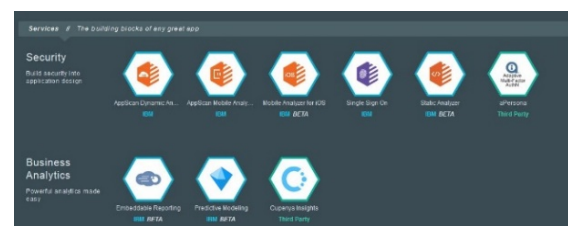
In conclusion, the current technologies presented in this paper significantly develop concepts on how to use the information. The IT expert systems analysis influences the flow of data generated by Big Data. Cloud computing offers and provides real-time information, regardless of geographical location. IOT introduce new trends in digital security architecture and information security should be redefined in the context of digital collisions. Technologies are constantly upgrading and security should be adapted to user requirements.

Looking ahead, all technologies should converge to the need of expert systems development in cyber society.

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