

# CLOUD TECHNOLOGY FOR INFORMATION-ANALYTICAL SYSTEMS OF EMERGENCIES

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**Abstract** – The possibility of using cloud technologies for information and analytical systems of emergencies in the context of technical, organizational, legislative and economical aspects is researched.

**Keywords** - informatization, emergencies, information and analytical systems, cloud technology.

## I. INTRODUCTION

Integration of Ukraine into European and world community, the advance of scientific and technological process, the increasing risk of disasters, as well as current social and economic processes that are undergoing in the country require the modernization of existing and the creating of modern information and analytical systems for emergencies (IASE).

One of the main fields in the development of modern information and analytical systems is the use of cloud technology. This is evident from the research carried out by the consulting companies Koman Deloitte [6] and Forrester [3], in 2015, which indicate that one of the ways to improve and automatize the processes of data processing is abandoning their own data centers and transition to cloud storage technology and the analysis of data provided by Amazon WS, Microsoft Azure etc.

## II. ADVANTAGES AND PROBLEMS USING CLOUD TECHNOLOGIES

The necessity of the implementation of cloud technologies in IASE realises the following advantages: reduction of financial costs for creating the IT infrastructure, flexibility in respond to changing computing needs, improvement of the stability of operation, reduction of the financial costs associated with the operation of the designed system.

However, despite the undeniable benefits of such systems, there are several difficulties (mostly technical), in spite of which their design is still complicated: reducing large amount of data received to a single format; providing a safe preservation and presentation of information necessary for decision-making to the users; qualitative and operational analysis; preparation of the analysis for further work with it, and adequate decision-making [2, p. 10].

In particular, it should be noted that according to the direct purpose of information and analytical systems some other difficulties can arise. Therefore, it is proposed to investigate the designated IASE under cloud technology integration

taking into account its technical, organizational, legislative and economical aspects in order to minimize risks.

## III. TECHNICAL ASPECTS

Judging the specificity of IASE, the risk of obtaining information about potentially dangerous objects and the increased risk of using it in illegal purposes by other institutions and persons should be noted. Therefore, we decided to research the problematic issues, about data confidentiality, which may appear as a result of cloud technologies adoption. The national provider «De Novo» was chosen as the object of analysis [5]. This choice is determined by successful projects in the transition of a number of Ukrainian banks and financial institutions, including the National Bank of Ukraine.

To determine the parameters by which it is proposed to carry out the investigation of the compliance with the technical aspects of data security observed by cloud providers, the requirements of leading organizations dealing with security of cloud technologies and regulation of the conditions for their implementation are analyzed. Such organizations as Alliance security in the cloud (Cloud Security Alliance, CSA), consisting of representatives of the IT-industry, as well as two state organizations in Europe and the US - European Agency for network and information security (ENISA) and the National Institute of Standards and technology (NIST) were picked out for the analysis [1].

As a result, the following parameters, according to which the research of the compliance with the technical aspects of data security was carried out, were selected for the study: availability of data and resources (off cloud services, DDoS attacks, EDoS-attacks, the location of data in Ukraine, the exhaustion of resources); portability and interoperability of software (software compatibility, standardized interface); security of applications and programs (software safety, parceling of access, activity monitoring of active applications, detection of dangerous programs, the protection of images of virtual machines from modification); data management and protection (data isolation, storage and secure data processing, data encryption, key management); identification, authentication and access management (model identification and authentication in the cloud, user profile management in the cloud, providing services for identification, authentication, sharing information or resources in the cloud, the implementation of user

authentication, data access to authorized users); virtualization (providing security for guest virtual machine against attacks, safeguard mechanisms against administrators' misconduct, quick consideration issues, increased peak of workload, increased number of crosspoints, providing data security at the level of virtual machine).

The results of research allow to state that the technical aspects of cloud technologies meet the requirements and provide reliable data protection.

#### IV. LEGISLATIVE ASPECTS

It should be noted, that deficient and outdated legislative framework of Ukraine is the major obstacle to the integration of cloud technologies in IASE. Thus, nowadays there are no legislative acts that could regulate the activity of cloud technology providers to ensure information security. The usage of cloud technology by state agencies services in its full is possible only under conditions of appropriate amendments to the laws of Ukraine "On information", "On protection of information in telecommunication systems", "On the National Informatization Program", "On basic principles of information Society in Ukraine in 2007-2015 ", "On electronic documents and e-document management", "On Telecommunications", and a number of other legal acts relating to the functioning procedure of information systems in government institutions. Particularly, in June 2013, the National Institute for Strategic Studies under the President of Ukraine, conducted the study of the major benefits and risks of using cloud technology, and it was stated that "the current version of the domestic law "On protection of personal data "not only misregulates its protection in cloud-environment, but also in a number of regulations it directly conflicts with the practices of cloud services and, in fact, it prohibits them"[4].

#### V. ECONOMICAL ASPECTS

The absolute advantage of cloud technologies is the reduction of expenses involved in the creation of a leased line IT infrastructure, since all the necessary equipment is rendered directly by the organization that provides access to cloud technologies and subsequent operation of the designed system (cost reduction in using engineering systems, electricity, ports, network equipment and KVM-ports, service and routine maintenance - this is the responsibility of the organization that provides access).

In particular, it is necessary to emphasize the flexibility of cloud technologies which makes it possible to rapidly provide and dismiss computing resources with minimal operational cost.

The efficiency of cloud technologies, was confirmed by the study of the process of deploying an IT infrastructure. Thus, the use of these technologies allowed the customers to reduce the average total cost of managing this infrastructure by 74% and achieve a return on investment of 300% in the first six months of the deployment project transition to cloud technologies [7].

#### VI. ORGANIZATIONAL ASPECTS

Despite the advantages of implementing cloud technologies and high technical level of information security, legislative and regulatory framework does not allow Ukraine to implement complex transition of IASE to these technologies. To solve this problem, we propose the hybrid structure of designed system (Fig. 1), under testing conditions of which, data confidentiality will be preserved as their processing and storage is supposed to be processed on State Emergencies Services local servers, which limit access and use the existing security systems.

In particular, based on national provider «De Novo», a study of some organizational issues of information security in cloud technology, user information security management; trust service provider (auditing, testing, software updates, support for the examination); protection from insiders; respond to information security incidents and its monitoring, troubleshooting; protection of personal user data; refusal of cloud services because of natural disasters, disruption in cloud services supported by third parties, was carried out. As a result, it can be confirmed, that the organizational aspects of information security of cloud technology fully comply with the requirements.

#### VII. CONCLUSION

The paper analyzes the advantages and some problematic issues of using cloud technology for IASE. Based on the research the following can be stated:

1. Technical aspects of using cloud technology meet the requirements of IASE and provide the appropriate level of data privacy.
2. Implementation of cloud technologies in IASE will minimize the economic costs of creation and subsequent operation of these systems.
3. Legislative acts of Ukraine nowadays do not allow government agencies and organizations to implement a comprehensive transition to cloud technology because of a number of flaws in the legislation and its desuetude.
4. Designed hybrid structure of IASE, given its approval, will on the one hand allow evaluating the benefits of cloud technology, and on the other hand – to ease concern over the security of critically important data, because the storage is proposed to be carried on local servers with existing data safety.

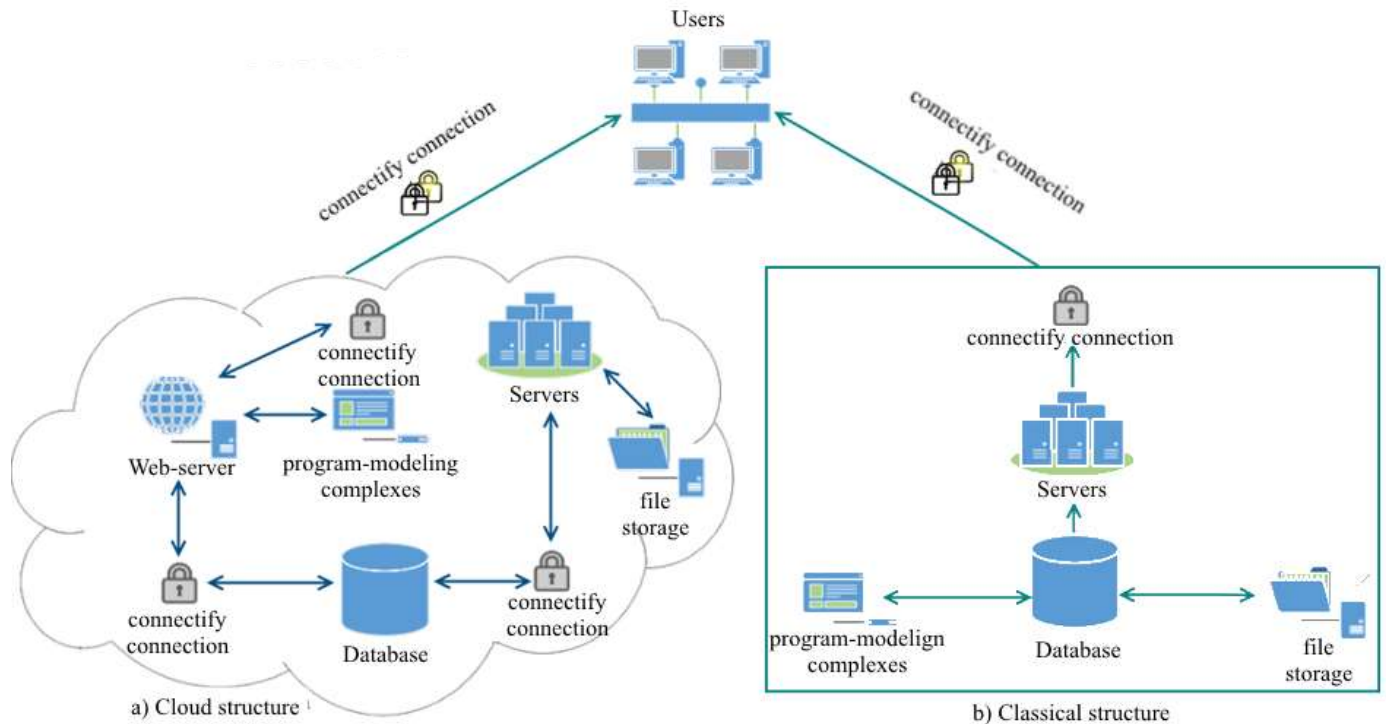


FIG 1. HYBRID STRUCTURE IASE

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