

# Obtaining Information From the Internet by Using Cloud Technologies During Pre-Trial Investigation

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**Abstract.** *The use of information technology is an essential part of law enforcement activity. Cloud technology is widely widespread in our life. Unfortunately, it should be noted that this technology is not widespread in the activities of investigators during the pre-trial investigation of criminal offenses. Therefore, in this article the author focuses on the possibilities of using cloud technologies in law enforcement, as well as on the distinctive features of this technology. In addition, the author has conducted a study in the context of the possibility of obtaining information from the Internet using cloud technologies during pre-trial investigation of criminal offenses. Ways of obtaining information from the Internet using cloud technologies during the pre-trial investigation are studied and criminal procedural means of obtaining such information during the pre-trial investigation are identified. The problems of using cloud technology by the investigator are described in the article. The positive aspects of replacing traditional personal computers with cloud services are identified. The history of the development of cloud technologies is described. The models of cloud technologies and their importance in the activities of the investigator are analysed. The author has investigated the features of using virtual computers in Amazon Web Services during the pre-trial investigation. The possibility of using software product such as Microsoft Office 365 by the investigator is described.*

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## Introduction

The first reference to using a computer for committing a crime dates back to the 1960s. Today, the increasing number of crimes are committed on the Internet.

ThreatMetrix has released data which indicates an increase in cyberattacks by 30% in Europe during the first quarter of 2018. Statistics on cybercrime indicate an increase in fraudulent attacks<sup>1</sup>. As the world becomes more digital, cyberattacks become more complex, so the material and technical support of law enforcement agencies should be in line with modern realities of public life.

Unfortunately, insufficient level of providing investigators and operative workers with appropriate computer equipment should be noted. This fact leads to the impossibility of a qualitative search and analysing information from the Internet during the pre-trial investigation of criminal offenses.

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<sup>1</sup> 2018 Europe Deep Dive in Cybercrime Report. *Electronic source:* <https://www.threatmetrix.com/info/2018-cybercrime-europe/>, accessed: 20.03.2019.

## Research Background

Various aspects of the use of information technology, including cloud technologies, in the activities of law enforcement agencies are researched by such scientists as V. Bakhin, R. Bielkin, V. Biliaiev, V. Biriukov, V. Halahan, V. Honcharenko, A. Ishchenko, R. Kaliuzhnyi, N. Karpov, N. Klymenko, V. Klius, V. Kuzmichov, Ye.Lukianchykov, M. Pohoretskyi, O. Rybalskyi, M. Saltevskyi, Yu. Orlov, S. Cherniavskyi, V. Khakhanovskyi, V. Shepitko and others.

Instead, the lack of theoretical knowledge about the possibility of obtaining information from the Internet by using cloud technologies necessitates the study of this issue.

## The purpose of the article

The purpose of the article is to study the possibility of using cloud technologies for obtaining information from the Internet during the pre-trial investigation of criminal offenses.

## The Main Part

The Internet is a global resource, which contains a wealth of information, accessible to anyone.

The productivity and efficiency of work will be increased if investigator obtains such information during the pre-trial investigation of criminal offenses. It should be noted that the productivity and effectiveness of such work is entirely dependent on the possibility of using modern information technologies which can significantly reduce the time devoted to searching and analysing information.

Thus, the use of information from the Internet is a promising direction of the investigation, but there are some obstacles which inhibit this process.

Firstly, it is necessary to have specialist knowledge, skills and abilities to understand such information technology as the Internet.

Secondly, the investigator should have the latest computer infrastructure which is usually quite expensive.

Therefore, the problem of insufficient logistic support of the investigator can be solved by using cloud technologies, whose service is generally cheaper than using traditional personal computers.

The advantages of using such technology by the investigator during the pre-trial investigation of criminal offenses are:

- the availability of powerful personal computers is not mandatory;
- cost savings in the use of licensed software and its constant renewal;
- a large amount of memory for data storage;
- the possibility of accessing cloud computing from different devices and places;
- a high level of data protection and the ability to recover information in case it gets destroyed.

Cloud technology is a new information paradigm that involves remote processing and storage of data. A characteristic feature of this technology is the use of electronic computing capabilities of remote servers that are located around the world. It is not necessary to have a personal computer with high characteristics of the processor, RAM, video cards etc. The main condition is the availability of high-speed Internet connection.

Computer scientist, John McCarthy, proposed the idea of computation being delivered as a public utility, similar to the service bureau that dates back to the 1960s<sup>2</sup>.

Amazon played a key role in the development of cloud computing by upgrading its data centres. When Amazon found out that the new cloud architecture can provide significant internal performance improvements, this company begun new research in the field of product development. The aim of this research was to provide cloud computing for external customers.

Later, the service Eucalyptus appeared in 2008. The main features of this service are:

- APL-compatible platform<sup>3</sup>,
- availability of open source;
- the possibility to deploy a private cloud.

In the same year, the service OpenNebula was launched, which provided a possibility to create both private and hybrid cloud<sup>4</sup>.

Today, there are three main models of cloud technology service:

- 1) **SaaS (Software as a Service)**—is the provision to the user of hardware infrastructure and software where access is unlimited. These are the services like Dropbox, Evernote, Google Drive, Asana, Unisender, Prezi, Toggl.com etc., where it is possible to store different file formats and process them in online mode;
- 2) **PaaS (Platform as a Service)** — is a cloud computing model where the client can use different operating systems, databases, software, as well as development and testing tools.

An example is Google Apps, which provides online applications by the Google Chrome browser. But the software and data are stored on Google servers;

- 1) **IaaS (Infrastructure as a Service)** — is an online environment where a user can set up and use their own virtual servers and online data storage. That is, the user receives power rented from the central processor (CPU), RAM, hard disk drives (HDD) and so on. A specified amount for the use of such service is paid in accordance with the volume of capacity utilized. The most popular companies that provide such service include Amazon, Microsoft, VMWare, Rackspace, and Red Hat.

An investigator has an urgent need to use a personal computer with the appropriate software during pre-trial investigation.

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<sup>2</sup> A history of cloud computing. *Electronic source*: <http://www.computerweekly.com/feature/A-history-of-cloud-computing>, accessed: 25.03.2019.

<sup>3</sup> APL is a programming language developed in the 1960s by Kenneth E. Iverson. Its central data structure is the multidimensional array.

<sup>4</sup> Nedashkivskiy O.L, Khmarni tekhnolohii typu "IaaS" yak zasib optymizatsii potokiv informatsii v merezhakh peredachi ta obrobky danykh. *Suchasnyi zakhyst informatsii*, 2017, Vol. 1, pp. 41–47.

It is necessary to agree with the opinion of V. Shepitko about the fact that information technology provides an opportunity for the rapid collection, comparison and analysis of information from various sources (messages, results of operational search activities, interrogations, databases etc.), the establishment of a chronological sequence of events in accordance with time and the correspondence of individual facts. Moreover, it is possible to prepare a plan and scheme of the place of the event, simulation of the crime with the help of computer technology, etc.<sup>5</sup>

It should be emphasized that information technologies change the rules of conducting certain investigative (detective) actions. For example, information from the Internet can be obtained by conducting inspection, provisional access to electronic information system and such covert investigative (detective) action as collecting information from electronic information systems. Moreover, information from the Internet can be obtained by conducting such investigative (detective) action as a search.

So, the obtaining of such information during pre-trial investigation requires the use of relevant information technology by the investigator. It should be noted that it is impossible to obtain, process and analyse information from the Internet without such technologies.

Today, there are many ways to obtain information from the Internet.

Firstly, there are a lot of online services on the Internet which enable us to obtain certain information (for example, such services as Truecaller and Sync.me allow to search mobile phone numbers and email addresses);

Secondly, special licensed software for searching and obtaining information from the Internet is being developed (for example, The Maltego CE software, relevant web functions in Microsoft Excel 365 and Microsoft Excel 2016);

Thirdly, the investigator has an opportunity to obtain information from various types of Internet resources, to automate the processes of searching, processing and analysis of such information by using R or Python programming languages. Fourth, professional search in Google search, social networks and so on.

As a rule, the use of all above mentioned ways of obtaining information from the Internet requires the availability of personal computers with good enough features of CPU, RAM, hard disk drives (HDDs) and so on.

Instead, the use of cloud technologies is the alternative to such personal computers because it is cheaper to maintain cloud technologies than traditional personal computers<sup>6</sup>.

Today, such services as Amazon Web Services and Digital Ocean Cloud Servers provide the ability to use virtual computers.

For example, Amazon Web Services provides the cloud infrastructures to private persons or entities through a paid subscription. There is also a free subscription available within the first 12 months.

<sup>5</sup> Shepitko V.Yu, *Informatsiini tekhnologii v kryminalistytsi ta slidchii diialnosti Pytannia borotby zi zlochynnistiu*, 2010, p. 19, pp. 194–202.

<sup>6</sup> Pavuk O, *Virtualizatsiya ekonomiki — borba za realnyie aktivyi*. Chast II. *Electronic source: <http://www.baltic-course.com/rus/opinion/?doc=38920>, accessed: 15.05.2019*; Yatsko, O.M, *Vplyv khmarnykh tekhnologii na rozvytok maloho ta serednoho biznesu v Ukrainy*. *Naukovyi visnyk Bukovynskoho derzhavnoho ofinansovo-ekonomichnoho universytetu. Ekonomichni nauky*, 2014, Vol. 26, pp. 446–456.

This technology allows to have a complete virtual cluster of computers which are always available through the Internet.

AWS virtual computers have most attributes of a real computer, including hardware devices (processor, graphics card, RAM, hard disk or SSD); operating system; the network; pre-installed applications, etc.

It should be noted that AWS provides various operating systems ranging from Windows 2016, Windows 2012 R, to Ubuntu, CentOS, Red Hat Enterprise Linux.

That is, the AWS service can replace a traditional personal computer and be used by an investigator to obtain information from the Internet during a pre-trial investigation.

Author has allocated this service based on their own work experience in law enforcement bodies and functionality which AWS provides. The competitor of AWS is Digital Ocean Cloud, but the disadvantage of this service is the limited number of operating systems that can be used by the client. However, the cost of use is lower. Of course, there are a lot of other solutions based on cloud technologies that can be used by law enforcement agencies. These include Microsoft, VMW, Rackspace, and Red Hat which has been mentioned in this article.

Typically, all of the above mentioned services enable the client to have their own computer remotely, together with the relevant software, including those programs that can retrieve information from the Internet.

It is impossible not to use Microsoft Office (Microsoft Word, Excel, Powerpoint, etc.) in the activity of law enforcement bodies. As of 2018, there are approximately 11 versions of the Microsoft Office. The latest release is the Microsoft Office 2016 package. The upcoming announcement of Microsoft Office 2019 is expected.

However, Microsoft Office 365 service is a more innovative solution in the use of such programs as Microsoft Word, Excel, etc. Office 365 is a subscription service that provides the ability to remotely edit files on One Drive online storage and the use of cloud-based tools that allow to work together on files in real time.

It should be noted that Microsoft provides 1 year free subscription to use Microsoft Office 365 package and 1 TB of One Drive storage.

## Conclusions

Law enforcement agencies are provided with a wealth of opportunities in the fight against crime because of the modern development of information technology. The main advantage of such development is the possibility for the investigator to have a lot of alternative solutions for logistics. Therefore, the use of cloud technologies during the pre-trial investigation of criminal offenses can significantly save time and resources of the investigator, as well as provide the most up-to-date opportunities for obtaining information from the Internet that may be used in criminal proceedings. The only obstacle is the complexity of understanding the specific features of working with cloud technologies. This requires the introduction of new training courses at universities which train law enforcement officers. In addition, the development of this area requires further progress of methodological recommendations and instructions on the peculiarities of using cloud technologies in the activity of law enforcement agencies.

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**Streszczenie.** Wykorzystanie technologii informatycznych stanowi integralną część działalności organów ścigania. Technologia chmury jest szeroko stosowana w życiu codziennym. Niestety, nie jest ona powszechnie stosowana podczas prowadzenia postępowań przygotowawczych w sprawach dotyczących popełnienia przestępstwa. Dlatego właśnie w artykule skoncentrowano się na możliwościach wykorzystania technologii chmury w działalności organów ścigania, a także na charakterystycznych cechach technologii. Autor przeprowadził badania na temat możliwości pozyskiwania informacji z Internetu z wykorzystaniem technologii chmury podczas postępowania przygotowawczego w sprawie dotyczącej popełnienia przestępstwa. Badaniu podlegały sposoby pozyskiwania informacji z Internetu z wykorzystaniem technologii chmury w trakcie postępowania przygotowawczego, a także środki postępowania karnego służące uzyskiwaniu takich informacji w ramach postępowania przygotowawczego. Zidentyfikowano problemy związane z wykorzystaniem technologii chmury, z którymi może się spotykać prowadzący postępowanie oraz określono pozytywne strony zastąpienia tradycyjnych komputerów personalnych usługami w chmurze. Opisano historię rozwoju i powstawania technologii chmury. Analizie poddano również modele technologii chmury oraz opisano ich znaczenie w działalności prowadzącego postępowanie. Autor przeprowadził badania dotyczące specyfiki wykorzystania komputerów wirtualnych AmazonWeb Services podczas postępowania przygotowawczego. W artykule opisano również możliwość korzystania przez prowadzących postępowanie z takiego oprogramowania jak MicrosoftOffice 365.

**Резюме.** Использование информационных технологий является неотъемлемой частью деятельности правоохранительных органов. Облачные технологии широко распространены в нашей жизни. К сожалению, следует отметить нераспространённость данной технологии в деятельности следователей во время досудебного расследования уголовных преступлений. Поэтому, автором в данной статье акцентировано внимание на возможностях использование облачных технологий в деятельности правоохранительных органов, а также на отличительных особенностях данной технологий. Кроме того, автор провел исследование в контексте возможности получения информации из сети Интернет с помощью облачных технологий во время досудебного расследования уголовных преступлений.

*Изучены способы получения информации из сети Интернет с помощью облачных технологий во время досудебного расследования, а также уголовно-процессуальные средства получения такой информации в рамках досудебного расследования. Определены проблемы использования следователем облачных технологий. Определены позитивные стороны замены традиционных персональных компьютеров на сервисы облачных технологий. Описано историю развития та становления облачных технологий. Проанализированы модели облачных технологий та ихнее значение в деятельности следователя. Автором исследованы особенности использования виртуальных компьютеров Amazon Web Services во время досудебного расследования. Описана возможность использования следователями такого программного продукта как Microsoft Office 365.*