protection. X.: HUPS. - 2012. - P. 65–68.
4. Yu.I. Skorin. Work program of the study discipline "Metrology and standardization" for students of the "Computer science" training direction of all forms of education / Yu.I. Skorin, V.V. Fedko, O. V. Shcherbakov. – Educational edition. Kharkiv: Ed. Khneu, 2012. – 48 p.
5. Virtual control and measuring devices and systems. URL : https://magnolia.lviv.ua/product/virtualni-kontrolno-vimiriuvalni-priladi-i-sistemi
6. Principles of development and use of virtual measuring tools URL : http://vtz.asv.gov.ua/article/view/174585
7. Theoretical foundations of modern Ukrainian pedagogy. URL : https://pedagogy.lnu.edu.ua/departments/pedagogika/library/vyshnevsky.pdf
8. Scientific novelty and theoretical significance of research results. URL : https://moodle.znu.edu.ua/mod/page/view.php?id=489528
9. Computer methods and means of solving engineering problems. URL : https://www.dstu.dp.ua/Portal/Data/3/21/3-21-mzs26.pdf
10. Korobko A.I. Virtual simulator of the accredited testing laboratory / A.I. Korobko, V.E. Shatikhina // Promising technologies and devices, No. 17 (December 24, 2020): pp. 72–78. URL : http://dx.doi.org/10.36910/6775-2313-5352-2020-17-11

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THE MANAGEMENT OF SCALABILITY IN CLOUD-BASED APPLICATIONS MODULE

Today's world is characterised by the rapid development of information technology, which is having a significant impact on all aspects of human activity.

The automation of business processes is particularly important, as it allows companies to improve their efficiency, optimise costs and increase the speed of response to market changes.

The use of cloud technologies is becoming an answer to the need for flexibility and scalability of IT infrastructure, allowing resources to be dynamically scaled up and down according to business needs [1].

Growing volumes of data and the need to process it require monitoring systems to be highly efficient and able to scale quickly.

However, traditional approaches often prove too inflexible or costly to deploy, prompting the search for new solutions.

In this context, cloud technologies offer the opportunity to efficiently deploy and scale monitoring and resource management systems, enabling high availability and reliability of IT services.

The need to develop systems capable of automatically adapting to changing workloads and optimising resource utilisation is being driven by increasing demands for efficiency in processing large amounts of data and the need to reduce the cost of maintaining IT infrastructure.

The relevance of the study focuses on the critical need to improve and optimise cloud resource scalability management systems.

With the rapid development of technology and the increase in data volumes, effective management of cloud infrastructure resources is becoming a critical factor in ensuring high performance and availability of online services.

Cloud technologies offer great opportunities for scalability and elasticity, but also require granular control and adaptive management to ensure an optimal performance/cost ratio [2; 3].

Today's business requirements change frequently, requiring scalability monitoring and management systems to adapt quickly and automatically to these changes.

Developing a module that can analyse current performance and resource usage and automatically adjust system scaling based on this analysis meets these requirements.

This not only ensures business continuity, but also contributes to a significant reduction in IT infrastructure maintenance costs.

Thus, the relevance of this study lies in the need to develop effective solutions for dynamically managing the scalability of cloud resources that can ensure high availability and performance of services at optimal cost.

The aim of this paper is to implement a software module for monitoring and managing the scalability of a cloud application based on the AWS (Amazon Web Services) platform and managed by Terraform [3].

The main idea is to create a system capable of automatically analysing current resource usage and adaptively adjusting service scaling based on the data obtained.

This will help to increase system efficiency, reduce overall maintenance costs and increase end-user satisfaction by maintaining optimal application performance.

The following is an abstract of the article.

The article presents an analysis of the challenges associated with monitoring and managing the scalability of a cloud application.

To this end, a module for monitoring and managing the scalability of a cloud application has been developed as part of this study.

The development process included the introduction of automatic scaling, and monitoring using Prometheus and Grafana, which allows for a high level of availability and resource efficiency.

The study comprised a series of phases, including requirements analysis, system design, development, testing, and evaluation.

Consequently, the system's performance, stability, and capacity to scale in response to fluctuating workloads were enhanced.

The module exhibits a high degree of adaptability to changes in system requirements and load, which is a crucial attribute for the dynamic development of business applications.

This solution assists in optimizing the allocation of resources and reducing infrastructure costs.

The project has been found to fully meet the set goals and objectives, as well as the requirements for effective resource management of the Amazon Web Services cloud platform using Terraform, Prometheus, and Grafana.

The practical value of the developed module is evidenced by a significant improvement in resource efficiency, service stability and cost optimisation.

The module design has been subjected to rigorous testing and has been successfully implemented in a test environment, thereby demonstrating the sustainability and efficiency of the developed solution.

The experience gained in the implementation and operation of this solution may prove useful for further expansion and optimization of cloud solutions in other projects and companies specializing in the provision of cloud solutions [2–4].

The findings of this study were validated in a test environment at an IT company with a specialization in cloud technologies.

The objective was to ascertain the functionality and efficiency of the developed module in a real-world context of cloud infrastructure operation.

The testing process entailed the configuration of the module on pre-existing cloud infrastructure systems, its integration with Prometheus and Grafana for monitoring purposes, and the execution of a series of stress tests designed to assess the module's scalability.

As a result of this testing, a number of critical points were identified that required further optimization.

The results of the study and the issues identified during the project testing have enabled the identification of several areas for further improvement and development of the system.

First and foremost, the optimization of automatic scaling algorithms represents a crucial avenue for improvement.

The development of these algorithms should be oriented towards utilizing historical monitoring data to anticipate potential shifts in system load.

Another pivotal area for enhancement is the precision of monitoring systems.

The integration of supplementary tools and the expansion of existing monitoring systems' functionality will facilitate the acquisition of more comprehensive insights into the system's condition [2; 7].

This, in turn, will facilitate the expedient identification and eradication of potential issues.

References

1. Didenko O.K. Application of the method of controlled development behaviour for automation of web application testing // O. K. Didenko, D. Y. Holubnychyi // Proceedings of the International Scientific and Practical Conference

of Young Scientists, Postgraduates and Students 'Information Technologies in the Modern World: Research of Young Scientists' 22-23 February 2024 – Kharkiv, 2024.

2. Nystopad Yurii. Development of a module for monitoring and managing the scalability of a cloud application based on AWS and Terraform // Yurii Lystopad, Yurii Skorin // Proceedings of the International Scientific and Practical Conference of Young Scientists, Postgraduate Students and Students 'Information Technologies in the Modern World: Research of Young Scientists' 22-23 February 2024 – Kharkiv, 2024.

3. Yevhen Brykman. Terraform: infrastructure at the code level, 2024. URL : https://bambooks.com.ua/ua/p1809769909-kniga-terraform-infrastruktura.html

4. Jack Dwyer. Automating Cloud Infrastructure with Terraform CI CD: A Step-by-Step Guide, 2024. URL : https://zeet.co/blog/terraform-ci-cd

5. Aalok Trivedi. Leveraging high availability by creating an AWS Auto scaling group & application load balancer, 2023. URL : https://medium.com/@aaloktrivedi/leveraging-high-availability-by-creating-an-aws-auto-scaling-group-application-load-balancer-2ea1f31a746

6. Real-time Monitoring and Analysis of Edge and Cloud Resources, 2023. URL : https://dl.acm.org/doi/10.1145/3589010.3594892

7. Scalability as a software requirement, meaning and definition. URL : https://uk.itpedia.nl/2021/07/20/schaalbaarheid-als-software-requirement-betekenis-en-definitie

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USABILITY TESTING FOR USER INTERFACES

The paper analyzes the problems of improving the quality of software, namely usability testing as one of the areas of ensuring this quality, analyzes publications that consider such methods as:

- electrooculography;
- electroretinography;
- mouse tracking;
- eye tracking

etc. and concludes that improving the quality of software directly depends on how effective the usability testing process will be [1].

An analysis of traditional tools and methods for testing software products was carried out and, as a result, mouse tracking technology and eye tracking technology were proposed as an alternative solution to the problem of improving the quality of software products.