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REQUIREMENTS FOR MODERN PROCESSORS FOR SECURE OPERATION OF INFORMATION SYSTEMS AND NETWORKS

Abstract. The article considers the main requirements for the technical support of computer architecture for the security of information systems and networks. It is proved that the problem of information protection requires the organization of a whole complex of special protection measures to prevent the loss of information contained in its transmission channels. The possibilities and consequences of abuse of information transmitted through telecommunications channels, which are developing and improving intensively, have been identified, and means of their prevention have been investigated. Thus, today there is a modern technology for protecting information transmitted via telecommunications channels, the sphere of influence of which includes not only communication channels, but also switching centers, peripheral devices, terminals, communication administrators, local computer networks, etc. It is justified that the analysis of requirements for modern technical and software components, among which the leading place should be given to the processor, is in the focus of our research. The consequences of non-compliance with the proposed requirements for the technical support of the computer architecture, which is a potential threat and a possible catalyst for the danger of information systems and networks, are investigated. The feasibility of implementing special tools, methods, and measures to prevent information loss has been established. It was determined that a thorough analysis requires studying the components of the set of recommendations for optimizing processor selection, based on the components and requirements for the security of information systems and networks, which are not sufficiently considered in the publications of domestic and foreign scientists. An analysis of processors included in the rating of the best models in recent years according to various criteria was performed, and the problem of choosing the optimal processor to meet the need for ensuring information security in the network was studied. Advice and recommendations on their selection for the security of information systems and networks are presented in numerous studies. Ways of improving the system are proposed, which are important to consider when modernizing the existing system in order to enable further updating of its components.

Keywords: computer architecture, processor, information security, information systems, networks.

Introduction

The possibility of abuse of information transmitted through telecommunications channels is developing and improving no less intensively than the means of preventing it. Therefore, the problem of information protection requires the organization of a whole complex of special protection measures to prevent the loss of information contained in its transmission channels. A comprehensive approach to information security involves the comprehensive development of all methods and means of information protection. Thus, today there is a modern technology for protecting information transmitted via telecommunications channels, which affects not only communication channels, but also switching centers, peripheral devices, terminals, communication administrators, local computer networks, etc. That is why the analysis of requirements for modern technical and software components, among which the leading place should be given to the processor, is the focus of our research. The intensive development of information transmission means and systems constantly requires ensuring information security, which consists in using special means, methods to some prevents information loss.

Analysis of recent research and publications. A thorough analysis also requires studying the components of the set of recommendations for optimizing processor selection, based on the components and requirements for the security of information systems and networks, which are not sufficiently considered in the publications of domestic and foreign scientists. Fahmi M., Muda I., Kesuma S. A. studied the requirements for digitization technologies and their applied significance [1]. Gatrifi M., Al Amayri J., Tottoli M. study the components of computer architecture [2]. Franchuk T., Stepashkina K., Tyshchenko D., Karpunin I. constantly study the issues of design and development of information systems and the requirements for their effective functioning [3]. Desyatko A., Karpunin I. analyze the requirements for digitalization processes in various fields of science and technology [4]. Belfo F., Trigo A. study information systems, traditions and directions of their further improvement and modernization, justifying those technical requirements that must be taken into account when designing them [5]. Tyshchenko D., Franchuk T., Zakharov R., Moskalenko V. consider the issues of supporting modern security needs by different means [6]. Yang J., Song X., Xiong Y., Meng Y. study the problems of software development taking into account the security of information systems and networks [7]. Sukhorebry O., Nenich D. investigate the element of using multimodal artificial intelligence in the process of information networks [8]. Analysis of processors included in the rating of the best models in recent years according to various criteria and research into the problem of choosing the optimal processor to meet the need for ensuring information security in the network, advice and recommendations for their selection for the security of information systems and networks are presented in numerous studies [9–16].

Main part

Requirements for the components and technical support of the architecture of modern technical means must be constantly analyzed, taking into account their widespread use in the field of ensuring the security of

information systems and technologies. This topic is relevant and deserves the attention of scientists for conducting scientific research, both domestic and foreign scientists who constantly monitor these issues and publish the results of their achievements in numerous open publications [9–16].

Modern computers and laptops are becoming more powerful thanks to high-quality processors. Let's consider the advantages and disadvantages of processors, wich based on the analysis. Automation of processes occurring in financial institutions is a complex problem, especially when it comes to a systemic approach, that is, the interconnection of all elements and components. Therefore, when designing automated systems, the software developer uses appropriate standards - principles, general requirements and regulations that are mandatory. The basis of information systems design standards is scientific and methodological provisions and recommendations for the design of automated control systems, which are currently enshrined in the state standard. These include the principles of consistency, development, compatibility, standardization and unification, and efficiency. Information security of information systems and networks consists of technical and psychological components. The technical part includes a Firewall - a program for controlling data transmission, which is a filter and a kind of security system. In order to be sure that the "right" people are logging in to sites under certain logins and passwords, CHAP (Challenge-Greeting Authentication Protocol) is used - an algorithm for verifying authenticity based on transmitting not the user's password, but indirect information about him. A major threat to information security on the network is posed by various USB media that are used to transfer various information within a particular organization. USB interface designed to transfer information for medium-speed and low-speed peripheral devices.

The four-conductor cable used to connect to the USB bus consists of two wires (twisted pair) designed to receive and send data, and two more wires to power the peripheral device, which eliminates the need for the peripheral device's own power supply. The maximum current that can be consumed by the USB bus power lines is limited to 500mA. For the new USB 3.0 specification, these limits are 900mA. USB Hub – allows you to connect multiple devices to one computer. Systems such as XNS (Xerox Network Services) - a protocol that allows you to use files on another computer, and NOS (Network Operating System) - an OS for sharing files, greatly protect the user from unauthorized use of information [12].

Computer network security is an important aspect for protecting confidential information, important data, and ensuring the normal operation of computer systems and networks. Depending on the specific organization or enterprise, the level of security of computer networks may vary, but it is always important to take the maximum possible measures to protect important information and ensure the stable operation of systems. The functions and tasks of information protection determine the composition and structure of protection methods and systems. This subjectivism of direct implementation can be divided into two groups: - threats, the implementation of which is carried out with the constant participation of a person (the attacker); - threats, the implementation of which is carried out by appropriate computer programs without direct human participation.

The requirements for effective security of information systems and networks now consist of updating platforms and using modern, latest processors. A computer with a fresh CPU will be more productive, there will be more opportunities for upgrading and improving the assembly. On the other hand, solutions for a platform with DDR4 memory will cost much less, and the performance of such systems is still sufficient for most current tasks. The leading place is occupied by Dimensity 9300, the main performance characteristics are: Manufacturer: MediaTek; Rating: 98 A+; AnTuTu score: 2257733; Geekbench score: 2239 / 7538; Number of cores: 8 (1+3+4); Frequency: 3250 MHz; Graphics processor: Mali-G720 MP12. When choosing models for effective work, you should focus on:

- price/performance ratio (we took into account not only the cost of the processor itself, but also the motherboard, since with equal performance, the price of some sets can differ significantly);
- a reserve for the future (a newer processor remains relevant longer, is supported by drivers, it is easier to find relevant components for it, has higher energy efficiency, and therefore, there is a chance to save a little on the power supply).

While investigating the requirements for information security of the hardware component of modern computers, let's analyze the financial characteristics of modern processors. (average price in April last year), the most important of which are presented on Fig. 1–3 [9].

Intel has improved its processors in the 14th generation, and buying them is advisable only for ardent fans of the brand, but not for those who are looking for the best models. AMD, on the contrary, is in no hurry to release the 9000-series desktop Ryzen, but is refining the old ones, which is bearing fruit. When examining the information security requirements of the hardware component of modern computers, in particular processors, their technical performance characteristics can be summarized in Fig. 4 [9].

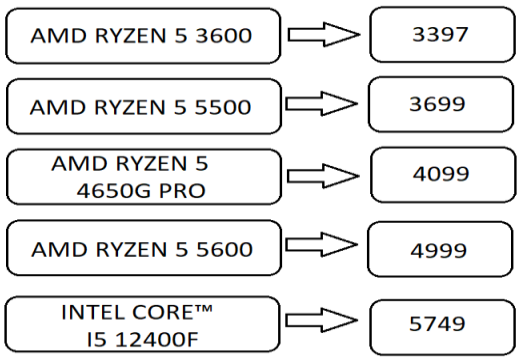

Fig. 1. Cost characteristics of modern budget processors

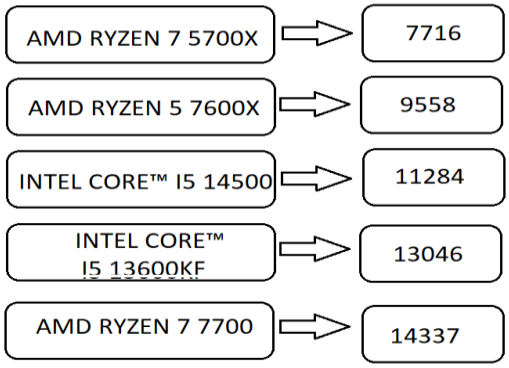

Fig. 2. Cost characteristics of mid-priced processors

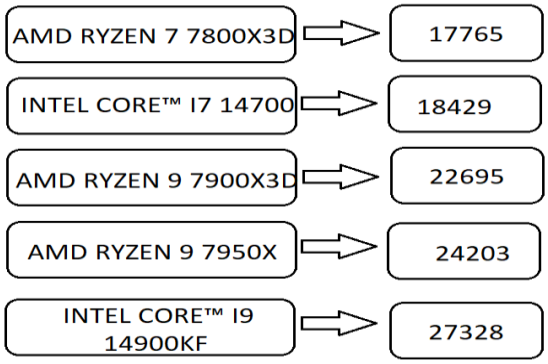

Fig. 3. Cost characteristics of high-cost processors

Processor	Single-thread	CPU Mark/ Multi-thread	Gaming Performance
Ryzen 5 3600	2569	17795	3,733
Ryzen 5 5500	2895	17985	3,687
Ryzen 5 4650G Pro	2900	17172	3,715
Ryzen 5 5600	3259	21655	4,625
Core i5 12400F	3704	25844	4,751
Ryzen 7 5700X	4015	28844	5,17
Ryzen 5 7600	4930	24630	5,85
CORE I5 14500	4870	26630	5,915
CORE I5 13600KF	5286	48630	6,79
Ryzen 7 7700	4276	36569	5,769
RYZEN 7 7800X3D	5849	51068	6,85
CORE™ I7 14700	4257	41772	5,799
RYZEN 9 7900X3D	5283	52505	6,795
RYZEN 9 7950X	5940	63609	5,947
CORE I9 14900KF	6016	59511	7,590

Fig. 4. Performance summary table

Support for the latest memory and interface standards is required, as is the widespread adoption of DDR5 and PCIe 5.0, which will provide higher bandwidth and system speed. Improvements in cooling technologies are leading to the use of innovative solutions, such as new materials and designs for cooling systems, which will help maintain stable operation even under high loads.

It is advisable to properly plan system upgrades, namely when building a new PC or upgrading an existing system, it is important to consider not only current needs, but also the possibility of future component upgrades.

This will save money in the future and ensure the system remains relevant for several years. Lead recommendations should be identified for planning system upgrades. It is necessary to choose a motherboard that supports the latest standards (DDR5, PCIe 5.0), which will allow you to easily upgrade the processor or memory in the future and take into account the possibility of gradually upgrading the system without spending too much at once. It is necessary to analyze the opinions of experts about future technological trends in order to make informed decisions about component upgrades.

The subjects of relations related to information processing in the network are: - information owners or authorized persons; - network owners or authorized persons; - information users; - Local area network users. Access to information stored, processed, and sent to the network occurs only in accordance with access delimitation rules established by the owner of the information or a person authorized by him.

Without the consent of the owner, access to information processed on the network occurs only in cases provided for by applicable law.

Information protection on the network is ensured by:

– compliance by legal entities with standards, requirements and principles of an organizational and technical nature regarding the protection of information being processed;

– use of computer equipment, software, communication and generally automated systems, information protection tools that meet the established requirements for information security (have the appropriate certificate);

– verification of compliance of computer equipment, software, communication devices and automated systems with a total of established information protection requirements (certification of computer devices, communication devices and automated systems);

– information protection control.

Conclusions

There is no need to justify the importance of ensuring effective data protection through modern information security services, as well as improving all means of compliance with legal norms in this area. That is why the need to study the key components of network protection and individual technical issues related to information security is within the scope of our study, which is not exhaustive.

Further in-depth research will help to realize how important it is to take a comprehensive approach to security, combining technical solutions with other technical components of its regulation and provision in a world of rapid innovation.

Each of these services is designed to combat a certain type of attack, which should not be confused with the real security mechanisms implemented in them. Knowledge of basic security requirements allows you to actively use them to resist attacks, which is mediated by additional technical requirements for the composition of the technical park and its components.

REFERENCES

1. Fahmi M., Muda I., Kesuma S. A. Digitization Technologies and Contributions to Companies towards Accounting and Auditing Practices. *International Journal of Social Service and Research*, 2023. Vol. 3, no. 3. URL: https://doi.org/10.46799/ijssr.v3i3.298
2. Al Ghatrifi M. O. M., Al Amairi J. S. S., Thottoli M. M. Surfing the technology wave. *Computers and Education: Artificial Intelligence*. 2023. no. 4. URL: https://doi.org/10.1016/j.caeai.2023
3. Tyshchenko D., Franchuk T., Stepashkina K., Karpunin, I. Проектування та розробка системи корпоративного електронного документообігу. *Європейський науковий журнал Економічних та Фінансових інновацій*. 2024. № 1(13). С. 200-207.
4. Franchuk T., Tyshchenko D., Desiatko A., Karpunin I. Features of accounting digitalization processes. *Galician economic journal*, 2025, vol. 95, no 1, pp. 61-66.
5. Belfo F., Trigo A. Accounting Information Systems: Traditions and Future Directions. *Accounting Information Systems – Traditionand Future Directions.* 2013. С. 536–546.
6. Tyshchenko D., Franchuk T., Zakharov R., Moskalenko V. Підтримка динамічних потреб безпеки засобами VPN *Системи управління, навігації та зв'язку.* Полтава: ПНТУ, 2024. Т. 3 (77). 149-152.
7. Yang J., Song X., Xiong Y., Meng Y. An Open Source Software Defect Detection Technique Based on Homology Detection and Pre-identification Vulnerabilitys, *International Conference on Innovative Mobile and Internet Services in* Ubiquitous *Computing*. 2018. URL: https://link.springer.com/chapter/10.1007/978-3-319-93554-6_94
8. Капітон А., Сухоребрий О., Ненич Д. Використання мультимодального штучного інтелекту в економіці, освіті, науці та транспорті. *Інформаційні технології та цифрова економіка*. Київ, 2024. 83-85.
9. TOP 15 processors – Ranking of the best models of 2024. URL: https://brain.com.ua/ukr/brain_guide/TOP-15-procesoriv--Reyting-naykraschih-modeley-2024-roku/?srsltid=AfmBOoqtP_wuuuSw23tX1wzcX-E96A78z78k6iBvEii8KWGqd2dc1R-W
10. Top 10 popular processors URL: https://mezha.media/articles/top-10-populiarnykh-protsesoriv/
11. How to choose the optimal processor for your computer - tips and recommendations URL: https://mediacom.com.ua/yak-vibrati-optimalnij-protsesor-dlya-vashogo-kompyutera-poradi-ta-rekomendatsii
12. How to choose a processor for your PC in 2025 URL: https://superkomp.com.ua/yak-vibrati-procesor
13. Security of information systems and networks URL: https://klaster.ua/ua/stati-i-obzory/informacionnaja-bezopasnost-seti/?srsltid=AfmBOor7KleY9vHOMg669VfiGgfDekagkJeAwODzZPwO3O_7jh8og_EN

14. Computer network security URL: https://a-si.com.ua/kompleksni-systemy-bezpeky/bezpeky-kompyuternyh-merezh/
15. What is cybersecurity? URL https://nordvpn.com/uk/cybersecurity/what-is-cybersecurity/
16. Information security services URL https://hackyourmom.com/pryvatnist/merezheva-bezpeka-poslugy-informaczijnoyi-bezpeky-ta-pravovi-aspekty-zahystu-merezhi/

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Вимоги до сучасних процесорів задля безпеки функціонування інформаційних систем та мереж

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Анотація. У статті розглянуто основні вимоги до технічного забезпечення архітектури комп'ютера задля безпеки інформаційних систем та мереж. Доведено, що проблема захисту інформації потребує організації цілого комплексу спеціальних заходів захисту з метою попередження втрати інформації, яка міститься в каналах її передачі. Визначені можливості та наслідки зловживань інформацією, яка передається каналами телекомунікацій, які розвиваються та вдосконалюються інтенсивно, та досліджено засоби їх попередження. Таким чином, нині існує сучасна технологія захисту інформації, яка передається каналами телекомунікацій і в сферу впливу якої потрапляють не тільки канали зв'язку, але й центри комутації, периферійні пристрої, термінали, адміністратори зв'язку, локальні комп'ютерні мережі тощо. Обгрунтовано, що аналіз вимог до сучасних технічних та програмних складових, серед яких провідне місце слід віддати процесору, перебуває в центрі уваги нашого дослідження. Досліджено наслідки недотримання запропонованих вимог до технічного забезпечення архітектури комп'ютера, що є потенційною загрозою та можливим каталізатором небезпеки інформаційних систем та мереж. Визначено, що провідне місце у комплексному підході до інформаційної безпеки, що передбачає комплексний розвиток усіх методів та засобів захисту інформації займає саме технічне забезпечення, а саме компоненти архітектури комп'ютера. Встановлено доцільність впровадження спеціальних засобів, методів та заходів, щоб запобігти втраті інформації. Визначено, що ґрунтовного аналізу вимагає вивчення компонентів сукупності рекомендацій щодо оптимізації вибору процесору, що ґрунтується на складових та вимогах щодо безпеки інформаційних систем та мереж, які недостатньо розглянуто в публікаціях вітчизняних та закордонних вчених. Виконано аналіз процесорів, що входять за різними критеріями до рейтингу найкращих моделей в останні роки та дослідження проблеми вибору оптимального процесору для задоволення потреби забезпечення безпеки інформації в мережі, поради та рекомендації при їх виборі для безпеки інформаційних систем та мереж представлений в численних дослідженнях Запропоновано шляхи вдосконалення системи, які при модернізації існуючої системи важливо враховувати з метою можливості подальшого оновлення її компонентів.

Ключові слова: архітектура комп'ютерів, процесор, інформаційна безпека, інформаційні системи, мережі.