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# **PROSPECTIVE DIRECTIONS OF MODERN SCIENCE AND EDUCATION IN THE WORLD**

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PUBLIC ADMINISTRATION		
74.	Ніколаєнко В.В. ВИДИ ТА КЛАСИФІКАЦІЯ ДЕРЖАВНИХ ПРОГРАМ: ПІДХОДИ ТА КРИТЕРІЇ	340
SOCIOLOGY		
75.	Pimenow S. INFORMATION AND ENTROPY REDUCTION: A PERSPECTIVE THROUGH THE EVOLUTION OF HUMAN SOCIETIES	342
TECHNICAL SCIENCES		
76.	Andrushchak I., Kraglik O., Gordiychuk Y. TECHNICAL FEATURES OF CHOOSING HOSTING FOR AN INFORMATION SITE	349
77.	Andrushchak I., Berezyuk P., Staschuk V. STEP-BY-STEP ASPECTS OF USING CMS SYSTEMS FOR SOLVING TECHNICAL PROBLEMS	354
78.	Bazylkhanova E., Azhgereyeva Z., Seidgaliyev R. FEATURES OF THE TECHNOLOGY OF FERMENTED MILK PRODUCTS USING PROBIOTIC STARTER CULTURES	359
79.	Ivakhnenko O., Khudiakov R., Vernydub M., Dernovyi O., Skrypka R. OVERVIEW OF TECHNICAL SOLUTIONS FOR THE MODERNIZATION OF 3D PRINTERS IN LABORATORY CONDITIONS	362
80.	Karakonstantyn D., Tvoroshenko I. ABOUT THE ISSUE OF OPTIMIZATION THE PERFORMANCE OF THE SERVER PART OF THE INFORMATION SYSTEM	364
81.	Kul'ment'ev A. ARTIFICIAL INTELLIGENCE IN OPTIMIZATION OF NUCLEAR REACTOR PLANT DESIGN AND OPERATION	367
82.	Mykhailenko D., Haltseva I., Malakhov S. SPECIFICS OF AI IMPLEMENTATION IN MODERN HONEYPOTS	368

## **ABOUT THE ISSUE OF OPTIMIZATION THE PERFORMANCE OF THE SERVER PART OF THE INFORMATION SYSTEM**

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The research is devoted to the analysis of modern methods of optimizing the performance of the server part of information systems, which help to increase the speed of query processing [1-6] and the efficiency of resource use [7-10]. The advantages and disadvantages of such approaches as data caching, asymmetric multithreading, and database query optimization are analyzed. It is established that these methods allow flexible adaptation of the server part to the specific requirements and complexities of the project, ensuring increased performance and efficiency of the system [11-14].

Advantages of caching:

- Reduced server load: caching reduces the number of requests to the main data, which reduces the load on the processor and database;
- Reduced response time: since cached data is available faster, the system can respond to requests more quickly;
- Improved scalability: systems that use caching can handle increased traffic more efficiently.

Cache management is important for optimizing the performance of the server side of the system, and the right strategy improves system efficiency:

- Cached data lifetime: defines the period during which data is stored in the cache;
- Caching priorities: some data can have a higher caching priority, which allows it to remain in the cache longer than other data;
- Cache replacement strategies: when the cache is full, you need to decide which data should be deleted to make room for new ones.

Disadvantages of caching:

- Data volatility: cached data can become outdated if the main data source is updated;
- Excessive memory usage: caching requires allocation of memory on a server or other resource;
- Management complexity: cache management requires careful customization of the data storage and replacement strategy;
- Possible conflicts with data: conflicts may arise with frequent cache updates or increased system load.

There are different approaches to asymmetric multithreading; each with its own advantages and disadvantages, and the choice depends on the system requirements:

- A strategy with separate management channels: some flows are allocated to manage resources and coordinate the work of other flows;

- Computing threads with uneven load: in this strategy, different threads receive different amounts of tasks depending on their performance or specialization;

Despite its significant advantages, asymmetric multithreading also has its challenges and limitations that should be taken into account when implementing it:

- Implementation complexity: managing threads and resources in asymmetric multithreading is more complicated than in symmetric multithreading;

- The possibility of bottlenecks: occurs when the flows responsible for coordination become limited in the system;

- Load balancing: the main challenge of asymmetric multithreading is to properly distribute the load between threads.

Optimization of database queries:

- The role of indexes – indexes speed up access to data, but their improper use can negatively affect performance;

- Aggregation functions – improper use of aggregation functions can reduce the speed of query execution;

- JOIN operations can cause delays, especially when joining large tables;

- Caching query results – caching allows you to store the results of complex queries, which reduces the load on the database;

- Performance analysis tools – help identify problematic requests by showing a plan for their execution;

- Minimize data volume – reduce the amount of transmitted data, select only the necessary columns;

- Continuous monitoring and optimization – query optimization requires regular performance monitoring.

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