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ПРОГРАМА

III ВСЕУКРАЇНСЬКОЇ
НАУКОВО – ТЕХНІЧНОЇ КОНФЕРЕНЦІЇ
МОЛОДИХ ВЧЕНИХ, АСПІРАНТІВ
ТА СТУДЕНТІВ

«КОМП'ЮТЕРНІ ІГРИ І МУЛЬТИМЕДІА ЯК ІННОВАЦІЙНИЙ ПІДХІД ДО КОМУНІКАЦІЇ - 2023»

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ПРЕЗИДІЯ ТА ОРГКОМІТЕТ КОНФЕРЕНЦІЇ

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Комп'ютерні ігри та мультимедіа як інноваційний підхід до комунікації - 2023 / Матеріали III Всеукраїнської науково-технічної конференції молодих вчених, аспірантів і студентів, Одеса, 28-29 жовтня 2023 р. - Одеса, Видавництво ОНТУ, 2023 р. – 270 с.

Збірник включає матеріали доповідей учасників конференції, які об'єднані за тематичними напрямками конференції.

Збірник буде корисним як для фахівців і працівників фірм, зайнятих в області розробки та просування комп'ютерних ігор, так і для викладачів, магістрів і студентів вищих навчальних закладів, які навчаються за напрямами і спеціальностями програмного забезпечення, комп'ютерних наук, комп'ютерної інженерії, прикладної математики та обробки інформації, буде корисним професіоналам у сферах гейміфікації, кіберспорту, стрімінгу, віртуальної реальності, доповненої реальності, штучного інтелекту, машинного навчання, геймдізайну, саунддізайну.

Результати досліджень у збірнику представляють собою своєрідний зріз сучасного стану справ в перерахованих галузях знань, який може допомогти як фахівцям, так і студентам університетів скласти загальну картину розвитку комп'ютерних ігор ы мультимедіа та пов'язаних з ними питань.

Наукові праці згруповані за напрямками роботи конференції та наведені в алфавітному порядку прізвищ авторів.

Матеріали (тези доповідей) друкуються в авторській редакції. Відповідальність за якість та зміст публікацій несе автор.

Матеріали подано українською та англійською мовами.

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PROBLEMS OF EVALUATING AND ELIMINATING PERFORMANCE BOTTLENECKS IN COMPUTER GAMES

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The work deals with the problems of assessing and eliminating performance bottlenecks in computer games. The relevance of the factors that affect the software part of performance bottlenecks is shown. The primary attention is paid to the problems of identifying potential software performance bottlenecks in computer games. The problem of a chain reaction of a distributed performance bottleneck to a software performance bottleneck is described.

Introduction.

In the ever-evolving landscape of technology and entertainment, computer games stand out as one of the most resource-intensive forms of software. These digital experiences have captivated audiences worldwide with immersive graphics, intricate gameplay mechanics, and dynamic storytelling. However, this level of complexity comes at a cost, often pushing computer hardware to its limits. As a result, the evaluation of computer game performance has become a crucial undertaking, essential for both developers and players.

Computer games' dynamic and interactive nature places unique demands on hardware components like CPUs, GPUs, RAM, and storage. Unlike many other software applications, games require real-time rendering, physics simulations, artificial intelligence calculations, and intricate audio processing. As technology advances, the gap between the capabilities of hardware and the ambitions of game developers continues to widen, making performance optimization an ongoing challenge.

Relevance.

Determining performance in computer games shares similarities with assessing other types of software. Still, it also presents unique challenges due to games' real-time interactivity and resource-intensive nature. Let's look at the relevance of the factors that affect the software side of performance bottlenecks.

Performance Analysis and Profiling. Like any software, performance analysis and profiling are crucial for understanding how a game utilizes hardware resources. These techniques help identify bottlenecks, resource usage patterns, and areas for optimization. Given that games are highly dynamic and resource-demanding, these techniques help ensure smooth gameplay experiences.

Criteria for Performance Bottlenecks. Defining clear criteria for identifying performance bottlenecks is essential. The complexity of games involving various subsystems (graphics, physics, AI, networking, etc.) makes it challenging to determine what aspects contribute most to performance issues. Developing standardized criteria can assist in targeting optimizations effectively.

Distributed Technologies. The adoption of distributed technologies in game development has become increasingly common. Such trends include multiplayer games, cloud-based streaming, and server-client architectures. Studying distributed performance bottlenecks is crucial to ensure seamless gameplay experiences in these scenarios.

An object of study such as Services. Services, which can encompass server components, networking protocols, and other backend elements, are a suitable object of study for both distributed and software performance bottlenecks. By analyzing the interactions and resource usage within these services, developers can optimize their performance, leading to smoother gameplay and enhanced user satisfaction.

Web Service Applications. Web service applications have gained prominence in implementing not only games but various types of applications. Their ubiquity makes them a relevant focus for performance studies. The complexities introduced by network communication, server-client interactions, and scalability make studying their performance crucial for delivering quality user experiences.

Thus, studying performance in computer games is vital due to their resource-intensive nature and the challenges posed by real-time interactivity. Addressing software and distributed performance bottlenecks is essential to ensure smooth gameplay experiences. By focusing on services and web service applications, developers can tackle these challenges effectively, leading to optimized games that cater to the expectations of modern players and the evolving landscape of technology.

The main part.

In the pursuit of delivering seamless and enjoyable gaming experiences, developers engage in meticulous performance research. This research involves dissecting the game's components, from graphics and physics to networking and audio, to identify potential bottlenecks and areas for improvement. By utilizing profiling tools, benchmarks, and performance monitoring software, developers can pinpoint resource-intensive sections of their games and make informed decisions about optimization strategies.

Understanding the performance requirements of different hardware configurations is also paramount. Developers must consider a wide range of user setups, from high-end gaming rigs to more modest systems, ensuring the game performs well across the spectrum. This necessitates testing and optimization for various hardware combinations, considering factors like CPU clock speeds, GPU capabilities, and available memory.

The assessment and management of performance bottlenecks in computer games are intricate tasks that involve both software-specific aspects and the increasingly prevalent distributed technologies. While criteria and methodologies for handling distributed performance bottlenecks have progressed significantly, questions and uncertainties remain surrounding the evolution of software performance bottlenecks. As the interplay between distributed and software bottlenecks becomes more apparent, the need for comprehensive research and analysis in this domain becomes paramount. In doing so, the evolution of Software Performance Bottlenecks is as follows.

The study of software performance bottlenecks has evolved with advancements in hardware, software architectures, and the complexity of game development. In the early days of gaming, performance limitations were often tied to raw processing power, memory constraints, and code optimization. As hardware capabilities expanded, newer challenges emerged, such as managing graphical fidelity, handling sophisticated physics simulations, and ensuring seamless transitions between gameplay scenarios.

Modern games, especially those with high-quality graphics and intricate mechanics, present a multitude of potential performance bottlenecks. These may include.

Graphics Rendering. The complexity of modern graphics engines can strain GPU resources. Achieving a balance between visual fidelity and frame rate is crucial, as dropped frames or stuttering can disrupt player immersion.

Physics and AI. Advanced physics simulations and AI routines can heavily tax CPU resources. Ensuring these calculations are optimized and distributed efficiently across processor cores is essential.

Memory Management. Effective memory management becomes critical with the increasing complexity of game worlds and assets. Poor memory usage can lead to frequent loading times and decreased overall performance.

I/O Operations. Fetching data from storage devices, whether for loading new areas or assets, can introduce latency and disrupt gameplay flow.

Network Synchronization. In multiplayer or online games, network latency and synchronization can lead to lag and connectivity issues, affecting the overall gameplay experience.

The problem of a chain reaction of a distributed performance bottleneck on a software performance bottleneck.

One notable challenge arises from the intricate interplay between distributed and software performance bottlenecks. As games increasingly adopt distributed technologies to accommodate multiplayer, cloud-based streaming, or seamless scenes, the potential bottlenecks are no longer isolated between themselves. Instead, they form a chain of dependencies, where a bottleneck in one area can trigger a cascade of issues affecting other components.

For instance, a slow response from a network service due to distributed bottlenecks can lead to software bottlenecks as the game waits for data, causing visible stuttering or delays. Conversely, a software bottleneck, such as inefficient rendering, can exacerbate distributed issues by overloading network connections with excessive data requests.

Therefore, there is a need for a comprehensive study, which is as follows.

Given the complex interactions between distributed and software performance bottlenecks, there is a clear need for comprehensive research and analysis. This entails the following.

Integrated Approach. Researchers and developers must adopt an integrated approach considering distributed and software bottlenecks. Solving one type of bottleneck without addressing its impact on the other can result in suboptimal solutions.

Realistic Testing Environments. Creating testing environments that accurately simulate real-world scenarios, including various hardware configurations and network conditions, is crucial for identifying potential bottlenecks and their interactions.

Advanced Profiling Techniques. Profiling tools and performance monitoring software should be refined to provide insights into the combined effects of distributed and software bottlenecks.

Continuous Adaptation. As technology evolves, so do the challenges posed by performance bottlenecks. Research in this field should be ongoing, adapting to new hardware architectures, networking technologies, and gaming paradigms.

In conclusion, studying performance bottlenecks becomes complex as computer games become more intricate and reliant on distributed technologies. The dynamic interplay between distributed and software bottlenecks necessitates a holistic approach to research and optimization. By studying both types of bottlenecks in tandem, developers can create games that offer seamless, immersive experiences, even in the face of increasing technical demands and expectations from players.

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RESEARCH ON THE ESTIMATION OF PROCESS MODELING EFFORT AND COST

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Abstract. *In this study, the relevant problem of the design and development of the software solution for estimation of business process modeling effort and cost has been solved. The creation of a software solution for estimating business process modeling effort and cost is a significant accomplishment since it enhances efficiency, accuracy, and resource optimization. The object of this study is the process of estimation of business process modeling effort and cost. The Subject of the study is the software solution for estimation of business process modeling effort and cost. The study aims to improve the process of estimation of business process modeling effort and cost.*

Problem statement. Estimating the effort and cost of business process modeling is critical for organizations seeking to increase operational efficiency, manage resources efficiently, and drive

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