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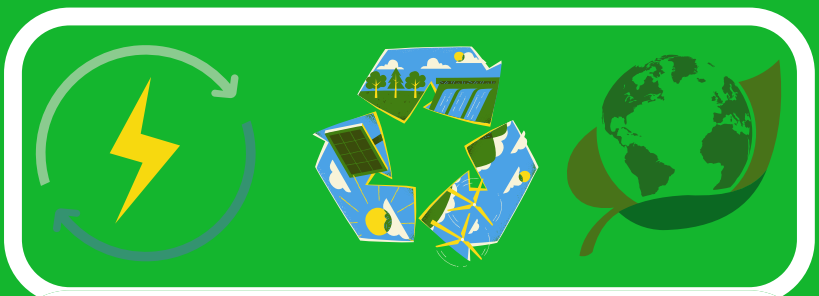

Sustainability Advanced

Which factor has the greatest impact on reducing software energy consumption?

A. Selecting an energy-efficient programming language

B. Optimizing algorithms to minimize computational complexity

C. Reducing unnecessary resource consumption through code simplification

What is the primary objective of green software design?

A. Lowering development costs through efficient resource management

B. Reducing environmental impact throughout the software lifecycle

C. Maximizing performance without prioritizing energy efficiency

How does cloud computing contribute to sustainable software engineering?

A reduce energy consumption by consolidating workloads onto fewer physical servers

B Using automation to turn off unused servers in data centers

C Replacing all physical data centers with virtualized environments

What does a software system’s carbon footprint primarily measure?

A. The total energy consumption of the software during execution

B. The greenhouse gas emissions associated with the software’s entire lifecycle

C. The efficiency of the code in utilizing computing resources

Which development practice has the most direct impact on software sustainability?

A. Running software on the most powerful hardware available

B. Using shorter variable names to reduce file size

C. Writing energy-efficient code that minimizes CPU and memory usage

What role does caching play in sustainable software?

A. Reducing redundant computations to lower energy consumption

B. Increasing server uptime to maximize resource utilization

C. Reducing energy consumption by minimizing communication overhead

Which of the following coding practices most effectively balances security and software sustainability?

A. Implementing a layered defence approach with redundant security checks to reduce vulnerabilities

B. Using adaptive encryption algorithms that adjust based on user behaviour

C. Designing algorithms with built-in security that minimize energy consumption

How does data storage management impact software sustainability?

A. Storing all data indefinitely ensures long-term accessibility

B. Using high-speed SSDs minimizes software energy consumption

C. By reducing unnecessary data storageand access

Why is edge computing relevant to sustainable software engineering?

A. It reduces dependence on cloud-based infrastructure

B. It reduces power consumption by reducing latency across networks

C. It minimizes data transfer energy by processing locally

How do energy-aware scheduling algorithms improve sustainability?

A. They increase hardware utilization by running tasks simultaneously

B. They allocate resources based on energy consumption to reduce waste

C. They optimize task execution to reduce peak power consumption

What is a key driver of high software-related carbon emissions?

A. The scale and efficiency of data processing and transfer mechanisms

B. The choice of programming languages and their runtime efficiency

C. The deployment architecture, particularly the use of local versus cloud infrastructure

Why is sustainability an important factor for software developers when making design choices?

A. It reduces long-term operational costs and energy consumption

B. It ensures compliance with environmental regulations

C. It guarantees the fastest execution speed possible

Why is adaptive scaling important for sustainable cloud applications?

A. It dynamically adjusts resource allocation to minimize energy consumption and waste

B. It ensures constant uptime by keeping all virtual machines running at full capacity

C. It maximizes server load at all times to increase efficiency

What is a drawback of frequent software updates in sustainability?

A. Increased energy consumption due to frequent downloads and installations

B. Decreased application performance due to complex optimizations

C. Increased carbon footprint from the infrastructure needed to support frequent updates

How does software bloat negatively affect energy efficiency?

A. It increases the amount of code that needs to be processed, leading to higher power consumption

B. It optimizes hardware usage by reducing the need for additional features

C. It improves energy efficiency by including more modular components

How does sustainable software engineering improve mobile application performance?

A. By reducing background tasks that drain battery life

B. By increasing network data usage for faster updates

C. By prioritizing high-priority tasks without considering resource usage

How does lazy loading enhance software sustainability?

A. By minimizing unnecessary resource loading, reducing energy consumption

B. By loading all resources at once, reducing future loading times

C. By prioritizing data transfer speed over energy efficiency

Why should developers minimize logging in high-performance applications?

A. It lowers disk writes and CPU usage, saving energy

B. It reduces the carbon footprint by lowering network traffic

C. It prevents excessive code complexity

What is the relation between energy consumption and cybersecurity

A More secure encryption techniques use more energy

B There is no relation between encryption algorithm and energy consumption

C More secure encryption techniques are more energy efficient

How does choosing the right data structure impact sustainability?

A. More complex structures always reduce energy consumption

B. Efficient structures reduce memory usage and processing time

C. Using dynamic structures minimizes processing power

Why does reducing software latency contribute to sustainability?

A. It improves user experience without reducing energy consumption

B. It decreases energy usage by reducing the time resources are active

C. It improves overall performance, which directly decreases emissions

What is a key energy-saving strategy in frontend development?

A. Using high-resolution assets to improve UX

B. Minimizing animations and background processes

C. Increasing DOM size for better interactivity

How does sustainable software engineering impact server cooling needs?

A. It has no direct effect on cooling requirements

B. More efficient software reduces heat generation, lowering cooling energy use

C. Faster processors always require less cooling power

Why is it important for developers to use energy-efficient algorithms in sustainable software development?

A They reduce the need for frequent software updates

B They minimize resource usage, decreasing energy consumption and environmental impact

C They increase system complexity for better performance

How does reducing API calls contribute to software sustainability?

A. It improves database indexing but increases memory load

B. It reduces network traffic and server processing demand

C. It increases CPU load but reduces server load

Why is asynchronous processing considered an energy-efficient strategy?

A. It minimizes unnecessary power consumption by avoiding idle CPU time

B. It optimizes resource usage, reduces power spikes, and ensures more efficient task execution

C. It increases CPU utilization, resulting in higher power consumption for better performance

What is a drawback of frequent data synchronization in terms of sustainability?

A. It improves system resilience but not efficiency

B. It increases network and CPU energy consumption, leading to higher environmental impact

C. It always optimizes data storage needs

Why is reducing dependency on external libraries beneficial for sustainability?

A. It decreases code maintainability

B. It reduces memory footprint and execution overhead

C. It ensures compatibility with older systems

What is the impact of using monolithic architectures on sustainability?

A. It improves scalability and reduces energy consumption

B. It can lead to inefficiency due to less modular resource usage

C. It ensures all components are optimized for energy use

How do serverless architectures improve sustainability?

A. They increase the need for permanent hardware infrastructure

B. They guarantee minimal energy usage for every operation

C. They only consume resources when in use, reducing idle time

Why should software developers aim for lower system requirements?

A. It helps to minimize energy consumption and reduce environmental impact

B. It ensures a faster user experience, regardless of energy use

C. It reduces hardware resource demand, saving energy

How does reducing the frequency of data backups support sustainability?

A. It increases storage space for essential data

B. It minimizes security risks from outdated backups

C. It reduces energy usage from repeated write operations

Why is using event-driven architecture beneficial for energy efficiency?

A. It reduces energy usage by continuously polling for events

B. It guarantees energy-efficient processing regardless of task complexity

C. It allows energy-efficient operation by triggering processes only when necessary

How does efficient software testing contribute to sustainability?

A. More tests lead to faster product delivery without energy impact

B. Frequent testing increases energy demand due to high computational overhead

C. Efficient testing minimizes resource consumption and reduces energy waste

Why is optimizing database indexing important for sustainable software?

A. It eliminates the need for database backups

B. It guarantees better scalability and resource utilization at all times

C. It reduces energy consumption by speeding up query processing

How do efficient garbage collection algorithms help in reducing energy consumption?

A. They reduce memory waste and energy consumption

B. They improve system security by eliminating unused objects

C. They always guarantee faster program execution

What impact does modular software architecture have on sustainability?

A. It allows for efficient updates, minimizing energy consumption

B. It increases the need for multiple servers to run the software

C. It reduces software complexity but doesn't impact energy use

How does minimizing the size of software artifacts benefit sustainability?

A. Smaller artifacts reduce storage and network transfer energy

B. It ensures software runs faster but increases energy use

C. It has no impact on resource consumption

How does reducing system over-provisioning affect software sustainability?

A. It minimizes energy use by matching resource demand to supply

B. It ensures that all resources are utilized maximally

C. It can slow down system performance

How does optimizing the use of background processes contribute to sustainability?

A. It ensures that processes run as quickly as possible

B. It reduces energy use by limiting non-essential background tasks

C. It increases overall system reliability but at a higher cost

Why is using efficient data formats important for sustainable software?

A. It guarantees faster data processing but uses more memory

B. It reduces the size of data, lowering storage and transmission energy

C. It improves security but has no impact on resource consumption

How does software localization (e.g., language support) impact sustainability?

A. It increases memory usage and computational load

B. It allows software to serve users in diverse regions efficiently

C. It reduces energy consumption by localizing processes

What is the downside of relying on synchronous operations?

A. It lowers power consumption due to blocking and waiting times

B. It increases power consumption due to blocking and waiting times

C. It leads to slower performance but with lower energy use

Why is reducing software complexity important for long-term sustainability?

A. It reduces power consumption by making processes more efficient

B. It improves maintainability but has little effect on energy use

C. It guarantees faster execution but increases energy consumption

How do software efficiency tools (profilers, optimizers) contribute to sustainability?

A. They increase energy usage by adding complexity to the software

B. They always guarantee improved software performance but with no energy savings

C. They help identify and fix inefficient code, reducing energy consumption

How does reducing database query complexity impact sustainability?

A. It increases the need for manual indexing

B. It eliminates the need for database maintenance

C. It minimizes processing time and energy usage during queries

Why is it important to assess the environmental impact of third-party libraries?

A. It guarantees faster application performance regardless of energy use

B. It increases security vulnerabilities but has no impact on sustainability

C. It ensures that external dependencies don’t introduce unnecessary energy waste

How does load balancing improve the energy efficiency of distributed systems?

A. It ensures that resources are used optimally, reducing idle energy consumption

B. It guarantees lower server maintenance costs

C. It increases the need for hardware upgrades

Why is minimizing software's dependency on user input beneficial for sustainability?

A. It reduces energy consumption by limiting waiting and processing time

B. It increases system interactivity but reduces energy efficiency

C. It eliminates user-driven interactions and simplifies application logic

How does implementing energy-efficient coding practices support sustainability?

A. It reduces resource consumption, leading to lower energy demand

B. It decreases software complexity but increases power usage

C. It guarantees faster execution without considering energy impact