PLTW Computer Science Essentials (CSE) Practice Test (Sample)

Study Guide

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Questions

1. **What does data abstraction primarily focus on in computer science?**
   - **A. Hiding implementation details**
   - **B. Maximizing computational speed**
   - **C. Expanding overall system capacity**
   - **D. Increasing hardware performance**

2. **Which type of variable is stored data that can only be used within a small scope of a project?**
   - **A. Global Variable**
   - **B. Local Variable**
   - **C. Static Variable**
   - **D. Instance Variable**

3. **Which of the following is a common use of the Terminal in programming?**
   - **A. Creating graphics**
   - **B. Executing commands**
   - **C. Writing documentation**
   - **D. Designing user interfaces**

4. **What term describes the sections of a program where a particular variable can be accessed and modified?**
   - **A. Scope**
   - **B. Syntax**
   - **C. Framework**
   - **D. Protocol**

5. **What is the action of directing a program to execute or reference a specific procedure called?**
   - **A. Procedure call**
   - **B. Function declaration**
   - **C. Method invocation**
   - **D. Subroutine execution**

6. What is short-circuit evaluation in logical operations?

- **A. A method that always evaluates all operands**
- **B. A process that only evaluates the true conditions**
- **C. A technique that stops evaluation as soon as the result is determined**
- **D. An algorithm used for sorting**

7. Which term refers to the practice of using a network of remote servers for data management?

- **A. Local Server**
- **B. Data Warehouse**
- **C. Cloud**
- **D. Virtual Machine**

8. What term describes information or signals produced by a computer system?

- **A. Input**
- **B. Output**
- **C. Process**
- **D. Data**

9. What aspect of programming does event-driven programming specifically enhance?

- **A. User efficiency in interacting with systems**
- **B. Data processing capabilities**
- **C. Code readability**
- **D. Storage management**

10. What format typically includes user-centered features in addition to technical requirements for app development?

- **A. Backlog**
- **B. Wireframe**
- **C. Agile Manifesto**
- **D. Mind Map**

Answers

1. A
2. B
3. B
4. A
5. A
6. C
7. C
8. B
9. A
10. A

Explanations

1. What does data abstraction primarily focus on in computer science?

A. Hiding implementation details

B. Maximizing computational speed

C. Expanding overall system capacity

D. Increasing hardware performance

Data abstraction primarily focuses on hiding implementation details, which means emphasizing the essential properties and features of the data while concealing the complexities of how those features are implemented. This approach allows programmers to work with data at a higher level without needing to understand the intricate inner workings of the system or the specific algorithms used. The purpose of data abstraction is to simplify interactions with complex systems, making it easier to manage, utilize, and manipulate data. By isolating the core functionality from the underlying code, developers can create more modular, maintainable, and reusable code. This is particularly beneficial in software design, where different layers of a system can interact without being tightly coupled to one another. In contrast, the other options pertain to different aspects of computer science and system design, such as optimizing speed, expanding capacity, or enhancing hardware performance, which are important but not the primary focus of data abstraction.

2. Which type of variable is stored data that can only be used within a small scope of a project?

A. Global Variable

B. Local Variable

C. Static Variable

D. Instance Variable

A local variable is designed to store data that is only accessible within a specific scope, typically within the function or block of code where it is created. This means that once the execution of that function or block is complete, the local variable ceases to exist, and its data cannot be accessed elsewhere in the project. Local variables help to manage memory efficiently and avoid conflicts with variable names in other parts of the code, promoting better organization and encapsulation within programming. In contrast, global variables are accessible from any part of the program, static variables retain their value between function calls but are still limited in scope, and instance variables belong to a specific instance of a class, making them available within the context of an object but potentially throughout the lifetime of that object. These differences highlight the unique function of a local variable in managing scope and data accessibility.

3. Which of the following is a common use of the Terminal in programming?

A. Creating graphics

B. Executing commands

C. Writing documentation

D. Designing user interfaces

The use of the Terminal in programming primarily revolves around executing commands. The Terminal, which is also known as a command-line interface (CLI), allows users to directly interact with the computer's operating system by typing commands. This is essential for performing a variety of tasks such as running scripts, managing files, and installing or updating software packages. Executing commands in the Terminal can often be faster and more efficient than using graphical user interfaces (GUIs), particularly for developers who are comfortable with command-line operations. It provides access to powerful functionalities that may not be available through GUI, such as automation of tasks using shell scripts. While creating graphics, writing documentation, and designing user interfaces are important aspects of programming and software development, they typically involve visual tools and applications rather than command line operations. Therefore, executing commands stands out as the most relevant use of the Terminal in a programming context.

4. What term describes the sections of a program where a particular variable can be accessed and modified?

A. Scope

B. Syntax

C. Framework

D. Protocol

The term that describes the sections of a program where a particular variable can be accessed and modified is "scope." In programming, scope defines the visibility and lifetime of a variable within a specific context. If a variable is declared within a certain scope, it can be accessed and modified only within that scope. For instance, variables defined inside a function usually have a local scope, meaning they cannot be accessed outside of that function, while global variables can be accessed anywhere in the program. When understanding scope, it is important to recognize that it helps avoid naming conflicts and keeps the code organized by limiting where variables can be accessed. This management of variable accessibility is crucial for creating maintainable and predictable code behavior. Other terms like syntax refer to the rules governing the structure of code, a framework is a collection of libraries or tools to help build applications, and a protocol usually relates to communication rules between systems, none of which relate to the concept of variable accessibility and modification in programming contexts.

5. What is the action of directing a program to execute or reference a specific procedure called?

A. Procedure call

B. Function declaration

C. Method invocation

D. Subroutine execution

The action of directing a program to execute or reference a specific procedure is known as a procedure call. This term specifically refers to the statement or command within the code that causes the program to jump to the location in memory where the specified procedure is defined. When the procedure is called, the program executes the instructions defined in that procedure until it reaches an end point or returns control to the point from which it was called. A procedure call serves the purpose of modularizing code, making it more organized and reusable, as procedures can be invoked multiple times from different points in a program. This reduces redundancy and improves maintainability. While method invocation is a term that can refer to calling a specific method in object-oriented programming, it is a more specialized term related to the context of objects and classes. Function declaration typically refers to the process of defining a function and its parameters, rather than executing it. Subroutine execution is a broader term that can encompass procedure calls but does not specifically define the act of calling a subroutine. Therefore, procedure call is the most precise and widely applicable term for this action in programming.

6. What is short-circuit evaluation in logical operations?

A. A method that always evaluates all operands

B. A process that only evaluates the true conditions

C. A technique that stops evaluation as soon as the result is determined

D. An algorithm used for sorting

Short-circuit evaluation is a technique used in logical operations where the evaluation of expressions stops as soon as the outcome can be definitively determined. This is particularly useful in conditional statements involving logical operators such as AND and OR, where not all operands need to be evaluated to arrive at a final result. For instance, in an expression using the AND operator, if the first condition evaluates to false, the overall expression must also be false regardless of the value of any subsequent conditions. Therefore, the evaluation of those subsequent conditions is bypassed. Similarly, with the OR operator, if the first condition evaluates to true, the overall expression is true, and any further conditions are not evaluated. This efficiency in evaluation minimizes unnecessary computation, making it a powerful aspect of programming that can enhance performance and reduce resource usage.

7. Which term refers to the practice of using a network of remote servers for data management?

A. Local Server

B. Data Warehouse

C. Cloud

D. Virtual Machine

The term that refers to the practice of using a network of remote servers for data management is "Cloud." Cloud computing allows users to store, manage, and process data over the internet using these remote servers, rather than relying on local servers or personal computers. This approach offers flexibility, scalability, and efficiency, as users can access their data and applications from any location with internet connectivity. Cloud services also provide various options such as data storage, computing power, and application hosting, which can be utilized based on the user's needs. This system contrasts significantly with a local server, which is physically present at a specific location and typically has limited capacity and accessibility. It also differs from a data warehouse, which is a centralized repository used for analysis rather than general data management across multiple locations. Lastly, a virtual machine is a software-based emulation of a physical computer but does not specifically pertain to the overall concept of managing data remotely.

8. What term describes information or signals produced by a computer system?

A. Input

B. Output

C. Process

D. Data

The term that describes information or signals produced by a computer system is "output." In computing, output refers to the results that the system generates after processing input data. This can take various forms, such as visual displays on a monitor, printed material from a printer, or audio signals through speakers. Output is an essential aspect of the computing process as it conveys the results of operations back to the user or another system. It completes the cycle of input, processing, and output, illustrating how computers transform data into meaningful information. In this context, while "input" refers to the data provided to the system for processing, "process" relates to the actions taken by the computer to manipulate the input data. "Data" is a more general term that encompasses both input and output but does not specifically denote the signals produced by the system. Therefore, "output" is the appropriate term for the signals or information produced.

9. What aspect of programming does event-driven programming specifically enhance?

A. User efficiency in interacting with systems

B. Data processing capabilities

C. Code readability

D. Storage management

Event-driven programming enhances user efficiency in interacting with systems by allowing the program to respond to events or user actions in real time. In this programming paradigm, the flow of the program is determined by events, such as user inputs (like clicks or keystrokes), system events, or messages from other programs. This approach makes it possible to create more interactive and responsive applications that can wait for these events to occur before executing specific actions, significantly improving the user experience. For example, a graphical user interface (GUI) application that uses event-driven programming can immediately respond to a user clicking a button or entering text, providing instant feedback and actions. This responsiveness encourages users to engage more fully with the application, enhancing their overall efficiency and effectiveness while using the system. Other aspects, such as data processing capabilities, code readability, and storage management, may play roles in programming but are not specifically enhanced by the event-driven model. Instead, those areas focus more on different programming paradigms or practices that are not directly tied to event-driven concepts.

10. What format typically includes user-centered features in addition to technical requirements for app development?

A. Backlog

B. Wireframe

C. Agile Manifesto

D. Mind Map

The format that typically includes user-centered features in addition to technical requirements for app development is a backlog. A backlog serves as a prioritized list of tasks or features that need to be developed, and it often includes user stories that describe the specific needs and desires of the end users. This means it not only focuses on what features need to be built but also emphasizes why those features are important from the user's perspective. In contrast, other formats such as wireframes primarily focus on the layout and design elements of an app rather than on the overall project's requirements and user needs. The Agile Manifesto, while foundational to agile development principles, outlines values and principles rather than being a format for capturing specific features or tasks. Mind maps are useful for brainstorming and organizing ideas but do not provide the structured, prioritized approach that a backlog does for managing user-centered features in app development.