HSC Software Design and Development Practice Exam (Sample)

Study Guide

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Questions

1. What do you call a preliminary model of a software system that allows for evaluation of features?

A. Program

B. Prototype

C. Procedure

D. Piracy

2. What sorting algorithm involves repeating a linear search to identify the smallest or largest item in a list?

A. Bubble Sort

B. Insertion Sort

C. Selection Sort

D. Quick Sort

3. What is the name of a function that calls itself during its execution?

A. Iteration

B. Recursion

C. Delegation

D. Subroutine

4. Which type of memory contains instructions that cannot be modified or erased once produced?

A. Volatile memory

B. Read Only Memory (ROM)

C. Dynamic RAM

D. Static RAM

5. What is the symbolic name referred to for an addressed, stored entity in a program?

A. Identifier

B. Variable

C. Constant

D. Function

6. What is the base of the binary number system?

A. ten

B. two

C. eight

D. four

7. What is meant by step-wise refinement in problem-solving?

A. Solving a problem in parallel steps

B. Breaking down a problem into smaller components

C. Applying the same solution to multiple problems

D. Summarizing large amounts of data

8. What type of memory is primary and allows both data and program instructions to be read from or written to it?

A. Read Only Memory (ROM)

B. Random Access Memory (RAM)

C. Flash Memory

D. Caching Memory

9. What term describes the process of returning some part of output to be used as input in a closed loop system?

A. Recycling

B. Feedback

C. Input/Output Cycle

D. Output Validation

10. What is the term for a computer check that ensures only conforming data is accepted as input?

A. Verification

B. Validation

C. Authentication

D. Testing

Answers

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

Explanations

1. What do you call a preliminary model of a software system that allows for evaluation of features?

A. Program

B. Prototype

C. Procedure

D. Piracy

A preliminary model of a software system designed to evaluate features is known as a prototype. Prototyping serves as an important step in the software development process, as it enables developers and stakeholders to visualize how the system will function and how users will interact with it. Through a prototype, features can be tested and feedback can be gathered early in the development cycle, which helps in making informed decisions and adjustments before moving on to more complex stages of development. This approach allows for exploring design ideas, functionality, and user experience without fully committing resources to a complete software build. The iterative nature of prototypes fosters collaboration between users and developers, leading to improved design outcomes and a better fit for user requirements. Such an understanding of prototypes is crucial in practicing effective software design and development methodologies.

2. What sorting algorithm involves repeating a linear search to identify the smallest or largest item in a list?

A. Bubble Sort

B. Insertion Sort

C. Selection Sort

D. Quick Sort

The sorting algorithm that involves repeatedly searching through the list to find the smallest or largest item is Selection Sort. This algorithm works by dividing the list into two parts: a sorted part and an unsorted part. Initially, the entire list is unsorted. The algorithm iterates over the unsorted portion, selects the smallest (or largest) element, and swaps it with the first element of the unsorted portion. This process is repeated, with the sorted portion growing and the unsorted portion shrinking until no unsorted elements remain. Selection Sort is characterized by its simplicity and clear steps, making it easy to understand and implement. However, it is not the most efficient sorting method for large datasets, as it has a time complexity of O(n^2) in the worst and average cases. In contrast, the other sorting algorithms listed work differently. For instance, Bubble Sort continually steps through the list, comparing adjacent items and swapping them if they are in the wrong order, which doesn't specifically involve searching for the smallest or largest item. Insertion Sort builds a sorted array one item at a time, inserting elements into their correct position rather than searching for minimums or maximums. Quick Sort utilizes a divide-and-conquer strategy to partition the list and sort the

3. What is the name of a function that calls itself during its execution?

A. Iteration

B. Recursion

C. Delegation

D. Subroutine

The function that calls itself during its execution is referred to as recursion. This programming concept allows a function to solve a problem by breaking it down into smaller instances of the same problem, effectively calling itself to perform the task. Recursion typically involves a base case, which stops the function from calling itself indefinitely, and a recursive case, which is where the function calls itself with modified arguments to approach the base case. In practical terms, recursion is useful for tasks such as traversing data structures (like trees), solving mathematical problems (like calculating factorials), or implementing algorithms (like quicksort). By defining a problem in terms of smaller sub-problems, recursion can lead to elegant and simplified code solutions, making it a powerful tool in programming. This understanding is key in computer science as recursion often provides a clear and concise way to solve complex problems through repeated self-references.

4. Which type of memory contains instructions that cannot be modified or erased once produced?

A. Volatile memory

B. Read Only Memory (ROM)

C. Dynamic RAM

D. Static RAM

Read Only Memory (ROM) is a type of memory that contains instructions which are permanently written and cannot be modified or erased under normal circumstances. This characteristic makes ROM particularly useful for storing firmware or software that needs to remain unchanged after manufacturing, such as the BIOS in computers. ROM is utilized for critical tasks where software needs to be reliable and stable, as it ensures that essential startup instructions are always available. Unlike volatile memory, which loses its contents when power is turned off, or dynamic and static RAM, which are both types of volatile memory subject to change and loss, ROM maintains its data integrity without needing a power supply. The immutability of ROM provides assurance that the system's foundational instructions will always be intact when needed, making it an essential component in various electronic devices.

5. What is the symbolic name referred to for an addressed, stored entity in a program?

A. Identifier

B. Variable

C. Constant

D. Function

The correct answer is an identifier, which is a symbolic name used to refer to a specific data entity within a program. In programming, identifiers are essential for distinguishing different variables, functions, and constants in the code. They allow programmers to write clear and understandable code by substituting descriptive names for the actual memory addresses used to store values. An identifier can refer to various entities, including variables, functions, and constants, but it encompasses broader usage than just variables alone. While a variable is a specific type of identifier that holds a changeable value, an identifier can also represent constants or functions. Thus, the term identifier is more encompassing and accurately captures the concept of a symbolic name in programming, making it the more appropriate choice in this context. In summary, while the term "variable" describes a specific type of entry in a program that stores a value, the symbolic name that can refer to any addressed entity is better described by the term "identifier."

6. What is the base of the binary number system?

A. ten

B. two

C. eight

D. four

The binary number system is defined by its base, which indicates the number of unique digits used in the system to represent values. In the case of the binary system, it employs only two digits: 0 and 1. Every value in binary is expressed using combinations of these two digits, where each position in a binary number represents a power of two. Understanding the base of a numbering system is essential because it defines how numbers are structured and interpreted. The base directly influences how we perform arithmetic, conversions to other systems, and how data is encoded in computing environments. In contrast, the other choices represent different bases used in other number systems. The decimal system is base ten, commonly used in everyday counting, the octal system is base eight with digits ranging from 0 to 7, and the hexadecimal system is base sixteen, which includes digits from 0 to 9 and letters A to F. Each of these systems has its specific applications and uses, but they do not pertain to the binary system, which is distinguished distinctly by its use of only the two digits.

7. What is meant by step-wise refinement in problem-solving?

A. Solving a problem in parallel steps

B. Breaking down a problem into smaller components

C. Applying the same solution to multiple problems

D. Summarizing large amounts of data

Step-wise refinement is a problem-solving technique where a complex problem is systematically broken down into smaller, more manageable components or sub-problems. This approach allows for a clearer understanding of each part of the problem, making it easier to develop specific solutions for each component. By dividing the problem into smaller steps, it becomes possible to tackle each part individually, which often leads to more efficient and effective problem-solving. Each smaller component can be refined and developed further, allowing you to build a comprehensive solution step by step. This method is particularly useful in software design and development, as it aligns with the structured approach needed for coding and algorithm creation. Choosing to break down the problem facilitates better focus on individual aspects, reducing complexity and enhancing clarity throughout the process. This technique contrasts with parallel problem-solving, where multiple solutions are sought simultaneously, or applying uniform solutions across different problems without addressing specific context or variability.

8. What type of memory is primary and allows both data and program instructions to be read from or written to it?

A. Read Only Memory (ROM)

B. Random Access Memory (RAM)

C. Flash Memory

D. Caching Memory

The correct answer is Random Access Memory (RAM). RAM is a type of volatile memory that provides space for the computer to read and write data and program instructions actively in use. It allows for quick access to this information, which is essential for the efficient operation of applications and the operating system. The read and write capabilities mean that data stored in RAM can be modified, which is crucial for tasks such as running programs and processing data in real time. In contrast, Read Only Memory (ROM) is non-volatile memory that is primarily used to store firmware and permanent instructions, which cannot be written to or modified under normal operation. Flash Memory, while it can be read from and written to, is primarily used for storage rather than as primary memory for running applications. Caching Memory serves a specific purpose of speeding up access to frequently used data but does not function as primary, general-purpose memory like RAM does.

9. What term describes the process of returning some part of output to be used as input in a closed loop system?

A. Recycling

B. Feedback

C. Input/Output Cycle

D. Output Validation

The term that describes the process of returning some part of the output to be used as input in a closed loop system is known as feedback. In a closed loop system, feedback is a crucial component as it allows the system to self-regulate and improve its performance by adjusting its operations based on the results of previous outputs. This concept is widely applied in various fields, including engineering, control systems, and software development, where the output provides information that influences future input decisions. For instance, in a temperature control system, the thermostat (the feedback mechanism) evaluates the current temperature (output) and adjusts the heating or cooling (input) based on whether the temperature is above or below the desired setpoint. This constant cycle ensures that the system remains stable and operates within the intended parameters. The other concepts mentioned do not adequately describe this specific process. Recycling refers to the reuse of materials, the Input/Output Cycle describes the broader process of data processing, and Output Validation focuses on verifying that the output meets certain criteria or standards. None of these terms capture the essence of using output to influence input like feedback does.

10. What is the term for a computer check that ensures only conforming data is accepted as input?

A. Verification

B. Validation

C. Authentication

D. Testing

The term that refers to a computer check designed to ensure that only conforming data is accepted as input is validation. Validation involves checking that the data entered into a system meets specific criteria or standards required by the system before it is processed further. This process can include checking the format, type, range, and other constraints of the data to prevent errors or undesired outcomes in the system's functioning. Validation is essential because it helps maintain the integrity and quality of data, preventing issues that may arise from incorrect or inappropriate input. For instance, if a form requires a date, validation ensures that the entered data is in the correct date format and falls within an acceptable range. Other terms listed, while related, refer to different processes. Verification typically involves confirming that data or a system's state matches a specified criterion or requirement. Authentication deals with validating the identity of a user or system. Testing refers to evaluating a system's functionality and performance, which is broader than just input data checks. These distinctions clarify why validation is the appropriate choice in this context.