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Homework 2

Q. 2) What two common data structures were included in Plankalkül?

Ans: The two common data structures that were included in Plankalkül, one of the first programming languages created by Konrad Zuse contained the following common data structures: (2.1.2)

a. The simplest data type in Plankalkül was the single bit.

b. Plankalkül also included arrays and records (called structs in the C-based languages). The records could include nested records.

Q. 5) Why was the lack of interpretation of programs acceptable in the early 1950s?

Ans: One of the primary reasons why the slowness of interpretive systems was acceptable in the early 1950s was the lack of floating-point hardware in the available computers. All floating-point operations had to be simulated in software, a very time-consuming process. Because so much processor time was spent in software floating-point processing, the overhead of interpretation and the simulation of indexing were relatively insignificant. As long as floating-point had to be done by software, interpretation was an acceptable expense. (2.3.1)

Q. 6) What hardware capability first appeared in the IBM704 computer that strongly affected the evolution of programming languages? Explain why.

Ans: The hardware capability of indexing and floating-point instructions which first appeared in the IBM 704 computer strongly affected the evolution of programming languages. This hardware announcement heralded the end of the interpretive era, at least for scientific computation. This is because the inclusion of floating-point hardware removed the hiding place for the cost of interpretation. It led to the development of the first widespread high-level programming languages, FORTRAN and LISP, which were specifically designed for scientific computations that often involve floating-point arithmetic (2.3.1).

Q. 7) In what year was the Fortran design project begun?

Ans: The Fortran design project had begun even before the IBM 704 computing system was announced, the first report related to Fortran was published in November 1954, and as the 704 system was announced in 1954. (2.3.2)

Q. 8) What was the primary application area of computers at the time Fortran was designed?

Ans: The primary application area of computers at the time Fortran was designed was scientific computations. (2.3.2)

Q. 9) What was the source of all of the control flow statements of Fortran I?

Ans: All of Fortran I's control statements were based on 704 instructions. (2.3.3)

Q. 10) What was the most significant feature added to Fortran I to get Fortran II?

Ans: The independent compilation of subroutines was the most significant feature added to Fortran I to get Fortran II (2.3.4).

Q. 11) What control flow statements were added to Fortran IV to get Fortran 77?

Ans: Logical loop control statements, and an If with an optional Else clause were added to Fortran IV to get Fortran 77. (2.3.5)

Q. 14) Why were linguists interested in artificial intelligence in the late 1950s?

Ans: Linguists were interested in artificial intelligence in the late 1950s due to their concern with natural language processing. (2.4.1)

Q. 15) Where was Lisp developed? By whom?

Ans: The concept of list processing was developed by Allen Newell, J. C. Shaw, and Herbert Simon at the RAND Corporation. However, Lisp as a language was first developed at MIT by John McCarthy in 1958. (2.4.2)

Q. 20) What missing language element of ALGOL60 damaged its chances for widespread use?

Ans: The main missing language element of ALGOL60 which is said to have damaged its chances for widespread use was the lack of input and output statements with formatting. (2.5.6)

Q. 21) What language was designed to describe the syntax of ALGOL60?

Ans: The language designed to describe the syntax of ALGOL 60 is the Backus–Naur Form (BNF). (2.5.7)

Q. 22) On what programming language was COBOL based?

Ans: COBOL was primarily based on FLOW-MATIC, a language developed by UNIVAC in 1957. Additionally, it was influenced by AIMACO (a minor variation of FLOW-MATIC used by the U.S. Air Force) and COMTRAN (COMmercial TRANslator) (2.6.2)

Q. 23) In what way did the COBOL design process begin?

Ans: The COBOL design process began in 1959, when a committee of people came together for short periods to design a programming language specifically for business applications. At the time, multiple organizations were working on business-oriented languages, but they were either proprietary (like FLOW-MATIC by UNIVAC) or not yet implemented (COMTRAN by IBM). The goal of the committee was to create a universal, manufacturer-independent language that could be used across different computer systems, leading to the development of COBOL. (2.6.3)

Q. 24) What data structure that appeared in COBOL originated with Plankalkül?

Ans: Hierarchical data structures (records) that originated with Plankalkül were first implemented in COBOL.

Q. 25) What organization was most responsible for the early success of COBOL (in terms of extent of use)?

Ans: The mandate for use placed by the Department of Defence was most responsible for the early success of COBOL.

Q. 36) What is a nonprocedural language?

Ans: A nonprocedural language, also known as a declarative language, is a type of computer language where the user specifies what the program should do, rather than how to do it.

Q. 37) What are the two kinds of statements that populate a Prolog database?

Ans: A Prolog database is populated by two kinds of statements: facts and rules.

Q. 46) What was the first application for Java?

Ans: The main reason for the invention of Java was reliability. In 1990, Sun Microsystems determined there was a need for a programming language for embedded consumer electronic devices, such as toasters, microwave ovens, and interactive TV systems. (2.17.1)

Q. 51) For what application area is JavaScript most widely used?

Ans: The primary uses of JavaScript in Web programming are to validate form input data and create dynamic HTML documents. (2.18.2)

Q. 52) What is the relationship between JavaScript and PHP, in terms of their use?

Ans: PHP is similar to JavaScript in its syntactic appearance, the dynamic nature of its strings and arrays, and its use of dynamic typing. In terms of use, both are popular in web applications.

Q. 57) What deficiency of the switch statement of C is addressed with the changes made by C# to that statement?

Ans: The following deficiency of the switch statement of C is addressed with the changes made by C#:

a. C# has a static semantics rule that disallows the implicit execution of more than one segment.

b. The control expression and the case statements can be strings in C#.

Q. 59) What are the inputs to an XSLT processor?

Ans: The inputs to an XSLT processor are XML Data Document (The original XML file that contains the data to be transformed.) and XSLT Document (The stylesheet that defines the transformation rules and templates for processing the XML data.) The XSLT processor reads these inputs and applies the transformations specified in the XSLT document to generate the output.

(2.20.1)

Q. 60) What is the output of an XSLT processor?

Ans: The output of an XSLT processor is a transformed XML document, which can also be in HTML or plain text. The transformation is based on the templates and instructions specified in the XSLT document, which define how the input XML data should be modified or structured in the output document.

(2.20.1)