

FIG. 8 is a diagram of a user interface dialog box which displays various document versions;

FIG. 9 is a diagram of a user interface dialog box which allows the creation of a new version.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates the system architecture for a computer system 100 such as an IBM PS/21, on which the invention may be implemented. The exemplary computer system of FIG. 1 is for descriptive purposes only. Although the description may refer to terms commonly used in describing particular computer systems, such as in IBM PS/2 computer, the description and concepts equally apply to other systems, including systems having architectures dissimilar to FIG. 1.

Computer system 100 includes a central processing unit (CPU) 105, which may be implemented with a conventional microprocessor, a random access memory (RAM) 110 for temporary storage of information, and a read only memory (ROM) 115 for permanent storage of information. A memory controller 120 is provided for controlling RAM 110.

A bus 130 interconnects the components of computer system 100. A bus controller 125 is provided for controlling bus 130. An interrupt controller 135 is used for receiving and processing various interrupt signals from the system components.

Non-volatile mass storage may be provided by diskette 142, CD ROM 147, or hard drive 152. Data and software may be exchanged with computer system 100 via removable media such as diskette 142 and CD ROM 147. Diskette 142 is insertable into diskette drive 141 which is, in turn, connected to bus 30 by a controller 140. Similarly, CD ROM 147 is insertable into CD ROM drive 146 which is, in turn, connected to bus 130 by controller 145. Hard disk 152 is part of a fixed disk drive 151 which is connected to bus 130 by controller 150.

User input to computer system 100 may be provided by a number of devices. For example, a keyboard 156 and mouse 157 are connected to bus 130 by controller 155. An audio transducer 196, which may act as both a microphone and a speaker, is connected to bus 130 by audio controller 197, as illustrated. It will be obvious to those reasonably skilled in the art that other input devices, such as a pen and/or tablet may be connected to bus 130 and an appropriate controller and software, as required. DMA controller 160 is provided for performing direct memory access to RAM 110. A visual display is generated by video controller 165 which controls video display 170. Computer system 100 also includes a communications adaptor 190 which allows the system to be interconnected to a local area network (LAN) or a wide area network (WAN), schematically illustrated by bus 191 and network 195.

Operation of computer system 100 is generally controlled and coordinated by operating system software, such as the OS/2® operating system, available from International Business Machines Corporation, Boca Raton, Fla. The operating system controls allocation of system resources and performs tasks such as processing scheduling, memory management, networking, and I/O services, among things. In particular, an operating system resident in system memory and running on CPU 105 coordinates the operation of the other elements of computer system 100. The present invention may be implemented with any number of commercially available operating systems including OS/2®, UNIX and DOS, etc.

FIG. 2 illustrates schematically illustrative software components including an illustrative word processing applica-

tion program 206 constructed in accordance with the principles of this invention as well as other system components with which the word processing system interacts. In particular, an operating system 200 resident in system memory and running on CPU 105 coordinates the operation of the other elements of computer system 100. The present invention may be implemented with any number of commercially available operating systems including OS/2, UNIX and DOS, etc. One or more applications 202 such as word processors, editors, spread sheets, compilers, etc., execute in order to control the operating system 200. If operating system 200 is a true multitasking operating system, such as OS/2, multiple applications may execute simultaneously.

The inventive versioning system may be implemented as an integral part of a document authoring application, such as a word processor. In particular, a word processing application suitable for use with the present invention, and to which the description of the illustrative embodiment of the invention will be directed, is Lotus WordPro®, 96 Edition, commercially available from Lotus Development Corporation, Cambridge, Mass., a subsidiary of International Business Machines Corporation. In the illustrative embodiment, versioning tool 204 is integrated into a word processing application 206. Word processing application 206 further comprises, among other software modules, word processing engine 205, user interface 214 and a loader/linker 212.

The word processing engine 205 operates on a document 208 which is constructed in accordance with the principles of the invention and which is loaded from non-volatile storage into memory by means of the loader-linker 212. The structure of objects used to construct documents in the illustrative embodiment is described in detail with reference to FIG. 3.

In the illustrative embodiment, the word processing application program 206 may be implemented in an object-oriented programming language, such as C++, using object-oriented programming techniques. C++ is a compiled language, that is, programs are written in a human-readable script and this script is then provided to another program called a compiler which generates a machine-readable numeric code that can be loaded into, and directly executed by, a computer. As described below, the C++ language has certain characteristics which allow a software developer to easily use programs written by others while still providing a great deal of control over the reuse of programs to prevent their destruction or improper use. The C++ language is well-known and many articles and texts are available which describe the language in detail. In addition, C++ compilers are commercially available from several vendors including Borland International, Inc. and Microsoft Corporation. Accordingly, for reasons of clarity, the details of the C++ language and the operation of the C++ compiler will not be discussed further in detail herein.

As will be understood by those skilled in the art, Object-Oriented Programming (OOP) techniques involve the definition, creation, use and destruction of "objects". These objects are software entities comprising data elements, or attributes, and methods, or functions, which manipulate the data elements. The attributes and related methods are treated by the software as an entity and can be created, used and deleted as if they were a single item. Together, the attributes and methods enable objects to model virtually any real-world entity in terms of its characteristics, which can be represented by the data elements, and its behavior, which can be represented by its data manipulation functions. In this