

FIRST PROCESSOR INSERTING HOOKS INTO SOFTWARE AND SENDING UNIQUE IDENTIFICATIONS TO OUTPUT BUS AND SECOND PROCESSOR ASSOCIATING DATA FRAMES AND TIME WITH THESE UNIQUE IDENTIFICATIONS

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates in general to the field of software monitoring and development and in particular to methods and systems for software monitoring and development which permit the detail tracing of software flow. Still more particularly, the present invention relates to methods and systems for software monitoring and development which permit the continuous recording of high-volume performance trace data for an extended time span.

2. Description of the Related Art

The monitoring and development of software applications has always represented a difficult technical challenge. Known software based "tracing" techniques typically require significant overhead in terms of processor requirements and output bus space. As a result, the performance of the software application under development cannot truly be monitored in an operating environment without severely degrading the performance thereof due to the processing requirements of the software based tracing program.

It is also especially difficult to monitor the development of software applications for a second generation processor while utilizing a first generation processor as the monitoring device. A known problem with existing hardware based software monitoring and development techniques is the inability of existing hardware monitoring systems to continuously record high-volume performance trace data for longer than a few seconds. Thereafter, the storage buffers in such devices are filled, and the monitoring system must overwrite, wrap around or stop recording.

Therefore, it should be apparent that a need exists for a software application monitoring and development system which permits the continuous recording of high-volume performance trace data without adversely affecting the performance of the software application under development.

SUMMARY OF THE INVENTION

It is therefore one object of the present invention to provide an improved method and apparatus for software monitoring and development.

It is another object of the present invention to provide an improved method and apparatus for software monitoring and development which permits the detailed tracing of software flow.

It is yet another object of the present invention to provide an improved method and apparatus for software monitoring and development which permits the detailed tracing of software flow with continuous recording of high-volume performance trace data for an extended time span.

The foregoing objects are achieved as is now described. The method and apparatus of the present invention utilize a limited number of uniquely identifiable elements or "hooks" which are inserted into the software application under development. Each time such an element is encountered during processing of the

application the identity of the element and a selected data frame are coupled to the output bus of the processor running the application under development. A data output card coupled to the output bus is utilized to couple that information to a data collection card via a dedicated cable. The collection card is utilized to generate a "header" or identifying data byte and to transfer the identity of each element encountered and its associated data frame along with a time value, to a second processor, which is utilized to record that data. In one embodiment of the present invention, a switched bank memory system is utilized in the collection card to permit high speed data storage. In the event the software application under development generates monitoring outputs at a speed greater than may be accurately accepted within the collection card, an overrun indication is stored and subsequent tests may be run utilizing fewer "hooks" within the application under development.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a pictorial representation of a system which may be utilized to implement the method of the present invention;

FIG. 2 is a schematic pictorial representation of the method of the present invention;

FIG. 3 is a generalized block diagram of a data output card which may be utilized with the method of the present invention;

FIG. 4 is a generalized block diagram of a data collection card which may be utilized with the method of the present invention; and

FIG. 5 is a logic flow chart illustrating the collection of monitoring data in accordance with the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular with reference to FIG. 1, there is depicted a pictorial representation of a system which may be utilized to implement the method of the present invention. As is illustrated, the system includes a first processor 10 which is utilized to operate the software application under development. Typically, in the case of new software applications, the major portion of development of new applications is accomplished for a new generation of processors. For example, first processor 10 may comprise a new personal computer such as the PS/2 Personal Computer manufactured by International Business Machines Corporation of Armonk, N.Y. Associated with first processor 10, in a manner well known in the prior art, are display 12 and keyboard 14. Schematically indicated in association with first processor 10 is output bus 16. Those skilled in the art will appreciate that output bus 16, in the case of a PS/2 Personal Computer will comprise a sixteen bit data bus.

In accordance with an important aspect of the present invention, a data output card 18 is coupled to output bus 16 by means of an expansion slot or other connection means generally provided in the personal computer art.