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(19) **United States**(12) **Patent Application Publication**
Plouffe et al.(10) **Pub. No.: US 2005/0120160 A1**(43) **Pub. Date: Jun. 2, 2005**(54) **SYSTEM AND METHOD FOR MANAGING
VIRTUAL SERVERS**(76) Inventors: **Jerry Plouffe**, Hollis, NH (US); **Scott H. Davis**, Needham, MA (US); **Alexander D. Vasilevsky**, Westford, MA (US); **Benjamin J. Thomas III**, Bedford, MA (US); **Steven S. Noyes**, Sterling, MA (US); **Tom Hazel**, Andover, MA (US)

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CAMBRIDGE, MA 02142 (US)(21) Appl. No.: **10/972,762**(22) Filed: **Oct. 25, 2004****Related U.S. Application Data**

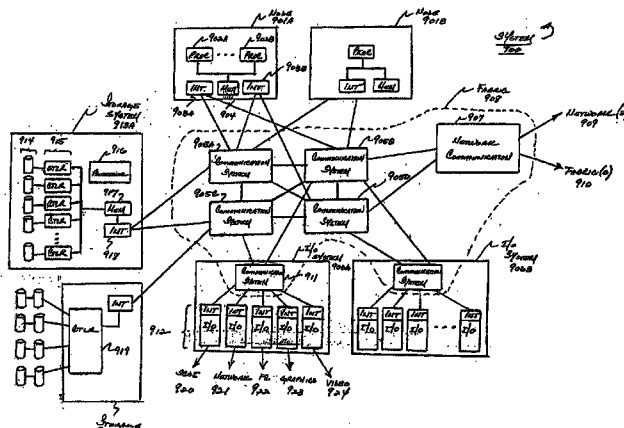
(63) Continuation-in-part of application No. 10/831,973, filed on Apr. 26, 2004.

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A management capability is provided for a virtual computing platform. In one example, this platform allows interconnected physical resources such as processors, memory, network interfaces and storage interfaces to be abstracted and mapped to virtual resources (e.g., virtual mainframes, virtual partitions). Virtual resources contained in a virtual partition can be assembled into virtual servers that execute a guest operating system (e.g., Linux). In one example, the abstract-

tion is unique in that any resource is available to any virtual server regardless of the physical boundaries that separate the resources. For example, any number of physical processors or any amount of physical memory can be used by a virtual server even if these resources span different nodes. A virtual computing platform is provided that allows for the creation, deletion, modification, control (e.g., start, stop, suspend, resume) and status (i.e., events) of the virtual servers which execute on the virtual computing platform and the management capability provides controls for these functions. In a particular example, such a platform allows the number and type of virtual resources consumed by a virtual server to be scaled up or down when the virtual server is running. For instance, an administrator may scale a virtual server manually or may define one or more policies that automatically scale a virtual server. Further, using the management API, a virtual server can monitor itself and can scale itself up or down depending on its need for processing, memory and I/O resources. For example, a virtual server may monitor its CPU utilization and invoke controls through the management API to allocate a new processor for itself when its utilization exceeds a specific threshold. Conversely, a virtual server may scale down its processor count when its utilization falls. Policies can be used to execute one or more management controls. More specifically, a management capability is provided that allows policies to be defined using management object's properties, events and/or method results. A management policy may also incorporate external data (e.g., an external event) in its definition. A policy may be triggered, causing the management server or other computing entity to execute an action. An action may utilize one or more management controls. In addition, an action may access external capabilities such as sending notification e-mail or sending a text message to a telephone paging system. Further, management capability controls may be executed using a discrete transaction referred to as a "job." A series of management controls may be assembled into a job using one or management interfaces. Errors that occur when a job is executed may cause the job to be rolled back, allowing affected virtual servers to return to their original state.



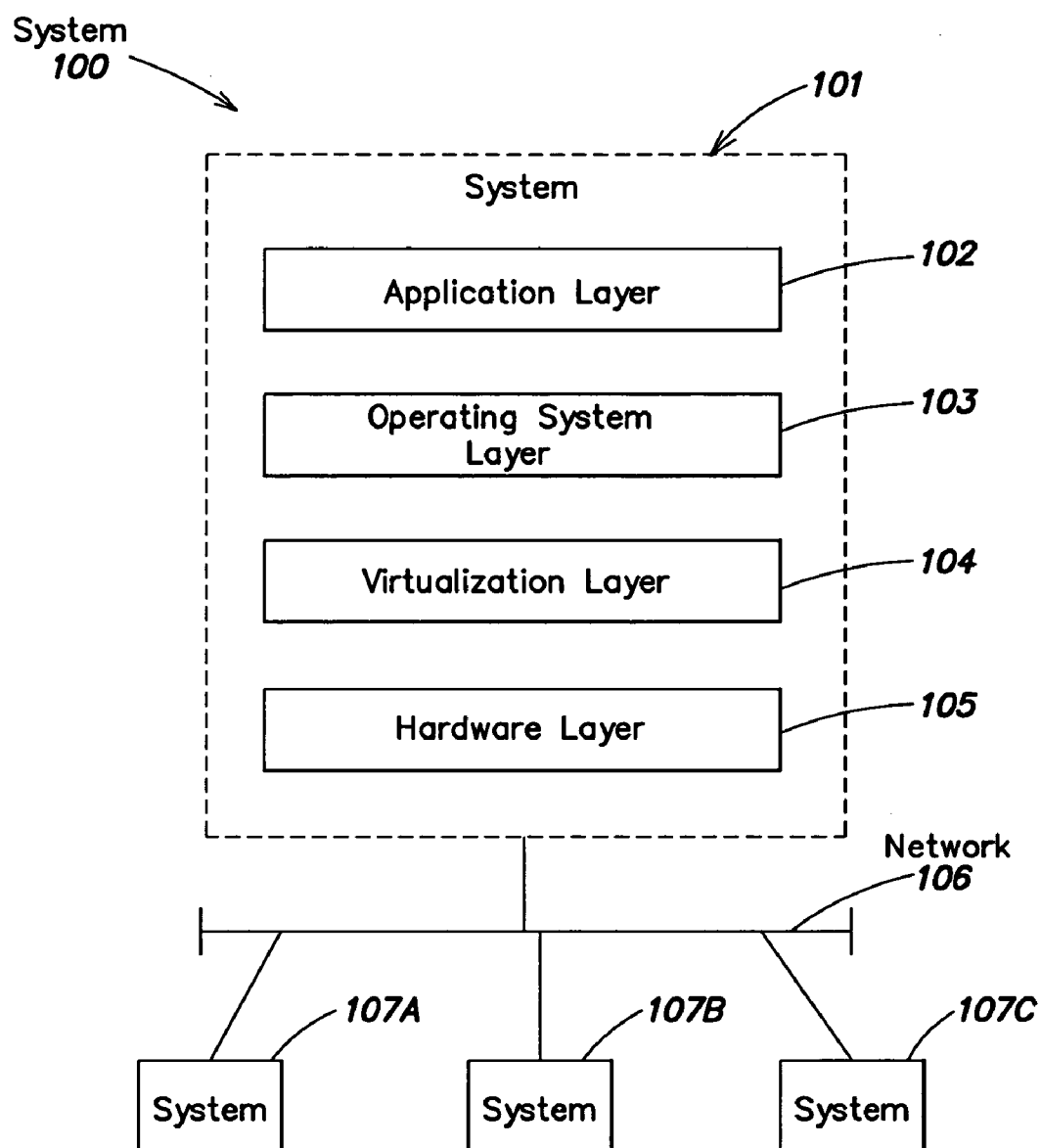


FIG. 1

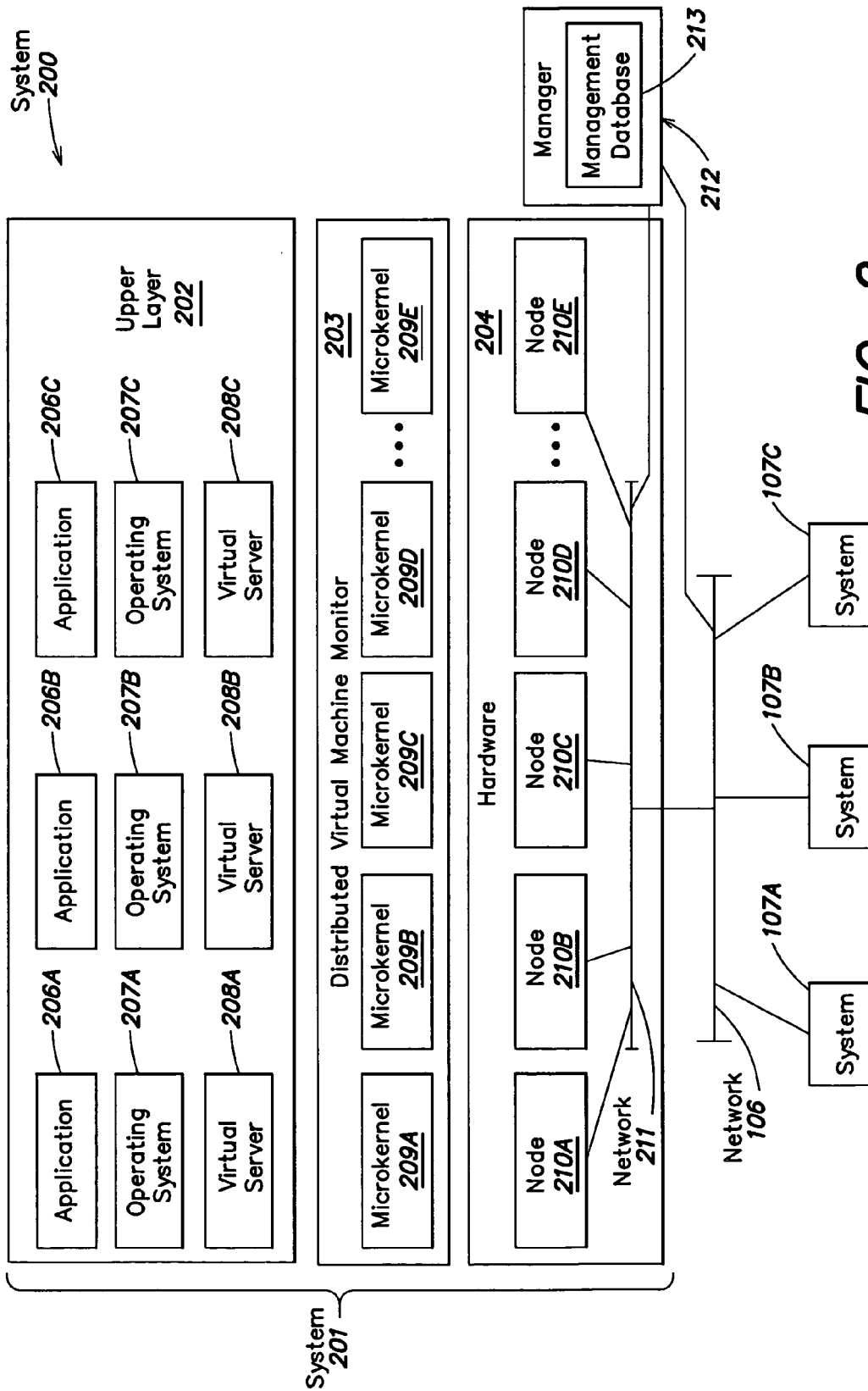


FIG. 2

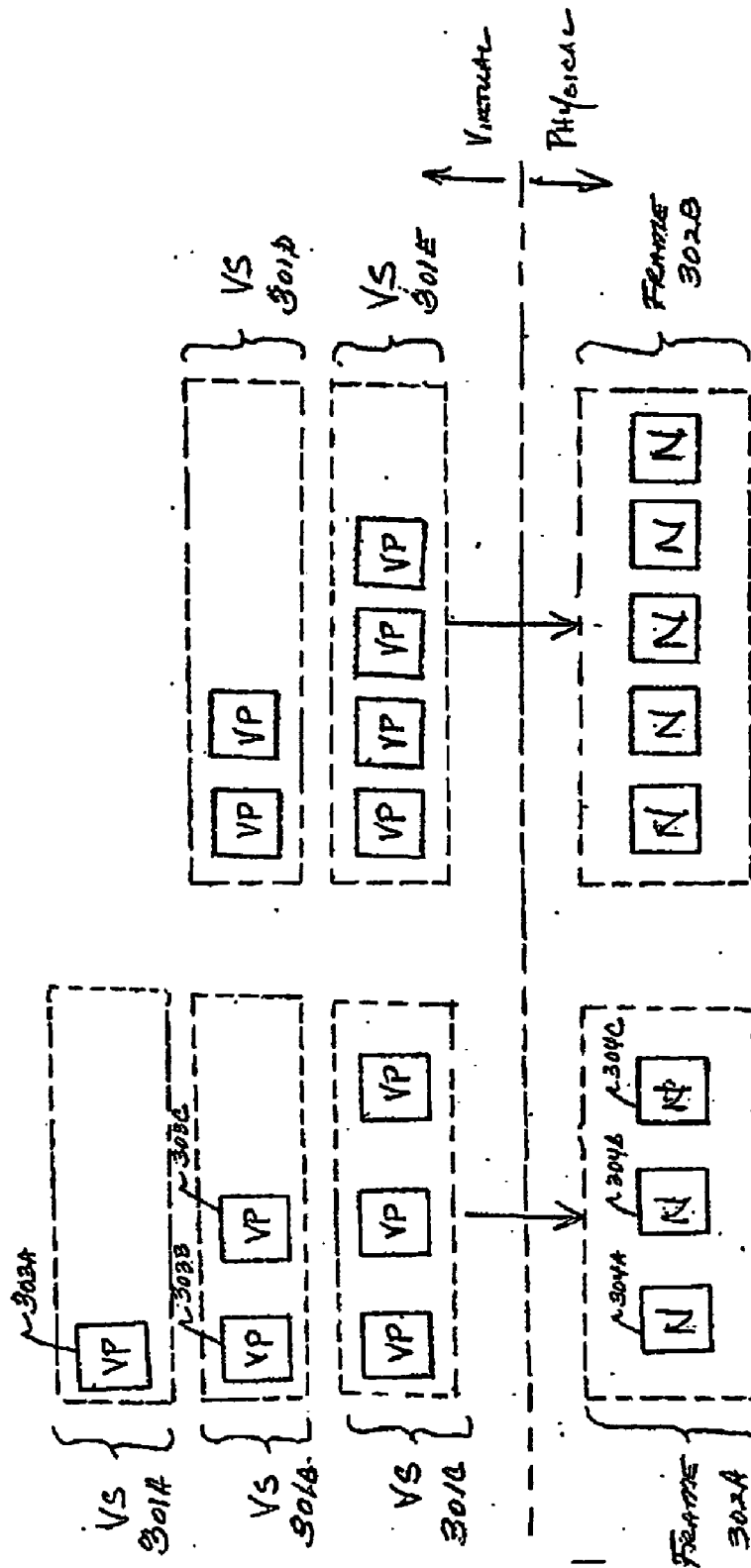


FIGURE 3

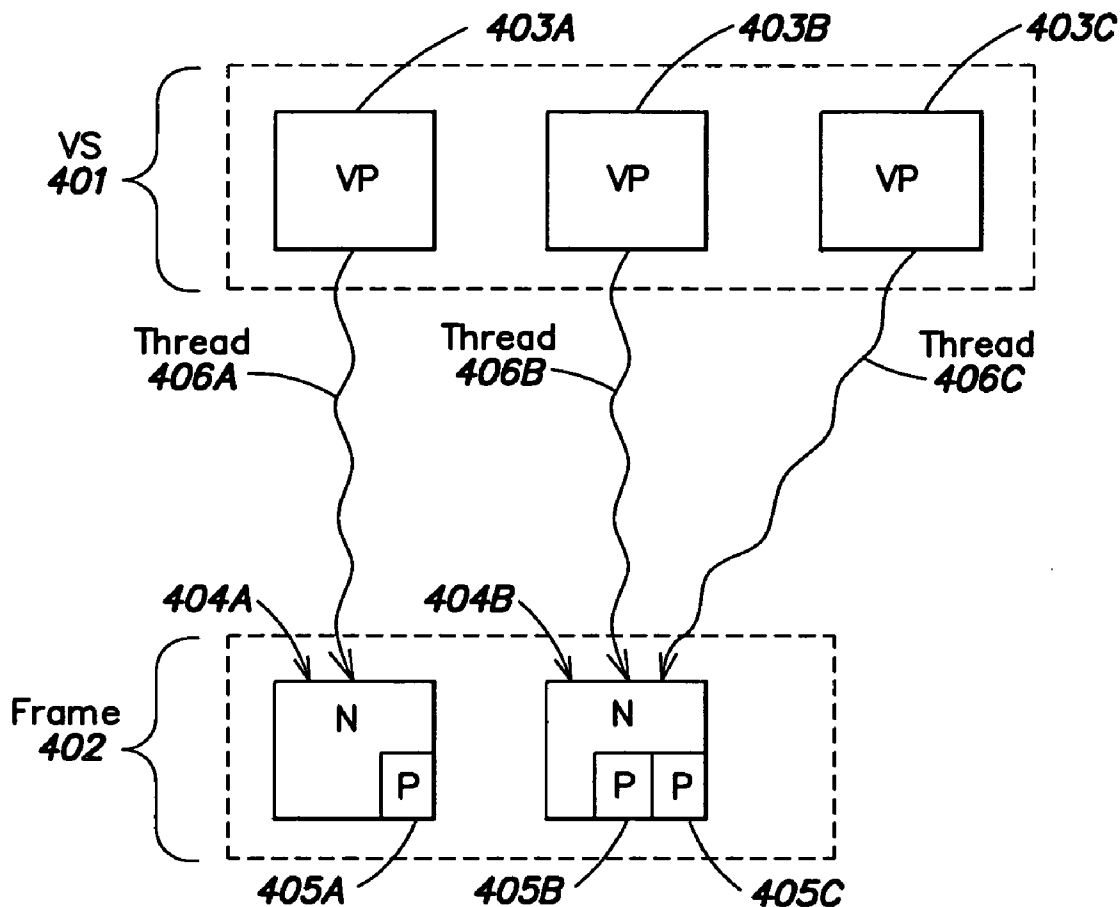


FIG. 4

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