

ABSTRACT

LOGICALLY ADDRESSABLE PHYSICAL MEMORY FOR A VIRTUAL
MEMORY COMPUTER SYSTEM THAT SUPPORTS MULTIPLE PAGE SIZES

A computer system having virtual memory that can be mapped using multiple page sizes onto logically addressable physical memory. An intermediate
5 addressing scheme permits the mapping of several non-contiguous small pages in physical memory onto a bigger sized virtual memory page. Rather than translating a virtual address directly into a physical address, a virtual address is translated into an intermediate address that may or may not be a physical address. If the virtual page is backed by physical memory that is contiguous and aligned on a proper
10 boundary for the page size, then the intermediate address will be the physical address and no second translation is required. If the intermediate address is not a physical address, it is then translated into a physical address. This is the case where a big page in virtual memory is backed by more than one smaller page in physical memory. Thus, non-contiguous small pages in physical memory can be mapped
15 together using an intermediate translation to form a single big page thereby removing the requirement that a big page be mapped using a single contiguous portion of physical memory and further removing the requirement that the big page be big page boundary aligned within physical memory. Furthermore, several small pages can be promoted to a single big page simply by changing the virtual address to
20 intermediate address mappings and also changing the intermediate address to physical address mappings to reflect the promotion thereby eliminating the need to move the contents of the small pages into a single contiguous, big page aligned region of physical memory. Furthermore, a big page sized region of virtual memory that has one or more smaller page sized holes within it can be treated as a single big
25 virtual memory page and be backed in physical memory using only as many smaller pages as are required to back the non-hole regions of the virtual address space.

