scanned, and quickly determine the current cold and hot state of the reserved memory to be scanned according to the current set state of the access bit.

[57] In the practical application, scanning the reserved memory to be scanned within the reserved memory scanning range requires scanning physical address of the reserved memory corresponding to the reserved memory to be scanned. The reserved memory scanning range includes two parts: a target hot page record table and a target cold page record table. In a case that the reserved memory scanning range corresponds to the target hot page record table, the cold and hot state of the reserved memory to be scanned in the target hot page record table will be scanned during specific scanning. In a case that the reserved memory scanning range corresponds to the target cold page record table, the cold and hot state of the reserved memory to be scanned in the target cold page record table will be scanned during the specific scanning. The specific implementation method is as follows:

the determining the physical memory address of the reserved memory to be scanned includes:

determining the target record table corresponding to the reserved memory scanning range, wherein the target record table includes a target hot page record table and a target cold page record table;

determining the physical memory address of the reserved memory to be scanned in the target cold page record table; and

determining the physical memory address of the reserved memory to be scanned in the target hot page record table, in a case that all the reserved memory to be scanned in the target cold page record table has been scanned and the target cold page record table or the target hot page record table meets a preset scanning condition.

[58] Among others, the preset scanning condition may be set according to the actual application, for example, the time from the previous time scanning the target hot page record table to the current time exceeds a preset time threshold (that is, the target hot page record table has not been scanned for a long time), or the amount of the reserved memory to be scanned in the target cold page record table is less than or equal to a preset threshold amount (that is, the amount of the reserved memory to be scanned in the target hot page record table is small).

determining a physical memory address of the reserved memory to be scanned within the reserved memory scanning range;

determining a virtual address corresponding to the physical memory address of the reserved memory to be scanned by a preset query method, in a case that there is a virtual page table; and

traversing and querying an access bit of the corresponding virtual page table through the virtual address and determining the current cold and hot state of the reserved memory to be scanned according to a current set state of the access bit.

[89] Optionally, the memory scanning module 304 is further configured for:

determining the target record table corresponding to the reserved memory scanning range, wherein the target record table includes a target hot page record table and a target cold page record table;

determining the physical memory address of the reserved memory to be scanned in the target cold page record table; and

determining the physical memory address of the reserved memory to be scanned in the target hot page record table, in a case that all the reserved memory to be scanned in the target cold page record table has been scanned and the target cold page record table or the target hot page record table meets the preset scanning condition.

[90] Optionally, the memory scanning module 304 is further configured for:

determining, in a case that there is a cache memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned, the virtual address corresponding to the physical memory address of the reserved memory to be scanned according to the cache memory mapping structure; or

acquiring a linked list of a memory mapping structure for allocating the reserved memory and adding a linked list lock to the linked list of the memory mapping structure, in a case that there is no cache memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned;

traversing the linked list of the memory mapping structure to determine the memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned; and

CLAIMS

What is claimed is:

1. A memory scanning method applied to a host, comprising:

determining a reserved memory scanning range at a preset time interval, wherein reserved memory constitutes part of host memory;

scanning reserved memory to be scanned within the reserved memory scanning range and determining a current cold and hot state of the reserved memory to be scanned; and

determining a target record table for the current cold and hot state of the reserved memory to be scanned according to the current cold and hot state of the reserved memory to be scanned and recording the current cold and hot state of the reserved memory to be scanned into the target record table.

2. The memory scanning method of claim 1, wherein the scanning the reserved memory to be scanned within the reserved memory scanning range and determining the current cold and hot state of the reserved memory to be scanned comprises:

determining a physical memory address of the reserved memory to be scanned within the reserved memory scanning range;

determining a virtual address corresponding to the physical memory address of the reserved memory to be scanned by a preset query method, in a case that there is a virtual page table; and

traversing and querying an access bit of the corresponding virtual page table through the virtual address and determining the current cold and hot state of the reserved memory to be scanned according to a current set state of the access bit.

3. The memory scanning method of claim 2, wherein the determining the physical memory address of the reserved memory to be scanned comprises:

determining the target record table corresponding to the reserved memory scanning range, wherein the target record table comprises a target hot page record table and a target cold page record table;

determining the physical memory address of the reserved memory to be scanned in the target cold page record table; and

determining the physical memory address of the reserved memory to be scanned in the target hot page record table, in a case that all the reserved memory to be scanned in the target cold page record table has been scanned and the target cold page record table or the target hot page record table meets a preset scanning condition.

4. The memory scanning method of claim 2 or 3, wherein the determining the virtual address corresponding to the physical memory address of the reserved memory to be scanned by the preset query method comprises:

determining, in a case that there is a cache memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned, the virtual address corresponding to the physical memory address of the reserved memory to be scanned according to the cache memory mapping structure; or

acquiring a linked list of a memory mapping structure for allocating the reserved memory and adding a linked list lock to the linked list of the memory mapping structure, in a case that there is no cache memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned;

traversing the linked list of the memory mapping structure to determine the memory mapping structure corresponding to the physical memory address of the reserved memory to be scanned; and

determining the virtual address corresponding to the physical memory address of the reserved memory to be scanned according to the memory mapping structure and adding the memory mapping structure to a cache.

5. The memory scanning method of claim 3, wherein the traversing and querying the access bit of the corresponding virtual page table through the virtual address and

determining the current cold and hot state of the reserved memory to be scanned according to the current set state of the access bit comprises:

traversing and querying the access bit of the corresponding virtual page table through the virtual address;

determining the current set state of the access bit, in a case that the query is successful; and

determining whether the current set state has been set,

if yes, clearing the current set state of the access bit and determining that the current cold and hot state of the reserved memory to be scanned is a hot state; and

if no, traversing and querying an access bit of a corresponding kernel page table through the virtual address and determining the current cold and hot state of the reserved memory to be scanned according to the current set state of the access bit of the memory page table.

6. The memory scanning method of claim 5, wherein the traversing and querying the access bit of the corresponding kernel page table through the virtual address and determining the current cold and hot state of the reserved memory to be scanned according to the current set state of the access bit of the memory page table comprises:

traversing and querying the access bit of the corresponding virtual page table through the virtual address and determining the current set state of the access bit of the kernel page table; and

determining whether the current set state has been set,

if yes, clearing the current set state of the access bit and determining that the current cold and hot state of the reserved memory to be scanned is a hot state; and

if no, determining that the current cold and hot state of the reserved memory to be scanned is a cold state.

7. The memory scanning method of claim 6, wherein the determining the target record table for the current cold and hot state of the reserved memory to be scanned

according to the current cold and hot state of the reserved memory to be scanned and recording the current cold and hot state of the reserved memory to be scanned into the target record table comprises:

in a case that the current cold and hot state of the reserved memory to be scanned in the target hot page record table is a hot state, determining the target hot page record table corresponding to the hot state of the reserved memory to be scanned and recording the hot state of the reserved memory to be scanned into the target hot page record table;

in a case that the current cold and hot state of the reserved memory to be scanned in the target hot page record table is a cold state, determining the target cold page record table corresponding to the cold state of the reserved memory to be scanned, deleting the reserved memory to be scanned in the target hot page record table and recording the cold state of the reserved memory to be scanned into the target cold page record table; or

in a case that the current cold and hot state of the reserved memory to be scanned in the target cold page record table is a hot state, determining the target hot page record table corresponding to the hot state of the reserved memories to be scanned, deleting the reserved memory to be scanned in the target cold page record table and recording the hot state of the reserved memory to be scanned into the target hot page record table; and

in a case that the current cold and hot state of the reserved memory to be scanned in the target cold page record table is a cold state, determining the target cold page record table corresponding to the cold state of the reserved memory to be scanned and recording the cold state of the reserved memory to be scanned into the target cold page record table.

8. The memory scanning method of claim 1, wherein the determining the target record table for the current cold and hot state of the reserved memory to be scanned according to the current cold and hot state of the reserved memory to be scanned and recording the current cold and hot state of the reserved memory to be scanned into the target record table comprises:

in a case that the current cold and hot state of the reserved memory to be scanned is a hot state, determining the target hot page record table corresponding to the hot state of the reserved memory to be scanned and recording the hot state of the reserved memory to be scanned into the target hot page record table; and

in a case that the current cold and hot state of the reserved memory to be scanned is a cold state, determining the target cold page record table corresponding to the cold state of the reserved memory to be scanned and recording the cold state of the reserved memory to be scanned into the target cold page record table.

9. The memory scanning method of claim 1, further comprising:

adding, in a case that there is new reserved memory and the reserved memory to be scanned has been scanned, the new reserved memory to the reserved memory scanning range.

10. The memory scanning method of claim 1, further comprising:

acquiring a scanning range lock and suspending the scanning of the reserved memory to be scanned within the reserved memory scanning range, in a case that there is reserved memory to be scanned within the reserved memory scanning range being released; and

deleting the released reserved memory to be scanned from the reserved memory scanning range and deleting a memory mapping structure corresponding to the released reserved memory to be scanned and the cold and hot state of the released reserved memory to be scanned in the target record table.

11. The memory scanning method of claim 7, wherein the recording the cold state of the reserved memory to be scanned into the target cold page record table comprises:

recording the cold state of the reserved memory to be scanned to an end of the target cold page record table; and

accordingly, the recording the hot state of the reserved memory to be scanned into the target hot page record table comprises:

recording the hot state of the reserved memory to be scanned to an end of the target hot page record table.

12. A memory scanning apparatus applied to a host, comprising:

a scanning range determining module configured for determining a reserved memory scanning range at a preset time interval, wherein reserved memory constitutes part of host memory;

a memory scanning module configured for scanning reserved memory to be scanned within the reserved memory scanning range and determining a current cold and hot state of the reserved memory to be scanned; and

a memory state recording module configured for determining a target record table for the current cold and hot state of the reserved memory to be scanned according to the current cold and hot state of the reserved memory to be scanned and recording the current cold and hot state of the reserved memory to be scanned into the target record table.

13. A computing device, comprising:

a memory and a processor;

wherein the memory is configured for storing computer-executable instructions, and the processor is configured for executing the computer-executable instructions that, when executed by the processor, implement the steps of the memory scanning method of any one of claims 1 to 11.

14. A computer-readable storage medium having computer-executable instructions stored thereon that, when executed by a processor, implement the steps of the memory scanning method of any one of claims 1 to 11.