METHOD AND APPARATUS FOR VIRUS SCANNING

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the priority to Chinese Patent Application No. 201210351773.5, filed September 20, 2012 in the State Intellectual Property Office of P.R. China, which is hereby incorporated herein in its entirety by reference.

FIELD OF THE INVENTION

The present invention relates to the field of computers, and more particularly to method and apparatus for virus scanning, and a non-transitory computer-readable medium that stores instructions to perform virus scanning.

BACKGROUND OF THE INVENTION

A computer virus refers to a set of instructions or program codes inserted into a computer program, which damages functions and/or data of computers, affects the use of computers, and is capable of self-replication. The computer virus is of parasitic, infectious, hidden, destructive, diversified, and so on, and causes great damages and destructions to the resources of computers.

In order to effectively detect a virus, conventionally, a virus scanning and killing method requires re-traversal of the entire hard disk and scanning each file in the hard disk at each time of virus scanning. If the user interrupts the current virus scanning, the re-traversal of virus scanning for the entire hard disk is required once again in the next virus scanning.

Therefore, a heretofore unaddressed need exists in the art to address the aforementioned deficiencies and inadequacies.

SUMMARY OF THE INVENTION

One of objectives of the present invention is to provide method and apparatus for virus scanning, and a non-transitory computer-readable medium that stores instructions to

perform virus scanning.

In one aspect of the invention, the method includes detecting a status of a system; and when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning does not begin, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the scanning progress, and recording a scanning progress of the current virus scanning.

In one embodiment, the step of detecting the status of the system includes:

detecting whether it is in an input status or a full-screen status, and detecting current occupancy of system resources;

if it is in the input status or the full-screen status, determining that the detected system status is busy;

determining, if it is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and

determining, if it is not in the input status and the full-screen status, when the current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

Further, before the step of detecting the system status, the method includes:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, in which attributes of each node of the tree structure include: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

In one embodiment, the step of setting attributes of the nodes where the directories or files are located includes:

when enumerating one directory, if enumeration is finished, setting an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the

directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

In one embodiment, the step of recording a scanning progress of the current virus scanning includes:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

Further, after the step of beginning the current virus scanning according to the scanning progress, the method also includes:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

In addition, after the step of detecting a system status, the method further includes:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.

In another aspect of the invention, an apparatus for virus scanning includes a detection module configured to detect a status of a system; and a first scanning module configured to, when the detection module detects that the system status is idle, if current virus scanning has begun, continue the current virus scanning, and if the current virus scanning does not begin, acquire a scanning progress of previous virus scanning, begin the current virus scanning according to the scanning progress, and record a scanning progress of the current virus scanning.

In one embodiment, the detection module includes a detection unit configured to detect whether it is in an input status or a full-screen status, and detect current occupancy of

system resources; a first determination unit configured to determine, if the detection unit detects that it is in the input status or the full-screen status, that the detected system status is busy; a second determination unit configured to determine, if the detection unit detects that it is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and a third determination unit configured to determine, if the detection unit detects that it is not in the input status and the full-screen status, when current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

Additionally, the apparatus further includes a first enumeration module configured to enumerate all hard disk partitions, and add the hard disk partitions to a tree structure, in which attributes of each node of the tree structure include: whether it is a file, whether enumeration is finished, and whether scanning is finished; and a second enumeration module configured to enumerate all directories or files in each hard disk partition, add the directories or files in the hard disk partitions as nodes to the tree structure, set attributes of the nodes where the directories or files are located, and add the files to a scan queue.

Further, the second enumeration module is configured to, when enumerating one directory, if enumeration is finished, set an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, set the attribute of the node where the directory is located as ENUMERATION UNFINISHED; when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, set the attribute of the node where the directory is located as SCANNING UNFINISHED; and when scanning one file, if scanning of the file is finished, set an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, set the attribute of the node where the file is located as SCANNING UNFINISHED.

In one embodiment, the first scanning module includes:

located labeled as SCANNING FINISHED.

Further, the apparatus also includes a second scanning module configured to, when the detection module detects that the system status is busy, if the current virus scanning does not begin, wait for the current virus scanning, and if the current virus scanning has begun, reduce the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stop the current virus scanning, and record a scanning progress of the current virus scanning.

In yet another aspect of the invention, the non-transitory computer-readable medium storing instructions which, when executed by one or more processors, cause the foregoing disclosed apparatus to perform the foregoing disclosed method for performing virus scanning.

The beneficial effects brought about by the technical solutions according to the embodiments of the present invention are as follows: by detecting a status of a system, the scanning speed can be reduced or the scanning can be stopped when the system status is busy, and virus scanning is performed when the system status is idle, so that the occupancy of the system by the virus scanning can be adjusted and the user experience can be improved; and scanning can continue according to a previous scanning progress during the virus scanning, so that unnecessary scanning time can be reduced greatly.

These and other aspects of the present invention will become apparent from the following description of the preferred embodiment taken in conjunction with the following drawings, although variations and modifications therein is affected without departing from the spirit and scope of the novel concepts of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate one or more embodiments of the invention and, together with the written description, serve to explain the principles of the invention. Wherever possible, the same reference numbers are used throughout the drawings to refer to the same or like elements of an embodiment. The drawings do not limit the present invention to the specific embodiments disclosed and described herein. The drawings are

CLAIMS

What is claimed is:

1. A method for virus scanning, comprising:

detecting a status of a system; and

when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning has not begin, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the acquired scanning progress, and recording a scanning progress of the current virus scanning.

2. The method according to claim 1, wherein the step of detecting the status of the system comprises:

detecting whether the system is in an input status or a full-screen status, and detecting a current occupancy of system resources;

determining, if the system is in the input status or the full-screen status, that the detected status of the system is busy;

determining, if the system is not in the input status and the full-screen status, when the detected current occupancy of the system resources is greater than a predetermined occupancy, that the detected status of the system is busy; and

determining, if the system is not in the input status and the full-screen status, when the current occupancy of the system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

3. The method according to claim 1, before the step of detecting the status of the system, further comprising:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise:

whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

4. The method according to claim 3, wherein the step of setting attributes of the nodes where the directories or files are located comprises:

when enumerating one directory, if enumeration is finished, setting an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, setting the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, setting the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, setting an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, setting the attribute of the node where the file is located as SCANNING UNFINISHED.

5. The method according to claim 4, wherein the step of beginning the current virus scanning according to the scanning progress comprises:

performing depth-first traversal on the tree structure, and checking whether a node has not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

if a node has not been scanned, determining whether the node is the node

where files are located, if yes, adding the node to the scan queue, and otherwise, continuing depth-first traversal of all sub-nodes of the node;

if a node has not been enumerated, enumerating a node where the directory is located, adding files enumerated under the node where the directory is located to the scan queue, adding sub-directories enumerated under the node where the directory is located to the tree structure, then recursively traversing the node where the directory is located, and after enumeration of the node where the directory is located is finished, labeling the node where the directory is located as ENUMERATION FINISHED; and

scanning files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, searching for a node where the file is located in the tree structure, setting an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

6. The method according to claim 5, wherein the step of recording a scanning progress of the current virus scanning comprises:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

7. The method according to claim 5, after the step of beginning the current virus scanning according to the scanning progress, further comprising:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

8. The method according to claim 1, after the step of detecting the status of the system, further comprising:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.

9. An apparatus for virus scanning, comprising:

a detection module configured to detect a status of a system; and

a first scanning module configured to, when the detection module detects that the status of the system is idle, if current virus scanning has begun, continue the current virus scanning, and if the current virus scanning does not begin, acquire a scanning progress of previous virus scanning, begin the current virus scanning according to the scanning progress, and record a scanning progress of the current virus scanning.

10. The apparatus according to claim 9, wherein the detection module comprises:

a detection unit configured to detect whether it is in an input status or a full-screen status, and detect current occupancy of system resources;

a first determination unit configured to determine, if the detection unit detects that the system is in the input status or the full-screen status, that the detected status of the system is busy;

a second determination unit configured to determine, if the detection unit detects that the system is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and

a third determination unit configured to determine, if the detection unit

detects that the system is not in the input status and the full-screen status, when the current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

11. The apparatus according to claim 9, further comprising:

a first enumeration module configured to enumerate all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

a second enumeration module configured to enumerate all directories or files in each hard disk partition, add the directories or files in the hard disk partitions as nodes to the tree structure, set attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

12. The apparatus according to claim 11, wherein the second enumeration module is further configured to:

when enumerating one directory, if enumeration is finished, set an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, set the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, set the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, set an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, set the attribute of the node where the file is located as

SCANNING UNFINISHED

13. The apparatus according to claim 12, wherein the first scanning module comprises:

a traversal unit configured to perform depth-first traversal on the tree structure, and check whether a node has not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

a first traversal subunit configured to determine, when the traversal unit detects that a node has not been scanned, whether the node is the node where files are located, if yes, add the node to the scan queue, and otherwise, continue depth-first traversal of all sub-nodes of the node;

a second traversal subunit configured to, when the traversal unit detects that a node has not been enumerated, enumerate a node where the directory is located, add files enumerated under the node where the directory is located to the scan queue, add sub-directories enumerated under the node where the directory is located to the tree structure, then recursively traverse the node where the directory is located, and after enumeration of the node where the directory is located is finished, label the node where the directory is located as ENUMERATION FINISHED; and

a scanning unit configured to scan files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, search for a node where the file is located in the tree structure, set an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED.

14. The apparatus according to claim 13, wherein the first scanning module further comprises:

a recording unit configured to, upon ending of the current virus scanning, according to the tree structure, record attributes of each directory enumerated or

traversed during the current virus scanning and whether the directory has been scanned, record attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, record whether the scanned file is a risk file, and when the file is a risk file, record a risk name and a hash value of the file.

15. The apparatus according to claim 13, wherein the first scanning module further comprises:

a deletion unit configured to delete all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

16. The apparatus according to claim 9, further comprising:

a second scanning module configured to, when the detection module detects that the status of the system is busy, if the current virus scanning does not begin, wait for the current virus scanning, and if the current virus scanning has begun, reduce the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stop the current virus scanning, and record a scanning progress of the current virus scanning.

17. A non-transitory computer-readable medium storing instructions which, when executed by one or more processors, cause an apparatus to perform a method for virus scanning, the method comprising:

detecting a status of a system; and

when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning has not begun, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the acquired scanning progress, and recording a scanning progress of the current virus scanning.

18. The non-transitory computer-readable medium according to claim 17, wherein the step of detecting the status of the system comprises:

detecting whether the system is in an input status or a full-screen status, and detecting a current occupancy of system resources;

determining, if the system is in the input status or the full-screen status, that the detected status of the system is busy;

determining, if the system is not in the input status and the full-screen status, when the detected current occupancy of the system resources is greater than a predetermined occupancy, that the detected status of the system is busy; and

determining, if the system is not in the input status and the full-screen status, when the current occupancy of the system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

19. The non-transitory computer-readable medium according to claim 17, wherein the method, before the step of detecting the status of the system, further comprises:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

20. The non-transitory computer-readable medium according to claim 19, wherein the step of setting attributes of the nodes where the directories or files are located comprises:

when enumerating one directory, if enumeration is finished, setting an

attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, setting the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, setting the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, setting an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, setting the attribute of the node where the file is located as SCANNING UNFINISHED.

21. The non-transitory computer-readable medium according to claim 20, wherein the step of beginning the current virus scanning according to the scanning progress comprises:

performing depth-first traversal on the tree structure, and checking whether a node has not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

if a node has not been scanned, determining whether the node is the node where files are located, if yes, adding the node to the scan queue, and otherwise, continuing depth-first traversal of all sub-nodes of the node;

if a node has not been enumerated, enumerating a node where the directory is located, adding files enumerated under the node where the directory is located to the scan queue, adding sub-directories enumerated under the node where the directory is located to the tree structure, then recursively traversing the node where the directory is located, and after enumeration of the node where the directory is located is finished, labeling the node where the directory is located as ENUMERATION FINISHED; and

scanning files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, searching for a node where the file is located in the tree structure, setting an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

22. The non-transitory computer-readable medium according to claim 21, wherein the step of recording a scanning progress of the current virus scanning comprises:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

23. The non-transitory computer-readable medium according to claim 21, wherein the method, after the step of beginning the current virus scanning according to the scanning progress, further comprises:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

24. The non-transitory computer-readable medium according to claim 17, wherein the method, after the step of detecting the status of the system, further comprises:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.

METHOD AND APPARATUS FOR VIRUS SCANNING

CROSS-REFERENCE TO RELATED APPLICATION

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BACKGROUND OF THE INVENTION

A computer virus refers to a set of instructions or program codes inserted into a computer program, which damages functions and/or data of computers, affects the use of computers, and is capable of self-replication. The computer virus is of parasitic, infectious, hidden, destructive, diversified, and so on, and causes great damages and destructions to the resources of computers.

In order to effectively detect a virus, conventionally, a virus scanning and killing method requires re-traversal of the entire hard disk and scanning each file in the hard disk at each time of virus scanning. If the user interrupts the current virus scanning, the re-traversal of virus scanning for the entire hard disk is required once again in the next virus scanning.

Therefore, a heretofore unaddressed need exists in the art to address the aforementioned deficiencies and inadequacies.

SUMMARY OF THE INVENTION

The invention is defined in the independent claims. Some optional features of the invention are defined in the dependent claims

As disclosed herein, a method includes detecting a status of a system; and when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning does not begin, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the scanning progress, and recording a scanning progress of the current virus scanning.

In one embodiment, the step of detecting the status of the system includes:

detecting whether it is in an input status or a full-screen status, and detecting current occupancy of system resources;

if it is in the input status or the full-screen status, determining that the detected system status is busy;

determining, if it is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and

determining, if it is not in the input status and the full-screen status, when the current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

Further, before the step of detecting the system status, the method may include:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, in which attributes of each node of the tree structure include: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

In one embodiment, the step of setting attributes of the nodes where the directories or files are located includes:

when enumerating one directory, if enumeration is finished, setting an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the

directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

In one embodiment, the step of recording a scanning progress of the current virus scanning includes:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

Further, after the step of beginning the current virus scanning according to the scanning progress, the method may also include:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

In addition, after the step of detecting a system status, the method may further include:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.

As also disclosed herein an apparatus for virus scanning includes a detection module configured to detect a status of a system; and a first scanning module configured to, when the detection module detects that the system status is idle, if current virus scanning has begun, continue the current virus scanning, and if the current virus scanning does not begin, acquire a scanning progress of previous virus scanning, begin the current virus scanning according to the scanning progress, and record a scanning progress of the current virus scanning.

In one embodiment, the detection module includes a detection unit configured to detect whether it is in an input status or a full-screen status, and detect current occupancy of

system resources; a first determination unit configured to determine, if the detection unit detects that it is in the input status or the full-screen status, that the detected system status is busy; a second determination unit configured to determine, if the detection unit detects that it is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and a third determination unit configured to determine, if the detection unit detects that it is not in the input status and the full-screen status, when current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

Additionally, the apparatus may further include a first enumeration module configured to enumerate all hard disk partitions, and add the hard disk partitions to a tree structure, in which attributes of each node of the tree structure include: whether it is a file, whether enumeration is finished, and whether scanning is finished; and a second enumeration module configured to enumerate all directories or files in each hard disk partition, add the directories or files in the hard disk partitions as nodes to the tree structure, set attributes of the nodes where the directories or files are located, and add the files to a scan queue.

Further, the second enumeration module may be configured to, when enumerating one directory, if enumeration is finished, set an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, set the attribute of the node where the directory is located as ENUMERATION UNFINISHED; when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, set the attribute of the node where the directory is located as SCANNING UNFINISHED; and when scanning one file, if scanning of the file is finished, set an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, set the attribute of the node where the file is located as SCANNING UNFINISHED.

In one embodiment, the first scanning module includes:

located labeled as SCANNING FINISHED.

Further, the apparatus may also include a second scanning module configured to, when the detection module detects that the system status is busy, if the current virus scanning does not begin, wait for the current virus scanning, and if the current virus scanning has begun, reduce the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stop the current virus scanning, and record a scanning progress of the current virus scanning.

In yet another aspect of the invention, the non-transitory computer-readable medium storing instructions which, when executed by one or more processors, cause the foregoing disclosed apparatus to perform the foregoing disclosed method for performing virus scanning.

The beneficial effects which may be brought about by the technical solutions according to the embodiments of the present invention are as follows: by detecting a status of a system, the scanning speed can be reduced or the scanning can be stopped when the system status is busy, and virus scanning is performed when the system status is idle, so that the occupancy of the system by the virus scanning can be adjusted and the user experience can be improved; and scanning can continue according to a previous scanning progress during the virus scanning, so that unnecessary scanning time can be reduced greatly.

These and other aspects of the present invention will become apparent from the following description of the preferred embodiment taken in conjunction with the following drawings, although variations and modifications therein is affected without departing from the spirit and scope of the novel concepts of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate one or more embodiments of the invention and, together with the written description, serve to explain the principles of the invention. Wherever possible, the same reference numbers are used throughout the drawings to refer to the same or like elements of an embodiment. The drawings do not limit the present invention to the specific embodiments disclosed and described herein. The drawings are

CLAIMS

What is claimed is:

1. A method for virus scanning, comprising:

detecting a status of a system; and

when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning has not begin, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the acquired scanning progress, and recording a scanning progress of the current virus scanning,

wherein the step of detecting the status of the system comprises:

detecting whether the system is in an input status or a full-screen status, and detecting a current occupancy of system resources;

determining, if the system is in the input status or the full-screen status, that the detected status of the system is busy;

determining, if the system is not in the input status and the full-screen status, when the detected current occupancy of the system resources is greater than a predetermined occupancy, that the detected status of the system is busy; and

determining, if the system is not in the input status and the full-screen status, when the current occupancy of the system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

2. The method according to claim 1, before the step of detecting the status of the system, further comprising:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes

where the directories or files are located, and adding the files to a scan queue.

3. The method according to claim 2, wherein the step of setting attributes of the nodes where the directories or files are located comprises:

when enumerating one directory, if enumeration is finished, setting an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, setting the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, setting the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, setting an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, setting the attribute of the node where the file is located as SCANNING UNFINISHED.

4. The method according to claim 3, wherein the step of beginning the current virus scanning according to the scanning progress comprises:

performing depth-first traversal on the tree structure, and checking whether a node has not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

if a node has not been scanned, determining whether the node is the node where files are located, if yes, adding the node to the scan queue, and otherwise, continuing depth-first traversal of all sub-nodes of the node;

if a node has not been enumerated, enumerating a node where the directory is located, adding files enumerated under the node where the directory is located to the scan queue, adding sub-directories enumerated under the node where the directory is located to the tree

structure, then recursively traversing the node where the directory is located, and after enumeration of the node where the directory is located is finished, labeling the node where the directory is located as ENUMERATION FINISHED; and

scanning files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, searching for a node where the file is located in the tree structure, setting an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

5. The method according to claim 4, wherein the step of recording a scanning progress of the current virus scanning comprises:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

6. The method according to claim 4, after the step of beginning the current virus scanning according to the scanning progress, further comprising:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

7. The method according to claim 1, after the step of detecting the status of the system, further comprising:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first

predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.

8. An apparatus for virus scanning, comprising:

a detection module configured to detect a status of a system; and

a first scanning module configured to, when the detection module detects that the status of the system is idle, if current virus scanning has begun, continue the current virus scanning, and if the current virus scanning does not begin, acquire a scanning progress of previous virus scanning, begin the current virus scanning according to the scanning progress, and record a scanning progress of the current virus scanning,

wherein the detection module comprises:

a detection unit configured to detect whether it is in an input status or a full-screen status, and detect current occupancy of system resources;

a first determination unit configured to determine, if the detection unit detects that the system is in the input status or the full-screen status, that the detected status of the system is busy;

a second determination unit configured to determine, if the detection unit detects that the system is not in the input status and the full-screen status, when the detected current occupancy of system resources is greater than predetermined occupancy, that the detected system status is busy; and

a third determination unit configured to determine, if the detection unit detects that the system is not in the input status and the full-screen status, when the current occupancy of system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

9. The apparatus according to claim 8, further comprising:

a first enumeration module configured to enumerate all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise: whether it is a file, whether enumeration is finished, and whether

scanning is finished; and

a second enumeration module configured to enumerate all directories or files in each hard disk partition, add the directories or files in the hard disk partitions as nodes to the tree structure, set attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

10. The apparatus according to claim 9, wherein the second enumeration module is further configured to:

when enumerating one directory, if enumeration is finished, set an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, set the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, set the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, set an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, set the attribute of the node where the file is located as SCANNING UNFINISHED.

11. The apparatus according to claim 10, wherein the first scanning module comprises:

a traversal unit configured to perform depth-first traversal on the tree structure, and check whether a node has not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

a first traversal subunit configured to determine, when the traversal unit detects that a node has not been scanned, whether the node is the node where files are located, if yes, add the node to the scan queue, and otherwise, continue depth-first traversal of all sub-nodes of

the node;

a second traversal subunit configured to, when the traversal unit detects that a node has not been enumerated, enumerate a node where the directory is located, add files enumerated under the node where the directory is located to the scan queue, add sub-directories enumerated under the node where the directory is located to the tree structure, then recursively traverse the node where the directory is located, and after enumeration of the node where the directory is located is finished, label the node where the directory is located as ENUMERATION FINISHED; and

a scanning unit configured to scan files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, search for a node where the file is located in the tree structure, set an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, set an attribute of a node where the directory is located as SCANNING FINISHED.

12. The apparatus according to claim 11, wherein the first scanning module further comprises:

a recording unit configured to, upon ending of the current virus scanning, according to the tree structure, record attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, record attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, record whether the scanned file is a risk file, and when the file is a risk file, record a risk name and a hash value of the file.

13. The apparatus according to claim 11, wherein the first scanning module further comprises:

a deletion unit configured to delete all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

14. The apparatus according to claim 8, further comprising:

a second scanning module configured to, when the detection module detects that the status of the system is busy, if the current virus scanning does not begin, wait for the current virus scanning, and if the current virus scanning has begun, reduce the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stop the current virus scanning, and record a scanning progress of the current virus scanning.

15. A non-transitory computer-readable medium storing instructions which, when executed by one or more processors, cause an apparatus to perform a method for virus scanning, the method comprising:

detecting a status of a system; and

when the status of the system is idle, if current virus scanning has begun, continuing the current virus scanning, and if the current virus scanning has not begun, acquiring a scanning progress of previous virus scanning, beginning the current virus scanning according to the acquired scanning progress, and recording a scanning progress of the current virus scanning,

wherein the step of detecting the status of the system comprises:

detecting whether the system is in an input status or a full-screen status, and detecting a current occupancy of system resources;

determining, if the system is in the input status or the full-screen status, that the detected status of the system is busy;

determining, if the system is not in the input status and the full-screen status, when the detected current occupancy of the system resources is greater than a predetermined occupancy, that the detected status of the system is busy; and

determining, if the system is not in the input status and the full-screen status, when the current occupancy of the system resources detected within a second predetermined time is less than or equal to the predetermined occupancy, that the detected system status is idle.

16. The non-transitory computer-readable medium according to claim 15, wherein the method, before the step of detecting the status of the system, further comprises:

enumerating all hard disk partitions, and adding the hard disk partitions to a tree structure, wherein attributes of each node of the tree structure comprise: whether it is a file, whether enumeration is finished, and whether scanning is finished; and

enumerating all directories or files in each hard disk partition, adding the directories or files in the hard disk partitions as nodes to the tree structure, setting attributes of the nodes where the directories or files are located, and adding the files to a scan queue.

17. The non-transitory computer-readable medium according to claim 16, wherein the step of setting attributes of the nodes where the directories or files are located comprises:

when enumerating one directory, if enumeration is finished, setting an attribute of a node where the directory is located as ENUMERATION FINISHED, and if the enumeration is unfinished, setting the attribute of the node where the directory is located as ENUMERATION UNFINISHED;

when scanning files or sub-directories under one directory, if scanning of all files and sub-directories under the directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED, and if the scanning of all the files or sub-directories under the directory is unfinished, setting the attribute of the node where the directory is located as SCANNING UNFINISHED; and

when scanning one file, if scanning of the file is finished, setting an attribute of a node where the file is located as SCANNING FINISHED, and if the scanning of the file is unfinished, setting the attribute of the node where the file is located as SCANNING UNFINISHED.

18. The non-transitory computer-readable medium according to claim 17, wherein the step of beginning the current virus scanning according to the scanning progress comprises:

performing depth-first traversal on the tree structure, and checking whether a node has

not been scanned or enumerated following the node corresponding to the scanning progress in the tree structure;

if a node has not been scanned, determining whether the node is the node where files are located, if yes, adding the node to the scan queue, and otherwise, continuing depth-first traversal of all sub-nodes of the node;

if a node has not been enumerated, enumerating a node where the directory is located, adding files enumerated under the node where the directory is located to the scan queue, adding sub-directories enumerated under the node where the directory is located to the tree structure, then recursively traversing the node where the directory is located, and after enumeration of the node where the directory is located is finished, labeling the node where the directory is located as ENUMERATION FINISHED; and

scanning files in the scan queue according to the scanning progress;

wherein, after scanning of one file is finished, searching for a node where the file is located in the tree structure, setting an attribute of the node where the file is located as SCANNING FINISHED, and after scanning of all files and sub-directories under one directory is finished, setting an attribute of a node where the directory is located as SCANNING FINISHED.

19. The non-transitory computer-readable medium according to claim 18, wherein the step of recording a scanning progress of the current virus scanning comprises:

upon ending of the current virus scanning, according to the tree structure, recording attributes of each directory enumerated or traversed during the current virus scanning and whether the directory has been scanned, recording attributes of each file enumerated or traversed during the current virus scanning and whether the file has been scanned, recording whether the scanned file is a risk file, and when the file is a risk file, recording a risk name and a hash value of the file.

20. The non-transitory computer-readable medium according to claim 18, wherein the method, after the step of beginning the current virus scanning according to the scanning

progress, further comprises:

deleting all files and sub-directories under the node where the directory is located labeled as SCANNING FINISHED.

21. The non-transitory computer-readable medium according to claim 15, wherein the method, after the step of detecting the status of the system, further comprises:

when the system status is busy, if the current virus scanning does not begin, waiting for the current virus scanning, and if the current virus scanning has begun, reducing the speed of the current virus scanning, and when system statuses detected within a first predetermined time are all busy, stopping the current virus scanning, and recording a scanning progress of the current virus scanning.