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- (71) Applicant (for all designated States except US): INTERNATIONAL BUSINESS MACHINES CORPORATION [US/US]; New Orchard Road, Armonk, NY 10504 (US).

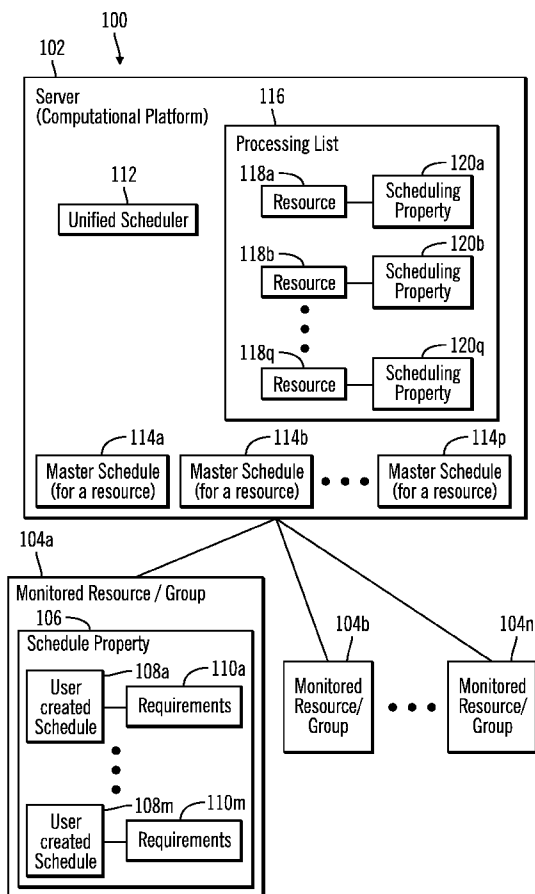
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): HUMPHRIES, Marshall, Lee [US/US]; 15429 Fisher Island Drive, Austin, TX 78717 (US).
- (74) Agent: WATSON, Justine, Nicola; IBM United Kingdom Limited, Intellectual Property Law, Hursley Park, Winchester Hampshire SO21 2JN (GB).
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- (71) Applicant (for MG only): IBM UNITED KINGDOM LIMITED [GB/GB]; PO Box 41, Portsmouth Hampshire PO6 3AU (GB).

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(54) Title: MANAGING SCHEDULES FOR MONITORED RESOURCES



(57) Abstract: Provided are a method, system, article of manufacture, and a computer readable medium, wherein a plurality of user defined schedules are received for collecting data on a plurality of resources. A schedule is generated for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource. Operations are executed on the at least one resource in accordance with the generated schedule.

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MANAGING SCHEDULES FOR MONITORED RESOURCES**BACKGROUND**5 Field

The disclosure relates to a method, system, and article of manufacture for managing schedules for monitored resources.

10 Background

15 A group of resources, such as, printers, scanners, workstations, etc., may be managed by one or more management applications in a computational environment. Management applications may collect data about resources, such as, printers, scanners, workstations, etc., that are managed by the management applications. In certain situations, the data about resources may be collected continuously in real time, but in many situations the continuous collection of data about resources may not be practical. As a result, end-users may create a plurality of schedules for
20 collecting data about a plurality of resources, and the plurality of resources may be executed by a scheduler application to collect data.

If a plurality of software applications monitor the same resource, then a plurality of schedules for collecting data from the same resource
25 may potentially be created. If a plurality of schedules attempt to use the same resource at the same time there may be conflicts and certain schedules may be unable to run or may collect incorrect data.

30 Users may find it difficult to determine that different schedules may be in conflict or that necessary data is not being collected frequently enough to meet the needs of the users. In certain situations, data collection may impact the performance of computing environments by utilizing resources that may be used for other operations. Inefficient scheduling may lead to data collection occurring more often than required
35 on certain resources, and may also lead to data collection occurring less frequently than needed on others. If data collections occur more frequently than required, then computing time is wasted. Also, if data collections occur less frequently than required then the data collected may be stale and may not help the software or the user to make informed
40 management decisions.

SUMMARY OF THE DESCRIBED EMBODIMENTS

5 Provided are a method, system, article of manufacture, and a
computer readable medium, wherein a plurality of user defined schedules
are received for collecting data on a plurality of resources. A schedule
is generated for data collection on at least one resource, based on
processing the plurality of user defined schedules to eliminate redundant
data collection on the at least one resource. Operations are executed on
10 the at least one resource in accordance with the generated schedule.

In additional embodiments, the user defined schedules provide
indications on selected resources to be monitored for collecting the data,
a frequency for collecting the data, and properties of the data to be
15 collected.

In yet additional embodiments, the operations on the at least one
resource in accordance with the generated schedule are first operations,
wherein the executing of the first operations in accordance with the
20 generated schedule consume less processing time in comparison to execution
of second operations that monitor the at least one resource based directly
on the user defined schedules.

In further embodiments, the plurality of resources may be included
25 in a plurality of groups, and wherein the user defined schedules indicate
collection of data on the plurality of groups. A determination is made as
to whether the user defined schedules indicating the collection of data on
the plurality of groups cause conflicts in collecting the data on the
plurality of resources. The conflicts are eliminated in the generated
30 schedule.

In yet further embodiments, collections of similar but not identical
requests in the user defined schedules are grouped. A collection of the
similar requests are combined into a single entity in the generated
35 schedule.

In certain further embodiments, an indication is received that a
user defined schedule has been modified. The schedule is rebuilt based on
the modified user defined schedule and other unmodified user defined
40 schedules.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Embodiments of the present invention will now be described, by way of example only, and with reference to the following drawings:

FIG. 1 illustrates a block diagram of a computing environment in accordance with certain embodiments;

10 FIG. 2 illustrates a block diagram that shows how a master schedule for a resource is generated from a plurality of user defined schedules, in accordance with certain embodiments;

15 FIG. 3 illustrates a first flowchart that shows how a data collection schedule is created, in accordance with certain embodiments;

FIG. 4 illustrates a second flowchart that shows how a master schedule is built, in accordance with certain embodiments;

20 FIG. 5 illustrates a third flowchart that shows how schedules are managed for monitored resources, in accordance with certain embodiments; and

25 FIG. 6 illustrates a system in which certain embodiments are implemented, in accordance with certain embodiments.

Like reference numbers represent corresponding parts throughout.

DETAILED DESCRIPTION

30 In the following description, reference is made to the accompanying drawings which form a part hereof and which illustrate several embodiments. It is understood that other embodiments may be utilized and structural and operational changes may be made.

35 If data collection schedules are created independently of resources (or groups of resources) then a plurality of schedules may be created to monitor or determine data about the same resource and conflicts may occur. In certain embodiments schedules are associated with groups that the
40 schedules collect data for, and a master schedule is created to determine

when to actually run data collection for each resource being monitored. The master schedule may reduce or eliminate conflicts and duplications.

FIG. 1 illustrates a block diagram of a computing environment 100 in accordance with certain embodiments.

At least one computational platform 102, where in certain embodiments the computational platform 102 may comprise a server, is coupled to one or more resources 104a, 104b, ... ,104n. While FIG. 1 indicates the computational platform 102 to be a server, in alternative embodiments the computational platform 102 may comprise any suitable computational platform, including those presently known in the art, such as, personal computers, workstations, mainframes, midrange computers, network appliances, palm top computers, telephony devices, blade computers, hand held computers, etc. The resources 104a...104n may comprise any suitable resource, including those presently known in the art, such as, printers, scanners, fax machines, disk drives, storage devices, peripheral devices, computing devices, routers, etc. The resources 104a...104n are not limited to hardware resources and may also comprise software resources such a lists, queues, stacks, databases, and other data structures in computing devices. The coupling of the server 102 to the resources 104a...104n may be direct or may be via any network known in the art, such as a Storage Area Network (SAN), Local Area Network (LAN), Wide Area Network (WAN), the Internet, an Intranet, etc. In certain embodiments a monitored resource, such as the monitored resource 104a, may represent a group of resources rather than a single resource.

Various processes and tasks may perform data collection operations on the resources 104a...104n. In exemplary embodiments, the processes and tasks that perform data collection operations on the resources may be scheduled to run at certain times or at certain intervals. For example, in certain embodiments in which the monitored resource 104a is a printer, a task may be scheduled at 3 PM to collect data on the number of pages printed in the last hour on the resource 104a.

The plurality of resources 104a...104n are managed or monitored by the server 102, and in certain embodiments the plurality of resources

104a...104n may be referred to as monitored resources 104a...104n. A schedule property, such as exemplary schedule property 106 may be associated with a monitored resource, such as the monitored resource 104a. Other schedule properties may be associated with other monitored resources. A schedule property, such as the schedule property 106, may include one or more user created schedules 108a...108m and corresponding requirements 110a...110m.

For example an exemplary user created schedule may have a requirement that data collection be performed on a resource four times a day.

The server 102 may include applications and/or data structures corresponding to a unified scheduler 112, a plurality of master schedules 114a, 114b,...,114p, and a processing list 116. The unified scheduler 112 processes a plurality of user created schedules for a plurality of monitored resources 104a...104n and schedules operations on the monitored resources 104a...104n. The master schedules 114a...114p each correspond to a schedule for a monitored resource that has been generated by the unified scheduler 112 from the user created schedules by eliminating conflicts and redundancies. For example, master schedule 114a may include schedules for a first resource, and master schedule 114b may include schedules for a second resource.

The processing list 116 is a data structure that includes a plurality of resources 118a, 118b, ...118q and corresponding scheduling properties 120a, 120b,...120q, where the resources 118a...118q may be selected from the monitored resources 104a...104n. The processing list 116 is used by the unified scheduler 112 to generate the master schedules 114a...114p from the user created schedules.

In certain embodiments illustrated in FIG. 1, the unified scheduler 112 processes the user created schedules for the resources 104a...104n, where the user created schedules may have conflicts or unnecessary repetition of operations on the resources 104a...104n. In certain embodiments, the unified scheduler 112 reduces or eliminates the conflicts and unnecessary repetition of operations on the resources while scheduling operations on the resources 104a...104n, i.e., the unified scheduler 112 schedules operations on the monitored resources 104a...104n by eliminating repetitions and redundancies in the user created schedules.

FIG. 2 illustrates a block diagram that shows data structures implemented in the computing environment 100, in accordance with certain embodiments.

5 In an exemplary embodiment, user created schedules 200 may include exemplary requirements 202a, 202b, where exemplary requirement 202a requests collection of data on free space in resource A 204 four times a day, and exemplary requirement 202b requests collection of data on free space in resource A 204 twice a day. For example, two different user may
10 have generated the user created schedules 200, or a single user may have for two different tasks generated the user created schedules 200.

The unified scheduler 112 processes the requirements 202a, 202b of the exemplary user created schedules 200, and generates a master schedule 206 for resource A 204. An exemplary master schedule 206 may include an
15 indication 208 to collect data on free space in resource A at 12 AM, 6AM, 12 PM, and 6PM. The indication 208 in the master schedule 106 satisfies the exemplary requirement 202a of collecting data four times a day, and also satisfies the exemplary requirement 202b of collecting data two times
20 a day.

Certain embodiments illustrated in FIG. 2 allow users to create schedules that reduce or eliminates overlaps and conflicts. The unified scheduler 112 generates a master schedule for a resource based on the user
25 created schedules. The master schedule generated by the unified scheduler may reduce or eliminate overlaps and conflicts and may also satisfy the requirements of the user created schedules.

FIG. 3 illustrates a first flowchart that shows how a data
30 collection schedule is created, in accordance with certain embodiments. The operations illustrated in the flowchart of FIG. 3 may be implemented in the unified scheduler 112 or in any other application that executes on the server 102. The data collection schedule created by the unified scheduler 112 may correspond to the master schedules 114a...114p.
35

Control starts at block 300, where the unified scheduler 112 on the server 102 receives schedules for one or more resources 104a...104n or for one or more groups of resources created by one or more users. For example, in certain embodiments the schedules received by the unified scheduler 112
40 in block 300 may include the user created schedules 108a...108n.

The unified scheduler 112 stores (at block 302) the schedules and the properties of the schedules including the resources the schedules are expected to run on, in a repository of the server 102. For example, in certain embodiments, the schedules may run on the managed resources 104a...104n. Additionally, the unified scheduler 112 stores (at block 304) a copy of the list of resources corresponding to the schedules in the processing list 116.

Control proceeds to block 306, where the unified scheduler 112 determines whether the type of data collection or operation requested is appropriate for a selected resource in the processing list. For example, if the number of pages printed in the last hour are requested for a printer then the request may be determined to be appropriate, whereas if the number of pages printed in the last hour are requested for a scanner then the request may be determined to be inappropriate if the scanner does not support printing. If at block 306, a determination is made that the type of data collection requested is appropriate, then control proceeds to block 306 where a determination is made as to whether all resources in the processing list 116 have been processed. If not, control returns to block 306, for determining whether the type of data collection requested is appropriate for a next selected resource of the processing list 116.

If at block 306, the unified scheduler 112 determines that the type of data collection requested is inappropriate for a selected resource, then the selected resource is removed from the processing list 116. For example, in certain embodiments the resource 118b may be removed from the processing list 116.

If at block 308 a determination is made that all resources, such as resources 118a...118n, in the processing list 208, have been processed then the unified scheduler 112 determines (at block 310) whether any resource remains on the processing list 116. The resources remaining on the processing list have appropriate data collection requests associated with the resources.

If the unified scheduler 112 determines (at block 310) that a resource remains on the processing list 116, then for each resource remaining in the processing list 116 the unified scheduler 112 builds or rebuilds (at block 312) the master schedule for the resource. For example, the unified scheduler 112 may build or rebuild the master schedule 114a for a resource, such as resource 104a. Once the master schedules have been built for all the resources remaining the processing list 116, the unified

scheduler 112 exits (at block 316) the process of creating the master schedules.

5 If at block 310, the unified scheduler 112 determines that no resource remains on the processing list then the unified scheduler 112 exits (at block 312) the process of creating the master schedules.

10 Certain embodiments illustrated in FIG. 3 show the creation of master schedules 114a...114p corresponding to monitored resources 104a...104n by the unified scheduler 112. The master schedule, such as master schedule 114a, for a resource may be created based on user created schedules 108a...108m. In certain embodiments, errors, duplications, redundancies, etc., may be removed while the master schedule for a resource is being generated by the unified scheduler 112.

15 FIG. 4 illustrates a second flowchart that illustrates operations for creating master schedules, in accordance with certain embodiments. The operations illustrated in the flowchart of FIG. 4 may be implemented in the unified scheduler 112 or in any other application that executes on the server 102.

20 Control starts at block 400, where the unified scheduler 112 processes a list of schedules, such as user created schedules 108a...108m, to determine the type of data gathering required and the frequency of data gathering. For example, in certain embodiments the data gathering required may include exemplary ping, scan, or scan with custom profile operations. Other embodiments may include other types of data gathering operations.

30 The unified scheduler 112 removes (at block 402) duplicates from the list of schedules. For example, if two schedules both request data collection on resource *B* four times a day, then instead of collecting data on resource *B* eight times a day, the two schedules may be merged to remove duplicates and data may be collected on resource *B* four times a day.

35 In certain embodiments, the unified scheduler 112 may create (at block 404) collections of similar but not identical requests. For example, a first scan request that is a default scan request to be performed twice a day with any profile, may be grouped in the same collection with a second scan request that is a scan request with a certain specific profile.

40

Control proceeds to block 406, where the unified scheduler 112 processes the collections by combining each collection into a single entity by retaining only the most stringent requirements for data collection. For example, the first scan request and the second scan
5 request may be combined to into one scan request that runs twice a day with the specific profile. In certain alternative embodiments, user specified capacity thresholds for processing of schedules and resources may also be included.

10 The unified scheduler 112 creates (at block 408) a master schedule for a resource based on the results of combining the requested data collection requested by users.

Subsequent to the creation of the master schedule, when the unified
15 scheduler 112 builds the list of schedules to run, the unified scheduler 112 builds the schedules from the master schedules 114a...114p rather than from the individual schedules 108a...108m that were created by end users. Certain embodiments allow the end users to specify what type of data gathering is needed based on groups of resources, and allows a management
20 software including the unified scheduler 112 on the server 102 to gather the data without redundant monitoring of the resources 104a...104n.

Should a user decide at a later time to delete a schedule property, such as schedule property 106, from a group, then a request is sent to the
25 server 102 to delete the schedule. The unified scheduler 112 removes the affected schedule from the schedule property of each resource against which the schedule was supposed to run. The unified scheduler 112 rebuilds the master schedule for each resource affected by the removal of the affected schedule.

30 FIG. 5 illustrates a third flowchart that illustrates how schedules are managed for monitored resources, in accordance with certain embodiments. The operations illustrated in the flowchart of FIG. 5 may be implemented in the unified scheduler 112 or in any other application that
35 executes on the server 102.

Control starts at block 500, where the unified scheduler 112 receives a plurality of user defined schedules for collecting data on a plurality of resources. The unified scheduler 112 generates (at block 502)
40 a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource.

Control proceeds to block 504, where the unified scheduler 112 determines whether the user defined schedules indicating the collection of data on the plurality of groups cause conflicts in collecting the data on the plurality of resources. The unified scheduler 112 eliminates (at block 506) the conflicts in the generated schedule.

The unified scheduler 112 groups (at block 508) collections of similar but not identical requests in the user defined schedules. Additionally, the unified scheduler 112 may combine (at block 510) a collection of the similar requests into a single entity in the generated schedule.

Control proceeds to block 512, where the unified scheduler 112 executes operations on the at least one resource in accordance with the generated schedule. On receiving (at block 514) an indication that a user defined schedule has been modified, the unified scheduler rebuilds (at block 516) the schedule based on the modified user defined schedule and other unmodified user defined schedules.

Certain embodiments allow the collection of data across a plurality of groups of resources and potentially across a plurality of software products. It is ensured that data collection is handled without unnecessary repetitions and without conflicts. End-users avoid creating individual resource schedules and may specify what kind of data is needed by the end-users at the group level at which a plurality of resources may be grouped. Such groups may include heterogeneous resources or may include other groups. The usability for users may be improved.

Certain embodiments reduce wasteful use of computational resources in collecting data, and is effective in collecting data more reliably. Certain embodiments also allow complex groups of resources to be created one and then reused. There is no need to have one type of group for data collection and another for actions against the data.

Additional Embodiment Details

The described techniques may be implemented as a method, apparatus or article of manufacture involving software, firmware, micro-code, hardware and/or any combination thereof. The term "article of manufacture" as used herein refers to code or logic implemented in a medium, where such medium may comprise hardware logic [e.g., an integrated circuit chip, Programmable Gate Array (PGA), Application Specific Integrated Circuit

(ASIC), etc.] or a computer readable medium, such as magnetic storage medium (e.g., hard disk drives, floppy disks, tape, etc.), optical storage (CD-ROMs, optical disks, etc.), volatile and non-volatile memory devices [e.g., Electrically Erasable Programmable Read Only Memory (EEPROM), Read Only Memory (ROM), Programmable Read Only Memory (PROM), Random Access Memory (RAM), Dynamic Random Access Memory (DRAM), Static Random Access Memory (SRAM), flash, firmware, programmable logic, etc.]. Code in the computer readable medium is accessed and executed by a processor. The medium in which the code or logic is encoded may also comprise transmission signals propagating through space or a transmission media, such as an optical fiber, copper wire, etc. The transmission signal in which the code or logic is encoded may further comprise a wireless signal, satellite transmission, radio waves, infrared signals, Bluetooth, etc. The transmission signal in which the code or logic is encoded is capable of being transmitted by a transmitting station and received by a receiving station, where the code or logic encoded in the transmission signal may be decoded and stored in hardware or a computer readable medium at the receiving and transmitting stations or devices. Additionally, the "article of manufacture" may comprise a combination of hardware and software components in which the code is embodied, processed, and executed. Of course, those skilled in the art will recognize that many modifications may be made without departing from the scope of embodiments, and that the article of manufacture may comprise any information bearing medium. For example, the article of manufacture comprises a storage medium having stored therein instructions that when executed by a machine results in operations being performed.

Certain embodiments can take the form of an entirely hardware embodiment, an entirely software embodiment or an embodiment containing both hardware and software elements. In a preferred embodiment, the invention is implemented in software, which includes but is not limited to firmware, resident software, microcode, etc.

Furthermore, certain embodiments can take the form of a computer program product accessible from a computer usable or computer readable medium providing program code for use by or in connection with a computer or any instruction execution system. For the purposes of this description, a computer usable or computer readable medium can be any apparatus that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The medium can be an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system (or apparatus

or device) or a propagation medium. Examples of a computer-readable medium include a semiconductor or solid state memory, magnetic tape, a removable computer diskette, a random access memory (RAM), a read-only memory (ROM), a rigid magnetic disk and an optical disk. Current examples
5 of optical disks include compact disk - read only memory (CD-ROM), compact disk - read/write (CD-R/W) and DVD.

The terms "certain embodiments", "an embodiment", "embodiment", "embodiments", "the embodiment", "the embodiments", "one or more
10 embodiments", "some embodiments", and "one embodiment" mean one or more (but not all) embodiments unless expressly specified otherwise. The terms "including", "comprising", "having" and variations thereof mean "including but not limited to", unless expressly specified otherwise. The enumerated listing of items does not imply that any or all of the items are mutually
15 exclusive, unless expressly specified otherwise. The terms "a", "an" and "the" mean "one or more", unless expressly specified otherwise.

Devices that are in communication with each other need not be in continuous communication with each other, unless expressly specified
20 otherwise. In addition, devices that are in communication with each other may communicate directly or indirectly through one or more intermediaries. Additionally, a description of an embodiment with several components in communication with each other does not imply that all such components are
25 required. On the contrary a variety of optional components are described to illustrate the wide variety of possible embodiments.

Further, although process steps, method steps, algorithms or the like may be described in a sequential order, such processes, methods and algorithms may be configured to work in alternate orders. In other words,
30 any sequence or order of steps that may be described does not necessarily indicate a requirement that the steps be performed in that order. The steps of processes described herein may be performed in any order practical. Further, some steps may be performed simultaneously, in parallel, or concurrently.

When a single device or article is described herein, it will be apparent that more than one device/article (whether or not they cooperate) may be used in place of a single device/article. Similarly, where more
40 than one device or article is described herein (whether or not they cooperate), it will be apparent that a single device/article may be used in place of the more than one device or article. The functionality and/or the features of a device may be alternatively embodied by one or more

other devices which are not explicitly described as having such functionality/features. Thus, other embodiments need not include the device itself.

5 FIG. 6 illustrates a block diagram of a system 600 in which certain
embodiments may be implemented. In certain embodiments, the computational
platform shown in FIG. 1 such as the server 102 may be implemented in
accordance with the system 600. The system 600 may include a circuitry 602
10 that may in certain embodiments include a processor 604. The system 600
may also include a memory 606 (e.g., a volatile memory device), and
storage 608. Certain elements of the system 600 may or may not be found in
the computational platform 102. The storage 608 may include a non-volatile
memory device (e.g., EEPROM, ROM, PROM, RAM, DRAM, SRAM, flash, firmware,
15 programmable logic, etc.), magnetic disk drive, optical disk drive, tape
drive, etc. The storage 608 may comprise an internal storage device, an
attached storage device and/or a network accessible storage device. The
system 600 may include a program logic 610 including code 612 that may be
loaded into the memory 606 and executed by the processor 604 or circuitry
602. In certain embodiments, the program logic 610 including code 612 may
20 be stored in the storage 608. In certain other embodiments, the program
logic 610 may be implemented in the circuitry 602. Therefore, while Fig. 6
shows the program logic 610 separately from the other elements, the
program logic 610 may be implemented in the memory 606 and/or the
circuitry 602.

25 Certain embodiments may be directed to a method for deploying
computing instruction by a person or automated processing integrating
computer-readable code into a computing system, wherein the code in
combination with the computing system is enabled to perform the operations
30 of the described embodiments.

 At least certain of the operations illustrated in FIGs. 3, 4, and 5
may be performed in parallel as well as sequentially. In alternative
embodiments, certain of the operations may be performed in a different
35 order, modified or removed.

 Furthermore, many of the software and hardware components have been
described in separate modules for purposes of illustration. Such
components may be integrated into a fewer number of components or divided
40 into a larger number of components. Additionally, certain operations
described as performed by a specific component may be performed by other
components.

The data structures and components shown or referred to in FIGs. 1-6 are described as having specific types of information. In alternative embodiments, the data structures and components may be structured differently and have fewer, more or different fields or different functions than those shown or referred to in the figures.

Therefore, the foregoing description of the embodiments has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the embodiments to the precise form disclosed. Many modifications and variations are possible in light of the above teaching.

CLAIMS

1. A method, comprising:

5 receiving a plurality of user defined schedules for collecting data on a plurality of resources;

10 generating a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource; and

executing operations on the at least one resource in accordance with the generated schedule.

15 2. The method of claim 1, wherein the user defined schedules provide indications on selected resources to be monitored for collecting the data, a frequency for collecting the data, and properties of the data to be collected.

20 3. The method of claim 1 or 2, wherein the operations on the at least one resource in accordance with the generated schedule are first operations, and wherein the executing of the first operations in accordance with the generated schedule consume less processing time in comparison to execution of second operations that monitor the at least one
25 resource based directly on the user defined schedules.

30 4. The method of claim 1, 2 or 3 wherein the plurality of resources may be included in a plurality of groups, and wherein the user defined schedules indicate collection of data on the plurality of groups, the method further comprising:

35 determining whether the user defined schedules indicating the collection of data on the plurality of groups cause conflicts in collecting the data on the plurality of resources; and

eliminating the conflicts in the generated schedule.

5. The method of any preceding claim, further comprising:

40 grouping collections of similar but not identical requests in the user defined schedules; and

combining a collection of the similar requests into a single entity in the generated schedule.

5 6. The method of any preceding claim, further comprising:

receiving an indication that a user defined schedule has been modified; and

10 rebuilding the schedule based on the modified user defined schedule and other unmodified user defined schedules.

7. A system, comprising:

15 memory; and

processor coupled to the memory, wherein the processor is operable to:

20 receive a plurality of user defined schedules for collecting data on a plurality of resources;

25 generate a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource; and

execute operations on the at least one resource in accordance with the generated schedule.

30 8. The system of claim 7, wherein the user defined schedules provide indications on selected resources to be monitored for collecting the data, a frequency for collecting the data, and properties of the data to be collected.

35 9. The system of claim 7 or 8, wherein the operations on the at least one resource in accordance with the generated schedule are first operations, and wherein the executing of the first operations in accordance with the generated schedule consume less processing time in comparison to execution of second operations that monitor the at least one
40 resource based directly on the user defined schedules.

10. The system of claim 7, 8 or 9 wherein the plurality of resources may be included in a plurality of groups, and wherein the user defined

schedules indicate collection of data on the plurality of groups, wherein the processor is further operable to:

5 determine whether the user defined schedules indicating the collection of data on the plurality of groups cause conflicts in collecting the data on the plurality of resources; and

eliminate the conflicts in the generated schedule.

10 11. The system of claim 7, 8, 9 or 10 wherein the processor is further operable to:

15 group collections of similar but not identical requests in the user defined schedules; and

combine a collection of the similar requests into a single entity in the generated schedule.

20 12. The system of any of claims 7 to 11, wherein the processor is further operable to:

receive an indication that a user defined schedule has been modified; and

25 rebuild the schedule based on the modified user defined schedule and other unmodified user defined schedules.

30 13. An article of manufacture, wherein the article of manufacture is capable of performing operations on a machine, the operations comprising:

receiving a plurality of user defined schedules for collecting data on a plurality of resources;

35 generating a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource; and

processing the at least one resource in accordance with the generated schedule.

40 14. The article of manufacture of claim 13, wherein the user defined schedules provide indications on selected resources to be monitored for

collecting the data, a frequency for collecting the data, and properties of the data to be collected.

5 15. The article of manufacture of claim 13 or 14, wherein the processing of the at least one resource in accordance with the generated schedule are first processing operations, and wherein the executing of the first processing operations in accordance with the generated schedule consume less processing time in comparison to execution of second processing operations that monitor the at least one resource based directly on the user defined schedules.

10 16. The article of manufacture of claim 13, 14 or 15 wherein the plurality of resources may be included in a plurality of groups, and wherein the user defined schedules indicate collection of data on the plurality of groups, the operations further comprising:

15 determining whether the user defined schedules indicating the collection of data on the plurality of groups cause conflicts in collecting the data on the plurality of resources; and

20 eliminating the conflicts in the generated schedule.

17. The article of manufacture of claim 13, 14, 15 or 16 the operations further comprising:

25 grouping collections of similar but not identical requests in the user defined schedules; and

30 combining a collection of the similar requests into a single entity in the generated schedule.

18. The article of manufacture of any of claims 13 to 17, the operations further comprising:

35 receiving an indication that a user defined schedule has been modified; and

40 rebuilding the schedule based on the modified user defined schedule and other unmodified user defined schedules.

19. A method for deploying computing infrastructure, comprising integrating computer readable code into a computing system, wherein the code in combination with the computing system is capable of performing:

receiving a plurality of user defined schedules for collecting data on a plurality of resources;

5 generating a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource; and

10 executing operations on the at least one resource in accordance with the generated schedule.

20. The method of claim 19, wherein the user defined schedules provide indications on selected resources to be monitored for collecting the data, a frequency for collecting the data, and properties of the data to be collected.

15 21. The method of claim 19 or 20, wherein the operations on the at least one resource in accordance with the generated schedule are first operations, and wherein the executing of the first operations in accordance with the generated schedule consume less processing time in
20 comparison to execution of second operations that monitor the at least one resource based directly on the user defined schedules.

25 22. The method of claim 19, 20 or 21 wherein the plurality of resources may be included in a plurality of groups, and wherein the user defined schedules indicate collection of data on the plurality of groups, wherein the code in combination with the computing system is further capable of performing:

30 determining whether the user defined schedules indicating the collection of data on the plurality of groups cause conflicts in collecting the data on the plurality of resources;

eliminating the conflicts in the generated schedule.

35 23. The method of claim 19, 20, 21 or 22, wherein the code in combination with the computing system is capable of performing:

40 grouping collections of similar but not identical requests in the user defined schedules; and

combining a collection of the similar requests into a single entity in the generated schedule.

24. The method of any of claims 19 to 23, wherein the code in combination with the computing system is capable of performing:

5 receiving an indication that a user defined schedule has been modified; and

rebuilding the schedule based on the modified user defined schedule and other unmodified user defined schedules.

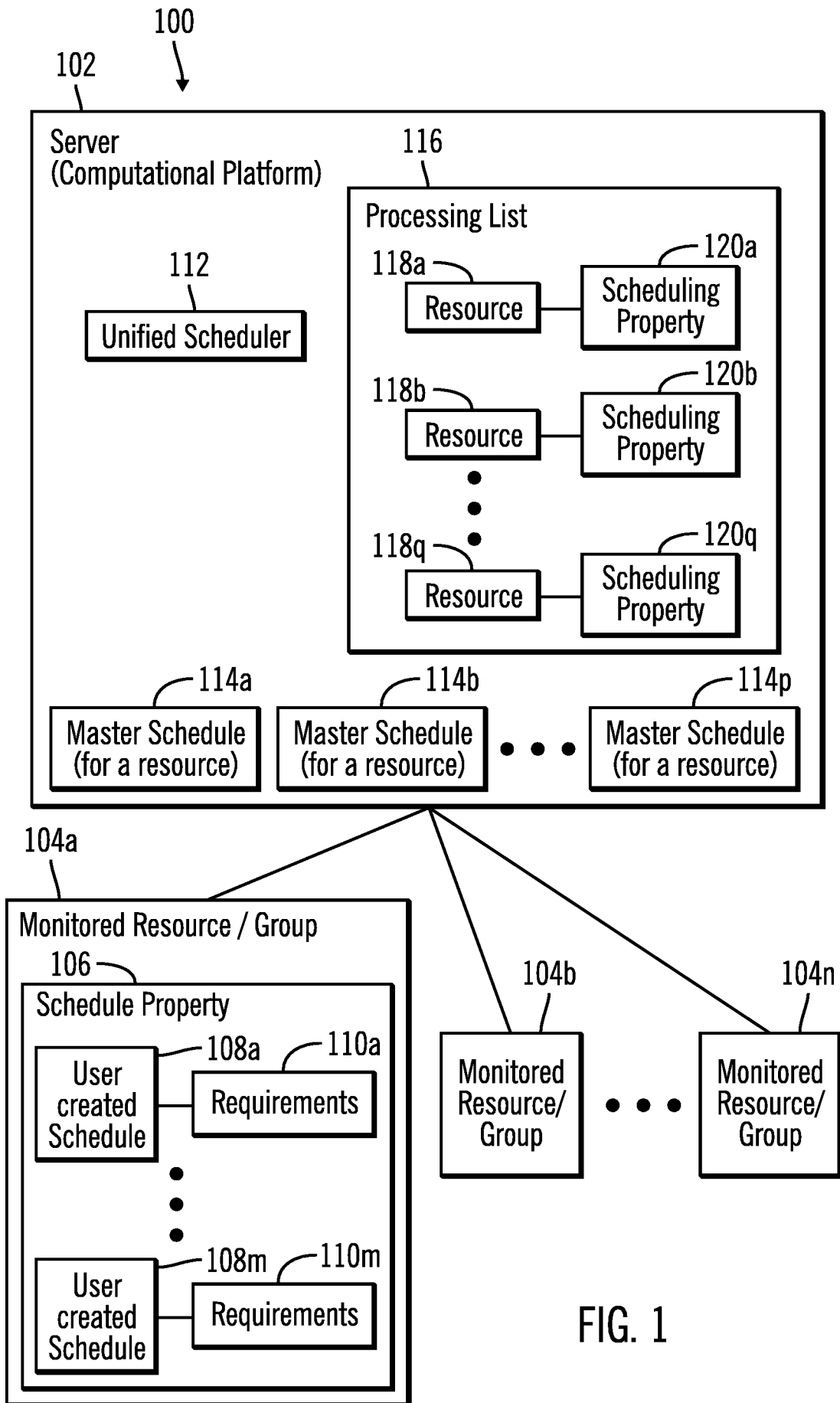
10 25. A computer readable medium including instructions, wherein the instructions when executed by a computer causes operations, the operations comprising:

15 receiving a plurality of user defined schedules for collecting data on a plurality of resources;

20 generating a schedule for data collection on at least one resource, based on processing the plurality of user defined schedules to eliminate redundant data collection on the at least one resource; and

processing the at least one resource in accordance with the generated schedule.

25 26. A computer program comprising program code means adapted to perform the method of any of claims 1 to 6 when said program is run on a computer.



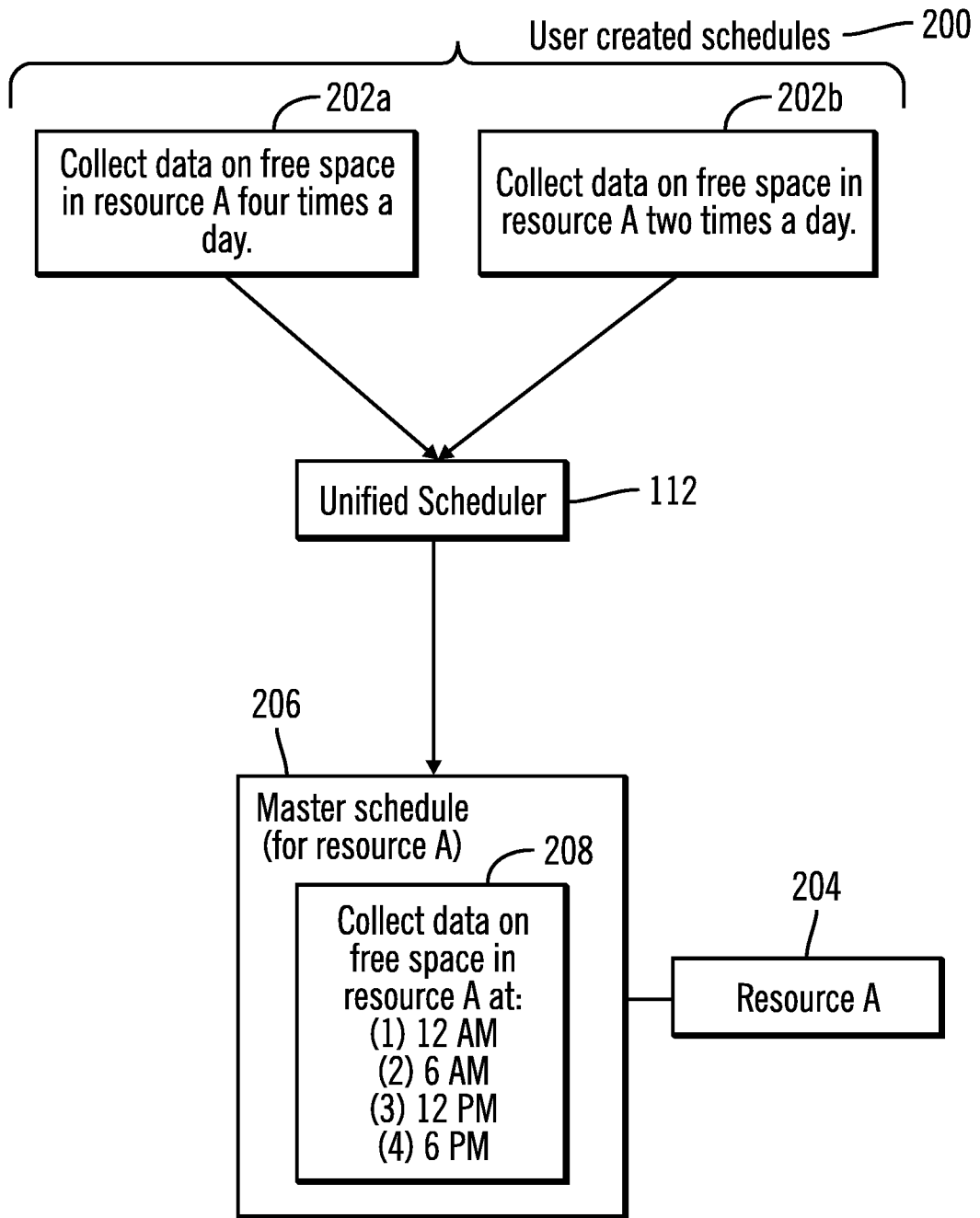


FIG. 2

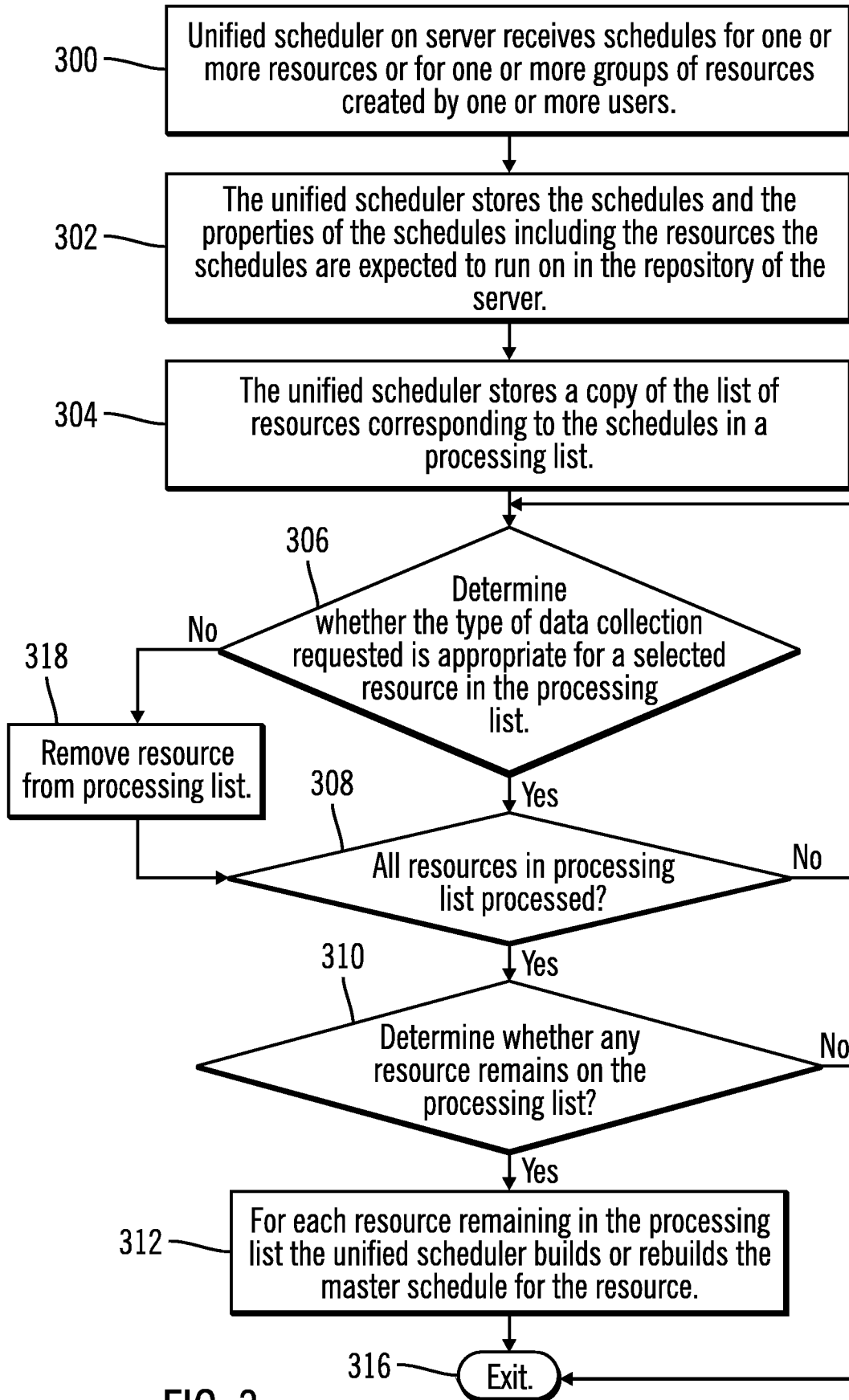


FIG. 3

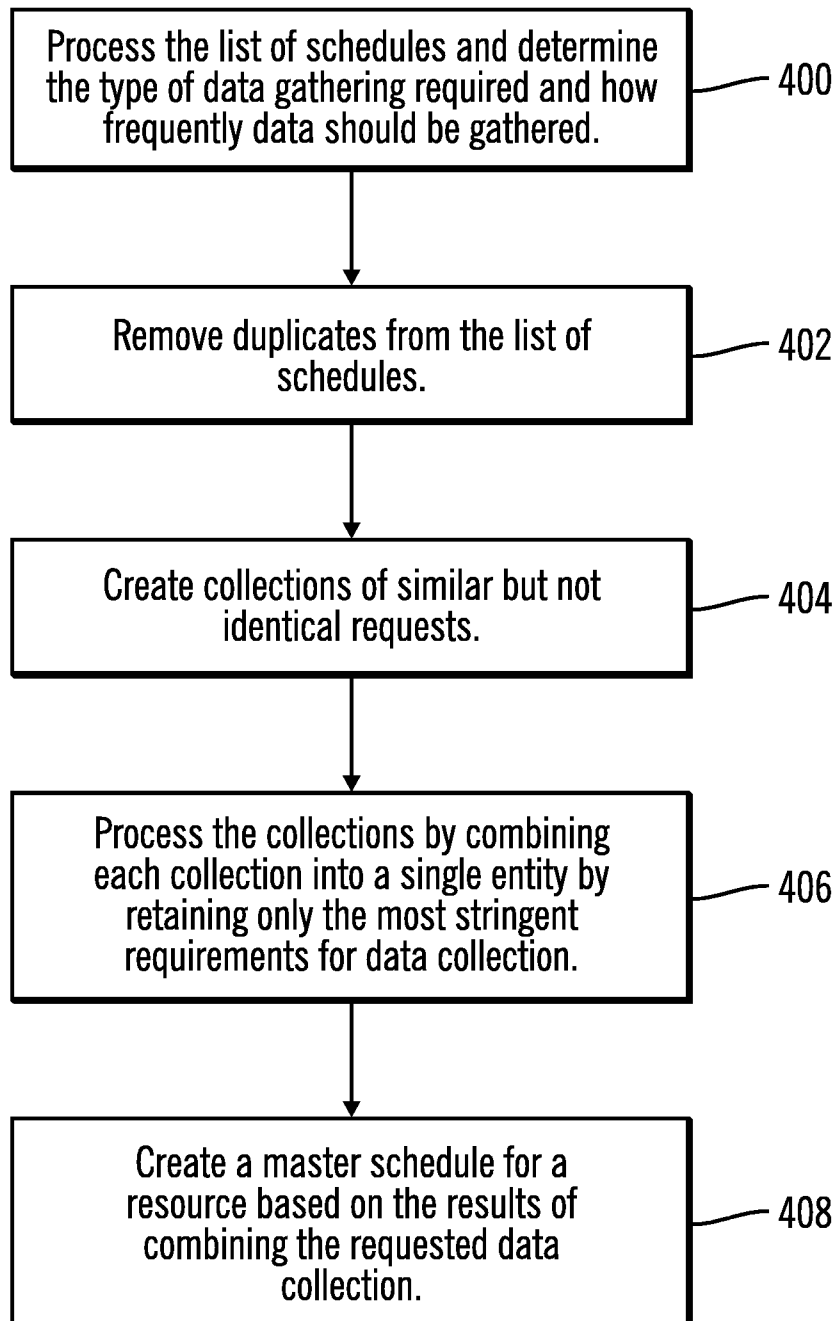


FIG. 4

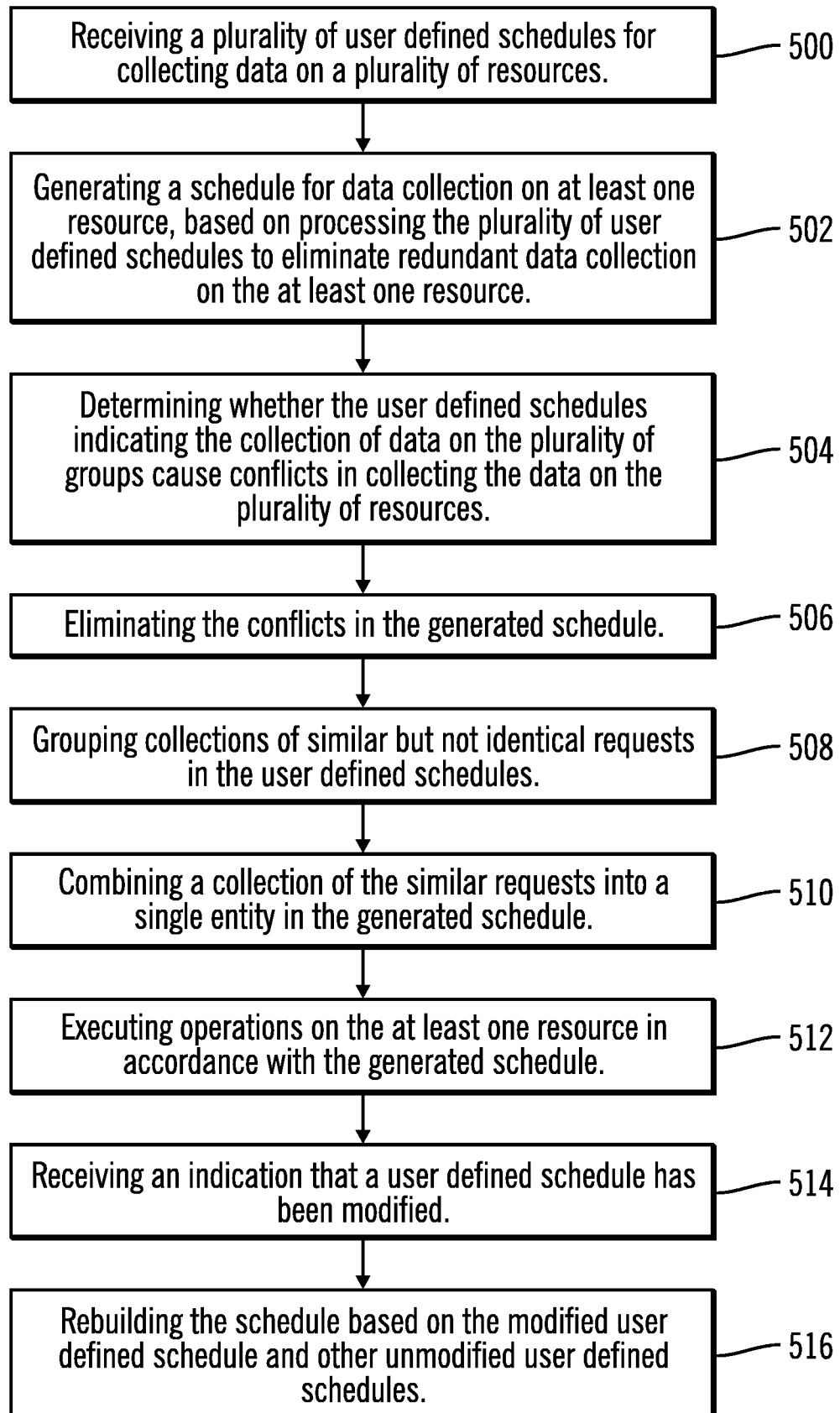


FIG. 5

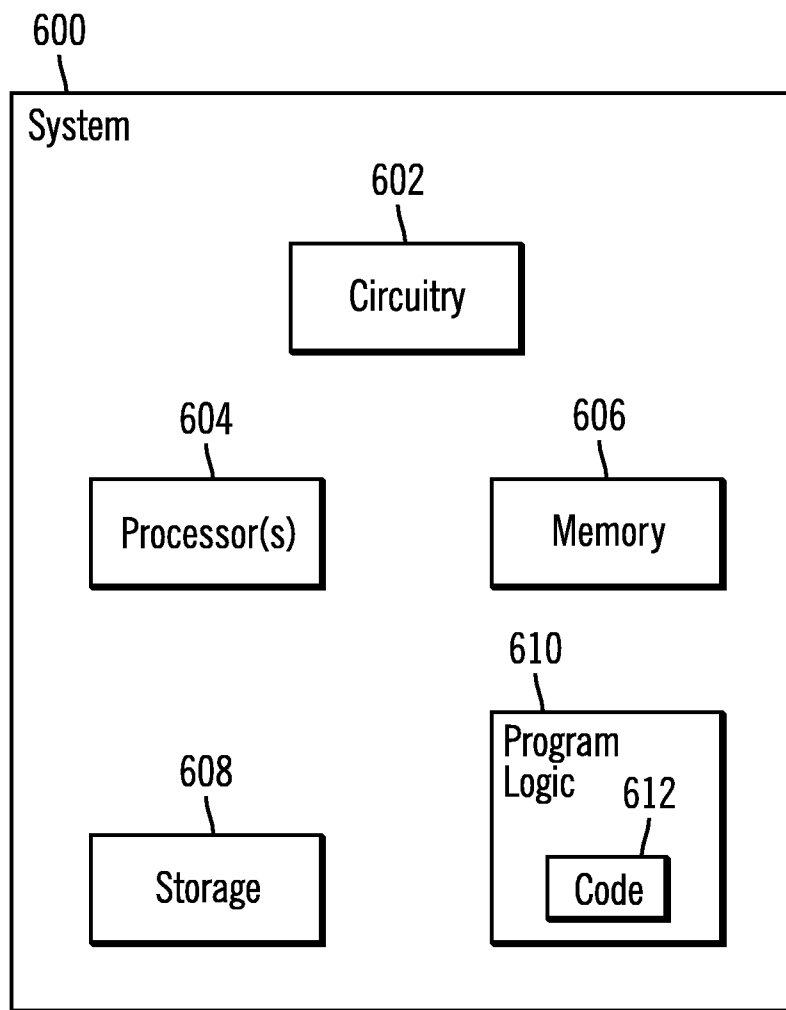


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/063404

A. CLASSIFICATION OF SUBJECT MATTER INV. G06F11/30				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) G06F H04L				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, INSPEC				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 2004/249935 A1 (JACKSON JUNEKO ET AL) 9 December 2004 (2004-12-09) abstract paragraph [0001] paragraph [0068] - paragraph [0076] paragraphs [0091], [0095], [0101], [0104] figures 2,3	1-26		
X	----- US 2003/001737 A1 (SHIRATORI KAZUHIRO ET AL) 2 January 2003 (2003-01-02) abstract paragraphs [0027], [0028], [0038], [0044] ----- -/--	1-26		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.				
<input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family </td> </tr> </table>			*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family			
Date of the actual completion of the international search	Date of mailing of the international search report			
7 September 2006	20/09/2006			
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Sabbah, Yaniv			

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/063404

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 023 507 A (WOOKEY ET AL) 8 February 2000 (2000-02-08) abstract column 3, line 49 - line 61 column 5, line 50 - column 6, line 14 column 14, line 48 - column 15, line 67 figures 1,2,4,11 -----	1-26
X	GB 2 388 214 A (* MONACTIVE LIMITED) 5 November 2003 (2003-11-05) abstract page 4, line 8 - page 5, line 23 page 6, line 13 - line 18 page 21, line 4 - line 10 -----	1-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2006/063404

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004249935 A1	09-12-2004	WO 03014936 A1	20-02-2003
US 2003001737 A1	02-01-2003	JP 2003006772 A	10-01-2003
US 6023507 A	08-02-2000	NONE	
GB 2388214 A	05-11-2003	AU 2003227898 A1	17-11-2003
		WO 03093957 A2	13-11-2003