



(43) International Publication Date
19 November 2015 (19.11.2015)

- (51) International Patent Classification:
H04L 29/08 (2006.01)
- (21) International Application Number:
PCT/EP2015/060243
- (22) International Filing Date:
8 May 2015 (08.05.2015)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
14/278,388 15 May 2014 (15.05.2014) US
14305711.5 15 May 2014 (15.05.2014) EP
- (71) Applicant: AMADEUS S.A.S. [FR/FR]; Route du Pin Montard 485, Sophia Antipolis, F-06140 Biot (FR).
- (72) Inventors: MAES, M Wim; Sint-Theresiastraat 44/6, B-2600 Berchem (BE). COLARDYN, M Frederik; Schrieksesteenweg 188, B-2221 Booischot (BE). KARIMI RAD, Soroush; Groenenborgerlaan 20 B21, B-2610 Wilrijk (BE). TORFS, Ben; 1, Avenue Frederic Mistral, F-06600 Antibes (FR). VAN BOUCHAUTE, Jurgen; Goed Ten Pauw, B-9080 Lochristi (BE).
- (74) Agent: GEVERS PATENTS; Holidaystraat 5, 1831 Diegem (BE).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: COMPUTER IMPLEMENTED GATEWAY

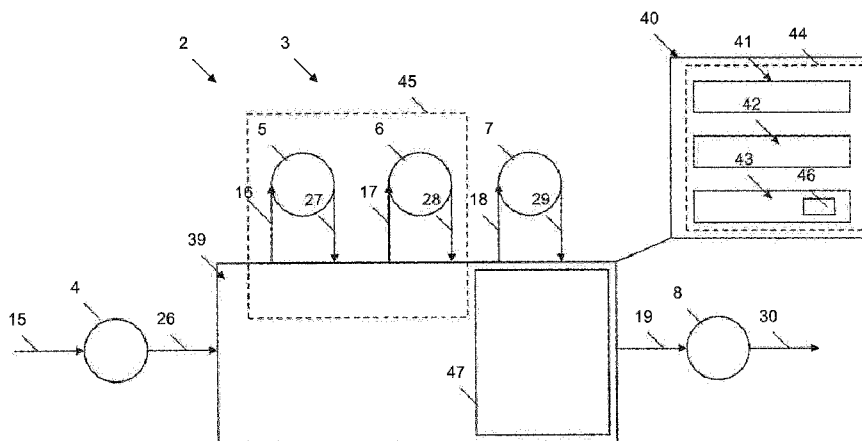


Fig. 2

(57) Abstract: A computer implemented gateway (1) comprising: an Enterprise Service Bus (ESB) architecture comprising at least one ESB for performing data transformations; wherein the gateway (1) further comprises a central configuration system (40) operatively coupled to the at least one ESB, the central configuration system (40) being arranged for receiving user configuration settings (44) and generating, based on at least the user configuration settings (44), the ESB configuration instance during gateway run-time.

Computer implemented gateway

The current invention relates to a computer implemented gateway according to the preamble of the first claim.

Such computer implemented gateways are for example known from WO2009102790A1. WO2009102790A1 for example describes a computer
5 implemented gateway comprising an Enterprise Service Bus (ESB) architecture. The ESB architecture comprises an ESB for performing data transformations, more in particular transferring messages in between different middleware services, each middleware service performing a particular function. The ESB thereto comprises a plurality of data processing components each arranged for
10 receiving first business data via at least a first communication channel of the data processing component and generating in response to the arrival of the first business data a second business data, which is transmitted via a second communication channel of the data processing component. The respective data processing components are provided to interact with the respective middleware
15 services and thus a flow of business data is being guided from an input endpoint to an output endpoint. The ESB further comprises a core component which is communicatively coupled to each of the data processing components via at least one of the communication channels of the respective data processing components. The core is arranged for controlling the flow of business data
20 between the input endpoint and the output endpoint based on an execution data flow determined by an ESB configuration instance. WO2009102790A1 further describes that the execution data flow determined by the ESB configuration instance can depend on for example the properties of digital media contained in the business data. Therefore, depending on the type of digital media contained in
25 the business data, the core may thus control the business data flow through the different data processing components.

However, although such conditional business data flow depending on the type of digital media contained in the business data provides the ESB architecture with dynamic properties, often a higher degree of flexibility is
30 required. For example, often it is desired to substantially amend the execution

data flow by, for example, substantially amending the data processing components which are used in the execution data flow and/or by changing the inlet and/or the outlet endpoint, etc. Such substantial alterations of the ESB configuration are not described in WO2009102790A1, as WO2009102790A1
5 only describes a predetermined, albeit conditional, execution data flow.

Therefore it is an object of the present invention to provide a computer implemented gateway in which the ESB architecture can be altered during gateway runtime.

10 This is achieved according to the present invention by a computer implemented gateway comprising the technical features of the characterizing portion of the first claim.

Thereto, the gateway further comprises a central configuration system operatively coupled to the at least one ESB, the central configuration system being arranged for receiving user configuration settings and generating,
15 based on at least the user configuration settings, the ESB configuration instance, during gateway run-time. By generating the ESB configuration instance for example a completely new ESB architecture can be set up or an existing ESB architecture can be re-configured by keeping part of the ESB architecture unchanged.

20 Such a central configuration system has been found to allow configuring and/or re-configuring at least partially the ESB architecture during gateway run-time by generating the ESB configuration instance based on at least the user configuration settings received. Such configuration offers a higher degree of flexibility. For example, it becomes possible to substantially amend the
25 execution data flow by, for example, substantially amending the data processing components which are used in the execution data flow and/or by changing the inlet and/or the outlet endpoint, etc. Therefore, it becomes possible to alter the ESB architecture during runtime.

According to preferred embodiments of the current invention, the
30 ESB comprises an endpoint data processing component, one of the first or second communication channel being, preferably directly, connected to one of the input or output endpoint and another one of the first or second communication channel being, preferably directly, connected to the core component. Such endpoint data processing components allow the ESB to

communicate business data with the endpoints. Moreover, by providing separate endpoint data processing components specifically dealing with the communication of the ESB with the endpoints, data processing components of the execution flow processing the business data after and before endpoint data processing components can process the data more independently from the way the business data was obtained from the endpoints, thus making the data processing components more generally employable in different ESBs and thus providing a higher degree of flexibility for generating the ESB configuration instance.

According to more preferred embodiments of the current invention the endpoint data processing components are adapted to the specific endpoints. As it has been found that the nature of the endpoints often determines the way in which the business data is communicated, it has been found that by providing specific endpoint data processing components, the business data can be more easily communicated with the endpoints. For example, the endpoints data processing components often are connected to enterprise servers, more in particular to middleware services, for example network middleware services, such as for example network server software, for example a http/https server, a mail server, for example a POP3 or SMTP server, an ftp/sftp server, a Java Message Service (JMS) listener, TCIL server, etc.

According to preferred embodiments of the current invention, the user configuration settings comprise endpoint configuration settings defining the at least one endpoint data processing component of the ESB configuration instance. Such endpoint configuration settings allow the user to configure the endpoint configuration settings of the ESB configuration instance, for example during gateway run-time.

According to preferred embodiments of the current invention, the ESB comprises an input endpoint data processing component provided for retrieving business data from the input endpoint, the first communication channel being connected, preferably directly connected, to the input endpoint and the second communication channel being connected, preferably directly connected, to the core component, the input endpoint data processing component being provided to receive the business data from the input endpoint via the first communication channel after retrieval by the input endpoint data processing

component from the input endpoint, generate the second business data and to transmit the thus generated second business data via the second communication channel to the core component. The generation of the second business data for example depends on the endpoint and can for example be removing data of the business data specifically connected to the type of endpoint, for example removing information specifically relating to the network server software, for example removing information specifically relating to the protocol used by the endpoint.

According to preferred embodiments of the current invention, the ESB comprises an output endpoint data processing component provided for outputting business data to the output endpoint, the second communication channel being connected, preferably directly connected, to the output endpoint and the first communication channel being connected, preferably directly connected, to the core component, the output endpoint data processing component being provided to receive first business data from the core component via the first communication channel, generate the second business data and transmit the thus generated second business data via the second communication channel to the output endpoint. The generation of the second business data for example depends on the endpoint and can for example be adding data to the business data specifically connected to the type of endpoint, for example adding information specifically relating to the network server software, for example adding information specifically relating to the protocol used by the endpoint.

According to preferred embodiments of the current invention, the central configuration system comprises endpoint configuration information allowing the at least one endpoint data processing component to communicate with the endpoint to which the at least one endpoint data processing component is connected. Such endpoint information for example comprises at least one or more from the list of: address information, preferably IP address of the endpoint, port of the endpoint, login information of the endpoint, for example information relating to login name and/or password, mail address, file system information, subfolder, etc.

According to preferred embodiments of the current invention, the user configuration settings comprise the endpoint configuration information

defining the endpoint configuration information of the ESB configuration instance. Such endpoint configuration information allows the user to configure the endpoint configuration information of the ESB configuration instance, for example during gateway run-time. Moreover, by separating the endpoint configuration information from the at least one endpoint data processing component, preferably from the endpoint configuration settings, configuration of the endpoint data processing components of the ESB configuration instance can be done independently from the endpoint configuration information, thus making it possible to, for example, define more abstractly the endpoint configuration information allowing a more flexible generation of the ESB configuration instance.

According to preferred embodiments of the current invention, the ESB comprises at least one core data processing component provided for altering the first business data received from the core component via the first communication channel connected to the core component into the second business data and transmitting the second business data via the second communication channel connected to the core component back to the core component. By providing separate at least one core data processing component specifically dealing with altering the first business data received from the core component via the first communication channel connected to the core component, a further abstraction can be made from for example the endpoint data processing components of the execution flow processing the business data after and before the at least one core data processing component such that the data can be more independently processed from the way the business data was obtained from the endpoints, thus making the core data processing components more generally employable in different ESBs and thus providing a higher degree of flexibility for generating the ESB configuration instance.

According to more preferred embodiments of the current invention, the ESB comprises at least two core data processing components.

According to further preferred embodiments of the current invention, the central configuration system comprises a core data processing template defining a sequence of at least two core data processing components. It has been found that such a core data processing template allows to more

easily reusing often used sequences of at least two core data processing components or even allows to reuse substantial parts of the data execution flow.

According to preferred embodiments of the current invention, the user configuration settings comprise a core data processing component configuration defining a sequence of at least one core data processing component. Such core data component configuration allows the user to configure the core data processing component configuration information, and thus a substantial part of the data execution flow, of the ESB configuration instance, for example during gateway run-time.

According to more preferred embodiments of the current invention, the core data processing component configuration comprises the core data processing template making it further easier for the user to configure an ESB configuration instance.

According to preferred embodiments of the current invention, the endpoint configuration settings, the endpoint configuration information and the core data processing component configuration of the user configuration settings are stored in separate files of the central configuration system and together define the execution data flow from the input endpoint to the output endpoint. When distributing the information needed to generate the desired ESB configuration instance over separate files, it has been found that this allows the information to be inputted in a parallel way, for example saving time, and/or by different people, for example allowing people to concentrate on different aspects of the ESB configuration instance. Moreover, it has been found that one or more of the endpoint configuration settings, the endpoint configuration information and the core data processing component configuration can be re-used in multiple Enterprise Service Busses ESBs running on the ESB architecture, for example two ESBs having identical endpoint configuration settings and core data processing component configuration but having different endpoint configuration information or two ESBs having identical core data processing component configuration but having different endpoint configuration information and endpoint configuration settings.

According to preferred embodiments of the current invention, the execution data flow further provides to the core an error handling flow for handling error data received from the data processing components.

According to more preferred embodiments of the current invention, the ESB comprises at least one error core data processing component, the error handling flow defining the at least one error core data processing component for sending error message notifications to the endpoints of the ESB. For example
5 the user configuration setting could define where the error message notification is sent to, in what format, etc.

According to preferred embodiments of the current invention, the configuration system is further communicatively coupled to the computer implemented gateway, such that during configuration, the data processing
10 components are configured inside the computer implemented gateway, thereby enabling for ESB components to be added to the ESB configuration instance during run-time of the gateway.

According to preferred embodiments of the current invention, the business data is travel data.

According to preferred embodiments of the current invention, the input endpoint is any one of an Enterprise Resource Planning (ERP) server, a Billing and Settlement Plan (BSP) server, typically used by travel agencies and transport companies, such as for example airlines for accommodating the flow of data with respect to payments and business data, more in particular travel data,
15 between them, etc.

According to preferred embodiments of the current invention output endpoint is a back-office server.

The invention also relates to a software product for implementing the computer implemented gateway according to the invention and a data carrier comprising such software product.
25

Other details and advantages of the computer implemented gateway according to the invention will become apparent from the enclosed figures and description of preferred embodiments of the invention.

Figure 1 shows a schematic overview of a computer implemented gateway according to the invention in use.
30

Figure 2 shows a schematic overview of an embodiment of the computer implemented gateway according to the invention.

Figure 3 shows a schematic overview of a different embodiment of the computer implemented gateway according to the invention.

The schematic overview of figure 1 shows the computer implemented gateway 1 according to the invention in use. As shown in figure 1, the gateway 1 preferably is implemented in a reconfigurable computer unit.

5 The gateway 1 is interconnected with an input endpoint 37 and an output endpoint 38. The endpoints 37, 38 are depicted schematically as computer servers. For example, the endpoints 37, 38 often are enterprise servers, more in particular middleware services, for example network middleware services, such as for example network server software, for example a http/https server, a mail server, for example a POP3 or SMTP server, an ftp/sftp server, a
10 Java Message Service (JMS) listener, TCIL server, etc. Although the gateway 1 and the endpoints 37, 38 are depicted as single computers, this is not critical for the invention and the gateway 1 and the endpoints 37, 38 can for example respectively comprise several interconnected computers, such as computers interconnected through a computer network. The precise configuration, more in
15 particular the physical configuration, of the gateway 1 and the endpoints 37, 38 is however not critical for the invention and can be further determined by the person skilled in the art.

The gateway 1 and the endpoints 37, 38 preferably are interconnected by a computer network, schematically represented here by the
20 arrows indicating the flow of business data from the input endpoint 37 through the gateway 1 to the output endpoint 38. The type of interconnection between the gateway 1 and the endpoints 37, 38 however is not critical for the invention and can be further determined by the person skilled in the art.

Although figure 1 only shows a single input endpoint 37
25 interconnected to a single output endpoint 38, this is not critical for the invention and the gateway 1 could also interconnect a multiple of input endpoints to a single output endpoint 38, a multiple of output endpoints to a single input endpoint 37 or the input endpoint and the output endpoint could even be identical, depending on the desired configuration.

30 Figure 1 further shows that the gateway 1 further comprises a central configuration system 40. The configuration system 40 is shown here as a separate computer interconnected to the gateway 1, for example by a computer network. This is however not critical for the invention and the configuration system 40 can also be part of the gateway 1 or could for example be part of the

computer comprising the endpoint 37, 38, depending on the desired configuration.

The embodiment of the computer implemented gateway 1 according to the invention shown in figure 2 comprises an Enterprise Service Bus (ESB) architecture 2 comprising at least one ESB 3 for performing data transformations.

Figure 2 also in more detail shows the configuration system 40 which is further communicatively coupled to the computer implemented gateway 1.

The ESB 3 comprises a plurality of data processing components 4, 5, 6, 7, 8, briefly 4 – 8, each arranged for receiving first business data via at least a first communication channel 15 – 19 of the data processing component 4 – 8. The data processing components 4, 5, 6, 7, 8 are further provided to generate in response to the arrival of the first business data a second business data. The second business data is then further transmitted via a second communication channel 26 – 30 of the data processing component 4 – 8.

The ESB further comprises a core component 39 communicatively coupled to each of the data processing components 4 - 8 via at least one of the communication channels 15 – 19 of the respective data processing components 4 - 8 and arranged for controlling a flow of business data through the respective data processing components 4 - 8 based on an execution data flow determined by an ESB configuration instance.

As can be seen in figure 2, the core component 39 further preferably comprises a storage area 47 for example for storing the business data received from the endpoints 37, 38. Making it for example possible to intermediately store the business data before it is being forwarded to one of the core data processing components 5, 6, 7. The storage area 47 is however not critical for the invention and can be omitted.

Although not shown in figure 2, the data processing component 4 is connected to an input endpoint 37 through its first communication channel 15 and the data processing component 8 is connected to an output endpoint 38 through its second communication channel 30. In other words, the ESB comprises endpoint data processing components 4, 8. The first communication channel 15 of endpoint data processing component 4 is connected to the input

endpoint 37 and the second communication channel 26 is connected to the core component 39. The first communication channel 19 of endpoint data processing component 8 is connected to the core component 39 and the second communication channel 30 is connected to the output endpoint 38. The input
5 endpoint data processing component 4 is provided to receive the business data from the input endpoint 37 via the first communication channel 15 after retrieval by the input endpoint data processing component 4, generate the second business data and transmit the thus generated second business data via the second communication channel 26 to the core component 39. The output
10 endpoint data processing component 8 is provided to receive first business data from the core component 39 via the first communication channel 19, generate the second business data and transmit the thus generated second business data via the second communication channel 30 to the output endpoint 38.

The endpoint data processing components 4, 8 are adapted to the
15 specific endpoints 37, 38. For example, the endpoints data processing components 4, 8 often are connected to enterprise servers, more in particular to middleware services, for example network middleware services, such as for example network server software, for example a http/https server, a mail server, for example a POP3 or SMTP server, an ftp/sftp server, a Java Message Service
20 (JMS) listener, TCIL server, etc. and as such are adapted to retrieve the business data from the enterprise servers. The input endpoint data processing component 4 for example can be adapted to retrieve mail from a mail server and is for example provided to strip information which is irrelevant for the further treatment of the business data from the business data, such as for example
25 specific mail related information, such as for example information in the e-mail header. According to further examples, the input endpoint data processing component 4 can be adapted to simply retrieve a file from an ftp server upon, for example, addition of a file to the ftp server, to receive a request from a http server, etc. The output endpoint data processing component 8 can for example
30 be provided to make an e-mail server send out the second business information received via the first communication channel 19 in an e-mail, for example as an attachment to the e-mail. Thereto, the output endpoint data processing component 8 can be provided to provide the mail server with all necessary data for sending out the e-mail, such as for example mail address, etc. According to

further examples, the output endpoint data processing component 8 can be adapted to simply put a file on an ftp server, to send a message to an http server, etc.

Figure 2 further shows that the ESB comprises at least one core data processing component 5, 6, 7, and even at least two data processing components 5, 6, 7, provided for altering the first business data received from the core component 39 via the first communication channel 16, 17, 18 connected to the core component 39 into the second business data and transmitting the second business data via the second communication channel 27, 28, 29 connected to the core component 39 back to the core component 39.

For example, after retrieval of business data by the input endpoint data processing component 4 from the input endpoint 37, the second business data, with respect to the input endpoint 4, is transmitted to the core component 39. The core component 39, based on the execution data flow determined by an ESB configuration instance, then forwards the business data, now called first business data with respect to the core data processing component 5, to the core data processing component 5 via the first communication channel 16. In response, the core data processing component 5 alters the first business data to the second business data and then transmits the second business data via the second communication channel 27 back to the core component 39. The core component 39 then, according to the execution data flow determined by the ESB configuration instance, then could transmit the received business data, now called first business data with respect to the core data processing component 6, to the core data processing component 6 via the first communication channel 17. In response, the core data processing component 6 alters the first business data to the second business data and then transmits the second business data via the second communication channel 28 back to the core component 39. The core component could, for example, also instead or thereafter, according to the execution data flow determined by the ESB configuration instance, transmit the business data, now called the first business data with respect to the output endpoint data processing component 8, to the output endpoint data processing component 8 via the first communication channel 19, which in response outputs the business data to the output endpoint 39.

This way, by steering the flow of business data through the different core data processing components according to the execution data flow determined by the ESB configuration instance, the business data retrieved at the input endpoint 37 can be processed before sending it to the output endpoint 38.

5 The core data processing components 5, 6, 7 can have a multitude of functionalities such as, but certainly not limited to any one or more of, analyze the first business data, extract relevant data from the first business data, format business data, transform business data, etc.

10 Although the core data processing components 5, 6, 7 shown in figure 2 and 3 are provided with a single first communication channel 16, 17, 18 and a single second communication channel 27, 28, 29, such a configuration is certainly not critical for the invention and more than one first or second communication channel 16, 17, 18, 27, 28, 29 are possible.

15 For example, it is possible that the core data processing component is provided to receive, for example a plurality of sets of first business data, each set for example through a respective first communication channel, and generate in response to the arrival of the plurality of sets of first business data the second business data. Furthermore it is possible that the core data processing component is provided to receive the first business data through the
20 first communication channel and generate in response to the arrival of the first business data a plurality of sets of second business data, each set being transmitted through for example a respective second communication channel. Moreover, a combination of these two possibilities is possible such that the core data processing component is provided to receive, for example a plurality of sets
25 of first business data, each set for example through a respective first communication channel, and generate in response to the arrival of the plurality of sets of first business data a plurality of sets of second business data, each set being transmitted through for example a respective second communication channel.

30 In addition, the plurality of first and second communication channels could also be used to receive other information than for example business data. For example, a second first communication channel could be used by the corresponding core data processing component to retrieve, through the second first communication channel, for example a configuration for the core

data processing component. This way it for example becomes possible to configure the core data processing component depending on the input received through the second first communication channel and, for example, to provide several alternatives for configuring the core data processing component.

5 As often a certain sequence 45 of core data processing components 5, 6 is used, a core data processing template 46 defining a sequence 45 of at least two core data processing components 5, 6 can be defined and re-used when generating the ESB configuration instance.

10 After receipt of the business data by the endpoint data processing components, next to sending the business data to the core data processing component 5, the core component 39 could also be set up to send, at least part of the business data, to, for example, another data processing component, for example core data processing component 7, via the first communication channel 18 and/or endpoint data processing component 8 via the first communication
15 channel 19, according to the execution data flow determined by the ESB configuration instance.

 Figure 2 further shows that the central configuration system 40 is arranged for receiving user configuration settings 44. The central configuration system 40 is further arranged for generating, based on at least the user
20 configuration settings 44, the ESB configuration instance during gateway run-time. As the configuration system 40 shown in figure 2 is further communicatively coupled to the computer implemented gateway 1, during configuration, the data processing components 4 – 8 can be configured inside the computer implemented gateway 1, thereby enabling for ESB components to be added to
25 the ESB configuration instance during run-time of the gateway 1.

 As shown in figure 2, the user configuration settings 44 may comprise endpoint configuration settings 41 defining the at least one endpoint data processing component 4, 8 of the ESB configuration instance.

30 As further shown in figure 2, the central configuration system 40 may comprise endpoint configuration information 42 allowing the at least one endpoint data processing component 4, 8 to communicate with the endpoint 37, 38 to which the at least one endpoint data processing component 4, 8 is connected. More preferably, as shown in figure 2, the user configuration settings

44 comprise the endpoint configuration information 42 defining the endpoint configuration information 42 of the ESB configuration instance.

5 The endpoint configuration information 42 for example comprises at least one or more from the list of: address information, preferably IP address of the endpoint, port of the endpoint, login information of the endpoint, for example information relating to login name and/or password, mail address, file system information, subfolder, etc. So for example, when the output endpoint data processing component 8 is provided to provide a mail server to send out an e-mail, the endpoint configuration information 42 may comprise information on
10 the recipient's e-mail address, the IP address of the mail server, the desired content, such as for example body or title, of the e-mail, etc.

As also shown in figure 2, the central configuration system 40 may comprise a core data processing template 46 defining a sequence 45 of at least two core data processing components 5, 6. More preferably, the user configuration settings 44 comprises a core data processing component configuration 43, preferably comprising the template 46 as shown in figure 2,
15 defining a sequence 45 of at least one core data processing component.

Figure 2 finally shows that, preferably, the endpoint configuration settings 41, the endpoint configuration information 42 and the core data processing component configuration 43 of the user configuration settings 44 are
20 stored in separate files of the central configuration system 40 and together define the execution data flow from the input endpoint 37 to the output endpoint 38.

Although not shown, the user configuration settings 44 can be adapted by a user, for example by amending the user configuration settings 44, for example by amending the endpoint configuration settings 41, the endpoint configuration information 42 and/or the core data processing component configuration 43, for example the files in which the one or more of them are stored, if present in the user configuration settings 44. Thereto, the central configuration system 40 could for example comprise, although not shown in
25 figure 2, an interface allowing the user to amend the endpoint configuration settings 41, the endpoint configuration information 42 and/or the core data processing component configuration 43. The interface could for example be a
30 command-line interface onto which the user could log on, for example, remotely.

The core data processing component configuration 43 could for example be created in a graphical user interface (GUI) environment and then for example later on copied onto the central configuration system 40. Although such GUI environment makes it easier for a user to provide the core data processing component configuration 43, it is not critical for the invention and the core data processing component configuration 43 could be provided to the central configuration system 40 in any way deemed appropriate by the person skilled in the art.

The schematic overview of the further embodiment of the computer implemented gateway 1 according to the invention shown in Figure 3 differs from the gateway 1 shown in figure 2.

For reasons of clarity, the ESB architecture only comprises two core data processing components 11, 12. The core data processing components 11, 12 are connected to the core component via the respective first 22, 23 and second 33, 34 communication channel. As described above, the number of core data processing components of the ESB architecture is however not critical for the invention and the ESB architecture could also comprise more or even less core data processing components.

Further, the ESB architecture comprises four endpoint data processing components 9, 10, 13, 14, of which two are input endpoint data processing components 9, 10 and two are output endpoint data processing components 13, 14. The input data processing components 9, 10 are connected to the core component 39 via the respective second communication channels 31, 32 and are connected via the respective first communication channels 20, 21 to at least one endpoint. Although the endpoints are not shown in figure 3, the respective input endpoint data processing components 9, 10 are connected to respective different endpoints. The output data processing components 13, 14 are connected via the respective first communication channels 24, 25 to the core component 39 and are connected to at least one output endpoint via the respective second communication channels 35, 36. Again, although the output endpoints are not shown in figure 3, the respective output endpoint data processing components 13, 14 are preferably connected to respective different endpoints.

Further it is shown in figure 3 that the ESB architecture 2 has an ESB configuration instance which comprises two Enterprise Service Buses (ESBs) 48, 49.

5 The first ESB 48 shown in figure 3 comprises a single core data processing component 11 connected to the single core component 39 with a single input endpoint data processing component 9 and a single output data processing component 13. The second ESB 49 shown in figure 3 comprises a single core data processing component 12 connected to the single core component 39 with a single input endpoint data processing component 10 and a single output data processing component 14. Such a configuration is however not critical for the invention and it is possible that the first and/or the second ESB 48, 49 comprise a plurality of core data processing components 11, 12, as for example shown in figure 2, and a plurality of endpoint data processing components as described above, depending on the desired configuration.

15 The ESB configuration instance is preferably determined by the central configuration system 40, as described above. Although not specifically shown, the central configuration system 40 has a similar configuration as described above and therefore for example the endpoint configuration settings 41, the endpoint configuration information 42 and the core data processing component configuration 43 of the user configuration settings 44 are stored on
20 the central configuration system 40 and together define the execution data flow from the input endpoints to the output endpoints.

The structure of the central configuration system 40 and more in particular the user configuration settings can be determined depending on the
25 desired configuration. For example, the user configuration settings can comprise different respective sets of endpoint configuration settings, the endpoint configuration information and the core data processing component configuration with each set of endpoint configuration settings, the endpoint configuration information and the core data processing component configuration defining a
30 respective ESB. For example, in such a configuration the different sets of endpoint configuration settings, the endpoint configuration information and the core data processing component configuration can be stored in different set of files stored in the central configuration system 40. According to a different embodiment, a single set of endpoint configuration settings, the endpoint

configuration information and the core data processing component configuration can also be provided with the single set of endpoint configuration settings, the endpoint configuration information and the core data processing component configuration defining the plurality of ESBs.

- 5 As described above, the user configuration settings can be adapted by a user, for example by amending the user configuration settings, for example by amending the endpoint configuration settings, the endpoint configuration information and/or the core data processing component configuration, for example the files in which the one or more of them are stored,
- 10 if present in the user configuration settings. As described above, this could be done by the interface allowing the user to amend the endpoint configuration settings, the endpoint configuration information and/or the core data processing component configuration. Although not shown in figure 3, it is also possible to add an ESB to an ESB architecture by amending the ESB configuration instance
- 15 on the central configuration system 40, for example by
- adding at least one endpoint, for example by adding an input and an output endpoint data processing component, to endpoint configuration settings, for example by adding them to existing endpoint configuration settings or by adding them to new endpoint configuration settings,
 - 20 - adding at least one sequence of at least one core data processing component defining at least partly the execution data flow by adding the at least one core component and their sequence defining the desired execution data flow to a core data processing component configuration, for example by adding them to an existing core data processing component configuration or
 - 25 by adding them to a new core data processing component configuration and
 - adding endpoint configuration information, for example by adding the information to existing endpoint configuration information or by adding them to new endpoint configuration information.

30 As the information present in the user configuration settings defining an ESB, preferably is split up, part of the information can be re-used in configuring a second ESB. For example, referring to the example above, the endpoint configuration settings and the core data processing component configuration can be copied when setting up another ESB and only the endpoint

configuration information for example needs to be adapted for the second ESB, making setting up a second ESB substantially faster.

Claims

1. A computer implemented gateway (1) comprising:
an Enterprise Service Bus (ESB) architecture (2) comprising at least one ESB (3)
5 for performing data transformations, the ESB (3) comprising:
a plurality of data processing components (4 – 14) each arranged for
receiving first business data via at least a first communication channel (15 – 25)
of the data processing component (4 – 14) connected to an input endpoint (37),
and generating in response to the arrival of the first business data a second
10 business data, which is transmitted to at least an output endpoint (38) via a
second communication channel (26 – 36) of the data processing component (4 –
14); and
a core component (39) communicatively coupled to each of the data
processing components (4 - 14) via at least one of the communication channels
15 (15 – 36) of the respective data processing components (4 - 14) and arranged for
controlling a flow of business data through the respective data processing
components (4 - 14) from the input endpoint (37) to the output endpoint (38)
based on an execution data flow determined by an ESB configuration instance;
wherein
20 the gateway further comprises a central configuration system (40) operatively
coupled to the at least one ESB, the central configuration system (40) being
arranged for receiving user configuration settings (44) and generating, based on
at least the user configuration settings (44), the ESB configuration instance
during gateway run-time.
- 25 2. A computer implemented gateway (1) according to claim 1, **wherein**
the ESB comprises an endpoint data processing component (4, 8, 9, 10, 13, 14),
one of the first or second communication channel (15, 30, 20, 21, 35, 36) being
connected to one of the input (37) or output (38) endpoint and another one of the
first or second communication channel (26, 19, 31, 32, 24, 25) being connected
30 to the core component (39).
3. A computer implemented gateway (1) according to claim 2, **wherein**
the user configuration settings (44) comprise endpoint configuration settings (41)

defining the at least one endpoint data processing component (4, 8, 9, 10, 13, 14) of the ESB configuration instance.

4. A computer implemented gateway (1) according to claim 2 or 3, **wherein** the ESB comprises an input endpoint data processing component (4, 9, 10) provided for retrieving business data from the input endpoint (37), the first communication channel (15, 20, 21) being connected to the input endpoint (37) and the second communication channel (26, 31, 32) being connected to the core component (39), the input endpoint data processing component (4, 9, 10) being provided to receive the business data from the input endpoint (37) via the first communication channel (15, 20, 21) after retrieval by the input endpoint data processing component (4, 9, 10), generate the second business data and transmit the thus generated second business data via the second communication channel (26, 31, 32) to the core component (39).

5. A computer implemented gateway (1) according to claim 2 or 3 or 4, **wherein** the ESB comprises an output endpoint data processing component (8, 13, 14) provided for outputting business data to the output endpoint (38), the second communication channel (30, 35, 36) being connected to the output endpoint (38) and the first communication channel (19, 24, 25) being connected to the core component (39), the output endpoint data processing component (8, 13, 14) being provided to receive first business data from the core component (39) via the first communication channel (19, 24, 25), generate the second business data and transmit the thus generated second business data via the second communication channel (30, 35, 36) to the output endpoint (38).

6. A computer implemented gateway (1) according to any one of claims 2 – 5, **wherein** the central configuration system (40) comprises endpoint configuration information (42) allowing the at least one endpoint data processing component (4, 8, 9, 10, 13, 14) to communicate with the endpoint (37, 38) to which the at least one endpoint data processing component (4, 8, 9, 10, 13, 14) is connected.

7. A computer implemented gateway (1) according to claim 6, **wherein** the user configuration settings (44) comprise the endpoint configuration information (42) defining the endpoint configuration information (42) of the ESB configuration instance.

8. A computer implemented gateway (1) according to any one of the preceding claims, preferably in combination with at least claim 4 and claim 5, **wherein** the ESB comprises at least one core data processing component (5, 6, 7, 11, 12) provided for altering the first business data received from the core component (39) via the first communication channel (16, 17, 18, 22, 23) connected to the core component (39) into the second business data and transmitting the second business data via the second communication channel (27, 28, 29, 33, 34) connected to the core component (39) back to the core component (39).

9. A computer implemented gateway (1) according to claim 8, **wherein** the ESB comprises at least two core data processing components (5, 6, 7, 11, 12).

10. A computer implemented gateway (1) according to claim 9, **wherein** the central configuration system (40) comprises a core data processing template (46) defining a sequence (45) of at least two core data processing components (5, 6).

11. A computer implemented gateway (1) according to any one of claim 8 – 10, **wherein** the user configuration settings (44) comprises a core data processing component configuration (43) defining a sequence (45) of at least one core data processing component.

12. A computer implemented gateway according to claim 11 in combination with claim 10, **wherein** the core data processing component configuration (43) comprises the core data processing template (46).

13. A computer implemented gateway according to any one of the preceding claims at least in combination with claims 3, 7 and 11, **wherein** the endpoint configuration settings (41), the endpoint configuration information (42) and the core data processing component configuration (43) of the user configuration settings (44) are stored in separate files of the central configuration system (40) and together define the execution data flow from the input endpoint (37) to the output endpoint (38).

14. A computer implemented gateway (1) according to any one of the preceding claims, **wherein** the execution data flow further provides to the core

an error handling flow for handling error data received from the data processing components.

15. A computer implemented gateway (1) according to claim 14, **wherein** the ESB comprises at least one error core data processing component, the error
5 handling flow defining the at least one error core data processing component for sending error message notifications to the endpoints of the ESB.

16. A computer implemented gateway according to any one of the preceding claims, **wherein** the configuration system (40) is further communicatively coupled to the computer implemented gateway (1), such that
10 during configuration, the data processing components (4 – 14) are configured inside the computer implemented gateway (1), thereby enabling for ESB components to be added to the ESB configuration instance during run-time of the gateway (1).

17. A computer implemented gateway (1) according to any one of the preceding claims, **wherein** the core (39) further comprises a storage area (47)
15 for storing the business data received from the endpoints (37, 38).

18. A computer implemented gateway (1) according to any of the preceding claims, **wherein** the gateway (1) is implemented in a reconfigurable computer unit.

20 19. Software product for implementing the computer implemented gateway (1) according to any one of the preceding claims.

20. Data carrier comprising a software product according to claim 19.

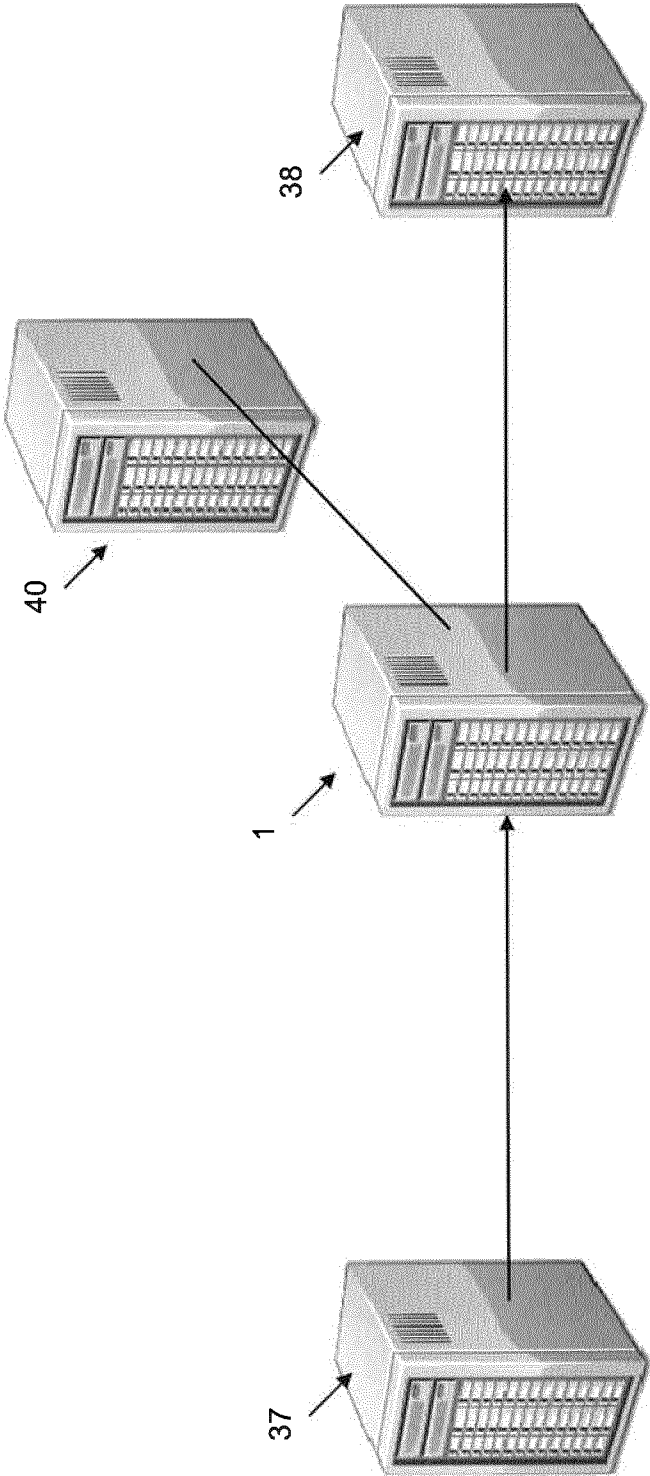


Fig. 1

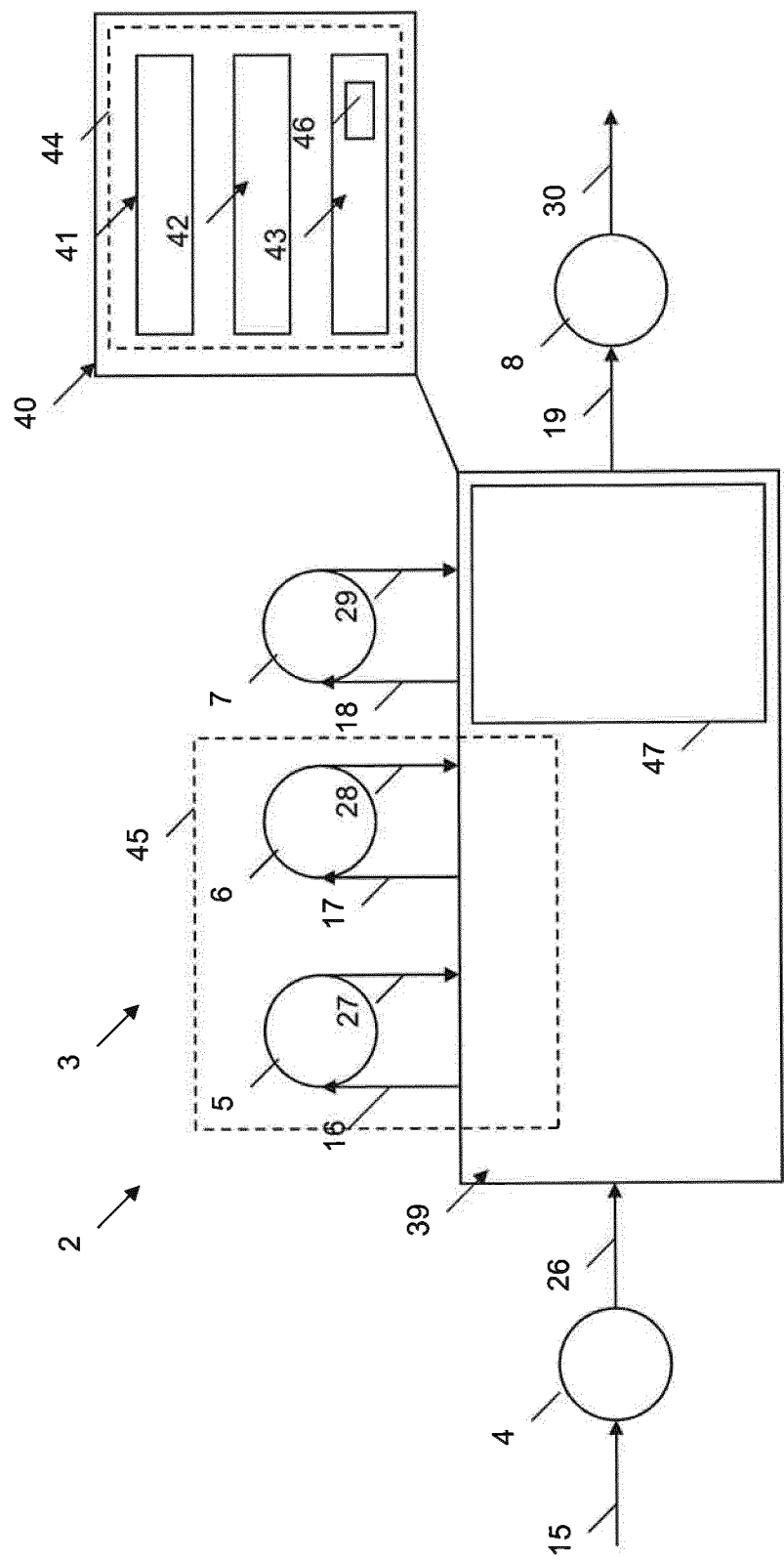


Fig. 2

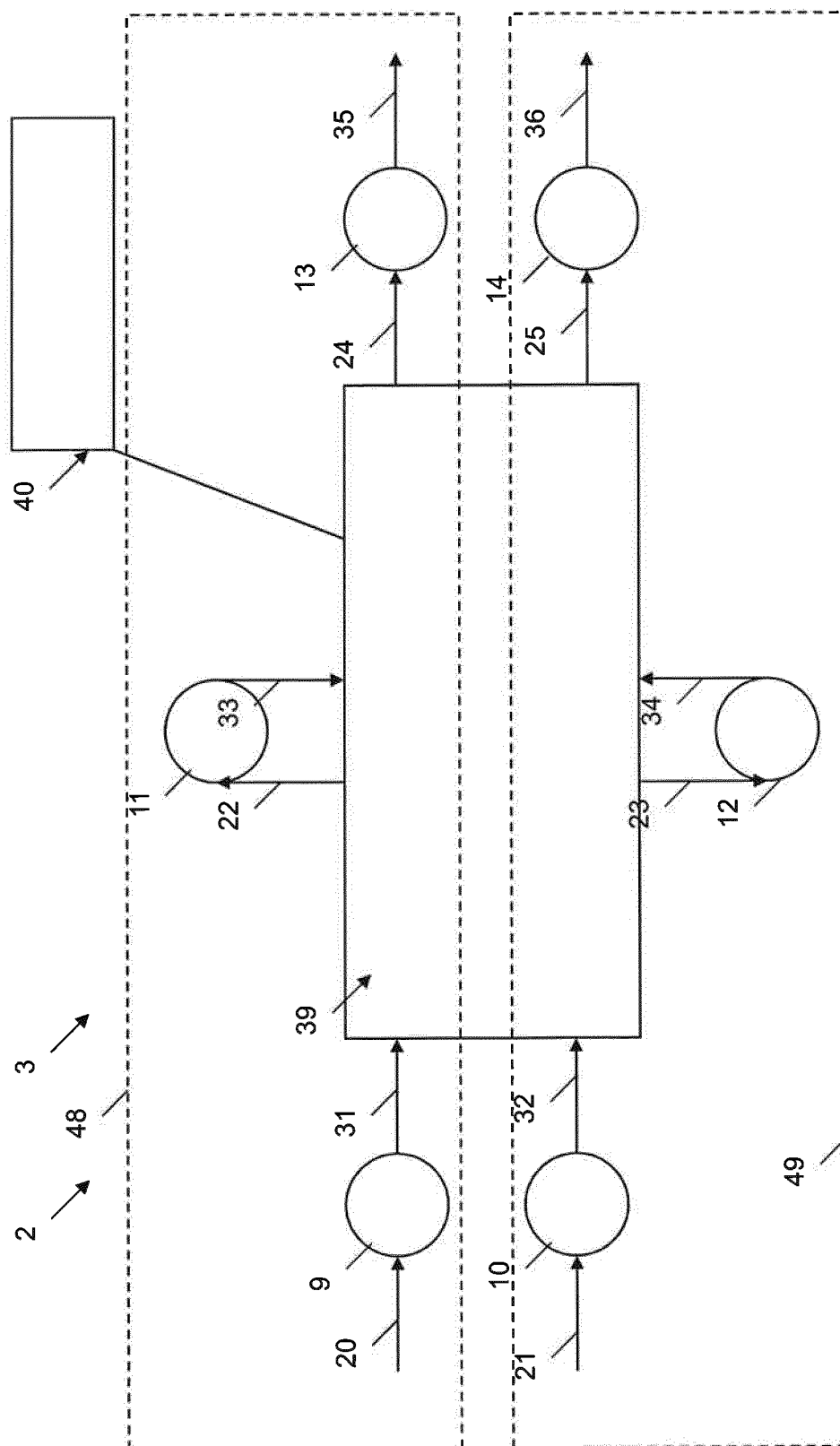


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2015/060243

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04L29/08

ADD.

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)

H04L G06F

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 practicable, search terms used)

EPO-Internal, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/102790 A1 (IBM; DETTORI PAOLO [US]; NOGIMA JULIO [US]; SCHAFFA FRANK A [US]; SANC) 20 August 2009 (2009-08-20) cited in the application the whole document	1-20
A	US 2010/080148 A1 (HULSE BRIAN [GB] ET AL) 1 April 2010 (2010-04-01) abstract paragraphs [0019] - [0034]	1-20
A	US 2008/140857 A1 (CONNER PETER A [US] ET AL) 12 June 2008 (2008-06-12) abstract paragraphs [0002], [0008] - [0016], [0043] - [0071], [0091] - [0094]	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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

26 June 2015

Date of mailing of the international search report

03/07/2015

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Kesting, Volker

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/060243

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009102790	A1	20-08-2009	EP 2257887 A1 08-12-2010
			US 2009201812 A1 13-08-2009
			WO 2009102790 A1 20-08-2009

US 2010080148	A1	01-04-2010	NONE

US 2008140857	A1	12-06-2008	NONE
