

and thus they cannot share information on the same subject under inspection, resulting in inefficient overall operations.

SUMMARY

According to an exemplary embodiment of the present disclosure, a customs inspection and release system is provided. The system comprises: a device layer comprising a plurality of devices for inspection and release, at least some of the plurality of devices being configured to detect a subject and generate detection data; an adaptor layer comprising a plurality of adaptors corresponding to the plurality of devices, respectively, each being configured to receive the detection data from its corresponding device and convert the detection data into an event in a form of a predetermined message service interface protocol; a message service layer comprising a message bus and configured to receive events from the adaptor layer and construct event messages based on the events; and a processing control layer comprising a business logic unit and configured to receive and process the event messages from the message bus, generate instructions associated with the event messages and transmit the instructions to the message service layer, wherein the business logic unit is configured to bind, to a single subject, a plurality of discrete event messages of different events originating from different devices in the device layer but associated with the single subject, and process the bound event messages jointly. The message service layer constructs instruction messages based on the received instructions and transmits the instruction messages to the adaptor layer. The adaptor layer converts the instruction messages into instructions in a form suitable for the corresponding devices and transmits the instructions to the device layer. The corresponding devices in the device layer operate based on the received instructions.

In an embodiment, the processing control layer further comprises a central control unit configured to provide a user interface for monitoring operation states of the devices and a state of the subject, and in response to a user operation, generate an instruction and transmit the instruction to the message service layer.

In an embodiment, the business logic unit comprises: a binding logic module configured to bind a-the plurality of discrete event messages associated with the

~~same~~ single subject to the single subject; a flow logic module configured to process the bound event messages jointly to generate an instruction corresponding to a result of the processing; a device state logic module configured to monitor states of the plurality of devices and issue a

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message bus, wherein said processing the event messages comprises binding, to a single subject, a plurality of discrete event messages of different events originating from different devices in the device layer but associated with the single subject, and processing the bound event messages jointly, constructing, by the message bus, instruction messages based on the received instructions and transmitting the instruction messages to the respective adaptors, converting, by the respective adaptors, the instruction messages into instructions in a form suitable for the corresponding devices and transmitting the instructions to the corresponding devices, and operating, by the corresponding devices, based on the received instructions.

In an embodiment, the method further comprises: providing a user interface for monitoring operation states of the devices and a state of the subject, and in response to a user operation, generating an instruction and transmitting the instruction to the message bus.

~~In an embodiment, the step of receiving and processing the event messages from the message bus, generating instructions associated with the event messages and transmitting the instructions to the message bus further comprises: receiving event messages from the message bus; binding a plurality of discrete events associated with the same subject to the subject based on the event messages; processing the bound events to generate an instruction corresponding to a result of the processing; and transmitting the generated instruction to the message bus.~~

In an embodiment, the method further comprises: receiving, by the message bus, other events from other customs business systems for processing, and transmitting processing results to the other customs business systems. The other customs business systems comprise a customs declaration system and/or a logistics system.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features and advantages will become more apparent with reference to the following description taken in conjunction with the figures where similar reference numerals denote the same elements, in which:

- 5 Fig. 1 is a block diagram showing a customs inspection and release system according to an exemplary embodiment of the present disclosure;

What is claimed is:

1. A customs inspection and release system, comprising:

a device layer comprising a plurality of devices for inspection and release, at
5 least some of the plurality of devices being configured to detect a subject and
generate detection data;

an adaptor layer comprising a plurality of adaptors corresponding to the
plurality of devices, respectively, each being configured to receive the detection
data from its corresponding device and convert the detection data into an event in a
10 form of a predetermined message service interface protocol;

a message service layer comprising a message bus and configured to receive
events from the adaptor layer and construct event messages based on the events;
and

a processing control layer comprising a business logic unit and configured to
15 receive and process the event messages from the message bus, generate
instructions associated with the event messages and transmit the instructions to
the message service layer, wherein the business logic unit is configured to bind, to
a single subject, a plurality of discrete event messages of different events
originating from different devices in the device layer but associated with the single
20 subject, and process the bound event messages jointly;

wherein the message service layer constructs instruction messages based on
the received instructions and transmits the instruction messages to the adaptor
layer,

the adaptor layer converts the instruction messages into instructions in a form
25 suitable for the corresponding devices and transmits the instructions to the device
layer, and

the corresponding devices in the device layer operate based on the received
instructions.

30 2. The system of claim 1, wherein the processing control layer further
comprises a central control unit configured to provide a user interface for
monitoring operation states of the devices and a state of the subject, and in

response to a user operation, generate an instruction and transmit the instruction to the message service layer.

3. The system of claim 1 or 2, wherein the business logic unit comprises:

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a binding logic module configured to bind ~~a~~ the plurality of discrete ~~events~~ event messages associated with the ~~same~~ single subject to the single subject;

a flow logic module configured to process the bound ~~events~~ event messages jointly and generate an instruction corresponding to a result of the processing;

a device state logic module configured to monitor states of the plurality of devices and issue a warning upon detecting an abnormal state; and

an integrated bus module coupled to the message bus, the binding logic module, the flow logic module and the device state logic module and configured to receive the event messages from the message bus, forward the received event messages to the respective logic modules, receive an instruction or a warning from the respective logic modules and transmit it to the message bus.

4. The system of claim 1 or 2, wherein the message bus comprises:

a message construction module configured to construct the event messages and the instruction messages based on the received events and instructions, respectively;

a message routing module configured to route the event messages to the processing control layer and the instruction messages to at least one corresponding adaptor among the plurality of adaptors in the adaptor layer; and

a message queue pool comprising an event message queue pool for buffering and queuing the event messages and an instruction message queue pool for buffering and queuing the instruction messages.

5. The system of claim 1 or 2, wherein the event messages each indicates a site where the subject is located, an identifier of the subject, a type and serial number of the device for the subject, a time at which the detection data is received from the device, and an event content, and

the instruction messages each indicates the site where the subject is located, the type and serial number of the device for the subject, a source of the instruction and an instruction content.

6. The system of claim 2, wherein the plurality of devices comprise at least two of a container/vehicle radiophotography inspection device, a radioactive material

11. The system of claim 10, wherein the binding logic module in the processing control layer is further configured to bind discrete events among the other events that are associated with the same subject to the subject.

5 12. A customs inspection and release method, comprising:

detecting, by at least some of a plurality of devices, a subject to generate detection data;

receiving, by each of a plurality of adaptors corresponding to the plurality of devices, respectively, the detection data from its corresponding device and
10 converting the detection data into an event in a form of a predetermined message service interface protocol;

receiving, by a message bus, events from the adaptors and constructing event messages based on the events; and

receiving and processing the event messages from the message bus,
15 generating instructions associated with the event messages and transmitting the instructions to the message bus, wherein said processing the event messages comprises binding, to a single subject, a plurality of discrete event messages of different events originating from different devices in the device layer but associated with the single subject, and processing the bound event messages jointly;

20 constructing, by the message bus, instruction messages based on the received instructions and transmitting the instruction messages to the respective adaptors;

converting, by the respective adaptors, the instruction messages into instructions in a form suitable for the corresponding devices and transmitting the
25 instructions to the corresponding devices; and

operating, by the corresponding devices, based on the received instructions.

13. The method of claim 12, further comprising: providing a user interface for monitoring operation states of the devices and a state of the subject, and in
30 response to a user operation, generating an instruction and transmitting the instruction to the message bus.

14. The method of claim 12 or 13, wherein said ~~receiving and processing the event messages from the message bus, generating instructions associated with the~~

~~event messages and transmitting the instructions to the message bus~~further
comprises:

~~_____receiving event messages from the message bus;~~

~~binding a plurality of discrete events associated with the same subject to the subject based on the event messages;~~

processing the bound events to generate an instruction corresponding to a
5 result of the processing; and
~~transmitting the generated instruction to the message bus.~~

15. The method of claim 12 or 13, further comprising:

receiving, by the message bus, other events from other customs business
10 systems for processing, and transmitting processing results to the other customs
business systems, and

wherein the other customs business systems comprise a customs declaration
system and/or a logistics system.