

Objects of the invention

One aspect of the present invention is to overcome at least some of the problems associated with the prior art.

5 Summary of the invention

The present invention provides a method and system as set out in the accompanying claims.

- According to one aspect of the present invention there is provided a method of ordering
- 10 a plurality of messages received from a sender to be sent to a receiver in a sequence based on the dependency of one message on one or more other messages ~~equivalent to a message order of the plurality of messages wherein the message order is determined in real time~~, the method comprising the steps of: receiving one or more messages from a stream of messages ~~and storing them in a database~~; generating one or more messages
- 15 from the stream of messages and determining an order, a target and a value for a status field for each of the generated messages; storing the generated messages in a database; identifying a characteristic (P-Key-Order) of each message which is common to a group of stored messages; identifying a message dependency for the stored messages in the group of messages from a parameter of the message; ~~sequence which corresponds to the message order (1, 2, 3, 4 etc.) for the group of messages from a parameter of the message~~; reviewing a particular stored message in the database to determine if the stored message can be sent by;
- 20 determining whether a ~~previous~~ the stored message is dependent on a previous message exists in the sequence before the stored message and determining a
- 25 status of the previous message by reading a value of the status field of the previous message; and
- updating the value of the status field of the stored message based on the status of the previous message; and
- 30 sending the stored message in accordance with the sequence once after acknowledgement that the previous message has been sent.

The present invention provides a highly scalable system, which can be easily extended to cope with increased traffic. The present invention also guarantees that messages are sent in the right order in a multiprocessor environment. The dependencies of the

messages are strictly those required. There is no dependency introduced by the system. The ordering is not total: messages that are independent can be sent in parallel. Thus, if one receiver link fails, it will not impact any other receiver unless the messages are functionally linked. In addition, using the right orders is very important as de-

- 5 synchronization between different processors can lead to many problems. For example, in the airline environment if there are problems in relation to the synchronization of the messages, passengers could be denied the seat when in fact there is space available on the aircraft. This leads to a loss of money in the airline and other disadvantages as well.
- 10 The process in accordance with the present invention is provided by a simple implementation since threads and affinity do not form part of the process. In particular, there is no affinity between any queuing and processing elements of the system as they are not present. In addition, there is a flexible manner in which errors can be processed. This is particularly important when handling a missing message in a sequence. By using
- 15 a database a full history of messages and transmissions are maintained for a specific window of time. The time window also provides a threshold. Before the threshold the message can be in one state and after the state can change. The threshold-is particularly useful for maintenance issues and for reducing the amount of space required to store messages and information associated therewith. In addition, queuing is
- 20 minimized and scalability is made easier.

- According to a second aspect of the present invention there is provided a message system for ordering a plurality of messages without a sequence identifier received from a sender to be sent to a receiver in a sequence equivalent to a message order of the
- 25 plurality of messages, the system method comprising the steps of: a receiving-receiver module embodied in a non-transitory computer readable medium and for receiving one or more messages from a stream of messages and for generating one or more messages from the stream of messages and determining an order, a target and a value of a status field for each of the generated messages, and storing themthe generated
- 30 messages in a database; a message management module embodied in the non-transitory computer readable medium and for identifying a characteristic (P-Key-Order) of each message which is common to a group of the stored messages; for identifying a sequence which corresponds to the message order (1 , 2, 3, 4 etc.) for the group of messages from a parameter of the message; and for reviewing a particular stored

message in the database to determine if the stored message can be sent by employing:

_____ means for determining whether a previous message exists in the sequence

_____ before the stored message and determining a status of the previous message by

_____ reading a value of the status field of the previous message; and

5 _____ means for updating the value of the status field of the stored message based on

_____ the status of the previous message; and

a transmission module embodied in the non-transitory computer readable medium and

for sending the stored message in accordance with the sequence once the previous

message has been sent.

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In a third aspect of the invention there is provided a non-transitory computer readable

medium encoded with a computer program having instructions which when executed

causes a computer to carry out a method of ordering a plurality of messages received

from a sender to be sent to a receiver in a sequence based on the dependency of one

15 message on one or more other messages, the method comprising the steps of: receiving

one or more messages from a stream of messages; generating one or more messages

from the stream of messages and determining an order, a target and a value for a status

field for each of the generated messages; storing the generated messages in a database;

identifying a characteristic (P-Key-Order) of each message which is common to a group

20 of the stored messages; identifying a message dependency for the messages in the

group of messages from a parameter of the message; reviewing a particular stored

message in the database to determine if the stored message can be sent by:

_____ determining whether the stored message is dependent on a previous message

_____ and determining a status of the previous message by reading a value of the

25 _____ status field of the previous message; and

_____ updating the value of the status field of the stored message based on the status

_____ of the previous message; and

sending the stored message after acknowledgement that the previous message has

been sent when said computer program is executed on a programmable apparatus.

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Claims

1. A method of ordering a plurality of messages received from a sender to be sent to a receiver in a sequence based on the dependency of one message on one or more other messages, the method comprising the steps of:
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- receiving one or more messages from a stream of messages and storing them in a database;
 - identifying a characteristic (P-Key-Order) of each message which is
 - 10 common to a group of messages;
 - identifying a message dependency for the messages in the group of messages from a parameter of the message;
 - reviewing a particular stored message in the database to determine if the stored message can be sent by;
 - 15 - determining whether the stored message is dependent on a previous message and determining a status of the previous message;
 - updating the status of the stored message based on the status of the previous message;
 - sending the stored message after acknowledgement that the previous
 - 20 message has been sent.
2. The method of claim 1, further comprising delaying the stored message until a predetermined condition is met.
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3. The method of claim 1, further comprising delaying the stored message until a time delay is met.

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4. The method of any preceding claim wherein the step of determining whether a previous message exists comprises receiving a message acknowledgement that the previous message has been received by a recipient.

5. The method of claim 4, further comprising sending the stored message to an outbound queue.

6. The method of claim 4 or claim 5, further comprising updating the status of the stored message to thereby update the status of any subsequent messages associated with the stored message.

7. The method of any preceding claim, further comprising sequentially repeating the reviewing, updating and sending steps for each message in the group of messages.

8. The method of any preceding claim, further comprising updating the database with any changes in status.

9. A message system for ordering a plurality of messages without a sequence identifier received from a sender to be sent to a receiver in a sequence equivalent to a message order of the plurality of messages, the method comprising the steps of:

- a receiver module for receiving one or more messages from a stream of messages and storing them in a database;

- a message management module for identifying a characteristic (P-Key-Order) of each message which is common to a group of messages; for identifying a sequence which corresponds to the message order (1, 2, 3, 4

- 20 -

etc.) for the group of messages from a parameter of the message; and for reviewing a particular stored message in the database to determine if the stored message can be sent by;

- 5 - determining whether a previous message exists in the sequence before the stored message and determining a status of the previous message; and
- updating the status of the stored message based on the status of the previous message;
- 10 - a transmission module for sending the stored message in accordance with the sequence once the previous message has been sent.

10. The system of claim 9, further comprising a delay module for delaying the stored message until a predetermined condition is met.

- 15 11. The system of claim 9, further comprising a time delay module for delaying the stored message until a time delay is met.

- 20 12. A computer program comprising instructions for carrying out the method of any of claims 1 to 8 when said computer program is executed on a programmable apparatus.

Claims

1. A method of ordering a plurality of messages received from a sender to be sent to a receiver in a sequence based on the dependency of one message on one or more other messages, the method comprising the steps of:
 - receiving one or more messages from a stream of messages;
 - generating one or more messages from the stream of messages and determining an order, a target and a value for a status field for each of the generated messages;
 - storing the generated messages in a database;
 - 10 identifying a characteristic (P-Key-Order) of each message which is common to a group of the stored messages;
 - identifying a message dependency for the stored messages in the group of messages from a parameter of the message;
 - reviewing a particular stored message in the database to determine if the stored message can be sent by:
 - 15 determining whether the stored message is dependent on a previous message and determining a status of the previous message by reading a value of the status field of the previous message; and
 - updating the value of the status field of the stored message based on the status of the previous message; and
 - 20 sending the stored message after acknowledgement that the previous message has been sent.
2. The method of claim 1, further comprising delaying the stored message until a predetermined condition is met.
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3. The method of claim 1, further comprising delaying the stored message until a time delay is met.

4. The method of claim 1, wherein the step of determining whether a previous message
5 exists comprises receiving a message acknowledgement that the previous message has been received by a recipient.

5. The method of claim 4, further comprising sending the stored message to an outbound queue.

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6. The method of claim 4, further comprising updating the value of the status field of the stored message to thereby update the value of the status field of any subsequent messages associated with the stored message.

15 7. The method of claim 1, further comprising sequentially repeating the reviewing, updating and sending steps for each message in the group of messages.

8. The method of claim 1, further comprising updating the database with any changes in status.

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9. A message system for ordering a plurality of messages without a sequence identifier received from a sender to be sent to a receiver in a sequence equivalent to a message order of the plurality of messages, the system comprising:
a receiver module embodied in a non-transitory computer readable medium and for
25 receiving one or more messages from a stream of messages and for generating one or more messages from the stream of messages and determining an order, a target and a

value of a status field for each of the generated messages, and storing the generated messages in a database;

a message management module embodied in the non-transitory computer readable medium and for identifying a characteristic (P-Key-Order) of each message which is

5 common to a group of the stored messages; for identifying a sequence which corresponds to the message order (1, 2, 3, 4 etc.) for the group of messages from a parameter of the message; and for reviewing a particular stored message in the database to determine if the stored message can be sent by employing:

means for determining whether a previous message exists in the sequence before the
10 stored message and determining a status of the previous message by reading a value of the status field of the previous message; and

means for updating the value of the status field of the stored message based on the status of the previous message; and

a transmission module embodied in the non-transitory computer readable medium and
15 for sending the stored message in accordance with the sequence once the previous message has been sent.

10. The system of claim 9, further comprising a delay module for delaying the stored message until a predetermined condition is met.

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11. The system of claim 9, further comprising a time delay module for delaying the stored message until a time delay is met.

12. A non-transitory computer readable medium encoded with a computer program
25 having instructions which when executed causes a computer to carry out a method of ordering a plurality of messages received from a sender to be sent to a receiver in a

sequence based on the dependency of one message on one or more other messages,
the method comprising the steps of:

receiving one or more messages from a stream of messages;

generating one or more messages from the stream of messages and determining an

5 order, a target and a value for a status field for each of the generated messages;

storing the generated messages in a database;

identifying a characteristic (P-Key-Order) of each message which is common to a
group of the stored messages;

identifying a message dependency for the messages in the group of messages from a

10 parameter of the message;

reviewing a particular stored message in the database to determine if the stored
message can be sent by:

determining whether the stored message is dependent on a previous message and

determining a status of the previous message by reading a value of the status field of

15 the previous message; and

updating the value of the status field of the stored message based on the status of the
previous message; and

sending the stored message after acknowledgement that the previous message has
been sent when said computer program is executed on a programmable apparatus.