DISTRIBUTED MATCHING ENGINE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of US provisional application No. 61/737,553 filed December 14, 2012 and 13/832,472 filed March 15, 2013 to Jacob Loveless, both of which are hereby incorporated by reference herein in their entireties.

FIELD

[0002] Some embodiments relate to matching and/or trading items.

BACKGROUND

[0003] Systems may be used for the electronic matching and/or trading of items between users.

SUMMARY

[0003a] According to an aspect, there is provided a system comprising a plurality of servers including at least a first server and a second server, wherein the plurality of servers is interconnected by at least one network: wherein the first server is configured to: maintain a first order book for a first item to be traded; receive a first order for the first item, wherein the first order includes a quantity; place the first order in the first order book, wherein the first server is responsible for controlling execution of contra-orders against the first order; and communicate the first order on the at least one network by selectively specifying the first order for at least one specified server of the plurality of servers, in which the at least one specified server includes the second server; wherein the second server is configured to: maintain a second order book for the first item; receive the first order communicated by the first server; place the first order in the second order book; receive a second order for the first item; determine the second order is a contra-order to the first order; and in response to determining the second order is a contra-order to, and has a size that exceeds a size of, the first order, communicate the second order to the first server; and communicate at least one additional order related to the second order on the network by selectively designating the at least one additional order for at least one designated server of the plurality of servers responsible for the at least one additional order, in which the second order book includes at least one other order for the first item of the at least one designated server; wherein the first server is further configured to: receive the second order from the second server; determine whether the first order is available; when the first order is available, execute a trade between the first and second orders; remove the first order from the first order book when the second order is for all available quantity of the first order; and communicate a first confirmation message on the at least one network indicating the first order is traded against; and wherein the second server is further configured to: receive the first confirmation message; and in response to receiving the first confirmation message, remove the first order from the second order book when the second order is for all available quantity of the first order, wherein the second server is further configured to: receive a third order for the first item, wherein the third order includes a quantity; place the third order

in the second order book, wherein the second server is responsible for controlling execution of contra-orders against the third order; and communicate the third order on the at least one network; wherein the first server is configured to: receive the third order communicated by the second server; place the third order in the first order book; receive a fourth order for the first item; determine the fourth order is a contra-order to the third order; and in response to determining the fourth order is a contra-order to the third order, communicate the fourth order to the second server; wherein the second server is further configured to: receive the fourth order from the first server; determine whether the third order is available; when the third order is available, execute a trade between the third and fourth orders; remove the third order from the second order book when the fourth order is for all available quantity of the third order; and communicate a second confirmation message on the network indicating the third order is traded against; and wherein the first server is further configured to: receive the second confirmation message from the second server; and in response to receiving the second confirmation message, remove the third order from the first order book when the fourth order is for all available quantity of the third order.

BRIEF DESCRIPTION OF THE FIGURES

[0004] Figure 1 shows an example distributed matching engine according to some embodiments.

DETAILED DESCRIPTION

[0005] Referring to Figure 1, there is shown an example system 100 according to an example embodiment. System 100 may include one or more computing systems (e.g. servers) 101-106. Computing systems 101-106 may be referred to herein as servers for purposes of description. However, it should be understood that the use of the term server is non-limiting, and that other types of computing systems may be used.

[0006] Each server 101-106 may include one or more processors and one or more memories, which may include one or more databases. Each server may include one or more network hardware/software/firmware based interfaces that enable the server to connect to and communicate over network 110. Network 110 may include a public and/or private network(s) and be a wired and/or wireless network based on any type of technology. Network 110 may also include a bus and/or backplane type architecture. Network 110 may include one or more elements including routers, switches, etc. Network 110 may be configured to allow at least each of servers 101-106 to communicate with the other.

Claims

1. A system comprising a plurality of servers including at least a first server and a second server, wherein the plurality of servers is interconnected by at least one network:

wherein the first server is configured to:

maintain a first order book for a first item to be traded;

receive a first order for the first item, wherein the first order includes a quantity;

place the first order in the first order book, wherein the first server is responsible for controlling execution of contra-orders against the first order; and

communicate the first order on the at least one network by selectively specifying the first order for at least one specified server of the plurality of servers, in which the at least one specified server includes the second server;

wherein the second server is configured to:

maintain a second order book for the first item;

receive the first order communicated by the first server;

place the first order in the second order book;

receive a second order for the first item;

determine the second order is a contra-order to the first order; and

in response to determining the second order is a contra-order to , and has a size that exceeds a size of, the first order,

communicate the second order to the first server; and

communicate at least one additional order related to the second order on the network by selectively designating the at least one additional order for at least one designated server of the plurality of servers responsible for the at least one additional order, in which the second order book includes at least one other order for the first item of the at least one designated server;

wherein the first server is further configured to:

receive the second order from the second server;

determine whether the first order is available;

when the first order is available, execute a trade between the first and second orders;

remove the first order from the first order book when the second order is for all available quantity of the first order; and

communicate a first confirmation message on the at least one network indicating the first order is traded against; and

wherein the second server is further configured to:

receive the first confirmation message; and

in response to receiving the first confirmation message, remove the first order from the second order book when the second order is for all available quantity of the first order,

wherein the second server is further configured to:

receive a third order for the first item, wherein the third order includes a quantity;

place the third order in the second order book, wherein the second server is responsible for controlling execution of contra-orders against the third order; and

communicate the third order on the at least one network;

wherein the first server is configured to:

receive the third order communicated by the second server;

place the third order in the first order book;

receive a fourth order for the first item;

determine the fourth order is a contra-order to the third order; and

in response to determining the fourth order is a contra-order to the third order, communicate the fourth order to the second server;

wherein the second server is further configured to:

receive the fourth order from the first server;

determine whether the third order is available;

when the third order is available, execute a trade between the third and fourth orders;

remove the third order from the second order book when the fourth order is for all available quantity of the third order; and

communicate a second confirmation message on the network indicating the third order is traded against; and

wherein the first server is further configured to:

receive the second confirmation message from the second server; and

in response to receiving the second confirmation message, remove the third order from the first order book when the fourth order is for all available quantity of the third order.

2. The system of claim 1,

wherein the first item is associated with a first port on the at least one network; and

wherein to communicate the first order on the at least one network comprises to communicate the first order over the first port.

3. The system of claim 2,

wherein to communicate the first order over the first port comprises to multicast the first order over the first port.

4. The system of claim 2,

wherein the second server is further configured to receive data from the at least one network communicated over the first port; and

wherein to receive the first order communicated by the first server comprises to receive the first order over the first port.

5. The system of claim 4,

wherein the first server is further configured to maintain an order book for a second item to be traded, the second item being different from the first item;

wherein the second item is associated with a second port on the at least one network, the second port being different from the first port; and

wherein the first server communicates information associated with the second order over the at least one network using the second port.

6. The system of claim 5,

wherein the second server is not configured to maintain an order book for the second item; and

as a result of not being configured to maintain an order book for the second item, the second server is not configured to receive information on the second port.

7. The system of claim1,

wherein the first item is associated with a port on the network;

wherein the first server is configured to send and receive information over the at least one network associated with the first item over the port;

wherein the second server is configured to send and receive information over the at least one network associated with the first item over the port;

wherein the first server is further configured to be taken off-line, in which taking the first server off-line includes configuring the first server to not receive information on the port, and

wherein when the first server is taken off-line prior to the second server communicating the second order, a trade is not executed between the first and second orders.

8. The system of claim 1, further comprising a third server associated with clearing transactions, wherein the third server is configured to receive the first confirmation message in order to clear a transaction created by executing the trade between the first and second orders.

9. The system of claim 1,

wherein a first entity at least one of owns or operates the system;

wherein resources of the first server are leased to a second entity; and

wherein resources of the second server are leased to a third entity.

10. The system of claim 9,

wherein the first server is further configured to execute a first application for trading the first item, wherein the first application is configured by the second entity; and

wherein the second server is further configured to execute a second application for trading the first item,

wherein the second application is configured by the third entity.

11. The system of claim 1,

wherein the first server is further configured to decrease an available quantity of the first order in the first order book when the second order is for less than all available quantity of the first order; and

wherein the second server is further configured to decrease an available quantity of the first order in the second order book when the second order is for less than all available quantity of the first order.

12. The system of claim 1, further comprising a third server associated with clearing transactions, wherein the third server is configured to:

receive the first confirmation message from the first server in order to clear a transaction created by executing the trade between the first and second orders; and

receive the second confirmation message from the second server in order to clear a transaction created by executing the trade between the third and fourth orders.

13. The system of claim 1, further comprising a third server configured to:

maintain a fifth order book for the first item;

receive the first order communicated by the first server; and

place the first order in a third order book.

14. The system of claim 13, wherein the third server is further configured to:

receive the first confirmation message; and

in response to receiving the first confirmation message, remove the first order from the third order book when the second order is for all quantity of the first order.

15. The system of claim 13,

wherein when the second server communicates the second order on the at least one network, the second server is configured to tag the second order as being for the first server; and

wherein the third server is further configured to:

receive the second order from the second server; and

ignore the second order because the second order is tagged for the first server.

16. The system of claim 15, wherein the third server is further configured to:

receive a fifth order for the first item;

determine the fifth order is a contra-order to the first order; and

in response to determining the fifth order is a contra-order to the first order, communicate the fifth order to the first server.

17. The system of claim 16,

wherein the first server removes the first order from the first order book as a result of executing the trade between the first and second orders; and

wherein the first server is further configured to:

receive the fifth order after receiving the second order;

determine the first order is not available; and

in response to determining that the first order is not available, communicate a message on the at least one network that a trade between the first and fifth orders is not confirmed.

18. The system of claim 16,

wherein the first server decreases an available quantity of the first order in the first order book as a result of executing the trade between the first and second orders; and

wherein the first server is further configured to:

receive the fifth order after receiving the second order;

determine the first order is available;

based in part on the first order being available, execute a trade between the first and fifth orders;

remove the first order from the first order book when the fifth order is for all available quantity of the first order; and

communicate another confirmation message on the at least one network indicating the first order is traded against;

wherein the second server is further configured to:

receive the another confirmation message; and

in response to receiving the another confirmation message, remove the first order from the second order book when the fifth order is for all available quantity of the first order; and

wherein the third server is further configured to:

receive the first confirmation message

in response to receiving the first confirmation message, decrease an available quantity of the first order in the third order book;

receive the another confirmation message; and

in response to receiving the another confirmation message, remove the first order from the third order book when the fifth order is for all available quantity of the first order.

19. The system of claim 1,

wherein the first server is further configured to execute an application for trading the first item, and wherein the first order is received from the application; and

wherein the first server is further configured to:

prior to executing the trade between the first and second orders, communicate with the application to determine whether the first order should still be traded against; and

execute the trade between the first and second orders when the application indicates the first order should still be traded against.

20. The system of claim 19, wherein the first server is further configured to:

remove the first order from the first order book when the application indicates the first order should not be traded against; and

communicate a message on the at least one network that a trade between the first and second orders is not confirmed.