TITLE

A multi site solution for securities trading.

TECHNICAL FIELD

The present invention relates to the trading of financial instruments, also referred to as securities, or similar entities. By means of the invention, the trading of securities and similar entities at a primary site with the use of a secondary site, a "fail-over" site, is greatly facilitated.

BACKGROUND ART

Commonly, and especially in view of recent events, systems for trading of financial instruments use a primary site for the trading, and utilize one or more replicate sites which can be designated as the new primary site if the primary site should crash or malfunction for some reason. Such replicate sites are often referred to as "fail-over" sites. In the event of a malfunction at the primary site, one of the replicate sites can be activated and start to act as a primary site, in some cases following a start-up procedure at the secondary site. Naturally, it is desired that the start up of the fail-over site, and its ability to act as a primary site, should take as little time as possible.

Conventionally, the maintaining of secondary or so called "fail-over" sites with short start-up time has been accomplished by transferring all the information used at the primary site to the secondary site. This solution has also been attractive in view of the fact that systems which support such a function are commercially available.

However, a problem in this context is that the sheer volume of information used in some trading systems is such that, for practical reasons, the information can only be transferred short distances. In view of the fact that one of the reasons for maintaining back-up sites is the ability to survive major disasters, there is a natural desire to keep a certain minimum geographical distance between the sites.

Thus, there is a conflict between the need for keeping the data transfer distances short, which would mean keeping the distance between the primary and secondary sites short, and the desire to keep a relatively large distance between the primary and secondary sites, in order to expose only one of them to the impact of a major disaster.

SUMMARY OF THE INVENTION

As stated above, in a system for trading of financial instruments or securities, where the trading is normally carried out at a primary site, there is a desire and a need for maintaining at least a secondary ("fail-over") site which, with a minimal start time, can take over the function of the primary site in the event of a systems failure or some other malfunction or disaster at the primary site.

This need is addressed by the present invention in that it discloses a method for trading in financial instruments at a primary site, where the trading is carried out according to information received from so called market makers and traders.

The information which is received comprises so called quotes and orders (terms which will be more closely defined in the following detailed description) for one or more instrument, and according to the method of the invention, said information is received and stored at the primary site, and used there to create deals in said instruments. In addition, said deals are also stored at the primary site, and according to the invention, use is also made of a secondary site, at which secondary site replicas of the orders and deals are stored, with the deals stored at the secondary site being used to update the orders stored at the secondary site.

Due to the fact that the vast majority of the information received and stored at a primary site is the so called quotes, the invention will make it possible to reduce the information which needs to be transferred to the secondary

(and/or tertiary) site, thus enabling a greater geographical separation than has hitherto been possible. The exact details of this will become apparent from the following detailed description.

In addition, by means of the invention, the transaction rate at the primary site, site "A", can be significantly increased if the system relies on "A" to receive confirmation from the secondary site, site "B", regarding the transfer of information.

An additional advantage obtained by means of the invention is that of cost-saving, since the bandwidth necessary between sites "A" and "B" can be reduced significantly.

DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail in the following, with reference to the appended drawings, in which

Figs 1a and 1b show a schematic overviews of systems using different embodiments of the invention, and

Fig 2 shows a schematic flowchart of a method according to the invention, and

Fig 3 is a schematic flowchart which shows how trading is transferred to B in the case of a malfunction at A.

EMBODIMENTS

In order to facilitate the understanding of the invention, some terms which will be used will be defined. The following is a list of terms and how they are to be perceived in this description:

- Order: an instruction to make a transaction, i.e. to buy or sell a certain amount of a specific instrument (or other entity, where and if applicable) at a given price. Orders are usually received from "investors", i.e. private investors or stock brokers.

- Market Maker: A party usually contracted by the operator of the trading system, for example a stock exchange, to maintain both buy and/or sell prices (and volumes) in the trading system for certain instruments. There may be some restrictions to this, e.g. that buy and sell prices should not differ more than a certain percentage.
- Quote: an instruction to a trading system or an exchange containing both buy and sell bids for one or more instrument. Usually issued by market makers, and usually updated quite frequently, making them transient in time.
- Deal: a match between orders and/or quotes, comprising at least two trades (one buy, one sell) which make up the "legs" of the deal.
- Order book: a table or a list in a trading system or an exchange etc, comprising all buy and sell orders, as well as all quotes.

Turning now to fig 1a, there is shown a system in which the present invention can be used. The system in fig 1a comprises a primary exchange site, referred to as "A", and a fail-over or secondary site referred to as "B". However, it should be mentioned that although only one fail-over site is referred to throughout this description, and shown in the drawings, the invention can be applied to a system with two or more such sites.

At the primary site "A", quotes are received from market makers, the quotes being stored in the system until they expire. Quotes are typically updated very frequently by Market Makers, either manually or through programmed applications. In fig 1a, two quotes from market makers are shown, with different kinds of broken lines. Naturally, two is not a limit on the amount of quotes from market makers in the system, the number is merely kept at a minimum in the drawing for reasons of clarity.

Since a quote usually comprises both buy and sell orders, these are shown in respective columns in the so called order book (Q & O) of site "A" in fig 1a.

Also shown in one of the quotes is the term "ID", referring to the quote ID, which comprises the parameters used in a quote, such as price, volume and identity of the instrument (or other entity) to which the quote refers. This or similar information is also comprised in orders described in the next paragraph.

In addition to quotes, the order book in "A" also comprises orders to buy and/or sell. Orders are usually received by the trading system from private investors or brokers. If an order matches a quote or another order (or if the "sell" side in one quote matches the "buy" side of another quote), a deal is made, usually by an automated function in the system. It could be mentioned here that the vast majority of the functions in the system are automated, and usually implemented on one or several computers.

The deal which has occurred due to such a match is then stored at site "A", in a list shown in fig 1a with the heading of "Deal Capture". The details of the deal will comprise a quote-ID and (where applicable) an order-ID, as well as for example, volume, price, identity of the instrument traded, and the identity of the buyer and the seller.

As mentioned previously, the quotes received by the system have a limited "life span", since they are updated frequently by the Market makers. This, in combination with the large amount of instruments traded with in some moderns systems, will lead to a very high number of quotes per second. Thus, when all the information comprised in "A" is transferred to another site, "B", for use as a secondary or "fail-over" site, the amount of information which is be transferred is be very large. If it is desired to transfer said information from A to B rapidly, in order to enable sites A and B to be "in step" with one another, this, for practical reasons, would in turn create a necessity for keeping sites "A" and "B" close to one another, something which it is desired to avoid, since one and the same system failure or major disaster might otherwise affect more than one site.

However, there is also a great desire to minimize the time needed to activate site "B" as the primary site, if site "A" goes down for some reason. A solution to this is provided by the invention, and shown schematically in fig 1a: at the secondary site, site "B", replicas or duplicates of the orders and deals received and/or made at site "A" are stored. However, no replicas or duplicates of the quotes received at site "A" are stored at site "B". As will be explained more closely below, if site "B" is activated to function as the primary site, the information retained at "B" will suffice to enable "B" to become the new primary site within a very short time span.

The transfer of the information mentioned to site "B" can be done in a number of different ways. It is not of central importance to the invention which way is chosen, but two methods which can be mentioned are the "Y" and the "L" methods, described in more detail below:

The "Y"-method is the one shown in figs 1a and 1b, and entails all information being sent from the source or sources to all destinations, in this case both "A" and "B". The source or sources mentioned would thus be market makers (quotes and/or orders) and private investors or brokers (orders). The "L"–method entails "A" receiving the information from the source or sources, and forwarding it to "B".

In the "Y"-method, it could be preferred to have identical functions at both "A" and "B", since site "B" will receive the "raw" information. If site "B" were given functions identical to "A", the same results would be reached, and could thus be stored at "B". In the "L"-method, A instead transfers some or all of the results of its functions to "B".

Regardless of which information transfer method that is chosen, "B" will thus have a set of the orders received by "A" and of the deals made at "A". As mentioned, the information regarding the deals stored at "B" is used to

update the information regarding the orders at "B", which will be explained in more detail below.

[0]A number of cases can be identified:

- A new order is received, which does not match any existing order or quote. The order is inserted into the order book at both A and B.
- A new quote is received, which does not match any existing orders or quotes. The new quote is inserted into the order book at A.
- A new quote is received, which matches an existing quote in the order book. The corresponding deal is made, the order book at A is adjusted, and the deal is stored at both A and B, in the list previously referred to as "Deal Capture".
- A new quote is received, which matches an existing order in the order book. A deal is made, and the order book at A is adjusted. The "Deal Capture"-list is updated at both A and B.
- A new order, O1 is received, which matches an existing order, O2 in the order-book. A deal is made, and the order book at A is adjusted. The "Deal Capture"-list is updated at both A and B.

As will be noted, the only order information which is stored at "B" in a system according to the invention is that regarding outstanding orders, i.e. orders which have not yet resulted in deals. However, information regarding the deals also needs to be stored at "B", which is done keeping the "Deal Capture"-list at B updated with the corresponding list at "A".

Thus, in a system which uses the invention, at "B" there will be an "order only book" (referred to as OB in the drawings), comprising orders but not quotes, and "deal capture" information (DC), and the said information at "B" will always correspond to the same information at "A". Quote information is not transferred to "B". However, the system of the invention comprises a

mechanism for updating the order information at "B" using the deal information at "B".

A number of different mechanisms could be used for this purpose, all of them suitably being computer based, i.e. a computer equipped with the proper program for the mechanism chosen. One principle, shown in fig 1a, is to have a corrective function or "update" function which would monitor the information going to the "Deal Capture"–list at "B", and then use this information to update the "order only book" information at "B". This "update" function is shown in fig 1a with broken lines on the connection to the "Deal Capture"-list at "B".

The function of the "update" or corrective function is as follows: deals (at both of the sites, since they are identical) comprise information by which they can be identified, e.g. information regarding the underlying quotes and/or orders on which they were based. In addition, the deal information might comprise the identity of the buyer and seller, the identity of the commodity involved in the deal, and the volume of said commodity.

Thus, the corrective function, which suitably is computerised, can use this information in order to go through the deal information going to "B", and update orders stored at "B" (possibly involving removal of the entire order, where applicable), and on which the deals in the deal information coming to "B" have been based.

As an alternative to this, shown in fig 1b, the information regarding the deals is first stored in the "Deal Capture"-list at "B", and the corrective function ("update"-function) will then monitor this list in order to use the information stored there to update the "order only book" at B. This alternative is shown in fig 1b. This function carries out its purpose immediately upon reception of the deal information or at regularly scheduled intervals.

In addition, a number of other ways of using the deal information to update the order information at "B" can be envisioned. One such way would be to let the order information to "B" pass via the deal information stored at "B" before the order information is stored at "B". In this way, obsolete orders could be weeded out or updated.

Another alternative way would be to store copies of the orders and deals of "A" at "B", and to then at defined intervals let, for example, a computer go through the orders against the background of the deals.

An additional feature in a system which uses the invention is that in case of a failure or malfunction of site A, an operator or an automated function at site B will make the determination that site A has been "lost", and that site B should take over operation as the primary site. A message will then be sent to all Market Makers (and traders if they are allowed to submit quotes), which informs them of the necessity of submitting new quotes for all instruments.

In fig 2, a flowchart of some of the major steps of the invention is shown. A possible sequence of events according to the invention will be described with reference to fig 2:

- Block 210: At a primary site for the trading of securities, "A", information is received from one or more market makers (quotes) and/or traders (orders and possibly quotes). Suitably, the information is received in an electronic manner, e.g. via computer communication.
- Block 220: The information received is stored at the primary site "A", preferably in an electronic memory.
- Block 230: Using the information received at site A, deals are created between orders which match another order or one side (buy/sell) of a quote, or between quotes whose opposite sides (buy/sell) match each other.

- Block 240: The orders which were received at A are also stored at a secondary site, "B", as well as the deals which have been made at "A".
- Block 250: An automated corrective function at "B", or between "A" and "B", preferably implemented on a computer, uses information regarding the deals which have been received at "B" to update the orders at "B".

The automated corrective function mentioned above, which is used at site "B", the "fail-over" site, in order to update the "order only book" maintained at "B" is suitably implemented on a computer, and can function in the following manner:

The deals (at both of the sites, since they are identical) comprise information by which they can be identified, e.g. information regarding the underlying quotes and/or orders on which they were based. In addition, the information might comprise the identity of the buyer and seller, the identity of the commodity involved in the deal, and the volume of said commodity.

Thus, an automated function, suitably a computerised such function, goes through the deals stored at "B" using the information mentioned above in order to update the "order only book" at "B" immediately (upon reception of deal information at "B"), or possibly at defined intervals, and updates orders stored at "B" (possibly involving removal of the entire order, where applicable), and on which deals have been based, said deals having been stored at "B" since the last update.

In order to further facilitate the understanding of the invention, fig 3 shows a schematic flowchart of a possible sequence of events where the invention is or can be used. These events are as outlined below:

- Block 310: At a primary site for the trading of securities, "A", information is received from one or more market makers (quotes) and/or traders (orders and possibly quotes). Suitably, the information is received in an electronic manner, e.g. via computer communication.
- Block 320: The information received is stored at the primary site "A", preferably in an electronic memory.
- Block 330: Using the information received at site A, deals are created between orders which match another order or one side (buy/sell) of a quote, or between quotes whose opposite sides (buy/sell) match each other.
- Block 340: The orders which were received at A are also stored at a secondary site, "B", as well as the deals which have been made at "A".
- Block 350: An automated corrective function at "B", or between "A" and "B", preferably implemented on a computer, uses information regarding the deals which have been received at "B" to update the orders at "B".
- Block 360: An automated (preferably) or manual function checks if there has been a malfunction at "A" such that the trading cannot be handled at "A".
- Block 380: If there are no such malfunctions at "A", trading continues at "A".
- Block 370: If there is a malfunction such that the trading can no longer be handled by the system at "A", the "B"-site takes over the trading.
- Block 390: A function in the system, preferably an automated function, sends a message to all market makers and traders who have the right to submit quotes to the system, that new quotes for all instruments should be submitted, this time to the "B"-site. As an alternative, the message transmitted could simply be that new quotes should be submitted, with an automated function in the system handling the fact that the quotes should now be routed to "B" instead of to "A".
- Block 395: Trading is then continued at "B".

All the necessary information for the "hand-over" described above is already present at "B", since it has been stored there. The only remaining information necessary for "B" to take over is the quotes, new quotes now need to be sent to B. As mentioned previously, quotes are usually updated quite frequently, regardless of which site that handles the trading, so this does not really require any extra effort on behalf of those submitting the quotes.

Although the invention has been illustrated above with the use of embodiments involving financial instruments, it should be pointed out that the invention could equally well be applied to[0] other kinds of trading, e.g. electricity, commodities etc.

It should also be mentioned that although only two configurations ("L" and "Y") for the "A"-"B" communication have been shown above, the invention can equally well be applied to other configurations, and larger number of fail-over sites. The system could the use configurations such as ring or "W"-configurations, etc.

CLAIMS

1. A method for trading in securities, the trading being carried out at a primary site according to information received from market makers and traders, said information comprising quotes and orders for one or more instrument, the method comprising the reception and storing of said information at the primary site, and using said information to create deals in said securities, said deals also being stored at the primary site, the method additionally comprising the use of a secondary site, at which secondary site replicas of the orders and deals are stored, with the deals stored at the secondary site being used by a corrective function to update the orders stored at the secondary site.

2. The method of claim 1, according to which the replicas stored at the secondary site are forwarded from the primary site, at which primary site the information on which the replicas are based is first received from the market makers and traders.

3. The method of claim 1, according to which the replicas stored at the secondary site are based on information received at the secondary site directly from the market makers and traders.

4. An automated system for trading in securities, said system comprising, at a primary site:

- Automated means for receiving information from market makers and traders, said information comprising quotes and orders for at least one instrument,
- Automated means for storing said information at the primary site,
- Automated means for creating deals using said received information, and automated means for storing said deals at the primary site,

the system additionally comprising a secondary site, at which the system comprises

- automated means for storing replicas of the orders received and the deals created at the primary site,
- automated means for a corrective function for using the deals stored at the secondary site to update the orders stored at the secondary site.

5. The system of claim 4, additionally comprising automated means for transmitting from the primary site to the secondary site the information on which the replicas at the secondary site are based.

6. The system of claim 4, additionally comprising automated means at the secondary site for receiving information directly from the market makers and traders on which the replicas stored at the secondary site are based.

7. A method for use in the automated trading of securities, the trading being carried out at a primary site according to information received from market makers and traders, said information comprising quotes and orders for one or more instrument, the method comprising the reception and storing of said information at the primary site and using said information to create deals in said securities, said deals being stored at the primary site, the method additionally comprising the use of a secondary site, at which secondary site replicas of the orders and deals are stored, with the deals stored at the secondary site being used by a corrective function to update the orders stored at the secondary site, according to which method the trading of securities is continued at the secondary site in case of a malfunction at the primary site, in which case the market makers and traders are prompted to submit new quotes to the secondary site.

8. The method of claim 7, according to which an automated function at the secondary site makes the determination that there has been a malfunction at the primary site, and that the trading should be continued at the secondary site.

9. The method of claim 7, according to which an operator makes the determination that there has been a malfunction at the primary site, and that the trading should be continued at the secondary site.

10. The method of claim 7, according to which the replicas stored at the secondary site are forwarded from the primary site, at which primary site the information on which the replicas are based is first received from the market makers and traders.

11. The method of claim 7, according to which the replicas stored at the secondary site are based on information received at the secondary site directly from the market makers and traders.

12. An automated system for trading in securities, said system comprising at a primary site:

- Automated means for receiving information from market makers and traders, said information comprising quotes and orders for at least one instrument,
- Automated means for storing said information at the primary site,
- Automated means for creating deals using said received information, and automated means for storing said deals at the primary site,

the system additionally comprising a secondary site, at which the system comprises

- automated means for storing replicas of the orders received and the deals created at the primary site,

- automated means for a corrective function for using the deals stored at the secondary site to update the orders stored at the secondary site,
- automated means for determining that there has been a malfunction a the primary site such that the trading should be continued at the secondary site.

13. The system of claim 12, additionally comprising an automated function for prompting the market makers and traders to submit new quotes to the secondary site.

14. The system of claim 12 or 13, additionally comprising automated means for transmitting from the primary site to the secondary site the information on which the replicas at the secondary site are based.

15. The system of claim 12 or 13, additionally comprising automated means at the secondary site for receiving information directly from the market makers and traders on which the replicas stored at the secondary site are based.

16. An automated corrective method for use in an automated system for trading in securities, in which system information regarding orders and deals from a primary trading site is passed to and stored at a secondary site, said corrective method using the deal information passed to the secondary site to update the order information stored at the secondary site.

17. The automated corrective method of claim 16, said method being used to monitor the information regarding deals stored at the secondary site in order to update the information regarding orders stored at the secondary site.

18. The automated corrective method of claim 16, according to which the order information which is passed to the secondary site is passed via the deal information stored at the secondary site.

19. The automated corrective method of claim 16, according to which copies of the orders and deals are stored at the secondary site, and at defined intervals said orders are gone through against the background of said deals.

20. An automated corrective means for use in an automated system for trading in securities, in which system information regarding orders and deals from a primary trading site is passed to and stored at a secondary site, said corrective means using the deal information passed to the secondary site to update the order information stored at the secondary site.

21. The automated corrective means of claim 20, said means monitoring the information regarding deals stored at the secondary site in order to update the information regarding orders stored at the secondary site.

22. The automated corrective means of claim 20, which lets the order information which is passed to the secondary site pass via the deal information stored at the secondary site.

23. The automated corrective means of claim 20, which stores copies of the orders and deals at the secondary site, and at defined intervals goes through said orders against the background of said deals.