SUMMARY

[0009] The embodiments described herein include, but are not limited to, various devices, systems, methods, and computer program products.

[0009a] According to a first aspect of the present invention, there is provided a method including: displaying by a client device an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression; determining by the client device an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons; displaying by the client device the determined expression live evaluation value in the algorithm area; determining by the client device a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and displaying by the client device the determined first element live evaluation value in relation to the first placed block representing the first element.

[0009b] According to a second aspect of the present invention, there is provided an apparatus including: a client device, wherein the client device is adapted to display an algorithm area; wherein the client device is adapted to determine and display an expression live evaluation value for a first expression in the algorithm area, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression; wherein the client device is adapted to determine the expression live evaluation value based on evaluating the first expression specified by the one or more placed building block buttons; wherein the client device is adapted to determine a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element;

wherein the client device is adapted to display the determined first element live evaluation value in relation to the first placed block representing the first element.

[0009c] According to a third aspect of the present invention, there is provided a computer readable storage medium including instructions that, when executed, cause a client device to at least: display an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element ofthe first expression; determine an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons; display the determined expression live evaluation value in the algorithm area; determine a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and display the determined first element live evaluation value in relation to the first placed block representing the first element.

[0010] Certain embodiments provide building block buttons and an algorithm area to define an algorithm. Certain embodiments allow for adjusting both the parameters and the logic of an algorithm rapidly, even during a single trading session. Certain embodiments provide live evaluation of an expression as the algorithm is being defined. Certain embodiments reduce the risks of traditionally programmed algorithms such as syntax errors, unclear logic, and the need for a non-trader programmer to develop the algorithm as specified by a trader by reducing or eliminating the writing of programming code by a user. Certain embodiments provide a single application for building, debugging, and simulating (with real market data) an algorithm all at the same time. In addition, the single application may also provide for initiating the placement of orders using the algorithm.

[0011] Certain embodiments provide a design canvas area and blocks for designing an algorithm. Certain embodiments provide blocks with complex functionality for use in an algorithm. Certain embodiments provide for grouping blocks placed in the design canvas area. Certain embodiments provide for virtualized group blocks enabling dynamic

instantiation of portions of an algorithm to handle particular discrete events. Certain embodiments allow for adjusting both the parameters and the logic of an algorithm rapidly, even during a single trading session. Certain embodiments provide live feedback for blocks as the algorithm is being designed. Certain embodiments provide safety features to reduce potential errors when an algorithm is designed. Certain embodiments provide for operation of some or all portions of an algorithm when a connection between a client device and an algorithm server is broken. Certain embodiments reduce the risks of traditionally programmed algorithms such as syntax errors, unclear logic, and the need for a non-trader programmer to develop the algorithm as specified by a trader by reducing or eliminating the writing of programming code by a user. Certain embodiments provide a single application for building, debugging, and simulating (with real market data) an algorithm all at the same time. In addition, the single application may also provide for initiating the placement of orders using the algorithm.

1. A method including:

displaying by a client device an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression;

determining by the client device an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons;

displaying by the client device the determined expression live evaluation value in the algorithm area;

determining by the client device a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and

displaying by the client device the determined first element live evaluation value in relation to the first placed block representing the first element.

2. The method of claim 1, further including:

managing by the client device an order based on the first expression.

3. The method of claim 2, wherein the algorithm area includes one of the following:

a price area, wherein the price area includes the first expression, wherein managing the order includes setting the price of the order based on the first expression;

a quantity area, wherein the quantity area includes the first expression, wherein managing the order includes setting the quantity of the order based on the first expression;

a conditional area, wherein the conditional area includes the first expression, wherein managing the order includes entering the order in the market and removing the order from the market based on the first expression.

4. The method of any preceding claim, wherein the first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

5. The method of claim 4, further including:

determining by the client device a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

displaying by the client device the determined plurality of element live evaluation values in relation to the respective sub-expression.

6. The method of any preceding claim, further including:

determining by the client device a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

displaying by the client device the determined second element live evaluation value in relation to the second placed block representing the second element.

7. The method of any preceding claim, further including:

receiving by the client device market data, wherein evaluating the first element is based on the market data; and

updating by the client device the first element live evaluation value in response to receiving new market data.

8. The method of any preceding claim, wherein the algorithm area is displayed in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

9. The method of any preceding claim, further including:

displaying by the client device a plurality of available building block buttons; and

receiving by the client device a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

10. An apparatus including:

a client device,

wherein the client device is adapted to display an algorithm area;

wherein the client device is adapted to determine and display an expression live evaluation value for a first expression in the algorithm area, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression;

wherein the client device is adapted to determine the expression live evaluation value based on evaluating the first expression specified by the one or more placed building block buttons;

wherein the client device is adapted to determine a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element;

wherein the client device is adapted to display the determined first element live evaluation value in relation to the first placed block representing the first element.

11. The apparatus of claim 10, wherein the client device is adapted to manage an order based on the first expression.

12. The apparatus of claim 11, wherein managing the order includes one of the following:

setting the price of the order based on the first expression; wherein the algorithm area includes a price area, wherein the price area includes the first expression;

setting the quantity of the order based on the first expression; wherein the algorithm area includes a quantity area, wherein the quantity area includes the first expression; or

entering the order in the market and removing the order from the market based on the first expression; wherein the algorithm area includes a conditional area, wherein the conditional area includes the first expression.

13. The apparatus of any one of claims 10 to 12, wherein the first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

14. The apparatus of claim 13, wherein the client device is adapted to determine a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

wherein the client device is adapted to display the determined plurality of element live evaluation values in relation to the respective sub-expression.

15. The apparatus of any one of claims 10 to 14, wherein the client device is adapted to determine a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

wherein the client device is adapted to display the determined second element live evaluation value in relation to the second placed block representing the second element.

16. The apparatus of any one of claims 10 to 15, wherein the client device is adapted to receive market data, wherein evaluating the first element is based on the market data; and

wherein the client device is adapted to update the first element live evaluation value in response to receiving new market data.

17. The apparatus of any one of claims 10 to 16, wherein client device is adapted to display the algorithm area in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

18. The apparatus of any one of claims 10 to 17, wherein the client device is adapted to display a plurality of available building block buttons; and

wherein the client device is adapted to receive a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

19. A computer readable storage medium including instructions that, when executed, cause a client device to at least:

display an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression;

determine an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons;

display the determined expression live evaluation value in the algorithm area;

determine a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and

display the determined first element live evaluation value in relation to the first placed block representing the first element.

20. The computer readable storage medium of claim 19, including instructions that, when executed, cause the client device to manage an order based on the first expression.

21. The computer readable storage medium of claim 20, including instructions that, when executed, cause the client device to manage the order by one of the following:

setting the price of the order based on the first expression, wherein the algorithm area includes a price area, wherein the price area includes the first expression;

setting the quantity of the order based on the first expression, wherein the algorithm area includes a quantity area, wherein the quantity area includes the first expression; or

entering the order in the market or removing the order from the market based on the first expression, wherein the algorithm area includes a conditional area, wherein the conditional area includes the first expression.

22. The computer readable storage medium of any one of claims 19 to 21, wherein first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

23. The computer readable storage medium of claim 22, including instructions that, when executed, cause the client device to:

determine a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

display the determined plurality of element live evaluation values in relation to the respective sub-expression.

24. The computer readable storage medium of any one of claims 19 to 23, including instructions that, when executed, cause the client device to:

determine a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

display the determined second element live evaluation value in relation to the second placed block representing the second element.

25. The computer readable storage medium of any one of claims 19 to 24, including instructions that, when executed, cause the client device to:

receive market data, wherein evaluating the first element is based on the market data; and

update the first element live evaluation value in response to receiving new market data.

26. The computer readable storage medium of any one of claims 19 to 25, including instructions that, when executed, cause the client device to display the algorithm area in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

27. The computer readable storage medium of any one of claims 19 to 26, including instructions that, when executed, cause the client device to:

display a plurality of available building block buttons; and

receive a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

CLAIMS

What is claimed is:

1. A method including:

displaying by a client device an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression;

determining by the client device an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons;

displaying by the client device the determined expression live evaluation value in the algorithm area;

determining by the client device a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and

displaying by the client device the determined first element live evaluation value in relation to the first placed block representing the first element.

2. The method of claim 1, further including:

managing by the client device an order based on the first expression.

3. The method of claim 2, wherein the algorithm area includes one of the following:

a price area, wherein the price area includes the first expression, wherein managing the order includes setting the price of the order based on the first expression;

a quantity area, wherein the quantity area includes the first expression, wherein managing the order includes setting the quantity of the order based on the first expression;

a conditional area, wherein the conditional area includes the first expression, wherein managing the order includes entering the order in the market and removing the order from the market based on the first expression.

4. The method of any preceding claim, wherein the first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

5. The method of claim 4, further including:

determining by the client device a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

displaying by the client device the determined plurality of element live evaluation values in relation to the respective sub-expression.

6. The method of any preceding claim, further including:

determining by the client device a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

displaying by the client device the determined second element live evaluation value in relation to the second placed block representing the second element.

7. The method of any preceding claim, further including:

receiving by the client device market data, wherein evaluating the first element is based on the market data; and

updating by the client device the first element live evaluation value in response to receiving new market data.

8. The method of any preceding claim, wherein the algorithm area is displayed in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

9. The method of any preceding claim, further including:

displaying by the client device a plurality of available building block buttons; and

receiving by the client device a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

10. An apparatus including:

a client device,

wherein the client device is adapted to display an algorithm area;

wherein the client device is adapted to determine and display an expression live evaluation value for a first expression in the algorithm area, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression,

wherein the client device is adapted to determine the expression live evaluation value based on evaluating the first expression specified by the one or more placed building block buttons;

wherein the client device is adapted to determine a first element live evaluation value, wherein the first element live evaluation value is for a first element

represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element;

wherein the client device is adapted to display the determined first element live evaluation value in relation to the first placed block representing the first element.

11. The apparatus of claim 10, wherein the client device is adapted to manage an order based on the first expression.

12. The apparatus of claim 11, wherein managing the order includes one of the following:

setting the price of the order based on the first expression; wherein the algorithm area includes a price area, wherein the price area includes the first expression;

setting the quantity of the order based on the first expression; wherein the algorithm area includes a quantity area, wherein the quantity area includes the first expression; or

entering the order in the market and removing the order from the market based on the first expression; wherein the algorithm area includes a conditional area, wherein the conditional area includes the first expression.

13. The apparatus of any one of claims 10 to 12, wherein the first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

14. The apparatus of claim 13, wherein the client device is adapted to determine a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

wherein the client device is adapted to display the determined plurality of element live evaluation values in relation to the respective sub-expression.

15. The apparatus of any one of claims 10 to 14, wherein the client device is adapted to determine a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

wherein the client device is adapted to display the determined second element live evaluation value in relation to the second placed block representing the second element.

16. The apparatus of any one of claims 10 to 15, wherein the client device is adapted to receive market data, wherein evaluating the first element is based on the market data; and

wherein the client device is adapted to update the first element live evaluation value in response to receiving new market data.

17. The apparatus of any one of claims 10 to 16, wherein client device is adapted to display the algorithm area in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

18. The apparatus of any one of claims 10 to 17, wherein the client device is adapted to display a plurality of available building block buttons; and

wherein the client device is adapted to receive a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building

block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.

19. *A tangible computer readable storage medium including instructions that,* when executed, cause a client device to at least:

display an algorithm area including a first expression, wherein the first expression is specified by one or more placed building block buttons placed in the algorithm area, wherein each placed building block button represents an element of the first expression;

determine an expression live evaluation value, wherein the expression live evaluation value is determined for the first expression in the algorithm area, wherein the expression live evaluation value is determined based on evaluating the first expression specified by the one or more placed building block buttons;

display the determined expression live evaluation value in the algorithm area;

determine a first element live evaluation value, wherein the first element live evaluation value is for a first element represented by a first placed building block button of the one or more placed building block buttons, wherein the first element live evaluation value is determined based on evaluating the first element; and

display the determined first element live evaluation value in relation to the first placed block representing the first element.

20. The tangible computer readable storage medium of claim 19, including instructions that, when executed, cause the client device to manage an order based on the first expression.

21. The tangible computer readable storage medium of claim 20, including instructions that, when executed, cause the client device to manage the order by one of the following:

setting the price of the order based on the first expression, wherein the algorithm area includes a price area, wherein the price area includes the first expression;

setting the quantity of the order based on the first expression, wherein the algorithm area includes a quantity area, wherein the quantity area includes the first expression; or

entering the order in the market or removing the order from the market based on the first expression, wherein the algorithm area includes a conditional area, wherein the conditional area includes the first expression.

22. The tangible computer readable storage medium of any one of claims 19 to 21, wherein first element is an IF-THEN-ELSE element, wherein the IF-THEN-ELSE element includes an IF portion including an IF sub-expression, a THEN portion including a THEN sub-expression, and an ELSE portion including an ELSE sub-expression, wherein the first element evaluates to one of (1) the evaluation of the THEN sub-expression when the IF sub-expression evaluates to TRUE and (2) the evaluation of the ELSE sub-expression when the IF sub-expression evaluates to FALSE.

23. The tangible computer readable storage medium of claim 22, including instructions that, when executed, cause the client device to:

determine a plurality of element live evaluation values, wherein the plurality of element live evaluation values includes an element live evaluation value for each of the IF sub-expression, the THEN sub-expression, and the ELSE sub-expression based on evaluating each sub-expression respectively; and

display the determined plurality of element live evaluation values in relation to the respective sub-expression.

24. The tangible computer readable storage medium of any one of claims 19 to 23, including instructions that, when executed, cause the client device to:

determine a second element live evaluation value, wherein the second element live evaluation value is for a second element represented by a second placed building block button of the one or more placed building block buttons, wherein the second element live evaluation value is determined based on evaluating the second element; and

display the determined second element live evaluation value in relation to the second placed block representing the second element.

25. The tangible computer readable storage medium of any one of claims 19 to 24, including instructions that, when executed, cause the client device to:

receive market data, wherein evaluating the first element is based on the market data; and

update the first element live evaluation value in response to receiving new market data.

26. The tangible computer readable storage medium of any one of claims 19 to 25, including instructions that, when executed, cause the client device to display the algorithm area in a trading interface including at least one of: (1) a design canvas including one or more placed blocks arranged to define a trading algorithm, (2) a market grid, and (3) a value axis.

27. The tangible computer readable storage medium of any one of claims 19 to 26, including instructions that, when executed, cause the client device to:

display a plurality of available building block buttons; and

receive a command to place a selected building block button of the plurality of available building block buttons, wherein the command includes one of: (1) a drag-and-drop operation of the selected building block button from the plurality of available building block buttons to the algorithm area and (2) a selection of the selected building block button to place the selected building block button in the algorithm area.