

COMPUTER-IMPLEMENTED METHOD, SYSTEM, AND DEVICE FOR DYNAMIC ADJUSTMENT OF EXCHANGE RATES

TECHNICAL FIELD

5 **[0001]** Various aspects relate to methods, systems, and non-transitory computer-readable medium for dynamic adjustment of exchange rates.

BACKGROUND

[0002] The following discussion of the background to the invention is intended to
10 facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

[0003] Online transaction platforms including electronic transaction platforms or E-
15 commerce systems often involve transactions where multiple currencies may be used in the purchase of goods and/or services. Such transactions are typically facilitated by third-party institutions. A typical scenario may involve a customer or client of the E-commerce system purchasing or buying goods/services using a first currency, for example in Chinese Yuan (CNY), and the settlement with the provider of goods/services, for example a merchant, may
20 be performed in a second currency, such as US dollar. The conversion of one currency to another may be deemed a conversion transaction requiring a foreign exchange conversion rate to be quoted to the customer.

[0004] At present, institutions tasked to provide a quotation associated with the transaction of two currencies include transaction cost of exchange rate with banks by

accessing a streaming exchange rate in the inter-bank market; then based on the transaction cost exchange rate, a certain proportion of fixed markup may be made according to the institution's operational requirements to ensure the exchange risks of the institution are covered and a certain amount of profit may be reaped. However, conventional methods of adjusting exchange rate data may not account for real-time fluctuations of exposure of the institutions, and the associated risks associated with over exposure of either the first currency or second currency, which causes imbalance in the exposure of the currencies in the institution. Such imbalance may result in increased operational costs to balance the exposures.

[0005] A need exists to provide an improved method, system and/or device for mitigating exposure risks associated with transactions using different currencies. A further need exists to provide an efficient database query system for processing of currency exchange related queries.

SUMMARY

[0006] The technical solution seeks to provide a system, device, and method for establishing dynamic adjustments of exchange rate. In some embodiments, such dynamic adjustments may be performed real-time in response to a database query for the dynamic adjustment.

[0007] Various aspects of the present disclosure provide for a device for executing a database query, the device comprising at least one processor, the at least one processor configured to: implement a database comprising a first table, the first table having at least one data entry indicative of at least one exposure range of a first currency, and a corresponding data entry indicative of a discount value associated with the at least one exposure range; and implement the database comprising a second table, the second table

having at least one data entry indicative of an exposure amount of the first currency, and at least one data entry indicative of an exposure amount of a second currency.

[0008] The implemented database may be used to receive a database query, the database query may be parsed to obtain input data associated with the exposure size between two or
5 more currencies, and output an adjustment parameter. In some embodiments, the adjustment parameter may be a discount value of exchange rate between the first currency and the second currency.

[0009] In some aspects, the implemented database comprising one or more look-up table may advantageously reduce the database query executing time significantly.

10 **[0010]** In some aspects of the present disclosure, there is provided a computer-implemented method for dynamic adjustment of an exchange rate between a first currency and a second currency, the method executed by at least one processor, and comprising:
defining or obtaining an exposure correspondence data of the first currency, the exposure correspondence data comprising at least one exposure range and a corresponding discount
15 value associated with the at least one exposure range; wherein, upon receiving a request for quotation data to exchange the first currency with a second currency, calculating a current exposure transaction data between the first currency and the second currency; determining, based on the current exposure transaction data, whether the current exposure transaction data is within the at least one exposure range; selecting the corresponding discount value
20 based on the determination of whether the current exposure transaction data is within the at least one exposure range; generating a quotation data in response to the request for quotation data based on the corresponding discount value; wherein the corresponding discount value is used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data.

[0011] In some embodiments, the exposure correspondence data of the first currency may be the first table of the database, and the current exposure transaction data may be the second table of the database. Such an arrangement enables the dynamic adjustment of exchange rate (which in turn quotations between the first currency and second currency) based on exposure size.

[0012] In some embodiments, the first table may be implemented such as to encourage transactions between the first currency and the second currency by preferential prices, and reduce exposure size.

[0013] Advantageously, through dynamic exchange rate adjustment and overall quotation adjustment associated with the transaction of currencies, which may include cross-border transactions, users may be provided with prices more palatable to them, leading to improved customer experience, increased transaction volume, and increased revenue. Such increased transaction volume may effectively reduce exposures of one or more currencies, and the risk of foreign exchange market fluctuations caused by exposure can be reduced, while the cost of closing a position can also be reduced.

[0014] According to another aspect of the present disclosure there is provided a system for dynamic adjustment of an exchange rate between a first currency and a second currency, the system comprises at least one processor, the at least one processor configured to: define or obtain an exposure correspondence data of the first currency, the exposure correspondence data comprising at least one exposure range of the first currency and a corresponding discount value associated with the at least one exposure range; monitor receipt of a request for quotation data to transact the first currency with a second currency; wherein upon receipt of the request for quotation data, parse the request for quotation data to generate a current exposure transaction data between the first currency and the second currency; determine, based on the current exposure transaction data, whether the current

exposure transaction data is within the at least one exposure range; select the corresponding discount value based on the determination of whether the current exposure transaction data is within the at least one exposure range; generate a quotation data in response to the request for quotation data based on the selected corresponding discount value;

- 5 wherein the corresponding discount value is used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data.

[0015] The present disclosure enables a user, such as a merchant or a platform administrator, to dynamically adjust exchange rates associated with the transaction between two or more currencies, depending on preferential conditions and platform exposure
10 balancing requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Throughout the drawings, it should be noted that like reference numbers are used to depict the same or similar elements, features, and structures. The drawings are not
15 necessarily to scale, emphasis instead generally being placed upon illustrating aspects of the disclosure. In the following description, some aspects of the disclosure are described with reference to the following drawings, in which:

[0001] FIG. 1 is a block diagram showing an example device according to various aspects of the present disclosure;

20 **[0002]** FIG. 2A is a block diagram showing a system for dynamic adjustment of exchange rates according to an aspect of the present disclosure;

[0003] FIG. 2B and FIG. 2C show an example implementation of a database, the database comprises a first table and a second table, according to some embodiments of the present disclosure;

25 **[0004]** FIG. 3A is a flow diagram showing a first use case of the system;

[0005] FIG. 3B is a flow diagram showing a second use case of the system; and

[0006] FIG. 4 is a flow chart showing a method for dynamic adjustment of exchange rate according to another aspect of the present disclosure.

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DETAILED DESCRIPTION

[0007] The following detailed description refers to the accompanying drawings that show, by way of illustration, specific details and aspects in which the disclosure may be practiced. One or more aspects are described in sufficient detail to enable those skilled in the art to practice the disclosure. Other aspects may be utilized and structural, logical, and/or electrical changes may be made without departing from the scope of the disclosure. The various aspects of the disclosure are not necessarily mutually exclusive, as some aspects can be combined with one or more other aspects to form new aspects or embodiments. Various aspects are described in connection with methods and various aspects are described in connection with devices. However, it may be understood that aspects described in connection with methods may similarly apply to the devices, and vice versa.

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[0008] It should be understood that the singular terms "a", "an", and "the" include plural references unless context clearly indicates otherwise. Similarly, the word "or" is intended to include "and" unless the context clearly indicates otherwise.

[0009] It will be further understood that the terms "comprise" (and any form of comprise, such as "comprises" and "comprising"), "have" (and any form of have, such as "has" and "having"), "include" (and any form of include, such as "includes" and "including"), and "contain" (and any form of contain, such as "contains" and "containing") are open-ended linking verbs. As a result, a method or device that "comprises," "has," "includes" or "contains" one or more steps or elements possesses those one or more steps or elements, but is not limited to possessing only those one or more steps or elements.

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Likewise, a step of a method or an element of a device that “comprises,” “has,” “includes” or “contains” one or more features possesses those one or more features, but is not limited to possessing only those one or more features. Furthermore, a device or structure that is configured in a certain way is configured in at least that way, but may also be configured in
5 ways that are not listed.

[0010] The term “exemplary” may be used herein to mean “serving as an example, instance, or illustration”. Any aspect or design described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other aspects or designs.

[0011] The terms “at least one” and “one or more” may be understood to include a
10 numerical quantity greater than or equal to one (e.g., one, two, three, four, [...], etc.). The term “a plurality” may be understood to include a numerical quantity greater than or equal to two (e.g., two, three, four, five, [...], etc.). The phrase “at least one of” with regard to a group of elements may be used herein to mean at least one element from the group consisting of the elements. For example, the phrase “at least one of” with regard to a group of elements
15 may be used herein to mean a selection of: one of the listed elements, a plurality of one of the listed elements, a plurality of individual listed elements, or a plurality of a multiple of listed elements.

[0012] The words “plural” and “multiple” in the description and in the claims expressly refer to a quantity greater than one. Accordingly, any phrases explicitly invoking the
20 aforementioned words (e.g., “a plurality of (objects)”, “multiple (objects)”) referring to a quantity of objects expressly refer to more than one of the said objects. The terms “group (of)”, “set (of)”, “collection (of)”, “series (of)”, “sequence (of)”, “grouping (of)”, etc., and the like in the description and in the claims, if any, refer to a quantity equal to or greater than one, i.e. one or more.

[0013] The term “data” as used herein may be understood to include information in any suitable analog or digital form, e.g., provided as a file, a portion of a file, a set of files, a signal or stream, a portion of a signal or stream, a set of signals or streams, and the like. Further, the term “data” may also be used to mean a reference to information, e.g., in form of a pointer. The term “data”, however, is not limited to the aforementioned examples and may take various forms and represent any information as understood in the art. Any type of information, as described herein, may be handled for example via one or more processors in a suitable way, e.g. as data.

[0014] The terms “processor” used herein may be understood as any kind of entity that allows handling data. The data may be handled according to one or more specific functions executed by the processor or controller. Further, a processor or controller as used herein may be understood as any kind of circuit, e.g., any kind of analog or digital circuit. A processor or a controller may thus be or include an analog circuit, digital circuit, mixed-signal circuit, logic circuit, processor, microprocessor, Central Processing Unit (CPU), Graphics Processing Unit (GPU), Digital Signal Processor (DSP), Field Programmable Gate Array (FPGA), integrated circuit, Application Specific Integrated Circuit (ASIC), etc., or any combination thereof. Any other kind of implementation of the respective functions, which will be described below in further detail, may also be understood as a processor, controller, or logic circuit. It is understood that any two (or more) of the processors, controllers, or logic circuits detailed herein may be realized as a single entity with equivalent functionality or the like, and conversely that any single processor, controller, or logic circuit detailed herein may be realized as two (or more) separate entities with equivalent functionality or the like.

[0015] The term “memory” detailed herein may be understood to include any suitable type of memory or memory device, e.g., a hard disk drive (HDD), a solid-state drive (SSD), a flash memory, etc.

[0016] The term “module” detailed herein refers to, or forms part of, or includes an
5 Application Specific Integrated Circuit (ASIC); an electronic circuit; a combinational logic circuit; a field programmable gate array (FPGA); a processor (shared, dedicated, or group) that executes code; other suitable hardware components that provide the described functionality; or a combination of some or all of the above, such as in a system-on-chip. The term module may include memory (shared, dedicated, or group) that stores code executed
10 by the processor.

[0017] Differences between software and hardware implemented data handling may blur. A processor, controller, and/or circuit detailed herein may be implemented in software, hardware, and/or as a hybrid implementation including software and hardware.

[0018] The term “system” detailed herein may be understood as a set of interacting
15 elements, wherein the elements can be, by way of example and not of limitation, one or more mechanical components, one or more electrical components, one or more instructions (e.g., encoded in storage media), and/or one or more processors, and the like.

[0019] The term “first”, “second”, “third”, “fourth”, “fifth”, “sixth”, etc. detailed herein are used to distinguish one element from another similar element and may not necessarily
20 denote order or relative importance, unless otherwise stated in the form of priority. For example, a first data entry, a second data entry of a database table may be used to distinguish two data entry associated two different currency exposure.

[0020] The term “third-party payment institution” detailed herein includes an independent institution having certain strength, reputation, and credit guarantee, which, by

signing contracts with financial institutions such as banks, provides a network payment mode interfaced with a bank payment system for a transaction payment platform. In the third-party payment model or mode, a buyer (e.g. user, client) purchases goods or services, using the account provided by the third-party platform to pay for the goods or services (e.g. pay to the third party), and the third party will notify the seller that the payment has been made and request the seller to deliver the merchant. After the buyer receives the goods, inspects the goods, and confirms them, the buyer notifies the third party to pay the seller. The third party then transfers the payment to the seller account.

[0021] The term “liquidity provider” detailed herein broadly include banks, financial institutions, principal trading firms (PTFs), and other providers of liquidity. Liquidity provision in modern markets requires diversity among liquidity providers to facilitate risk transfer and efficiently match buyers with sellers during continuous trading.

[0022] The term “position” detailed herein refers to currency profit and loss caused by fluctuation(s) of the exchange rate during a holding period. Different types of positions may arise from foreign exchange exposure. For example, financial institutions or liquidity providers may have "long" or "short" positions (the professional term for foreign exchange assets in the financial circle) in the intermediary services of foreign exchange transactions for customers. A long position generally refers to purchase amount is greater than the sales amount. The short position means that the sales amount is greater than the purchase amount. This kind of "short" and "long" may also be referred to as "foreign exchange exposure". A closing position (or closing a transaction) refers to using opposite positions to reduce a particular position to zero. For example, selling long positions and make up (cover) short positions. The closing position may also be referred to as a closing exposure.

[0023] Various aspects relate to a database device which provides a significantly reduced database query execution time. In the following, various aspects are described for the exemplary scenario of foreign exchange (FX) rates and the real time conversion thereof. It is understood that this serves as an example for illustrating the present invention and that the principles can be applied accordingly to any other scenario including, for example, other (real-time) data and/or another use of the data.

[0024] FIG. 1 is a block diagram showing an example electronic device 100, according to an embodiment of the present disclosure. The electronic device 100 may be a laptop computer, a desktop computer, a tablet computer, an automobile computer, a smart phone, a personal digital assistant, a server, or other electronic devices capable of running computer applications. In some embodiments, the electronic device 100 includes a processor 102, an input/output (I/O) module 104, memory 106, a power unit 108, and one or more network interfaces 110. The electronic device 100 can include additional components. In some embodiments, the processor 102, input/output (I/O) module 104, memory 106, power unit 108, and the network interface(s) 110 are housed together in a common housing or other assembly.

[0025] The memory 106 may include a database 116. The database 116 may be configured to receive database query data from the input/output module 104. The input/output module 104 may in turn be configured to stream real-time data to the database 116.

[0026] One or more servers (not shown) may be configured to provide (e.g., transmit) real-time data to the device 100.

[0027] The processor 102 can execute instructions, for example, to generate output data based on data inputs. The instructions can include programs, codes, scripts, or other types of data stored in memory (e.g., memory 106). Additionally, or alternatively, the instructions

can be encoded as pre-programmed or re-programmable logic circuits, logic gates, or other types of hardware or firmware components or modules. The processor 102 may be, or may include, a multicore processor having a plurality of cores, and each such core may have an independent power domain and can be configured to enter and exit different operating or performance states based on workload. Additionally, or alternatively, the processor 102 may be, or may include, a general-purpose microprocessor, as a specialized co-processor or another type of data processing apparatus. In some cases, the processor 102 performs high-level operation of the electronic device 100. For example, the processor 102 may be configured to execute or interpret software, scripts, programs, functions, executables, or other instructions stored in the memory 106.

[0028] The I/O module 104 may include a mouse, keypad, touch screen, scanner, optical reader, sensors, and/or stylus (or other input device(s)) through which a user of the electronic device 100 may provide input to the electronic device 100, and may also include one or more audio speakers for providing audio output and a video display device for providing textual, audiovisual, and/or graphical output.

[0029] The example memory 106 may include computer-readable storage media, for example, a volatile memory device, a non-volatile memory device, or both. The memory 106 may include one or more read-only memory devices, random-access memory devices, buffer memory devices, or a combination of these and other types of memory devices. In some instances, one or more components of the memory can be integrated or otherwise associated with another component of the electronic device 100. The memory 106 may store instructions that are executable by the processor 102. In some examples, the memory 106 may store instructions for an operating system 112 and for application programs 114. The memory 106 may also store the database 116.

[0030] The example power unit 108 provides power to the other components of the electronic device 100. For example, the other components may operate based on electrical power provided by the power unit 108 through a voltage bus or other connection. In some embodiments, the power unit 108 includes a battery or a battery system, for example, a rechargeable battery. In some embodiments, the power unit 108 includes an adapter (e.g., an AC adapter) that receives an external power signal (from an external source) and converts the external power signal to an internal power signal conditioned for a component of the electronic device 100. The power unit 108 may include other components or operate in another manner.

[0031] The electronic device 100 may be configured to operate in a wireless, wired, or cloud network environment (or a combination thereof). In some embodiments, the electronic device 100 can access the network using the network interface(s) 110. The network interface(s) 110 can include one or more adapters, modems, connectors, sockets, terminals, ports, slots, and the like. The wireless network that the electronic device 100 accesses may operate, for example, according to a wireless network standard or another type of wireless communication protocol. For example, the wireless network may be configured to operate as a Wireless Local Area Network (WLAN), a Personal Area Network (PAN), a metropolitan area network (MAN), or another type of wireless network. Examples of WLANs include networks configured to operate according to one or more of the 802.11 family of standards developed by IEEE (e.g., Wi-Fi networks), and others. Examples of PANs include networks that operate according to short-range communication standards (e.g., BLUETOOTH®, Near Field Communication (NFC), ZigBee), millimeter wave communications, and others. The wired network that the electronic device 100 accesses may, for example, include Ethernet, SONET, circuit-switched networks (e.g., using components such as SS7, cable, and the like), and others.

[0032] The processor 102 may be used to execute a computer-implemented method for dynamic adjustment of exchange rates between two or more currencies according to the present disclosure.

[0033] FIG. 2A is a block diagram showing an example system 200 according to an embodiment of the present disclosure. The system 200 may comprise the electronic device 100 and in particular may include processor 102. In various embodiments, the system 200 may be implemented in an online transaction platform providing direct or indirect multi-currency exchange services. In various embodiments, one or more third-party payment services may be used by one or more merchants operating on the platform with quotations of different currency exchange rates, for example, in cross-border payment scenarios, whereby users (via user device 202, which may be an electronic device) who buy from an e-commerce platform may pay in various different currencies. In various embodiments, third-party payment services may buy currencies from and/or sell currencies to liquidity providers such as banks (e.g. server 206 managed by a bank).

[0034] The database 116 may be configured to receive and process real-time data 212. The user device 202 may be configured to transmit the real-time data 212 to the at least one processor 102, which may then process the real-time data 212 (e.g. parse the real-time data 212) to a database query 214, and transmit the database query 214 to the database 116 to request data from the database 116. The database 116 may be configured to determine the requested data 216 in response to receiving the database query 214. The database 116 then provide (e.g., transmit) the requested data 216 for processing by the at least one processor 102 before being sent to the user device 202.

[0035] The at least one processor 102 may be configured in data communication with a third-party server 206, for example, that managed by a financial institution. The at least one

processor 102 may be configured to periodically receive ad-hoc data 218 from the third-party server 206. In some embodiments, the at least one processor 102 may be configured to PULL the ad-hoc data 218 from the third-party 206 at regular time intervals or as and when required.

5 **[0036]** In some embodiments, the at least one processor 102 comprises a quotation generation module and a transaction handling module.

[0037] FIG. 2B shows a particular embodiment of the database 116, comprising a first table 240. The first table 240 may comprise a first data entry 241 indicative of a first exposure range of a first currency and second data entry 242 indicative of a second exposure
10 range of the first currency, and a corresponding third data entry 243 indicative of a first discount value associated with the first exposure range and a fourth data entry 244 indicative of a second discount value associated with the second exposure range.

[0038] In the embodiment shown in FIG. 2B, a third exposure range 245, a fourth exposure range 246, a corresponding third discount value 247, and a corresponding fourth
15 discount value 248 may be entered. It is contemplated more data entries, corresponding to different exposure ranges and corresponding discount value, may be included.

[0039] FIG. 2C shows a particular embodiment of the database 116, comprising a second table 260. The second table 260 may comprise a fifth data entry 261 indicative of a current exposure amount of the first currency, and a sixth data entry 262 indicative of a
20 current exposure amount of a second currency.

[0040] FIG. 3A shows an embodiment of a first use case 300 of the system 200 and device 100 for exchange rate adjustment in the transaction between a first currency- US dollars (USD), and a second currency- Chinese Yuan (CNY). The first use case corresponds to a scenario where a customer 302 wishes to sell USD 50,000 to buy CNY. An electronic
25 quotation request 304 may be sent to the quotation generation module 320 of the at least one

processor 102. The quotation generation module 320 may then parse the request data 304 to determine the first currency and the second currency, and load the relevant database 116, the first table 240 and second table 260 associated with the first currency and second currency.

5 **[0041]** Based on the parsed data, the quotation generation module 320 may then send a database query 322 to the second table 260 to read a current exposure transaction data between the first currency and the second currency. As may be seen from FIG. 3A, the current exposure may be zero for both the first currency and the second currency. Based on the current exposure, the quotation generation module 320 is configured to send a database
10 query 324 to the first table 240 to determine the discount value in accordance with the exposure of the first currency.

[0042] In the case of the first example, as the current exposure does not fall under any of the first exposure range, second exposure range, third exposure range, or fourth exposure range, no discount value is applicable. In other words, the database 116 will be configured
15 to return a result of no discount value.

[0043] In addition to accessing the database 116, the quotation generation module 320 may be configured to obtain a benchmark quotation 326 before any application of discount value or rate. The benchmark quotation may be based on the ad-hoc data 218 obtained from the server 206.

20 **[0044]** The quotation generation module 320 may then generate a quotation based on the benchmark quotation and the discount rate. As illustrated in FIG. 3A, the benchmark quotation may be based on an exchange rate of 1 USD is to 7 CNY, and without any applicable discount value or rate based on the response to query 324, the quotation 328 in response to the request 304 will be 350,000 CNY for selling 50,000 USD.

[0045] Upon receiving the quotation 328, the customer 302 may decide whether to proceed with the transaction based on the received quotation 328. The customer 302 may send a transaction decision data 342 in response to the quotation data indicating acceptance or rejection of the quotation to the transaction handling module 340. The transaction
5 handling module 340 may then be configured to parse the transaction decision data 342 to determine if the customer 302 has accepted or rejected the quotation 328. In the event of a positive determination that the transaction decision data is indicative of an acceptance status, the transaction handling module 340 may then be configured to determine an intended exposure data based on the quotation data; and updating the current exposure transaction
10 data, i.e. the second table 260, the fifth data entry 261, and the sixth data entry 262, using the intended exposure data upon completion of the transaction. In the example of FIG. 3A, the second table is updated 344 based on the accepted quotation and completed transaction of USD 50,000 and -CNY 350,000.

[0046] FIG. 3B illustrates a second transaction performed by the customer 302. The
15 second transaction may be regarded as the second use case of the system 200 and device 100 for exchange rate adjustment in the transaction between the first currency- US dollars (USD), and the second currency- Chinese Yuan (CNY). The second use case corresponds to a scenario where a customer 302 wishes to buy USD 30,000 and sells CNY. An electronic quotation request data 354 may be sent to the quotation generation module 320 of the at
20 least one processor 102. The quotation generation module 320 may then parse the request data 354 to determine the first currency and the second currency, and load the relevant database 116, the first table 240 and second table 260 associated with the first currency and second currency.

[0047] Based on the parsed data, the quotation generation module 320 may then send a database query 362 to the second table 260 to read a current exposure transaction data between the first currency and the second currency. As may be seen from FIG. 3B, the current exposure, which was based on the update performed in the first transaction, is such
5 that the first currency exposure is 50,000 and the second currency exposure is -350,000. Based on the current exposure, the quotation generation module 320 is configured to send a database query 364 to the first table 240 to determine the discount value in accordance with the exposure of the first currency.

[0048] In the case of the second use case, as the current exposure of the first currency is
10 50,000, it falls within the first exposure range. Accordingly, the applicable discount value is 1%. In other words, the database 116 will be configured to return a result of 1% discount value.

[0049] As with the first use case, in addition to accessing the database 116, the quotation generation module 320 may be configured to obtain a benchmark quotation 366 before any
15 application of discount value or rate. The benchmark quotation may be based on the ad-hoc data 218 obtained from the server 206.

[0050] The quotation generation module 320 may then generate a quotation based on the benchmark quotation and the discount rate. For example, the benchmark quotation may be based on an exchange rate of 1 USD is to 7.2 CNY. With the discount rate of 1% based
20 on the response to query 364, the quotation 368 in response to the request 354 will be to sell 213,900 CNY for buying 30,000 USD.

[0051] After receiving the quotation 368, the customer 302 may again decide whether to proceed with the transaction based on the received quotation 368. The customer 302 may send a transaction decision data 372 in response to the quotation data indicating acceptance

or rejection of the quotation to the transaction handling module 340. The transaction handling module 340 may then be configured to parse the transaction decision data 372 to determine if the customer 302 has accepted or rejected the quotation 368. In the event of a positive determination that the transaction decision data is indicative of an acceptance status, the transaction handling module 340 may then be configured to determine an intended exposure data based on the quotation data; and update 374 the current exposure transaction data, i.e. the second table 260, the fifth data entry 261, and the sixth data entry 262, using the intended exposure data upon completion of the transaction. In the illustrated example of FIG. 3B, the second table 260 may be updated based on the accepted quotation and completed transaction of USD 20,000 and -CNY 136,100.

[0052] It may be appreciated that the use of conventional solutions (i.e. mere provision of benchmark quotation without exposure-based database and discount rates) may result in the expansion in the exposures of various currencies due to the imbalance of customers' different trading directions, which may inadvertently increase position risk, and/or increases a platform and/or a financial institution's cost of closing the position.

[0053] By providing the technical solution of the present disclosure, a quotation discount mechanism based on exposure size may be established to encourage customers to trade in reverse and therefore facilitate the reduction of exposure as illustrated the update of the second table 260 in FIG. 3B.

[0054] In some embodiments, the first table 240 of database 116 of the device 100 may be modified such as to include historical data associated with the acceptance or rejection of quotations. Such historical data may be used to derive a sensitivity index associated with a particular user 302, and may in turn be used to fine-tune or adjust any discount value on a dynamic basis. In some embodiments, an artificial intelligence (AI) module may be

configured to receive the historical data as training input to predict or optimize a suitable discount value depending on exposure range for each user of the system 200. In some embodiments, the historical data may include simulated data, real-world data, or a mixture of simulated data and real-world data.

- 5 **[0055]** The database 116, the associated first table 240 and second table 260, may be pre-configured or determined by an authorized user, such as an administrator of the system 200, for each specific currency.

10 **[0056]** FIG. 4 is a flow chart showing an example method 400 according to an embodiment of the present disclosure. The method 400 may be a computer-implemented method for dynamic adjustment of an exchange rate between a first currency and a second currency, the method executed by at least one processor. The method 400 may be implemented as a software executable instructions in a processor, for example processor 102. The processor 102 may comprise the quotation generation module 320 and the transaction handling module 340 as described.

- 15 **[0057]** The method 400 may commence with a step 402 of defining or obtaining an exposure correspondence data of the first currency, the exposure correspondence data comprising a first exposure range and a second exposure range of the first currency and a corresponding first discount value associated with the first exposure range and a corresponding second discount value. This step 402 may correspond with implementing the
20 database 116, or accessing the first table 240 of the already populated database 116.

[0058] In step 404, the processor 102 may wait for a request for quotation from a user or customer device, such as device 202.

[0059] In step 406, upon receiving the request for quotation, the processor 102 may be configured to calculate a current exposure transaction data of the first currency. Such calculation may be based on parsing the request and identifying the first currency data.

[0060] In step 408, based on the first currency data obtained, determining, based on the
5 current exposure transaction data, whether the current exposure transaction data is within a first exposure range 241 or within a second exposure range 242. This may further correspond to determining if the exposure is within the range 245, or the range 246. Additional ranges may be defined in the database where necessary.

[0061] In step 410, if the current exposure transaction data is within the first exposure
10 range 241, then the database 116 is configured to return the first discount value 243 as the response to the database query. If the current exposure transaction data is within the second exposure range 242, then the second discount value 244 is selected as the response to the database query. In this step 410, if it is determined that the current exposure transaction data is not within any of the defined exposure ranges, then no discount value will be applicable.
15 See, for example, FIG. 3A.

[0062] In step 412, a quotation data is generated in response to the request for quotation data based on the selected first discount value or selected second discount value, as the case may be. If no discount is applicable, then the quotation data will be based on a benchmark quotation, which may be a quotation obtained from a financial institution at a pre-
20 determined time interval.

[0063] In step 414, the first discount or second discount value (as the case may be) may be used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data. If no discount is applicable, then the exchange rate will be based on the benchmark quotation.

[0064] In step 416, the processor 102 may be configured to detect a transaction decision data in response to the quotation data, the transaction decision data indicative of an acceptance status or a rejection status of the quotation data.

[0065] In step 418, in a positive determination of the acceptance of the quotation data;
 5 the processor 102 is configured to calculate an intended exposure data based on the quotation data upon completion of the transaction; and update the current exposure transaction data using the intended exposure data upon completion of the transaction. Referring to the use cases in FIG. 3A and FIG. 3B, the current exposure transaction data may be updated in accordance with a similar format as table 260.

10 **[0066]** The aforementioned method 400 may be implemented as software instructions and may include a computer program element or a computer program product.

[0067] It is appreciable that although the examples of the first table 240 provided two to four exposure ranges of the first currency and corresponding two to four discount rates, the present disclosure requires at least one exposure range. It is further appreciable that more
 15 exposure ranges may be defined or configured.

[0068] While the method 400 described above is illustrated and described as a series of steps or events, it will be appreciated that any ordering of such steps or events are not to be interpreted in a limiting sense. For example, some steps may occur in different orders and/or concurrently with other steps or events apart from those illustrated and/or described herein.
 20 In addition, not all illustrated steps may be required to implement one or more aspects or embodiments described herein. Also, one or more of the steps depicted herein may be carried out in one or more separate acts and/or phases.

[0069] In some embodiments, the database 116 may be implemented or arranged in a distributed ledger, such as a blockchain.

[0070] Some of the subject matter and operations described in this specification can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them. Some of the subject matter described in this specification can be implemented as one or more computer programs, i.e., one or more modules of computer program instructions, encoded on a computer storage medium for execution by, or to control the operation of, data-processing apparatus. A computer storage medium can be, or can be included in, a computer-readable storage device, a computer-readable storage substrate, a random or serial access memory array or device, or a combination of one or more of them. Moreover, while a computer storage medium is not a propagated signal, a computer storage medium can be a source or destination of computer program instructions encoded in an artificially generated propagated signal. The computer storage medium can also be, or be included in, one or more separate physical components or media (e.g., multiple CDs, disks, or other storage devices).

[0017] Some of the operations described in this specification can be implemented as operations performed by a data processing apparatus on data stored on one or more computer-readable storage devices or received from other sources.

[0018] The term “data processing apparatus” encompasses all kinds of apparatus, devices, and machines for processing data, including by way of example a programmable processor, a computer, a system on a chip, or multiple ones, or combinations, of the foregoing. The apparatus can include special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application specific integrated circuit). The apparatus can also include, in addition to hardware, code that creates an execution environment for the computer program in question, e.g., code that constitutes processor firmware, a protocol

stack, a database management system, an operating system, a cross-platform runtime environment, a virtual machine, or a combination of one or more of them.

[0019] A computer program (also known as a program, software, software application, script, or code) can be written in any form of programming language, including compiled or interpreted languages, declarative or procedural languages, and it can be deployed in any form, including as a stand-alone program or as a module, component, subroutine, object, or other unit suitable for use in a computing environment. A computer program may, but need not, correspond to a file in a file system. A program can be stored in a portion of a file that holds other programs or data (e.g., one or more scripts stored in a markup language document), in a single file dedicated to the program, or in multiple coordinated files (e.g., files that store one or more modules, sub programs, or portions of code). A computer program can be deployed to be executed on one computer or on multiple computers that are located at one site or distributed across multiple sites and interconnected by a communication network.

[0020] Some of the processes and logic flows described in this specification can be performed by one or more programmable processors executing one or more computer programs to perform actions by operating on input data and generating output. The processes and logic flows can also be performed by, and apparatus can also be implemented as, special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application specific integrated circuit).

[0021] While this specification contains many details, these should not be understood as limitations on the scope of what may be claimed, but rather as descriptions of features specific to particular examples. Certain features that are described in this specification or shown in the drawings in the context of separate embodiments can also be combined. Conversely, various features that are described or shown in the context of a single

embodiment can also be implemented in multiple embodiments separately or in any suitable sub-combination.

[0022] Similarly, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular
5 order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the embodiments described above should not be understood as requiring such separation in all embodiments, and it should be understood that the described program components and systems can
10 generally be integrated together in a single product or packaged into multiple products.

[0071] A number of embodiments have been described. Nevertheless, it will be understood that various modifications can be made. Accordingly, other embodiments and combinations of one or more of the described embodiments are within the scope of the following claims.

CLAIMS

1. A computer-implemented method for dynamic adjustment of an exchange rate between a first currency and a second currency, the method executed by at least one processor, and comprising:

defining or obtaining an exposure correspondence data of the first currency, the exposure correspondence data comprising a first exposure range of the first currency and a corresponding first discount value associated with the first exposure range;

wherein, upon receiving a request for quotation data to exchange the first currency with a second currency,

calculating a current exposure transaction data of the first currency;

determining, based on the current exposure transaction data, whether the current exposure transaction data is within the first exposure range;

selecting the first discount value based on a positive determination that the current exposure transaction data is within the first exposure range;

generating a quotation data in response to the request for quotation data based on the selected first discount value;

wherein the selected first discount value is used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data; and wherein in a determination that the current exposure transaction data is not in the first exposure range, a quotation data without discount is generated.

2. The computer-implemented method according to claim 1, wherein the exposure correspondence data comprises a second exposure range of the first currency and a corresponding second discount value associated with the second exposure range, and wherein the determining based on the current exposure transaction data includes

determining whether the current exposure transaction data is within the second exposure range; the selecting includes selecting the second discount value based on a positive determination of that the current exposure transaction data is within the second exposure range; and the selected second discount value is used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data; and wherein in a determination that the current exposure transaction data is not in the second exposure range, the quotation data without discount is generated.

3. The computer-implemented method according to claim 1 or 2, further comprising detecting a transaction decision data in response to the quotation data, the transaction decision data indicative of an acceptance status or a rejection status of the quotation data; wherein in a positive determination of the acceptance of the quotation data; calculating an intended exposure data based on the quotation data upon completion of the transaction; and updating the current exposure transaction data using the intended exposure data upon completion of the transaction.

4. The computer-implemented method according to claim 2 or 3, wherein the exposure correspondence data is a database entry of a database, the database configured to receive the current exposure of the first currency as input and output the first discount value or the second discount value.

5. The computer-implemented method according to claim 4, wherein the database is a look-up table (LUT).

6. The computer-implemented method according to any one of claims 2 to 5, wherein generating the quotation data includes multiplying the calculated exchange rate with the selected first discount value or the second discount value.
7. The computer-implemented method according to any one of the preceding claims, wherein the exposure correspondence data further comprises a third exposure range of the first currency and a corresponding third discount value of the third exposure range.
8. The computer-implemented method according to any one of the preceding claims, wherein in the defining of the exposure correspondence data of a first currency, the second exposure range corresponds to a higher exposure amount relative to the first exposure range, and the second discount value is higher than the first discount value.
9. A system for dynamic adjustment of an exchange rate between a first currency and a second currency, the system comprises at least one processor, the at least one processor configured to:
 - define or obtain an exposure correspondence data of the first currency, the exposure correspondence data comprising a first exposure range of the first currency and a corresponding first discount value associated with the first exposure range;
 - monitor receipt of a request for quotation data to transact the first currency with a second currency;
 - wherein upon receipt of the request for quotation data, parse the request for quotation data to generate a current exposure transaction data between the first currency and the second currency;

determine, based on the current exposure transaction data, whether the current exposure transaction data is within the first exposure range;

select the first discount value based on a positive determination that the current exposure transaction data is within the first exposure range or within the second exposure range;

generate a quotation data in response to the request for quotation data based on the selected first discount value;

wherein the first discount value is used to dynamically calculate the exchange rate between the first currency and the second currency in the generation of the quotation data; and wherein in a determination that the current exposure transaction data is not in the first exposure range, a quotation data without discount is generated.

10. The system according to claim 9, wherein the exposure correspondence data comprises a second exposure range of the first currency and a corresponding second discount value associated with the second exposure range, and wherein the at least one processor is further configured to: determine, based on the current exposure transaction data, whether the current exposure transaction data is within the second exposure range; select the second discount value based on a positive determination of that the current exposure transaction data is within the second exposure range; and dynamically calculate, based on the second discount value, the exchange rate between the first currency and the second currency in the generation of the quotation data; and wherein in a determination that the current exposure transaction data is not in the second exposure range, the quotation data without discount is generated.

11. The system according to claim 9 or 10, wherein the at least one processor further configured to: detect a transaction decision data in response to the quotation data, the

transaction decision data indicative of an acceptance status or a rejection status of the quotation data; wherein in a positive determination of the acceptance of the quotation data; calculate an intended exposure data based on the quotation data upon completion of the transaction; and update the current exposure transaction data using the intended exposure data upon completion of the transaction.

12. The system according to claim 10 or 11, wherein the at least one processor comprises a quotation generation module, the quotation generation module arranged in data communication with the exposure correspondence data and configured to: receive the request for quotation data to transact the first currency with a second currency, obtain the current exposure transaction data between the first currency and the second currency; determine, based on the current exposure transaction data, whether the current exposure transaction data is within the first exposure range or within the second exposure range; select the first discount value or the second discount value based on the determination of whether the current exposure transaction data is within the first exposure range or within the second exposure range; generate the quotation data in response to the request for quotation data based on the selected first discount value or second discount value.

13. The system according to claim 12, wherein the at least one processor comprises a transaction handling module, the transaction handling module configured to: detect the transaction decision data in response to the quotation data; determine whether the quotation data is accepted, and wherein in a positive determination of the acceptance of the quotation data; calculate the intended exposure data based on the quotation data upon completion of the transaction; and update the current exposure transaction data using the intended exposure data upon completion of the transaction.

14. The system according to any one of claims 9 to 13, wherein the exposure correspondence data is a database entry of a database, the database configured to receive the current exposure of the first currency as input and output the first discount value or the second discount value.

15. The system according to claim 14, wherein the database is a look-up table (LUT) configured to receive the current exposure of the first currency as a database query, the database configured to output the first discount value or the second discount value.

16. The system according to any one of claims 9 to 15, wherein the at least one processor is configured to generate the quotation data by multiplying the calculated exchange rate with the selected first discount value or the second discount value.

17. The system according to any one of claims 9 to 16, wherein the exposure correspondence data further comprises a third exposure range of the first currency and a corresponding third discount value of the third exposure range.

18. The system according to any one of claims 9 to 17, wherein the at least one processor is configured to define the exposure correspondence data of a first currency such that the second exposure range corresponds to a higher exposure amount relative to the first exposure range, and the second discount value is higher than the first discount value.

19. A device for executing a database query, the device comprising at least one processor, the at least one processor configured to:

implement a database comprising a first table, the first table having at least one data entry indicative of at least one exposure range of a first currency, and a corresponding data entry indicative of a discount value associated with the at least one exposure range; and
implement the database comprising a second table, the second table having at least one data entry indicative of an exposure amount of the first currency, and at least one data entry indicative of an exposure amount of a second currency.

20. The device of claim 19, wherein the database comprises a Look-Up Table (LUT).

21. The device of claim 19 or 20, further comprises an input module configured to receive a current exposure transaction data between the first currency and the second currency, and wherein the database is configured to receive a database query indicative of the current exposure transaction data, and output the first discount value or the second discount value.

22. A non-transitory computer-readable medium storing computer executable code comprising instructions for dynamic adjustment of an exchange rate between a first currency and a second currency according to any one of the method of claims 1 to 9.