COMPUTER-IMPLEMENTED METHOD AND SYSTEM FOR CLOSING MULTI-CURRENCY TRANSACTIONS

TECHNICAL FIELD

[0001] Various aspects relate to methods, systems, and non-transitory computer-readable medium for closing multi-currency transactions.

BACKGROUND

[0001] The following discussion of the background to the invention is intended to 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.

[0002] Online transaction platforms including electronic transaction platforms or E-commerce systems often involve cross-border payment transactions, where multiple currencies may be used in the purchase of goods and/or services. Such transactions are typically facilitated by third-party payment platforms. 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 RMB, and the settlement with the provider of goods/services, for example a merchant, may be performed in a second currency, such as US dollar.

[0003] In transactions involving multiple currencies, existing transaction platforms may have to reference a central or preferred platform currency in the performance of reconciliation or settlement. For example, most cross currencies of the prior art are relative

to the U.S. dollar as the reference currency. For non-USD core position sets, existing technology does not have the capability to identify cross currencies so as to minimize fluctuation risks associated with one single reference currency. In addition, existing transaction systems are not equipped to deal with sudden fluctuations of currencies which can adversely affect the closure of transactions, causing loss to transaction platforms.

[0004] A need exists to provide an improved method and system for mitigating risks associated with a single central or reference currency in a platform involving transactions performed in a plurality of currencies. A further need exists to provide an efficient data processing method of transaction data in a safe and secure manner.

SUMMARY

[0005] The technical solution seeks to provide a system and method for the selection of multiple cross-currencies to perform closure, settlement or reconciliation. The system provides for a user-defined dataset of priority currency pairs for selection, and a fail-safe mechanism to ensure any attempted closure of transactions will not result in reversal of position due to sudden fluctuations in order or transaction volume.

[0006] According to an aspect of the present disclosure there is provided a computer-implemented method for closing a multi-currency transaction, the method executed by at least one processor of a transaction platform, and comprising: defining a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency; wherein, upon receiving an order request data to close the multi-currency transaction, generating an exposure transaction dataset, the exposure transaction dataset comprises linking the first priority quote currency as a first temporary base currency and a central currency as a platform quote currency; calculating the base currency amount and the quote currency amount of the first priority quote currency and the platform quote

currency; and selecting the first priority quote currency amount against the base currency amount to close the multi-currency transaction based on the generated exposure transaction dataset; and closing the multi-currency transaction by using the central currency amount against any remainder base currency amount.

[0007] According to another aspect of the disclosure there is provided a system for closing a multi-currency transaction, the system comprises a processor configured to: receive or obtain a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency; wherein, upon receiving an order request data to close the multi-currency transaction, generate an exposure transaction dataset, the exposure transaction dataset comprises linking the first priority quote currency as a first temporary base currency and a central currency as a platform quote currency; calculate the base currency amount and the quote currency amount of the first priority quote currency and the platform quote currency; and select the first priority quote currency amount against the base currency amount to close the multi-currency transaction, and use the central currency amount against any the base currency amount to close any reminder base amount.

[0008] The above configuration enables a user, such as a merchant or a platform administrator, to select one or more preferred sets of cross-currency pairs to close a multi-currency transaction (position) at any point in time, depending on conditions or currency exchange rates. In some aspects, the priority dataset may advantageously be implemented as a computer device to react to sudden currency exchange rate changes.

[0009] According to an aspect of the disclosure, there is provided a computer-implemented method for closing a multi-currency transaction, the method executed by at least one processor of a transaction platform, and comprising: defining or obtaining a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency; wherein, upon receiving a request data to close

the multi-currency transaction, generating an exposure transaction dataset, the generation comprises linking the first priority quote currency as a first temporary base currency and a central currency as a platform quote currency; calculating a first temporary base currency exposure of the first priority quote currency and the quote currency amount of the platform quote currency; and closing the multi-currency transaction based on the generated exposure transaction dataset by selecting the first priority quote currency exposure against the base currency exposure, and closing the multi-currency transaction by using the central currency amount against any remainder base currency exposure.

[0010] In some embodiments, defining the priority dataset further comprises defining a second data indicative of the base currency and a second priority quote currency, and the generation of the exposure transaction dataset further comprises linking the second priority quote currency as a second temporary base currency with the central currency, and the calculation includes calculating a second temporary base currency exposure of the second priority quote currency.

[0011] In some embodiments, the computer-implemented method further comprises a step of selecting the second priority quote currency amount against the base currency exposure to close the multi-currency transaction, before using the central currency amount against any remainder base currency exposure.

[0012] In some embodiments, the computer-implemented method further comprises determining the first temporary base currency exposure of the first priority quote currency amount and/or determining the second temporary base currency exposure of the second priority quote currency amount are opposite to the position of the base currency exposure, before closing.

[0013] In some embodiments, in the case it is determined that the first temporary base currency exposure is not opposite to the position of the base currency exposure, the

computer-implemented method further comprises a step of selecting the second priority quote currency amount against the base currency exposure for closing the multi-currency transaction.

[0014] In some embodiments, in the case it is determined that the position of the second temporary base currency exposure is not opposite to the position of the base currency exposure, the computer-implemented method further comprises a step of selecting the platform quote currency amount against the base currency exposure for closing the multi-currency transaction.

[0015] In some embodiments, closing the multi-currency transaction comprises multiplying each of the base currency exposure and the first priority quote currency amount with a pre-determined threshold.

[0016] In some embodiments, the computer-implemented method further comprises a step of converting the multiplied base value and threshold to a normalized value A_{norm} and the multiplied quote value and threshold to a normalized value B_{norm}, wherein the normalization is with respect to the central currency exchange rate, and recording the smaller of the normalized value A_{norm} and the normalized value B_{norm} value as a benchmark value C. In some embodiments, the benchmark C may be used to derive a D value, the D value equals to the benchmark C multiplied by a market benchmark rate.

[0017] In some embodiments, the closed multi-currency transaction is further checked for a position reversal abnormality.

[0018] According to another aspect of the disclosure there is a system for closing a multi-currency transaction, the system comprises a processor configured to: receive or obtain a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency; wherein, upon receiving an order request data to close the multi-currency transaction, generate an exposure transaction dataset, the

exposure transaction dataset comprises the first priority quote currency as a first temporary base currency linked to a central currency as a platform quote currency; calculate a first temporary base currency exposure of the first priority quote currency and the quote currency amount of the platform quote currency; and select the first priority quote currency amount against the base currency exposure to close the multi-currency transaction, and use the central currency amount against any the base currency exposure to close any remainder base amount.

[0019] In some embodiments, the processor is further configured to define a second data indicative of the base currency and a second priority quote currency, link the second priority quote currency as a second temporary base currency with the central currency, and calculate a second temporary base currency exposure of the second priority quote currency.

[0020] In some embodiments, the processor is further configured to select the second priority quote currency amount against the base currency exposure and to close the multi-currency transaction by using the second priority quote currency amount against any remainder base currency exposure.

[0021] In some embodiments, the processor is further configured to determine the first temporary base currency exposure of the first priority quote currency amount and/or determine the second temporary base currency exposure of the second priority quote currency amount are opposite to the position of the base currency exposure, before closing. In some embodiments, in the case it is determined that the first temporary base currency exposure is not opposite to the position of the base currency exposure, the processor is configured to select the second priority quote currency amount against the base currency exposure to close the multi-currency transaction. In some embodiments, in the case it is determined that the position of the second temporary base currency exposure is not opposite to the position of the base currency exposure, the processor is configured to select the

platform quote currency amount against the base currency exposure to close the multi-currency transaction.

[0022] In some embodiments, the processor is configured to multiply each of the base currency exposure and the first priority quote currency amount with a pre-determined threshold. In some embodiments, the processor may be configured to convert the multiplied base value and threshold to a normalized value A_{norm} and the multiplied quote value and threshold to a normalized value B_{norm}, wherein the processor is further configured to normalize with respect to the central currency exchange rate, and record the smaller of the normalized value A_{norm} and the normalized value B_{norm} value as a benchmark value C. In some embodiments, the benchmark C is used to derive a D value, the D value equals to the benchmark C multiplied by a market benchmark rate.

[0023] In some embodiments, the closed multi-currency transaction is further checked for a position reversal abnormality.

[0024] In some embodiments, the processor is arranged in data connection with a priority configuration database module to receive or obtain the priority dataset. In some embodiments, the processor priority configuration database module may comprise a user interface, the user interface configured to provide a plurality data fields for users to input the first priority quote currency.

[0025] In some embodiments, the processor comprises a currency pairing and transaction module configured to: generate the exposure transaction dataset and calculate the base currency exposure and the quote currency amount of the first priority quote currency and the platform quote currency. In some embodiments, the processor comprises a cross-currency selector module configured to select the first priority quote currency amount against the base currency exposure to close the multi-currency transaction, and close

the multi-currency transaction by using the central currency amount against any remainder base currency exposure.

[0026] In some embodiments, at least one of the priority configuration database module, the currency pairing and transaction module, and currency settlement module comprise one or more databases arranged in a distributed ledger.

[0027] According to another aspect of the disclosure there is a non-transitory computer-readable medium storing computer executable code comprising instructions for closing a multi-currency transaction according to the method as described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] 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 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:

FIG 1. is a block diagram showing an example electronic device for closing multi-currency transactions, according to an embodiment of the present disclosure;

FIG. 2A is a block diagram showing an example system according to an embodiment of the present disclosure; FIG. 2B shows an example of a priority dataset according to an embodiment of the present disclosure;

FIGS. 3A to 3F show use cases of the system of the present disclosure;

FIG. 4 is a flow chart illustrating a decision making process for

FIG. 5 shows a flow chart depicting a method for closing multi-currency transactions according to an embodiment of the present disclosure; and

FIG. 6 is a block diagram showing a selecting step of an example method according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0029] 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.

[0030] 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.

[0031] 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. 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 ways that are not listed.

[0032] Approximating language, as used herein throughout the specification and claims, may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as “about,” “substantially”, is not limited to the precise value specified but within tolerances that are acceptable for operation of the embodiment for an application for which it is intended. In some instances, the approximating language may correspond to the precision of an instrument for measuring the value.

[0033] 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.

[0034] The terms “at least one” and “one or more” may be understood to include a 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 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.

[0035] 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 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.

[0036] 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.

[0037] The term “transaction data” refers to data that are associated with selling and/or buying one or more goods and/or services. Such goods and/or services may include one or more currencies. In some embodiments, transaction data may suitably be secured or encrypted. In some embodiments, a transaction data may be a fulfilled or unfulfilled order for a good or service transaction at a particular currency.

[0038] 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.

[0039] 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.

[0040] The term "module" detailed herein refers to, or forms part of, or includes an 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 by the processor.

[0041] 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.

[0042] The term “system” (e.g., a transaction facilitator system, a computing system, etc.) detailed herein may be understood as a set of interacting 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.

[0043] The term “first”, “second”, “third” detailed herein are used to distinguish one element from another similar element and may not necessarily denote order or relative importance, unless otherwise stated in the form of priority. For example, a first transaction data, a second transaction data may be used to distinguish two transactions based on two different currency exchange.

[0044] 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.

[0045] 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.

[0046] The term “merchants” detailed herein refers to business (B-end) users who have signed contracts (which may be stored as electronic data) after being authenticated by the third-party payment platform, and supply transaction resources (goods, services, etc.) for ordinary users.

[0047] The term “position” detailed herein refers to a balance or exposure that has a 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" is called "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 short positions. The closing position may also be referred to as closing exposure.

[0048] The term “position set”, also referred to as an exposure set, is used to record the bookkeeping of foreign exchange exposures. Under a single currency position set, the exposure may be presented in single currency amount, such as US dollar (USD). However, foreign exchange transactions may be carried out in the form of currency pairs. Therefore, under the single currency position set, there will be a concept of a central currency. The central currency is generally the quote currency, and the single currency position set will be paired with the central currency to form currency pairs for transactions.

[0049] The term “internalized profit” detailed herein may be understood as when the third-party payment receives two opposite orders (for example, a buy order and a sell order) with respect to the same currency, the third-party payment may choose to offset the two orders, without exchanging the currency with the bank. The profit and loss generated by this procedure is called internalized profit.

[0050] The term “closing cost” detailed herein refers to the profit and loss as a result of one or more transactions between the third-party payment and the bank. When the third-party payment accumulates large amounts of currency, foreign exchange risks may rise. The third-party payment may choose to trade with the bank and sell the currency on hand.

[0051] The term “platform rates” details herein refers to currency exchange rates that the platform generates, taking into account fluctuation risks and markups.

[0052] An institution may divide the profit and loss of orders (e.g. transaction data) into realized profit and loss and unrealized profit and loss under risk control. When an order accumulates in the account of the institution, the profit and loss caused by fluctuations of exchange rates may not be considered as profit or loss. When the institution closes transaction with the bank, the profit and loss brought by this order may be considered to have been realized. Current profit and loss, unrealized profit and loss may return to a value of zero (0).

[0053] The platform (e.g. the third-party payment service) may manage risks of the foreign currency exchange by taking the accounts of a pair of currency exchange as the smallest unit for analysis and may not track the profit and loss brought by each transaction data. It may be difficult for third-party payment services to make refined assessment of foreign currency exchange services, for example, the longer holding time may cause greater fluctuation in profit and loss of the position, the unreasonable internalization strategy may

cause less internalized profit, or a sudden increase in closing cost may cause the cost deviating from the quoted price.

[0054] Realized profit and loss and unrealized profit and loss according to whether the position is closed or not may reflect the profit and loss caused by market fluctuations. In open positions, the unrealized profit and loss may be equivalent to the position profit and loss. When the position is closed, this part of the profit and loss may be mixed with other factors to become the realized profit and loss. The third-party payment services may not determine the profit and loss brought by the holding time of the position to this order afterwards.

[0055] According to various aspects, the method may include creating transaction data that closes positions with the transaction data in the at least one data group, for example, at a fixed timing (e.g. 0630 am UTC8) every day. That may mean that a temporary exposure transaction data of the created transaction data (e.g. temporary base currency) and the transaction data in the at least one data group for which the exposure transaction data is generated is zero (e.g. closed to zero).

[0056] In some instances, aspects of the systems and methods described here provide technical improvements and advantages over existing approaches. For example, the proposed systems and methods may provide a technical solution to close a multi-currency transaction, the method executed by at least one processor of a transaction platform. This is an improvement over the prior art where the closure of positions or transactions are based on the platform currency, and may be susceptible to currency fluctuation risks. The use of a selected priority dataset provides an efficient way of data management to reduce currency fluctuation risks associated with using only one quote currency for closing positions or transactions.

[0057] The following examples pertain to various aspects and embodiments of the present disclosure.

[0058] 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.

[0059] 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.

[0060] The example I/O module 104 may include a mouse, keypad, touch screen, scanner, optical reader, 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.

[0061] 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 a database 116.

[0062] 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 coverts 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.

[0063] 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.

[0064] The processor 102 may be used to execute a computer-implemented method for closing a multi-currency transaction according to the present disclosure.

[0065] FIG. 2 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 (e.g. user 202) who buy from the merchants 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. bank 206).

[0066] In one example, a merchant may supply products or services in RMB (e.g. local currency), a user may purchase a product in using a specific foreign currency (e.g. US dollars) through the platform (e.g. the third-party payment service). In such an embodiment, the platform (e.g. the third-party payment service) may be regarded as buying the specific foreign currency (e.g. US dollars) from the user and selling RMB to the user for payment to the merchant. The specific foreign currency (e.g. US dollars) and RMB may be traded based on an exchange rate.

[0067] As shown in FIG. 2A, the system 200 may be arranged in data connection with a priority configuration database 210 to receive or obtain a priority dataset, the priority dataset comprising at least a first data 212 indicative of a base currency and a first priority quote currency according to the present disclosure. The first data 212 may be in the form of a configuration file or a database entry and may contain information pertaining to one or more base currencies, one or more quote currencies, and the priority associated with each base-quote currency pair.

[0068] With reference to FIG. 2B, the priority dataset comprises a first data 212 and a second data 214, the second data indicative of the base currency and a second priority quote currency. It is contemplated that one or further priority quote currencies may be defined for the base currency. It is envisaged that at least one priority quote currency is defined. The priority dataset may be pre-configured or determined by an authorized user, such as a merchant, of the system 200, for each specific base currency. In the example shown in FIG. 2B, two quote currencies are defined for the base currency EUR, with the USD as the first priority quote currency being prioritized over the SGD as the second priority quote currency.

The desired cross-currency pairs is pre-determined before triggering a request to close a transaction or position, also referred to as “close-position”.

[0069] Put in another way, for the base currency EUR exposure, the trader expects to close the position using EURUSD first, then with EURSGD, and so on, until finally, if there is any remaining exposure, the currency pair formed by EUR and the central currency, for example, RMB of the position set will be used to close the position. Therefore, the central currency of the system 200 is a default currency used to close any remaining position after the first and second priority quote currencies have been used.

[0070] FIG. 3A describes a particular example or use case example 1 of the system 200 for closing multi-currency transactions. The system central currency is set as RMB, which will be the default quote currency used against all other base currency.

[0071] Upon receiving a request to close the multi-currency transaction, the processor 102 generates an exposure transaction dataset 300. As shown in FIG. 3A, the exposure transaction dataset 300 may be organized as a data or linked list comprising the following data fields organized as columns: identifiers 302, currency pairs 304, delivery period/date 306, base currency exposure amount 308, and quote currency amount 310.

[0072] The identifier field 302 may be used to differentiate different transactions in the platform based on the currency pair. For example, identifier field 1 is associated with the currency pair 304 EUR, which is the base currency, and the RMB, which is the central quote currency. The delivery period 306 field is used to organize the relevant positions/transactions within a period that is to be closed.

[0073] With reference to FIG. 3A, besides linking the base currency to the central currency to form a currency pair, the first priority quote currency (USD) is used as a first temporary base currency and a central currency as a platform quote currency (i.e. in RMB).

Likewise the second priority quote currency as a second temporary base currency is linked with the central currency. The purpose of linking the different currencies to form cross-currency pairs is to facilitate the calculation of the base currency exposure and the quote currency amount, and the first priority quote currency and second priority quote currency expressed in terms of temporary base currency exposure, so as to determine if the priority quote currencies can be used to cover the base exposure. In the example shown in FIG. 3A, the calculation reveals that the first and second priority quote currencies USD and SGD are positive and can be used to cover the negative exposure of the base currency EUR.

[0074] FIG. 3B shows an order or request 301 being sent to the processor 102 to close the EUR based on the priority dataset. As can be seen, the processor 102 may be configured to determine the exposure of the first priority quote currency amount and the second priority quote currency amount are in positions opposite to the position of the base currency amount. The expected closing exchange rates 312 associated with each currency pair is used to calculate respective expected quote currency amounts 314 as part of the process to close the exposure.

[0075] FIG. 3C illustrates the closing process. According to the priority dataset, USD is the highest (first) priority cross-currency linked pair to close the base currency EUR exposure, and the base currency exposures of EUR and USD meet the conditions for generating cross currency pairs. The same applies for SGD exposure, so the following two close-position orders for cross-currency pairs may be generated. In other words, the processor 102 may be configured to select the first priority quote currency amount against the base currency EUR exposure to close the multi-currency transaction, and use the central currency amount against any the base currency amount to close any reminder base amount. It can be seen from the first row (Exposure No. 1) that the exposure of the base currency EUR has been closed, i.e. reduced to zero, with the first priority quote currency USD (see

row of Exposure No. 2) being fully used to balance or cover the EUR, and a remainder left for the second priority quote currency SGD (see row of Exposure No. 3). In the example shown in FIGS. 3A to 3C, the central currency RMB is not required to be used to close the position as the first priority quote currency and second priority quote currency are sufficient to cover the base currency exposure.

[0076] Another example or case study is illustrated with reference to FIG. 3D to 3F, with reference to the priority dataset configuration of FIG. 2B. In this example, the central currency of the currency position set is RMB, that is, the quote currency is all RMB. EUR has a negative exposure, while USD has no exposure, and SGD has a positive exposure. As is illustrated, although the exposure of SGD is in opposite direction of the EUR, the positive exposure of SGD is not adequate to cover the negative exposure of EUR.

[0077] According to the priority dataset configuration, although USD is the first priority quote currency, which is the highest priority cross currency pair with EUR, the USD does not have any exposure, so EUR and USD may not be used to generate cross-currency pairs for closure of positions (see FIG. 3D). For the next highest priority, i.e. second priority quote currency, which is the SGD exposure, it meets the conditions for generating a cross currency pair close-position order with EUR. However, the SGD exposure is not enough, so a close-position order of EUR and RMB (the central currency of the position set) will be generated. The expected closing exchange rates 312 associated with each currency pair is used to calculate respective expected quote currency amounts 314 as part of the process to close the exposure (see FIG. 3E).

[0078] After closing the position according to the expected closing exchange rate 312, the remaining exposure results in all exposures being balanced to “zero”, see FIG. 3F. This assumes that the market base price can close the quote currency.

[0079] In some situations, the price of the bank's transaction may not be in line with our expected closing exchange rate, causing the exposure not to close or in some cases, to reverse in position. For example, in the case study depicted in FIG. 3E, the EURRMB currency pair transaction exchange rate of order 2 may be 7.4, which, although is slightly higher than the expected value of 7.37, which may lead to excessive close-position of the RMB exposure of EURRMB, and therefore causes reversal from positive exposure to negative exposure.

[0080] In view of the possible risks cause by difference(s) between the expected exchange rate and the actual exchange rate, a threshold buffer may be incorporated.

[0081] FIG. 4 is a flow chart showing an example method 400 according to an embodiment of the present disclosure, incorporating the threshold buffer as another layer of check to minimize reversal of positions. The method 400 may be implemented as a software executable instructions in a processor, for example processor 102.

[0082] The method 400 may commence with a step of reading the base currency exposure and reading the priority dataset 212 to determine the next cross-currency pair comprising a priority quote currency to be selected for closing the base currency. In the case this is the first time the method 400 is executed for a base currency, the first priority quote currency will be selected. Otherwise the second priority quote currency and subsequent priority quote currencies (if any) will be selected.

[0083] At step 404, a decision step may determine whether the current quote currency to be used is the central currency. This may correspond to the situation where all the priority quote currencies have been applied and the base currency position has not been closed. In the case where the central currency is determined to be the quote currency, the order

instructions to close the transaction is generated- see step 412, bypassing steps 406, 408, 410.

[0084] Step 406 applies to the case where the current quote currency to be used is not the central currency. In step 406, the exposure of the quote currency is checked to be opposite to the exposure of the base currency. It is appreciable that in the case the quote currency is opposite, it can be applied to offset or close the exposure of the base currency. In the case where the quote currency is not opposite to the

[0085] Step 408 applies to the case where the exposure of the currency quote currency is opposite to the exposure of the base currency. In step 408, the base currency exposure and the quote currency exposure are multiplied by a predetermined percentage threshold, such as 10 basis point or 0.1%. It is appreciable that other values 0.15%, 0.2%, etc. may be selected. The resultant product of the base currency exposure and the threshold is stored as a value represented as “A” and the resultant product of the current quote currency exposure and the threshold is represented as “B”. The two values A and B are converted to the central currency denominator based on an internal exchange rate to form normalized values A_{norm} and B_{norm}. The two normalized values are then compared, and the lower of the two values is represented as “C”.

[0086] Step 410 calculates the foreign currency based on the C, and the value is recorded as D. In some embodiments, the value of D is equals to C multiplied by a market benchmark rate of the base and quote currency exposure mentioned in step 408. An order for closing the exposure or position is then placed with the specified currency of the order as base currency.

[0087] Step 412 generates the order instructions based on the placed order in step 410. If the current quote currency is the central currency of the position set or exposure set, the order instructions comprise an instruction to close all exposures of the base currency.

[0088] Step 414 is a decision step to determine whether the exposure of the base currency has been closed, i.e. reduced to a value of zero. In the case the exposure is closed, i.e. proceed to step 416. In the case where the base currency is not closed, the method 400 goes back to step 402 to calculate any remainder base currency exposure, and read the exposure of the quote currencies of the next priority or if there are no other preferred quote currencies, the central currency.

[0089] In the case the base currency exposure is deemed to be closed, step 416 performs a further decision step to check if all exposure amounts can reduce the base currency exposure towards zero and not cause any reversal of exposure. In the case where the check is passed, the method ends and returns to the order instruction set in step 418. A new base currency and associated priority dataset may then be loaded. In step 416, if the check is not passed, it may indicate an error in the respective datasets and/or error in the algorithm. An exception error may be indicated and the method will be terminated prematurely (step 420).

[0090] FIG. 5 shows a generalized method 500 for closing multi-currency transaction according to the present disclosure. The method 500 may be implemented as executable software codes stored in a non-transitory computer readable medium in one or more processors, for example, memory 106. The method 500 comprises the following steps.

[0091] Step 502: Defining a priority dataset or obtaining a pre-defined priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency;

[0092] Step 504: generating an exposure transaction dataset, the exposure transaction dataset comprises linking the first priority quote currency as a first temporary base currency and a central currency as a platform quote currency. The linking of the first priority quote currency and the central currency may create currency pair 304 as shown in FIG. 3A and 3D.

[0093] Step 506: calculating a temporary base currency exposure and the quote currency amount of the first priority quote currency and the platform quote currency. This calculating step may create the data fields 308 and 310.

[0094] Step 508: closing the multi-currency transaction based on the generated exposure transaction dataset by selecting the first priority quote currency exposure against the base currency exposure, and closing the multi-currency transaction by using the central currency amount against any remainder base currency exposure. This closing step may correspond to the successive reduction of base currency exposure to zero shown in FIG. 3C and FIG. 3F.

[0095] The aforementioned instructions may include a computer program element or a computer program product.

[0096] It is appreciable that although the examples provided two levels of priority for creating cross-currencies, the present disclosure requires at least one level of priority. It is further appreciable that more priority levels above two may be defined or configured.

[0097] While the method 400 and method 500 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. 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.

[0098] FIG. 6 shows an embodiment of a particular implementation of a computer or server 600. This may correspond to or form part of the electronic device 100. The computer may comprise a priority configuration database module 602, a currency pairing and exchange module 604, a cross-currency selector module 606 and a settlement module 608.

[0099] In some embodiments, the priority configuration database module 602 may comprise a user interface, the user interface configured to provide a plurality data fields for users to input the first priority quote currency.

[00100] The currency pairing and exchange module 604 may be configured to generate the exposure transaction dataset and calculate the base currency amount and the quote currency amount of the first priority quote currency and the platform quote currency.

[00101] The settlement module 608 may be used to close the multi-currency transaction based on the various priority levels configured, and close the multi-currency transaction by using the central currency amount against any remainder base currency amount.

[00102] In some embodiments, at least one of the priority configuration database module 602, the currency pairing and exchange module 604, and the settlement module 608 may comprise one or more databases arranged in a distributed ledger.

[00103] 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).

[00104] 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.

[00105] 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.

[00106] 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.

[00107] 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).

[00108] 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.

[00109] 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 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 generally be integrated together in a single product or packaged into multiple products.

[00110] 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 closing a multi-currency transaction, the method executed by at least one processor of a transaction platform, and comprising:

defining or obtaining a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency;

wherein, upon receiving a request data to close the multi-currency transaction,

generating an exposure transaction dataset, the generation comprises linking the first priority quote currency as a first temporary base currency and a central currency as a platform quote currency;

calculating a first temporary base currency exposure of the first priority quote currency and the quote currency amount of the platform quote currency; and

closing the multi-currency transaction based on the generated exposure transaction dataset by selecting the first priority quote currency exposure against the base currency exposure, and closing the multi-currency transaction by using the central currency amount against any remainder base currency exposure.

2. The computer-implemented method according to claim 1, wherein defining the priority dataset further comprises defining a second data indicative of the base currency and a second priority quote currency, and the generation of the exposure transaction dataset further comprises linking the second priority quote currency as a second temporary base currency with the central currency, and the calculation includes calculating a second temporary base currency exposure of the second priority quote currency.

3. The computer-implemented method according to claim 2, further comprising selecting the second priority quote currency amount against the base currency exposure to

close the multi-currency transaction, before using the central currency amount against any remainder base currency exposure.

4. The computer-implemented method according to claim 2 or 3, further comprises determining the first temporary base currency exposure of the first priority quote currency amount and/or determining the second temporary base currency exposure of the second priority quote currency amount are opposite to the position of the base currency exposure, before closing.

5. The computer-implemented method according to claim 4, wherein in the case it is determined that the first temporary base currency exposure is not opposite to the position of the base currency exposure, selecting the second priority quote currency amount against the base currency exposure for closing the multi-currency transaction.

6. The computer-implemented method according to claim 5, wherein in the case it is determined that the position of the second temporary base currency exposure is not opposite to the position of the base currency exposure, selecting the platform quote currency amount against the base currency exposure for closing the multi-currency transaction.

7. The computer-implemented method according to any one of the preceding claims, wherein closing the multi-currency transaction comprises multiplying each of the base currency exposure and the first priority quote currency amount with a pre-determined threshold.

8. The computer-implemented method according to claim 7, further comprises converting the multiplied base value and threshold to a normalized value A_{norm} and the multiplied quote value and threshold to a normalized value B_{norm}, wherein the normalization is with respect to the central currency exchange rate, and recording the smaller of the normalized value A_{norm} and the normalized value B_{norm} value as a benchmark value C.

9. The computer-implemented method according to claim 8, wherein the benchmark C is used to derive a D value, the D value equals to the benchmark C multiplied by a market benchmark rate.

10. The computer-implemented method according to any one of the preceding claims, wherein the closed multi-currency transaction is further checked for a position reversal abnormality.

11. A system for closing a multi-currency transaction, the system comprises a processor configured to:

receive or obtain a priority dataset, the priority dataset comprising at least a first data indicative of a base currency and a first priority quote currency;

wherein, upon receiving an order request data to close the multi-currency transaction,

generate an exposure transaction dataset, the exposure transaction dataset comprises the first priority quote currency as a first temporary base currency linked to a central currency as a platform quote currency;

calculate a first temporary base currency exposure of the first priority quote currency and the quote currency amount of the platform quote currency; and

select the first priority quote currency amount against the base currency exposure to close the multi-currency transaction, and use the central currency amount against any the base currency exposure to close any remainder base amount.

12. The system according to claim 11, wherein the processor is further configured to define a second data indicative of the base currency and a second priority quote currency, link the second priority quote currency as a second temporary base currency with the central currency, and calculate a second temporary base currency exposure of the second priority quote currency.

13. The system according to claim 11 or 12, wherein the processor is further configured to select the second priority quote currency amount against the base currency exposure and to close the multi-currency transaction by using the second priority quote currency amount against any remainder base currency exposure.

14. The system according to claim 12 or 13, wherein the processor is further configured to determine the first temporary base currency exposure of the first priority quote currency amount and/or determine the second temporary base currency exposure of the second priority quote currency amount are opposite to the position of the base currency exposure, before closing.

15. The system according to claim 14, wherein in the case it is determined that the first temporary base currency exposure is not opposite to the position of the base currency exposure, the processor is configured to select the second priority quote currency amount against the base currency exposure to close the multi-currency transaction.

16. The system according to claim 15, wherein in the case it is determined that the position of the second temporary base currency exposure is not opposite to the position of the base currency exposure, the processor is configured to select the platform quote currency amount against the base currency exposure to close the multi-currency transaction.

17. The system according to any one of claims 11 to 16, wherein the processor is configured to multiply each of the base currency exposure and the first priority quote currency amount with a pre-determined threshold.

18. The system according to claim 17, wherein the processor is configured to convert the multiplied base value and threshold to a normalized value A_{norm} and the multiplied quote value and threshold to a normalized value B_{norm}, wherein the processor is further configured to normalize with respect to the central currency exchange rate, and record the smaller of the normalized value A_{norm} and the normalized value B_{norm} value as a benchmark value C.

19. The system according to claim 18, wherein the benchmark C is used to derive a D value, the D value equals to the benchmark C multiplied by a market benchmark rate.

20. The system according to any one of the claims 11 to 19, wherein the closed multi-currency transaction is further checked for a position reversal abnormality.

21. The system according to any one of claims 11 to 20, wherein the processor is arranged in data connection with a priority configuration database module to receive or obtain the priority dataset.

22. The system according to claim 21, wherein the processor priority configuration database module comprises a user interface, the user interface configured to provide a plurality data fields for users to input the first priority quote currency.

23. The system according to any one of claims 11 to 22, wherein the processor comprises a currency pairing and transaction module configured to: generate the exposure transaction dataset and calculate the base currency exposure and the quote currency amount of the first priority quote currency and the platform quote currency.

24. The system according to claim 23, wherein the processor comprises a cross-currency selector module configured to select the first priority quote currency amount against the base currency exposure to close the multi-currency transaction, and close the multi-currency transaction by using the central currency amount against any remainder base currency exposure.

25. The system according to any one of claims 21 to 24, wherein at least one of the priority configuration database module, the currency pairing and transaction module, and currency settlement module comprise one or more databases arranged in a distributed ledger.

26. A non-transitory computer-readable medium storing computer executable code comprising instructions for closing a multi-currency transaction according to the method of claim 1 to 10.