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## SYSTEM AND METHOD FOR GENERATING FUND SUFFICIENCY SCORE FOR A CARDHOLDER

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*Visa*

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**TITLE: “SYSTEM AND METHOD FOR  
GENERATING FUND SUFFICIENCY SCORE  
FOR A CARDHOLDER”**

**VISA**

**GUILLERMO SEPULVEDA RODRIGUEZ**

## **TECHNICAL FIELD**

The present subject matter relates to field of card-based transactions, more particularly, but not exclusively to a system and method for generating fund sufficiency score for a cardholder.

## **BACKGROUND**

Non-sufficient funds in an account of a cardholder causes inconvenience to the cardholder to make transaction for purchase. The cardholder may not be able to use his card during shopping, touring, transactions and so on. The card may be debit card, credit card or reloadable prepaid card which is issued for transactions to the cardholder. For example, consider **Figure 1** showing a transaction for a cardholder. **Figure 1** indicates a merchant 101 who may be selling coffees. A cardholder 102 buys a coffee from the merchant 101 and uses his credit card to make payment. The merchant 101 uses a payment terminal 103 to initiate transaction. If the cardholder has sufficient amount/funds in his account, the transaction is completed successfully. However conventionally, if the cardholder 102 has less funds in his account, the transaction is declined, and the cardholder may have to pay amount in cash for his purchase. Most of the time, around 85% of transactions may be completed. However, around 15% of the transactions may be declined due to insufficient amount of funds. For example, consider around 18 transactions occurs per second. The transaction may provide some million United States Dollar (USD) in which a percentage of the USD may be service provider's (like VISA) share. However, due to insufficient/ non-sufficient funds in accounts, million cardholders may change payment methods. Thus, non-sufficient funds may cause less sales for the merchant 101 if there are no alternative payment methods. Acquirer discount factor does not arrive to terminal owner. The acquirer is a bank or financial institution that process credit card or debit card payments on behalf of the merchant 101. Issuer may experience non-profitable transaction. The issuer is a bank or financial institution that process credit card and debit card payments on behalf of the cardholder 102. The cardholder 102 may discourage cashless payments and therefore service provider may generate lesser revenue.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the figures to reference like features and components. Some embodiments of device or system

and/or methods in accordance with embodiments of the present subject matter are now described, by way of example only, and with reference to the accompanying figures, in which:

**Figure 1** illustrates exemplary scenario for non-sufficient funds in transaction using payment cards;

**Figure 2** illustrates an exemplary environment of a system for generating fund sufficiency score for a cardholder, in accordance with some embodiments of the present disclosure;

**Figures 3 and 4** illustrate schematic flows indicating methods for generating fund sufficiency score for a cardholder, in accordance with some embodiments of the present disclosure;

**Figure 5** illustrates flow diagram showing method for generating fund sufficiency score for a cardholder, in accordance with some embodiments of the present disclosure; and

**Figure 6** illustrates a block diagram of an exemplary computer system for implementing embodiments consistent with the present disclosure.

The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles of the disclosure described herein.

### **DESCRIPTION OF THE DISCLOSURE**

In the present document, the word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment or implementation of the present subject matter described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

While the disclosure is susceptible to various modifications and alternative forms, specific embodiment thereof has been shown by way of example in the drawings and will be described in detail below. It should be understood, however that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternative falling within the spirit and the scope of the disclosure.

The terms “comprises”, “comprising”, or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a setup, device or method that comprises a list of components or steps does not include only those components or steps but may include other components or steps not expressly listed or inherent to such setup or device or method. In other words, one or more elements in a device or system or apparatus preceded by “comprises... a” does not, without more constraints, preclude the existence of other elements or additional elements in the device or system or apparatus.

The terms "an embodiment", "embodiment", "embodiments", "the embodiment", "the embodiments", "one or more embodiments", "some embodiments", and "one embodiment" mean "one or more (but not all) embodiments of the invention(s)" unless expressly specified otherwise.

The terms "including", "comprising", “having” and variations thereof mean "including but not limited to", unless expressly specified otherwise.

The present disclosure proposes a system and method for generating fund sufficiency score for a cardholder. The proposed system uses the fund sufficiency score to allow the cardholder to make payment even when the cardholder has insufficient funds in his account. The proposed system may decline the transaction if the fund sufficiency score of the cardholder is less. The proposed system increases revenue of service provider such as Visa and encourages electronic payment methods.

**Figure 2** illustrates an exemplary environment 200 of a system 201 which is configured to generate fund sufficiency score for a cardholder. The cardholder uses payment cards for initiating transactions to merchants, shopkeepers and like. The payments cards which may be used for transactions may include credit cards, debit cards, charge cards, ATM cards, fleet cards pre-paid cards and so on. The environment 200 for generating the fund sufficiency score includes a merchant 202, a cardholder 203, an acquirer 204, an issuer 205, a communication network 206 and the system 201. For example, consider a scenario where the cardholder 203 wants to purchase an item from the merchant 202. In an embodiment, the cardholder 203 may be a person who possesses a card, specifically a credit card to perform his transactions. In an embodiment, the merchant 202 may be person who buys and sells commodities for profit. The merchant 202 may be a dealer, a trader, a shopkeeper, a retailer and like. The cardholder 203

may use his credit card to initiate payment transaction for the item purchased from the merchant 202. If the cardholder 203 has sufficient amount in his account, the payment transaction for the item purchased is successful and the merchant 202 bank also referred as the acquirer 204 may be credited with the amount. However, if the cardholder 203 account has non-sufficient or insufficient amount, the system 201 may be configured to generate a fund sufficiency score. The fund sufficiency score may be generated based on previous payment behaviour of the cardholder 203. In an embodiment, the previous payment behaviour may indicate whether the cardholder 203 pays his bills on time or delays his payments for the bills and so on. In an embodiment, the system 201 may be configured to communicate the generated fund sufficiency score to the issuer 205. In an embodiment, the system 201 may communicate the fund sufficiency score via International Organization for standardization (ISO) message or Application Programming Interface (API). The ISO is an international standard for financial transaction card originated interchange messaging. The ISO exchanges electronic transactions initiated by the cardholder 203 using payment cards. The API is a software that allows two applications to communicate with each other. In an embodiment, the system 201 may also be configured to send a message to the cardholder 203. The message may indicate that despite not having sufficient funds and considering the cardholder 203 payment records, the issuer 205 has approved the transaction and remaining balance of the payment may be deducted by X period. Further, the cardholder 203 may be able to pay his bill for the item purchased even after having insufficient fund in his account. However, if the fund sufficiency score for the cardholder 203 generated is very less, then the transaction is rejected. The cardholder 203 may then pay his bill using other payment modes. The other payment modes may include cash payment, check, mobile payment and so on. Thus, using the proposed system 201, the cardholder 203 may make payments even when account has non- sufficient funds.

In an embodiment, the system 201, the merchant 202, the cardholder 203, the acquirer 204, and the issuer 205 may communicate via the communication network 206, for generating the fund sufficiency score for the cardholder 203. The communication network 206 may include, without limitation, a direct interconnection, Local Area Network (LAN), Wide Area Network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, and the like. In an embodiment, the system 201 may be implemented in a server configured to generate the fund sufficiency score for the cardholder 203. In an embodiment, such server may be a dedicated server or a cloud-based server.

Further, the system 201 may include one or more processor 207, I/O interface 208, and a memory 209. In some embodiments, the memory 209 may be communicatively coupled to the one or more processor 207. The memory 209 stores instructions, executable by the one or more processor 207, which, on execution, may cause the system 201 to generate the fund sufficiency score for the cardholder 203, as disclosed in the present disclosure. In an embodiment, the memory 209 may include one or more modules 210 and data 211. The one or more modules 210 may be configured to perform the steps of the present disclosure using the data 211, to generate the fund sufficiency score for the cardholder 203. In an embodiment, each of the one or more modules 210 may be a hardware unit which may be present outside the memory 209 and coupled with the system 201. The system 201 may be implemented in a variety of computing systems, such as a laptop computer, a desktop computer, a Personal Computer (PC), a notebook, a smartphone, a tablet, e-book readers, a server, a network server, a cloud-based server and the like.

**Figures 3 and 4** illustrate schematic flows indicating methods for generating fund sufficiency score for a cardholder, in accordance with some embodiments of the present disclosure.

**Figure 3** shows a scenario which involves a merchant 301 who sells coffee at a restaurant. A cardholder 302 wants to buy coffee from the merchant 301. The cardholder 302 chooses to pay the merchant 301 with a credit card provided by a service provider such as Visa. In the scenario, the merchant 301 provides a payment terminal 303 to the cardholder 302 to pay his bill. The payment terminal 303 may also be known as Point Of Sale Terminal (POS) or credit card terminal. The payment terminal 303 is a device which interfaces with payment cards to make electronic funds transfer. In an embodiment, the payment terminal 303 allow the merchant 301 to capture required payment card information and to transmit the information to an acquirer 401 as shown in **Figure 4**. The acquirer 401 performs authorization for the transaction initiated by the cardholder 302 and transfers funds to the merchant 301. If the cardholder 302 account has sufficient fund 308 as shown in **Figure 3**, the transaction is completed. In an embodiment, the completed transaction is referred as successful transaction 309 as shown in **Figure 3**. In an embodiment, if the cardholder 302 account does not have sufficient amount as shown in **Figure 3** (referred as non-sufficient fund 304), the system 201 may be configured to generate the fund sufficiency score 305. In an embodiment, the system 201 may be configured to pre-generate the fund sufficiency score 305 for the cardholder 302 and store the fund sufficiency score 305. The fund sufficiency score 305 may be retrieved when non-sufficiency of funds may be

identified during initiation of transaction by the cardholder 302. In an embodiment, as shown in **Figure 4** an Electronic Payment Network (EPN) and switch 402 generates the fund sufficiency score 305. In an embodiment, the EPN may be a visanet and switch 402. The EPN is an Automated Clearing House (ACH) system i.e., a computerized electronic funds transfer system which processes both individual consumer and commercial financial transactions. In an embodiment, the fund sufficiency score 305 may be generated based on previous payment behaviours of the cardholder 302. In an embodiment, the fund sufficiency score 305 may be generated using machine learning and Artificial Intelligence (AI). In an embodiment, the machine learning and the AI may be used in order to provide accurate fund sufficiency score 305 and to increase approval for non-sufficient fund 304 transactions. In an embodiment, machine learning techniques such as regression, decision tree and so on, may be used to determine the fund sufficiency score 305. In an embodiment, AI techniques such as natural language processing, automation and so on may be used to determine the fund sufficiency score 305. Upon generating the fund sufficiency score 305, the EPN and switch 402 may deliver the fund sufficiency score 305 via one or more delivery options 403. In an embodiment, one of the delivery options may be sending a message with the fund sufficiency score 305 through the ISO message. In an embodiment, the ISO message may be sent to local switches processing 404. The local switches processing 404 dynamically routes payment transactions between multiple acquirers and payment service providers using Bank Identification Number (BIN). In an embodiment, one of the delivery options may be sending the fund sufficiency score 305 via the API when potential code may be 51. In an embodiment, the 51 is a decline code 51 which is a processing response for insufficient funds. The fund sufficiency score 305 may be sent to issuer 405. The issuer 405 may approve based on the fund sufficiency score 305. For example, the fund sufficiency score 305 may be between 1 to 100. In an embodiment, score 1 may indicate lowest risk for repayment for the cardholder 302. In an embodiment, score 100 may indicate highest risk for repayment for the cardholder 302. If the fund sufficiency score 305 may be 100, the issuer 405 may reject the transaction for the cardholder 302. In an embodiment, if the transaction may be rejected, the cardholder 302 may pay his bill by cash 307 as shown in **Figure 3**. If the fund sufficiency score 305 may be 1, the issuer 405 may approve the transaction for the cardholder 302. In an embodiment, the cardholder 302 may also receive a message stating to approve the transaction despite having insufficient funds in his account. In an embodiment, the message may also include information regarding amount which may be deducted from account of the cardholder 302 by X period. The X period may indicate a date



on which the amount may be deducted from account of the cardholder 302. In an embodiment, the X period may indicate a time span say two dates between which the amount may be deducted from account of the cardholder 302. In an embodiment, the cardholder 302 may complete his transaction via mobile banking 306 as shown in **Figure 3**. In an embodiment, the cardholder 302 may be able to perform the transaction successfully (referred as successful transaction 309). In an embodiment, the issuer 406 charges available funds from the cardholder 302. In an embodiment, the issuer 406 may charge the cardholder 302 for remanent amount.

In an embodiment, the issuer 205 may authorize transaction initiated by the cardholder 203 for one or more scenarios. In an embodiment first scenario from the one or more scenarios may be that the issuer 205 may authorize transaction initiated by the cardholder 203, when there is low risk for repayment. In an embodiment second scenario from the one or more scenarios may be that the issuer 205 may authorize transaction, when the cardholder 203 may have a card such as credit card, debit card and so on. In an embodiment third scenario from the one or more scenarios may be that the issuer 205 may authorize transaction for non-affluent customers. The non-affluent customers may have investable assets less than dollar 1 million. In an embodiment fourth scenario from the one or more scenarios may be that the issuer 205 may authorize transaction, when the fund sufficiency score may be low. In an embodiment fifth scenario from the one or more- scenario may be that the issuer 205 may authorize transaction, in case of non-recurrent transactions. The non-recurrent transactions may be transaction which occurs at irregular intervals and may not be anticipated generally. For example, consider a customer performs a particular amount of transaction on grocery every month, such as \$100 on grocery every month. However, the customer may perform a transaction of \$5000 for purchasing a car in a particular month, such a transaction may be referred as the non-recurrent transaction.

**Figure 5** illustrates flow diagram showing methods for generating fund sufficiency score for a cardholder, in accordance with some embodiments of the present disclosure.

At block 501 of **Figure 5**, the cardholder 203 makes a purchase with the merchant 202 and uses his credit card to make payment. The merchant 202 uses the payment terminal to complete transaction. In an embodiment, the system 201 may be configured to check for sufficiency of funds for the cardholder 203 to complete the transaction.

At block 502 of **Figure 5**, the acquirer 204 checks whether the cardholder 203 has sufficient fund in his account or not. If the cardholder 203 has non-sufficient fund, step at block 503 is performed. If the cardholder 203 has sufficient fund in his account, step at block 504 is performed.

At block 504 of **Figure 5**, when the cardholder 203 has sufficient fund in his account, the transaction for the cardholder 203 may be completed without the fund sufficiency score. For example, if the cardholder 203 is having an amount needed to clear his bill, the transaction may be completed by deducting the amount from his account without having to generate the fund sufficiency score for the cardholder 203.

At block 503 of **Figure 5**, the system 201 may be configured to generate the fund sufficiency score for the cardholder 203 based on previous payment behaviour of the cardholder 203. In an embodiment, to generate the fund sufficiency score for the cardholder 203, transaction log related to the cardholder 203 may be considered. The transaction log may be a collection of data related to the transactions performed by the cardholder 203 previously. In an embodiment, significant information from the transaction log may be used to generate pattern with respect to the payment behaviour of the cardholder 203. In an embodiment, if the cardholder 203 pays his bills on time the fund sufficiency score may be low. For example, the fund sufficiency score for the cardholder 203 may be low such as one, indicating there is low risk for repayment. In an embodiment, the fund sufficiency score for the cardholder 203 may be in a range like 1 to 50, indicating if the system 201 generates the fund sufficiency score for the cardholder 203 between the range, there is low risk for repayment. In an embodiment, if the cardholder 203 does not pay his bills on time the fund sufficiency score may be high. For example, the fund sufficiency score for the cardholder 203 may be high such as hundred, indicating high risk for repayment. In an embodiment, if the system 201 generates the fund sufficiency score in range 49 to 100, there may be high risk for repayment from the cardholder 203. In an alternate embodiment, if the cardholder 203 pays his bills on time the fund sufficiency score may be high. For example, the fund sufficiency score for the cardholder 203 may be high such as hundred, indicating there is low risk for repayment. In an embodiment, the fund sufficiency score for the cardholder 203 may be in a range like 50 to 100, indicating if the system 201 generates the fund sufficiency score for the cardholder 203 between the range, there is low risk for repayment. In an embodiment, if the cardholder 203 does not pay his bills on time the fund

sufficiency score may be low. For example, the fund sufficiency score for the cardholder 203 may be low such as one, indicating high risk for repayment. In an embodiment, if the system 201 generates the fund sufficiency score in range 1 to 49, there may be high risk for repayment from the cardholder 203.

At block 505 of **Figure 5**, the system 201 may be configured to transmit the generated fund sufficiency score to the issuer 205 by the one or more delivery options. In an embodiment, the fund sufficiency score may be transmitted by the ISO message to the issuer 205. In an embodiment, the fund sufficiency score may be transmitted by the API to the issuer 205.

At block 506 of **Figure 5**, the issuer 205 checks if the fund sufficiency score for the cardholder 203 is low. If the fund sufficiency score for the cardholder 203 may be low, step at block 507 may be performed. If the fund sufficiency score for the cardholder 203 is high, step at block 509 may be performed.

At block 509 of **Figure 5**, when the fund sufficiency score for the cardholder 203 is high, the issuer 205 rejects the transaction for the cardholder 203 based on the high fund sufficiency score. For example, consider that the fund sufficiency score generated for the cardholder 203 is 100, which is indicating that the cardholder 203 does not pay his bills on time. Thus, there is high risk that the cardholder 203 may not re-pay the transaction amount to the issuer 205. In an embodiment, after declination of the transaction by the issuer 205, the cardholder 203 needs to pay his pill through other modes such as cash payment, mobile banking, and so on.

At block 507 of **Figure 5**, the cardholder 203 receives a confirmation message for authorization of the transaction. In an embodiment, the message states that the issuer 205 has approved the cardholder 203 transaction despite having insufficient fund in his account and amount may be deducted by X period upon issuer 205 notification.

At block 508 of **Figure 5**, the issuer 205 approves the transaction for the cardholder 203 and the transaction may be completed even after having non-sufficient fund in the cardholder 203 account.

#### Advantages of the present disclosure

Embodiments of the present disclosure discloses a system and method to generate fund sufficiency score for a cardholder to perform transaction even in case of non-sufficient fund in account of the cardholder.

Embodiments of the present disclosure increases revenue for both visa and the merchant by reducing transaction declination due to non-sufficient fund, by generating the fund sufficiency score for the cardholder.

### Computing System

**Figure 6** illustrates a block diagram of an exemplary computer system 600 for implementing embodiments consistent with the present disclosure. In an embodiment, the computer system 600 is used to implement the system 201 for generating fund sufficiency score for a cardholder. The computer system 600 may include a central processing unit (“CPU” or “processor”) 602. The processor 602 may include at least one data processor for executing processes in Virtual Storage Area Network. The processor 602 may include specialized processing units such as, integrated system (bus) controllers, memory management control units, floating point units, graphics processing units, digital signal processing units, etc.

The processor 602 may be disposed in communication with one or more input/output (I/O) devices 609 and 610 via I/O interface 601. The I/O interface 601 may employ communication protocols/methods such as, without limitation, audio, analog, digital, monaural, RCA, stereo, IEEE-1394, serial bus, universal serial bus (USB), infrared, PS/2, BNC, coaxial, component, composite, digital visual interface (DVI), high-definition multimedia interface (HDMI), radio frequency (RF) antennas, S-Video, VGA, IEEE 802.n /b/g/n/x, Bluetooth, cellular (e.g., code-division multiple access (CDMA), high-speed packet access (HSPA+), global system for mobile communications (GSM), long-term evolution (LTE), WiMax, or the like), etc.

Using the I/O interface 01, the computer system 600 may communicate with one or more I/O devices 609 and 10. For example, the input devices 609 may be an antenna, keyboard, mouse, joystick, (infrared) remote control, camera, card reader, fax machine, dongle, biometric reader, microphone, touch screen, touchpad, trackball, stylus, scanner, storage device, transceiver, video device/source, etc. The output devices 610 may be a printer, fax machine, video display (e.g., cathode ray tube (CRT), liquid crystal display (LCD), light-emitting diode (LED), plasma, Plasma Display Panel (PDP), Organic light-emitting diode display (OLED) or the like), audio speaker, etc.

In some embodiments, the computer system 600 may consist of the system 201. The processor 602 may be disposed in communication with a communication network 611 via a network interface 603. The network interface 603 may communicate with the communication network 611. The network interface 603 may employ connection protocols including, without limitation, direct connect, Ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc. The communication network 611 may include, without limitation, a direct interconnection, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, etc. Using the network interface 603 and the communication network 611, the computer system 600 may communicate with a merchant 612, a cardholder 613, an acquirer 614 and an issuer 615 to complete any transactions without non-sufficient fund in the cardholder 613 account. The network interface 603 may employ connection protocols include, but not limited to, direct connect, Ethernet (e.g., twisted pair 10/100/1000 Base T), transmission control protocol/internet protocol (TCP/IP), token ring, IEEE 802.11a/b/g/n/x, etc.

The communication network 611 includes, but is not limited to, a direct interconnection, an e-commerce network, a peer to peer (P2P) network, local area network (LAN), wide area network (WAN), wireless network (e.g., using Wireless Application Protocol), the Internet, Wi-Fi, and such. The first network and the second network may either be a dedicated network or a shared network, which represents an association of the different types of networks that use a variety of protocols, for example, Hypertext Transfer Protocol (HTTP), Transmission Control Protocol/Internet Protocol (TCP/IP), Wireless Application Protocol (WAP), etc., to communicate with each other. Further, the first network and the second network may include a variety of network devices, including routers, bridges, servers, computing devices, storage devices, etc.

In some embodiments, the processor 602 may be disposed in communication with a memory 605 (e.g., RAM, ROM, etc. not shown in **Figure 6**) via a storage interface 604. The storage interface 604 may connect to memory 605 including, without limitation, memory drives, removable disc drives, etc., employing connection protocols such as, serial advanced technology attachment (SATA), Integrated Drive Electronics (IDE), IEEE-1394, Universal Serial Bus (USB), fibre channel, Small Computer Systems Interface (SCSI), etc. The memory drives may further include a drum, magnetic disc drive, magneto-optical drive, optical drive,

Redundant Array of Independent Discs (RAID), solid-state memory devices, solid-state drives, etc.

The memory 605 may store a collection of program or database components, including, without limitation, user interface 606, an operating system 607, web browser 608 etc. In some embodiments, computer system 600 may store user/application data, such as, the data, variables, records, etc., as described in this disclosure. Such databases may be implemented as fault-tolerant, relational, scalable, secure databases such as Oracle ® or Sybase®.

The operating system 607 may facilitate resource management and operation of the computer system 600. Examples of operating systems include, without limitation, APPLE MACINTOSH® OS X, UNIX®, UNIX-like system distributions (E.G., BERKELEY SOFTWARE DISTRIBUTION™ (BSD), FREEBSD™, NETBSD™, OPENBSD™, etc.), LINUX DISTRIBUTIONS™ (E.G., RED HAT™, UBUNTU™, KUBUNTU™, etc.), IBM™ OS/2, MICROSOFT™ WINDOWS™ (XP™, VISTA™/7/8, 10 etc.), APPLE® IOS™, GOOGLE® ANDROID™, BLACKBERRY® OS, or the like.

In some embodiments, the computer system 600 may implement a web browser 608 stored program component. The web browser 608 may be a hypertext viewing application, such as Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Apple Safari, etc. Secure web browsing may be provided using Hypertext Transport Protocol Secure (HTTPS), Secure Sockets Layer (SSL), Transport Layer Security (TLS), etc. Web browsers 608 may utilize facilities such as AJAX, DHTML, Adobe Flash, JavaScript, Java, Application Programming Interfaces (APIs), etc. In some embodiments, the computer system 600 may implement a mail server stored program component. The mail server may be an Internet mail server such as Microsoft Exchange, or the like. The mail server may utilize facilities such as ASP, ActiveX, ANSI C++/C#, Microsoft .NET, Common Gateway Interface (CGI) scripts, Java, JavaScript, PERL, PHP, Python, WebObjects, etc. The mail server may utilize communication protocols such as Internet Message Access Protocol (IMAP), Messaging Application Programming Interface (MAPI), Microsoft Exchange, Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), or the like. In some embodiments, the computer system 600 may implement a mail client stored program component. The mail client may be a mail viewing application, such as Apple Mail, Microsoft Entourage, Microsoft Outlook, Mozilla Thunderbird, etc.

Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer-readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer-readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term “computer-readable medium” should be understood to include tangible items and exclude carrier waves and transient signals, i.e., be non-transitory. Examples include Random Access Memory (RAM), Read-Only Memory (ROM), volatile memory, non-volatile memory, hard drives, Compact Disc (CD) ROMs, DVDs, flash drives, disks, and any other known physical storage media. media.

The described operations may be implemented as a method, system or article of manufacture using standard programming and/or engineering techniques to produce software, firmware, hardware, or any combination thereof. The described operations may be implemented as code maintained in a “non-transitory computer readable medium”, where a processor may read and execute the code from the computer readable medium. The processor is at least one of a microprocessor and a processor capable of processing and executing the queries. A non-transitory computer readable medium may include media such as magnetic storage medium (e.g., hard disk drives, floppy disks, tape, etc.), optical storage (CD-ROMs, DVDs, optical disks, etc.), volatile and non-volatile memory devices (e.g., EEPROMs, ROMs, PROMs, RAMs, DRAMs, SRAMs, Flash Memory, firmware, programmable logic, etc.), etc. Further, non-transitory computer-readable media may include all computer-readable media except for a transitory. The code implementing the described operations may further be implemented in hardware logic (e.g., an integrated circuit chip, Programmable Gate Array (PGA), Application Specific Integrated Circuit (ASIC), etc.).

The illustrated steps are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described

herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments. Also, the words "comprising," "having," "containing," and "including," and other similar forms are intended to be equivalent in meaning and be open ended in that an item or items following any one of these words is not meant to be an exhaustive listing of such item or items or meant to be limited to only the listed item or items. It must also be noted that as used herein and in the appended claims, the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise.

Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term "computer readable medium" should be understood to include tangible items and exclude carrier waves and transient signals, i.e., are non-transitory. Examples include random access memory (RAM), read-only memory (ROM), volatile memory, non-volatile memory, hard drives, CD ROMs, DVDs, flash drives, disks, and any other known physical storage media.

Finally, the language used in the specification has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter. Accordingly, the disclosure of the embodiments of the disclosure is intended to be illustrative, but not limiting, of the scope of the disclosure.

With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.



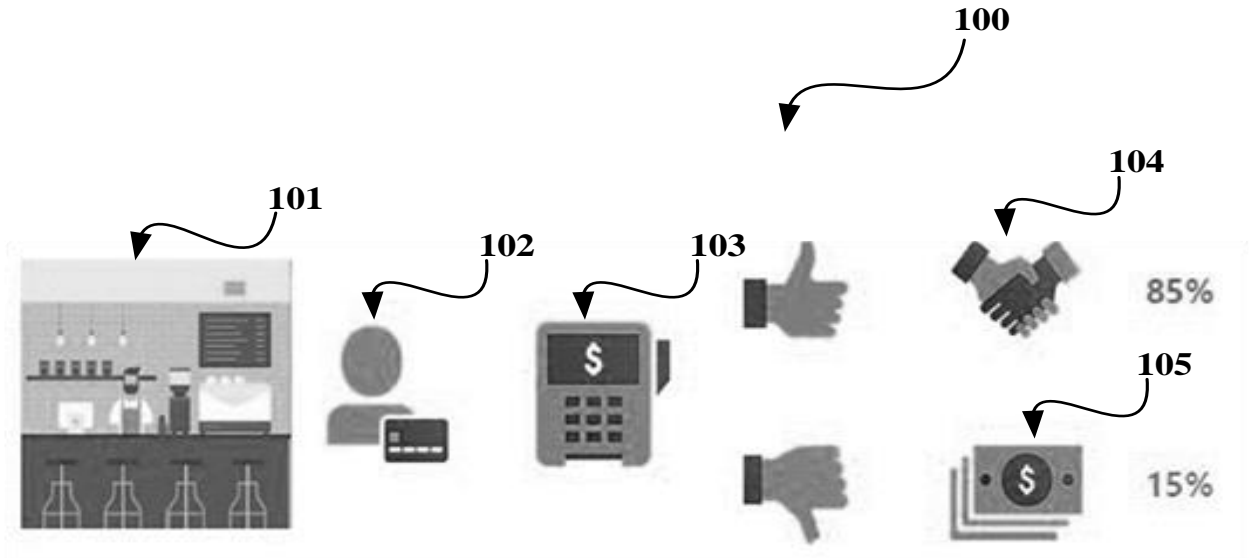
## **SYSTEM AND METHOD FOR GENERATING FUND SUFFICIENCY SCORE FOR A CARDHOLDER**

### **ABSTRACT**

The present disclosure provides a system and a method for generating fund sufficiency score for a cardholder. The proposed system generates a fund sufficiency score when there is not enough fund available in account of the cardholder to complete a transaction. The fund sufficiency score is communicated to an issuer through ISO message or API interface. Further the cardholder also receives a message stating confirmation of authorization for the transaction. The proposed system allows the cardholder to pay his bill even when the cardholder account has less funds. However, if the fund sufficiency score for the cardholder is less then transaction of the cardholder is rejected. The system increases revenue of merchants. Also, the system encourages electronic payment methods and saves time for both the merchant and the cardholder.

### **Figure 5**

1/6



[Figure 1]

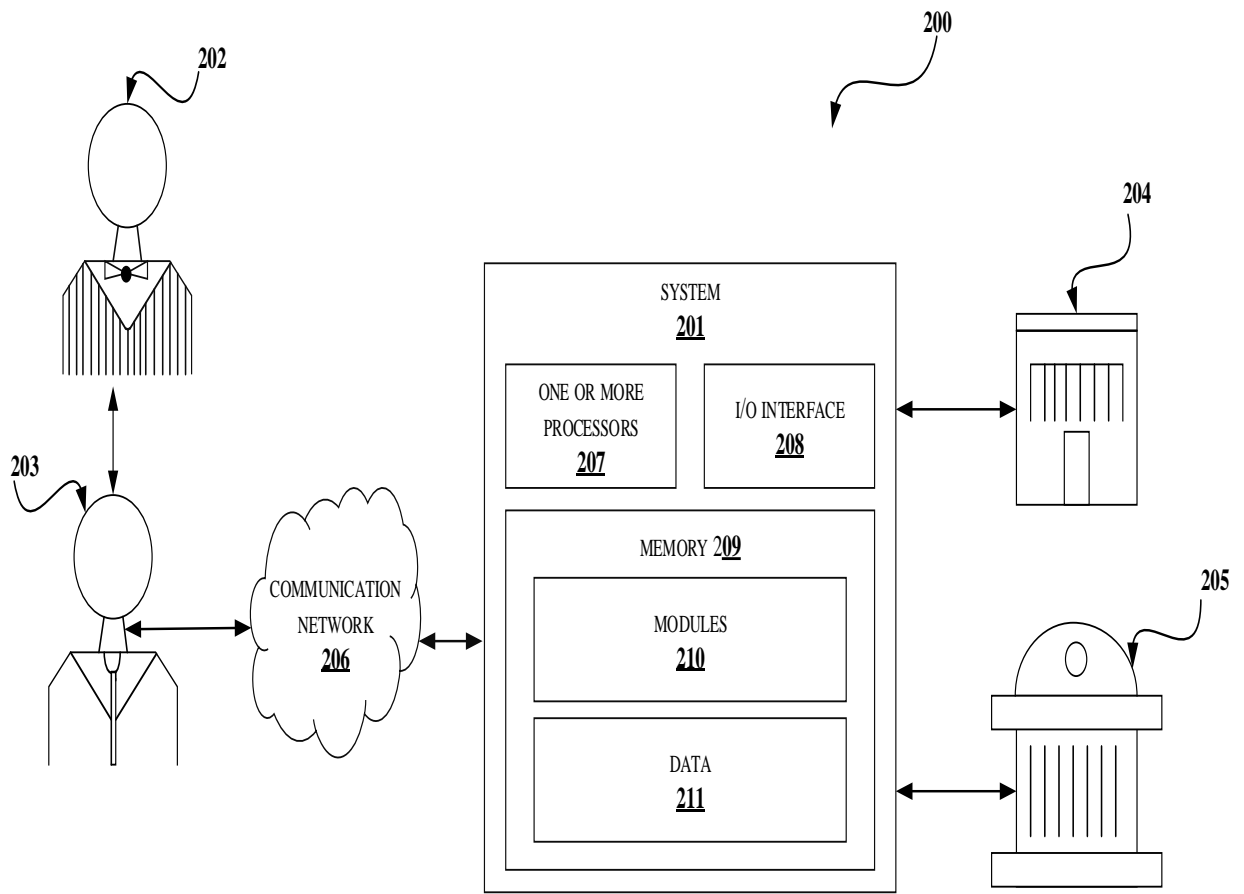


Figure 2

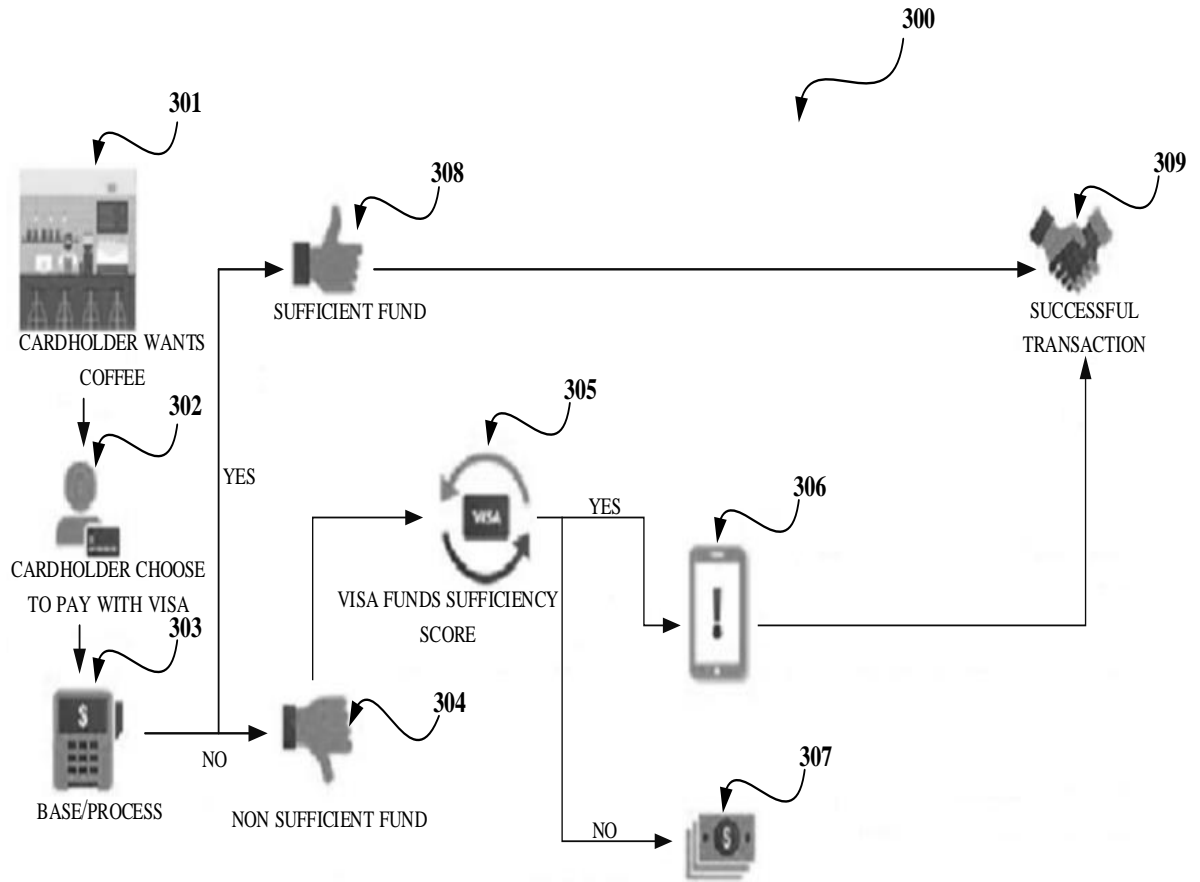


Figure 3

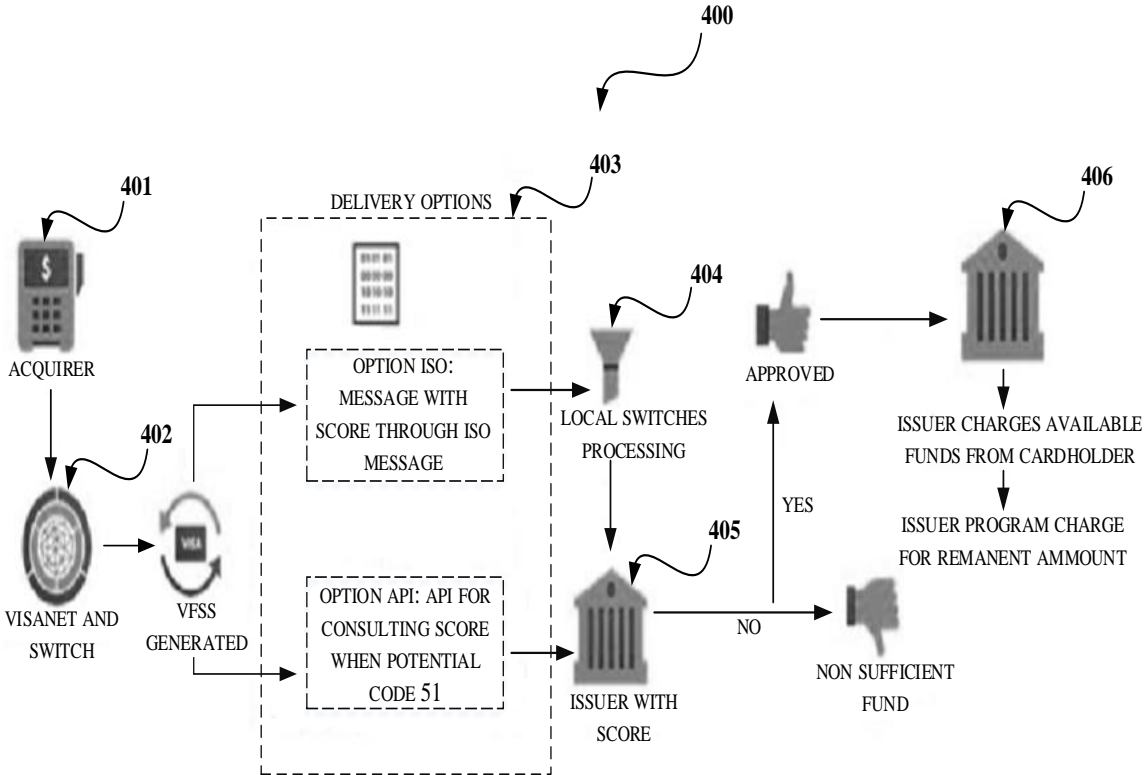


Figure 4

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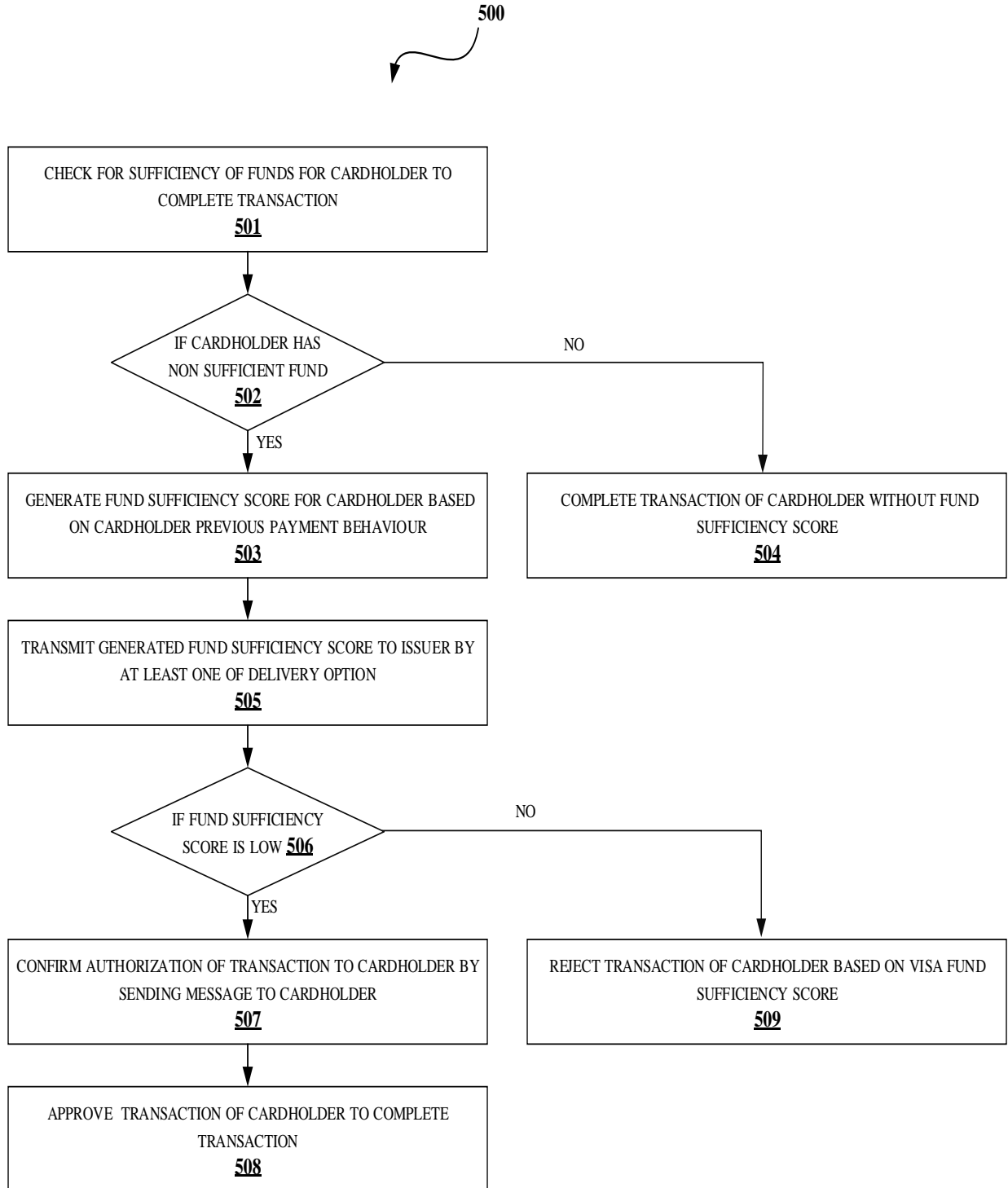


Figure 5

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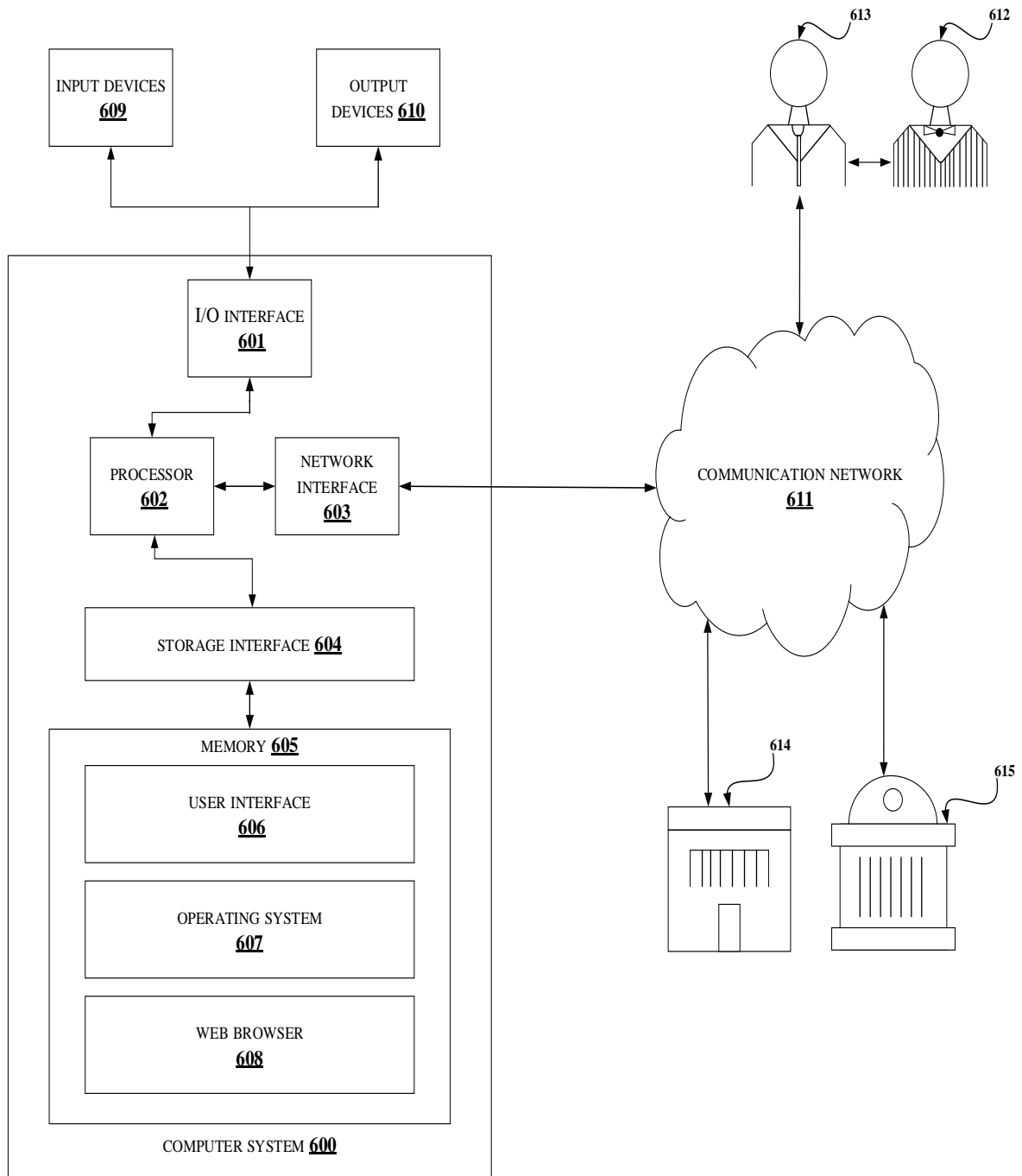


Figure 6