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(54) **SYSTEM AND METHOD FOR GROUP PAYMENTS**

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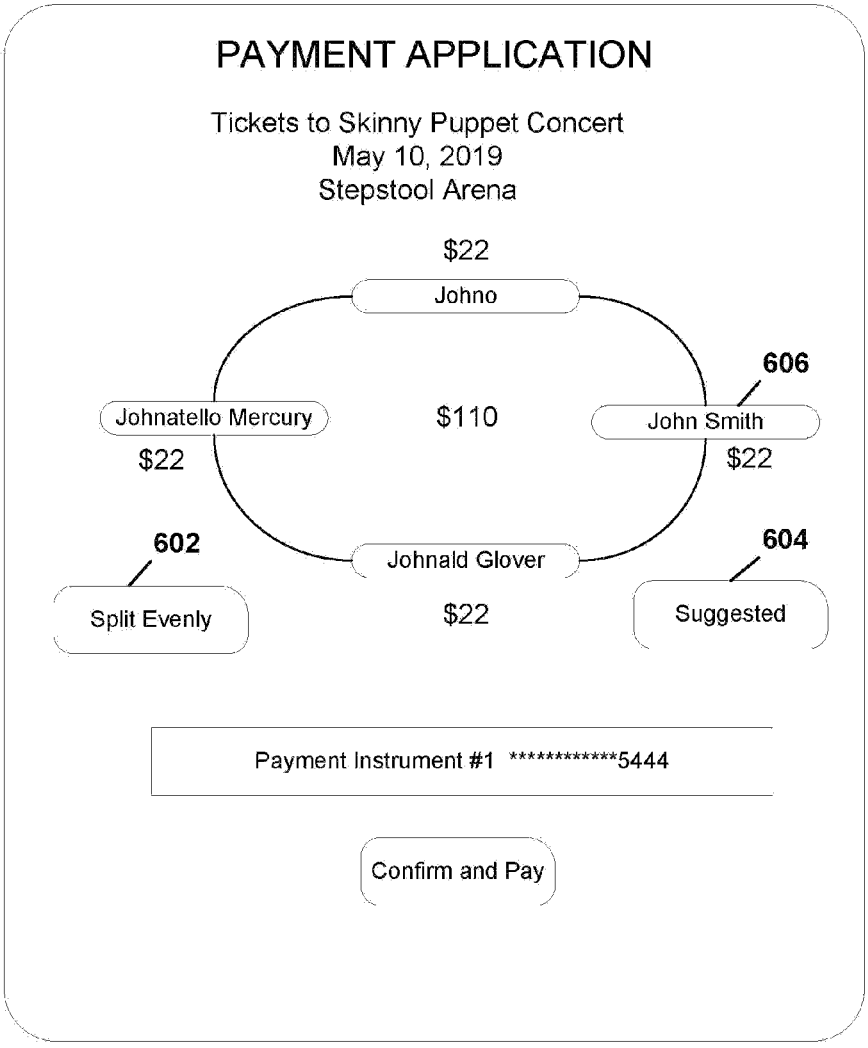
(52) **U.S. Cl.**

CPC ***G06Q 20/29*** (2013.01); ***G06Q 30/04*** (2013.01); ***G06Q 20/14*** (2013.01)

(57) **ABSTRACT**

Based on detecting a selection, by a first user, of a group payment option on a merchant interface, the computer system launches a user selection user interface that includes one or more user selection interface elements that correspond to one or more users associated with the first user. Based on detecting a selection of one or users, the computer system launches a group payment user interface that includes one or more payment allocation user interface elements that corresponds to a payment allocation for the selected users. Based on detecting a confirmation of a first payment allocation plan, the computer system processes a payment for the purchase and further transmits invoices to the selected users which include an allocated payment amount.



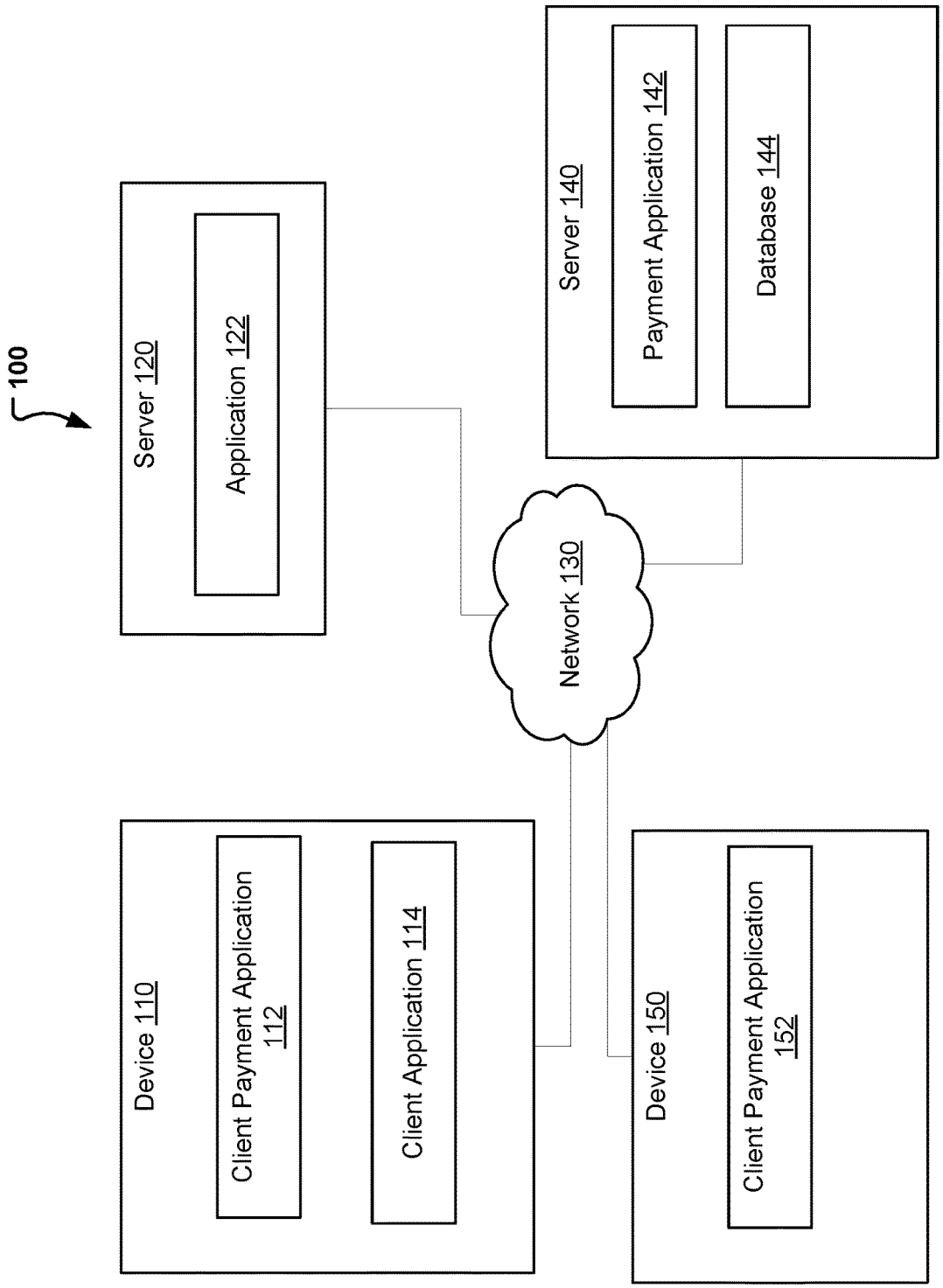

100
Server 120
Application 122
Server 140
Payment Application 142
Database 144
Network 130
Device 110
Client Payment Application 112
Client Application 114
Device 150
Client Payment Application 152

FIG. 1

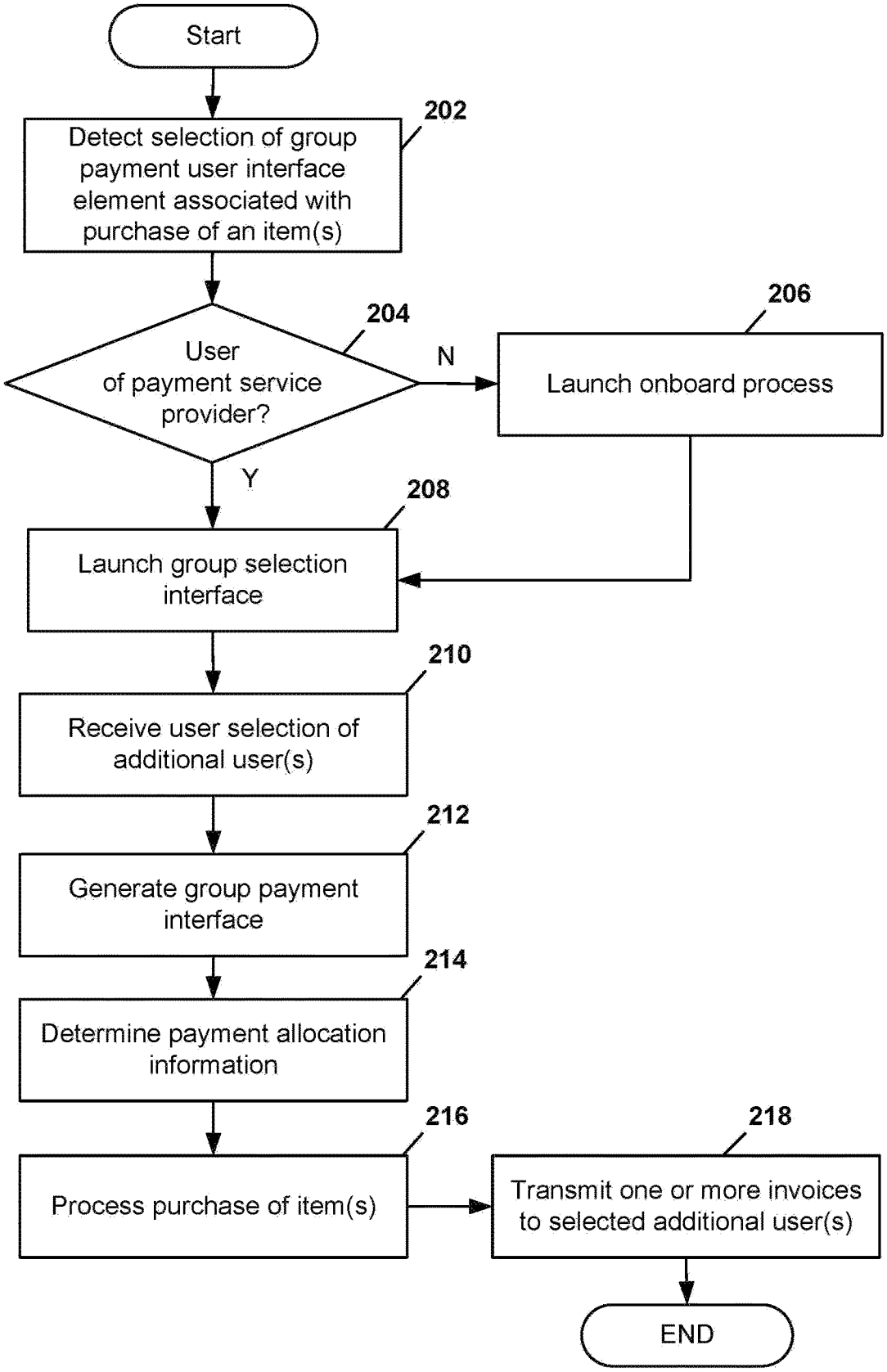

Start
202
Detect selection of group payment user interface element associated with purchase of an item(s)
204
User of payment service provider?
N
206
Launch onboard process
Y
208
Launch group selection interface
210
Receive user selection of additional user(s)
212
Generate group payment interface
214
Determine payment allocation information
216
Process purchase of item(s)
218
Transmit one or more invoices to selected additional user(s)
END

FIG. 2

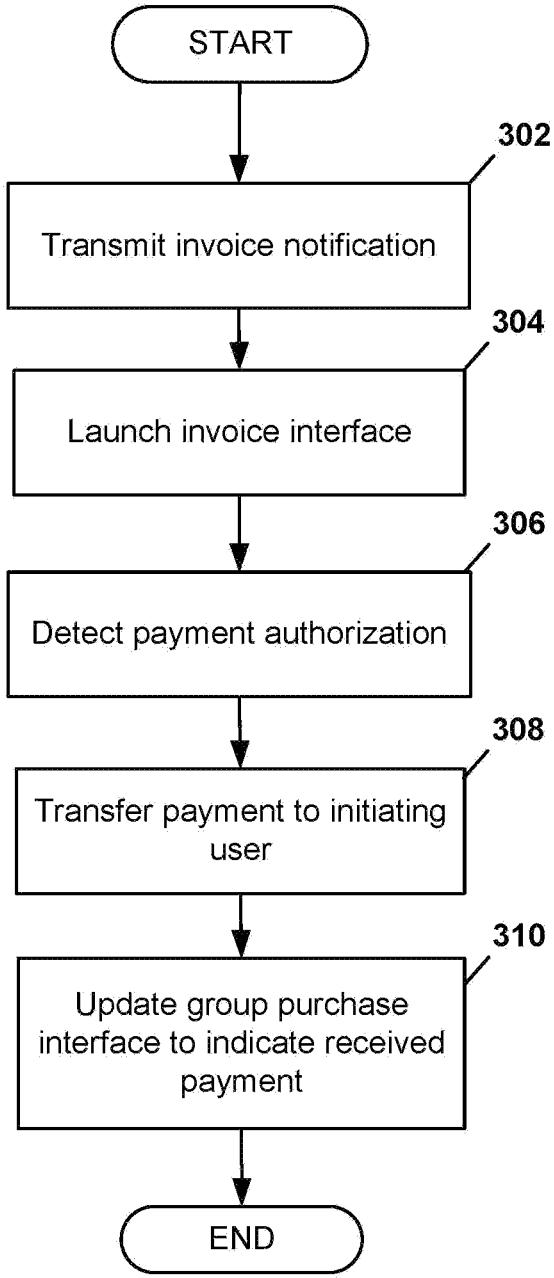

START
302
Transmit invoice notification
304
Launch invoice interface
306
Detect payment authorization
308
Transfer payment to initiating user
310
Update group purchase interface to indicate received payment
END

FIG. 3

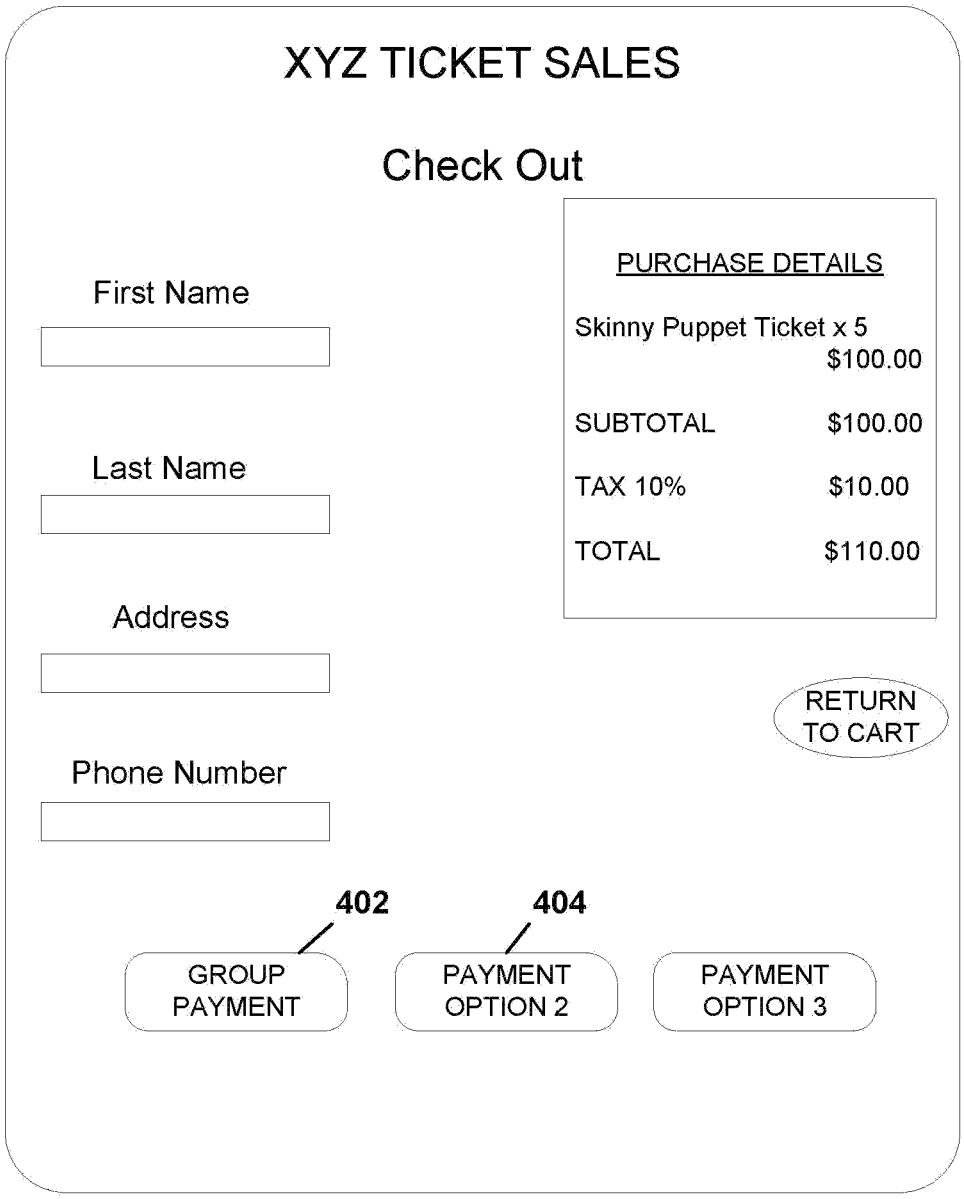

XYZ TICKET SALES
Check Out
First Name
Last Name
Address
Phone Number
PURCHASE DETAILS
Skinny Puppet Ticket x 5 $100.00
SUBTOTAL $100.00
TAX 10% $10.00
TOTAL $110.00
RETURN TO CART
402
404
GROUP PAYMENT
PAYMENT OPTION 2
PAYMENT OPTION 3

FIG. 4

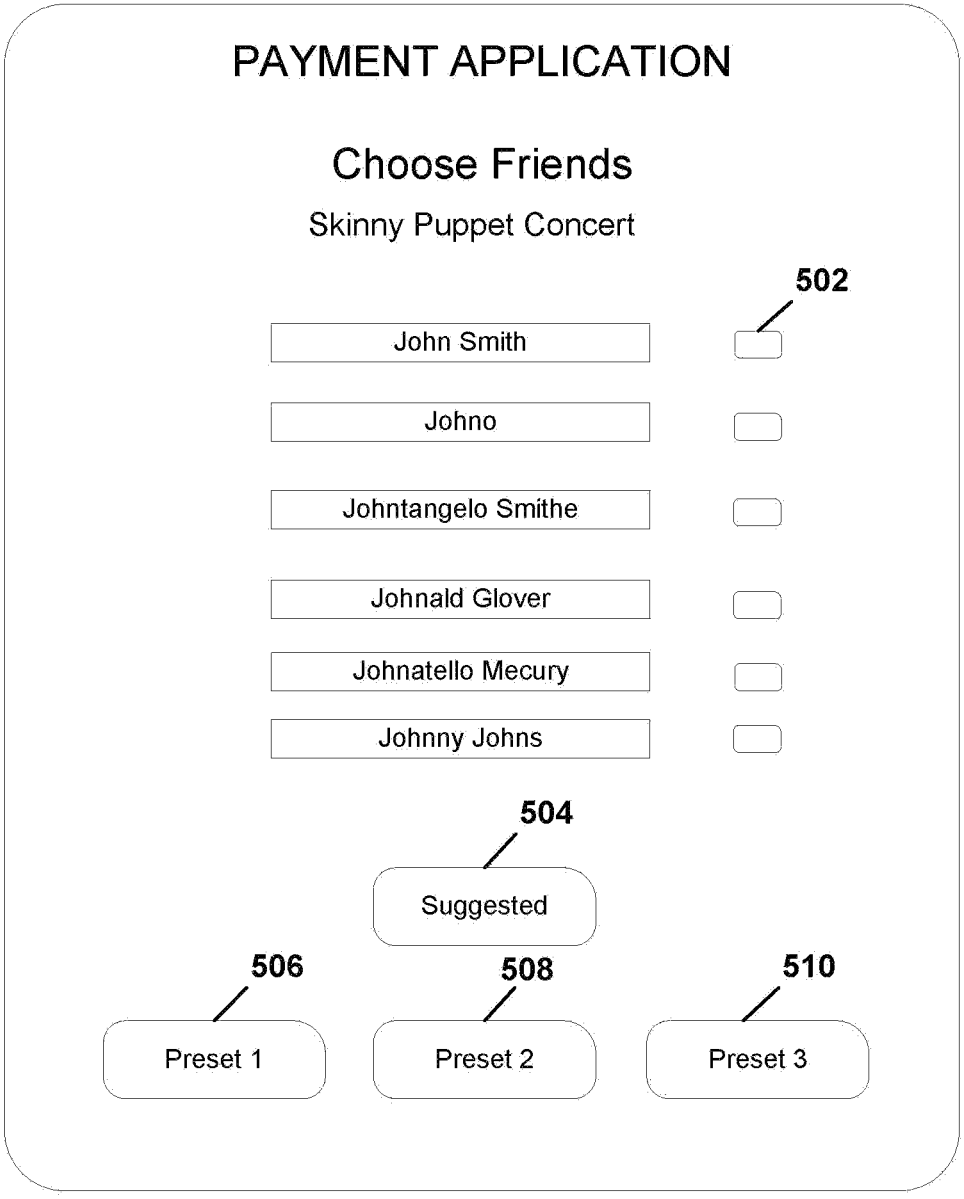

PAYMENT APPLICATION
Choose Friends
Skinny Puppet Concert
502
John Smith
Johno
Johntangelo Smithe
Johnald Glover
Johnatello Mecury
Johnny Johns
504
Suggested
506
Preset 1
508
Preset 2
510
Preset 3

FIG. 5

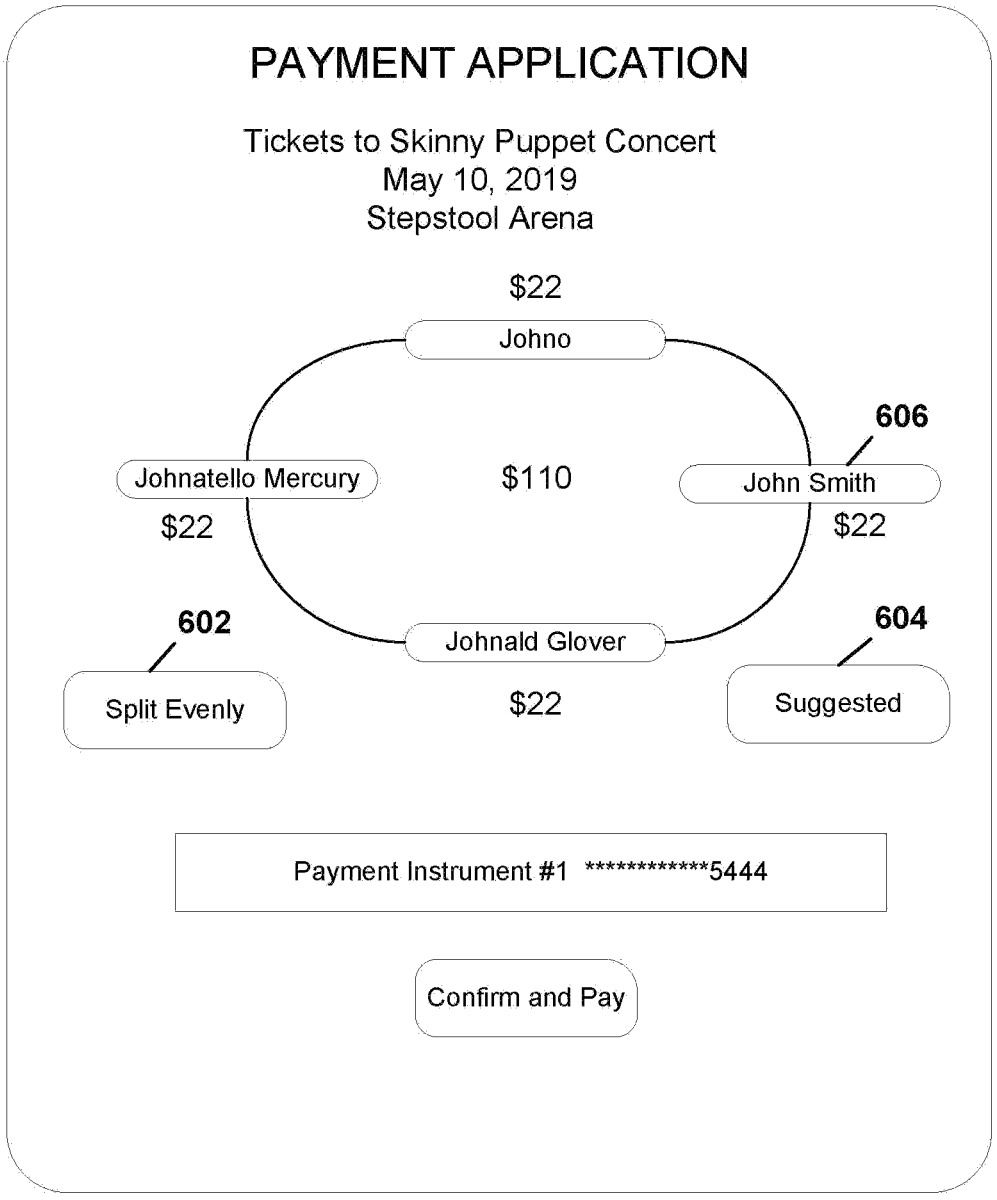

PAYMENT APPLICATION
Tickets to Skinny Puppet Concert
May 10, 2019
Stepstool Arena
$22
Johno
606
Johnatello Mercury
$110
John Smith
$22
$22
602
604
Johnald Glover
Split Evenly
$22
Suggested
Payment Instrument #1 **********5444
Confirm and Pay

FIG. 6

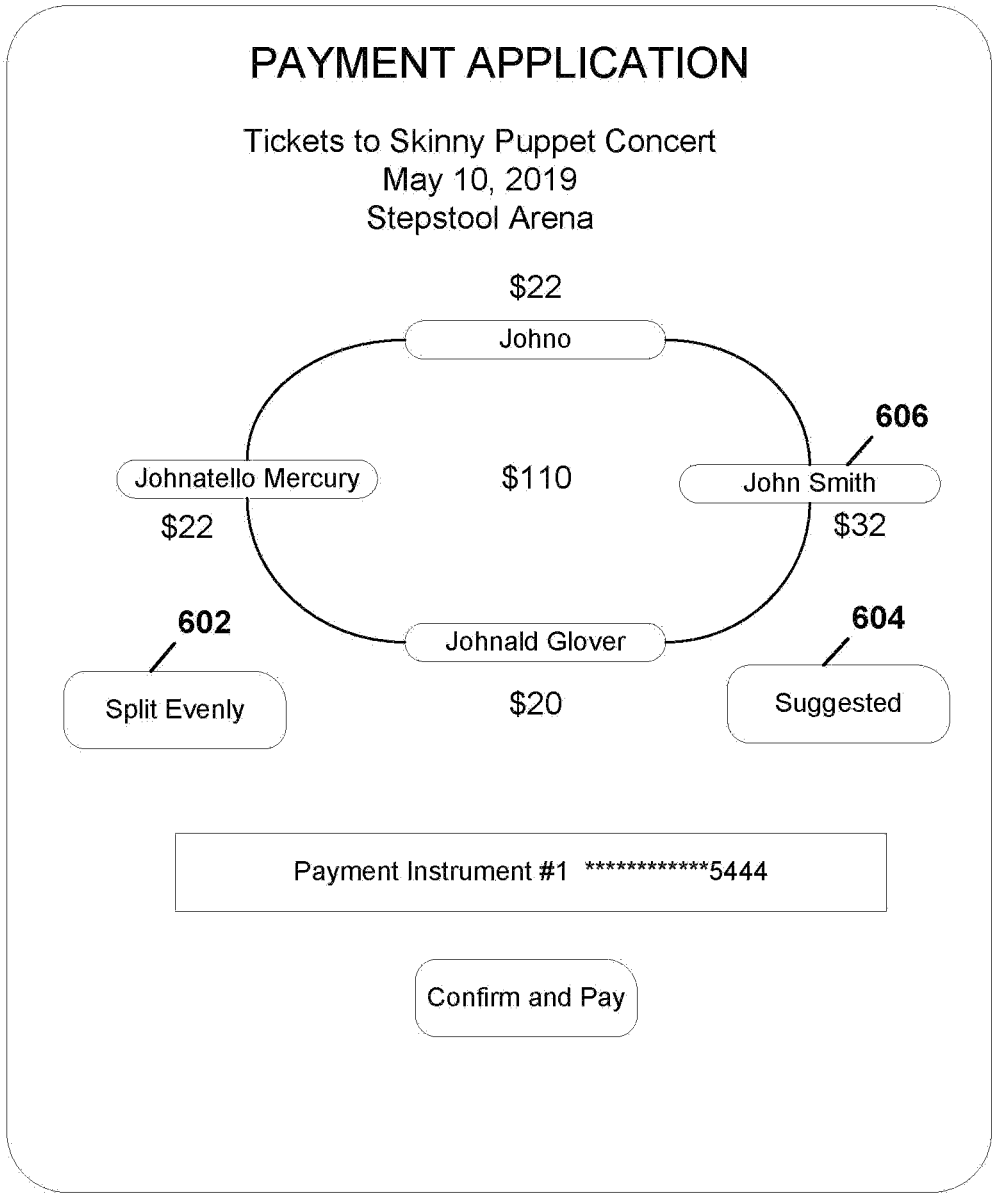

PAYMENT APPLICATION
Tickets to Skinny Puppet Concert
May 10, 2019
Stepstool Arena
$22
Johno
606
Johnatello Mercury
$22
$110
John Smith
$32
602
604
Johnald Glover
$20
Split Evenly
Suggested
Payment Instrument #1 **********5444
Confirm and Pay

FIG. 7

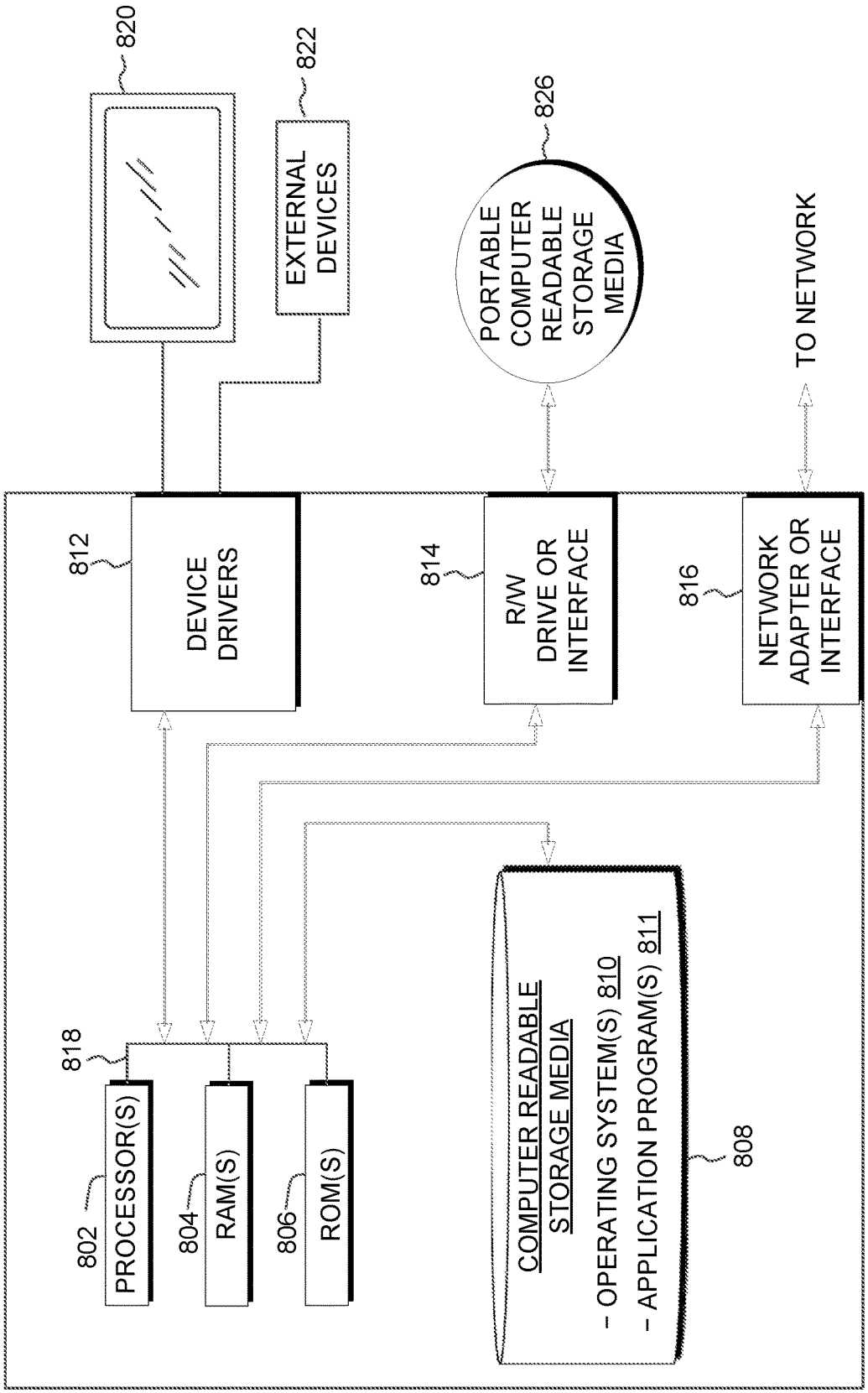

820
822
826
EXTERNAL DEVICES
PORTABLE COMPUTER READABLE STORAGE MEDIA
TO NETWORK
812
DEVICE DRIVERS
814
R/W DRIVE OR INTERFACE
816
NETWORK ADAPTER OR INTERFACE
818
802
PROCESSOR(S)
804
RAM(S)
806
ROM(S)
COMPUTER READABLE STORAGE MEDIA
- OPERATING SYSTEM(S) 810
- APPLICATION PROGRAM(S) 811
808

FIG. 8

SYSTEM AND METHOD FOR GROUP PAYMENTS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. application Ser. No. 16/430,721, filed Jun. 4, 2019. The disclosure of which are incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to group payments, and more particularly to a system and method for facilitating group payments.

BACKGROUND

[0003] The payments landscape has changed drastically over the past decade. This is primarily due to fintech companies that have allowed consumers to have simple and frictionless shopping experiences online, while also allowing consumers to transfer money to their family and friends via their computers and mobile devices. Furthermore, fintech companies have also provided users with an avenue to send invoices to other users and also to keep track of their transactions. However, as the digital payments landscape continues to evolve, there remains a need for a system that allows for easy and frictionless group payments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1** illustrates a group payment system, in accordance with an embodiment.

[0005] FIG. **2** is a flowchart illustrating the operations of the payment application of FIG. **1** in facilitating a group payment, in accordance with an embodiment.

[0006] FIG. **3** is a flowchart illustrating the operations of the payment application of FIG. **1** in updating the group payment interface based on detection of received payment, in accordance with an embodiment.

[0007] FIG. **4** is a depiction of a merchant interface that includes a group payment option for a purchase, in accordance with an embodiment.

[0008] FIG. **5** is a depiction of a group selection interface that allows for the selection of one or more users, in accordance with an embodiment.

[0009] FIG. **6** is a depiction of a group payment interface that allows for the adjustment of payment allocation amounts, in accordance with an embodiment.

[0010] FIG. **7** is a second depiction of the group payment interface that allows for the adjustment of payment allocation amounts, in accordance with an embodiment.

[0011] FIG. **8** is a block diagram depicting the hardware components of the autoencoder system of FIG. **1**, in accordance with an embodiment.

DETAILED DESCRIPTION

[0012] Embodiments of the present disclosure provide a system, method, and program product. In response to detecting a selection, by a first user, of a first payment user interface element displayed on a merchant interface corresponding to a purchase, a computer system launches a user selection user interface, wherein the user selection user interface corresponds to a payment service provider, and wherein the first payment user interface includes one or more user selection interface elements that correspond to one or more users associated with the first user. In response to detecting a selection of at least a first user selection interface element of the one or more user selection interface elements, the computer system launches a group payment user interface, wherein the group payment user interface includes one or more payment allocation user interface elements that corresponds to a payment allocation for a portion of one or more users that correspond to the selected at least the first user selection interface element. In response to detecting a confirmation of a first payment allocation plan for the portion of the one or more users that correspond to the selected at least the first user selection interface element, the computer system processes a payment for the purchase, wherein the processing the payment for the purchase includes transmitting one or more invoices to the portion of the one or more users that correspond to the selected at least the first user selection interface element, wherein a payment allocation corresponding to each invoice of the one or more invoices corresponds to the first payment allocation plan.

[0013] In the example embodiment, the present disclosure describes a solution that describes providing a group payment interface that allows a user to initiate and carry out a frictionless group purchase. In the example, embodiment, a group payment interface element may be provided on a merchant website, which upon selection, causes a payment service provider to launch a group payment user selection user interface. Within the group payment user selection user interface, a user is able to select one or more other users (other users of the payment service provider) to associated with the group purchase. Furthermore, in one or more embodiments, the group payment user selection user interface may provide one or more user interface elements that corresponds to a group of preset users and may also provide one or more user interface elements that correspond to a group of users predicted to correspond to the group purchase. Upon selection of the other users to associate with the group purchase, the payment service provider may launch a group payment interface that allows the user to allocate an appropriate portion of the group purchase amount to each of the selected users. Furthermore, the payment service provider may analyze previous transactional activity and apply any outstanding payments to the current allocation scheme, and based on this, provide a suggested allocation amount for each of the selected users. Upon confirmation of the payment allocation scheme, the payment service provider may automatically transmit invoices to each of the selected users (which may include a corresponding allocated payment amount).

[0014] Embodiments of the present disclosure will now be described in detail with reference to the accompanying Figures.

[0015] FIG. **1** illustrates group payment system **100**, in accordance with an embodiment. In the example embodiment, group payment system **100** includes device **110**, server **120**, server **140**, and device **150** interconnected via network **130**.

[0016] In the example embodiment, network **130** is the Internet, representing a worldwide collection of networks and gateways to support communications between devices connected to the Internet. Network **130** may include, for example, wired, wireless or fiber optic connections. In other embodiments, network **130** may be implemented as an intranet, a Bluetooth network, a local area network (LAN),

or a wide area network (WAN). In general, network **130** can be any combination of connections and protocols that will support communications between computing devices, such as between device **110** and server **140**.

[0017] In the example embodiment, server **120** includes application **122**. In the example embodiment, server **120** may be a desktop computer, a laptop computer, a tablet computer, a mobile device, a handheld device, a thin client, or any other electronic device or computing system capable of receiving and sending data to and from other computing devices, such as device **110**, via network **130**. Although not shown, optionally, server **120** can comprise a cluster of servers executing the same software to collectively process requests as distributed by a front-end server and a load balancer. In the example embodiment, server **120** is a computing device that is optimized for the support of applications that reside on server **120**, such as application **122**, and for the support of network requests related to application **122**. Server **120** is described in more detail with regard to the figures.

[0018] In the example embodiment, application **122** is a server-side application that is capable of responding to requests from corresponding clients-side applications. In the example embodiment, application **122** is an e-commerce application, however, in other embodiments, application **122** may be a financial application, a social media application, a merchant application, a service provider application, or another type of application. Application **122** is described in more detail with regard to the figures.

[0019] In the example embodiment, device **110** includes client payment application **112** and client application **114**. In the example embodiment, device **110** may be a desktop computer, a laptop computer, a tablet computer, a mobile device, a handheld device, a thin client, or any other electronic device or computing system capable of receiving and sending data to and from other computing devices, such as server **120**, via network **130**. Device **110** is described in more detail with regard to the figures.

[0020] In the example embodiment, client payment application **112** is a client-side application, corresponding to the server-side payment application **142**, that is capable of transmitting requests to payment application **142** and is further capable of providing received information to a user of device **110** via a user interface. In the example embodiment, client payment application **112** is a stand-alone client application, however, in other embodiments, client payment application **112** may be fully or partially integrated with client application **114**. Client payment application **112** is described in more detail with regard to the figures.

[0021] In the example embodiment, client application **114** is a client-side application, corresponding to the server-side application **122**, that is capable of transmitting requests to application **122** and is further capable of providing received information to a user of device **110** via a user interface. In the example embodiment, client application **114** is an e-commerce application, however, in other embodiments, application **114** may be a financial application, a social media application, a merchant application, a service provider application, or another type of application. Application **122** is described in more detail with regard to the figures.

[0022] In the example embodiment, device **150** includes client payment application **152**. In the example embodiment, device **150** may be a desktop computer, a laptop computer, a tablet computer, a mobile device, a handheld device, a thin client, or any other electronic device or computing system capable of receiving and sending data to and from other computing devices, such as server **140**, via network **130**. Device **150** is described in more detail with regard to the figures.

[0023] In the example embodiment, client payment application **152** is a client-side application, corresponding to the server-side payment application **142**, that is capable of transmitting requests to payment application **142** and is further capable of providing received information to a user of device **150** via a user interface. In the example embodiment, client payment application **152** is a stand-alone client application, however, in other embodiments, client payment application **152** may be fully or partially integrated with another application on device **150**. Client payment application **152** is described in more detail with regard to the figures.

[0024] In the example embodiment, server **140** includes payment application **142** and database **144**. In the example embodiment, server **140** may be a desktop computer, a laptop computer, a tablet computer, a mobile device, a handheld device, a thin client, or any other electronic device or computing system capable of receiving and sending data to and from other computing devices, such as device **110**, via network **130**. Furthermore, in the example embodiment, server **140** is a computing device that is optimized for the support of applications that reside on server **140**, such as payment application **142**. Although not shown, optionally, server **140** can comprise a cluster of servers executing the same software to collectively process requests as distributed by a front-end server and a load balancer. Server **140** is described in more detail with regard to the figures.

[0025] In the example embodiment, database **144** is a database that includes information corresponding to one or more users of a payment service provider, such as the payment service provider corresponding to payment application **142**. For example, database **144** may include user financial information, user authentication information, user preferences, user connections (other users that a user may be linked to, connected with, etc.), information detailing each user's transactional history, and additional user information. Database **144** is described in more detail with regard to the figures.

[0026] In the example embodiment, payment application **142** is a server-side application, corresponding to the client-side payment applications such as client payment application **112** and client payment application **152**. Payment application **142** is capable of receiving information from client payment applications and further capable of responding to requests from corresponding client payment applications. In addition, in the example embodiment, based on detecting the selection of a group payment interface element by a user, payment application **142** is capable of authenticating the user, importing purchase information, and generating one or more group payment user interfaces. Furthermore, payment application **142** is capable of determining a payment allocation for each user corresponding to the group payment, and further capable of transmitting invoices to the users associated with the group payment. In addition, based on detecting a payment made in response to an invoice, payment application **142** is capable of updating a corresponding group payment user interface. Payment application **142** is described in more detail with regard to the figures.

[0027] Furthermore, in one or more embodiments, payment application **142** may utilize an application programming interface (API) in communicating with other programs, and further in communicating with database **144**.

[0028] FIG. **2** is a flowchart illustrating the operations of payment application **142** in facilitating a group payment, in accordance with an embodiment. In the example embodiment, a user of user device **110** may be in client application **114** for the purpose of completing a purchase. In the example embodiment, client application **114** may be a client-side application of an e-commerce application (application **122** being the server-side application), however, in other embodiments, client application **114** may be a different type of application.

[0029] In the example embodiment, payment application **142** may detect a selection of a group payment user interface element associated with the purchase of an item (or service) (step **202**). In the example embodiment, a user of user device **110** may select a "group payment" user interface element or button displayed on a checkout interface of client application **114**, with the user interface element being associated with the payment service provider corresponding to payment application **142**. For example, the payment service provider may serve as a payment option or payment facilitator for users of application **122** (or the merchant/service provider associated with application **122**) and may therefore provide custom logic to the merchant/service provider in order to provide a "group payment" user interface element within application **122**. Upon selection of the "group payment" user interface element, the checkout flow may be taken over by payment application **142** and redirected to an interface corresponding to payment application **142**. In other embodiments, upon selection of the "group payment" user interface element, rather than redirecting, payment application **142** may take over the checkout flow within an interface corresponding to client application **114**. Furthermore, in the example embodiment, upon selection of the "group payment" user interface element, information corresponding to the purchase may also be transmitted (by client application **114** or application **122**) to payment application **142**. For example, the item/service to be purchased, the purchase price, location corresponding to the item/service, a date/time of the purchase, a date/time corresponding to the service (or event), a merchant identifier corresponding to the item/service, and additional purchase information may be transmitted to payment application **142**.

[0030] In addition, in one or more embodiments, the "group payment" user interface element may be a "smart" user interface element/smart button, and therefore, may be rendered based on an analysis of the transaction. For example, if the transaction/purchase corresponds to a certain category of purchase (such as an event), then the "group payment" user interface element may be rendered. In another example, whether or not the "group payment" user interface element is rendered may be dependent on a merchant agreement with the payment service provider.

[0031] In the example embodiment, upon detection that the "group payment" user interface has been selected by the user of user device **110**, payment application **142** may determine if the user of user device **110** is a user of the payment service provider corresponding to payment application **142** (decision **204**). In the example embodiment, payment application **142** may request authentication credentials from the user of user device **110** by causing client payment application **112** to launch and requesting the authentication credentials via client payment application **112**. In other embodiments, payment application **142** may request authentication credentials from the user of user device **110** via an interface corresponding to client application **114**. In the example embodiment, after receiving the authentication credentials, payment application **142** may compare the received authentication credentials against user information contained in database **144** in order to determine if the user of user device **110** is a registered user of the payment service provider corresponding to payment application **142**.

[0032] If payment application **142** determines that the user of user device **110** is not a user of the payment service provider corresponding to payment application **142** (decision **204**, "NO" branch), payment application **142** may launch an onboarding process via client payment application **112** on user device **110** (step **206**). In the example embodiment, payment application **142** may utilize client payment application **112** to provide an interface to the user of user device **110** to capture one or more pieces of user information in order to onboard the user and create a user account with the payment service provider corresponding to payment application **142**. Furthermore, in one or more embodiments, payment application **142** may analyze the user information corresponding to the purchase (received from client application **114** or application **122**) in order to auto-fill certain portions of the onboarding process. In certain embodiments, payment application **142** may filter out portions of the onboarding questions or onboard the user without requiring additional information based on determining that the received user information corresponding to the purchase provides sufficient information.

[0033] If payment application **142** determines that the user of user device **110** is a user of the payment service provider corresponding to payment application **142** (decision **204**, "YES" branch) or if the user of user device **110** has been onboarded (based on step **206**), payment application **142** launches a group (or user) selection interface via client payment application **112** (step **208**). In the example embodiment, the group selection interface provides an interface where the user of user device **110** can select one or more users of the payment service provider corresponding to payment application **142** to be part of the group purchase. In the example embodiment, payment application **142** may access database **144** and identify other users of the payment service provider that are associated with the user of user device **110** (such as phone contacts, social media friends, linked users within the payment service provider system, etc.) and may provide the identified other users as options that may be selected to be part of the group purchase.

[0034] Furthermore, in one or more embodiments, payment application **142** may provide additional selectable user interface elements on the group selection interface, such as a "suggested" selection, or one or more "preset" selections. In these one or more embodiments, payment application **142** may provide the option for the user of user device **110** to have "preset" user interface elements that correspond to one or more users (that the user may input). Furthermore, payment application **142** may additionally suggest that a user of user device **110** associate a group of other users with a "preset" user interface element based on the number of group transactions that includes the group of other users and the user of user device **110** exceeding a threshold level. In

other embodiments, payment application **142** may suggest that a user of user device **110** associate a group of other users with a "preset" user interface element based on a number of interactions between the users (the group of other users plus the user of user device **110**) exceeding a threshold amount or the frequency of interactions exceeding a threshold frequency. In the example embodiment, "preset" options provides a quick and easy method for selecting the appropriate users for a group purchase, particularly in situations where the user of user device **110** transacts with certain users on a regular basis. In these one or more embodiments, payment application **142** may determine one or more users to associate with the "suggested" user interface element based on analyzing previous activity associated with the user of user device **110**, and further based on information associated with the current group purchase. In addition, payment application **142** may determine one or more users to associate with the "suggested" user interface element based on the current user selection of one or more users to associate with the group purchase. The "preset" and "suggested" user interface elements are depicted and discussed in further detail with respect to FIG. **5**.

[0035] In the example embodiment, payment application **142** may receive, via the group selection interface, a selection, from the user of user device **110**, of one or more additional users to associate with the group purchase (step **210**). Payment application **142** may then generate and provide (via client payment application **112**) a group payment interface based on the received selection of one or more additional users (step **212**). In the example embodiment, the group payment interface may also include details corresponding to the purchase, such as the item/service to be purchased, the purchase price, location corresponding to the item/service, a date/time of the purchase, a date/time corresponding to the service (or event), and a merchant identifier corresponding to the item/service.

[0036] Furthermore, the group payment interface may include a "split evenly" user interface element as well as a "suggested" user interface element. The "split evenly" user interface element, if selected, evenly distributes the purchase price between the users associated with the group purchase (including the user of user device **110**). The "suggested" user interface element, if selected, may distribute the purchase price between the users associated with the group purchase, but may also take into account outstanding invoices associated with members of the group. For example, if a first user still owes the user of user device **110** $10 for a previous group purchase, upon selection of the "suggested" user interface element, $10 may be added to the purchase amount associated with the first user. In the example embodiment, payment application **142** may, by default, distribute the purchase price between the users associated with the group purchase according to the "suggested" amounts associated with each user (taking into account outstanding invoices), and therefore, may be taken into account in the initial group payment interface presented to the user of user device **110**. In this example embodiment, if there are no outstanding invoices between the users associated with the group purchase, the initial group payment interface may depict the purchase price split evenly between the users. In other embodiments, the initial group payment interface may not allocate the purchase price of the group purchase between the users until an option is selected by the user of user device **110**.

[0037] Additionally, in the example embodiment, a user interface element may be associated with each user of the users associated with the group purchase, which allows the user of user device **110** to input a custom allocation amount for an associated user. The group payment interface is depicted and described in additional detail with regard to FIGS. **6** and **7**.

[0038] In the example embodiment, payment application **142** may determine the appropriate payment allocation for each user of the users associated with the group purchase based on input provided by the user of user device **110** (step **214**). In the example embodiment, the payment allocation may be determined based on the user of user device **110** selected a user interface element corresponding to confirmation of the information presented by the group payment interface. Furthermore, in the example embodiment, upon receiving a confirmation to proceed from the user of user device **110**, payment application **142** may process or cause the payment for the group purchase to be processed (step **216**). In the example embodiment, payment application **142** may utilize stored financial information associated with the user of user device **110** or financial information input by the user of user device **110** to process the payment for the group purchase. In addition, in the example embodiment, payment application **142** may transmit one or more invoices to each of the users associated with the group purchase (step **218**). In the example embodiment, the invoices may include information associated with the group purchase as well as information associated with an amount of the group purchase allocated to each specific user. Furthermore, in one or more embodiment, payment application **142** may re-transmit the invoice or a request for payment to each user on a periodic basis until the corresponding payment is made.

[0039] FIG. **3** is a flowchart illustrating the operations of payment application **142** in updating the group payment interface based on detection of received payment, in accordance with an embodiment. In the example embodiment, payment application **142** transmits an invoice notification to a user device associated with a group payment, such as device **150** (step **302**). In the example embodiment, the user of user device **150** may be selected by the user of user device **110** to be part of a group purchase. The invoice notification may be received by client payment application **152** on device **150** and presented to the user of user device **150** via an alert or notification.

[0040] In the example embodiment, in response to detection of a selection, by the user of user device **150** of a link or a user interface element associated with the invoice notification, payment application **142** may utilize client payment application **152** to launch an invoice interface on user device **150** (step **304**). In the example embodiment, payment application **142** provide information associated with the group purchase as well as information associated with an amount of the group purchase allocated to the user of user device **150** within the invoice interface. Furthermore, a user interface element may be provided for the user of user **150** to confirm the purchase and initiate transfer of the funds to an account of the requesting user (in this example, the user of user device **110**).

[0041] In the example embodiment, payment application **142** may detect a payment authorization within the provided invoice interface (step **306**). In the example embodiment, payment application **142** may detect that the user of user device **150** has authorized a payment to be made to the user

of user device **110**, via the provided invoice interface. Based on receiving authorization for the payment, payment application **142** may transfer the payment to an account associated with the initiating user (i.e., the user of user device **110**) (step **308**).

[0042] In the example embodiment, based on performing the transfer to the user of user device **110**, payment application **142** updates a group purchase interface to reflect the payment and may also provide a notification to the user of user device **110** that the payment has been made (step **310**). In the example embodiment, the user of user device **110** may log into client payment application **112** and view the updated group purchase interface (which may be further updated by payment application **142** as payments are authorized and transferred from the other users associated with the group purchase). Furthermore, the group purchase interface may include information corresponding to the users associated with the purchase, the outstanding balance of each of the payment allocations corresponding to each of the users associated with the purchase and may further have information corresponding to the group purchase. In one or more embodiments, the other users associated with the group purchase may also be provided access to view the group purchase interface (and also may receive updates to the group purchase interface as described above).

[0043] In other embodiments, rather than a user, such as the user of user device **110** provided the initial funds for the group purchase, payment application **142** may provide a money pool that may be usable by each transaction group. In these other embodiments, the purchase initiator (i.e., the user of user device **110**), may select the "group purchase" option, which causes payment application **142** to utilize the money pool (corresponding to the group of users associated with the group purchase) to pay for the group purchase. Furthermore, based on the group purchase being completed, payment application **142** may transfer an allocated payment amount associated with the purchase initiator to the money pool. In addition, payment application may identify the allocated amounts associated with each of the other users associated with the group purchase and transmit one or more invoices to each of the other users associated with the group purchase. In one or more embodiments, if payments are not made within a threshold amount of time after the invoices are transmitted, payment application **142** may pull each respective allocated amount from the payment service provider accounts associated with each of the other users associated with the group purchase and deposit the funds into the money pool. Furthermore, after a threshold period of time has passed from the group purchase time/date, payment application **142** may sweep the money from the money pool to reimburse the funds that were provided to front the group purchase. In further embodiments, rather than first depositing money received or pulled from the users associated with the group purchase into the money pool, payment application **142** may transfer the funds directly into an account associated with payment application **142**.

[0044] FIG. **4** is a depiction of a merchant interface that includes a group payment option for a purchase, in accordance with an embodiment. In the example embodiment, FIG. **4** depicts a merchant interface that includes multiple payment options, such as payment option **402** and payment option **404**. Furthermore, in the example embodiment, payment option **402** represents a "group payment" user interface element as described above.

[0045] FIG. **5** is a depiction of a group selection interface that allows for the selection of one or more users, in accordance with an embodiment. In the example embodiment, payment application **142** includes an interface that provides for the selection of one or more users by way of selection an associated user interface element. For example, element **502** is a user interface element that corresponds with the user "John Smith". In the example embodiment, the user of user device **110** may select "John Smith" to be part of the group purchase detailed in FIG. **4** by selecting element **502**. Furthermore, the group selection interface depicted in FIG. **5** also includes additional user interface elements such as suggested element **504**, preset element **506**, preset element **508**, and preset element **510**. In the example embodiment, preset element **506**, **508**, and **510** may correspond to one or more users that are preset by the user of user device **110**. In other embodiments, payment application **142** may provide suggestions as to group of users that the user of user device **110** should associate with one or more preset elements based on analyzing past group transactions, past group interactions, and further based on the amount/frequency of the past group transactions/interactions. For example, if "John Smith" and "Johno" perform group purchases with the user of user device **110** on a weekly basis, payment application **142** may suggest that preset **506** be associated with "John Smith" and "Johno". Furthermore, payment application **142** may make the same suggestion on accounts corresponding to "John Smith" and "Johno".

[0046] In the example embodiment, suggested element **504** corresponds to a group of users that payment application **142** predicts may be associated with the current group purchase. Payment application **142** may predict the associated users based on analyzing previous transactional history, previous interactions, based on information corresponding to each contact (likes/dislikes, interests, etc.), analyzing location information of contacts associated with the transaction initiator, based on transactional information associated with the current group transaction, user preference information, social media information, and additional user information. For example, payment application **142** may predict that a current group transaction is associated with "John Smith" and "Johnald Glover" based on a location of each user being within a merchant location at the time of initiation of the group purchase. In another example, payment application **142** may predict that a current group transaction (tickets to watch a "Skinny Puppet" concert) is associated with "John Smith" and "Johnald Glover" based on each user having previously purchased tickets for "Skinny Puppet" concerts in the past.

[0047] FIG. **6** is a depiction of a group payment interface that allows for the adjustment of payment allocation amounts, in accordance with an embodiment. In the example embodiment, the group payment interface in FIG. **6** depicts a payment allocation where an initiating user (such as the user of user device **110**) has chosen element **602** which corresponds to splitting a group purchase evenly amongst the associated users. In one or more embodiments, payment application **142** may default to an even split allocation unless another option is chosen, therefore, in these one or more embodiments, the user of user device **110** may not be required to select element **602** to achieve this allocation type. Furthermore, each associated user may be associated with a selectable element, such as element **606** which may

allow the user of user device **110** to adjust the allocated amount to a custom amount (via input).

[0048] FIG. **7** is a second depiction of the group payment interface that allows for the adjustment of payment allocation amounts, in accordance with an embodiment. In the example embodiment, the group payment interface in FIG. **7** depicts a payment allocation where an initiating user (such as the user of user device **110**) has chosen element **604** which corresponds to splitting a group purchase based on a suggested allocation determined by payment application **142**. In the example embodiment, payment application **142** may identify if there are any outstanding invoices between the users within the group, and based on any identified outstanding invoices, payment application **142** may adjust the allocated amount associated with one or more users. For example, if payment application **142** determines that "John Smith" still owes the user of user device **110** $10 based on a previous transaction or purchase (such as a previous group purchase), payment application **142** may adjust the allocated amount associated with "John Smith" to $32 as depicted. Furthermore, if payment application **142** determines that the user of user device **110** owes "Johnald Glover" $2 based on a previous transaction or purchase, payment application **142** may adjust the allocated amount associated with "Johnald Glover" to $20. In the example embodiment, payment application **142** may refer to a transactional database, such as database **144** to access transactional information and identify outstanding invoices and payments due to or from each user. Furthermore, in the example embodiment, upon confirmation of the suggested payment allocation by the user of user device **110**, payment application **142** may remove or adjust previous invoices based on the amount applied to the group purchase. In one or more embodiments, payment application **142** may default to the suggested allocation unless there are no outstanding invoices within the group of users, in which case, the default may be to split the purchase evenly amongst the group of users.

[0049] In addition, in one or more embodiments, if a group purchase is made and a refund is subsequently requested by the user of user device **110**. Payment application **142** may refer to accepted payment allocation scheme and further may reference payment information to determine whether each invoiced user has provided payment to the user of user device **110**. Based on the accepted payment allocation and whether each invoiced user has provided the appropriate payment, payment application **142** may determine a refund allocation scheme. For example, referring to FIG. **6**, if each user associated with the group purchase has paid the invoiced amount to the user of user device **110**, payment application **142** may refund each user's account with $22. However, if each user except for "Johno" has paid the invoiced amount, payment application **142** may refund each user, except for "Johno", $22 and refund the user of user device **110** $44. Furthermore, payment application **142** may remove/cancel the invoice sent from the user of user device **110** to "Johno".

[0050] Furthermore, in one or more embodiments, based on the group purchases/transactions, a user's interests, purchases/transactions associated with linked users, items that linked are interested in, and metadata associated with products purchased by a user or linked user, payment application **142** may provide users with product suggestions. In addition, payment application **142** may provide a shortcut or link to a group payment interface corresponding to a purchase of the product for linked users identified as corresponding to the product.

[0051] The foregoing description of various embodiments of the present disclosure has been presented for purposes of illustration and description. It is not intended to be exhaustive nor to limit the disclosure to the precise form disclosed. Many modifications and variations are possible. Such modifications and variations that may be apparent to a person skilled in the art of the disclosure are intended to be included within the scope of the disclosure as defined by the accompanying claims.

[0052] FIG. **8** depicts a block diagram of components of computing devices contained in group payment system **100** of FIG. **1**, in accordance with an embodiment. It should be appreciated that FIG. **8** provides only an illustration of one implementation and does not imply any limitations with regard to the environments in which different embodiments may be implemented. Many modifications to the depicted environment may be made.

[0053] Computing devices may include one or more processors **802**, one or more computer-readable RAMs **804**, one or more computer-readable ROMs **806**, one or more computer readable storage media **808**, device drivers **812**, read/write drive or interface **814**, network adapter or interface **816**, all interconnected over a communications fabric **818**. Communications fabric **818** may be implemented with any architecture designed for passing data and/or control information between processors (such as microprocessors, communications and network processors, etc.), system memory, peripheral devices, and any other hardware components within a system.

[0054] One or more operating systems **810**, and one or more application programs **811**, for example, payment application **142**, are stored on one or more of the computer readable storage media **808** for execution by one or more of the processors **802** and by utilizing one or more of the respective RAMS **804** (which typically include cache memory). In the illustrated embodiment, each of the computer readable storage media **808** may be a magnetic disk storage device of an internal hard drive, CD-ROM, DVD, memory stick, magnetic tape, magnetic disk, optical disk, a semiconductor storage device such as RAM, ROM, EPROM, flash memory or any other computer-readable tangible storage device that can store a computer program and digital information.

[0055] Computing devices may also include a R/W drive or interface **814** to read from and write to one or more portable computer readable storage media **826**. Application programs **811** on the computing devices may be stored on one or more of the portable computer readable storage media **826**, read via the respective R/W drive or interface **814** and loaded into the respective computer readable storage media **808**.

[0056] Computing devices may also include a network adapter or interface **816**, such as a TCP/IP adapter card or wireless communication adapter (such as a 4G wireless communication adapter using OFDMA technology). Application programs **811** on the computing devices may be downloaded to the computing devices from an external computer or external storage device via a network (for example, the Internet, a local area network or other wide area network or wireless network) and network adapter or interface **816**. From the network adapter or interface **816**, the

programs may be loaded onto computer readable storage media **808**. The network may comprise copper wires, optical fibers, wireless transmission, routers, firewalls, switches, gateway computers and/or edge servers.

[0057] Computing devices may also include a display screen **820**, and external devices **822**, which may include, for example a keyboard, a computer mouse and/or touchpad. Device drivers **812** interface to display screen **820** for imaging, to external devices **822**, and/or to display screen **820** for pressure sensing of alphanumeric character entry and user selections. The device drivers **812**, R/W drive or interface **814** and network adapter or interface **816** may comprise hardware and software (stored on computer readable storage media **808** and/or ROM **806**).

[0058] The programs described herein are identified based upon the application for which they are implemented in a specific embodiment. However, it should be appreciated that any particular program nomenclature herein is used merely for convenience, and thus the disclosure should not be limited to use solely in any specific application identified and/or implied by such nomenclature.

[0059] Based on the foregoing, a computer system, method, and computer program product have been disclosed. However, numerous modifications and substitutions can be made without deviating from the scope of the present disclosure. Therefore, the various embodiments have been disclosed by way of example and not limitation.

[0060] Various embodiments of the present disclosure may be a system, a method, and/or a computer program product. The computer program product may include a computer readable storage medium (or media) having computer readable program instructions thereon for causing a processor to carry out aspects of the present disclosure.

[0061] The computer readable storage medium can be a tangible device that can retain and store instructions for use by an instruction execution device. The computer readable storage medium may be, for example, but is not limited to, an electronic storage device, a magnetic storage device, an optical storage device, an electromagnetic storage device, a semiconductor storage device, or any suitable combination of the foregoing. A non-exhaustive list of more specific examples of the computer readable storage medium includes the following: a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a static random access memory (SRAM), a portable compact disc read-only memory (CD-ROM), a digital versatile disk (DVD), a memory stick, a floppy disk, a mechanically encoded device such as punch-cards or raised structures in a groove having instructions recorded thereon, and any suitable combination of the foregoing. A computer readable storage medium, as used herein, is not to be construed as being transitory signals per se, such as radio waves or other freely propagating electromagnetic waves, electromagnetic waves propagating through a waveguide or other transmission media (e.g., light pulses passing through a fiber-optic cable), or electrical signals transmitted through a wire.

[0062] Computer readable program instructions described herein can be downloaded to respective computing/processing devices from a computer readable storage medium or to an external computer or external storage device via a network, for example, the Internet, a local area network, a wide area network and/or a wireless network. The network may comprise copper transmission cables, optical transmission fibers, wireless transmission, routers, firewalls, switches, gateway computers and/or edge servers. A network adapter card or network interface in each computing/processing device receives computer readable program instructions from the network and forwards the computer readable program instructions for storage in a computer readable storage medium within the respective computing/processing device.

[0063] Computer readable program instructions for carrying out operations of the present disclosure may be assembler instructions, instruction-set-architecture (ISA) instructions, machine instructions, machine dependent instructions, microcode, firmware instructions, state-setting data, configuration data for integrated circuitry, or either source code or object code written in any combination of one or more programming languages, including an object oriented programming language such as Smalltalk, C++, or the like, and procedural programming languages, such as the "C" programming language or similar programming languages. The computer readable program instructions may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider). In some embodiments, electronic circuitry including, for example, programmable logic circuitry, field-programmable gate arrays (FPGA), or programmable logic arrays (PLA) may execute the computer readable program instructions by utilizing state information of the computer readable program instructions to personalize the electronic circuitry, in order to perform aspects of the present disclosure.

[0064] Aspects of the present disclosure are described herein with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems), and computer program products according to embodiments of the disclosure. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer readable program instructions.

[0065] These computer readable program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. These computer readable program instructions may also be stored in a computer readable storage medium that can direct a computer, a programmable data processing apparatus, and/or other devices to function in a particular manner, such that the computer readable storage medium having instructions stored therein comprises an article of manufacture including instructions which implement aspects of the function/act specified in the flowchart and/or block diagram block or blocks.

[0066] The computer readable program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other device to cause a series of operational steps to be performed on the computer, other programmable apparatus or other device to produce a computer implemented process, such that the instructions which execute on the computer, other programmable apparatus, or other device implement the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0067] The flowchart and block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods, and computer program products according to various embodiments of the present disclosure. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of instructions, which comprises one or more executable instructions for implementing the specified logical function(s). In some alternative implementations, the functions noted in the blocks may occur out of the order noted in the Figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts or carry out combinations of special purpose hardware and computer instructions.

1. (canceled)

2. A method, comprising:

receiving, at a trained second classifier module of a computer system, an indication of a pending transaction initiated by a user computing device,

wherein a first classifier module was trained using first data for a set of completed transactions as training data input, wherein the first data includes, for respective transactions in the set of completed transactions both pre-transaction information and post-transaction information, wherein labeled classifications for transactions in the set of completed transactions are known, and wherein the post-transaction information for a first transaction in the set of completed transactions includes information for one or more transactions performed subsequent to a completion of the first transaction and non-transaction activity occurring subsequent to the completion of the first transaction for a user associated with the first transaction,

wherein the trained second classifier module was trained using operations comprising:

generating respective weights for multiple transactions in the set of completed transactions based on classification outputs of the trained first classifier for the multiple transactions; and

training, based on the generated weights, a second classifier module using second data for the set of completed transactions as training data input, wherein the second data for the set of completed transactions includes pre-transaction information for transactions in the set of completed transactions;

classifying, using the trained second classifier module of the computer system, the pending transaction based on pre-transaction information for the pending transaction; and

the computer system generating, based on a classification output by the trained second classifier for the pending transaction, an authorization decision for the pending transaction, wherein the authorization decision specifies an indication of approval or non-approval for the pending transaction.

3. The method of claim **2**, wherein the post-transaction information includes location data for a plurality of user devices.

4. The method of claim **2**, wherein the post-transaction information includes Internet browsing history data associated with a plurality of user devices.

5. The method of claim **2**, wherein the post-transaction information includes textual data input by a plurality of users associated with the post-transaction information.

6. The method of claim **2**, wherein the pending transaction is an electronic purchase transaction initiated by the user computing device via a software program executing on the user computer device.

7. The method of claim **2**, wherein the training based on the generated weights includes one or more of:

performing a greater number of training iterations for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction; or

performing a greater training adjustment for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction.

8. The method of claim **2**, wherein the generating the respective weights is based on relationships between labeled classifications and output predictions generated by the trained first classifier module for the transactions.

9. The method of claim **2**, wherein the generating the respective weights provides greater weights for transactions whose output predictions are further from a labeled classification.

10. A non-transitory computer-readable medium having stored thereon instructions that are executable by a computer system having a processor and a memory to cause the computer system to perform operations comprising:

receiving, at a trained second classifier module of the computer system, an indication of a pending transaction initiated by a user computing device,

wherein a first classifier module was trained using first data for a set of completed transactions as training data input, wherein the first data includes, for respective transactions in the set of completed transactions both pre-transaction information and post-transaction information, wherein labeled classifications for transactions in the set of completed transactions are known, and wherein the post-transaction information for a first transaction in the set of completed transactions includes information for one or more transactions performed subsequent to a completion of the first transaction and non-transaction activity occurring subsequent to the completion of the first transaction for a user associated with the first transaction,

wherein the trained second classifier module was trained using operations comprising:

generating respective weights for multiple transactions in the set of completed transactions based on classification outputs of the trained first classifier for the multiple transactions; and

training, based on the generated weights, a second classifier module using second data for the set of completed transactions as training data input,

wherein the second data for the set of completed transactions includes pre-transaction information for transactions in the set of completed transactions;

classifying, using the trained second classifier module of the computer system, the pending transaction based on pre-transaction information for the pending transaction; and

the computer system generating, based on a classification output by the trained second classifier for the pending transaction, an authorization decision for the pending transaction, wherein the authorization decision specifies an indication of approval or non-approval for the pending transaction.

11. The non-transitory computer-readable medium of claim **10**, wherein the post-transaction information includes textual data input by a plurality of users associated with the post-transaction information.

12. The non-transitory computer-readable medium of claim **10**, wherein the pending transaction is an electronic purchase transaction initiated by the user computing device via a software program executing on the user computer device.

13. The non-transitory computer-readable medium of claim **10**, wherein the training based on the generated weights includes one or more of:

performing a greater number of training iterations for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction; or

performing a greater training adjustment for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction.

14. The non-transitory computer-readable medium of claim **10**, wherein the generating the respective weights is based on relationships between labeled classifications and output predictions generated by the trained first classifier module for the transactions.

15. The non-transitory computer-readable medium of claim **10**, wherein the generating the respective weights provides greater weights for transactions whose output predictions are further from a labeled classification.

16. A computer system, comprising:

a processor;

a network interface; and

a non-transitory computer-readable medium having stored thereon instructions executable by the computer system to cause the computer system to perform operations comprising:

receiving, at a trained second classifier module of the computer system, an indication of a pending transaction initiated by a user computing device,

wherein a first classifier module was trained using first data for a set of completed transactions as training data input, wherein the first data includes, for respective transactions in the set of completed transactions both pre-transaction information and post-transaction information, wherein labeled classifications for transactions in the set of completed transactions are known, and wherein the post-transaction information for a first transaction in the set of completed transactions includes information for one or more transactions performed subsequent to a completion of the first transaction and non-transaction activity occurring subsequent to the completion of the first transaction for a user associated with the first transaction,

wherein the trained second classifier module was trained using operations comprising:

generating respective weights for multiple transactions in the set of completed transactions based on classification outputs of the trained first classifier for the multiple transactions; and

training, based on the generated weights, a second classifier module using second data for the set of completed transactions as training data input, wherein the second data for the set of completed transactions includes pre-transaction information for transactions in the set of completed transactions;

classifying, using the trained second classifier module of the computer system, the pending transaction based on pre-transaction information for the pending transaction; and

the computer system generating, based on a classification output by the trained second classifier for the pending transaction, an authorization decision for the pending transaction, wherein the authorization decision specifies an indication of approval or non-approval for the pending transaction.

17. The computer system of claim **16**, wherein the training the second classifier module based on the generated weights is performed using gradient boosting tree machine learning techniques.

18. The computer system of claim **16**, wherein the training based on the generated weights includes one or more of:

performing a greater number of training iterations for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction; or

performing a greater training adjustment for a first transaction than for a second transaction based on the first transaction having a greater weight than the second transaction.

19. The computer system of claim **16**, wherein the generating the respective weights is based on relationships between labeled classifications and output predictions generated by the trained first classifier module for the transactions.

20. The computer system of claim **16**, wherein the generating the respective weights provides greater weights for transactions whose output predictions are further from a labeled classification.

21. The computer system of claim **16**, wherein the post-transaction information includes textual data input by a plurality of users associated with the post-transaction information.

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