COMMUNICATIONS SERVER APPARATUS, METHOD AND COMMUNICATIONS SYSTEM FOR MANAGING A SERVICE BOOKING

Technical Field

The invention relates generally to the field of communications. One aspect of the invention relates to a communications server apparatus for managing a service booking. Other aspects of the invention relate to a method for managing a service booking and a communications system for managing a service booking.

One aspect of the invention has particular, but not exclusive, application to booking of services where the user attempting to make a booking for a service may be presented with point redemption options during the booking process for the user's consideration for offsetting against at least part of the cost of the service.

Background

Service providers may provide points, for example, as part of a reward or loyalty program, which may enable a path to profitability (PTP). It provides opportunities for revenue generation (e.g., by helping internal verticals earn more, sale of points to external partners, etc.) and cost reduction (e.g., by lowering acquisition, retention and appeasements costs). It has the ability to steer consumer behaviour and establish long term loyalty. However, revenue is only recognised when points are burned.

Known approaches that are used involve creating partner specific (e.g., food, transport, etc.) rewards of fixed denominations (for example, in Singapore, $5, $10, $15, $20 and $25) and allow the users to select one of them. Additionally, pay with points is a feature that supports this kind of functionality but is written to work only for peer to merchant (P2M) Transactions.

From a customer's perspective, there are problems where:

- users cannot use their points until they have enough points for the minimum available denomination of the rewards;
- users, even though they have enough points to cover the cost of the reward, are forced to choose from fixed denominations. In some cases, users might also lose value or waste points. For example, a ride costs $9 and the user wants to cover the entire ride with points. The user will redeem a $10 reward, causing the user to lose points worth $1.

Summary

Aspects of the invention are as set out in the independent claims. Some optional features are defined in the dependent claims.

Implementation of the techniques disclosed herein may provide significant technical advantages.

Techniques disclosed herein may provide a plurality of point redemption options to the user, with varying degrees of currency values for offsetting against at least part of the cost of the service that the user wishes to book. With the plurality of point redemption options provided, the user may be able to make a booking of the service that the user desires, with the ability to select one of the point redemption options that best caters to the user's budget. Thus, this may alleviate or minimise the need for users to keep submitting new booking requests or search for different services to suit the user's budget, and, the techniques disclosed herein may, therefore, help to improve efficiency in usage of resources, bandwidth and processing load.

In at least some implementations, the techniques disclosed herein may also provide for resource management efficiency and/or processing load efficiency as described

below. With the known approaches, where each denomination has a corresponding reward, records are created in a database (DB) for each one of them. As a non-limiting example, the DB may be of the following format shown in TABLE 1, per country per vertical (e.g., Transport, Deliveries, etc.).

TABLE 1

RewardID	Name
100000	$1 off
100001	$2 off
100002	$5 off
...	...
n	$X off

This means that several of these records would need to be loaded (i.e., multiple calls are made to the database depending on requests) and stored in the cache (in-memory and/or a distributed cache like Redis). For instance, request 1 comes where a user is trying to use $1 off, so the reward details for rewardID 100000 would be queried from the database and stored in the cache. Then, request 2 may come where a user wants $5 off, so the rewardID 100002 would be queried from the database (if it's not already present in the cache) and then stored in the cache as well and so on.

In contrast, the techniques disclosed herein may create a template reward in which details such as discount amount, name, description, etc., may be present as templates and (only) added when the user makes the purchase or redeems the points. So taking the example above, irrespective of whether the user is trying to use $1 off or $5 off, the reward (only) needs to be queried once and (only) 1 reward stored in the cache, for example, based on the format shown in TABLE 2. So, the techniques disclosed herein may reduce the number of rewards that need to be queried from the database and stored in the memory/cache.

TABLE 2

RewardID	Name
100000	{{.CurrencySymbol}}{{.DiscountValue}} off

In an exemplary implementation, the functionality of the techniques disclosed herein may be implemented in software running on a handheld communications device, such as a mobile phone. The software which implements the functionality of the techniques disclosed herein may be contained in an "App" – a computer program, or computer program product – which the user has downloaded from an online store. When running on the, for example, user's mobile telephone, the hardware features of the mobile telephone may be used to implement the functionality described below, such as using the mobile telephone's transceiver components to establish the secure communications channel for managing a service booking.

Brief Description of the Drawings

The invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

FIG. 1 is a schematic block diagram illustrating an exemplary communications system involving a communications server apparatus.

FIG. 2A shows a schematic block diagram illustrating a communications server apparatus for managing a service booking.

FIG. 2B shows a schematic block diagram illustrating a data record.

FIG. 2C shows a schematic block diagram illustrating architecture components of the communications server apparatus of FIG. 2A.

FIG. 2D shows a flow chart illustrating a method for managing a service booking.

FIG. 3A shows a diagram illustrating a flow chart for the present techniques.

FIG. 3B shows a screenshot of an App that may be usable by a user.

FIGS. 4A to 4C shows screenshots of options presented to a user.

FIG. 5 shows a diagram illustrating a system architecture for the present techniques.

FIGS. 6A to 6D show flow charts illustrating processes relating to the system architecture of FIG. 5.

Detailed Description

Various embodiments may provide for context aware flexible redemptions.

The present techniques may help to increase the total number of points burnt (and by extension, increase the revenue) to service providers. For example, this may be due to the offering of discounts via point use to entice customers to use the services more (e.g., book more rides). Points and loyalty help to increase the transactions within the ecosystem and bring in more users or retain existing ones.

In the context of various embodiments, awarding of points may be referred to as "Points Earn", and redeeming (or use) of points may be referred to as "Points Burn".

The present techniques may address one or more of the problems of the known approaches described above. The present techniques may offer possibilities or options to users to choose the amount of points to be redeemed in accordance with the users' preference. This allows user flexibility in deciding whether to redeem part of or all of the points available to the user or available in the user's account. This further helps to minimise or prevent point wastage as the user can be offered options that do not lead to overpayment of the cost in terms of the points and the user can choose one of such options knowing that there is no wastage of the user's points. Any remaining cost or payment required, after redemption of the points, may be made in terms of a monetary currency or component such as cash.

Flexible redemptions offered by the techniques disclosed herein may address one or more problems of the known methods by suggesting rewards of dynamic denominations relevant to the user in the booking flow. These denominations may

be calculated or determined based on one or more of the cost or fare (as the upper bound), value of points available with the user (i.e., available point balance), discount intervals, and lowest currency denomination chosen among other things.

By gently nudging the users or customers to “Save Using Points” and showing them the options offered by the present techniques, an uplift of up to 500% in points burnt may be observed or achieved.

Referring first to FIG. 1, a communications system 100 is illustrated, which may be applicable in various embodiments. The communications system 100 may be for managing a service booking.

The communications system 100 includes a communications server apparatus 102, a first user (or client) communications device 104 and a second user (or client) communications device 106. These devices 102, 104, 106 are connected in or to the communications network 108 (for example, the Internet) through respective communications links 110, 112, 114 implementing, for example, internet communications protocols. The communications devices 104, 106 may be able to communicate through other communications networks, such as public switched telephone networks (PSTN networks), including mobile cellular communications networks, but these are omitted from FIG. 1 for the sake of clarity. It should be appreciated that there may be one or more other communications devices similar to the devices 104, 106.

The communications server apparatus 102 may be a single server as illustrated schematically in FIG. 1, or have the functionality performed by the communications server apparatus 102 distributed across multiple server components. In the example of FIG. 1, the communications server apparatus 102 may include a number of individual components including, but not limited to, one or more microprocessors (μP) 116, a memory 118 (e.g., a volatile memory such as a RAM (random access

memory)) for the loading of executable instructions 120, the executable instructions 120 defining the functionality the server apparatus 102 carries out under control of the processor 116. The communications server apparatus 102 may also include an input/output (I/O) module (which may be or include a transmitter module and/or a receiver module) 122 allowing the server apparatus 102 to communicate over the communications network 108. User interface (UI) 124 is provided for user control and may include, for example, one or more computing peripheral devices such as display monitors, computer keyboards and the like. The communications server apparatus 102 may also include a database (DB) 126, the purpose of which will become readily apparent from the following discussion.

The communications server apparatus 102 may be for managing a service booking.

The user communications device 104 may include a number of individual components including, but not limited to, one or more microprocessors (µP) 128, a memory 130 (e.g., a volatile memory such as a RAM) for the loading of executable instructions 132, the executable instructions 132 defining the functionality the user communications device 104 carries out under control of the processor 128. User communications device 104 also includes an input/output (I/O) module (which may be or include a transmitter module and/or a receiver module) 134 allowing the user communications device 104 to communicate over the communications network 108. A user interface (UI) 136 is provided for user control. If the user communications device 104 is, say, a smart phone or tablet device, the user interface 136 may have a touch panel display as is prevalent in many smart phone and other handheld devices. Alternatively, if the user communications device 104 is, say, a desktop or laptop computer, the user interface may have, for example, one or more computing peripheral devices such as display monitors, computer keyboards and the like. User communications device 104 may also include satnav components 137, which allow user communications device 104 to conduct a measurement or at least approximate the geolocation of user communications device 104 by receiving, for example, timing

signals from global navigation satellite system (GNSS) satellites through GNSS network using communications channels, as is known.

The user communications device 106 may be, for example, a smart phone or tablet device with the same or a similar hardware architecture to that of the user communications device 104. User communications device 106, has, amongst other things, user interface 136a in the form of a touchscreen display and satnav components 138. User communications device 106 may be able to communicate with cellular network base stations through cellular telecommunications network using communications channels. User communications device 106 may be able to approximate its geolocation by receiving timing signals from the cellular network base stations through cellular telecommunications network as is known. Of course, user communications device 104 may also be able to approximate its geolocation by receiving timing signals from the cellular network base stations and user communications device 106 may be able to approximate its geolocation by receiving timing signals from the GNSS satellites, but these arrangements are omitted from Figure 1 for the sake of simplicity.

The user communications device 104 and/or the user communications device 106 may be for managing a service booking. The user communications device 104 and/or the user communications device 106 may be for communicating with the communications server apparatus 102 for managing a service booking.

FIG. 2A shows a schematic block diagram illustrating a communications server apparatus 202 for managing a service booking, while FIG. 2B shows a schematic block diagram illustrating a data record 240 that, for example, may be generated by the communications server apparatus 202.

The communications server apparatus 202 includes a processor 216 and a memory 218, where the communications server apparatus 202 is configured, under

control of the processor 216 to execute instructions in the memory 218 to, in response to receiving booking request data having at least one data field indicative of a user attempting a booking of a service, generate, based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, in one or more data records 240, a plurality of point redemption data (three point redemption data 242, 244, 246 are illustratively shown in FIG. 2B) for a corresponding plurality of point redemption options, wherein, for each point redemption data 242, 244, 246, the point redemption data 242, 244, 246 includes currency value data 242a, 244a, 246a indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of a cost of the service, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed, and communicate the plurality of point redemption options to a communications device of the user for presentation of the plurality of point redemption options to the user for the booking. The processor 216 and the memory 218 may be coupled to each other (as represented by the line 217), e.g., physically coupled and/or electrically coupled.

In other words, there may be provided a communications server apparatus 202 for managing a service booking. A user may attempt to make a booking of a service (e.g., including, but not limited to, a transport-related service, a logistics-related service, a food-related service, a goods-related services, etc.). For example, the user may be searching for point redemption or discount options during the process of making the booking for the service, or may activate a certain "Offers" option or button on a corresponding App that the user may use to make the booking. In response to receiving booking request data having at least one data field indicative of the user attempting the booking, the communications server apparatus 202 may

generate, in one or more data records 240, a plurality of point redemption data 242, 244, 246 for a corresponding plurality of point redemption options based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is (determined to be) equal to or greater than the defined lowest denomination value (i.e., total point value ≥ defined lowest denomination value).

The point data and/or the denomination data may be accessible by the communications server apparatus 202. The point data and/or the denomination data may be stored in the memory 218.

The total point value and the total currency value of the point variable associated with the user mean, respectively, the available total amount of points that the user has and the corresponding or equivalence in terms of the currency worth of the total amount of points available to the user. The point data may include total point value data indicative of the total point value, and total currency value data indicative of the total currency value. The total amount of points may mean the points that the user currently has, points that the user has accumulated, or points available in the user's account. As non-limiting examples, users may collect or accumulate points (e.g., reward or loyalty points) from past purchases, where the points may be used or redeemed for current and future purchases to offset against part of the purchase costs.

For each point redemption data 242, 244, 246 (of each point redemption option), the point redemption data 242, 244, 246 include currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of the cost, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed.

In the context of various embodiments, for each point redemption data 242, 244, 246, the redemption data 242, 244, 246 may include the currency value data, and point value data indicative of the point value to be redeemed.

As described above, the point variable associated with the user may be defined by a point value and a currency value. The point value and the currency value may correspond to or equivalent to each other as determined by a point conversion rate. The currency value may be in terms of the local currency used in the relevant country. The user may have a certain number of points currently available, i.e., total point value, which may be converted, via use of the point conversion rate, to the equivalent or corresponding total currency value. Using a point conversion rate of Singapore dollar (SGD) 1 = 500 points as a non-limiting example, a user having 1000 points available (i.e., total point value = 1000) would have the corresponding or equivalent total currency value of SGD 2. When redeeming points for offsetting against at least part of the cost of the service, the user may choose to redeem a certain point value of the point variable (e.g., a portion of the total point value) for a certain corresponding currency value (e.g., a portion of the total currency value).

The defined lowest denomination value may mean the smallest discount or cost offset available. The currency value of the each redemption data or the each point redemption option may be a multiple of the defined lowest denomination value (e.g., ×1, ×2, ×3, ×4, or any higher number). This may also mean that the respective currency values of the plurality of redemption data may be separated from each other by the defined lowest denomination value or multiple(s) thereof.

The communications server apparatus 202 may then communicate (e.g., transmit) the plurality of point redemption options to a communications device of the user for presentation of the plurality of point redemption options to the user for the booking. This may include communicating or transmitting the plurality of point redemption

data 242, 244, 246 for presentation of the plurality of point redemption options to the communications device of the user. In communicating the plurality of point redemption data 242, 244, 246 to the (user) communications device, the currency value data (and the point value data) may be communicated or transmitted to the communications device.

When presented with the plurality of point redemption options on or via the (user) communications device, the user may select one point redemption option for the booking.

For generating the plurality of point redemption data, the communications server apparatus 202 may generate first point redemption data (e.g., 242) of the plurality of point redemption data, the first point redemption data 242 including the currency value data indicative of a first currency value of the point variable, out of the total currency value available to the user, that is closest to and less than the cost, the first currency value being a multiple of the defined lowest denomination value.

For generating the first point redemption data, the communications server apparatus 202 may determine a minimum value of the cost or the total currency value, and may round down the minimum value to a first integer that is the multiple of the defined lowest denomination value that is closest to the minimum value, wherein the first integer defines the first currency value. This may mean that, whichever of the cost of the service and the total currency value that is determined to be lower is the minimum value, which is then rounded down to the first integer.

For generating the first point redemption data, the communications server apparatus 202 may further generate first redeemed point data indicative of a first point value of the point variable to be redeemed, the first point value corresponding to the first currency value.

For generating the plurality of point redemption data, the communications server apparatus 202 may further generate second point redemption data (e.g., 244) of the plurality of point redemption data, the second point redemption data 244 including the currency value data indicative of a second currency value of the point variable, out of the total currency value available to the user, the second currency value being a multiple of the defined lowest denomination value.

For generating the second point redemption data, the communications server apparatus 202 may calculate a first percentage (or first interval) of the first currency value to define a first proportion value, and may round up the first proportion value to a second integer to define the second currency value, the second integer being the multiple of the defined lowest denomination value that is closest to the first proportion value. The first proportion value may, for example, be determined at 70% of the first currency value. The second currency value determined may be lower than the first currency value.

For generating the second point redemption data, the communications server apparatus 202 may further generate second redeemed point data indicative of a second point value of the point variable to be redeemed, the second point value corresponding to the second currency value.

In various embodiments, if the second integer is (determined to be) same as the first currency value, the communications server apparatus 202 may discard the second integer.

For generating the plurality of point redemption data, the communications server apparatus 202 may further generate third point redemption data (e.g., 246) of the plurality of point redemption data, the third point redemption data 246 including the currency value data indicative of a third currency value of the point variable, out of the total currency value available to the user, the third currency value being lower

than the second currency value and, further, being a multiple of the defined lowest denomination value.

For generating the third point redemption data, the communications server apparatus 202 may calculate a second percentage (or second interval) of the first currency value to define a second proportion value, and may round up the second proportion value to a third integer to define the third currency value, the third integer being the multiple of the defined lowest denomination value that is closest to the second proportion value. The second proportion value may, for example, be determined at 40% of the first currency value.

For generating the third point redemption data, the communications server apparatus 202 may further generate a third redeemed point data indicative of a third point value of the point variable to be redeemed, the third point value corresponding to the third currency value.

In various embodiments, for a point redemption option of the plurality of point redemption options after (or subsequent to) the first redemption option (e.g., second redemption option, third redemption option) where the point value of the point redemption option may be less than the defined lowest denomination value, for generating the plurality of point redemption data, the communications server apparatus 202 may generate aspirational point redemption data of the plurality of point redemption data for an aspirational point redemption option, the aspirational point redemption data including the currency value data indicative of an aspirational currency value that is more than the first currency value, the aspirational currency value being a multiple of the defined lowest denomination value that is closest to the first currency value, and, for communicating the plurality of point redemption options, the communications server apparatus 202 may communicate the aspirational point redemption option to the communications device for presentation of the aspirational point redemption option to the user.

Depending on the total point value associated with the user, the aspirational point redemption option may or may not be disabled or selectable.

The aspirational point redemption data may further include aspirational point value data indicative of an aspirational point value corresponding to the aspirational currency value.

In various embodiments, in response to receiving selection data including at least one data field indicative of selection of a point redemption option of the plurality of point redemption options by the user, the communications server apparatus 202 may query a data template, and determine an amount to offset against the cost in accordance with the data template and a point value to be redeemed for the point redemption option selected by the user. The data template may be accessible by the communications server apparatus 202. The data template may be stored in a database that may be accessible by the communications server apparatus 202. The data template may be stored in the memory 218.

The communications server apparatus 202 may further, in response to receiving the booking request data, generate, based on the point data and the denomination data, and if the total currency value available to the user is (determined to be) less than the defined lowest denomination value, in the one or more data records 240, goal redemption data for a goal redemption notification, the goal redemption data being indicative of the defined lowest denomination value, and communicate the goal redemption notification to the communications device for presentation of the defined lowest denomination value to the user for offsetting against at least part of the cost. The goal redemption data may be communicated or transmitted to the communications device for presentation of the goal redemption notification. The goal redemption data may include the denomination data.

The goal redemption data may further include goal point value data indicative of a remaining point value that is required by the user to reach a defined point value that corresponds to a defined currency value that is same as the defined lowest denomination value.

In the context of various embodiments, the one or more data records 240 may include one or more point redemption data fields. The communications server apparatus 202 may generate, for or in the one or more point redemption data fields, the point redemption data 242, 244, 246, the aspirational point redemption data, and the goal redemption data.

In the context of various embodiments, the one or more data records 240 may be associated with or accessible by the communications server apparatus 202. The one or more data records 240 may be generated by the communications server apparatus 202. The one or more data records 240 may be modified or updated by the communications server apparatus 202. The one or more data records 240 may be stored at the communications server apparatus 202, e.g., in the memory 218.

FIG. 2C shows a schematic block diagram illustrating architecture component of the communications server apparatus 202. That is, the communications server apparatus 202 may further include a data generating module 260 to generate the plurality of point redemption data 242, 244, 246 (including the first point redemption data, the second point redemption data, the third point redemption data, the aspirational point redemption data) and the goal redemption data. The communications server apparatus 202 may further include a communication module 262 to communicate the plurality of point redemption options to the (user) communications device.

In the context of various embodiments, the communications server apparatus 202 may be a single server, or have the functionality performed by the communications server apparatus 202 distributed across multiple server components.

FIG. 2D shows a flow chart 250 illustrating a method for managing a service booking.

In response to receiving booking request data having at least one data field indicative of a user attempting a booking, at 252, a plurality of point redemption data for a corresponding plurality of point redemption options are generated in one or more data records based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, wherein, for each point redemption data, the point redemption data includes currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of a cost of the service, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed, and, at 254, the plurality of point redemption options are communicated to a communications device of the user for presentation of the plurality of point redemption options to the user for the booking.

At 252, first point redemption data of the plurality of point redemption data may be generated, the first point redemption data including the currency value data indicative of a first currency value of the point variable, out of the total currency value available to the user, that is closest to and less than the cost, the first currency value being a multiple of the defined lowest denomination value.

For generating the first point redemption data, a minimum value of the cost or the total currency value may be determined, and the minimum value may be rounded down to a first integer that is the multiple of the defined lowest denomination value that is closest to the minimum value, wherein the first integer defines the first currency value.

At 252, generating second point redemption data of the plurality of point redemption data may be generated, the second point redemption data including the currency value data indicative of a second currency value of the point variable, out of the total currency value available to the user, the second currency value being a multiple of the defined lowest denomination value.

For generating the second point redemption data, a first percentage of the first currency value may be calculated to define a first proportion value, and the first proportion value may be rounded up to a second integer to define the second currency value, the second integer being the multiple of the defined lowest denomination value that is closest to the first proportion value.

If the second integer is the same as the first currency value, the second integer may be discarded.

At 252, third point redemption data of the plurality of point redemption data may be generated, the third point redemption data including the currency value data indicative of a third currency value of the point variable, out of the total currency value available to the user, the third currency value being lower than the second currency value and, further, being a multiple of the defined lowest denomination value.

For generating the third point redemption data, a second percentage of the first currency value may be calculated to define a second proportion value, and the

second proportion value may be rounded up to a third integer to define the third currency value, the third integer being the multiple of the defined lowest denomination value that is closest to the second proportion value.

In various embodiments, for a point redemption option of the plurality of point redemption options after the first redemption option where the point value of the point redemption option may be less than the defined lowest denomination value, at 252, aspirational point redemption data of the plurality of point redemption data for an aspirational point redemption option may be generated, the aspirational point redemption data including the currency value data indicative of an aspirational currency value that is more than the first currency value, the aspirational currency value being a multiple of the defined lowest denomination value that is closest to the first currency value, and, at 254, the aspirational point redemption option may be communicated to the communications device for presentation of the aspirational point redemption option to the user.

In response to receiving selection data including at least one data field indicative of selection of a point redemption option of the plurality of point redemption options by the user, a data template may be queried, and an amount to offset against the cost may be determined in accordance with the data template and a point value to be redeemed for the point redemption option selected by the user.

In response to receiving the booking request data, goal redemption data for a goal redemption notification may be generated in the one or more data records based on the point data and the denomination data, and if the total currency value available to the user is less than the defined lowest denomination value, the goal redemption data being indicative of the defined lowest denomination value, and the goal redemption notification may be communicated to the communications device for presentation of the defined lowest denomination value to the user for offsetting against at least part of the cost.

The goal redemption data may further include goal point value data indicative of a remaining point value that is required by the user to reach a defined point value that corresponds to a defined currency value that is same as the defined lowest denomination value.

It should be appreciated that description in the context of the communications server apparatus 202 may correspondingly be applicable in relation to the method as described in the context of the flow chart 250, and vice versa.

The method as described in the context of the flow chart 250 may be performed in a the communications server apparatus (e.g., 202; FIG. 2A) for managing a service booking, under control of a processor of the communications server apparatus. The method may further include, executing under control of the processor, instructions stored in a memory of the communications server apparatus, operating a data generating module (e.g., 260, FIG. 2C) to generate the plurality of point redemption data and the goal redemption data, and operating a communication module (e.g., 262, FIG. 2C) to communicate the plurality of point redemption options to the (user) communications device.

In the context of various embodiments, a (user) communications device may include, but not limited to, a smart phone, tablet, handheld/portable communications device, desktop or laptop computer, terminal computer, etc.

In the context of various embodiments, an “App” or an “application” may be resident or installed on a (user) communications device and may include processor-executable instructions for execution on the device. As a non-limiting example, booking of a service may be carried out by a user via an App.

There may also be provided a computer program product having instructions for implementing the method for managing a service booking as described herein.

There may also be provided a computer program having instructions for implementing the method for managing a service booking as described herein.

There may further be provided a non-transitory storage medium storing instructions, which, when executed by a processor, cause the processor to perform the method for managing a service booking as described herein.

Various embodiments may further provide a communications system for managing a service booking, having a communications server apparatus, at least one user communications device and communications network equipment operable for the communications server apparatus and the at least one user communications device to establish communication with each other therethrough, wherein the at least one user communications device includes a first processor and a first memory, the at least one user communications device being configured, under control of the first processor, to execute first instructions in the first memory to, transmit, for receipt by the communications server apparatus for processing, booking request data including at least one data field indicative of a user attempting a booking of a service, and wherein the communications server apparatus includes a second processor and a second memory, the communications server apparatus being configured, under control of the second processor, to execute second instructions in the second memory to, in response to receiving data indicative of the booking request data, generate, based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, in one or more data records, a plurality of point redemption data for a corresponding plurality of point redemption options, wherein, for each

point redemption data, the point redemption data includes currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of the cost, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed, and communicate the plurality of point redemption options to the at least one user communications device for presentation of the plurality of point redemption options to the user for the booking.

Various embodiments or techniques will now be further described in detail, using the non-limiting example of a user booking a transport-related service (e.g., ride-hailing services, ride-sharing services, etc.). Nevertheless, it should be appreciated that the techniques disclosed herein may be employed for other applications or services, including but not limited to logistics (e.g., delivery of documents, packages, parcels, goods, etc.), finance (e.g., payment, banking, insurance, etc.), food (e.g., food ordering, food delivery, etc.), goods services (e.g., purchase and/or delivery of groceries, packaged goods/foods, household products, etc.), trade or handyman-related services, etc.

FIG. 3A shows a diagram illustrating a flow chart for the present techniques, showing non-limiting examples of services (Grab-fare 371b, Offers 371c, Rewards 371d, Abacus 371e) that may be involved, and how the different services 371b, 371c, 371d, 371e may interact with each other and with the users 371a.

The services involved may include:

- Grab-fare 371b: responsible for calculating and signing the fare for a booking;
- Offers 371c: orchestration service that proxies calls to Rewards 371d;
- Rewards 371d: responsible for calculating the options and redeeming a reward of the user's choice;

- Abacus 371e: responsible for points management, e.g., burning points, maintaining history, etc.

Each of the above-mentioned services 371b, 371c, 371d, 371e may have their own respective servers and may expose some Application Programming Interface (API) endpoints. These endpoints are called in order to have communication therewith and therebetween. Nevertheless, it should be appreciated that two or more of the above-mentioned services may be part of a common or shared server.

At 372, a user may put in a request for fare for a service, e.g., a ride-hailing service. The request and the corresponding data may be communicated to a server, e.g., the communications server apparatus described herein. The Rewards service 371d may be called at 373, which then obtains the points balance for the user 371a from the Abacus service 371e at 374 so that the Rewards service 371d may determine the (redemption) offers or options that may be suitable for the user based on the available user points. The Rewards service 371d then returns., at 375, the determined options with their corresponding point value to the user side at 376. The bulk part of the logic happens in the endpoint called "List Flexible Offers" 373 which returns the context aware options to the users 371a.

At 377, the user may decide whether to check the options for redeeming the user's points. If the user decides to check what the options may be, the user may click on an "Offers" button at 377, as will be described further below, which will take the user to 378 to view the available options. If the user 371a decides not to check what the options may be, the user 371a is taken through paths 380a, 381a, 382 to proceed with booking of the service without using points.

At 378, after having viewed the options, the user 371a may decide not to take up any of the options, and the user 371a is taken through paths 380b, 381a, 382 to proceed with booking of the service without using points. If the user decides, at 378, to

proceed with one of the redemption options presented to the user, the user selects, at 379, a particular option to redeem a certain point value associated with the cost offset or discount corresponding to the selected option. This leads to the Rewards service 371d being called at 383 for the redemption. Correspondingly, the Abacus service 371e is called at 384 to burn the points corresponding to the user's selected option. The redemption and the related data are stored or saved at 385, where a discount token is generated for the redemption and communicated to the user side 371a.

In the context of various embodiments, a "Discount Token" refers to a string to identify the discount. Generally, there may be several types of offers, e.g., promos, redemptions, unique code promotions and so on, which may be in the format of "DiscountType:param1:param2" and so on. For Flexible redemptions that (only) work with redemption types, the discount token for this feature may be, for example, of the following format "1:{{redemptionID}}". A non-limiting example may be "1:3182190423", where "3182190423" may refer to the redemptionID.

The discount token is sent to the Grab-fare service 371b to obtain the updated fare, taking into consideration the cost offset corresponding to the user selected option. The Offers service 371c may be called to validate the updated fare at 387 by validating with the Rewards service 371d at 388. When validated, the Offers service 371c returns the corresponding discount or cost offset to the Grab-fare service 371b which may then validate or sign the fare and return it to the user side 371a for further action.

At 390, the user 371a may decide whether to book the service using the discount or not. If the user 371a decides not to proceed with the selected option with the corresponding discount, the user 371a is taken through paths 381b, 382 to proceed with booking of the service without using points. If the user 371a decides, at 390, to proceed with the selected option with the corresponding discount, the discount is

used at 391, and the user 371a is taken through path 381c to proceed with booking of the service with the discount and point redemption.

FIG. 3B shows a screenshot 395 of an App that may be used by a user for managing a service booking. The App may be used for booking a transport-related service, where a map 396 associated with the transport-related service that the user desires may be shown to the user. Different types of services 397, with their respective costs, may be shown to the user. An "Offers" button 398 may be provided.

At 377 (please see FIG. 3A), clicking on the "Offers" button 398 provides an entry point for the user to see the available redemption options (please refer to FIGS. 4A to 4C which will be discussed further below).

To understand how the options offered to the users may be calculated or determined, the following three terms or parameters shown in TABLE 3 may be used or defined.

TABLE 3

Name	Type	Comment
Lowest Denomination	float64	This is smallest discount available. All other discounts will be a multiple of this value. So for instance, in SG, if lowest denomination is S$1, available discounts will be S$1, 2, 3 and so on. Similarly, for VN, if lowest denomination is VND50, available discounts will be VND 50, 100, 150 etc. What this means is that if calculated option comes to be VND53, it will be rounded down to VND 50.
Discount Intervals	[ ]int64	This is the interval at which the options will be calculated. Example 100%, 70%, 40%
Points Conversion Rate	float64	Points value of unit currency. For example, if S$1 = 500 points, then conversion rate is 500

The "Lowest Denomination" is the smallest discount available, and may vary depending on the countries or markets. For example, as shown in TABLE 3, the lowest denomination for Singapore (SG) may be defined as S$ 1 (one Singapore dollar; S$ 1 or SGD 1), while the lowest denomination for Vietnam (VN) may be defined as VND 50 (50 Vietnamese dong).

The "Lowest Denomination" (of discount) is used to reduce cognitive overhead for the customer and show nice rounded discounts that are anchored to the denominations in which most customers think or may be familiar with.

The "Points Conversion Rate" (or point value of unit currency) is used to identify the local currency worth of the user's points. An entity or administrator or service provider of the points program may set the conversion rate for each country. As a non-limiting example, in Singapore, the conversion may be at the rate of 500 points = S$ 1. So, if a user (or pax) has 8000 points, the example conversion rate mentioned above can be used to calculate the worth of 8000 points, which is S$ 16 (i.e., 8000/500). As another example, at the rate of S$ 1 = 500 points, a user having accumulated 800 points would have a worth or equivalent of S$ 1.6 (i.e., 800/500). As a further example, a user with 1357 points would have a worth or equivalent of S$ 2.714 (i.e., 1357/500). Such determination may be applicable for other currencies for other countries based on the respective conversion rate for each country.

In general, the relationship [(user's total points / point value of unit currency) = currency value of total points] may be used to determine the equivalence in currency value of a user's available points. Alternatively, the relationship may be (users total points * currency value of unit points = currency value of total points). However, "currency value of unit points" is a fraction, which may be a challenge to operate with in codes, so the former relationship may be preferable. Using the example point conversion rate of S$ 1 = 500 points, the phrase "point value of unit currency" means 500 (where unit currency = S$ 1), while the phrase "currency value of unit points" means S$ 0.002 (i.e., S$1/500). As a non-limiting example, if a user has 3000 points, the currency value of total points for the user may be calculated using the relationship (user's total points / point value of unit currency) which results in S$ 6 (i.e., 3000/500) or the relationship (users total points * currency value of unit points) which results in S$ 6 (i.e., 3000*0.002).

One or more options for point usage or redemption may be determined at 373 (FIG. 3A) and then returned or presented 375 (FIG. 3A) to the users for consideration and selection. As a non-limiting example, three (configurable) options may be shown to the users.

The various point redemption options may be determined as follows. After the options have been determined, the options are presented to the users, as shown in FIGS. 4A to 4C illustrating screenshots 490a, 490b, 490c of (point redemption) options presented to a user. As may be observed, available (or existing) points or point balance (i.e., total point value) 491a, 491b, 491c for or associated with the user may be shown. The screenshots 490a, 490b, 490c may be those of an App which users can use to perform bookings (or transactions) or request for services, including transport-related services.

(i) As a non-limiting example, the top most option (or first point redemption option), *Option*1, may be determined or calculated using "$Min(Fare,$ *Currency* $value\ of\ points\ balance).Floor()$", and then rounded down (i.e., *RoundDown*) to the closest multiple of lowest denomination. Rounding down is carried out to ensure that the pax or user is not wasting his/her points while being able to fully utilise the discount.

The parameter "*Currency value of points balance* " refers to how much the points are worth in the local currency unit. As a non-limiting example, in Singapore, if 500 points = S$ 1, for a user having 2350 points, then the currency value of points balance (in local Singapore dollars) is S$ 4.7 (i.e., 2350/500). As a further non-limiting example, for Malaysia, if RM 1 = 160 points, for a user having 2350 points, then the currency value of points balance (in local Malaysia ringgit) would be RM 14.68 (i.e., 2350/160). Therefore, the metric "*Currency value of points balance*" denotes the value of the user's available reward points in the local currency.

"$Floor()$" is a function in Mathematics and computing that basically means rounding down. As a non-limiting example, if the fare for a ride is SGD 18.6 and the user (or pax) wishing to book the ride has points worth SGD 23.5, then the first denomination or *Option*1 may be SGD 18. Rounding down is carried out in this case even though the user has enough points for SGD 18.6 to cater to people's thinking and perception as people, generally, think or are more familiar with rounded denominations or values compared to values with fractions or decimal values. Taking a different non-limiting example, if the fare is SGD 18.6 and the pax has points worth SGD 13.4, the first denomination suggested may be SGD 13. Here, rounding up should not be carried out to suggest SGD 14 because the user does not have enough points for that. Therefore, for the first denomination or *Option*1, rounding down is carried out, i.e., using the Floor function.

(ii) The subsequent or remaining number of discount or point redemption options (e.g., for a total of 3 options) may be calculated as a percentage of the first point redemption option mentioned above. As non-limiting examples, for Singapore, the configured intervals for the options may be set at 100%, 70% and 40%. Based on this example, then, the remaining or subsequent two options may be "$RoundUp(0.7 * Option1)$" (e.g., to define the second point redemption, *Option*2) and "$RoundUp(0.4 * Option1)$" (e.g., to define the third point redemption, *Option*3). Such options, after *Option*1, are rounded up considering that the users or customers can afford the rounded up points, which, however is not true for *Option*1. The intervals for the point redemption options of lower discounts, after *Option*1, may be varied according to requirements, and may, for example, be set instead at 75%, 50% or 30%.

The remaining point redemption options, whether one, two, three or any higher number of options after *Option*1, are rounded up to the closest multiple of lowest denomination.

If for some combinations, two or more discount options are of the same value, only one option is maintained with the rest being removed or skipped. This ensures that all options (e.g., three options) shown to the users are distinct. As such, the users would have options of different discount values to consider and to select from.

If one or more of the determined or calculated point redemption options start falling below the lowest possible denomination, one or more aspirational options (as will be discussed below) that the users may not be able to afford may be returned or presented to the users. The amount may be calculated by adding one or more multiples of the lowest denomination to *Option*1.

The options shown to the user are extremely configurable, with flexibility in deciding what are the points conversion rate, lowest denomination, etc. for each country and vertical. The code may be written to account for all possible configurations, including where there may be the possibilities of similar discount options. The non-limiting examples below in TABLE 4 are provided to illustrate such possibilities.

TABLE 4

S.No	Points	Currency	Currency value of users points	Fare	Lowest Denomination	Opt 1	Opt 2	Opt 3
1	8000	SGD	16 (Rate 500 points = 1 SGD)	13.5	4	12	12 → 8	8 → 16
2	11000	SGD	22	21.4	6	18	18 → 12	12→ 24
3	234259	VND	234.25 (Rate 1000 = 1 VND)	163	50	150	150 → 100	100 → 200
4	53200	VND	53.2	98	25	50	50 → 25	25 → 75
5	8123	SGD	16	7.8	2	6	6 → 4	4 → 8

In the example of S.No 1 in TABLE 4, the intervals are configured at 100%, 70%, 40% and the lowest denomination is set to S$ 4. *Option*1 is determined to be S$ 12, which

is lower than the fare of S$ 13.5. So, *Option*2 would be determined to be S$ 8.4 (i.e., 0.7*12), rounded up to the nearest multiple of lowest denomination, i.e., S$ 12. But as *Option*1 is S$ 12 as well, *Option*2 as determined above and rounded up to S$ 12 is skipped. Then, at 40%, calculation results in S$ 4.8 (i.e., 0.4*12), rounded up to S$ 8 which becomes the appropriate *Option*2. Where three options are to be provided, since there is one more slot/option left, it may return an aspirational option, *Option*3, determined to be S$ 16, which is the next multiple of the lowest denomination that is higher than and closest to S$ 12 of *Option*1. The aspirational option, *Option*3, is affordable by the user based on the user's available points although the determined amount of S$ 16 is higher than the fare of S$ 13.5. Such *Option*3 may be selectable by the user when booking the corresponding service.

In the example of S.No 2 in TABLE 4, as the currency is SGD (for the Singapore market) similar to that of the example of S.No 1, the intervals are similarly configured at 100%, 70% and 40% while the lowest denomination is set to S$ 6. *Option*1 is determined to be S$ 18, which is lower than the fare of S$ 21.4. So, *Option*2 would be determined to be S$ 12.6 (i.e., 0.7*18), rounded up to the nearest multiple of lowest denomination, i.e., S$ 18. But as *Option*1 is also S$ 18 as well, *Option*2 as determined above and rounded up to S$ 18 is skipped. Then, at 40%, calculation results in S$ 7.2 (i.e., 0.4*18), rounded up to S$ 12 which becomes the appropriate *Option*2. Where three options are to be provided, since there is one more slot/option left, it may return an aspirational option, *Option*3, determined to be S$ 24, which is the next multiple of the lowest denomination that is higher than and closest to S$ 18 of *Option*1. However, based on the user's available points, the user cannot afford the amount of S$ 18 corresponding to the aspirational option, *Option*3. Such *Option*3, while may be presented to the user, may not be selectable by the user when booking a service.

In the example of S.No 4 in TABLE 4, the intervals are configured at 100%, 70% and 50% while the lowest denomination is VND 25. *Option*1 is determined to be VND 50,

which is lower than the fare of VND 98. So *Option*2 is determined to be VND 35 (i.e., 0.7*50), rounded up to VND 50. However, this is skipped as it is a duplicate of *Option*1. Then, at 50%, calculation results in VND 25 (i.e., 0.5*50), which equals the lowest denomination, that then becomes the appropriate *Option*2. Where three options are to be provided, since there is one more slot/option left, it may return an aspirational option, *Option*3, determined to be VND 75, which is the next multiple of the lowest denomination that is higher than and closest to VND 50 of *Option*1. However, based on the user's available points, the user cannot afford the amount of VND 75 corresponding to the aspirational option, *Option*3. Such *Option*3, while may be presented to the user, may not be selectable by the user when booking the corresponding service.

FIG. 4A shows a screenshot 490a for a user who has enough points for three (or all) point redemption options. The user has 8600 points available 491a (i.e., total point value). In this example, the conversion rate is 500 points to S$1, and the lowest denomination is set at S$1, and the defined number of options to be shown to the user is three. At the above-mentioned conversion rate, 8600 points correspond to S$ 17.2 (i.e., total currency value).

The point redemption options shown to the user include the top most option (i.e., first point redemption option), *Option*1, 492a where 8500 points (which is less than the points available 491a) can be used to obtain a discount or offset of S$17 (17 Singapore dollars). The next point redemption option in line (i.e., second point redemption option or *Option*2) 493a offers S$13 off for use or redemption of 6500 points, while the following option (i.e., third point redemption option or *Option*3) 494a offers S$6 off for use or redemption of 3000 points. The various point redemption options 492a, 493a, 494a, may be shown in the form of a list in decreasing discount values or number of points required. In the non-limiting example shown in FIG. 4A, the user selects *Option*2 493a, as indicated by the check

mark 495a. The user may then press the "Redeem Now" button 496a to redeem the corresponding points and avail himself/herself of the discount value of S$ 13.

FIG. 4B shows a screenshot 490b for a user who has sufficient points for some point redemption options but insufficient for three (or all) point redemption options. The user has 1100 points available 491b. In this example, the conversion rate is 500 points to S$1, and the lowest denomination is set at S$1. The point redemption options shown to the user include the top most point redemption option, *Option*1, 492b where 1000 points (which is less than the points available 491b) can be used to obtain a discount of S$2, and a second point redemption option, *Option*2, 493b that offers S$1 off for use of 500 points. The various options 492b, 493b, may be shown in the form of a list in decreasing discount values or number of points required. In the example shown in FIG. 4B, the user selects *Option*1 492b, as indicated by the check mark 495b. The user may then press the "Redeem Now" button 496b to redeem the corresponding points and avail himself/herself of the discount value of S$ 2.

In the non-limiting example of FIG. 4B, the defined number of options to be shown to the user may be set at three. As only two point redemption options, i.e., *Option*1 492b and *Option*2 493b, are available to the user, based on the available point balance 491b of the user, a third option (e.g., an aspirational point redemption option to guide user behaviour) 497b may be presented to the user to show the next (or immediate) higher discount compared to *Option*1 492b which may be available to the user if the user has the points shown for the aspirational point redemption option 497b available. As the number of points required for the option 497b is higher than the available point balance 491b, the option 497b is not selectable by the user (i.e., option 497b is disabled) and may be greyed out or shown in any suitable format as indication that the user is not allowed or not able to choose the option 497b. The option 497b may be shown at the bottom of the list, after *Option*1 492b and *Option*2 493b.

The option 497b may be shown to the user to guide user behaviour. For example, having looked at the option 497b, the user may decide not to redeem the points at present time (e.g., for the current transport-related service) and try to accumulate additional points in order to be able to select the option 497b the next time (e.g., for the next transport-related service), or the user may decide anyway to redeem the points at present time.

It should be appreciated that, in various embodiments, aspirational option(s) provided to a user may be an option which the user can afford, i.e., the user has sufficient available points to select the aspirational option(s), but which may exceed the cost of the service (for example, see *Option*3 of S.No 1 in TABLE 4). In such situations, the aspirational option(s) are selectable by the user and are not greyed out. However, such aspirational option(s) would still be shown at the bottom of the list of options because the aspirational option(s) is not the (most) recommended option(s).

FIG. 4C shows a screenshot 490c for a user who, based on the available point balance 491c of the user, does not have enough points available for even the option with the lowest denomination. In this non-limiting example, an goal redemption option or notification (e.g., to guide user behaviour or to provide the user with a goal) 498c corresponding to the lowest denomination may be presented to the user. The goal redemption notification 498c may include an indication of the remaining points 499c that are needed, after taking into consideration the existing points 491c available to the user, for the user to be able to select the option 498c or avail himself/herself of the discount associated with the option 498c. As the option 498c is not selectable by the user, the option 498c may be greyed out or shown in any suitable format as indication that the user is not allowed or not able to choose the option 498c. Further, the "Redeem Now" button 496c may be greyed out or shown

in any suitable format as indication that the user is not allowed or not able to press the button 496c.

Once the various options are determined and presented to the user for consideration, the user may select one of the point redemption options. Once the user has selected one of the selectable point redemption options, the points corresponding to the selected point redemption option are burnt and the corresponding discount amount may be injected into a template reward which the user redeems, as described below. This allows the user to avail himself or herself of the discount.

In various embodiments, a reward entity may have a few attributes - such as country, name, discount, etc. When a reward is created, it has all these values defined for it. The following simplified examples are used to aid understanding.

When a user redeems a reward, a new entity called Redemption (see TABLE 6 below) is created, which basically says user ABCD redeemed reward 1001. All the details of the reward, such as how much discount to give, etc., are already present and can be looked up in the reward table shown in TABLE 5.

TABLE 5: Schema - Rewards (known approach)

RewardID	*Name*	*Discount*	*CountryID*
1001	*$10 off*	*10 SGD*	*4 (Singapore)*

TABLE 6: Schema - Redemptions (known approach)

RedemptionID	*UserID*	*RewardID*
5001	*ABCD*	*1001*

In contrast, for the techniques relating to flexible redemption disclosed herein, when the reward is created, it has a data template instead of concrete values, as illustrated in TABLE 7. When a user redeems this reward, the front-end (mobile app) states or informs, in the request, how many points the user is willing to redeem and based on that, the endpoint (server) calculates the discount amount and other details. When creating the redemption entity, as illustrated in TABLE 8, a few extra fields are added.

TABLE 7: Schema - Rewards (various embodiments)

RewardID	*Name*	*Discount*	*CountryID*
1001	*{{.CurrencySymbol}}{{.DiscountAmount}} off*	*0*	*4 (Singapore)*

TABLE 8: Schema - Redemptions (various embodiments)

RedemptionID	*UserID*	*RewardID*	*Meta*
5001	*ABCD*	*1001*	*DiscountAmount : 5*
5002	*EFGH*	*1001*	*DiscountAmount : 8*

As may be observed in TABLE 8 above, while the rewardID remains the same, the discount for each redemption is different because each redemption is written separately while redeeming. When the redemption entity is prepared, the discount field is not populated from the rewards schema (see TABLE 7), rather, it is done from the redemption schema (see TABLE 8).

FIG. 5 shows a diagram illustrating a system architecture 570 for the present techniques, while FIGS. 6A to 6D show flow charts illustrating the related processes. The system architecture 570 may include a number of services, for example, api-gateway 574, bookings 576, grab-fare 578, offers 580, rewards 582, grab-fraud 584, abacus 586, and paysicore (or ledger) 588. Also included may be a cache (which may be optional) 590, and two databases 592, 594. Data from the database 594 may be

loaded and stored, at least temporarily, at the cache 590. Each of the services 574, 576, 578, 580, 582, 584, 586, 588 may have their own respective servers. Nevertheless, it should be appreciated that two or more of the services 574, 576, 578, 580, 582, 584, 586, 588 may be part of a common or shared server. The cache 590 and the databases 592, 594 may be implemented based on Amazon Web Services (AWS).

A user may use a client or user communications device 572 to make a booking request for a service. Communication may be established with the api-gateway 574. Referring to FIG. 6A, at 672, the bookings service 576 receives the booking request via the api-gateway 574 to provide a quote for the service. Using a ride-hailing service as a non-limiting example, the quote may be provided for a given pickup location and a destination location. At 674, the bookings service 576 calls the grab-fare service 578 to get the corresponding fare information, which may be valid for a defined time duration (e.g., 5 minutes).

At 676, the user checks the fare (e.g., displayed on the device 572) and may decide to check "Offers" (see, for example, button 398, FIG. 3B). In response thereto, at 678, the rewards service 582 receives the request to show several (redemption) options for flexible redemptions. At 680, the user selects one of the options and redeems the reward (or discount) corresponding to the selected option. At 682, the grab-fare service 578 receives a request to recalculate the fare with the given or redeemed reward. At 684, the offers service 580 receives a request from the grab-fare service 578 and forwards the request to the rewards service 582. At 686, the rewards service 582 validates the redemption and returns the discount information. At 688, the user proceeds to create a booking with the discounted fare. Thereafter, the process ends.

Referring to FIGS. 6A and 6B, when the rewards service 582 receives, at 678, the request to show several (redemption) options for flexible redemptions, the rewards

service 582, at 678a, loads a template reward (for example, from the database 594, or the cache 590, if the template reward has been previously activated or loaded) and "config" (or parameters, e.g., the interval rate, etc., for determining the (redemption) options). At 678b, the rewards service 582 calls the abacus service 586 to load the user's point balance. At 678c, the rewards service 582 calculates or determines the options based on the config.

Referring to FIG. 6C, for calling the abacus service 586 at 678b, the abacus service 586 receives a request to get the user's point balance at 690a. At 690b, the abacus service 586 selects the appropriate ledger 588 based on currency. At 690c, the ledger 588 is called to get the latest balance.

Referring to FIGS. 6A and 6D, when the user selects one of the options and redeems the reward at 680, the rewards service 582 receives, at 680a, the request to burn a certain amount of points ("X" points) and redeems the reward via the api-gateway 574. At 680b, the rewards service 582 loads the reward and user details from a data store. At 680c, the rewards service 582 validates the reward details such as expiry, inventory, rules, tiers, etc. At 680d, the rewards service 582 calls the grab-fraud service 584 to check for possible points fraud. A fraud decision or verdict is issued at 680e. If it is determined that there is (potential) fraud, the process ends. If no fraud is detected, at 680f, the rewards service 582 calls the abacus service 586 to burn the corresponding amount of points. At 680g, the rewards service 582 adds the redemption and discount details to a data store, for example, the database 592.

It will be appreciated that the invention has been described by way of example only. Various modifications may be made to the techniques described herein without departing from the spirit and scope of the appended claims. The disclosed techniques comprise techniques which may be provided in a stand-alone manner, or in combination with one another. Therefore, features described with respect to one technique may also be presented in combination with another technique.

Claims

1. A communications server apparatus for managing a service booking, comprising a processor and a memory, the communications server apparatus being configured, under control of the processor to execute instructions in the memory to:

in response to receiving booking request data comprising at least one data field indicative of a user attempting a booking of a service,

generate, based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, in one or more data records, a plurality of point redemption data for a corresponding plurality of point redemption options, wherein, for each point redemption data, the point redemption data comprises currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of a cost of the service, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed; and

communicate the plurality of point redemption options to a communications device of the user for presentation of the plurality of point redemption options to the user for the booking.

2. The communications server apparatus as claimed in claim 1, wherein, for generating the plurality of point redemption data, the communications server apparatus is configured to:

generate first point redemption data of the plurality of point redemption data, the first point redemption data comprising the currency value data indicative of a first currency value of the point variable, out of the total currency value

available to the user, that is closest to and less than the cost, the first currency value being a multiple of the defined lowest denomination value.

3. The communications server apparatus as claimed in claim 2, wherein, for generating the first point redemption data, the communications server apparatus is configured to:

determine a minimum value of the cost or the total currency value; and

round down the minimum value to a first integer that is the multiple of the defined lowest denomination value that is closest to the minimum value, wherein the first integer defines the first currency value.

4. The communications server apparatus as claimed in claim 2 or 3, wherein, for generating the plurality of point redemption data, the communications server apparatus is further configured to:

generate second point redemption data of the plurality of point redemption data, the second point redemption data comprising the currency value data indicative of a second currency value of the point variable, out of the total currency value available to the user, the second currency value being a multiple of the defined lowest denomination value.

5. The communications server apparatus as claimed in claim 4, wherein, for generating the second point redemption data, the communications server apparatus is configured to:

calculate a first percentage of the first currency value to define a first proportion value; and

round up the first proportion value to a second integer to define the second currency value, the second integer being the multiple of the defined lowest denomination value that is closest to the first proportion value.

6. The communications server apparatus as claimed in claim 5, wherein, if the second integer is same as the first currency value, the communications server apparatus is configured to discard the second integer.

7. The communications server apparatus as claimed in claim any one of claims 4 to 6, wherein, for generating the plurality of point redemption data, the communications server apparatus is further configured to:

generate third point redemption data of the plurality of point redemption data, the third point redemption data comprising the currency value data indicative of a third currency value of the point variable, out of the total currency value available to the user, the third currency value being lower than the second currency value and, further, being a multiple of the defined lowest denomination value.

8. The communications server apparatus as claimed in claim 7, wherein, for generating the third point redemption data, the communications server apparatus is configured to:

calculate a second percentage of the first currency value to define a second proportion value; and

round up the second proportion value to a third integer to define the third currency value, the third integer being the multiple of the defined lowest denomination value that is closest to the second proportion value.

9. The communications server apparatus as claimed in any one of claims 2 to 8, wherein, for a point redemption option of the plurality of point redemption options after the first redemption option where the point value of the point redemption option is less than the defined lowest denomination value,

for generating the plurality of point redemption data, the communications server apparatus is configured to generate aspirational point redemption data of the plurality of point redemption data for an aspirational point redemption option, the aspirational point redemption data comprising the currency value data indicative of

an aspirational currency value that is more than the first currency value, the aspirational currency value being a multiple of the defined lowest denomination value that is closest to the first currency value; and

for communicating the plurality of point redemption options, the communications server apparatus is configured to communicate the aspirational point redemption option to the communications device for presentation of the aspirational point redemption option to the user.

10. The communications server apparatus as claimed in any one of claims 1 to 9, wherein, in response to receiving selection data comprising at least one data field indicative of selection of a point redemption option of the plurality of point redemption options by the user, the communications server apparatus is configured to:

query a data template; and

determine an amount to offset against the cost in accordance with the data template and a point value to be redeemed for the point redemption option selected by the user.

11. The communications server apparatus as claimed in any one of claims 1 to 10, further configured to:

in response to receiving the booking request data,

generate, based on the point data and the denomination data, and if the total currency value available to the user is less than the defined lowest denomination value, in the one or more data records, goal redemption data for a goal redemption notification, the goal redemption data being indicative of the defined lowest denomination value; and

communicate the goal redemption notification to the communications device for presentation of the defined lowest denomination value to the user for offsetting against at least part of the cost.

12. The communications server apparatus as claimed in claim 11, wherein the goal redemption data further comprises goal point value data indicative of a remaining point value that is required by the user to reach a defined point value that corresponds to a defined currency value that is same as the defined lowest denomination value.

13. A method for managing a service booking, the method comprising:

in response to receiving booking request data comprising at least one data field indicative of a user attempting a booking,

generating, based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, in one or more data records, a plurality of point redemption data for a corresponding plurality of point redemption options, wherein, for each point redemption data, the point redemption data comprises currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of a cost of the service, the currency value being determined in accordance with the defined lowest denomination value and further being associated with a point value of the point variable to be redeemed; and

communicating the plurality of point redemption options to a communications device of the user for presentation of the plurality of point redemption options to the user for the booking.

14. The method as claimed in claim 13, wherein, generating the plurality of point redemption data comprises:

generating first point redemption data of the plurality of point redemption data, the first point redemption data comprising the currency value data indicative of a first currency value of the point variable, out of the total currency value

available to the user, that is closest to and less than the cost, the first currency value being a multiple of the defined lowest denomination value.

15. The method as claimed in claim 14, wherein generating the first point redemption data comprises:

determining a minimum value of the cost or the total currency value; and

rounding down the minimum value to a first integer that is the multiple of the defined lowest denomination value that is closest to the minimum value, wherein the first integer defines the first currency value.

16. The method as claimed in claim 14 or 15, wherein generating the plurality of point redemption data further comprises:

generating second point redemption data of the plurality of point redemption data, the second point redemption data comprising the currency value data indicative of a second currency value of the point variable, out of the total currency value available to the user, the second currency value being a multiple of the defined lowest denomination value.

17. The method as claimed in claim 16, wherein generating the second point redemption data comprises:

calculating a first percentage of the first currency value to define a first proportion value; and

rounding up the first proportion value to a second integer to define the second currency value, the second integer being the multiple of the defined lowest denomination value that is closest to the first proportion value.

18. The method as claimed in claim 17, wherein, if the second integer is same as the first currency value, the method comprises discarding the second integer.

19. The method as claimed in claim any one of claims 16 to 18, wherein generating the plurality of point redemption data further comprises:

generating third point redemption data of the plurality of point redemption data, the third point redemption data comprising the currency value data indicative of a third currency value of the point variable, out of the total currency value available to the user, the third currency value being lower than the second currency value and, further, being a multiple of the defined lowest denomination value.

20. The method as claimed in claim 19, wherein generating the third point redemption data comprises:

calculating a second percentage of the first currency value to define a second proportion value; and

rounding up the second proportion value to a third integer to define the third currency value, the third integer being the multiple of the defined lowest denomination value that is closest to the second proportion value.

21. The method as claimed in any one of claims 14 to 20, wherein, for a point redemption option of the plurality of point redemption options after the first redemption option where the point value of the point redemption option is less than the defined lowest denomination value,

generating the plurality of point redemption data comprises generating aspirational point redemption data of the plurality of point redemption data for an aspirational point redemption option, the aspirational point redemption data comprising the currency value data indicative of an aspirational currency value that is more than the first currency value, the aspirational currency value being a multiple of the defined lowest denomination value that is closest to the first currency value; and

communicating the plurality of point redemption options comprises communicating the aspirational point redemption option to the communications device for presentation of the aspirational point redemption option to the user.

22. The method as claimed in any one of claims 13 to 21, wherein, in response to receiving selection data comprising at least one data field indicative of selection of a point redemption option of the plurality of point redemption options by the user, the method comprises:

querying a data template; and

determining an amount to offset against the cost in accordance with the data template and a point value to be redeemed for the point redemption option selected by the user.

23. The method as claimed in any one of claims 13 to 22, further comprising:

in response to receiving the booking request data,

generating, based on the point data and the denomination data, and if the total currency value available to the user is less than the defined lowest denomination value, in the one or more data records, goal redemption data for a goal redemption notification, the goal redemption data being indicative of the defined lowest denomination value; and

communicating the goal redemption notification to the communications device for presentation of the defined lowest denomination value to the user for offsetting against at least part of the cost.

24. The method as claimed in claim 23, wherein the goal redemption data further comprises goal point value data indicative of a remaining point value that is required by the user to reach a defined point value that corresponds to a defined currency value that is same as the defined lowest denomination value.

25. A computer program or a computer program product comprising instructions for implementing the method as claimed in any one of claims 13 to 24.

26. A non-transitory storage medium storing instructions, which when executed by a processor cause the processor to perform the method as claimed in any one of claims 13 to 24.

27. A communications system for managing a service booking, comprising a communications server apparatus, at least one user communications device and communications network equipment operable for the communications server apparatus and the at least one user communications device to establish communication with each other therethrough,

wherein the at least one user communications device comprises a first processor and a first memory, the at least one user communications device being configured, under control of the first processor, to execute first instructions stored in the first memory to transmit, for receipt by the communications server apparatus for processing, booking request data comprising at least one data field indicative of a user attempting a booking of a service; and

wherein the communications server apparatus comprises a second processor and a second memory, the communications server apparatus being configured, under control of the second processor, to execute second instructions stored in the second memory to:

in response to receiving data indicative of the booking request data,

generate, based on point data indicative of a point variable associated with the user and denomination data indicative of a defined lowest denomination value, and if a total currency value of the point variable available to the user and corresponding to a total point value of the point variable is equal to or greater than the defined lowest denomination value, in one or more data records, a plurality of point redemption data for a corresponding plurality of point redemption options, wherein, for each point redemption data, the point redemption data comprises currency value data indicative of a currency value of the point variable, out of the total currency value available to the user, to offset against at least part of the cost, the currency value being determined in accordance with the defined lowest

denomination value and further being associated with a point value of the point variable to be redeemed; and

communicate the plurality of point redemption options to the at least one user communications device for presentation of the plurality of point redemption options to the user for the booking.