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(54) TRANSACTION AGGREGATION SYSTEM AND METHOD

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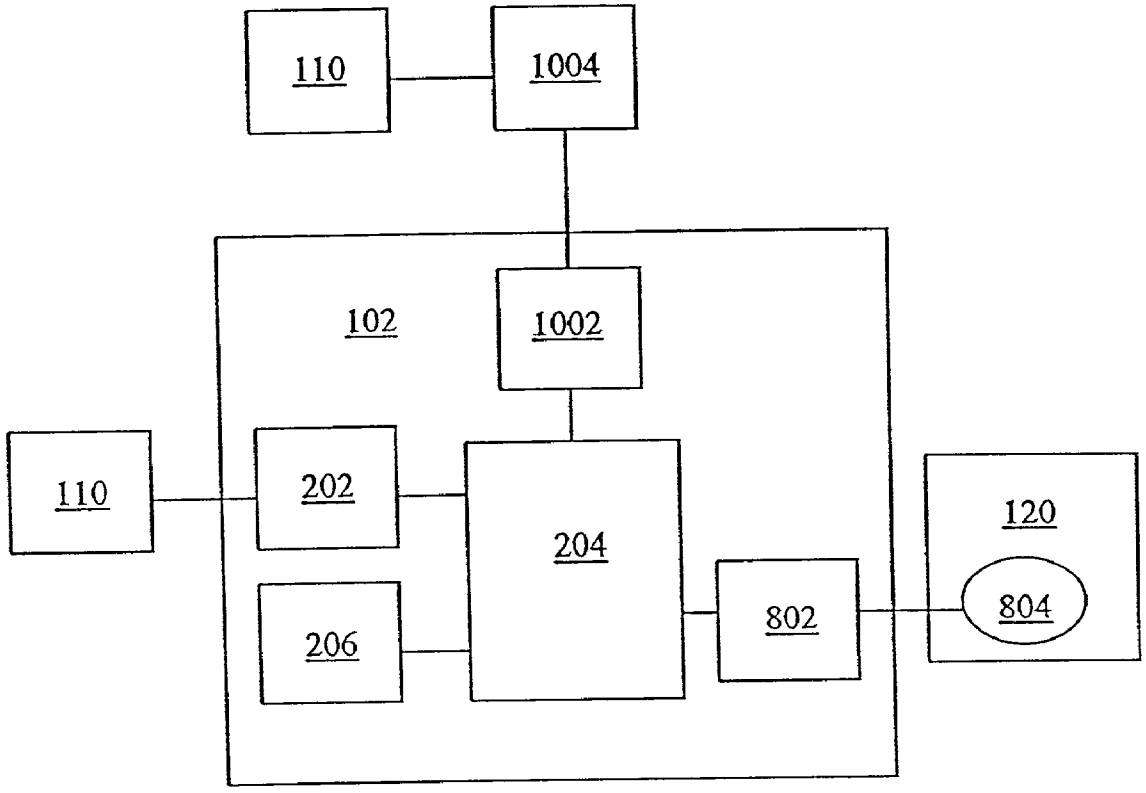
(57) **ABSTRACT**

An aggregation system is configured to execute transactions between a customer and a merchant as transaction messages. The transaction aggregation system includes a user agent, multiple message schemas, a repository for storing the message schemas, and a transaction engine. The user agent converts a transaction request received from the customer into a first-transaction message. The transaction engine then receives and maps the first-transaction message into a second-transaction message using one of the message schemas. The transaction engine then transmits the second-transaction message to the merchant to execute the customer transaction.



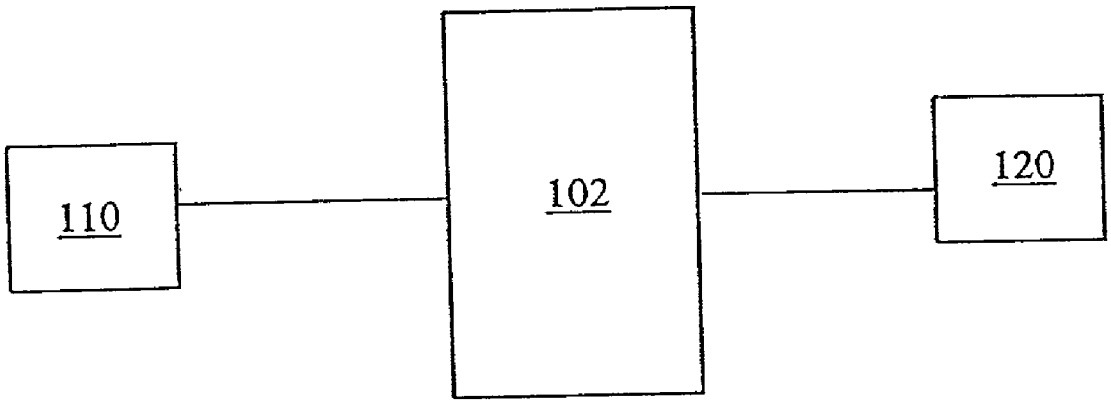


FIG. 1

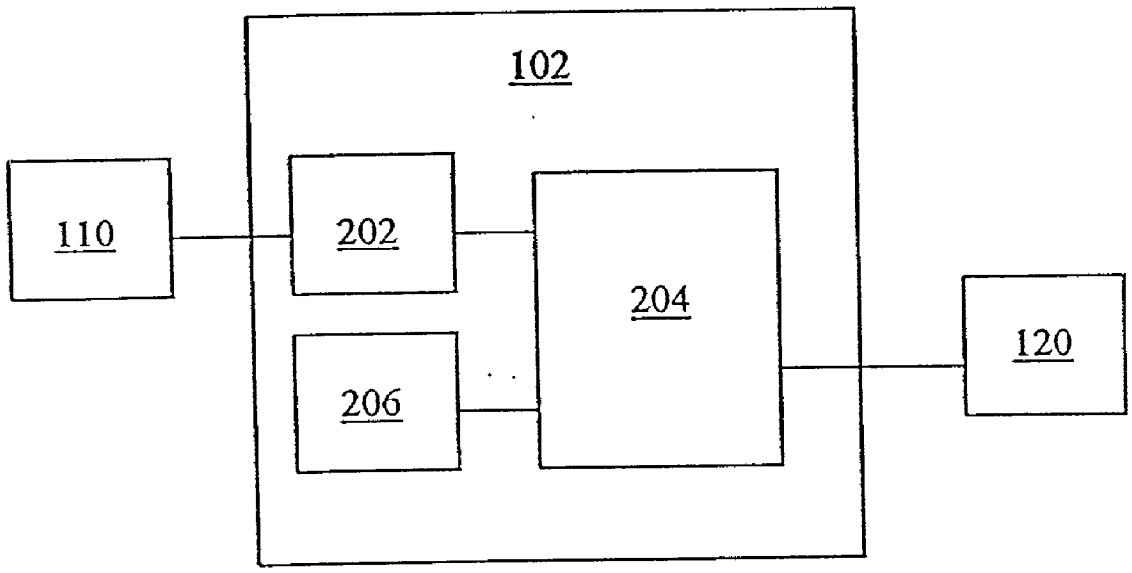


FIG. 2

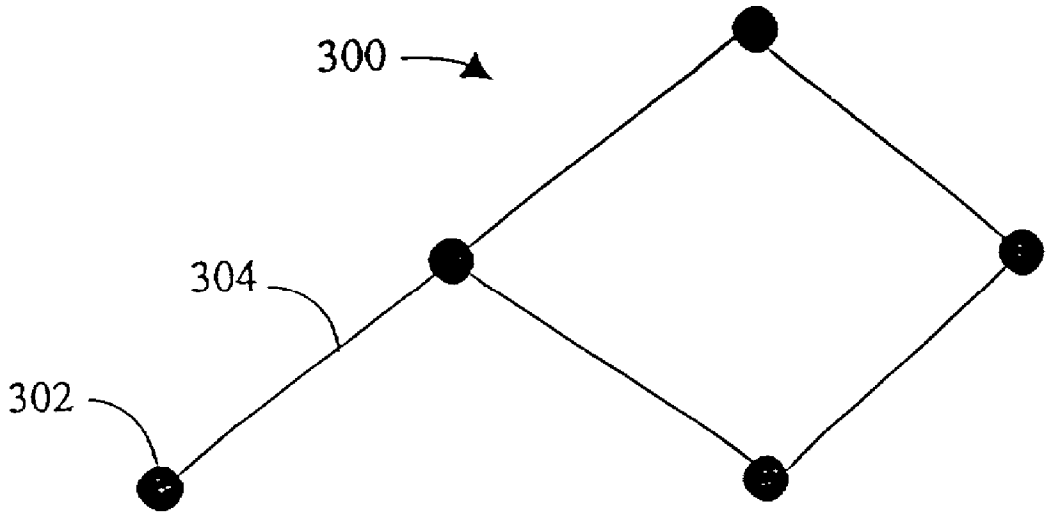


FIG. 3

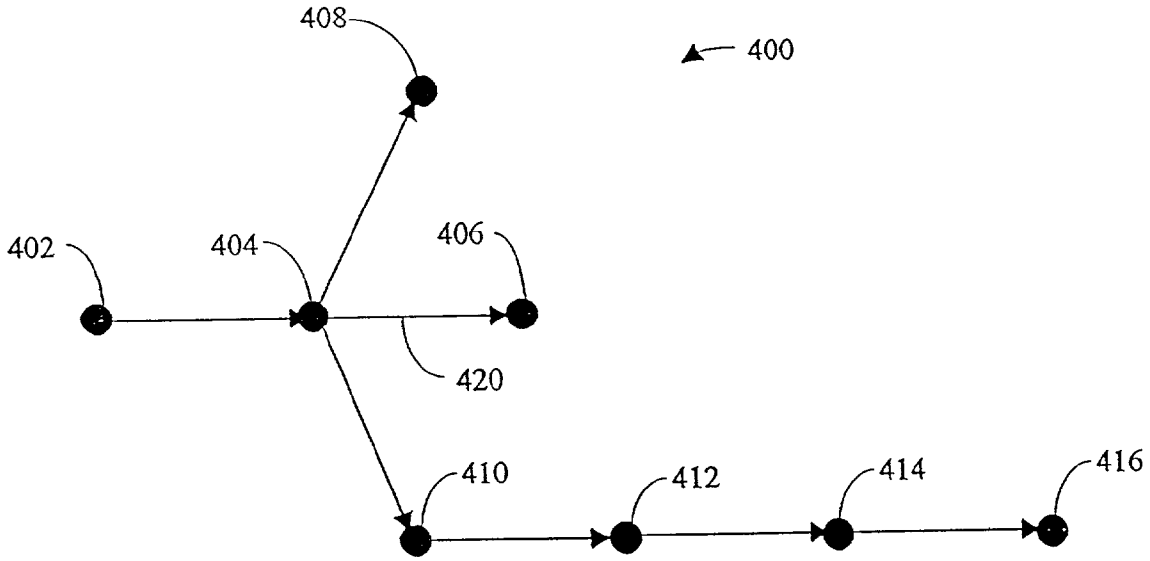


FIG. 4

500

```
<graph>
—>
<info name="ebp/workflow/order" version="1.00"/>

<node          id="entry" name="system.Pipe" desc="Pipe"/>
<node          id="reply" name="system.Pipe" desc="send reply message"/>
<node          id="genOrderId" name="system.Mapper">
               <param name="map">orderid.map</param>
</node>
<node          id="addOrderToTable" name="system.DBAdapter">
               <param name="map">order_db.map</param>
</node>
<node          id="fixMerchantConfig" name="system.Mapper">
               <param name="map">merchantconfig.map</param>
</node>
<node          id="placeOrderWithMerchant" name="order" type="Service" />

<node          id="updateOrderHistory" name="system.DBAdapter" desc="update order history">
               <param name="map">status_hist.map</param>
</node>
<node          id="email" name="system.EMailAdapter">
               <param name="map">status_email.map</param>
</node>
<edge          id="0" head="entry" tail="genOrderId" />

<edge  id="1" head="genOrderId" tail="reply" condition="/mesg/header/@schema = 'ebp.status'" />

<edge          id="11" head="genOrderId" tail="addOrderToTable"/>

<edge          id="12" head="genOrderId" tail="fixMerchantConfig"/>

<edge          id="23" head="fixMerchantConfig" tail="placeOrderWithMerchant"/>

<edge          id="34" head="placeOrderWithMerchant" tail="updateOrderHistory"/>

<edge          id="45" head="updateOrderHistory" tail="email"/>

</graph>
```

FIG. 5

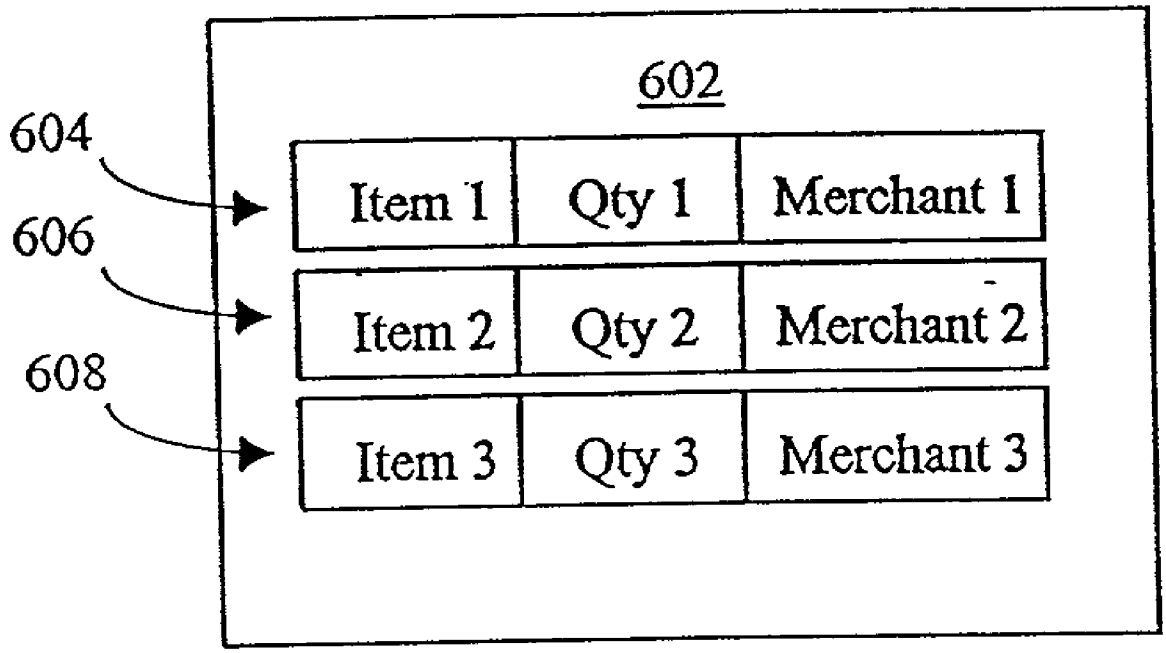

602
604
606
608
Item 1
Qty 1
Merchant 1
Item 2
Qty 2
Merchant 2
Item 3
Qty 3
Merchant 3

FIG. 6

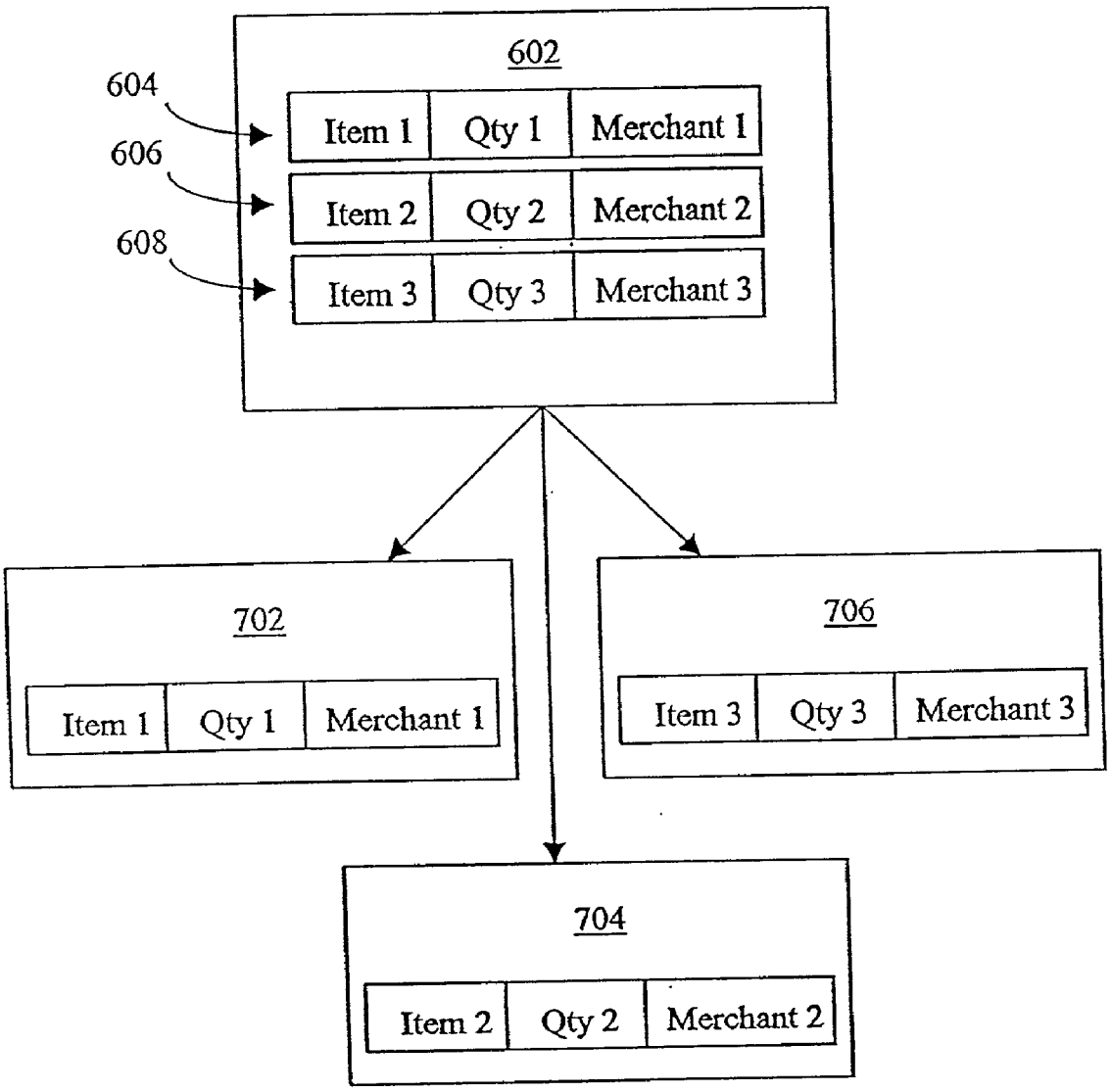

602
604
606
608
Item 1
Qty 1
Merchant 1
Item 2
Qty 2
Merchant 2
Item 3
Qty 3
Merchant 3
702
Item 1
Qty 1
Merchant 1
706
Item 3
Qty 3
Merchant 3
704
Item 2
Qty 2
Merchant 2

FIG. 7

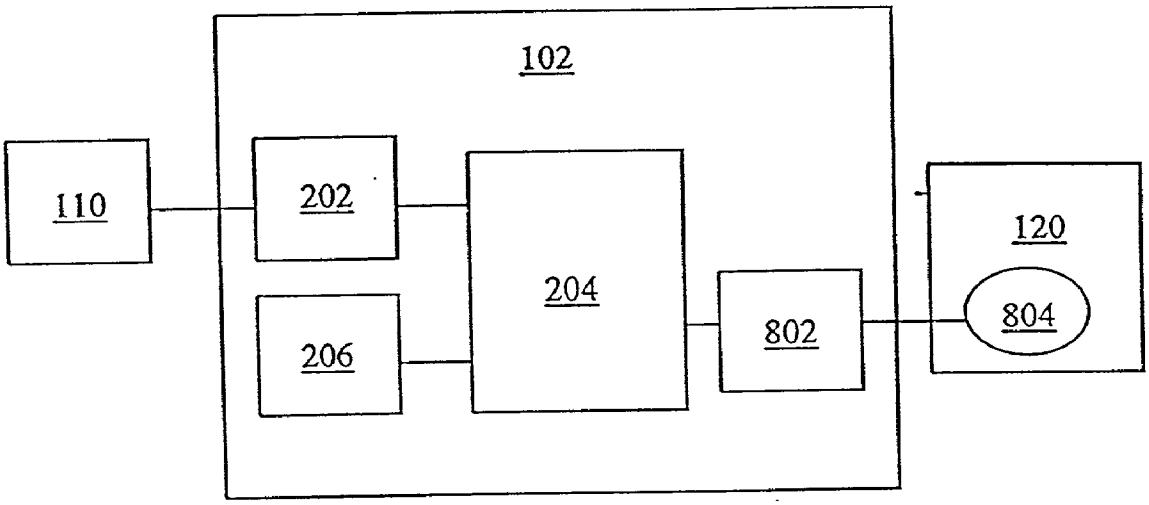


FIG. 8

900

```
<graph>
<info name="merchant/workflow/order" version="1.0"/>

<node          id="GetItem" name="system.HTTPAdapter">
               <param name="inmap">GetItem.map</param>
</node>
<node          id="AddToCart" name="system.HTTPAdapter">
               <param name="inmap">AddToCart.map</param>
</node>
<node          id="Checkout" name="system.HTTPAdapter">
               <param name="inmap">Checkout_inmap.map</param>
</node>
<edge id="GetItem-AddToCart" head="GetItem" tail="AddToCart"
               condition="/mesg/header/@schema = 'order'/>

<edge id="AddToCart-Checkout" head="AddToCart" tail="Checkout"
               condition="/mesg/header/@schema = 'order'/>
</graph>
```

FIG. 9

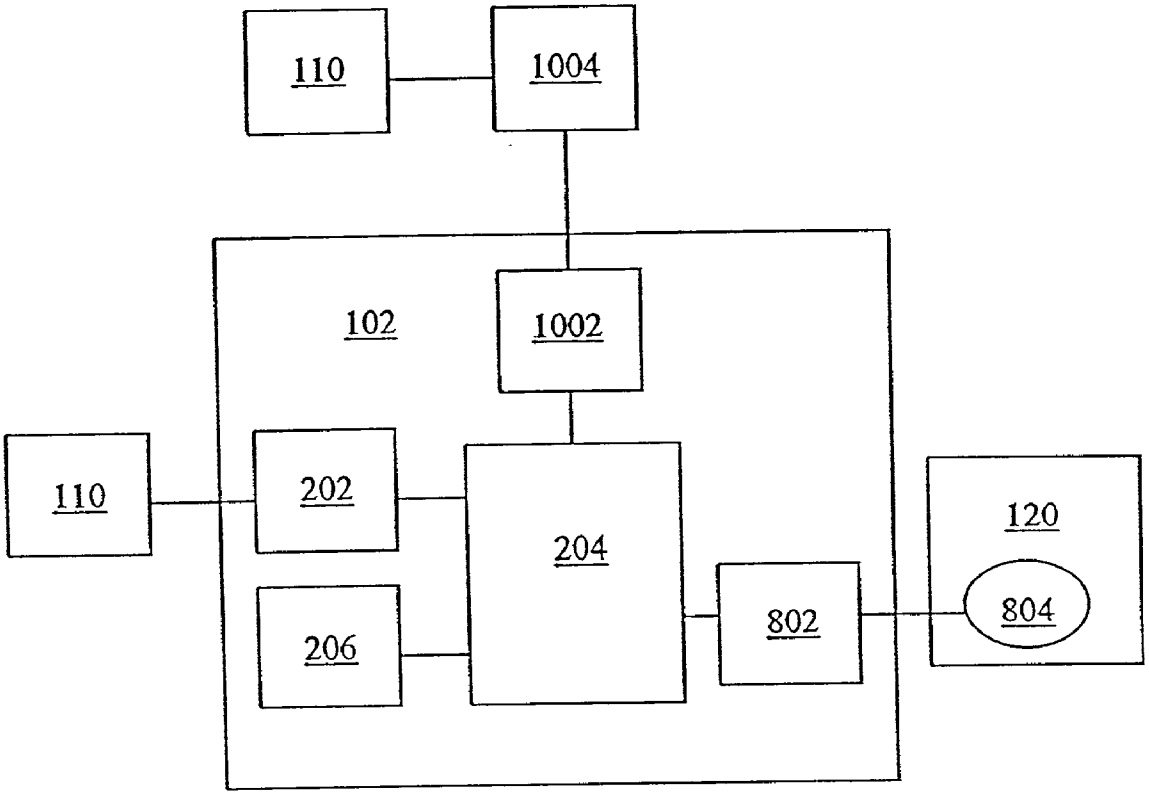


FIG. 10

TRANSACTION AGGREGATION SYSTEM AND METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the general field of computers, telecommunications, and computer and Internet related systems. More specifically, the invention relates to a transaction aggregation system and method for facilitating various types of transactions between a customer and a merchant.

[0003] 2. Description of Related Art

[0004] E-commerce can include various activities and/or transactions conducted between a customer and a merchant, such as buying a good and/or service, making a reservation, obtaining the status of an order, and the like. These activities and/or transactions can be conducted through any convenient electronic medium, such as through computer networks, telephone lines, wireless networks, optical networks, and the like. For e-commerce conducted through the Internet and the web, a customer typically conducts transactions directly with a merchant. For example, assume that a merchant sells books and that a customer wants to purchase a book from the merchant. Typically, the merchant sells books through their web site. As such, in order for a customer to purchase a book from the merchant, the customer needs to access the merchant's web site.

[0005] Additionally, E-commerce transactions between the customer and the merchant are typically conducted synchronously. For example, when the customer places an order with the merchant through their web site, the customer must remain logged on to the web site during the entire ordering process. Thus, synchronous transactions can consume a lot of time and require focused attention. Furthermore, if the connection between the customer and the merchant is interrupted during a synchronous transaction, the order is typically lost. This can result in lost revenues for the merchant and dissatisfaction for the customer.

[0006] Additionally, an increasing number of customers are accessing the Internet through smaller and more portable devices, such as wireless telephones, Personal Digital Assistant (PDAs), internet appliances, and the like. However, it can be more costly and difficult to maintain the connection between customer and merchant on these devices. Additionally, the limited display and user-interface capabilities of these devices, limit the amount of information that can be displayed and or entered through these devices. For example, at present, wireless telephones can be configured to provide Internet access. However, these web-enabled telephones typically have limited display capabilities and limited keyboards.

[0007] Furthermore, different merchants can require different procedures for conducting transactions with their web site. For example, assume that there are three merchants and that they all sell books. It is not uncommon for each merchant to provide a proprietary web site that has a purchasing process that differs from other merchants. As such, if customer wants to obtain goods and/or services from these merchants, customer typically logs onto the web site for each merchant and places an order with each merchant.

SUMMARY OF THE INVENTION

[0008] The present invention relates to a transaction aggregation system which executes transactions between a customer and a merchant as transaction messages. In accordance with one aspect of the present invention, the transaction aggregation system includes a user agent, multiple message schemas, a repository for storing the message schemas, and a transaction engine. The user agent converts a transaction request received from the customer into a first-transaction message. The transaction engine then receives and maps the first-transaction message into a second-transaction message using one of the message schemas. The transaction engine then transmits the second-transaction message to the merchant to execute the customer transaction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is a block diagram of one embodiment of a transaction aggregation system;

[0010] **FIG. 2** is a block diagram of another embodiment of a transaction aggregation system;

[0011] **FIG. 3** is a graph depicting the processing of a transaction;

[0012] **FIG. 4** is a graph depicting an example of an order-process flow;

[0013] **FIG. 5** is one example of an order-process flow;

[0014] **FIG. 6** is one example of an order message;

[0015] **FIG. 7** is a block diagram depicting the mapping of the order message in **FIG. 6** into multiple separate merchant-specific-order messages;

[0016] **FIG. 8** is a block diagram of another embodiment of a transaction aggregation system;

[0017] **FIG. 9** is another example of an order-process flow; and

[0018] **FIG. 10** is a block diagram of another embodiment of a transaction aggregation system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0019] In order to provide a more thorough understanding of the present invention, the following description sets forth numerous specific details, such as specific configurations, parameters, and the like. It should be recognized, however, that such description is not intended as a limitation on the scope of the present invention, but is instead provided to enable a more full and complete description of exemplary embodiments.

[0020] With reference to **FIG. 1, a** transaction-aggregation system **102** is depicted connecting a customer **110** and a merchant **120**. As will be described in greater detail below, in accordance with one aspect of the present invention, transaction-aggregation system **102** is configured to facilitate electronic commerce (e-commerce) between customer **110** and merchant **120**. It should be recognized, however, that transaction-aggregation system **102** can be configured to facilitate various types of transactions other than those that relate to e-commerce. In a preferred embodiment, the transaction-aggregation system **102** can run on a user workstation

such as a Sun® Ultra5™ workstation. However, it should be noted that the transaction aggregation system **102** can also run on a general purpose PC.

[**0021**] As a preliminary matter, it should be recognized that customer **110** can include any party that is interested in obtaining a good and/or service, such as an individual consumer, a business, and the like. Merchant **120** can include any party that is interested in providing a good and/or service, such as an individual retailer, a business, and the like. Additionally, although one customer **110** and merchant **120** are depicted in **FIG. 1**, it should be recognized that transaction-aggregation system **102** can facilitate transactions between any number of customers **110** and merchants **120**.

[**0022**] In accordance with one aspect of the present invention, transaction-aggregation system **102** can be configured to model transactions between customer **110** and merchant **120** as transaction messages. As will be described in greater detail below, transactions between customer **110** and merchant **120** can be modeled as messages exchanged between customer **110** and transaction-aggregation system **102**, messages exchanged between transaction-aggregation system **102** and merchant **120**, and messages exchanged within transaction-aggregation system **102**. As such, as will be described in greater detail below, customer **110** can provide a more uniform, simpler, and convenient procedure for conducting transactions with any number of merchants **120**.

[**0023**] As will be described in greater detail below, in one embodiment of the present invention, these transactions are modeled utilizing Extensible Markup Language (XML). As such, each transaction between customer **110** and merchant **120** can be modeled as an XML string (i.e., an XML message). For example, customer **110** can request an order from merchant **120**. As will be described below, such an order transaction can be modeled as a series of XML messages exchanged between customer **110** and transaction-aggregation system **102**, within transaction-aggregation system **102**, and between transaction-aggregation system **102** and merchant **120**. One advantage of utilizing XML is that the XML messages can be easily interchanged without requiring proprietary software. However, it should be recognized that the present invention can be implemented utilizing any convenient protocol or programming language.

[**0024**] With reference now to **FIG. 2**, in one exemplary embodiment, transaction-aggregation system **102** includes a user agent **202** and a transaction engine **204**. As described above, in the present embodiment, user agent **202** is configured to communicate with customer **110** through the Internet. More particularly, in one preferred embodiment, user agent **202** can include a web site with a Uniform Resource Locator (URL). As such, customer **110** can access user agent **202** through a browser. Additionally, customer **110** can access user agent **202** utilizing a variety of devices, such as a web-enabled cell phone, a Personal Digital Assistant (PDA), an Internet appliance, a laptop, a desktop, and the like. Furthermore, customer **110** can access user agent **202** through any number of intermediary web sites, portals, and the like. As noted earlier, it should be recognized, however, that transaction-aggregation system **102** can be configured to communicate with customer **110** through various types of devices utilizing various communication protocols.

[**0025**] With continued reference to **FIG. 2**, when customer **110** submits a transaction request, user agent **202** is configured to convert this request into an XML message. User agent **202** then transmits this XML message to transaction engine **204**. As alluded to earlier, customer **110** can access user agent **202** utilizing a variety of devices and utilizing a variety of communication protocols. Accordingly, user agent **202** can be configured to convert requests in various protocols into XML messages. For example, if customer **110** accesses user agent **202** through a web browser, then user agent **202** can be configured to convert the request from customer **110** in HTML format into an XML message. Similarly, if customer **110** accesses user agent **202** through a web-enabled-wireless telephone (WAP browser), then user agent **202** can be configured to convert the request from customer **110** in WML format into an XML message.

[**0026**] As will be described in greater detail below, transaction engine **204** then processes the XML message to execute the transaction request with merchant **120**. In this manner, customer **110** can request goods and/or services from any number of merchants **120** by interacting with user agent **202**. Additionally, as will be described in greater detail below, transaction engine **204** can accommodate merchants **120** with varying requirements for conducting transactions while providing customer **110** with a more uniform interface.

[**0027**] For example, assume that customer **110** wants to order a good and/or service from merchant **120**. Customer **110** can send an order request to user agent **202** to order the good and/or service from merchant **120**. User agent **202** receives this order request from customer **110** and converts it into an XML message. User agent **202** then sends this XML message to transaction engine **204**. As alluded to above, user agent **202** can provide customer **110** a single uniform order request. As also alluded to earlier and as will be described in greater detail below, transaction engine **204** can then process the uniform order request from customer **110** and execute the order with any number of merchants **120**, regardless of the particular ordering process that a merchant **120** may require.

[**0028**] Additionally, multiple transactions can be requested utilizing a single transaction request. For example, with reference to **FIG. 6**, an order request **602** can include multiple orders **604**, **606**, and **608** that specify different items, quantities, and merchants.

[**0029**] Furthermore, with reference again to **FIG. 2**, after submitting a transaction request with user agent **202**, customer **110** can disconnect from user agent **202**. As such, customer **110** need not remain connected until the transaction is completed with merchant **120**. As will be described in greater detail below, status on the transaction can be provided to customer **110** when customer **110** reconnects with user agent **202**. It should be recognized that customer **110** need not reconnect utilizing the same device that may have been used to initiate the transaction.

[**0030**] Thus far, user agent **202** has been described as converting requests received from customer **110** into messages that are sent to transaction engine **204**. It should be recognized, however, that user agent **202** can be configured to also convert messages received from transaction engine **204** into an appropriately formatted message for customer

110. For example, if customer **110** accesses user agent **202** through a web browser, then user agent **202** can be configured to convert the XML message received from transaction engine **204** into an HTML formatted message. Similarly, if customer **110** accesses user agent **202** through a web-enabled-wireless telephone (WAP browser), then user agent **202** can be configured to convert the XML message received from transaction engine **204** into a WML formatted message.

[**0031**] Furthermore, XML styles sheets (i.e., XSLs) can be utilized to customize the message for a particular customer **110**. Accordingly, user agent **202** determines the type of device customer **110** is utilizing, such as a desktop computer, a web-enabled telephone, a PDA, and the like. It then determines the format to utilize, such as HTML, WML, XML, Voice XML, and the like. User agent **202** can then convert the XML message to any appropriate format for each customer **110**.

[**0032**] In one preferred embodiment, user agent **202** can be implemented as a JAVA application server. However, it should be recognized that user agent **202** can be implemented as any number and type of application server.

[**0033**] As described above, the various transactions between customer **110** and transaction-aggregation system **102** can be modeled as transaction messages. More particularly, in the present embodiment, transactions are modeled as XML messages. Thus, as also described above, user agent **202** converts transaction requests received from customer **210** into XML messages. When these XML messages are received by transaction engine **204**, they are verified with their appropriate XML schemas. As such, transaction-aggregation system **102** includes XML schemas that correspond to the various XML messages that can be utilized to model the various transaction requests from customer **110**. In the present embodiment, these XML schemas are stored in a repository **206** that can be configured as a table, a database, and the like. Additionally, in the present embodiment, these XML schemas are located utilizing a Lightweight Directory Access Protocol (LDAP) system.

[**0034**] When user agent **202** converts a transaction request received from customer **110** into an XML message, it includes in the XML message a tag specifying the appropriate schema for that XML message. When the XML message is received by transaction engine **204**, it reads the tag and retrieves the appropriate XML schema from repository **206**. In this manner, the XML message can be verified to insure that it is well-formed and valid.

[**0035**] For example, assume that customer **110** has made an order request. Accordingly, user agent **202** converts the order request into an XML message that includes a tag specifying that an order schema corresponds to the XML message. As such, when transaction engine **204** reads the XML message, it retrieves the corresponding order schema from repository **206**. It then confirms that the XML message is a well-formed and valid order message.

[**0036**] Having received and examined the transaction message, transaction engine **206** then processes the transaction message. In accordance with one aspect of the present invention, transaction engine **204** can be configured to queue transaction messages before processing them. Accordingly, as alluded to earlier, customer **110** can disconnect after sending a transaction request to user agent **202**. When the transaction request is received by user agent **202**, it can be converted into a transaction message and sent to transaction engine **204**. The transaction message can then be queued in transaction engine **204** to be processed at a later time.

[**0037**] For example, if the transaction request involved communicating with merchant **120**, there may be a delay before the transaction request can be executed by merchant **120**. As such, rather than requiring that customer **110** remain connected and wait for merchant **120** to execute the transaction request, customer **110** can disconnect and transaction engine **204** can communicate with merchant **120** to have the request executed. In this manner, transaction-aggregation system **102** can facilitate asynchronous communication between customer **110** and merchant **120**.

[**0038**] In accordance with another aspect of the present invention, transaction engine **204** can be configured to process transaction messages in accordance with conditions and processes set forth in a process flow. More particularly, in one embodiment of the present invention, the processing of a transaction can be modeled as a graph. Based on this graph, a process flow for the transaction can then be generated.

[**0039**] For example, with reference to **FIG. 3, a** graph **300** depicts the processing of a transaction. As depicted in **FIG. 3**, graph **300** includes nodes **302** and edges **304**. Each node **302** of graph **300** represents a particular process to be performed in processing the transaction. Each edge can represent a condition that can be tested before performing the process set forth at a node **302**.

[**0040**] As will be described below in greater detail with regard to an example, a process flow can be generated based on graph **300**. More particularly, in the present embodiment, the process flow can be generated utilizing XML. In this manner, process flows can be generated to handle the processing of any transaction. However, it should be recognized that process flows can be generated without utilizing graph **300**.

[**0041**] With reference again to **FIG. 2**, in the present embodiment, process flows can be stored in repository **206** utilizing an LDAP system. It should be recognized, however, that process flows can be stored in any convenient storage device utilizing any convenient storage system.

[**0042**] As an example, assume again that the XML message received was an order message. As described earlier, transaction engine **204** identifies the XML message received from user agent **202** as an order message and matches the order message with its corresponding order schema. Then, transaction engine **204** processes the order message in accordance with an order-process flow.

[**0043**] With reference to **FIG. 4, a** graph **400** is depicted of an example order-process flow. As depicted in **FIG. 4**, graph **4** includes nodes **402** through **416** that correspond to processing of an order message. More particularly, node **402** corresponds to an "Entry" process in which the order message is read. Node **404** corresponds to a "GenerateOrderID" process in which an identification is associated with the order message. Node **406** corresponds to a "reply" process in which a reply message is sent to customer **110** (**FIG. 1**). Node **408** corresponds to an "addOrderToTable" process in which an order is added to a table in transaction-

aggregation system **102** (**FIG. 1**). Node **410** corresponds to a "fixMerchantConfig" process in which additional information relating to the merchant specified in the order message can be retrieved and added. Node **412** corresponds to a "placeOrderWithMerchant" process in which an order is placed with the appropriate merchant. Node **414** corresponds to a "updateOrderHistory" process in which the order history is updated for this order message. Node **416** corresponds to an "email" process in which an e-mail message is sent to customer **110** (**FIG. 1**).

[**0044**] With continued reference to **FIG. 4**, graph **400** also includes an edge **420** that connects node **404** and node **406**. Edge **420** corresponds to a "/mesg/header/@schema='ebp-.status'" condition, which is the same as a verification rule stating that the schema of the message is "ebp.status". Node **406** is activated only if the condition in edge **420** is true. All of the remaining edges in graph **400** have conditions that are always true.

[**0045**] With reference now to **FIG. 5**, an order-process flow **500** is depicted. As described above, order-process flow **500** can be generated based on graph **400** shown in **FIG. 4**. In the present embodiment, as depicted in **FIG. 5**, order-process flow **500** is written in XML. It should be recognized, however, that order-process flow **500** can be written in any convenient programming language and/or protocol.

[**0046**] With reference again to **FIG. 2**, as described above, a transaction message can be processed by transaction engine **204** based on a process flow. In the present embodiment, as will be described in greater detail below, transaction engine **204** executes a transaction by taking transaction messages and transforming them into one or more messages. As such, a transaction can be modeled as processes passing transaction messages to each other with some input messages and some output messages. As will be described in greater detail below, in the present embodiment transaction messages can be transformed utilizing an appropriate mapping algorithm.

[**0047**] As also described earlier, in a preferred embodiment of the present invention, transaction messages are generated utilizing XML. As such, these XML messages have corresponding XML schemas. Thus, in the present preferred embodiment, schema-based mapping can be utilized to map one or more XML messages into one or more XML messages.

[**0048**] More particularly, XML schemas contain meta-information about their corresponding XML messages, such as data types, structures, relationships between tags and elements, occurrence counts, range of permissible values, and the like. Therefore, in schema-based mapping, the meta-information contained in the schemas can be utilized to transform one or more XML messages into one or more XML messages. As alluded to above, it should be recognized that multiple XML messages can be mapped into a single XML message. Alternatively a single XML message can be mapped into multiple XML messages.

[**0049**] As an example, assume again that the transaction message is an order message. In processing the order request, additional customer and merchant information can be gathered. More particularly, the order message can contain some customer and merchant information, such as their names, address, phone number, and the like. However, additional information relating to existing customers and merchants can be available on transaction-aggregation system **102**. Alternatively, additional information can be obtained directly from customer **110** or merchant **120**.

[**0050**] Utilizing the mapping process describe earlier, a merchant-specific-order message can be generated based on the original order message and the customer and merchant information retrieved from transaction-aggregation system **102**. As alluded to earlier, a single order message can be mapped into multiple merchant-specific-order messages. Alternatively, multiple order messages can be mapped into a single merchant-specific order.

[**0051**] For example, with reference again to **FIG. 6**, order message **602** can include multiple orders **604**, **606**, and **608** that include different items, quantities, and merchants. As such, with reference now to **FIG. 7**, utilizing the mapping process described earlier, order message **602** can be mapped into three separate merchant-specific-order messages **702**, **704**, and **706**.

[**0052**] With reference now to **FIG. 8**, as described earlier, transaction engine **204** processes transaction messages by transforming one or more transaction messages into one or more different transaction messages. In some instances, however, transaction engine **204** may need to communicate with a device and/or system that does not directly accept transaction messages. As such, transaction-aggregation system **102** includes one or more process adapters **802**.

[**0053**] In accordance with one aspect of the present invention, process adapter **802** can be configured to communicate with transaction engine **204** utilizing transaction messages and communicate with devices and/or systems that do not accept transaction messages. Additionally, a process adapter **802** can be utilized as part of any process flow to execute any transaction. As such, process adapter **802** need not be specific to one specific transaction.

[**0054**] For example, in a web-based transaction, process adapter **802** can be configured as an HTTP adapter **802**. In accordance with one aspect of the present invention, HTTP adapter **802** simulates a browser to interact with web site **804**, which is associated with merchant **120**. As such, in response to transaction messages from transaction engine **204**, HTTP adapter **802** can interact with web site **804**. More particularly, as will be described in greater detail below, HTTP adapter **802** utilizes any convenient XML query process, such as XQL, to get data from and put data to web site **804**.

[**0055**] As an example, assume again that the transaction request from customer **110** is an order request. Also assume that the order request contained multiple orders to multiple merchants as depicted in **FIG. 6**. As described earlier, these multiple orders to multiple merchants are mapped into multiple merchant-specific-order messages utilizing the mapping process described above in accordance with a process flow, as also described above. Now assume that order **702** (**FIG. 7**) is to be executed. Assume that order **702** (**FIG. 7**) is an order for a good and/or service from merchant **120** and that web site **804** belongs to merchant **120**. As such, the order-process flow includes a process to retrieve an order-process flow specific to merchant **120**.

[**0056**] Assume now that to execute an order at web site **804**, web site **804** requires that a user login, fill a cart with

an item, and then check-out the cart. As such, with reference to **FIG. 9**, an order-process flow **900** specific to a particular merchant is depicted. In the present example, assume that order-process flow **900** includes a login process, a fill-cart process, and a check-out-cart process.

[**0057**] As such, with reference again to **FIG. 8**, to execute the order request, transaction engine **204** initiates HTTP adapter **802** to interact with web site **804**. As alluded to earlier, HTTP adapter **802** can be configured to act as a browser to interact with website **804**. Based on order **702** (**FIG. 7**), utilizing the mapping process described above, a new message is generated that includes the login name of customer **110**. This message is utilized by HTTP adapter **802** to login to web site **804**. If the login is successful, then HTTP adapter **802** returns a message indicating that the login was successful. Then, based on order **702** (**FIG. 7**), another message is generated that includes the item and quantity information. This message is then utilized by HTTP adapter **802** to fill the cart at web site **804**. When this process is completed, based on order **702** (**FIG. 7**), still another message is generated that includes the payment and shipping information. This message is then utilized by HTTP adapter **802** to check-out the cart from web site **804**. When the order is completed, then a message can be sent to customer **110** to indicate that their order has been fulfilled.

[**0058**] Additionally, as described with regard to an earlier example, transaction-aggregation system **102** can be configured to send an e-mail message to customer **110**. For example, with reference to **FIG. 4**, as described earlier, node **416** corresponds to sending an e-mail message to customer **110** noting that their order request has been executed. With reference again to **FIG. 8**, in accordance with one aspect of the present invention, process adapter **802** can be configured as an e-mail adapter **802**. Thus, in response to a transaction message from transaction engine **204**, e-mail adapter **802** can generate an e-mail message to customer **110**.

[**0059**] Although, process adapter **802** has been described as an HTTP adapter and an e-mail adapter, it should be recognized that process adapter **802** can be configured to communicate with devices and/or systems utilizing any convenient protocol. For example, process adapter **802** can be configured to access a database based on transaction message from transaction engine **204**.

[**0060**] Furthermore, in accordance with one aspect of the present invention, process adapter **802** can be configured to be transaction independent, meaning that any particular process adapter **802** can be utilized in processing any specific transaction. Thus, in this manner, a set of process adapters **802** can be configured such that they can be utilized to process any number and type of transactions.

[**0061**] As described above, transactions between customer **110** and merchant **120** can be modeled utilizing transaction messages. More particularly, as described above, transactions between customer **110** and transaction-aggregation system **102** can be modeled utilizing a first-transaction message. Transactions between transaction-aggregation system **102** and merchant **120** can be modeled utilizing a second-transaction message. Utilizing a mapping algorithm, the first-transaction message can be mapped into the second-transaction message through any number of intermediary messages that are internal to transaction-aggregation system **102**.

[**0062**] As described above, after receiving a transaction message from user agent **102**, transaction engine **204** processes the transaction message internally. More particularly, the transaction message can be mapped into any number of subsequent messages within transaction engine **204**. As also described above, in one preferred embodiment, transaction messages are XML messages. As such, in the present embodiment, these XML messages can be converted into JAVA objects. More particularly, as described above, transaction-aggregation system **102** includes XML schemas corresponding to the various XML messages utilized to model transactions. As such, JAVA objects can be generated based on these XML schemas and stored. Thus, when a particular XML message is received, transaction engine **204** can retrieve the appropriate JAVA object corresponding to that XML message. One advantage of converting the XML message into a JAVA object is that the JAVA object can be more quickly accessed than the XML message.

[**0063**] Additionally, as described above, the specific steps associated with performing any particular process can be set forth in process flows. As described above, these process flows can include processes for transforming messages and for utilizing process adapters to perform various tasks, such as interacting with web sites, accessing databases, sending e-mails, and the like. It should be recognized that a process flow can be linked to one or more process flows. As such, a new transaction can be modeled utilizing a set of existing process flows that are linked together. In this manner, a new process flow does not necessarily need to be created from scratch.

[**0064**] Thus far, the present invention has been described in conjunction with a web-based transaction where customer **110** accesses a web site on user agent **202**. It should be recognized, however, that the present invention can be utilized in conjunction with various types of e-commerce transactions.

[**0065**] For example, with reference to **FIG. 10**, transaction-aggregation system **102** includes a connector module **1002** that interfaces with a web-portal **1004**. Thus, in this manner, customer **110** can connect with transaction-aggregation system **102** through web-portal **1004** rather than directly through user agent **202**.

[**0066**] Additionally, it should be recognized that transaction -aggregation system **102** can be utilized in a non-web-based transactions. For example, transaction aggregation system **102** can be configured to connect to customer **110** and merchant **120** through a TCP/IP connection, a database connection, a direct connection, and the like.

[**0067**] Furthermore, although transaction-aggregation system **102** has been described in conjunction with conducting transactions in e-commerce, it should be recognized that transaction-aggregation system **102** can be configured to facilitate transactions in various applications. For example, customer **110** and merchant **120** can include parties that engage in transacting data and/or information without necessarily engaging in a commercial transaction.

[**0068**] In the description above, various process steps have been described. It should be recognized that each step and combination of steps can be implemented as computer program instructions. It should also be recognized that each step and combination of steps can also be implemented by

special purpose hardware-based computer systems that perform the specified functions or steps, or combination of special purpose hardware and computer instructions.

[0069] Additionally, although the present invention has been described in conjunction with particular embodiments illustrated in the appended drawing figures, various modifications can be made without departing from the spirit and scope of the invention. Therefore, the present invention should not be construed as limited to the specific form shown in the drawings and described above.

We claim:

1. A transaction aggregation system configured to execute transactions between a customer and a merchant as transaction messages, comprising:

a user agent configured to convert a transaction request received from said customer into a first-transaction message;

a plurality of message schemas;

a repository configured to store said plurality of message schemas; and

a transaction engine configured to:

receive said first-transaction message from said user agent;

map said first-transaction message into a second-transaction message using one of said message schemas stored in said repository; and

transmit said second-transaction message to said merchant, wherein said merchant executes said customer transaction request.

2. The system of claim 1, wherein said transaction aggregation system further comprises:

a process adapter configured to receive said second-transaction message from said transaction engine and translate said second-transaction message to communicate with a plurality of different merchants; and

a connector module for connecting said customer to said transaction engine.

3. The system of claim 1, wherein said customer transaction request comprises a plurality of transaction requests for a plurality of different merchants.

4. The system of claim 3, wherein said transaction engine processes said plurality of transaction requests according to conditions in a process flow.

5. The system of claim 1, wherein said transaction aggregation system facilitates asynchronous communication between said customer and said merchant.

6. The system of claim 1, wherein said customer can disconnect from said user agent after submitting said transaction request to said user agent using a first customer device and reconnect to said user agent using a second customer device to determine the status of said transaction request.

7. The system of claim 3, wherein said transaction engine queues said plurality of transaction messages to be processed a synchronously.

8. The system of claim 1, wherein said transaction engine maps said first transaction message into said second transaction message using schema based mapping, wherein meta-information contained in said schemas are utilized to transform said first transaction message to said second transaction message.

9. The system of claim 2, wherein said process adapter generates and transmits a transaction request status message to said customer.

10. A method for executing transactions between a customer and a merchant using transactions messages, comprising the steps of:

providing a user agent for converting a transaction request received from said customer into a first-transaction message;

storing a plurality of message schemas in a repository

providing a transaction engine for mapping said first-transaction message into a second-transaction message using one of said message schemas stored in said repository;

transmitting said second-transaction message to said merchant, wherein said merchant executes said customer transaction request.

11. The method of claim 10, comprising the additional steps of:

providing a process adapter for translating said second-transaction message to communicate with a plurality of different merchant devices and transmitting a transaction request status message to said customer.

12. The method of claim 10, comprising the additional step of providing a connector module for connecting said customer to said transaction engine.

13. The method of claim 10, wherein said customer transaction request comprises a plurality of transaction requests for a plurality of different merchants.

14. The method of claim 13, wherein said plurality of transactions requests are processed according to conditions in a process flow.

15. The method of claim 10, wherein said customer can disconnect from said user agent after submitting said transaction request to said user agent using a first customer device and reconnect to said user agent using the same customer device or a second customer device to determine the status of said transaction request.

16. The method of claim 13, wherein said transaction engine queues said plurality of transaction messages to be processed asynchronously.

17. The method of claim 10, wherein said transaction engine maps said first transaction message into said second transaction message using schema based mapping, wherein meta-information contained in said schemas are utilized to transform said first transaction message to said second transaction message.

18. A computer-readable storage medium containing computer executable code for implementing a transaction aggregation application by instructing a computer to operate as follows:

execute a user agent for converting a transaction request received from said customer into a first-transaction message;

execute a repository for storing a plurality of message schemas;

execute a transaction engine for mapping said first-transaction message into a second-transaction message by accessing and using one of said message schemas stored in said repository;

transmitting said second-transaction message to said merchant, wherein said merchant executes said customer transaction request.

19. The computer readable storage medium of claim 18, wherein said computer is further instructed to execute a process adapter for translating said second-transaction message to communicate with a plurality of different merchant devices and transmitting a transaction request status message to said customer.

20. The computer readable storage medium of claim 18, wherein said computer is further instructed to execute a connector module for connecting said customer to said transaction engine.

21. The computer readable storage medium of claim 18, wherein said customer transaction request comprises a plurality of transaction requests for a plurality of different merchants.

22. The computer readable storage medium of claim 21, wherein said computer is further instructed to process said plurality of transactions requests according to conditions in a process flow.

23. The computer readable storage medium of claim 18, wherein said customer can disconnect from said user agent after submitting said transaction request to said user agent using a first customer device and reconnect to said user agent using the same customer device or a second customer device to determine the status of said transaction request.

24. The computer readable storage medium of claim 22, wherein said computer is further instructed to execute said transaction engine to queue said plurality of transaction messages to be processed asynchronously.

25. The computer readable storage medium of claim 18, wherein said computer is further instructed to execute said transaction engine to map said first transaction message into said second transaction message using schema based mapping, wherein meta-information contained in said schemas are utilized to transform said first transaction message to said second transaction message.

26. The transaction aggregation system configured to execute transactions between a customer and a merchant as transaction messages, comprising:

a customer transaction request;

a first transaction message;

a second transaction message;

a user agent configured to convert said customer transaction request into said first transaction message;

a plurality of message schemas;

a process flow;

a repository configured to store said plurality of message schemas and said process flow;

a transaction engine configured to:

receive said first-transaction message from said user agent;

map said first-transaction message into said second-transaction message according to said process flow using one of said message schemas stored in said repository; and

transmit said second-transaction message to said merchant, wherein said merchant executes said customer transaction request.

27. The system of claim 26, wherein said transaction aggregation system further comprises:

a process adapter configured to receive said second-transaction message from said transaction engine and translate said second-transaction message to communicate with a plurality of different merchants; and

a connector module for connecting said customer to said transaction engine.

28. The system of claim 26, wherein said customer transaction request comprises a plurality of transaction requests for a plurality of different merchants.

29. The system of claim 26, wherein said transaction aggregation system facilitates asynchronous communication between said customer and said merchant.

30. The system of claim 26, wherein said customer can disconnect from said user agent after submitting said transaction request to said user agent using a first customer device and reconnect to said user agent using a second customer device to determine the status of said transaction request.

31. The system of claim 28, wherein said transaction engine queues said plurality of transaction messages to be processed asynchronously.

32. The system of claim 26, wherein said transaction engine maps said first transaction message into said second transaction message using schema based mapping, wherein meta-information contained in said schemas are utilized to transform said first transaction message to said second transaction message.

33. The system of claim 27, wherein said process adapter generates and transmits a transaction request status message to said customer.

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