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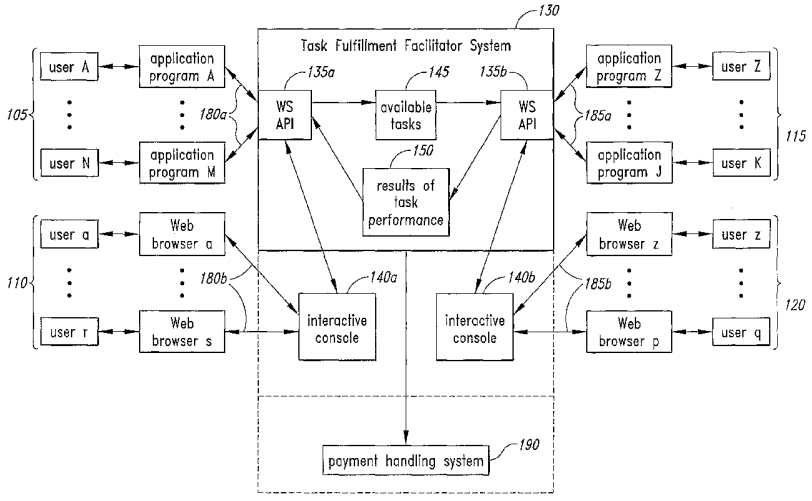
(54) Title: PROVIDING AN ELECTRONIC MARKETPLACE TO FACILITATE HUMAN PERFORMANCE OF PROGRAMMATICALLY SUBMITTED TASKS



(57) Abstract: A method, system, and computer-readable medium is described for facilitating interactions between task requesters who have tasks that are available to be performed and task performers who are available to perform tasks. In some situations, the tasks to be performed are human performance tasks that use cognitive and other mental skills of human task performers, such as to employ judgment, perception and/or reasoning skills of the human task performers. In addition, in some situations the available tasks are submitted by human task requesters via application programs that programmatically invoke one or more application program interfaces of an electronic marketplace in order to request that the tasks be performed and to receive corresponding results of task performance in a programmatic manner, so that an ensemble of unrelated human agents can interact with the electronic marketplace to collectively perform a wide variety and large number of tasks.

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PROVIDING AN ELECTRONIC MARKETPLACE TO FACILITATE HUMAN PERFORMANCE OF PROGRAMMATICALLY SUBMITTED TASKS

BACKGROUND

Technical Field

The following disclosure relates generally to facilitating interactions between computing systems, and more particularly to facilitating such interactions to enable performance by humans of tasks whose performance is programmatically requested, such as for tasks that are supplied by application programs via programmatic invocations to an electronic marketplace in order to receive results from the performance of the tasks.

Description of Related Art

Distributed computing systems are known in which multiple computer systems interact in order to achieve a goal. It is often desirable for an application program on a computer system to interact with remote systems and applications in order to obtain various types of information and functionality that are not part of the application program. By performing such interactions, an application program may be able to leverage information and functionality from vast numbers of other computer systems over the Internet or other networks.

In order to enable such interactions between remote computer systems and application programs, various programmatic interaction mechanisms have been developed. For example, remote procedure call ("RPC") protocols have long existed that allow a program on one computer to cause a program on another computer to be executed, and various object-oriented architectures such as CORBA ("Common Object Request Broker Architecture") and DCOM ("Distributed Component Object Model") provide similar capabilities. In addition, a variety of middleware programs have been implemented to connect separate applications (often of distinct types and from unrelated sources) to allow communication. For example, various EDI ("Electronic Data Interchange") networks exist that provide standard mechanisms to allow a computer system of one user of the network to send data to a computer system of another user of the network.

The widespread popularity of the World Wide Web ("Web") has provided additional opportunities for computers to inter-communicate. For example, much current Web use involves users interactively requesting Web

pages from Web servers (*e.g.*, via executing Web browser applications of the users) and receiving the requested information in response. In addition to such interactive user specification of requested information, there is also growing use of the Web to provide so-called "Web services," which typically involve the programmatic interaction of remote applications to exchange information via defined APIs ("application program interfaces"), or the like. Web services may allow heterogeneous applications and computers to interact, and can be defined and implemented using a variety of underlying protocols and techniques. For example, some Web service implementations return data in XML ("eXtensible Markup Language") format using HTTP ("HyperText Transport Protocol") in response to a Web service invocation request specified as a URI ("Uniform Resource Identifier"), such as a URL ("Uniform Resource Locator") that includes a specified operation and one or more query parameters. In other implementations, additional underlying protocols are used for various purposes, such as SOAP ("Simple Object Access Protocol") for standard message exchange, WSDL ("Web Services Description Language") for description of service invocations, and UDDI ("Universal Description, Discovery, and Integration service") for discovery of available services.

Unfortunately, while Web services and other programmatic interaction mechanisms allow various application programs and computers to interact, such interactions are typically limited in various ways. For example, the types of information and functionality that are available to be requested using such programmatic interactions are typically restricted to very limited types of requests that the remote computer systems and applications can automatically fulfill (*e.g.*, to provide a specified predefined group of information, such as a Web page or file, or to perform a specified database query on a specified database).

However, while such types of programmatic requests can be useful, there is a very large class of tasks which computers and application programs cannot easily automatically perform, but which humans can typically easily perform, referred to herein as "human performance tasks." This is due at least in part to various cognitive and other mental capabilities of humans that are not easily encoded in automated programs, such as the ability to use human judgment to form opinions, to perform abstract or common-sense reasoning, to perform various discernment and perception tasks (*e.g.*, visual and aural pattern recognition, such as based on experience), to use cultural awareness and emotional intelligence, and to perform various other everyday yet highly complex kinds of perception, cognition, reasoning and thinking.

One example of such a human performance task is identifying obscene content – in particular, despite the ability of a human observer to typically identify obscene content very rapidly based on a cursory review, automated techniques are largely unable to accurately identify most such content. In a similar manner, Justice Potter Stewart famously said of pornography that he could not explain exactly what it was, but "I know it when I see it," and the Supreme Court of Justice Stewart's era went on to establish a legal test for pornography that incorporates subjective community standards. Today, despite much effort into developing automated pornography and other content filters, no one has yet figured out a way to make a computer that really "knows it when it sees it."

Thus, given the existing limitations regarding automated performance of tasks, it would be beneficial to provide a solution that enables application programs to programmatically request that such tasks be performed and to receive programmatic responses with results of task performance, as well as that addresses other related problems.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A is a network diagram illustrating interactions and information flow for an example embodiment of the described electronic marketplace for human performance tasks.

Figure 1B is a block diagram illustrating an example embodiment of a system for providing the described electronic marketplace.

Figures 2A-2G illustrate examples of programmatic messages used to interact with an example embodiment of the described electronic marketplace.

Figure 3 is a block diagram illustrating a computing system suitable for executing an embodiment of a system for providing the described electronic marketplace.

Figures 4A and 4B are a flow diagram of an embodiment of Task Fulfillment Facilitator routine.

Figure 5 is a flow diagram of an embodiment of a Qualification Manager routine.

Figure 6 is a flow diagram of an embodiment of an Information Corroboration Manager routine.

Figure 7 is a flow diagram of an embodiment of an Activity Tracker routine.

Figure 8 is a flow diagram of an embodiment of an Automated Matcher routine.

Figure 9 is a flow diagram of an embodiment of a Task Submission Receiver routine.

Figure 10A-B is a flow diagram of an embodiment of a Task Interaction Controller Type Definer routine.

Figure 11 is a flow diagram of an embodiment of a Task Interaction Controller routine.

Figures 12A-12J illustrate examples of using multiple types of user interaction processing to control performance of a task by a task performer in an example embodiment of the described electronic marketplace.

Figure 13 is a block diagram illustrating an example system for providing an embodiment of the described electronic marketplace.

DETAILED DESCRIPTION

A software facility is described that facilitates interactions between task requesters who have tasks that are available to be performed and task performers who are available to perform tasks. In at least some embodiments, the tasks to be performed are cognitive human performance tasks that use cognitive and other mental skills of human task performers, such as to employ judgment, perception and/or reasoning skills of the human task performers. In addition, in at least some embodiments an intermediary electronic marketplace platform is provided that allows task requester users and task performer users to programmatically and/or interactively engage in task-related transactions and to perform various other activities related to performance of tasks.

In particular, in some embodiments one or more platform computing systems providing the electronic marketplace act as an intermediary to allow task requesters to programmatically request (*e.g.*, via programmatic invocations of one or more APIs of the electronic marketplace by application programs of the task requesters) that tasks be performed by human task performers and to receive corresponding results after the tasks are performed (*e.g.*, as responses to the programmatic invocations). Similarly, human task performers can access the electronic marketplace (*e.g.*, in a programmatic or interactive manner) to obtain data or other information about available tasks that they can perform and to provide the results of task performance after the completion of tasks that they are assigned. By enabling large numbers of unaffiliated or otherwise unrelated task requesters and task performers to interact via the intermediary electronic marketplace in this manner, free-market mechanisms mediated by the Internet or

other public computer networks can be used to programmatically harness the collective intelligence of an ensemble of unrelated human task performers.

The electronic marketplace further performs a variety of additional activities to facilitate the performance of tasks. For example, the electronic marketplace may track the progression of the tasks through various states (*e.g.*, an "open" state for tasks that are available to be performed, an "assigned" state for each assignment of a task to one or more task performers, a "completed" state for an assignment after the task performer provides the results of performance of the task, etc.), and may further take various actions corresponding to the tasks. In addition, in some embodiments a task requester user may impose various criteria regarding performance of a task (*e.g.*, required and/or preferred qualifications for task performers, time limits for task completion, etc.) and/or may specify various actions associated with task performance (*e.g.*, payment of a specified fee under specified conditions), and if so the electronic marketplace may enforce those criteria and initiate those actions as appropriate for the task. Similarly, task performer users may specify various actions related to tasks, such as to request that information about available tasks and/or about other users be provided in various ways (*e.g.*, to be notified when specified types of tasks become available), and if so the electronic marketplace may similarly initiate those actions as appropriate.

In some embodiments, the electronic marketplace further provides a variety of types of functionality related to obtaining and using information about qualifications and other attributes of task performer users and/or task requester users, such as to allow users to identify and/or specify types of users with whom to conduct transactions. For example, the electronic marketplace may track various information about activities by task performer users and/or task requester users in some embodiments, such as to automatically generate quantitative measurements of actions taken by the users that may be used as qualifications (*e.g.*, activities related to prior task performance). More generally, in some embodiments the electronic marketplace may support user qualifications of various types (*e.g.*, qualifications for a user that are asserted by that user, that are specified by one or more other users, and/or that are automatically generated by the electronic marketplace). Furthermore, in some embodiments the electronic marketplace provides functionality to authenticate or otherwise corroborate information about users (*e.g.*, users' qualifications, identities, non-qualification attributes, etc.), such as based on obtained evidence that supports that information, and may then use such corroborated information in various ways. Functionality provided by the

electronic marketplace related to qualifications and corroboration of user information is discussed in greater detail below.

Interactions between the electronic marketplace and users of the marketplace can occur in a variety of ways. As previously noted, in some embodiments task requesters interact with the electronic marketplace in a programmatic manner, such as by invoking defined APIs of the marketplace (*e.g.*, APIs based on Web services provided by the electronic marketplace) to send messages that request or supply data or other information. The defined APIs may allow the task requesters to not only submit tasks that are available to be performed, but also to perform various other actions with respect to previously submitted tasks (*e.g.*, check on the status of pending tasks, modify information about pending tasks, submit instructions regarding handling of pending tasks, and interactively obtain results for completed tasks). In addition, the defined APIs may allow task requesters to further perform various other types of interactions with the electronic marketplace, such as searching for and/or browsing for information of interest (*e.g.*, to identify available task performers having specified qualifications or attributes, or to identify information about tasks submitted by other task requesters), supplying qualification information for themselves and/or for task performers, etc. In addition, while in some embodiments all communications between task requesters and task performers occur via the electronic marketplace, in other embodiments at least some communications may occur directly between a task requester and a task performer (*e.g.*, to allow a task performer to obtain information from a task requester regarding a task to be performed, to allow a task performer to provide task results information to a task requester for a task that has been performed, etc.) or more generally between any two or more users, such as after the electronic marketplace facilitates that direct communication (*e.g.*, by providing appropriate contact or other communication-related information to at least one of the parties to the communication).

In situations in which a final response is not immediately available to a programmatically supplied message (*e.g.*, a final response that includes results from performing a task that is submitted with the message), the electronic marketplace may in some embodiments provide an immediate response that acknowledges receipt of the message (*e.g.*, by providing a unique task identifier for a task being submitted), and may later provide one or more additional related electronic communications (*e.g.*, to provide the results from performing a task to the task requester who submitted the task). Such additional electronic communications can be performed in a variety of ways, such as by initiating a new

electronic message (*e.g.*, email, instant messaging, etc.), by using a callback mechanism supplied along with the original message, etc.

In at least some embodiments, the electronic marketplace may also provide an interactive console that allows task requesters to interactively perform some or all of the various types of actions previously noted, whether instead of or in addition to a programmatic interface that is provided for those actions. For example, in some embodiments the interactive console functionality may be accessed by a task requester user via a Web browser that interacts with a Web server for the electronic marketplace (*e.g.*, by supplying appropriate information in a form on a Web page from the electronic marketplace).

In a similar manner, task performer users may interact with the electronic marketplace in a variety of ways in order to identify available tasks of interest and to perform such tasks, whether in a programmatic and/or interactive manner. More generally, task performer users may similarly perform a variety of types of actions with respect to the electronic marketplace, including searching for and/or browsing for available tasks for which they are qualified, searching for and/or browsing for tasks from task requesters who have specified attributes, supplying qualification information, requesting assignments for available tasks of interest, supplying results from performance of tasks to which they have been assigned, requesting notifications of later-submitted tasks for which they are qualified, providing various types of preference information, etc. Additional details regarding specific types of interactions with the electronic marketplace by task requester and task performer users are discussed in greater detail elsewhere.

Figure 1A provides a high-level overview of types of interactions by task performers and task requesters in one example embodiment. In particular, a Task Fulfillment Facilitator ("TFF") system 130 is operating in this example embodiment to facilitate task-related interactions, such as by providing an electronic marketplace for cognitive human performance tasks and/or other types of human performance tasks. In this example embodiment, the TFF system provides an API 135 for programmatic interactions with users, and an interactive console interface 140 is also available for interactive communications. The TFF system may be implemented in various ways in various embodiments, such as a software system executing on one or more server computing systems or devices (*e.g.*, in a distributed manner, such as on a peer-to-peer or grid network), not shown.

In particular, in this example a variety of human task requester users 105 are each interacting with one or more application programs executing on one

or more task requester client computing systems (not shown) in order to request that tasks be performed by registering or otherwise submitting the tasks to the TFF system, as well as to perform various other interactions with the TFF system. To submit the tasks or perform other interactions, the application programs each programmatically invoke 180a one or more Web services ("WSes") that are part of TFF system's API 135a in this example embodiment. As discussed in greater detail elsewhere, each of the task requests may include a variety of information about the task to be performed, including one or more qualifications needed by any human task performer who performs the tasks, one or more other criteria related to task performance (*e.g.*, deadlines for completion and requirements for the format of results from the task performance), and one or more associated fees to be provided to the human task performers who successfully perform the task.

Similarly, in the illustrated embodiment other task requester users 110 submit available tasks and perform other interactions with the TFF system in an interactive manner via Web browser programs executing on one or more task requester client computing systems (not shown) that communicate 180b information supplied by the users to an interactive console 140a, with the console then interacting with the API 135a of the TFF system in a manner similar to that of the interactions 180a by the application programs. In the illustrated embodiment, the console is provided as part of the TFF system (whether on the same or different computing systems used for other parts of the TFF system), such as based on one or more Web pages provided by a Web server of the TFF system. In other embodiments, however, one or more such consoles or other mechanisms to interact with the TFF system may instead by provided externally to the TFF system, such as by third parties (whether instead of or in addition to any console(s) provided by the TFF system). After receiving the information for the available tasks being submitted via the API 135a, the TFF system stores information 145 about the available tasks for use by task performers. While not illustrated here, some task requester users may be part of both group 105 and group 110 by interacting with the TFF system in both programmatic and interactive manners, such as at different times and/or for different purposes.

Figure 1A also illustrates various human task performer users who interact with the electronic marketplace to perform available tasks. In particular, in this example various task performer users 120 each interact with a Web browser program executing on a task performer client computing system (not shown) that communicates 185b with an interactive console 140b of the TFF system, such as to identify tasks that are currently available for which they are qualified and to

provide information about results of performance of tasks to which they have been assigned. As with console 140a, console 140b then interacts with an API 135b of the TFF system to provide information supplied by the task performer users to the TFF system. In this illustrated embodiment, other task performer users 115 instead directly interact programmatically with the TFF system via API 135b in order to perform activities related to task performance, such as by each using one or more application programs executing on one or more task performer client computing systems (not shown) that programmatically invoke 185a appropriate Web services that are part of the API 135b. While illustrated separately in this example, consoles 140a and 140b may in some embodiments be part of a single console provided by the TFF system, and the APIs 135a and 135b of the TFF system may similarly each be portions of a single API 135 for the system. In addition, while not illustrated here, some task performer users may be part of both group 115 and group 120 by interacting with the TFF system in both programmatic and interactive manners, such as at different times and/or for different purposes. In addition, some users may serve as both task requesters and task performers, such as for different tasks.

Based on the interactions with the human task performers, the TFF system tracks information about the current status of tasks, such as by updating information 145 about available tasks, and stores results 150 from the performance of tasks that are received via interface 135b. After a task is performed and corresponding results are received, the TFF system can notify the task requester that supplied that task of the results in a variety of ways. For example, in some embodiments the results are provided to task requesters via the interactive console 140a when the task requesters next interact with the console. Alternatively, task performance results may instead be electronically sent to the task requesters via the API 135a as a response to a prior invocation, or may instead be sent to task requesters in any other way that provides the information to the task requesters in a timely manner (*e.g.*, via email, telephone, fax, postal mail, etc.).

In addition, the TFF system in the illustrated embodiment facilitates the exchange of payments between parties to transactions involving tasks, such as between task requesters and task performers (*e.g.*, to provide payments to the task performers from the task requesters for satisfactory performance of submitted tasks). In the illustrated embodiment, the TFF system may include internal payment handling capabilities, such as via a payment handling system 190, although in other embodiments the TFF system may instead interact with an

external payment handling system (whether from the same organization that provides the TFF system or instead from a third party) to provide the payments. In some situations, task performance payments may be made automatically after a task is performed (*e.g.*, after automated verification is performed by the TFF system on received task results to ensure that any criteria for the task have been met), while in other situations the payments may instead be made only after the task requester has reviewed and accepted the results (or failed to reject the results after a specified period of time). In addition, as described in greater detail elsewhere, a variety of other types of payments may be made in other situations, such as payments from task performers, payments to or from the TFF system (*e.g.*, for services provided by the system), and/or payments to or from one or more third parties.

Moreover, a variety of types of non-monetary compensation (*e.g.*, for performance of tasks) and other non-monetary rewards may also be used in other embodiments, whether provided by task requesters (*e.g.*, for performance of submitted tasks), task performers (*e.g.*, for the opportunity to perform tasks), the TFF system (*e.g.*, for specified types of user activities), and/or third parties to transactions related to task performance. In particular, in some embodiments compensation to one or more task performers for performance of one or more tasks may include credit and/or discounts for use at one or more online retailers (*e.g.*, a Web merchant affiliated with the TFF system), such as to allow those task performers to purchase and/or rent goods and services for themselves and/or for others as gifts. In addition, in some embodiments such compensation and/or information about such compensation (*e.g.*, a promise to provide such compensation at a future time when specified conditions are satisfied) may also be provided immediately or substantially immediately to a task performer or other recipient of the compensation, such as to allow the recipient to immediately use the compensation for a retail transaction. In other situations, a reward for performance of a task may include recognition of the task performer (*e.g.*, by display information about specified activities of the task performer and/or a ranking of the task performer relative to other task performers), such as a task performed for a task requester that is a charity or that otherwise benefits a charitable cause or other beneficial entity or activity.

Figure 1B illustrates examples of various types of modules and functionality for one example embodiment of the TFF system 130. In particular, the illustrated embodiment of the TFF system includes a module 131 that receives requests and information from users via the API 135 of the TFF system, and

handles the requests and information as appropriate (*e.g.*, by implementing business logic and/or workflow processing for a specific embodiment, or by providing or otherwise producing requested information, such as to produce information related to tasks to be performed and/or related to results of task performance). For example, as tasks are submitted by task requesters via the API, the module 131 stores information about the available tasks in a database 145, and further stores any additional associated information for the tasks (*e.g.*, information to be analyzed or manipulated as part of a task) in a database 146. Information about available tasks may then be provided to users by the module 131 via the API, such as in response to requests from task performers and/or task requesters that are received via the API (*e.g.*, requests to access information about a specified task, or to search or browse for various tasks). In addition, when task performers provide results from performance of tasks via the API, the module 131 stores the task results information in a database 150, and may further provide information about the results to users (*e.g.*, the task requesters that submitted the tasks) as appropriate via the API.

The module 131 may also provide a variety of types of functionality other than exchanging task and task result information with users. For example, the module 131 may receive various types of information about users via the API (*e.g.*, evidence of a user's identity, qualification information for users, payment source and/or repository information for a user, demographic information, user preferences, etc.), such as when users initially register with the TFF system to act as task performers and/or task requesters. In the illustrated embodiment, the module 131 then stores the user qualification information in database 147 and the other user information in database 148 (although in other embodiments the information may be stored in other ways), and may then provide such information to users when appropriate via the API, such as in response to search and/or browse requests. A variety of other types of information may also be available (*e.g.*, information about users' accounts with the TFF system, aggregate information about groups of related users or all users, information about historical activities of specific users and/or groups of users, summary and overview information about tasks that have been performed, etc.), and if so the module 131 may similarly provide such information to users when appropriate via the API.

In the illustrated embodiment, the TFF system further includes various additional modules that provide additional types of functionality, such as to assist the module 131, although in other embodiments some or all of the additional modules and/or additional types of functionality may not be included, or may be

combined together in different manners. As one example, the illustrated embodiment of the TFF system includes an Access Control Manager module 136 to assist in controlling access to various functionality and stored information, such as based on specific access policies specified by users for specific pieces of information and/or based on default policies of the TFF system. In particular, after a user's identity and/or other relevant information is determined (whether by the Access Control Manager module, module 131, or other entity such as an external system affiliated with the TFF system or provided by a third party), the Access Control Manager module may assist in determining whether the user is allowed to access TFF system information based on that determined user information, with the module 131 providing information to users only when they are authorized to receive it. Access control information can be specified for various types of information in various ways, such as for information about users (*e.g.*, as specified by those users), tasks (*e.g.*, as specified by the task requesters that submitted the tasks), results of task performance (*e.g.*, as specified by the task requesters that submitted the tasks and/or task performers that performed the tasks), etc.

The illustrated embodiment of the TFF system also includes a User Interaction Manager module 134 to assist in managing at least some types of interactions with users. For example, in some embodiments task requesters and/or task performers may be allowed to specify preferences and/or requirements for how certain types of task-related interactions are to occur, such as to allow a task requester to specify how a submitted task is to be presented to a task performer and/or how results from the task performer are to be obtained. In embodiments in which the TFF system includes one or more consoles (not illustrated here) with which users interact during the task performance process, the User Interaction Manager module may further be included with or otherwise affiliated with one or more of the consoles to facilitate those user interactions with the consoles. In addition, while in the illustrated embodiment the User Interaction Manager module operates in conjunction with the module 131 to control particular types of interactions in a user-configurable manner, in other embodiments the module 131 may instead directly include some or all of the types of functionality provided by the User Interaction Manager module.

To facilitate the control of user interactions, the User Interaction Manager module in the illustrated embodiment provides various predefined Task Interaction Control ("TIC") types (not shown) that each include a combination of multiple types of processing related to task performance, and allows task requesters to specify a TIC type for use with each task that is submitted. When a

task is later to be performed by a human task performer, the User Interaction Manager module then controls the interactions with the human task performer by performing the types of processing specified by the TIC type associated with the task. The types of user interaction processing may include, for example, manipulating information associated with a task in a specified manner before it is provided to a task performer (*e.g.*, to format the information in a specified manner), providing the manipulated information to the task performer in a specified manner (*e.g.*, by invoking an applet or other functionality on a computing system of the task performer that controls the display or other presentation of the manipulated task information to the task performer), obtaining results of task performance from the task performer in a specified manner (*e.g.*, as input to a CGI ("Common Gateway Interface") program), and manipulating obtained task results before they are provided to the task requester (*e.g.*, to format the information in a specified manner). Multiple predefined alternatives may be provided for each of the types of user interaction processing, and users may further be allowed to define new TIC types based on specified combinations of predefined alternatives and/or by using new processing information supplied by the users. Other information regarding management of task-related interactions with users is discussed in greater detail elsewhere.

The illustrated embodiment of the TFF system further includes a User Qualification Manager module 133 to assist in specifying qualifications of users, such as qualifications of task performer users related to performing tasks and/or qualifications of task requester users related to submitting available tasks and to handling results from performance of tasks. In particular, in the illustrated embodiment the User Qualification Manager module allows users to specify new qualification types, as well as to issue or assert specific qualifications of users of those qualification types (or of predefined qualification types in embodiments in which the TFF system provides them). Information about user-specified qualification types and specified user qualifications is then stored in the illustrated embodiment in database 147, and may be used by task requesters and/or task performers who have access to that information (*e.g.*, to search for users having specified qualifications, to identify preferred or required qualifications for task performers who perform tasks, to identify preferred or required qualifications for task requesters who have submitted tasks, etc.). As discussed in greater detail elsewhere, in some embodiments the TFF system may further assist in specifying user qualifications based on numerical assessments of prior task-related activities by tracking information about the occurrences of such activities. Other information

regarding qualification types and qualifications is discussed in greater detail elsewhere.

The illustrated embodiment of the TFF system also includes a User Information Corroboration Manager module 137 to assist in authenticating or otherwise corroborating information about users, such as identities of users, specified qualifications of users, and other types of attributes of users. In particular, in the illustrated embodiment the User Corroboration Manager module obtains various information that may serve as evidence for one or more pieces of information about users, such as from users that supply the evidence via the API to corroborate particular pieces of user information, and may then use that information for corroboration purposes in various ways. For example, in some embodiments corroborative information may be provided to users along with the information that it corroborates, such as to allow a recipient to evaluate the corroborative value of that information. Alternatively, in some embodiments and for some types of corroborative information, the Information Corroboration Manager module may automatically make an assessment of a degree and/or type of corroboration provided by the information. After a piece of user information has been sufficiently corroborated, it can be used in various ways, such as to provide indications to others about the degree or type of corroboration for the information, to limit some types of functionality to users who have sufficiently corroborated information (*e.g.*, to require that task performers for a task have a sufficiently corroborated qualification, or to limit some types of access to information to users' whose identities have been sufficiently corroborated), etc. Other information regarding corroboration of user information is discussed in greater detail elsewhere.

A Task and User Matching Manager module 132 is also illustrated in the example embodiment of the TFF system to assist in matching available tasks to be performed and available task performers who can perform the tasks. The matching of tasks and task performers can be performed at various times and in various ways. For example, in some embodiments the matching may be performed in response to requests from task performer users for tasks that meet specified criteria, with the matching tasks provided to the task performer users as candidates that they can select to perform. Alternatively, in some embodiments the matching may be automatically performed for at least some types of tasks when the tasks are submitted, such as to assist in quickly identifying one or more task performers to perform the tasks. In addition, in some embodiments the matching may be performed by matching information about the tasks and the task

performers, such as by identifying task performers having qualifications that meet or exceed any required qualifications specified for a task. In other embodiments the Matching Manager module may use additional information (*e.g.*, information about task requesters that submit tasks, preferences of task performers and/or task requesters, preferred but not required criteria specified for tasks, etc.) when performing matching and/or perform various additional activities related to matching. Other information regarding matching of tasks and task performers is discussed in greater detail elsewhere.

The illustrated embodiment of the TFF system further includes several other modules that provide additional types of functionality to assist operation of the system. For example, the illustrated embodiment includes an Activity Tracking Manager module 138 that tracks a variety of types of activities (*e.g.*, each activity taken by a user with respect to a submitted task) and stores the tracked information in an activity log database 149. The Activity Tracking Manager module or other part of the system can then analyze the logged information to determine various types of aggregate or summary information (*e.g.*, for specific users, groups of users, all users, types of tasks, groups of related tasks, etc.), and make that aggregate or summary information available to users as appropriate. The illustrated embodiment also includes a Notification Manager module 139 that provides notifications to users as appropriate, such as to notify task performers when new tasks that meet specified criteria become available, to notify task requesters when results of performance of their previously submitted tasks are available, etc. The notifications can be performed in various ways in various embodiments, such as via a console or programmatic interface of the TFF system, or via other electronic communication mechanisms (*e.g.*, cellphone, email, instant messaging, etc.). The illustrated embodiment also includes a Reward Manager module 142 that tracks information about compensation and other rewards for users based on their activities, such as to maintain a financial repository for each user for use in providing or receiving monetary compensation. In addition, the illustrated embodiment includes an Accounting Manager module 141 to perform various administrative functions for the system, such as to obtain financial payments or other reward information from users.

Figure 3 illustrates a server computing system 300 suitable for executing an embodiment of the TFF system facility that provides an electronic marketplace for human performance tasks, as well as various task requester computing systems 350, task performer computing systems 370, and other computing systems 390. In the illustrated embodiment, the server computing

system 300 includes a CPU 305, various I/O devices 310, storage 320, and memory 330. The I/O devices include a display 311, a network connection 312, a computer-readable media drive 313, and other I/O devices 315.

An embodiment of the TFF system 340 is executing in memory, and it interacts with the other computing systems over the network 380 using the network connection 312 (*e.g.*, via the Internet and/or the World Wide Web). In particular, users of task requester computing systems 350 may interact with the TFF system in order to provide information about available tasks to be performed, such as by using application program 359 executing in memory 357 to send stored task information 355 (*e.g.*, information about the task, any associated criteria, any reward for successful performance, etc.) and related information 356 (*e.g.*, information to be analyzed by human task performers as part of the tasks) on storage 354. Human task performer users similarly use task performer computing systems 370 to interact with the TFF system, such as via a program 379 (*e.g.*, a Web browser) in memory 377 to programmatically or interactively obtain information about available tasks and provide results information for performed tasks. When information is received at the computing system 370 about available tasks, the information is stored in this example embodiment with current task information 375 in storage 374 (*e.g.*, temporarily until performance of the task is completed).

The TFF system and its modules (not shown) may also access and use various task-related and user-related information on storage 320 or elsewhere, such as information stored in one or more databases 321. In addition, in some embodiments the TFF system may also interact with other optional systems 332 executing in memory 330 and/or other optional computing systems 390 to perform additional related functionality, such as to perform payment processing in order to provide payments to human task performers on behalf of task requesters and/or to obtain qualification information from third-party qualification issuing authorities.

Those skilled in the art will appreciate that computing systems 300, 350, 370 and 390 are merely illustrative and are not intended to limit the scope of the present invention. The TFF system may instead be executed by multiple interacting computing systems or devices, and computing system 300 may be connected to other devices that are not illustrated, including through one or more networks such as the Internet or via the World Wide Web ("Web"). More generally, a "client" or "server" computing system or device may comprise any combination of hardware or software that can interact, including (without limitation) desktop or other computers, network devices, PDAs, cellphones, wireless phones, pagers,

electronic organizers, Internet appliances, television-based systems (*e.g.*, using set-top boxes and/or personal/digital video recorders), and various other consumer products that include appropriate inter-communication capabilities. In addition, the functionality provided by the discussed TFF system modules may in some embodiments be combined in fewer modules or distributed in additional modules. Similarly, in some embodiments the functionality of some of the modules may not be provided as part of the TFF system and/or other additional functionality may be available.

Those skilled in the art will also appreciate that, while various items are discussed or illustrated as being stored in memory or on storage while being used, these items or portions of them can be transferred between memory and other storage devices for purposes of memory management and data integrity. Alternatively, in other embodiments some or all of the software modules and/or components may execute in memory on another device and communicate with the illustrated computing system via inter-computer communication. Some or all of the system modules and/or data structures may also be stored (*e.g.*, as software instructions or structured data) on a computer-readable medium, such as a hard disk, a memory, a network, or a portable media article to be read by an appropriate drive or via an appropriate connection. The system modules and data structures can also be transmitted via generated data signals (*e.g.*, as part of a carrier wave or other analog or digital propagated signal) on a variety of computer-readable transmission mediums, including wireless-based and wired/cable-based mediums, and can take a variety of forms (*e.g.*, as part of a single or multiplexed analog signal, or as multiple discrete digital packets or frames). Such computer program products may also take other forms in other embodiments. Accordingly, the present invention may be practiced with other computer system configurations.

As previously noted, in at least some embodiments human task requesters submit tasks to the electronic marketplace that are available to be performed by human task performers. The types of tasks that can be submitted and performed may vary in various embodiments. In particular, in some embodiments the tasks are each cognitive human performance tasks that use cognitive and/or other mental skills of human task performers, such as to use human judgment capabilities to form an opinion related to one or more subjective bases, to use human discernment and/or perception skills to select information (*e.g.*, by analyzing audio and/or video information, such as to perform pattern recognition), to use human reasoning skills (*e.g.*, based on common-sense reasoning), etc. More generally, in at least some embodiments the tasks to be

performed are human performance tasks that are selected based on their susceptibility to performance by humans, whether because automated systems are not currently capable of performing the tasks or because human task performers can perform the tasks more cheaply, rapidly, and/or accurately. For example, while automated text translation tools may translate text between languages at a limited level of proficiency, human translators with appropriate qualifications may be able to perform the translations with a significantly higher proficiency level. In addition, in some embodiments some or all of the tasks include questions to be answered by the task performers, such as to select from an enumerated set of potential answers or to more generally generate an appropriate answer. The results of task performance can also take various forms in various embodiments, including answers to questions, a selection by a task performer of one or more options provided as part of the task, a manipulated form of information provided to the task performer, a categorization or other analysis of information provided to the task performer, etc. Additional information regarding tasks and task results is discussed elsewhere.

For illustrative purposes, some embodiments are described below in which a specific form of electronic marketplace provides various specific types of capabilities and functionalities with respect to various specific types of tasks, and interacts with task requesters and task performers in specific types of ways. However, those skilled in the art will appreciate that the techniques of the invention can be used in a wide variety of other situations, including with other types of tasks, with types of programmatic interfaces and/or access mechanisms that do not use Web services, and in situations other than with an electronic marketplace, and that the invention is not limited to the exemplary details provided.

Figures 2A-2G illustrate examples of programmatic messages used to interact with an example embodiment of an electronic marketplace for human performance tasks, with the message contents formatted in XML to use various example types of XML tags. In other embodiments, similar types of information could be formatted in other ways, and a variety of additional types of messages may similarly be used to provide other types of information and obtain other types of functionality from the electronic marketplace.

In particular, Figure 2A illustrates an example of a task submission message that a task requester can programmatically provide to the electronic marketplace in order to describe a task that is available to be performed. In this example, the task is of a type identified by the task requester as being "ImageChoice" (as shown in line 5), such as based on a previous specification by

the task requester of that task type or instead based on a predefined type of task provided by the electronic marketplace. The task in this example involves answering the question of which one of 4 specified photographs best shows a specified subject (which in this example is a business in Seattle by the name of "Wildboar Tavern," as indicated in lines 30-37), with the answer being the selected photograph. The task may be, for example, one of thousands or millions of related tasks for a task requester who is creating a directory of businesses with associated photographs. As discussed in greater detail later, Figure 12A illustrates an alternative example of encoding task information for a similar type of task.

In this example, the message identifies the task requester in line 2 of the message as having an ID of "BarnabyPhoto", specifies details regarding the task in lines 29-44, and specifies information in lines 4-28 regarding criteria and other associated information for the task. A verbal description of the task is provided in lines 7-8, an indication of payment compensation for successful performance of the task is provided in lines 9-12 (which in this example is 6 cents, to be provided to the task performer after approval of the results of task performance by the task requester), and an estimate of the time needed to complete the task is indicated in line 13 to be 30 seconds. The message also indicates various criteria in lines 17-23 regarding task performers who are allowed to perform the task, which in this example does not include any specific qualification criteria (as shown in line 22) or any specific task performers who are identified as being allowed to perform the task (as shown in line 18), but does specify one task performer in lines 19-21 who is excluded from performing the task. Timeout information in lines 24-27 indicates that the task will remain open for performance for 172,800 seconds (or 48 hours), but that an assignment of the task to a task performer will be kept open for only 60 seconds before the task becomes available to others. The message further indicates in lines 39-42 the supplied photographs to be analyzed, and in lines 15-16 indicates an application that will provide functionality for comparing the images (*e.g.*, by displaying all four photographs along with a control for indicating which photograph was selected). In response to submitting this message, the task requester receives a message (not shown) indicating that the task information was received and including a unique task ID of "109234875" that was generated for referencing the task.

Figure 2B illustrates an example message that a task requester may programmatically supply to the electronic marketplace in order to determine the status of various tasks previously submitted by the task requester. In this example, the previously discussed task requester whose ID is "BarnabyPhoto" has

supplied previous tasks that were also of type "ImageChoice", and is gathering information about the performance of those tasks. The message in this example identifies the task requester in line 2, and lines 3-11 indicate to perform a search and provide information about tasks of type "ImageChoice" that have been submitted by the task requester and that have been completed. In response, the task requester will receive a message (not shown) including information about each of the tasks matching those specified criteria.

Figure 2C illustrates an example message that is later provided to the task requester to give task results from performance of the task illustrated in Figure 2A, such as after receiving a similar message from a task performer to whom the task was assigned. In particular, line 3 of this example message indicates the task ID for the task to which the results correspond, line 5 identifies the task performer as being "BestManBryan", and in line 6 indicates that the task performance has been completed. Lines 7-10 indicate the actual results of the task, which in this example includes an indication of a particular photograph that was selected, as well as a corresponding ID supplied by the task requester for the business being identified (in line 31 of the message illustrated in Figure 2A).

Figure 2D next illustrates an example message sent back to the electronic marketplace from the task requester to indicate that the results are acceptable by closing the task, which in this example triggers the payment of 6 cents to be provided to the human performer for the task performance. If the task requester had instead been unsatisfied with the results, the task requester could have rejected the prior performance result and instead made the task again available for performance to other task providers.

Figures 2E-2G next illustrate examples of some messages that are programmatically exchanged with a task performer in order to identify and perform tasks of interest. In particular, Figure 2E illustrates an example message that a task performer can send to the electronic marketplace in order to identify available tasks, such as by indicating in lines 2-5 of this example message to perform a search for all tasks that are open and available, and to rank the available types of tasks by the number of each type that are available.

In response, the electronic marketplace may provide an example message as illustrated in Figure 2F, which indicates two types of available tasks. In this example, lines 3-6 of the message indicate that there are 400 available tasks related to selecting photographs or other images (*e.g.*, to match them to business locations), and lines 7-10 of the message indicate that there 80 available tasks related to translating text between French and English. In some

embodiments, all available tasks may be indicated to the task performer regardless of the qualifications of the performer, while in other embodiments only available tasks for which the performer is qualified and/or which the performer is authorized to access may be indicated (*e.g.*, if the performer in this example has a previously established associated qualification of having French to English translation abilities).

Figure 2G then illustrates an example message that a human task performer can use to request that an available task be assigned to them. While in some situations a human task performer may identify one or more specific tasks of interest (*e.g.*, by the task IDs of those tasks), in this example the human task performer indicates an available task by specifying criteria related to the task. In particular, this example message requests in lines 3-10 to assign and lock one of the open tasks for selecting images, and in particular to rank tasks of that type by their creation date so as to select the oldest available task of that type. After information about the task is provided to the human task performer (such as in a message similar to that of Figure 2A), the human task performer can make an appropriate selection and provide results of task performance to the electronic marketplace (such as in a response message similar to that of Figure 2C). It will be apparent that a variety of other types of messages could similarly be exchanged for various other types of functionality and using various other formats, and that similar types of messages could be used for a wide variety of types of tasks.

Figures 4A and 4B are a flow diagram of an embodiment of a Task Fulfillment Facilitator routine 400. The routine may, for example, be provided by execution of an embodiment of the TFF system 130 of Figures 1A and 1B and/or of TFF system 340 of Figure 3, such as to in this illustrated embodiment provide an electronic marketplace for human performance tasks by interacting with task requesters and task performers as appropriate to facilitate performance of tasks, as well as optionally to interact with other third-party systems as appropriate.

The routine begins in step 405, where an indication is received of information or a request, and in step 410 determines whether the sender of the information or request is authorized to perform requests of that type or provide information of that type, such as based on previously defined access controls for specific users or types of users. If the routine identifies the sender as authorized in step 415, the routine continues to step 420 to determine whether the received indication was a request to submit a task. If so, the routine continues to step 425 to store task information received in step 405, including any task criteria related to

task performance, information about any associated rewards for performance of the task, and any associated information to be analyzed or manipulated as part of the task.

The routine then continues to step 430 to determine whether to perform automated matching to identify task performers who are appropriate to perform the task, such as based on the type of task submitted and/or an explicit request by the submitter of the task, although in other embodiments such automated matching functionality may not be provided. In the illustrated embodiment, if automated matching is to be performed, the routine continues to step 435 to execute an Automated Matcher routine, and in step 440 then receives identifications from the Automated Matcher routine of any identified task performers. The routine then notifies those identified task performers of the task in an appropriate manner (*e.g.*, based on previously specified user preferences for those task performers). After step 440, or if it was instead determined in step 430 that automated matching was not to be performed, the routine continues to step 490.

If it was instead determined in step 420 that the received indication was not to submit a task, the routine continues instead to step 445 to determine whether a request was received to perform an update for an existing task, and if so continues to step 450 to perform the update as appropriate. Such updates may take a variety of forms, such as to modify information about or delete a pending task that has not been performed, to perform an indicated activity related to a task (*e.g.*, to cause a reward to be provided to a task performer after the task requester has reviewed and accepted the task results), etc. If it was instead determined in step 445 that the received indication was not to update an existing task, the routine continues to step 455 to determine whether the received indication was a request for information about one or more tasks and/or one or more users, such as for a search or browse request, a request for detailed information about a particular task or user, a request for summary or aggregate information about some or all types of tasks and/or users, etc. If so, the routine continues to step 460 to identify and obtain the requested information, and then continues to step 462 to determine whether the indicated recipient of the information is authorized to receive all of the obtained information, such as based on access controls associated with any aspects or elements of the obtained information (although in other embodiments the access determination may be made before or as part of the obtaining of the information). In step 464, the routine then removes any information for which the recipient is not authorized, and in step 466 sends any remaining information to the

recipient. In some embodiments, indications may be provided to the recipient of any removed information for which they were not authorized, while in other embodiments such indications may not be provided. After steps 450 or 466, the routine continues to step 490.

If it was instead determined in step 455 that the received indication was not a request for information about tasks or users, the routine continues instead to step 470 to determine whether the received indication was a request from a task performer to perform an indicated task. If so, the routine continues to step 471 to retrieve and provide information about the task to the task performer in an appropriate manner (*e.g.*, in a manner specified for the task), and in step 473 obtains results of performance of the task by the task performer. In step 475, the routine then determines whether to immediately send the task results to the task requester, such as based on information associated with the task and/or user preferences for the task requester. If so, the routine continues to step 477 to send the results. After step 477, or if it was instead determined in step 475 not to send the results to the task requester at this time, the routine continues to step 479 to optionally provide any reward associated with the task to the task performer in accordance with the task information, such as if such rewards are to be provided automatically upon receipt of the task results or instead if the task results satisfy any automatically verifiable criteria specified for the task that trigger the providing of the reward. After step 479, the routine continues to step 490.

While the illustrated embodiment indicates a synchronous flow in which the routine waits for and obtains task results in step 473 after sending the task information in step 471, in other embodiments the routine could be structured in other manners, such as to continue with other processing while waiting for task results (if any) to be sent. In addition, in some situations task performers may not provide task results for a task after they accept an assignment to perform the task, which may be indicated to the routine in an explicit message from the task performer that the task performer is abandoning or withdrawing from task performance or instead by not receiving task results within a specified period of time, and if so the routine would continue to handle other task-related requests and information. In addition, while not illustrated here, in other embodiments various types of notifications may be sent to task requesters related to their submitted tasks, such as when a task is assigned to a task performer for performance and/or when an assigned task is withdrawn from a task performer who has not completed the performance.

If it was instead determined in step 470 that the received indication was not to perform a task, the routine continues instead to step 480 to determine whether a request was received to specify information related to user qualifications, and if so continues to step 482 to execute a Qualification Manager routine to handle the qualification-related activities. If it was instead determined in 480 that the received indication was not to specify qualification-related information, the routine continues instead to step 484 to determine whether information or a request was received related to corroboration of user qualifications or other user information, and if so continues to step 486 to execute an Information Corroboration Manager routine to handle the corroboration-related activities. If it was instead determined in step 484 that the received indication was not related to corroboration, the routine continues instead to step 488 to perform another indicated operation as appropriate, such as from a task performer indicating a withdrawal from or abandonment of an assignment to perform a task, to specify various types of user information (*e.g.*, information related to a user's identity or attributes, information related to an account of a user with the TFF system, information related to specifying access controls for information and/or functionality, administrative requests related to system operations, requests for information related to monitoring performance of tasks or other operations of the system, etc.).

After steps 482, 486, or 488, the routine continues to step 490 to execute an Activity Tracking Manager routine to log information about activities that have occurred and to generate various types of review and summary aggregate information for the system related to tasks and users. After step 490, the routine continues to step 492 to perform any additional housekeeping operations, such as to take appropriate actions when events do not occur within specified periods of time (*e.g.*, to withdraw assigned tasks from task performers who do not timely perform the tasks, to provide rewards to task performers for tasks that they have performed when task requesters do not timely reject the task results provided by the task performers, etc.). After step 492, the routine continues to step 495 to determine whether to continue. If so, or if it was determined in step 415 that the sender was not authorized, the routine returns to step 405, and if not continues to step 499 and ends. While the illustrated embodiment may include tasks being specified one at a time, in other embodiments tasks may instead be specified in other manners, such as to allow multiple tasks to be submitted together (*e.g.*, to allow for batch processing), whether or not those tasks are related to each other.

Figure 5 is a flow chart of an embodiment of a Qualification Manager routine 500. The routine may, for example, be provided by execution of an embodiment of the User Qualification Manager module 133 of Figure 1B, such as to receive information related to user qualifications and handle the information as appropriate.

The routine begins in step 505, where an indication is received of information or a request related to user qualifications. In step 510, the routine then determines whether the received indication was a request from a user to define a new type of qualification for use with the system, such as for use by that user and/or other indicated users (or all users). If so, the routine continues to step 515 to obtain various information about the new qualification type and to store it for later use. As discussed in greater detail elsewhere, such qualification types may include a unique name, indications of one or more entities authorized to issue qualifications of that type, indications of a rating scale for how qualifications of that type may be rated, an indication of a particular system at which the qualification type is defined, (*e.g.*, the TFF system), etc.

If it was instead determined in step 510 that the received indication was not a request to define a new type of qualification, the routine continues instead to step 520 to determine whether the received indication was a request to specify a particular qualification for a particular user, such as from an issuing entity for qualifications of that type. As discussed in greater detail elsewhere, in some embodiments any user is allowed to author any qualification for any user (including themselves), with other corroborative and/or reputational information able to be used to determine how much weight to give to a particular qualification. If it is determined in step 520 that the received indication was related to specifying a qualification, the routine continues to step 525 to obtain the received qualification information and to store it for the indicated user. As discussed in greater detail elsewhere, such qualifications may include an indication of a qualification type for the qualification, of a rating or value for the qualification, the issuer of the qualification, an indication of a particular system that stores the qualification (*e.g.*, the TFF system), etc. After step 525, a determination is made in step 530 whether to attempt to corroborate the qualification information at this time, such as based on other information that may serve as evidence of the accuracy or validity of the qualification. If so, the routine continues in step 535 to execute Information Corroboration Manager routine 535, and if not continues to step 599. In other embodiments, such corroboration functionality may not be provided or may be performed at other times.

If it was instead determined in step 520 that the received indication was not a request to specify a qualification for a user, the routine continues instead to step 590 to perform another indicated operation as appropriate, such as to update information about or remove existing qualifications, or to provide information about user qualifications to a user or other system. In addition, in some embodiments the routine may issue qualifications to at least some users, such as based on past activities of the user with regard to the TFF system that had been tracked, such as automatically (*e.g.*, on a periodic basis) and/or in response to a received request from a user to issue one or more qualifications of a specified type for one or more specified user based on specified types of tracked activity, and if so could perform such qualification issuance in step 590. After steps 515, 535, or 590, the routine continues to step 599 and ends. While the illustrated embodiment may include qualifications and qualification type definitions being specified one at a time, in other embodiments qualifications and/or qualification type definitions may instead be specified in other manners, such as to allow multiple qualifications and/or qualification type definitions to be submitted together (*e.g.*, to allow for batch processing).

Figure 6 is a flow diagram of an embodiment of an Information Corroboration Manager routine 600. The routine may, for example, be provided by execution of an embodiment of the User Information Corroboration Manager module 137 of Figure 1B, such as to receive information and requests related to corroborating user qualifications and other types of user information, and to respond as appropriate.

The routine begins at step 605, where an indication is received of a corroboration request or of corroborative information for a specified type of user information. In step 610, the routine determines whether corroborative information was received, such as for a particular user qualification or other piece of user information. If so, the routine continues to step 615 to associate the corroborative information with the user qualification or other user information that it corroborates, such as for later presentation to others along with that user information to allow the recipient to assess its credibility.

The routine then continues to step 620 to determine whether to automatically assess a degree of corroboration provided by the corroborative information if possible, although in some embodiments such automatic assessment functionality may not be provided. In the illustrated embodiment, if the corroboration is to be automatically assessed, the routine continues in step 625 to analyze information about the corroborative information in order to assess a

degree of corroboration that the information provides for the user qualification or other information to which the corroborative information applies. For example, the analysis may be based at least in part on the type of corroborative information and indicators about the reliability of that information, such as the source of the information (and other associated information about the source, such as a reputation of the source). After step 625, the routine continues to step 630 to optionally combine the assessed degree of corroboration for the newly received corroborative information with any other corroborative information for each user qualification or other user information to which it applies in order to assess an overall degree of corroboration for those user qualifications or other user information, such as by using any of various information combination techniques (*e.g.*, averaging, weighted averaging, etc.).

If it was instead determined in step 610 that the received indication was not corroborative information, the routine continues instead to step 635 to determine whether a request was received to attempt to perform corroboration for indicated user information at this time, although in other embodiments such requests may not be handled. In the illustrated embodiment, if a corroboration-related request was received, the routine continues to step 640 to attempt to obtain appropriate corroborative information, and if it is determined in step 645 that it was obtained, the routine returns to step 615 to process the corroborative information. Attempts to obtain corroborative information may be performed in a variety of ways, such as based on the type of information to be corroborated (*e.g.*, attempting to corroborate a user's identity based on querying the user to provide evidence of the identity in various forms, attempting to corroborate a qualification of the user by testing the user with respect to that qualification, attempting to obtain information from a third party that may have additional related information, etc.).

If it was instead determined in step 635 that a corroboration-related request was not received, the routine continues instead to step 690 to perform another indicated operation related to corroboration as appropriate, such as to provide corroborative information or an assessed degree of corroboration to users or other systems. After steps 630 or 690, or if it was instead determined in step 620 not to assess the degree of corroboration or in step 645 that corroborated information was not obtained, the routine continues to step 699 and ends. While not illustrated here, in other embodiments additional types of functionality could be provided, such as to provide a response to the sender that provided the corroborative information or corroboration-related request in step 605, such as to

indicate the results of the analysis of provided corroborative information and/or the results of attempting to satisfy a received corroboration-related request. While the illustrated embodiment may include corroborative information being specified one piece at a time, in other embodiments corroborative information may instead be specified in other manners, such as to allow multiple pieces of corroborative information to be submitted together (*e.g.*, to allow for batch processing).

Figure 7 is a flow diagram of an embodiment of an Activity Tracker routine 700. The routine may, for example, be provided by execution of an embodiment of the Activity Tracking Manager module 138 of Figure 1B, such as to track user activities related to task performance. The routine begins at step 705, where an indication is received of one or more actions taken by task requesters and/or task performers since a last activity tracking analysis. The routine continues in step 710 to store the activity information and to update quantitative measurements and/or rankings for users that are affected by the indicated actions. The routine then continues to step 799 and ends. In some embodiments, the routine may be executed at various times, such as periodically, in response to an activity to be tracked and/or in response to a request to perform the routine.

Figure 8 is a flow diagram of an Automated Matcher routine 800. The routine receives indications of new task requests and attempts to automatically match the tasks to appropriate task performers. The routine may, for example, be provided by execution of an embodiment of the Task and User Matching Manager module 132 of Figure 1B, such as to match tasks and task performers as appropriate. In some embodiments, the routine may be performed in response to receiving new submissions of some or all tasks and/or at other times (*e.g.*, in response to requests to perform the matching). In addition, in some times the automated matching may be performed in other ways, such as to receive an indication of one or more task performers (*e.g.*, new task performers for the system) and to match appropriate tasks to those performers.

In the illustrated embodiment, the routine begins at step 805, where an indication is received of a new task. In step 810, the routine identifies one or more task performers whose qualifications satisfy any qualification criteria for the new task. In some embodiment the matching of qualifications may be performed without the routine understanding the meaning or context of the qualifications (*e.g.*, based on identifying qualifications from task criteria and for task performers that are of the same qualification type and that have compatible values or ratings), such as in embodiments in which the qualifications are of types defined by users. The routine then continues in step 815 to retrieve preference information for the

identified task performers to determine whether and how to notify them of the new task. In step 820, the routine notifies the identified task performers of the new tasks in accordance with the preference information. While not illustrated here, in other embodiments the automated matcher subroutine could further automatically assign new tasks to one or more human task performers as appropriate, such as based on prior requests by the task performers. In addition, in some embodiments the automated matcher routine may perform one or more of the indicated activities for a fee, such as from the task requester who supplied the new task and/or the task performers who are notified of the task. After step 820, the routine continues to step 899 and ends. While the illustrated embodiment may include tasks and tasks performers being matched one at a time, in other embodiments tasks may be instead matched to task performers and/or task performers may instead be matched to tasks in various other manners, such as to allow multiple tasks and task performers to be matched together (*e.g.*, to allow for batch processing).

As previously noted, a variety of types of tasks can be submitted and performed in various embodiments, and may include tasks that involve a variety of types of activities by human task performers, such as analysis of one or more supplied pieces of information (*e.g.*, to translate a supplied word or paragraph, to select which of several supplied photographs best represents a specified subject matter, or to identify whether a supplied human signature is authentic, such as by comparison to a known sample and/or on another basis), or retrieval or identification of desired information. In some embodiments the tasks may each require little time of the human task performer (*e.g.*, at most a few seconds), while in other embodiments tasks may be sufficiently complex to take significant amounts of time (*e.g.*, hours or days). In addition, while in some embodiments each of the tasks may be a cognitive human performance task that uses cognitive and/or other mental capabilities of human task performers, in other embodiments some or all of the tasks may include physical activities by one or more human task performers (*e.g.*, to take and supply a specified type of picture), whether instead of or in addition to one or more cognitive or other mental activities of one or more human task performers.

In addition, in some embodiments each task may be a stand-alone activity that is unrelated to other tasks, while in other embodiments some tasks may each be a small part of a larger collective, such as to allow a large number of unrelated human task performers to perform a time-consuming collective task in parallel in a very short time (*e.g.*, without the individual task performers even being aware that the individual tasks are part of a larger collective task), such as in a

manner analogous to grid computing. When individuals tasks are part of a larger collective task, a single task requester may in some situations collect and aggregate or analyze the individual results, while in other situations some or all of the aggregation or analysis activities may instead be one or more other tasks made available through the electronic marketplace. Other information related to users performing tasks is included in pending commonly-owned U.S. Patent Application No. 09/976,717, filed October 12, 2001 and entitled "A Hybrid Machine/Human Computing Arrangement."

A non-exclusive list of examples of types of human performance tasks that may be performed via the electronic marketplace include the following: translation or conversion of information of various forms (*e.g.*, text, speech and other audio, images and other video, etc.) between languages and/or information form (*e.g.*, transcription of audio material); selection of one or more groups of visual information (*e.g.*, photographs or other images) and/or audio information (*e.g.*, songs, voice messages, etc.) that satisfy a specified criteria (*e.g.*, to identify groups that are similar, that have specified characteristics, etc.); supplying answers to specified questions (*e.g.*, to obtain information for use in research, for marketing purposes, for use as feedback, for use with computer-human interface and other types of user studies, for use as pre-release and/or post-release reviews of or reactions to products and/or content, etc.) and/or supplying other types of specified information (*e.g.*, a missing description for a specified item available from a Web store); outsourced tasks of various types (*e.g.*, engineering, marketing, sales, customer support, etc.); and analysis of content of various forms of information to identify specified types of content (*e.g.*, spam, pornography and other obscene or offensive material, etc.) and/or to otherwise categorize the information (*e.g.*, according to a predefined taxonomy; based on a determined source or other aspect of the information; etc.). When information is to be analyzed as part of a task, that information can be provided to a task performer in a variety of ways, such as from the TFF system along with other task-related information, by providing a link or other indicator to the task performer to allow the task performer to retrieve the information (*e.g.*, from the TFF system, from the task requester for the task, from a location or source external to the TFF system, etc.).

As one specific example, a task requester may submit tasks on behalf of a store (*e.g.*, a Web store) that each request at least two human task performers to submit a specified type of data that is missing for one or more items offered by the store (*e.g.*, performance specifications for a stereo). The first two human task performers that submit the same (or sufficiently similar) data for a task

will each receive payment (*e.g.*, $0.25), thus providing information with some degree of reliability in a manner that minimizes overhead for the task performers and the task requester. As another examples, tasks may include analyzing results of task performance from other task performers, such as to corroborate or verify the accuracy or other aspect of interest of the results (*e.g.*, to have a human task performer with a higher level or qualification and/or additional qualifications review the results from less-qualified task performers), to compare results from multiple task performers for the same or related tasks (*e.g.*, to compare performance of human task performers to automated task performers, such as for research purposes, or to compare performance of different groups of human task performers), to analyze results in an attempt to determine whether the task performer is human or not (*e.g.*, for research purposes, or to verify or corroborate the identity and/or qualifications of a task performer), etc.

As previously noted, in some embodiments a variety of types of user qualifications can be specified and used, and may further in some embodiments each be associated with a specified qualification type. Such qualification types may include a variety of associated information in various embodiments, including a name (*e.g.*, for later reference purposes), a rating scale to indicate allowed values (*e.g.*, any floating point number, true/false, an enumerated ranked set of values, etc.), indications of one or more entities or entity types who may issue specific qualifications of the qualification type to users, expiration conditions (*e.g.*, an expiration date/time) or other indications of how and when qualifications of the type are effective, an indication of the user (*e.g.*, a unique user identifier) who specified the qualification type (*e.g.*, to limit who can modify, delete and/or view information about the qualification type), etc. In some embodiments, each qualification may be stored in or as part of a qualification data structure that may contain some or all of the indicated types of associated information, whether using a qualification data structure specific to a specified qualification type or independent of any specific qualification type. In addition, for embodiments in which multiple instances or versions of the TFF system are operating, or in which other types of systems with overlapping types of functionality may interact, the specified qualification types may further have an associated indication of the system at which the qualification type is specified. Moreover, in some embodiments users may be allowed to define new qualification types for use within the system.

As previously noted, task performer qualifications can also take various forms in various embodiments, including self-assertions by a user of

qualifications that they possess, human-generated ratings of human task performers by other humans based on prior task performances by the task performers (*e.g.*, feedback from task requesters who supplied the tasks and/or ratings by other reviewers of the past performances), and credentials supplied by third-party authorities (*e.g.*, educational degrees or other accomplishments from specified educational institutions, awards and other recognitions from specified organizations or contests, recognitions of levels of training or knowledge, etc.). One form of credential that may be used in some embodiments is a reputation or other rating of a user that is supplied by a third party as a service, such as for a fee. A discussion of techniques related to generating and providing user rating information that could be used in some embodiments for user qualifications is included in pending commonly-owned U.S. Patent Application No. 10/646,341, filed August 22, 2003 and entitled "Managing Content Based On Reputation," which is hereby incorporated by reference in its entirety.

Task performer qualifications may also include various quantitative measurements by the electronic marketplace of tracked activities of human task performers, including measurements related to a specific task, average and/or cumulative measurements over a specified group of multiple tasks and/or a specified period of time, and information about a rate of change for one or more measurements over one or more specified periods of time. A non-exclusive list of types of measurements that may be used in various embodiments include the number of tasks assigned to a task performer, the number or percentage of tasks assigned to a task performer that are completed, the number or percentage of tasks completed by a task performer that are approved or rejected (*e.g.*, by the task requester), the number or percentage of assigned tasks that are explicitly abandoned (or "dropped") by a task performer before completion, the number or percentage of assigned tasks that are withdrawn from a human task performer before completion (*e.g.*, by the electronic marketplace for failure to complete the task within a specified time limit), the number or percentage of tasks that are offered to a task performer that are refused (if an embodiment includes offering tasks to task performers), an amount of time taken before performing assigned tasks (*e.g.*, an average or distribution over time), etc. In some embodiments, task requesters may also be given qualifications based on quantitative measurements by the electronic marketplace of tracked activities, such as the number of submitted available tasks from a task requester, the number or percentage of submitted tasks that are removed before assignment by a task requester, the number or percentage of completed tasks that are approved or rejected by a task

requester, the number or percentage of submitted tasks that are modified by a task requester, the timeliness of a task requester in providing payment when due, etc. In addition, in some embodiments task performers may be able to provide qualifications for task requesters by rating them, such as for task performers that have been involved in performance of tasks submitted by those task requesters. Such ratings may be based on, for example, the reasonableness of the task requester in categorizing their submitted tasks, in providing appropriate compensation for the level of task difficulty, in providing payment after satisfactory task results are provided, etc.

In some embodiments, the electronic marketplace may also provide rankings of task performers relative to other task performers on the basis of one or more of the various types of qualifications, and a task performer's ranking level could further be used as a qualification (*e.g.*, a performer in the top 10% for a specified quantitative measurement). More generally, a performer qualification can in some embodiments include any information about a performer that can be measured or identified.

Thus, as previously noted, a variety of types of information may serve as qualifications in some embodiments. More generally, in some embodiments any user may specify any qualification for any user (including themselves), with the qualification measuring any dimension or aspect, using any rating scale, and may further include objective and/or subjective qualifications. The meaning or context of a qualification may in some embodiments be maintained externally to the TFF system (*e.g.*, by the issuers of the qualifications and/or task requesters that use them as criteria for tasks being submitted), such that the TFF system performs tracking of and matching of qualifications as arbitrary data values without knowledge or use of the meaning of the qualifications. Thus, in such embodiments any user can act as their own issuing authority to issue qualifications, and to later use the qualifications by searching for users that have them and/or tasks that include them in their task criteria. In addition, in some embodiments qualifications may be issued to and used for entities that are not directly associated with users of the TFF system, such as qualifications for various types of third-party entities (*e.g.*, issuers of qualifications).

In addition, in some embodiments the activities of users with other systems may be used as qualifications or in other manners, such as based on importing data from such other systems. For example, in some embodiments the TFF system may be affiliated with or otherwise receive information related to shopping-related activities of users, such as with a Web retailer or other online

merchant. Types of information that may be obtained and used from a retailer's system include the user's browsing history, search history, click-stream history, click-through history, purchase or rental history, payment and/or credit history, returns history, history of service-related activities (*e.g.*, frequency and number of calls to customer service), use of discounts and purchase incentives, contributions of content and/or information (including various details about such contributions, such as length, subject matter, frequency of submission, quality as judged by other users, etc.) provided by the user (*e.g.*, reviews of items, lists or groups of items of interest, etc.), participation in various community-based features, reputation within the system (*e.g.*, based on voting or other rating by other users), browser and browsing device used, etc. Similarly, qualification and other information from the TFF system may in some embodiments be able to be exported to other systems for use by those other systems. In addition, when such types of information are available, they can also be used in other ways. For example, if recommendation information is available for a user based on a relationship of the user to other users, such recommendation information may be used as qualification information for the user (*e.g.*, this user is likely to want to do tasks of a certain type) and/or to recommend tasks to a task performer (*e.g.*, other task performers similar to you perform tasks of this type).

A non-exclusive list of various example qualifications includes the following:

C++ programming Level 2 test certification, issued by Professor Bob Smith of Stanford University, test score 95% (Jan. 13, 2005, 10:03 GMT; expires 5 years from issuance)

C++ programming recommendation certificate, issued by Kernighan & Ritchie, "Expert" rating (Jan. 13, 2005, 10:03 GMT; no expiration date)

Able to distinguish pornography from non-pornography according to community standards prevalent in St. Louis, Missouri, issued by myself, "I know it when I see it" (Jun. 27, 2006, 14:18 PDT)

Completes tasks requiring a self-issued "Able to distinguish pornography from non-pornography according to community standards prevalent in St. Louis, Missouri" qualification with over 90% acceptance rate, issued by TFF system, 1000 tasks completed with acceptance rate of 98% (Jun. 27, 2006, 14:18 GMT, based on performance results in TFF system from Jan 14, 2005, 9:00 GMT through the present)

Dialysis patient unable to eat solid food, issued by the Mayo Clinic, (no value) (Jan. 15, 2005, 22:47 EST)

Scholastic Aptitude Test taken, issued by Educational Testing Service, Princeton, NJ, scores verbal =508, math=518 (Oct. 1, 2004, expiry date 6 years from issuance)

Qualified to practice law in the state of California, issued by the State Bar of California, "active member" and "member in good standing" (Oct. 3, 2004;date of bar admission May 15, 1994; continued status contingent on compliance with continuing legal education requirement, with next compliance period ending on or before Jan. 31, 2005).

Has published at least two reviews of popular English-language novels in The New York Times Book Review, issued by The New York Times, total number of such reviews published by the reviewer to date (Jun. 15, 2005, 12:01 EDT).

Is a considerate person, issued by Jeanette Smith of Geneva, Switzerland, "*très sympa*" (Feb. 29, 2004, 12:32 CET).

Information about qualification-related activities can also be tracked and stored in various ways. For example, performance-related qualification scores could be tracked for all tasks, regardless of task type and/or required qualifications. Alternatively, activities could be tracked for particular types of tasks or groups of related tasks (*e.g.*, to determine that a task performer completes tasks with qualification 'A' 95% of the time but completes tasks with qualification 'B' only 80% of the time). Similarly, activities could be tracked for categories of tasks, such as to determine that a task performer completes 'pornography identification' tasks correctly 100% of the time, but only completes 'czech-english translation' tasks satisfactorily 80% of the time.

When searching for information related to qualifications and/or tasks, the TFF system in some embodiments allows a variety of types of searches to be performed. A non-exclusive list of example searches that a user could execute includes the following:

All tasks that I created/accepted, and status/progress of same (*e.g.*, by a task requester and/or task performer)

All tasks currently available for acceptance, including the necessary qualifications for each task and the payment/reward for each (*e.g.*, by a task performer)

All qualification types in the system that have been added in the last 24 hours (*e.g.*, by any user)

All users to whom new qualifications have been issued in the last week (*e.g.*, by any user with sufficient permissions)

All users having a nickname attribute with a value of "Jill" (*e.g.*, by anyone with sufficient permissions to see user nicknames)

Which available tasks have prices < $1? How many task performers currently in the system and not currently working on a task would qualify for one or more of these tasks? (*e.g.*, by a task requester)

How many task requesters of available tasks have qualification B? (*e.g.*, by a task performer, such as a task performer who will only do tasks from certain task requesters)

How many users have qualifications X and (Y or Z) but not W? Of these, which ones have qualification X with a value above 90%? (*e.g.*, by anyone)

Which task performers completed tasks requiring qualification X this week? What percent of their total completed tasks were approved by the requesters? (*e.g.*, by anyone)

Of all qualification types containing "C++" in the name field, what percent were created in the twelve-month period ending Jun. 30, 2004? (*e.g.*, by anyone)

How many qualifications containing the string "St. Louis" in their name were issued last month by or on behalf of Issuer ABC? (*e.g.*, by anyone)

In some embodiments, the system further provides functionality to assist in authenticating or otherwise corroborating information about users, such as identities of users, specified qualifications of users, and other kinds of attributes of users. In particular, various information may be obtained and used to serve as evidence to corroborate one or more pieces of information about users, such as by obtaining information about a user's past activities (*e.g.*, feedback and/or rating information related to the activities), "testimonials" or other assertions from others as to the accuracy of information about a user, information about a user's reputation, information about a user's status within a community or group (*e.g.*, a social networking group), and more generally any observable indicia that can serve to corroborate user information. The corroborative information may be obtained in various ways, including from third-party sources and/or from a user whose information is being corroborated, and the obtaining of the corroborative information may be initiated in various ways, including as initiated by a user who is supplying corroborative information and/or initiated in an automated manner (*e.g.*, based on a need for the corroborative information). In addition, in some embodiments corroboration is further enhanced by using additional techniques, such as by monitoring activities of a user and/or by occasionally challenging a user

(*e.g.*, by giving the user a short test) to verify information about the user (*e.g.*, to obtain information to confirm or contradict a user's qualifications and/or identity).

As one example of corroborating users' identities based on evidence or other information from third parties, the third party may be an issuer of credit cards and/or debit cards, with such a card providing evidence that the cardholder name on the card is the actual name of the cardholder. A variety of other types of evidence or information associated with third parties may similarly be used to provide information about a user's identity, including information about a bank account or other financial account of a user, government-issued information for a user (*e.g.*, a driver's license, passport, social security number, voting identity card, etc.), other government records (*e.g.*, property records), etc. In such situations, a user may obtain such evidence from the third party and later provide the evidence to the system, or alternatively the system may in some embodiments directly interact with a third party to obtain such evidence for a user. For example, the system may interact with a third-party card issuer or government agency, or instead with a third party that provides a service involving verifying users' actual identities based on appropriate evidence and then providing assurances of the verified actual identity information to others upon request.

As previously noted, various types of evidence or other corroborative information related to users' identities can be obtained in various ways in various embodiments, and can be used in various ways to identify and/or corroborate a user's identity. For example, in some embodiments information about a user's identity may be obtained by using information stored by a telephone service provider. In some such embodiments, a user may be provided with a toll-free number of a system performing identity corroboration activities, and when the user calls that toll-free number, the entity can gather user identity information provided by the telephone service provider with that call (*e.g.*, a number from which the user is calling and a name associated with that number), such as for use in corroborating an actual name that the user previously provided. Information may be gathered about users in similar manners from other third parties that have similar information, such as by using Caller ID technology with non-toll-free numbers, doing a reverse number lookup on a phone number provided by a user in order to identify the name of the user associated with that phone number, gathering information about a user based on an electronic communication sent by the user (*e.g.*, based on an email address used by the user, a domain name of the user, an instant messaging or other message sender identity, etc.), and/or gathering information stored by other providers of services to the user (*e.g.*, an

Internet Service Provider, utility companies, educational institutions, medical facilities, etc.). More generally, in some embodiments the system may provide a predefined API and/or one or more Web services via which others can provide corroborative and other information about users.

In some embodiments, information about users' identities may further be obtained and/or corroborated based on groups to which the users belong and/or other affiliations of the users. For example, a user may be able to demonstrate membership or other affiliation with a group or organization that provides publicly available information about its members or other affiliated users, thus providing some corroboration that the user's asserted identity is accurate based on the asserted identity being in the publicly available membership or affiliation information. Alternatively, a user may be part of a social networking group or other group of users such that one or more other users of the group will attest to an identity of the user. In such embodiments, a user may provide contact and other information about one or more of such other users (*e.g.*, email addresses), and a system performing identity corroboration activities may then use the provided information to assist in corroborating the user's identity, such as by using the contact information to query those other users to provide corroborative statements or other information about the user's identity. In addition, when information from other users is used to corroborate information about a user (*e.g.*, based on a social networking group), an additional factor that may be considered is whether a group of users is merely acting as a self-corroborating body such that users of the group are corroborated only by each other, or whether other external evidence is available to provide additional corroboration.

After corroborative information is obtained, it may be used in various ways. In some embodiments, one or more pieces of corroborative information for a piece of user information (*e.g.*, a user qualification) may be presented or otherwise provided with the user information, such as to allow the recipient of the user information to evaluate its accuracy, credibility and reliability based on the associated corroborative information. In other embodiments, the system may attempt to automatically assess the corroborative information in order to determine a confidence level or value or other assessment of the user information being corroborated, such as based on a type of the corroborative information, a degree of correspondence between the corroborative information and the information being corroborated, and/or on the source of the corroborative information (*e.g.*, to affect the weight given the corroborative information, such as based on a reputation of the source). In addition, in some embodiments some of the types of

corroboration-related activities may be performed for a fee, such as from the user whose information is being corroborated.

A particular type of performer qualification that is available in some embodiments relates to performance of a human task performer on one or more qualifying examinations. For example, a task requester who plans to submit multiple tasks of a similar type may first create a task with a known or desired performance result. That task may then be made available via the electronic marketplace as a qualifying examination task for performance by human task performers that are interested in performing other later tasks for the task requester. After a human task performer provides results for the qualifying examination task, those results can be graded relative to the known or desired results in order to determine whether and/or at what level the human task performer can successfully perform the task. A specified level of performance for the qualifying examination task (*e.g.*, having a minimum specified score, or scoring at a minimum percentile relative to other human task performers) can then be used as a performer qualification criteria for later tasks by that task requester. Such qualifying examination tasks can be performed in various ways in various embodiments, including with or without a fee paid to successful performers of the task, with a fee paid by task performers for a task performance attempt and/or completion, as a task available to any task performers or to only task performers that meet other specified criteria (*e.g.*, a first specified number of human task performers to successfully pass the test, to human task performers who have other specified qualifications, etc.), and as a task that is explicitly identified to task performers as a qualifying examination or that is not identified as such.

In addition to performer qualification criteria, task requesters can also specify a variety of other types of criteria for tasks. For example, in some embodiments task requesters may specify criteria related to when a task is to be performed, such as an expiration time period for initial assignment to a human task performer and/or an expiration time limit for a human task performer to provide results of task performance after a task has been assigned to them. A task requester may also in some embodiments specify information about a format in which results are to be supplied, including by supplying information to the task performer related to the results format (*e.g.*, a response form to be completed by the human task performer, or an executable results program that the human task performer is to use to provide results and/or to perform the task). The performer qualification criteria and other types of criteria can also be specified in various forms, including as an exact match and as a minimum or maximum threshold, and

for various activities related to a task (*e.g.*, to allow task assignment; to verify performance results as being satisfactory; to determine whether a value of a task performer's qualification is sufficient, such as based on a generated confidence level or value for appropriateness of the qualification value; to determine whether a task performer's qualification is sufficiently corroborated, such as based on a generated confidence level or value based on a degree or amount of corroboration; etc.). Such thresholds may also be specified by other users (*e.g.*, task performers) and/or automatically by the TFF system in other situations and embodiments.

In addition, in some embodiments task requesters may supply additional task-related information to assist task performers in identifying appropriate or interesting tasks, such as one or more categories for the task (*e.g.*, based on a type of the task) and/or one or more keywords corresponding to the task. Such category and/or keyword information can then later be used by task performers when searching for and/or browsing for tasks of interest. In other embodiments, such category and/or keyword information may instead be automatically generated by the electronic marketplace based on analysis of information related to the task (*e.g.*, by using a textual description of the task provided by the task requester, by using historical information about tasks supplied by task requesters, by using information that is supplied with the task to be analyzed, by using information about criteria specified for the task, etc.).

As previously noted, in at least some embodiments the task requests may also each specify one or more fees to be paid by the task requester to one or more task performers for successful performance of a task. In such embodiments, the fee can be specified to be paid under any of a variety of circumstances, including in a manner related to a specified state of a task (*e.g.*, to the first task performer whose performance results are explicitly accepted by the task requester, to the first task performer whose performance results are automatically accepted by the electronic marketplace, to the first task performer who supplies performance results to the electronic marketplace, to the first task performer to whom a requested task is assigned, etc.). In other situations, multiple task performers may receive payment for performance of a task, such as the first X task performers that provide results (where X is a specified number by the task requester), multiple task performers whose results are in agreement and form a specified level (*e.g.*, a majority) of performance results from X task performers, etc.

In other embodiments, payment for task requests can be determined in other ways, such as based on bidding by task performers (*e.g.*, as part of a

standard or Dutch auction), as a variable rate that is dependent on a degree or amount of success in providing satisfactory performance results, etc. In addition, in some embodiments the task requester may allow the electronic marketplace to specify the associated payment for a task (*e.g.*, for a fee), such as based on a category of the task, on dynamic pricing based on current conditions at the time of task request, as part of a premium service for which the electronic marketplace guarantees some aspects of the results (*e.g.*, a maximum time to receive performance results, a minimum level of performance results, etc.). Moreover, in some embodiments the system provides information to task requesters to assist them in manually pricing tasks, such as by providing historical pricing information for tasks of the same type or for other related tasks, by providing summary information about current pricing and current pricing trends, etc.

After payment is determined to be provided to one or more task performers for a task, the payment can be made in a variety of ways. In some embodiments the electronic marketplace or an associated system may provide accounts to task requester and/or task performer users, and if so payments may be made from those accounts of task requesters and/or to those accounts of task performers. In other embodiments, the electronic marketplace may also interact with third-party systems in order to effect payment, such as credit card companies, banks, etc. In addition, in some embodiments a variety of other types of payments could be made, whether in addition to or instead of payments from task requesters to task performers, such as payments to the electronic marketplace from task requesters and/or task performers for any of the functionality provided by the electronic marketplace, and/or such as payments to task requesters from task performers for performing tasks of the task requesters. More generally, in some embodiments payments and other rewards can be specified to flow from any one or more parties to any one or more other parties, whether task performers, task requesters, the TFF system, external parties, etc. A discussion of payment-related techniques that could be used to make payments in some embodiments is included in U.S. Patent Application No. 10/894,347, filed July 19, 2004 and entitled "Automatic Authorization Of Programmatic Transactions," which is hereby incorporated by reference in its entirety.

After a task request has been submitted to the electronic marketplace, task performers can obtain information about available tasks in a variety of ways. In some embodiments, task performers will make requests to the electronic marketplace to identify tasks that are currently available that meet specified indicia, such as all currently available tasks or tasks whose specified

qualification criteria are satisfied by the current qualifications of the task performer. While some such task information requests may be made interactively in some embodiments, in other embodiments at least some such requests may instead be made in a programmatic manner, such as by using a specialized program or instructions (*e.g.*, a client-side program, macro, plug-in, etc.) that is designed to retrieve such information for a task performer (*e.g.*, that is obtained from the electronic marketplace or from a task requester for their tasks). In addition to searching for a task based on qualifications of the task performer, the task performers can also specify a variety of other types of information about tasks to identify, such as tasks available from specified task requesters, tasks in specified categories or having specified keywords, tasks having specified associated payments or other associated criteria (*e.g.*, expiration date), tasks from task requesters who satisfy specified requester qualification criteria, etc.

In addition to searching for tasks, task performers can also request that tasks be assigned to them in various ways, such as by identifying one or more specific tasks of interest and/or by identifying tasks that meet specified conditions (*e.g.*, based on task criteria, an associated reward for a task, information about or an identity of a task requester who submitted the task, etc.). After a task has been assigned to a task performer, the task performer may then interact with the electronic marketplace (whether interactively or programmatically) to provide performance results information based on performance of the task. In addition, in some embodiments a task performer may specify in various ways that they desire to receive a string of assignments of related tasks, such as tasks of a specified task type. By creating such a "pipeline" of incoming tasks, the task performer may be able to perform the tasks more efficiently (*e.g.*, if sufficient tasks are assigned to a task performer to allow them to constantly have a queue of available tasks to be performed), and correspondingly may be charged a fee in some embodiments for receiving such functionality. The creation of such a string of task assignments may be performed in various ways, such as by registering a notification and/or assignment request with the TFF system for a specified type of task, by repeatedly executing a search or assignment request with the TFF for a specified type of task, by using an application program to automatically perform such repeated searches, etc.

In some embodiments, the determination of whether a task is to be assigned to a task performer is based at least in part on information specified for the task by the task requester. For example, each task may allow a specified number (*e.g.*, one) of simultaneous or sequential assignments of a task to task

performers. Moreover, in some embodiments an assignment of a task is made in such a manner as to lock that assignment (*e.g.*, for a specified period of time) so that it is not available to other task performers, while in other embodiments such locking may not be performed. Thus, for example, if a task requester desired results as soon as possible and was willing to pay only the first human task performer who provided satisfactory results, the task requester could specify that the task be made available to any number of human task performers and that it not be locked upon assignment, resulting in a race between task performers to be the first to supply successful results. Alternatively, the task requester may instead desire satisfactory results from only a single task performer but may provide for the task to be locked after it is assigned to a human task performer to allow them a specified amount of time (*e.g.*, a minute or a day) to provide satisfactory results before the task will be made available to other task performers.

As another example, the task requester may desire responses from multiple task performers (*e.g.*, to enable comparison of multiple responses as an automated accuracy check), and if so may allow a specified number of simultaneous assignments (*e.g.*, corresponding to the number of desired responses). When responses from multiple human task performers are obtained, they can be used in various ways, such as to generate an average of the various results, to identify results that are agreed upon by all or by a majority or by a median number, etc. In addition, in such situations the multiple task performers can be paid in various ways, such as to provide the same payment to all task performers who provided results, to provide payment only to task performers whose results were determined to be accurate or otherwise used (*e.g.*, based on them being in a majority of the results), to pay differing amounts to different task performers (*e.g.*, based on determined accuracy of the results, or promptness of providing the results), etc.

After a task performer has completed performance of a task and submitted the results of task performance to the electronic marketplace, the results are handled in a manner specified by the task requester. For example, in some embodiments such task results for a task may be immediately forwarded to the task requester for the task, while in other embodiments the task results may be stored until the task requester retrieves them (*e.g.*, after receiving notification from the electronic marketplace of their availability). In addition, in some embodiments the task requester may have specified one or more criteria related to evaluating whether the performance results are satisfactory, and if so the electronic marketplace system may automatically perform such result verification based on

those criteria before providing the results to the task requester. In some embodiments, the task requester will further receive additional information related to performance of the task, such as information about the identity of the task performer, while in other embodiments such additional information may not be available to the task requester.

As previously noted, in some embodiments payment to the human task performers will also be triggered by one or more activities related to the performance results, such as the supplying of the task results by the task performer or the approval of the task results by the task requester and/or automated task verification activities. In addition, in some embodiments after task performance results are provided by task performers, the task requesters for those tasks may further be queried to provide human-generated ratings for the task performers (*e.g.*, for use in qualification determinations for those task performers), such as related to adequacy and timeliness of the performance results, while in other embodiments the electronic marketplace could instead receive any such feedback information from the task requesters even when not explicitly solicited. Similarly, in some embodiments task performers may provide rating and other feedback information for task requesters that may be used for qualification determinations for those task requesters (whether in response to queries or otherwise), such as related to promptness and adequacy of payment, sufficiency of the description of the task, etc.

In embodiments in which quantitative measurements are made of task performers and/or task requesters, such as for use as qualifications for those users, the electronic marketplace system further performs a variety of types of tracking activities in order to gather information for those quantitative measurements. In particular, in some embodiments each activity of a task performer and/or task requester relative to a task is recorded and can be used as a quantitative measurement. In addition, at least some such tracking information can also be used for other purposes in at least some embodiments, such as to determine availability of and load on the electronic marketplace (*e.g.*, to determine whether additional computing resources are needed or whether current computing resources are underutilized).

In addition to providing task information to task performers in response to requests, the electronic marketplace may in some embodiments provide functionality to automatically match task performers and new tasks as they become available, such as for a fee (*e.g.*, a fixed amount, or a percentage of any payment provided to the task performer if they complete a task for which they are

notified). For example, if a human task performer has previously supplied qualification information and/or preference information regarding tasks of interest (*e.g.*, tasks in specified categories, having specified key words, from specified task requesters, from requesters having specified qualifications, etc.), such as during an initial registration process, the electronic marketplace can perform automated matching for new tasks that are submitted in order to determine whether the human task performer satisfies any specified criteria for the task and would desire to be notified of the task. If so, the electronic marketplace can notify the task performer in a variety of ways, such as based on previously provided preference information regarding how and when they are to be notified. In addition, in some embodiments the automated matching may further automatically assign new tasks to appropriate task performers (*e.g.*, in accordance with preference information specified by the performers), including locking the task assignments if appropriate for the task. In other embodiments, task performers may receive similar functionality using third-party functionality, such as an automated program that obtains information about new tasks from the electronic marketplace (*e.g.*, based on polling) and performs the automated matching functionality for those new tasks on behalf of one or more of the task performers.

Matching of tasks and task performers may be provided in a variety of ways. For example, in some embodiments matching will be performed in a bi-directional manner, such as when tasks have criteria for task performers and task performers have conditions for tasks (*e.g.*, attributes of the task and/or of the task requester that submitted the task). In addition, a variety of other types of information may similarly be considered when performing matching. For example, in some embodiments a match may be time-sensitive (*e.g.*, based on an urgency of a task) and/or price-sensitive (*e.g.*, when the price for performing the task varies over time, such as to increase the price over time until a task is performed or to instead decrease the price over time). Similarly, in some embodiments a variety of other types of information may be considered, such as legal constraints (*e.g.*, to enforce a minimum or maximum limit on the number of tasks assigned to a task performer, such as for contractual or tax reasons, or to restrict performance of tasks in some embodiments and situations to task performers in a certain geographical area due to tax or national security reasons). In addition, some types of tasks may be restricted to certain types of task performers, such as only new task performers (*e.g.*, to assist new task performers who may lack extensive qualifications) and/or only experienced task performers.

In addition, in some embodiments and/or for some types of tasks (*e.g.*, tasks for which a task requester has requested and/or purchased an enhanced, or "concierge," level of service), the system may facilitate task performance by attempting to locate a task performer to perform the task in various ways. For example, the system may in some embodiments assist task performers to enhance their qualifications, such as by recommending to them to acquire new qualifications (*e.g.*, based on current and/or projected demand for qualifications, or based on comparisons to other similar task performers with whom they may be competing for tasks), and may further assist the task performers in acquiring the new qualifications in some embodiments (*e.g.*, by offering a qualification test to acquire the qualification, providing information on how to acquire a qualification from a third-party qualification issuer (or "issuing entity"), etc.). When an exact match for a task performer is not available, the system may also provide additional functionality to assist a task requester, such as to identify task performers who are closest to being a match and providing a ranked list based on the closeness of those task performers. The system may similarly rank tasks for task performers (*e.g.*, in response to a search), such as to identify the tasks that are the closest match and/or that possess other attributes of interest (*e.g.*, having the highest reward) first. In addition, the system may in some embodiments attempt to identify external sources of qualification information and import additional qualification information, such as to identify a match that was not initially known due to a lack of complete qualification information.

In addition, while tasks may in some embodiments have associated categories and/or keywords that are supplied by task requesters, in other embodiments the electronic marketplace system automatically categorizes tasks and/or generates keywords for tasks based on analysis of information about the tasks, such as by analyzing similarities in attributes using data mining and other related analyses techniques. In a similar manner, in some embodiments the electronic marketplace may organize related task performers and/or related task requesters into groups based on similarities in qualifications and other attributes. Such organization and categorization of tasks, task performers and/or task requesters assists users of the electronic marketplace in identifying tasks and other parties of interest, such as other parties with whom to work or with whom to avoid working.

As previously noted, in some embodiments each task may be a simple stand-alone activity for which a task performer receives a task description (and optionally additional information to analyze) and provides results of task

performance. In other embodiments, however, some or all of the tasks may instead have multiple stages and/or multiple related successive activities by the task performer, including having multiple interactions (*e.g.*, with the task requester, the TFF system and/or one or more other executing applications) during and/or between the stages or successive activities. In such embodiments, payment can be provided to a task performer in various ways, such as based on completion of all stages/activities or instead based on completion of each of one or more intermediate stages/activities.

In addition, while in some embodiments each of the task performers may be unrelated to (and even unknown to) other task performers, in other embodiments multiple task performers may instead be affiliated or related to each other in various ways, such as by being part of a single organization, by working together (*e.g.*, as a group) when performing some or all tasks (*e.g.*, to coordinate performance of related tasks and/or to share task-related knowledge), etc. In at least some such embodiments, tasks may be submitted by one or more task requesters for performance by a group of multiple task performers (*e.g.*, by a specified group, by a group that has at least a minimum number of members and/or that has at most a maximum number of members, by a group that has one or more specified qualifications for the group, etc.), and/or a group of multiple task performers may accept one or more tasks for performance by one or more members of the group even if the task requesters had not specified that those tasks were for performance by a group. In addition, when multiple users work together as a group, the group may in some embodiments by treated by the TFF system in a manner similar to a single user, such as to allow the group to be issued qualifications and/or to have various types of associated information, as well as to in some embodiments automatically determined aggregate qualifications for a group based on the individual qualifications of group members.

Similarly, while in some embodiments each of the task requesters may be unrelated to (and even unknown to) other task requesters, in other embodiments multiple task requesters may instead be affiliated or related to each other in various ways, such as by being part of a single organization, by working together (*e.g.*, as a group) for some or all tasks to be performed (*e.g.*, to coordinate performance requests for related tasks, such as by identifying them as being related and/or specifying criteria related to performance of a group of tasks), etc. In a related manner, in some embodiments groups of tasks may be identified as being related (*e.g.*, based on indications received from the task requesters for the tasks), such as to coordinate performance of the tasks in the group in various

ways (*e.g.*, by collecting or aggregating performance results for all of the tasks, by assigning them to one or more task performers in a manner to facilitate the coordination of the performance, etc.). In addition, in some embodiments task requesters and/or task performers may be recruited for participation in the system in a variety of ways, including on the basis of existing group membership or other affinity information (*e.g.*, to identify people likely to have time to work as task performers, such as based on their status as being potentially retired due to their membership in a seniors-oriented group).

In some embodiments, additional security mechanisms are further employed to restrict access to at least some information for at least some users. For example, some information about tasks may not be made available to at least some task performers, such as to hide information about the existence of tasks or about certain task details from task performers who are not qualified to perform the task, to whom the task is not assigned, or who otherwise meet criteria specified by a task requester. Furthermore, some information about a task may be made available to a potential task performer only when certain conditions are satisfied, such as completion of a non-disclosure agreement or satisfaction of other specified criteria. Similarly, at least some information about the task requesters and/or task performers may be hidden from at least some other task performers and/or task requesters, such as to shield identities of users (*e.g.*, to provide partial or total anonymity between a task requester who submits a task and a task performer who performs the task, or to limit information about a task performer or task requester to potential competitors), or to limit access to information about quantitative measurements or other qualifications in order to minimize attempts by participants in the marketplace to artificially manipulate rankings and other qualification information. In particular, in some embodiments at least some qualifications of task performers may be private to the task performers and/or to task requesters who issued those qualifications to those task performers, such as to allow the task requesters to limit performance of their tasks to task performers in a manner that is not visible to other task performers who do not have those qualifications.

In some embodiments, the system further attempts to provide meta-information about other information in the system (*e.g.*, results of task performance, appropriateness of a user's qualification, appropriateness of corroboration of a user's qualification, etc.), such as to provide a confidence value to a task requester regarding a likely appropriateness (*e.g.*, accuracy, reliability, reproducibility, etc.) of results of task performance, to provide a confidence value to a user regarding a likely appropriateness (*e.g.*, accuracy, reliability,

reproducibility, etc.) of a qualification of a user (*e.g.*, of a rating value for the user for the qualification), to provide a confidence value to a user regarding a likely appropriateness (*e.g.*, accuracy, reliability, reproducibility, etc.) of corroboration of a qualification of a user, etc. Such confidence values may be generated or otherwise determined in various ways for task results, such as based on information obtained from other task performers than those who provided the results (*e.g.*, by having multiple task performers perform a task and comparing the results, by having more-qualified task performers review the initially obtained task results, etc.), on comparison of the results to other results received for similar or related tasks, on automatically verifying whether the results satisfy criteria specified for the task, etc. Such confidence values may be generated or otherwise determined in various ways for users' qualifications and for corroboration of users' qualifications, including based on information provided by or otherwise associated with those users and/or based on information provided by or otherwise associated with other users.

In some embodiments, the system further assists task requesters to obtain useful results in various ways, such as by providing insurance to recoup payments made for results that are not received or that turn out to be unsatisfactory, by providing an escrow service in which payments are held until they can be verified as satisfactory, by providing for appropriate contractual terms (*e.g.*, binding arbitration) or other mechanisms to resolve disputes, etc. Some or all of these functionalities may be provided for a fee in some embodiments, such as a fee charged to the task requesters and/or to the task performers involved in a transaction benefiting from the functionality provided. In addition, in some embodiments the system attempts to improve its performance over time by learning preferences of task requesters and/or task performers, such as by monitoring their activities and/or gathering feedback from them regarding prior activities.

The system and/or the described techniques can also be used in other manners in some embodiments. As previously noted, the system may export various information in some embodiments for use by other systems, such as user qualification information and other types of user information. In addition, use of qualification information may be used for purposes of dating or other social or business networking in some embodiments, such as by submitting tasks having qualification criteria intended to match users whose qualifications satisfy the qualification criteria – in this example, the task may be performed by identifying the one or more task performers who satisfy the task's associated qualifications or

other criteria. In a similar manner, users matching specified criteria could similarly be found for other purposes in other embodiments, such as to identify appropriate users for a research study, polling, opinion taking, surveys, etc.

As previously noted, in some embodiments the TFF system assists in managing at least some types of interactions with users, such as to allow task requesters and/or task performers to specify how certain types of task-related interactions are to occur. In particular, in some embodiments task requesters are allowed to specify how interactions are to occur with task performers who are performing their tasks, and in particular to specify one or more task interaction control ("TIC") types for each of their submitted tasks. In at least some such embodiments, each TIC type is associated with a distinct combination of multiple types of processing to be performed when presenting task-related information to a task performer and/or when obtaining results of the task performance from the task performer. When the TFF system interacts with a task performer to manage the performance of a task having a specified TIC type, the TFF system implements the combination of processing types for the specified TIC type to control those interactions.

In some embodiments, at least four types of user interaction processing may be specified for each TIC type, including a specified manner of manipulating information associated with a task before it is provided to a task performer (*e.g.*, to prepare the information to be presented to the task performer), a specified manner of providing the manipulated information to the task performer (*e.g.*, to control the presentation of the manipulated task information to the task performer), a specified manner of receiving or otherwise obtaining results of task performance from the task performer (*e.g.*, to control how the task results are specified by and sent by the task performer), and a specified manner of manipulating obtained task results before they are provided to the task requester (*e.g.*, to prepare the information to be presented or otherwise provided to the task requester). In this manner, each of the types of user interaction processing may be specified independently of the others, such as to transmit task information to a task performer using a first data format and/or first transmission protocol and to receive task results from the task performer using a distinct second data format and/or distinct second transmission protocol, and/or to have task information specified in a first format and to have task results specified in a different format.

In addition, in at least some embodiments each specified manner of performing one of the types of user interaction processing may be implemented by a component containing executable information to implement that specified

manner of processing. For example, each specified manner of manipulating task information before it is provided to a task performer may be implemented by an appropriate task information manipulation component, each specified manner of sending manipulated task information to a task performer may be implemented by an appropriate task information provider component, each specified manner of receiving task results from a task performer may be implemented by an appropriate task results receiver component, and each specified manner of manipulating received task results may be implemented by an appropriate task results manipulation component.

Some illustrative examples of the user interaction processing type of manipulating task information before it is provided to a task performer include the following: using XSLT ("eXtensible Style Language Transformation") to transform task data in XML format to HTML ("HyperText Markup Language") format (*e.g.*, for display to the task performer as a Web page formatted in a specific manner) or to another format (*e.g.*, a different XML format); wrapping task data that is in a format presentable on the task performer's computing device (*e.g.*, in "Flash" format to be presented by a Macromedia player on the task performer's computing device, or included as part of a Java applet executable on the task performer's computing device) in another format (*e.g.*, HTML) for transmission to the task performer; encrypting the task information before it is sent to the task performer (*e.g.*, in a manner so that it can be decrypted by the computing device of the task performer); modifying the form of the task information (*e.g.*, to convert XML-based data to a chart/graph/table for presentation); manipulating the content of the task information (*e.g.*, to transform text in one language to another), whether in addition to or instead of manipulating the information format; and acting as a pass-through mechanism that does not modify the task information. The task information to be manipulated can also take a variety of forms, including text, numerical data, one or more images, video data, audio information, etc.

Some illustrative examples of the user interaction processing type of providing task information to the task performer include the following: sending a Web page or other document type to the task performer for display or other presentation by a Web browser or other appropriate application program on a computing device of the task performer (*e.g.*, using HTTP, WAP (or "Wireless Application Protocol"), SSL (or "Secure Sockets Layer"), Secure HTTP, etc.); and sending executable code (*e.g.*, a Java applet) to the computing device of the task performer in a manner to invoke an appropriate environment to execute the code (*e.g.*, using JNLP (or "Java Network Launching Protocol") to execute a Java

applet). In some embodiments, the user interaction processing type of providing task information to the task performer may include selecting a protocol to be used in sending the task information and/or may include causing a particular type of application on the task performer's computing device to receive and handle the task information (*e.g.*, by causing that program to be invoked).

Some illustrative examples of the user interaction processing type of obtaining results of task performance from the task performer include the following: receiving the task results via a provided Web service-based interface that a program on the task performer's computing device invokes to send the task results; receiving the task results as CGI data (*e.g.*, via HTTP GET and/or POST commands), such as from a form on a Web page displayed to the task performer; and receiving task results sent from an executing program on the task performer's computing device (*e.g.*, a program invoked using a specified user interaction processing type of providing task information to the task performer), such as using a variety of communication techniques (*e.g.*, CORBA, RPC, Java RMI (or "Remote Method Invocation"), by using ReST (or "REpresentational State Transfer") to send XML data over HTTP, etc.).

Some illustrative examples of the user interaction processing type of manipulating obtained task results before they are provided to the task requester may include processing similar to that of manipulating task information before it is provided to a task performer. In addition, the manipulating of obtained task results before they are provided to the task requester may include the following: using XSD ("XML Schema Definition") or DTD ("Document Type Definition") to convert task results data in CGI form to XML form; decrypting task results that were encrypted at the computing device of the task performer; modifying the form of or manipulating the content of the task results in various ways; and acting as a pass-through mechanism that does not modify the task results.

In some embodiments, multiple alternatives are provided by the TFF system for each of the types of user interaction processing, such as by implementing each alternative as a distinct component. Thus, for example, the alternatives for the manipulation of task information processing type may each be implemented by a corresponding task information manipulation component, and may include one or more distinct components that each have XSLT instructions for transforming data in XML format in a specified manner, a component including executable information to wrap task data in Flash format in an HTML wrapper, and a pass-through component that provides as output the same task information that

it receives as input. Similar alternatives may be provided by the TFF system for each of the user interaction processing types.

In addition, in some embodiments the TFF system provides one or more predefined TIC types that are each associated with a distinct combination of components that includes at least one component of each of the user interaction processing types. In this manner, a task requester may specify a TIC type for a task being submitted by selecting one of the predefined TIC types. In addition, in some embodiments a task requester may specify multiple TIC types for a task (*e.g.*, with the TIC types using differing types of processing for providing manipulated task information to a task performer), such as to allow task performers with computing devices having a greater variability of capabilities to perform the task. In addition, in some embodiments the TFF system may further facilitate the performance of a task by automatically selecting one of multiple specified TIC types for a task for use by a task performer, such as based on known or identifiable capabilities of the computing device of the task performer.

In addition to selecting predefined TIC types, the TFF system in some embodiments further allows users to define their own TIC types, such as for their own use and/or the user of other users. In some embodiments the TIC type definition may include the user selecting a predefined component for each of the user interaction processing types, while in other embodiments a user may further be allowed to supply his/her own components for each of one or more of the user interaction processing types (*e.g.*, components designed to handle data that is formatted in a manner specific to a task type created by the user). In addition, in some embodiments the user-supplied components may perform the user interaction processing in different manners than those of predefined alternatives (*e.g.*, a user-supplied component that combines the processing of two or more of the user interaction processing types, such as to both send task information to a task performer and receive task results information from the task performer) and/or may perform various additional types of processing. Moreover, while in some embodiments the selected components for a TIC type interoperate in a predefined serial manner (with the task information manipulation component receiving the raw task data and sending the manipulated task information to the task information providing component, and with the task results obtaining component receiving the raw task results and sending them to the task results manipulation component), in other embodiments a user may be allowed to specify additional logic or relationships to define how the components interoperate. In addition, in some embodiments the selection of a component may depend on the components used

before and/or after the component being selected, and thus the types of components made available to a user defining a new TIC type may vary based on selections already made and/or information specific to the task.

For illustrative purposes, some embodiments are described below in which specific types of user interactions are managed in specific ways, including by using various specific types of task information processing information in specific ways. However, those skilled in the art will appreciate that the techniques of the invention can be used in a wide variety of other situations, including with other types of task information processing and to manage other types of user interactions, and that the invention is not limited to the exemplary details provided.

Figures 12A-12J illustrate an example of using multiple user interaction processing types to manage interactions related to performance of a task. In particular, Figure 12A illustrates an example task that is submitted to the TFF and associated with a TIC type (not shown), with the task information specified in XML format in this example. In addition, the task in this example includes a question of type "multi-choice" (as shown on line 2), which is a multiple-choice question in which a task performer will select one of 5 specified images that best satisfies indicated conditions, in a manner similar to that previously discussed with respect to Figure 2A. In this example, the task conditions are related to selecting an image best matching a specified subject (as indicated by the text in line 4 of the task that will be presented to the task performer), and the task includes indications of 5 images of type "image/jpeg" on lines 6-35.

Figure 12B shows an example of an XSD file that includes information that can be used by the TFF system or other entity to validate that tasks having questions of type "multi-choice" are properly structured and include the appropriate data. For example, lines 30-35 of the file show the allowed types and data elements used in the "Question" section of the task illustrated in Figure 12A, and in particular show that the "Question" data element has child elements of "Title", "Text" and "Choices" which have allowed types of "string", "string" and "ChoicesType", respectively. Other portions of the file provide other related information, such as lines 23-29 that further define the "ChoicesType" data type.

Figures 12C-12G next illustrate an example of task information manipulation processing type information for use in preparing the task information illustrated in Figure 12A for presentation to a task performer, such as based on that task information manipulation processing type being specified for the TIC type associated with the task. In this example embodiment, the task information manipulation processing type information is implemented as an XSLT component

that can be used to convert an XML input file to an output HTML file. The information in the XSLT component may be used by an XSLT processor program to find particular statement patterns in the XML input file that are then transformed in a specified manner in a new output file created by the XSLT processor. For example, line 4 of Figure 12C shows that in this example the output file format will be HTML. Line 7 shows that the input XML file statement to be matched is "/Question", and lines 8-23 show corresponding HTML tags to be included in the output file. The following lines illustrated in Figure 12C and those in Figures 12D-12G then illustrate how the task information from the task is manipulated to form an appropriate output HTML file to be presented to a task performer as a Web page.

After the HTML output file is sent to a computing device of the task performer (*e.g.*, by a manipulated task information provider processing component, not shown, that sends the data using the HTTP protocol, such as based on the manipulated task information provider processing type being specified for the TIC type associated with the task), Figure 12H illustrates the display of the HTML output file to the task presenter as a Web page, such as on a Web browser on the computing device of the task performer. In this example, the displayed Web page shows a question 1225 posed to the task performer, with multiple user-selectable image choices 1205a-e displayed as possible answers to the question. In particular, in this example each of the choices 1205 includes a displayed image and a user-selectable radio button control 1215 that the task performer can select. After the selection is made, which in this example is of Image 4, the task performer clicks on the "Submit" button 1220 at the bottom of the screen to cause the results of the task performance to be sent back to the TFF system.

After the task results information is received at the TFF system (*e.g.*, by a processing component, not shown, that obtains task results by receiving CGI data from the task performer, such as based on the task results obtainer processing type being specified for the TIC type associated with the task), Figure 12I illustrates an example of task results manipulation processing type information for use in preparing the task results to be provided to the task requester that submitted the task, such as based on that task results manipulation processing type being specified for the TIC type associated with the task. In particular, in this example the processing information is implemented as another XSLT file component that can be used to convert the task results from the task performer to XML format so that they can be programmatically provided to the task requester. For example, line 4 shows that the output of the XSLT file will be "xml" data, line 5

specifies that "/CGIData" is to be matched in the results information, and lines 6-11 specify that the value of the "@value" parameter for the selected image is to be written to the output XML file as the desired data. Figure 12J then illustrates the output XML file that results from the operation of the task results manipulation processing, with line 3 showing that the answer selected by the task performer was labeled "Image4".

Figure 13 illustrates an example embodiment of the TFF system 130 similar to that previously discussed with respect to Figure 1B, but with additional modules to provide the described functionality related to the use of TIC types. In particular, Figure 1B included a User Interaction Manager module 134 to assist in managing at least some types of interactions with users, and Figure 13 includes three additional modules 1343, 1344 and 1346 in the illustrated embodiment to provide functionality related to the use of TIC types (*e.g.*, as sub-modules of or a specific implementation of the User Interaction Manager module). In particular, the TFF system 130 in the embodiment illustrated in Figure 13 includes a Task Interaction Controller module 1343, a TIC Type Definer module 1344, and a Task Submission Receiver module 1346. Various of the other modules and information discussed with respect to Figure 1B are not included in Figure 13 for the sake of brevity, but may be included and interact with the illustrated modules as appropriate in other embodiments.

In the illustrated embodiment, the Task Submission Receiver module receives submissions of tasks from task requesters and associates one or more TIC types with each of the submitted tasks, such as based on a specification of the TIC type for a task by the task requester submitting the task. In situations in which the task requester submits one or more tasks in an interactive manner, the Task Submission Receiver module may assist the identification of an appropriate TIC type by providing options for the TIC type to the task requester, such as based on the type of task(s) and/or information associated with the task requester. The TIC type options may include predefined TIC types and/or TIC types previously defined by the task requester, and in some embodiments the Task Submission Receiver may further allow a task requester to define a new TIC type for use with a task being submitted, such as based on interactions with the TIC Type Definer module. In other embodiments, the association of one or more TIC types with a task may instead be performed at times other than task submission, such as after the submission. After tasks are submitted and associated with one or more TIC types, information about the associated TIC types is included with the other information about the task in the database 145. During performance of the task, at least one

of the associated TIC types will be used to control the task performance, and the associated TIC types may further be used in some embodiments to assist in initially selecting appropriate task performers for the task (*e.g.*, based on those task performers having capabilities to receive task information and provide task results in a manner consistent with the processing types specified for the associated TIC types).

The Task Interaction Controller module in the illustrated embodiment controls the performance of tasks based on the TIC types associated with the tasks. In particular, when a task is to be performed by a task performer, the Task Interaction Controller module selects one of the TIC types associated with the task, and uses the types of information processing specified for the TIC type to control the task performance. In the illustrated embodiment, definitions of predefined system-provided TIC types (if any) are included in the database 1351, and definitions of user-defined TIC types (if any) are included in the database 1352. Each of the TIC type definitions specify multiple processing types to be used with the TIC type, and in some embodiments may specify logic or parameters to control how the multiple processing types interoperate. In some embodiments, each of the processing types is associated with an associated component or other grouping of processing information, with predefined system-provided components (if any) stored in the illustrated embodiment in database 1353 and user-defined components (if any) stored in the illustrated embodiment in database 1354. Thus, to control performance of a task based on an associated TIC type, the Task Interaction Controller module retrieves the TIC type definition from databases 1351 or 1352, retrieves the components specified in the TIC type definition from databases 1353 and/or 1354, and executes those components in an appropriate manner to control the task performance. An appropriate TIC type associated with a task can be selected by the Task Interaction Controller module can be selected for use in various ways, such as based on the selected TIC type being the only TIC type associated with the task, on the selected TIC type being specified by the task performer, on the selected TIC type being preferred or needed for use with the computing device of the task performer based on the device's capabilities, etc.

The TIC Type Definer module in the illustrated embodiment allows users (*e.g.*, task requesters) to define new TIC types for use in controlling tasks to be submitted, and may further in some embodiments allow users to supply or otherwise define new components for use with a TIC type being defined (*e.g.*, to process information specified in a format and/or task type specific to a task requester, or to provide additional capabilities, such as to encrypt and decrypt

information sent to and received from a task performer in a specified manner). In other embodiments, users may not be allowed to define their own TIC types, and thus the TIC Type Definer module may not be present in those embodiments. The TIC type definition may be performed in various ways, such as by successively displaying or otherwise providing to a user each of the available alternatives for each of a series of types of information processing, such as based on predefined system-provided components. In embodiments and situations in which dependencies exist between different components or processing types, the module may further limit the provided alternatives based on the prior selections. After a new TIC type is defined, the module stores the definition in the database 1352, and further stores any user-supplied components in the database 1354.

In other embodiments, some of the types of illustrated functionality and/or information may not be provided, and other types of information and/or functionality may be available. In addition, the illustrated functionality may be combined in more or fewer modules, and the illustrated types of information may be stored in other manners.

Figure 9 is a flow diagram of an embodiment of a Task Submission Receiver routine 900. The routine may, for example, be provided by execution of an embodiment of the Task Submission Receiver module 1346 of Figure 13, such as to receive task submissions and associate one or more TIC types with the tasks. In the illustrated embodiment, the routine interacts with a user in an interactive manner to associate a TIC type with a task, although in other embodiments a user may submit an indication of a task and of one or more TIC types in a non-interactive manner.

The routine begins at step 905, where an indication is received from a task requester to submit one or more new tasks. The routine determines in step 910 whether to use one or more existing TIC types (*e.g.*, predefined system-provided TIC types), such as based on an indication received from the task requester, and if so continues to step 920 to determine available TIC types. Available TIC types may be determined in various ways, such as based on all defined TIC types, TIC types determined to be appropriate for the task and/or the user submitting the task, etc. The routine then continues to step 925 to provide the determined TIC types to the task requester, and in step 930 obtains a selection from the task requester of one or more of the TIC types. If it was instead determined in step 910 not to use an existing TIC type, the routine continues instead to execute the TIC Type Definer routine in step 1000 to define one or more

new TIC types, and in step 915 selects the newly defined TIC type(s) for use with the task being submitted.

After steps 930 or 915, the routine continues to step 935 to associate the selected TIC type(s) with the task(s) being submitted, and continues to step 940 to make the tasks available for performance (*e.g.*, by storing information about the tasks in an available tasks database). The routine then continues to step 995 to determine whether to continue. If so, the routine returns to step 905, and if not the routine continues to step 999 and ends.

Figure 10 is a flow diagram of an embodiment of a Task Interaction Controller Type Definer routine 1000. The routine may, for example, be provided by execution of an embodiment of the TIC Type Definer module 1344 of Figure 13, such as to define new TIC types by users. In the illustrated embodiment, the routine interacts with a user in an interactive manner to define a new TIC type, although in other embodiments a user may instead submit a definition of one or more new TIC types in a non-interactive manner.

The routine begins at step 1005, where an indication is received from a user (*e.g.*, a task requester) to define a new TIC type. The routine continues to step 1010 to identify the processing types to be used for the TIC type being defined, such as based on a default set of processing types used for all TIC types or instead in another manner. The routine then continues to step 1015 to select the next information processing type to be specified for the new TIC type being defined, beginning with the first. In step 1020 the routine then determines available alternatives for the selected information processing type, such as all alternatives or instead in a manner based on other information from the new TIC type (*e.g.*, other alternatives already selected, the user defining the new TIC type, etc.). The routine then continues to step 1025 to present the available alternatives to the task requester along with an option to instead supply a new alternative implementation, although in other embodiments such user-supplied alternatives may not be used or may be specified by the task requester at other times or in other manners.

The routine then continues to step 1030 to receive a selection from the task requester, and in step 1035 determines whether the task requester selected one of the previously available alternatives. If not, the routine continues to step 1040 to obtain an alternative implementation from the task requester (*e.g.*, by receiving a component with executable information to implement the alternative) and selects it for use with the new TIC type being defined, and in step 1050 stores the obtained alternative for later user. After step 1050, or if it was instead

determined in step 1035 that the task requester selected an existing alternative, the routine continues to step 1045 to store an indication of the selected alternative as being specified for the new TIC type. The routine then determines in step 1055 whether there are more information processing types to specify for the new TIC type, and if so returns to step 1015 to select the new information processing type to specify. If not, the routine stores a definition of the new TIC type for later use, and then continues to step 1060 to optionally specify any received additional information for the new TIC type (*e.g.*, information about the conditions under which the TIC type may be used and who may use it). While not illustrated here, the routine may in some embodiments also return an indication to the task requester for the new defined TIC type, such as a unique identifier for later use in referencing the new TIC type. The routine then determines in step 1095 whether to continue. If so, the routine returns to step 1005, and if not continues to step 1099 and ends.

Figure 11 is a flow diagram of an embodiment of a Task Interaction Controller routine 1100. The routine may, for example, be provided by execution of an embodiment of the Task Interaction Controller module 1343 of Figure 13, such as to control performance to tasks based on TIC types associated with the tasks.

The routine begins at step 1105, where an indication is received of a task to be performed by a task performer, such as based on a request by the task performer. The routine continues to step 1110 to retrieve task information for the task, and in step 1115 determines a TIC type for use in controlling performance of the task, such as based on an association of the TIC type with the task and/or a selection of the TIC type by the task performer. The routine then continues to step 1120 to determine multiple task information processing types specified for the determined TIC type – in the illustrated embodiment, each TIC type specifies a component or other group of processing information for each of four task information processing types, although in other embodiments other numbers or types of processing types may instead be used.

In steps 1125-1140, the routine then performs each of the types of processing specified for the determined TIC type. In step 1125, the routine manipulates the retrieved task information in a specified manner based on a specified task information manipulation processing type for the TIC type, and in step 1130 the routine provides the manipulated task information to the task performer in a specified manner based on a specified task information providing processing type for the TIC type. After the task performer performs the task, the

routine receives the results of the task performance in a specified manner in step 1135 based on a specified task results receiver processing type for the TIC type, and in step 1140 manipulates the received task results in a specified manner based on a task results manipulation processing type for the TIC type. While the illustrated embodiment indicates a synchronous flow in which the routine waits for and obtains task results after sending the task information, in other embodiments the routine could be structured in other manners, such as to continue with other processing while waiting for task results (if any) to be sent. In addition, in some situations task performers may not provide task results for a task after they accept an assignment to perform the task, which may be indicated to the routine in an explicit message from the task performer to withdraw from task performance or instead by not receiving task results within a specified period of time, and if so the routine would continue to handle other task-related requests and information.

After step 1140, the routine continues to step 1145 to provide the manipulated task results to the task requester in a specified manner, although in other embodiments the task results may instead be stored until the task requester proactively retrieves them. After step 1145, the routine continues to step 1195 to determine whether to continue. If so, the routine returns to step 1105, and if not continues to step 1199 and ends.

While the use of TIC types and associated use of various types of information processing have been described in conjunction with the TFF system, those skilled in the art will appreciate that these techniques may similarly be used in variety of other situations, including in other types of systems in which questions are provided and answers are gathered, or more generally in which information is provided and received. In addition, in some embodiments and situations only some of the illustrated types of information processing may be used, such as to use processing for providing information or for receiving information but not for both. Accordingly, TIC types can be used in a variety of other embodiments.

Those skilled in the art will also appreciate that in some embodiments the functionality provided by the routines discussed above may be provided in alternative ways, such as being split among more routines or consolidated into fewer routines. Similarly, in some embodiments illustrated routines may provide more or less functionality than is described, such as when other illustrated routines instead lack or include such functionality respectively, or when the amount of functionality that is provided is altered. In addition, while various operations may be illustrated as being performed in a particular manner (*e.g.*, in serial or in parallel) and/or in a particular order, those skilled in the art will

appreciate that in other embodiments the operations may be performed in other orders and in other manners. Those skilled in the art will also appreciate that the data structures discussed above may be structured in different manners, such as by having a single data structure split into multiple data structures or by having multiple data structures consolidated into a single data structure. Similarly, in some embodiments illustrated data structures may store more or less information than is described, such as when other illustrated data structures instead lack or include such information respectively, or when the amount or types of information that is stored is altered.

From the foregoing it will be appreciated that, although specific embodiments have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims and the elements recited therein. In addition, while certain aspects of the invention are presented below in certain claim forms, the inventors contemplate the various aspects of the invention in any available claim form. For example, while only some aspects of the invention may currently be recited as being embodied in a computer-readable medium, other aspects may likewise be so embodied.

CLAIMS

What is claimed is:

1. A computer-implemented method for providing an electronic intermediary platform that facilitates interactions between task requester client computing systems able to supply tasks to be performed and task performer client computing systems able to provide results from performance of tasks, the electronic intermediary platform having a programmatic interface for interacting with programs executing on the task requester client computing systems, the computer-implemented method comprising:

receiving data at the electronic intermediary platform via the programmatic interface that is supplied by multiple programs executing on task requester client computing systems, each of the programs being associated with a task requester and supplying data to the electronic intermediary platform that indicates one or more tasks available from the associated task requester such that each of the available tasks has one or more associated required qualifications for a human performer of the task and has associated compensation for satisfactory performance of the task;

for each of at least some of the available tasks, identifying one or more human task performers who have registered with the electronic intermediary platform as being available to perform tasks and who each have one or more qualifications that satisfy the required qualifications for the task, and providing data about the task to a task performer client computing system of each of the identified human task performers; and

for each of at least some of the available tasks, after receiving results for the available task from one or more task performer client computing systems based on performance of the task by one or more human task performers, and without further human intervention, automatically supplying the received results via the programmatic interface to a program executing on a task requester client computing system of the task requester from whom the task was received, and facilitating providing of the associated compensation for the task to one or more of those human task performers on behalf of that task requester.

2. The method of claim 1 wherein the electronic intermediary platform provides an electronic marketplace that facilitates transactions between task requester users and unrelated task performer users involving performance of tasks, wherein each of the tasks includes a specified question to be answered, wherein each of the executing programs supplying data about tasks is an application program operating on

behalf of a task requester and wherein the supplying of data to the electronic intermediary platform to indicate an available task is performed so as to submit the task as being available for performance and includes specifying an associated fee and associated qualifications and associated task performance criteria for the task such that the fee is to be paid to a human task performer who has the qualifications and who satisfactorily performs the task by answering the specified question for the task in such a manner as to satisfy the criteria, wherein the data provided for each of the at least some available tasks to a task performer client computing system of an identified human task performer includes the specified question for the task, wherein the receiving of results for an available task includes receiving an answer generated by a human task performer for the specified question of the task, and further comprising:

before the identifying of the one or more human task performers for the at least some available tasks, and for each of multiple users unaffiliated with the electronic marketplace, receiving information from the user regarding availability of the user to act as a human task performer, the received information including current qualifications of the user related to performing tasks, and registering the user at the electronic marketplace as an available human task performer; and

in response to receiving data for each of the indicated tasks being submitted, registering the submitted task at the electronic marketplace as being available;

and wherein, for each of at least some of the registered tasks and after receiving an answer generated by a human task performer for the specified question of the task, and if the human task performer who generated the answer has current qualifications matching the associated qualifications for the task and if the associated criteria for the task are satisfied, the supplying of the received results for the task via the programmatic interface includes providing the received answer via the programmatic interface to the application program that submitted the task,

so that application programs can programmatically purchase answers to questions that are provided by human task performers.

3. The method of claim 2 wherein the programmatic interface of the electronic marketplace is an application programming interface that includes one or more Web services, and wherein each submission of a task from an application program is based on an invocation by the application program of one of the Web services.

4. The method of claim 3 wherein each providing of a received answer for a submitted task to an application program is provided as a response to the invocation by the application program that submitted the task

5. The method of claim 2 wherein each providing of data about a task to a task performer client computing system of a human task performer is performed in response to a request from the human task performer for information about one or more tasks that the human task performer is qualified to perform.

6. The method of claim 2 wherein each providing of data about a task to a task performer client computing system of a human task performer is performed automatically after the registering of the task and after automatically identifying the human task performer as being qualified to perform the task.

7. The method of claim 2 wherein at least some of the registered tasks are all of a single task type, and wherein the providing of data for those tasks to one or more human task performers is performed so as to repeatedly provide data about available tasks of that task type to a selected task performer so that the selected task performer can perform those tasks.

8. The method of claim 2 wherein at least some of the registered tasks are provided a basic level of service by the electronic marketplace and at least some other of the registered tasks are provided a concierge level of service by the electronic marketplace that exceeds the basic level of service, and wherein each providing of data to one or more human task performers about a task that is provided the concierge level of service is performed automatically in such a manner as to identify at least one task performer who will answer the specified question for the task in such a manner as to satisfy the associated task performance criteria for the task.

9. The method of claim 2 wherein each task submission further includes supplied information that is associated with the task being submitted, and wherein the answering of the specified question for each of the registered tasks involves a human task performer providing a human judgment regarding a subjective aspect of the supplied associated information for the task.

10. The method of claim 2 wherein the providing of associated fees to task performers for tasks submitted for task requesters includes obtaining the fees from the task requesters on behalf of the task performers.

11. The method of claim 2 wherein the associated qualifications for a human task performer to perform each of at least some of the registered tasks include one or more qualifications based on quantitative measurements by the electronic marketplace of past performance of the task performer, one or more qualifications based on assertions of the task performer, one or more qualifications based on ratings of the task performer provided by task requesters, and one or more qualifications based on credentials of the task performer supplied by one or more third-party qualification authorities.

12. The method of claim 1 wherein the electronic intermediary platform provides an electronic marketplace that facilitates transactions between task requester users and task performer users involving performance of tasks.

13. The method of any of claims 1-12 further comprising receiving information at the electronic intermediary platform from each of multiple users unaffiliated with the electronic intermediary platform that includes information about qualifications of the user to act as a human task performer, and registering each of the multiple users at the electronic intermediary platform as being available to act as a human task performer to perform available tasks after the receiving of the information.

14. The method of claim 1 wherein the providing of data about each of the at least some available tasks to each of the one or more identified human task performers for that task is performed in response to a request from the human task performer for information about one or more tasks for which the human task performer is qualified.

15. The method of claim 14 wherein the identifying of the one or more human task performers for each of the at least some available tasks is performed in response to the requests from those human task performers.

16. The method of claim 14 wherein each of the requests from a human task performer is received at the electronic intermediary platform via an interactive console used by the human task performer to specify the request, and wherein the

providing of the data about one or more of the available tasks in response to the request includes presenting the information to the human task performer via the interactive console.

17. The method of claim 1 wherein the providing of data about each of the at least some available tasks to the one or more identified human task performers for that task is performed automatically after the one or more human task performers are automatically identified for the task.

18. The method of claim 1 wherein the providing of data about each of one or more of the available tasks to one or more human task performers includes providing one or more indications of accessible information for the task that is external to the electronic intermediary platform.

19. The method of claim 1 wherein the providing of data about each of one or more of the available tasks to one or more human task performers includes providing information about an indicated task requester in such a manner as to allow direct communication between the one or more human task performers and the indicated task requester regarding performance of the task, the indicated task requester being the task requester from whom the task was received.

20. The method of claim 1 wherein the providing of data about at least some of the available tasks to one of the identified human task performers is performed so as to repeatedly provide information to that human task performer about available tasks matching specified criteria.

21. The method of claim 20 wherein the available tasks for which information is provided to the one human task performer are all of a single task type, and wherein the specified criteria includes a task being of that task type.

22. The method of claim 20 wherein the available tasks for which information is provided to the one human task performer are each part of a group of related tasks, and wherein the specified criteria includes a task being in that group of related tasks.

23. The method of claim 20 including charging the human task performer for performing the repeated providing of information about available tasks matching specified criteria.

24. The method of claim 20 wherein each providing of information about one of the available tasks to the human task performer is performed in response to a request from the human task performer.

25. The method of claim 1 wherein at least some of the available tasks are provided a concierge level of service by the electronic intermediary platform that exceeds a level of service provided to other tasks by the electronic intermediary platform.

26. The method of claim 25 wherein the providing of the concierge level of service by the electronic intermediary platform for an available task includes automatically identifying one or more human task performers who each have one or more qualifications that satisfy the required qualifications for the task and facilitating performance of the task by at least one of those identified human task performers.

27. The method of claim 26 wherein the automatic identifying of the one or more human task performers for an available task receiving the concierge level of service from the electronic intermediary platform includes automatically attempting to identify users to perform the available task who have not yet registered with the electronic intermediary platform as being available to perform tasks.

28. The method of claim 25 wherein the providing of the concierge level of service by the electronic intermediary platform for an available task includes providing a guarantee to the task requester who submitted the available task regarding performance of the available task.

29. The method of claim 25 including charging a fee for providing the concierge level of service to task requesters who request the concierge level of service for submitted tasks.

30. The method of claim 1 including providing data to human task performers for each of one or more tasks generated by the electronic intermediary platform to facilitate functionality provided by the electronic intermediary platform.

31. The method of claim 30 wherein at least some of the tasks generated by the electronic intermediary platform include reviewing results received from human task performers for performance of available tasks submitted by task requesters.

32. The method of claim 31 wherein each reviewing of received results for a task is performed by one or more human task performers distinct from the human task performers who provided the results and is performed to verify accuracy of the received results, such that those received results are not supplied to the task requester for the task and such that the associated compensation for the task is not provided unless the results are verified to be accurate.

33. The method of claim 30 wherein at least some of the tasks generated by the electronic intermediary platform include reviewing available tasks submitted by task requesters to verify that the available tasks meet specified requirements for submitted tasks.

34. The method of claim 30 wherein at least some of the tasks generated by the electronic intermediary platform include reviewing available tasks submitted by task requesters to categorize those tasks for use by task performers in identifying tasks of interest.

35. The method of claim 30 wherein at least some of the tasks generated by the electronic intermediary platform include reviewing results received from task performers for performance of available tasks to determine whether the task performers are humans.

36. The method of claim 1 including, after the receiving of results for each of at least some of the available tasks, automatically determining a level of confidence regarding accuracy of the results for the task and providing an indication of the determined level of confidence to the task requester from whom the task was received.

37. The method of claim 36 wherein the automatic determining of the level of confidence regarding the accuracy of the results of each of at least one of the tasks is performed based on automatically verifying whether the results satisfy criteria specified for the task.

38. The method of claim 36 wherein the automatic determining of the level of confidence regarding the accuracy of the results of each of at least one of the tasks is performed based on obtaining information from task performers other than those who provided the results and using the obtained information to verify the accuracy of the results.

39. The method of claim 36 wherein the automatic determining of the level of confidence regarding the accuracy of the results of each of at least one of the tasks is performed based on automatically comparing the results to other results for other related tasks.

40. The method of claim 1 wherein the associated compensation for each of at least some of the available tasks is a monetary payment.

41. The method of claim 1 wherein the associated compensation for each of at least some of the available tasks is a non-monetary reward.

42. The method of claim 1 wherein each of at least some of the available tasks is submitted on behalf of a charitable cause, and wherein the associated compensation for each of those available tasks is recognition of performing volunteer work to assist the charitable cause.

43. The method of claim 1 wherein the providing of associated compensation for each of one or more of the available tasks is facilitated only if the task requester from whom the task was received authorizes the providing of the compensation.

44. The method of claim 1 wherein the providing of associated compensation for each of one or more of the available tasks is facilitated in such a manner that the task requester from whom the task was received is able to avoid responsibility for the compensation if the results for the task are not satisfactory.

45. The method of claim 1 wherein the facilitating of the providing of associated compensation for each of one or more of the available tasks includes sending an indication to an external entity to provide that compensation.

46. The method of claim 1 wherein the facilitating of the providing of an associated compensation for each of one or more of the available tasks includes automatically providing that compensation.

47. The method of claim 1 wherein data received for each of at least some of the available tasks includes an indication of a category of the task and/or one or more keywords for the task so as to assist users in identifying the task via browsing and/or searching activities.

48. The method of claim 1 wherein data received for each of at least some of the available tasks includes an indication of a group of tasks to which the task belongs so as to assist the electronic intermediary platform in handling the tasks in the group in a consistent manner.

49. The method of claim 1 wherein data received for each of at least some of the available tasks includes information to be analyzed by human task performers as part of performing of the task, and wherein providing of data about the task to a human task performer includes providing the information to be analyzed.

50. The method of claim 1 wherein performance of each of the available tasks includes answering a question specified for the task.

51. The method of claim 1 wherein performance of each of the available tasks includes a human task performer providing a human judgment regarding a subjective aspect of the task.

52. The method of claim 1 wherein performance of each of the available tasks includes a human task performer performing discernment regarding information supplied for the task.

53. The method of claim 1 including, before the providing of data about each of the available tasks to one or more human task performers, automatically determining that each of the human task performer is authorized to receive the information.

54. The method of claim 1 including, before the providing of data about each of the available tasks to one or more human task performers, automatically

determining that the task requester from whom the task was received is authorized to submit the task for performance.

55. The method of claim 1 wherein the programmatic interface of the electronic intermediary platform is an application programming interface that includes one or more Web services, and wherein data about each of at least some of the available tasks is received from an executing application program of a task requester based on an invocation by the application program of one of the Web services to submit the available task.

56. The method of claim 55 wherein each supplying of received results for an available task includes supplying the received results to the application program from which the data about the available task was received as a response to the invocation by the application program that submitted the task.

57. The method of claim 1 wherein each of at least some of available tasks are performed by multiple human task performers such that the results supplied for each of those tasks are based on information received from two or more of the multiple task performers.

58. The method of claim 1 wherein one or more task performers providing results based on performance of tasks are automated programs.

59. The method of claim 1 wherein the electronic intermediary platform is provided in a distributed manner on multiple distinct computing systems.

60. The method of claim 1 wherein the qualifications of the human task performers include multiple of qualifications based on quantitative measurements by the electronic intermediary platform of past performance of the human task performers, qualifications based on assertions of the human task performers, qualifications based on ratings of the human task performers provided by task requesters, and qualifications based on credentials of the human task performers supplied by one or more third-party qualification authorities.

61. A computer-readable medium whose contents enable a computing device to act as an intermediary to facilitate performance by task performers of tasks submitted by task requesters, by performing a method comprising:

receiving information from an executing program of a task requester about a task that is available to be performed, the information received via a defined programmatic application program interface and indicating one or more criteria for satisfactory performance of the task;

providing information about the task to one or more human task performers who are able to satisfactorily perform the task based on the indicated criteria; and

after receiving results for the available task based on performance of the task by one or more of the human task performers to whom the information about the task was provided, supplying the received results via the defined programmatic interface to a program of the task requester.

62. The computer-readable medium of claim 61 wherein the indicated criteria for the available task include one or more associated required qualifications of a human performer of the task, and wherein the one or more human task performers who are able to satisfactorily perform the task based on the indicated criteria are each identified as having associated qualifications that satisfy the required qualifications.

63. The computer-readable medium of claim 61 wherein the computing device provides an electronic marketplace to which multiple task requesters submit available tasks to be performed and to which multiple task performers provide results from performance of available tasks.

64. The computer-readable medium of claim 61 wherein the available task is a qualifying examination such that a human task performer who performed the task receives an associated qualification that allows that human task performer to perform other tasks.

65. The computer-readable medium of claim 61 wherein the receiving of information about the available task from an executing program of a task requester is based on submission by the task requester of a new task that is distinct from any existing available tasks.

66. The computer-readable medium of claim 61 wherein the available task has associated compensation for satisfactory performance of the task, and including providing at least a portion of the associated compensation to a human task performer who performs the task.

67. The computer-readable medium of claim 61 wherein the computer-readable medium is a memory of a computing device.

68. The computer-readable medium of claim 61 wherein the computer-readable medium is a data transmission medium transmitting a generated data signal containing the contents.

69. The computer-readable medium of claim 61 wherein the contents are instructions that when executed cause the computing device to perform the method.

70. The computer-readable medium of claim 61 wherein the contents include a data structure for use in facilitating performance of tasks, the data structure comprising multiple entries that each correspond to a task and that each contain indications of at least one qualification of a human task performer for the task and of associated compensation for performance of the task.

71. The computer-readable medium of claim 69 wherein at least some of the entries of the data structure each further contain one or more additional indications related to the task for the entry, the additional indications for the entry including at least one of one or more task requesters who provided the task, one or more task performers who performed the task, a callback mechanism via which to provide results of performance of the task to a program of a task requester, one or more pieces of information for use by a task performer during performance of the task, and one or more pieces of information related to corroboration of one or more of the indicated qualifications for the task.

72. A computing system configured to facilitate transactions between task requesters having tasks available to be performed and task performers able to perform tasks, comprising:

an application programming interface configured to allow executing programs of task requesters to submit tasks available to be performed and to allow the

executing programs to receive information about results of performance of submitted tasks;

storage configured to store information about each of the submitted tasks that includes an associated reward for satisfactory performance of the task and associated criteria for satisfactory performance of the task; and

a task fulfillment facilitator system configured to, for each of at least some of the submitted tasks, provide information about the task to one or more task performers, receive results that are from performance of the task by one or more task performers and that satisfy the associated criteria for the task, and facilitate providing of the associated reward for the task to one or more of the task performers who performed the task.

73. The computing system of claim 72 wherein the task fulfillment facilitator system provides an electronic marketplace to which multiple task requesters submit available tasks to be performed and to which multiple human task performers unrelated to task requesters provide results from performance of tasks submitted by those task requesters.

74. The computing system of claim 72 wherein the task fulfillment facilitator system includes software executing in memory of the computing system.

75. The computing system of claim 72 wherein the task fulfillment facilitator system consists of a means for, for each of the at least some submitted tasks, providing information about the task to one or more task performers, receiving results that are from performance of the task by one or more task performers and that satisfy the associated criteria for the task, and facilitating providing of the associated reward for the task to one or more of the task performers who performed the task.

76. A method for a computing system to provide an electronic intermediary platform for facilitating transactions between task requesters having tasks to be performed and task performers able to perform tasks, the computer-implemented method comprising:

receiving information from multiple task requesters about available tasks, the received information for each of the available tasks indicating one or more human analysis activities to be performed by a human task performer for one or more associated groups of information supplied by a task requester for the task, each task further having one or more associated criteria for satisfactory performance of the task

that include at least one required qualification of a human performer of the task and having an associated payment amount for satisfactory performance of the task; and

for each of multiple of the available tasks,

automatically matching the task to one or more potential human performers of the task that each have qualifications satisfying the required qualifications for the task and notifying those potential human task performers of the task; and

after receiving results information that is based on successful performance of the task by a human task performer such that the human task performer has completed the one or more analysis activities for the associated groups of information for the task,

providing the received results information to the task requester for the task; and

if the task performance by the human task performer is determined to satisfy the associated criteria for the task, causing a payment of the associated payment amount for the task to be provided to the human task performer.

77. A method for a computing device of a human task performer to facilitate performance of available human performance tasks provided to an electronic intermediary platform by task requesters, the computer-implemented method comprising:

providing information to the electronic intermediary platform to register a human task performer as being available to perform tasks, the provided information including indications of one or more qualifications of the human task performer related to performing tasks;

requesting information from the electronic intermediary platform regarding tasks that are available to be performed by a human task performer having one or more indicated qualifications, each task having associated compensation for satisfactory performance and each being submitted by an executing program of an unrelated task requester via a programmatic interface of the electronic intermediary platform;

after receiving the requested information, providing to the electronic intermediary platform results from performance by the human task performer of each of one or more tasks indicated in the received information; and

after the provided results for each of the performed tasks are determined to be satisfactory, receiving the associated compensation for the task.

78. A method for a computing device of a task requester to use an electronic intermediary platform of human performance tasks to facilitate performance of

available tasks by human task performers, the electronic intermediary platform having a programmatic interface, the computer-implemented method comprising:

providing information to the electronic intermediary platform via the programmatic interface about one or more tasks of a task requester that are available to be performed, the provided information for each of the available tasks indicating one or more required qualifications of a human performer of the task and including associated compensation for satisfactory performance of the task;

for each of at least some of the available tasks, after results for the available task are generated from performance of the task by one or more human task performers, receiving the results for the task via the programmatic interface; and

if the received results for a task are determined to be satisfactory, causing the associated compensation for the task to be provided to one or more of those human task performers.

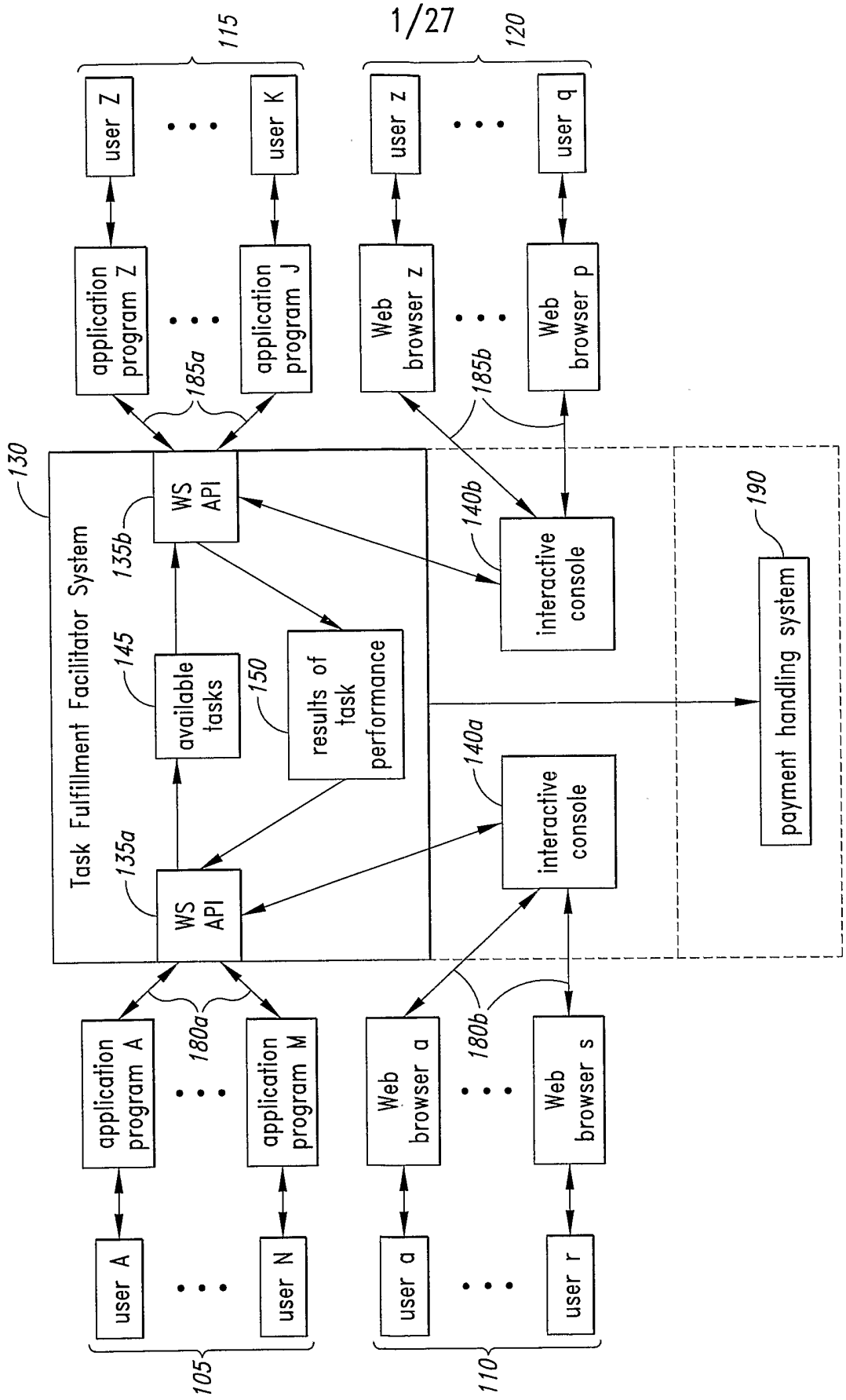
115
120
user Z
user K
user z
user q
application program Z
application program J
Web browser z
Web browser p
185a
185b
130
Task Fulfillment Facilitator System
WS API
135b
140b
interactive console
190
145
available tasks
150
results of task performance
payment handling system
140a
interactive console
135a
WS API
application program A
application program M
180a
Web browser a
Web browser s
180b
user A
user N
user a
user r
105
110

FIG. 1A

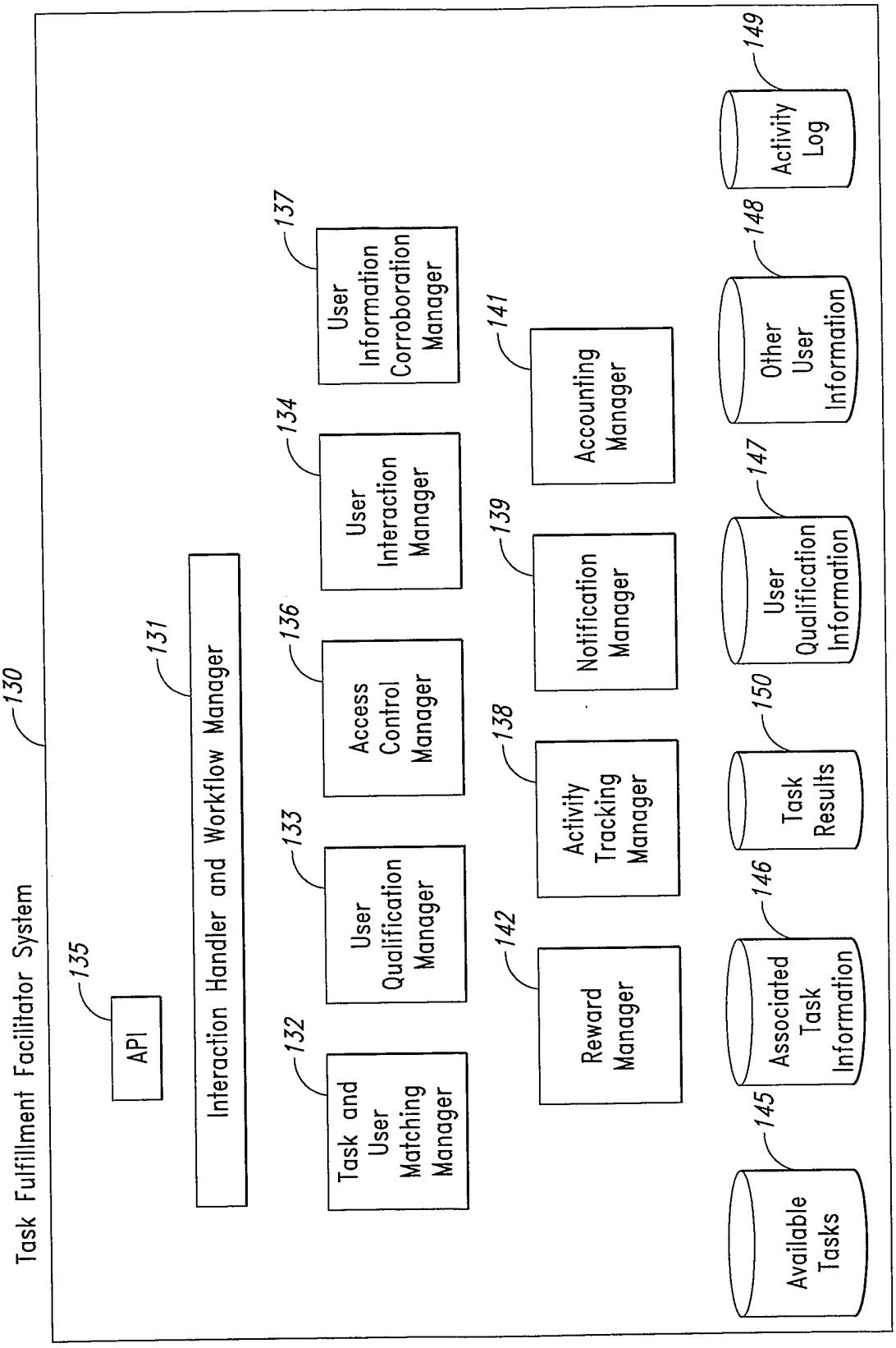
Task Fulfillment Facilitator System
130
API
135
Interaction Handler and Workflow Manager
131
Task and User Matching Manager
132
User Qualification Manager
133
Access Control Manager
136
Reward Manager
142
Activity Tracking Manager
138
Notification Manager
139
User Interaction Manager
134
Accounting Manager
141
User Information Corroboration Manager
137
Available Tasks
145
Associated Task Information
146
Task Results
150
User Qualification Information
147
Other User Information
148
Activity Log
149

FIG. 1B

Example Task Submission

```
<CreateTask>
  <ParticipantId>BarnabyPhoto</ParticipantId>
  <Operation>
    <TaskType>
      <Name>ImageChoice</Name>
      <Description>
        <Verbal>Select which of 4 photographs best shows a business
                                location </Verbal>
        <Compensation>
          <CurrencyCode>USD</CurrencyCode>
          <Amount>0.06</Amount>
        </Compensation>
        <TimeEstimate>30</TimeEstimate>
      </Description>
      <ProviderApplication> http://imagematch.abcde.com/
          </ProviderApplication>
      <ProviderCriteria>
        <AllowedProviders/>
        <DisallowedProviders>
            <Provider>PoorProvider1</Provider>
        </DisallowedProviders/>
        <ProviderQualifications/>
      </ProviderCriteria>
      <StateTimeouts>
        <Open>172800</Open>
        <Locked>60</Locked>
      </StateTimeouts>
    </TaskType>
    <Request>
      <ImageSubject>
        <ItemID>B0000F5R9P</ItemID>
        <Name>Wildboar Tavern</Name>
        <Address>
          <Street>1200 Main Street</Street>
          <City>Seattle</City> <State>WA</State> <Zip>98118</Zip>
        </Address>
      </ ImageSubject>
      <Images>
        <Image> http://image.abcde.com/biz_images/10913487 </Image>
        <Image> http://image.abcde.com/biz_images/10913488 </Image>
        <Image> http://image.abcde.com/biz_images/10913489 </Image>
        <Image> http://image.abcde.com/biz_images/10913490 </Image>
      </Images>
    </Request>
  </Operation>
</CreateTask>
```

FIG. 2A

Example Task Request Status Query

```
<TaskSearch>
    <ParticipantId>BarnabyPhoto</ParticipantId>
    <Operation>
        <SearchFields>
            <Requester>BarnabyPhoto</Requester>
            <State>Completed</State>
            <TaskType>
                <Name>ImageChoice</Name>
            </TaskType>
        </SearchFields>
    </Operation>
</TaskSearch>
```

FIG. 2B

Example Task Performance Response

```
<TaskSearchResponse>
    <Task>
        <TaskId>109234875</TaskId>
        <Requester>BarnabyPhoto</Requester>
        <Provider>BestManBryan</Provider>
        <State>Completed</State>
        <ResponseData>
            <ItemID>B0000F5R9P</ItemID>
            <Image> http://image.abcde.com/biz_images/10913490 </Image>
        </ResponseData>
    </Task>
</TaskSearchResponse>
```

FIG. 2C

Example Task Completion Notification

```
<CloseTask>
    <ParticipantId>BarnabyPhoto</ParticipantId>
    <Operation> <TaskId>109234875</TaskId>  </Operation>
</CloseTask>
```

FIG. 2D

Example Available Task Query

```
<TaskGroupSearch>
    <Operation>
        <SearchFields> <State>Open</State> </SearchFields>
        <RankBy>NumTasks</RankBy>
    </Operation>
</TaskSearch>
```

FIG. 2E

Example Available Task Response

```
<TaskTypeSearchResponse>
   <TaskGroups>
      <TaskGroup>
         <TaskType> <Name>ImageChoice</Name> </TaskType>
         <NumTasks>400</NumTasks>
      </TaskGroup>
      <TaskGroup>
         <TaskType> <Name>French-EnglishTranslation</Name> </TaskType>
         <NumTasks>80</NumTasks>
      </TaskGroup>
   </TaskGroups>
</TaskTypeSearchResponse>
```

FIG. 2F

Example Available Task Performance Request

```
<LockingTaskSearch>
   <ParticipantId>BestManBryan</ParticipantId>
   <Operation>
      <NumToLock>1</NumToLock>
      <SearchFields>
         <TaskType> <Name>ImageChoice</Name> </TaskType>
         <State>Open</State>
      </SearchFields>
      <RankBy>CreateDate</RankBy>
   </Operation>
</LockingTaskSearch>
```

FIG. 2G

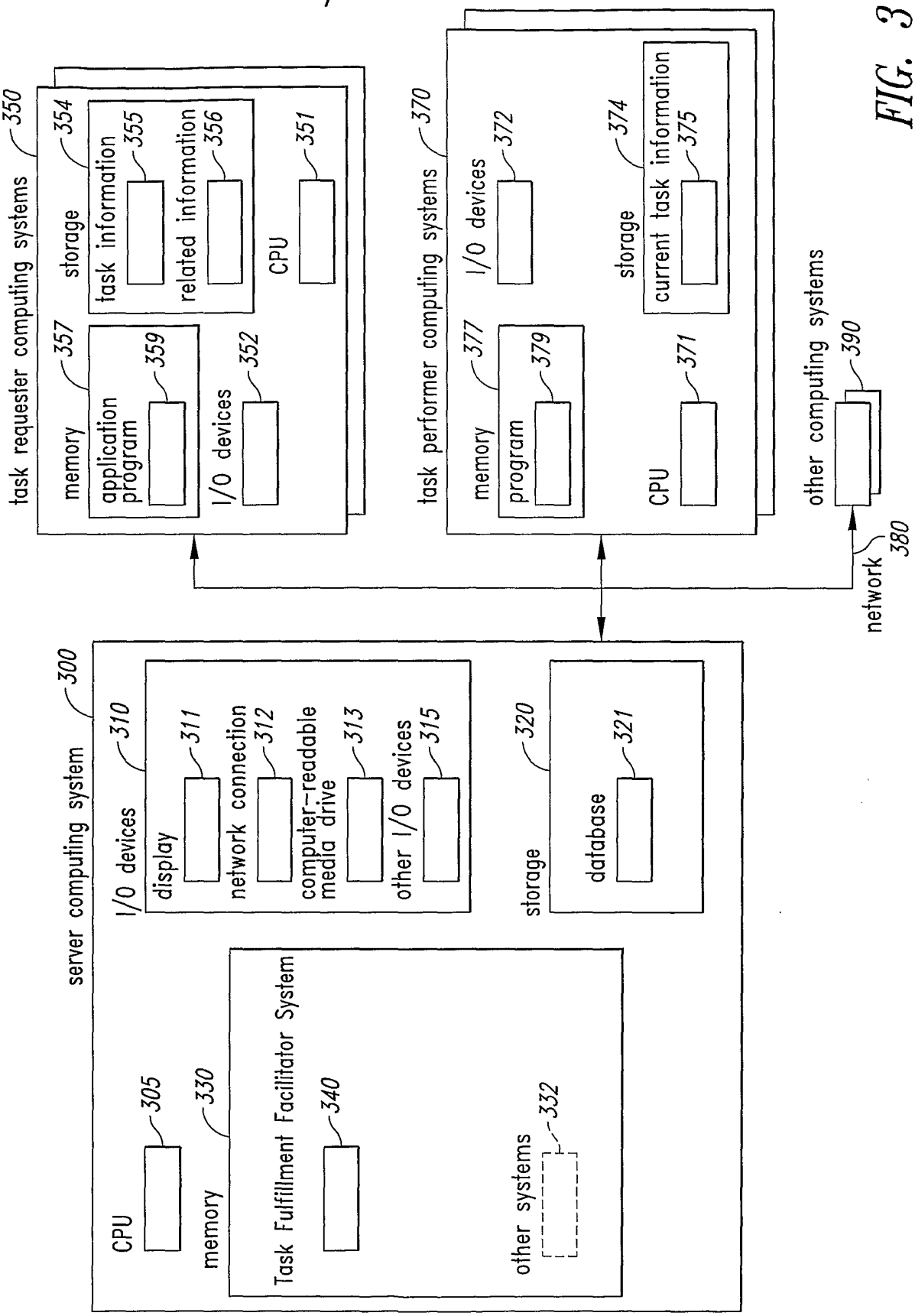
server computing system
300
CPU
305
memory
330
Task Fulfillment Facilitator System
340
other systems
332
I/O devices
310
display
311
network connection
312
computer-readable media drive
313
other I/O devices
315
storage
320
database
321
task requester computing systems
350
memory
357
application program
359
I/O devices
352
storage
354
task information
355
related information
356
CPU
351
task performer computing systems
370
memory
377
program
379
I/O devices
372
CPU
371
storage
374
current task information
375
other computing systems
390
network
380

FIG. 3

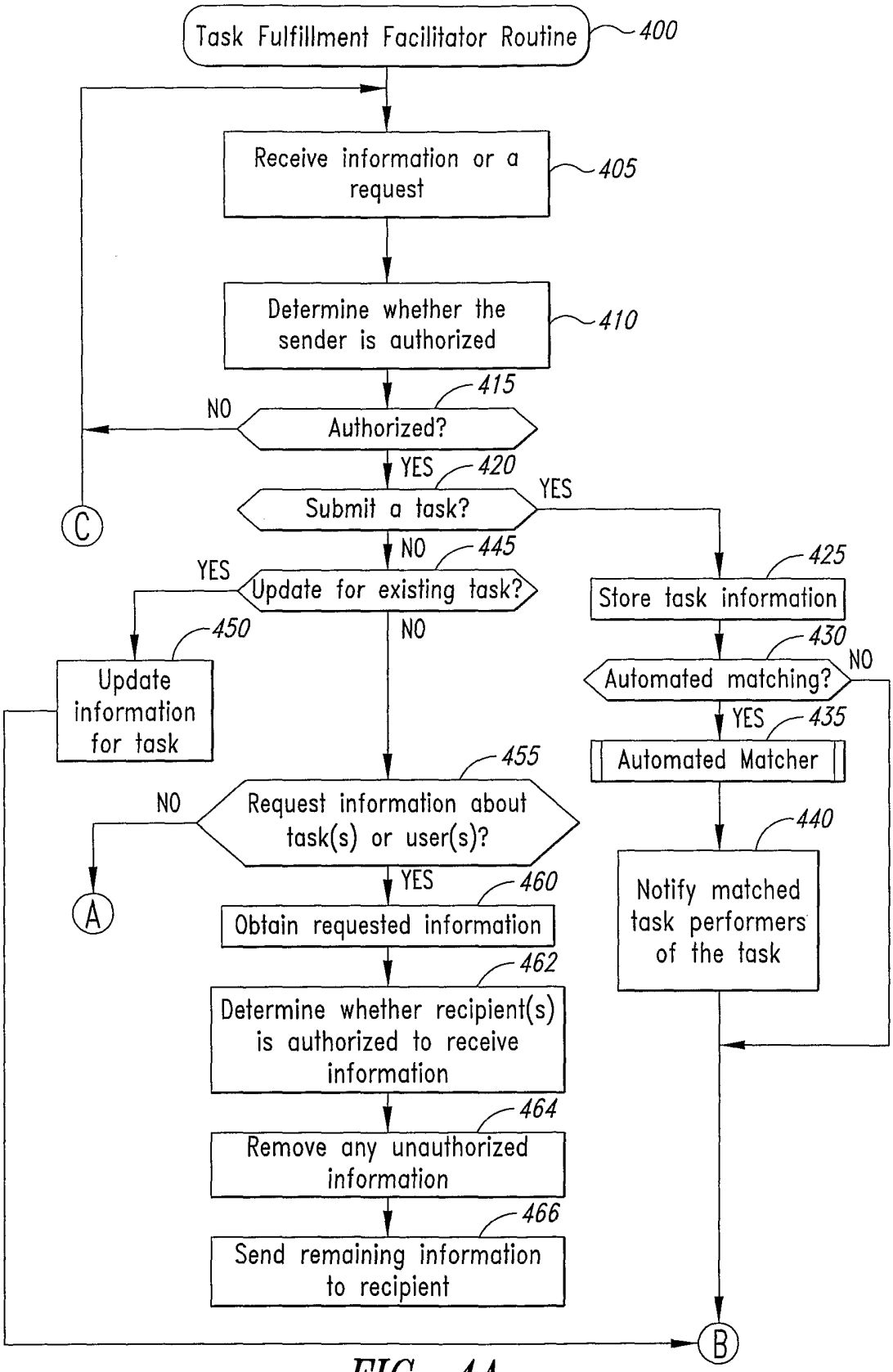
Task Fulfillment Facilitator Routine
400
Receive information or a request
405
Determine whether the sender is authorized
410
415
NO
Authorized?
YES
420
Submit a task?
YES
C
NO
445
YES
Update for existing task?
425
Store task information
NO
450
Update information for task
430
Automated matching?
NO
YES
435
Automated Matcher
455
NO
Request information about task(s) or user(s)?
440
Notify matched task performers of the task
YES
460
Obtain requested information
462
Determine whether recipient(s) is authorized to receive information
464
Remove any unauthorized information
466
Send remaining information to recipient
A
B

FIG. 4A

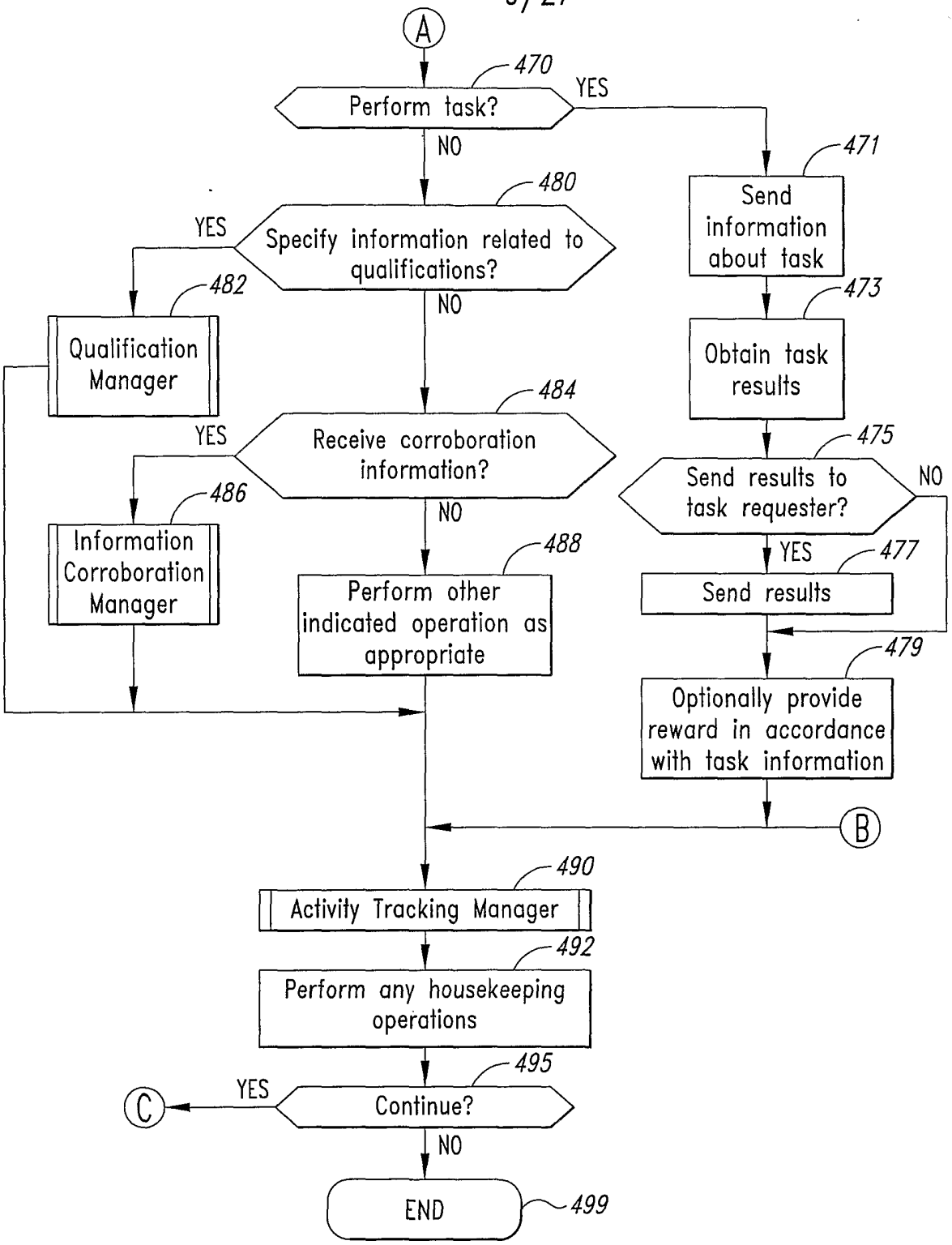
A
470
Perform task?
YES
NO
471
Send information about task
480
Specify information related to qualifications?
YES
NO
482
Qualification Manager
473
Obtain task results
484
Receive corroboration information?
YES
NO
475
Send results to task requester?
NO
YES
486
Information Corroboration Manager
488
Perform other indicated operation as appropriate
477
Send results
479
Optionally provide reward in accordance with task information
B
490
Activity Tracking Manager
492
Perform any housekeeping operations
495
Continue?
YES
C
NO
END
499

FIG. 4B

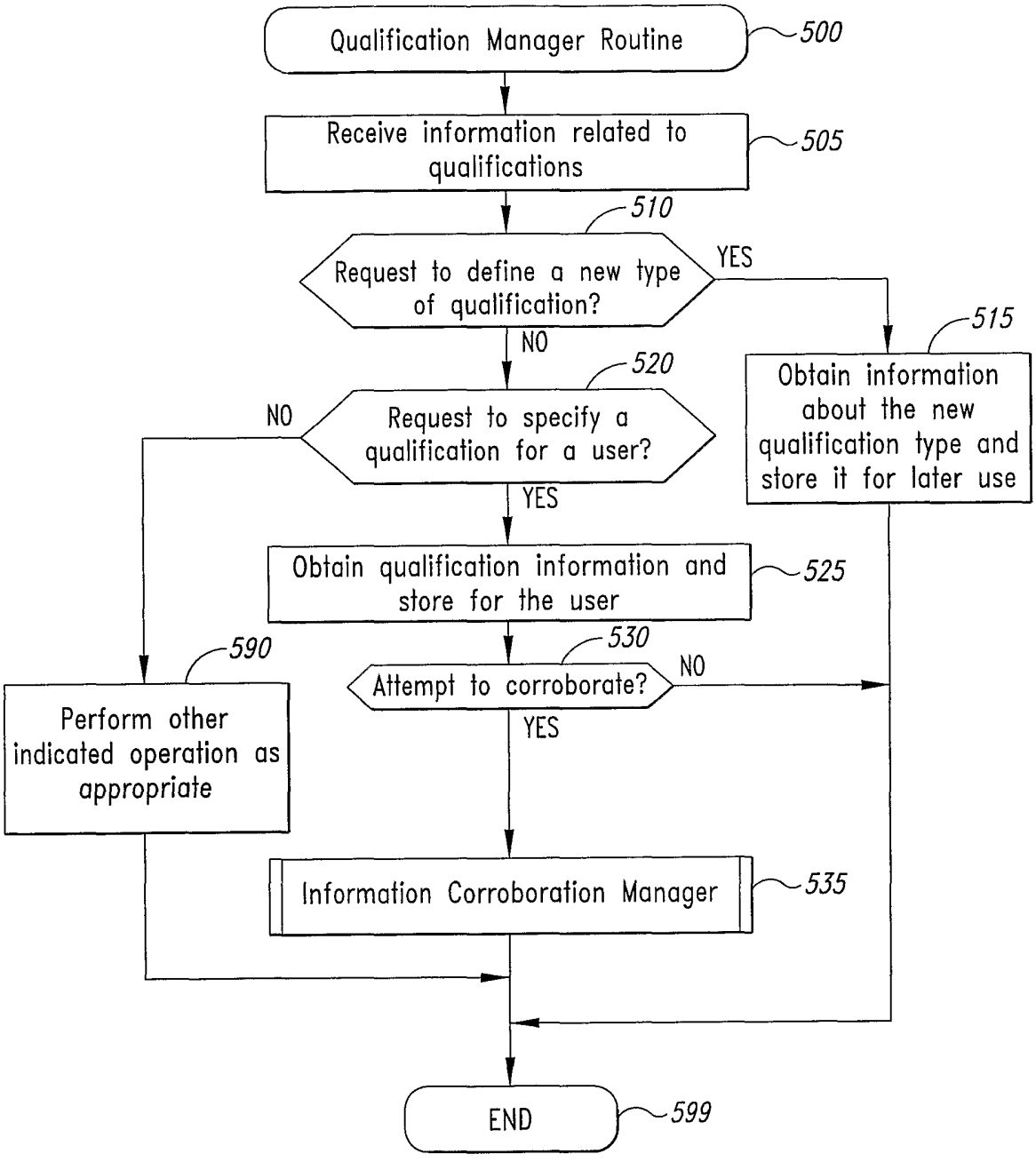
Qualification Manager Routine
500
Receive information related to qualifications
505
510
Request to define a new type of qualification?
YES
NO
515
Obtain information about the new qualification type and store it for later use
520
Request to specify a qualification for a user?
NO
YES
Obtain qualification information and store for the user
525
530
Attempt to corroborate?
NO
YES
590
Perform other indicated operation as appropriate
Information Corroboration Manager
535
END
599

FIG. 5

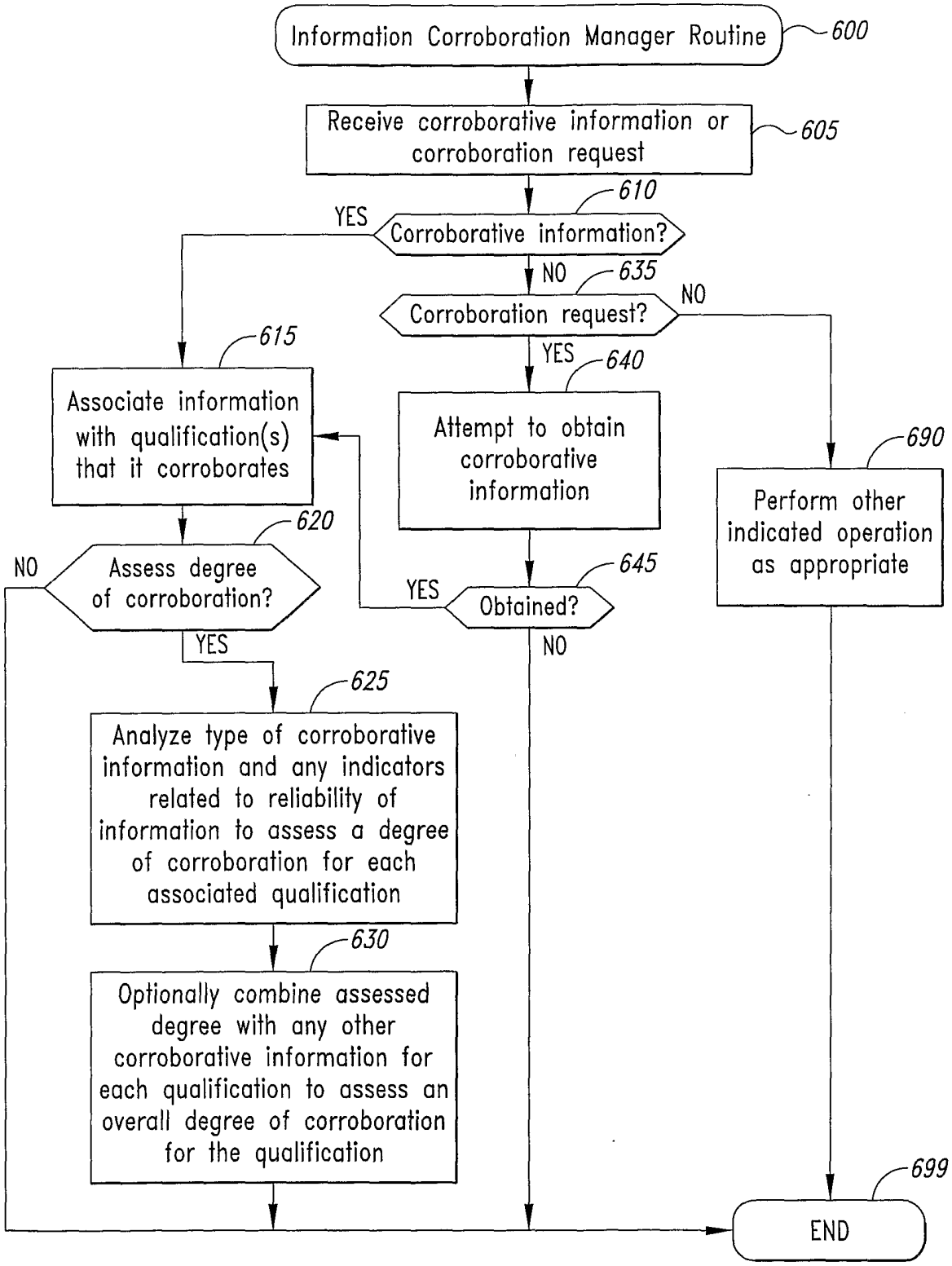
Information Corroboration Manager Routine
600
Receive corroborative information or corroboration request
605
610
YES
Corroborative information?
NO
635
Corroboration request?
NO
YES
640
615
Associate information with qualification(s) that it corroborates
Attempt to obtain corroborative information
690
Perform other indicated operation as appropriate
620
NO
Assess degree of corroboration?
YES
645
YES
Obtained?
NO
YES
625
Analyze type of corroborative information and any indicators related to reliability of information to assess a degree of corroboration for each associated qualification
630
Optionally combine assessed degree with any other corroborative information for each qualification to assess an overall degree of corroboration for the qualification
699
END

FIG. 6

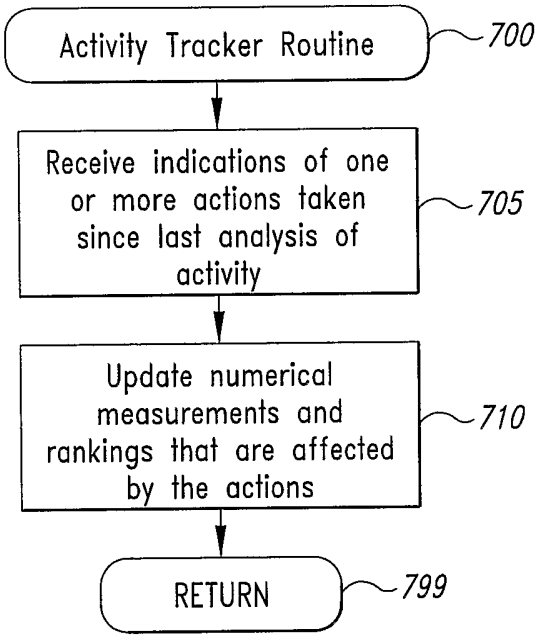
Activity Tracker Routine
700
Receive indications of one or more actions taken since last analysis of activity
705
Update numerical measurements and rankings that are affected by the actions
710
RETURN
799

FIG. 7

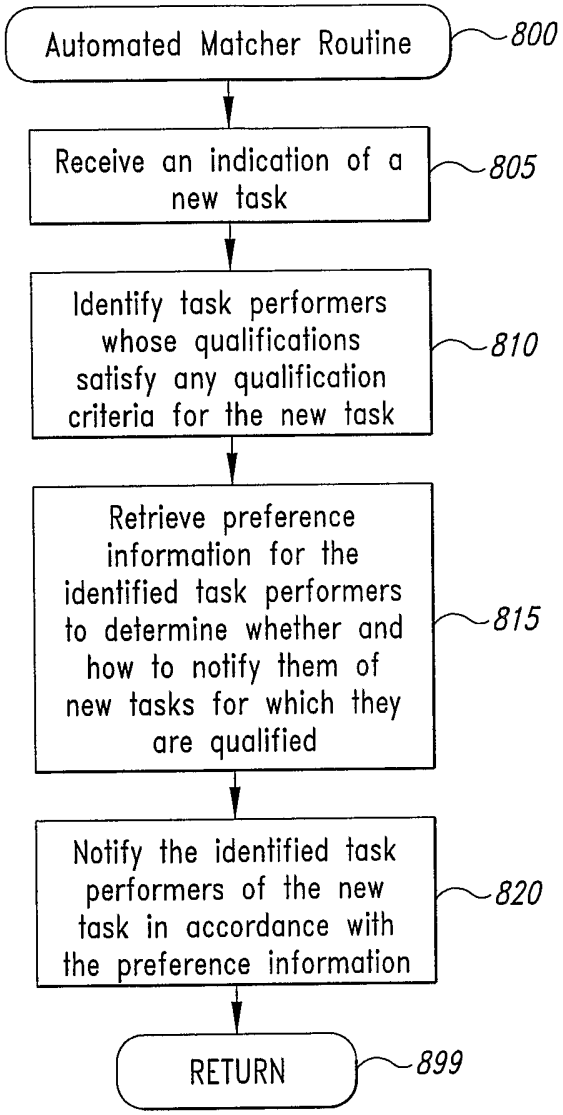
Automated Matcher Routine
800
Receive an indication of a new task
805
Identify task performers whose qualifications satisfy any qualification criteria for the new task
810
Retrieve preference information for the identified task performers to determine whether and how to notify them of new tasks for which they are qualified
815
Notify the identified task performers of the new task in accordance with the preference information
820
RETURN
899

FIG. 8

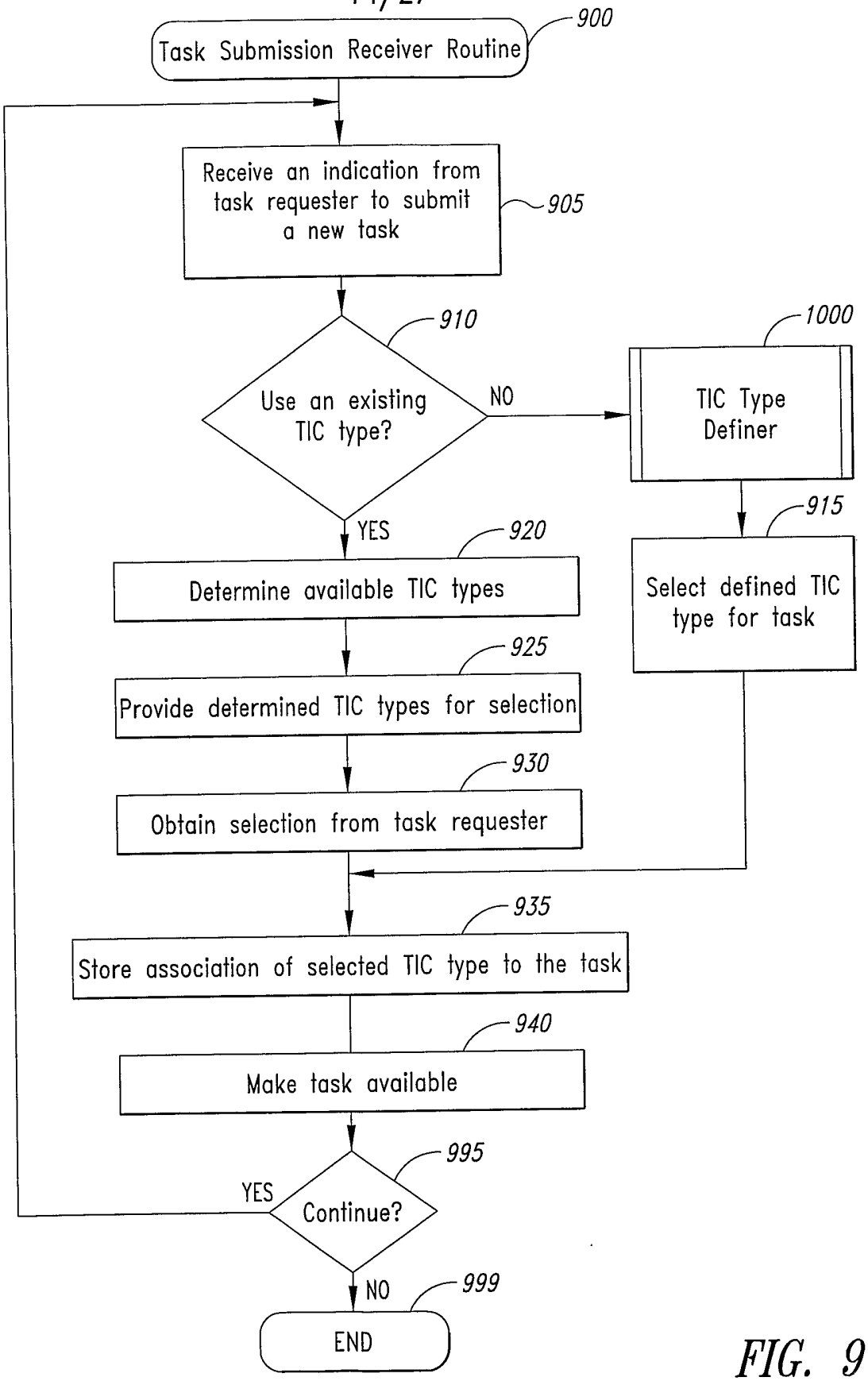
Task Submission Receiver Routine
900
Receive an indication from task requester to submit a new task
905
Use an existing TIC type?
910
NO
TIC Type Definer
1000
YES
Determine available TIC types
920
Select defined TIC type for task
915
Provide determined TIC types for selection
925
Obtain selection from task requester
930
Store association of selected TIC type to the task
935
Make task available
940
Continue?
995
YES
NO
END
999

FIG. 9

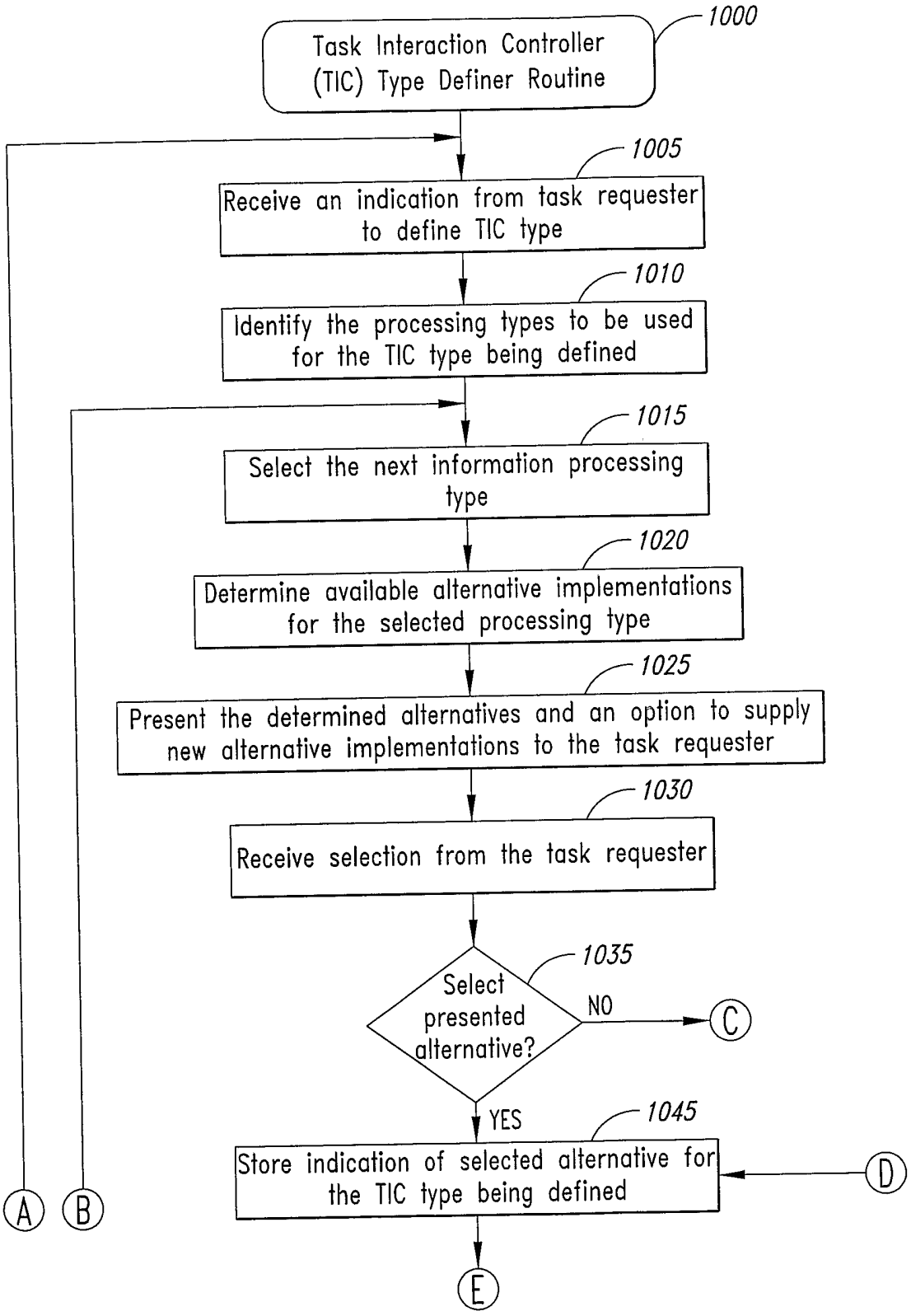
Task Interaction Controller (TIC) Type Definer Routine
1000
Receive an indication from task requester to define TIC type
1005
Identify the processing types to be used for the TIC type being defined
1010
Select the next information processing type
1015
Determine available alternative implementations for the selected processing type
1020
Present the determined alternatives and an option to supply new alternative implementations to the task requester
1025
Receive selection from the task requester
1030
Select presented alternative?
1035
NO
YES
Store indication of selected alternative for the TIC type being defined
1045
A
B
C
D
E

FIG. 10A

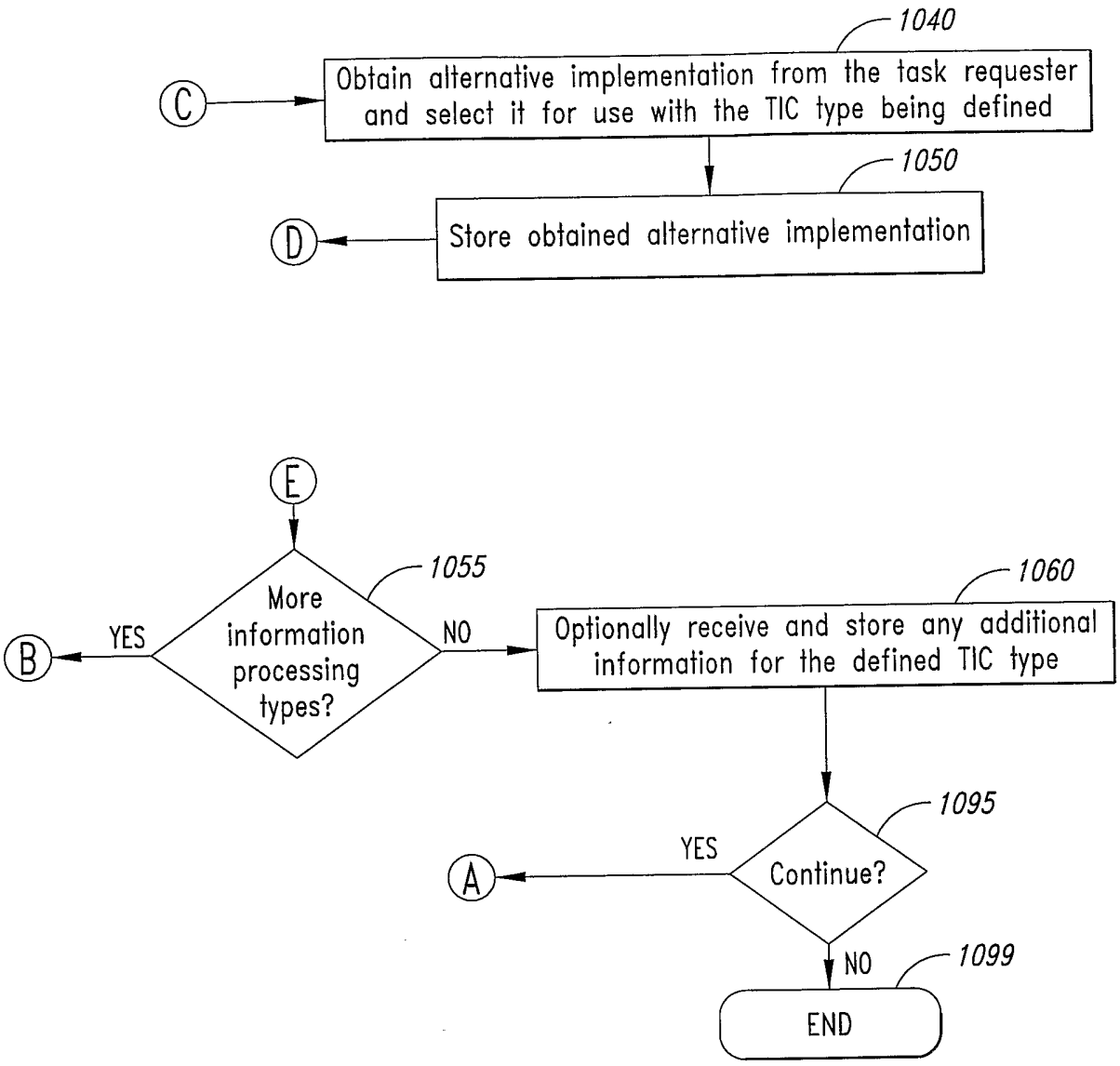
1040
C
Obtain alternative implementation from the task requester and select it for use with the TIC type being defined
1050
D
Store obtained alternative implementation
E
1055
More information processing types?
YES
B
NO
1060
Optionally receive and store any additional information for the defined TIC type
1095
YES
A
Continue?
NO
1099
END

FIG. 10B

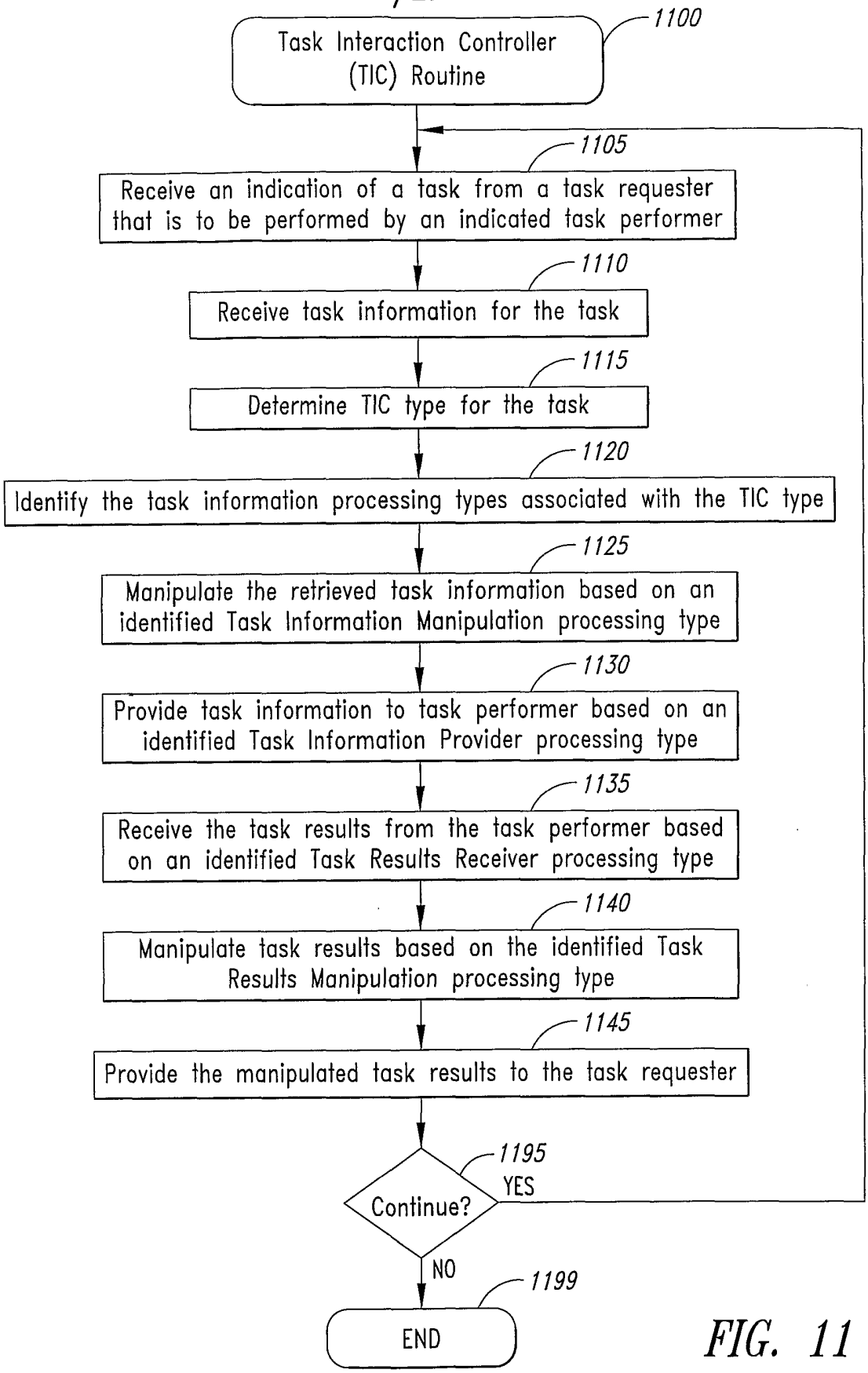
Task Interaction Controller (TIC) Routine
1100
Receive an indication of a task from a task requester that is to be performed by an indicated task performer
1105
Receive task information for the task
1110
Determine TIC type for the task
1115
Identify the task information processing types associated with the TIC type
1120
Manipulate the retrieved task information based on an identified Task Information Manipulation processing type
1125
Provide task information to task performer based on an identified Task Information Provider processing type
1130
Receive the task results from the task performer based on an identified Task Results Receiver processing type
1135
Manipulate task results based on the identified Task Results Manipulation processing type
1140
Provide the manipulated task results to the task requester
1145
Continue?
1195
YES
NO
END
1199

FIG. 11

Example Task

```
<?xml version="1.0" encoding="UTF-8" ?>
- <Question ="multi-choice">
    <Title>A sample multi-choice Task</Title>
    <Text>Which image best shows the XYZ Bank?</Text>
  - <Choices presentation="radio">
    - <Choice>
        <Media type="image/jpeg"
          width="250">imgs/00002405.jpg</Media>
        <Label>Image1</Label>
        <Text />
      </Choice>
    - <Choice>
        <Media type="image/jpeg"
          width="250">imgs/00002438.jpg</Media>
        <Label>Image2</Label>
        <Text />
      </Choice>
    - <Choice>
        <Media type="image/jpeg"
          width="250">imgs/00002458.jpg</Media>
        <Label>Image3</Label>
        <Text />
      </Choice>
    - <Choice>
        <Media type="image/jpeg"
          width="250">imgs/00003319.jpg</Media>
        <Label>Image4</Label>
        <Text />
      </Choice>
    - <Choice>
        <Media type="image/jpeg"
          width="250">imgs/00003354.jpg</Media>
        <Label>Image5</Label>
        <Text />
      </Choice>
    </Choices>
  </Question>
```

FIG. 12A

Example Task Validation Processing Information

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="http://xml.abcd.com/tasktype/multichoice"
  targetNamespace="http://xml.abcd.com/tasktype/multichoice"
  elementFormDefault="qualified">
  <xs:complexType name="MediaType">
    <xs:simpleContent> <xs:extension base="xs:anyURI">
      <xs:attribute name="type" type="xs:string" use="required"/>
      <xs:attribute name="height" type="xs:positiveInteger" use="optional"/>
      <xs:attribute name="width" type="xs:positiveInteger" use="optional"/>
    </xs:extension> </xs:simpleContent> </xs:complexType>
  <xs:complexType name="ChoiceType">
    <xs:sequence>
      <xs:element name="Media" type="tns:MediaType"/>
      <xs:element name="Label" type="xs:Name"/>
      <xs:element name="Text" type="xs:string" minOccurs="0"/>
    </xs:sequence> </xs:complexType>
  <xs:simpleType name="PresentationAttr">
    <xs:restriction base="xs:string">
      <xs:enumeration value="dropdown"/> <xs:enumeration value="radio"/>
      <xs:enumeration value="checkbox"/>
    </xs:restriction> </xs:simpleType>
  <xs:complexType name="ChoicesType">
    <xs:sequence>
      <xs:element name="Choice" type="tns:ChoiceType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="presentation" type="tns:PresentationAttr" default="radio"/>
    <xs:attribute name="default" type="xs:Name" use="optional"/>
  </xs:complexType>
  <xs:element name="Question">
    <xs:complexType> <xs:sequence>
      <xs:element name="Title" type="xs:string"/>
      <xs:element name="Text" type="xs:string"/>
      <xs:element name="Choices" type="tns:ChoicesType"/>
    </xs:sequence> </xs:complexType> </xs:element>
  <xs:element name="Answer">
    <xs:complexType> <xs:sequence>
      <xs:element name="Label" type="xs:Name" maxOccurs="unbounded" minOccurs="0"/>
    </xs:sequence> </xs:complexType> </xs:element>
</xs:schema>
```

FIG. 12B

Example Task Information Manipulation Processing Information

```
<?xml version="1.0" encoding="UTF-8" ?>
- <xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    version="1.0">
    <xsl:output method="html" />
    <xsl:param name="postAction" />
    <xsl:param name="assignmentId" />
  - <xsl:template match="/Question">
    - <html>
      - <head>
        - <title>
            <xsl:value-of select="Title" />
          </title>
        </head>
      - <body>
        - <h1>
            <xsl:value-of select="Title" />
          </h1>
        - <p>
            <xsl:value-of select="Text" />
          </p>
          <xsl:apply-templates select="Choices" />
        </body>
      </html>
    </xsl:template>
  - <xsl:template match="Choices">
    - <xsl:choose>
      - <xsl:when test="@presentation='radio'">
        - <form action="{$postAction}" method="post">
            <input type="hidden" name="id"
              value="{$assignmentId}" />
          - <table>
            - <tr>
                <th>Choice</th>
                <th>Subject</th>
              </tr>
            - <xsl:for-each select="Choice">
              - <tr>
                - <td>
                  - <input>
                    - <xsl:attribute name="type">
```

FIG. 12C

Example Task Information Manipulation Processing Information *(continued)*

```
                    <xsl:text>radio</xsl:text
                        >
                    </xsl:attribute>
                  - <xsl:attribute
                      name="name">

                        <xsl:text>choice</x
                        sl:text>
                    </xsl:attribute>
                  - <xsl:attribute
                      name="value">
                      <xsl:value-of
                        select="Label" />
                    </xsl:attribute>
                  </input>
                </td>
              - <td>
                  <xsl:apply-templates select="."
                    />
                </td>
              </tr>
            </xsl:for-each>
          - <tr>
            - <td>
                <input type="submit" />
              </td>
            </tr>
          </table>
        </form>
      </xsl:when>
    - <xsl:when test="@presentation='dropdown'">
      - <form action="{$postAction}" method="post">
          <input type="hidden" name="id"
            value="{$assignmentId}" />
        - <table>
          - <tr>
            - <td>
              - <select name="choice">
                - <xsl:for-each select="Choice">
                  - <option>
                    - <xsl:attribute
                        name="Label">
                        <xsl:value-of
                          select="Text" />
                      </xsl:attribute>
```

FIG. 12D

Example Task Information Manipulation Processing Information *(continued)*

```
                    - <xsl:attribute
                        name="value">
                        <xsl:value-of
                          select="Label"
                          />
                      </xsl:attribute>
                    </option>
                  </xsl:for-each>
                </select>
              </td>
            - <xsl:for-each select="Choice">
              - <td>
                  <xsl:apply-templates select="."
                    />
                </td>
              </xsl:for-each>
            </tr>
          </table>
        </form>
      </xsl:when>
    - <xsl:when test="@presentation='checkbox'">
      - <form action="{$postAction}" method="post">
          <input type="hidden" name="id"
            value="{$assignmentId}" />
        - <table>
          - <tr>
              <th>Choice</th>
              <th>Subject</th>
            </tr>
          - <xsl:for-each select="Choice">
            - <tr>
              - <td>
                - <input>
                  - <xsl:attribute name="type">
                      <xsl:text>checkbox
                      </xsl:text>
                    </xsl:attribute>
                  - <xsl:attribute
                      name="name">
                      <xsl:text>choice</x
                      sl:text>
                    </xsl:attribute>
```

FIG. 12E

Example Task Information Manipulation Processing Information *(continued)*

```
                    - <xsl:attribute
                        name="value">
                        <xsl:value-of
                          select="Label" />
                      </xsl:attribute>
                    </input>
                  </td>
                - <td>
                    <xsl:apply-templates select="."
                      />
                  </td>
                </tr>
              </xsl:for-each>
            </table>
          </form>
        </xsl:when>
      </xsl:choose>
    </xsl:template>
  - <xsl:template match="Choice">
      <xsl:apply-templates select="Media" />
    - <xsl:if test="Text">
        <br />
        <xsl:value-of select="Text" />
      </xsl:if>
    </xsl:template>
  - <xsl:template match="Media">
    - <xsl:choose>
      - <xsl:when test="substring-before(@type, '/')='image'">
        - <img>
          - <xsl:attribute name="src">
              <xsl:value-of select="." />
            </xsl:attribute>
          - <xsl:if test="@height">
            - <xsl:attribute name="height">
                <xsl:value-of select="@height" />
              </xsl:attribute>
            </xsl:if>
          - <xsl:if test="@width">
            - <xsl:attribute name="width">
                <xsl:value-of select="@width" />
              </xsl:attribute>
            </xsl:if>
          </img>
        </xsl:when>
```

FIG. 12F

Example Task Information Manipulation Processing Information *(continued)*

```
      - <xsl:otherwise>
        - <object>
          - <xsl:attribute name="data">
              <xsl:value-of select="." />
            </xsl:attribute>
          - <xsl:attribute name="type">
              <xsl:value-of select="@type" />
            </xsl:attribute>
          - <xsl:if test="@height">
            - <xsl:attribute name="height">
                <xsl:value-of select="@height" />
              </xsl:attribute>
            </xsl:if>
          - <xsl:if test="@width">
            - <xsl:attribute name="width">
                <xsl:value-of select="@width" />
              </xsl:attribute>
            </xsl:if>
          </object>
        </xsl:otherwise>
      </xsl:choose>
    </xsl:template>
  </xsl:stylesheet>
```

FIG. 12G

Example Presentation Of Task

Which image best shows the XYZ Bank? 1225

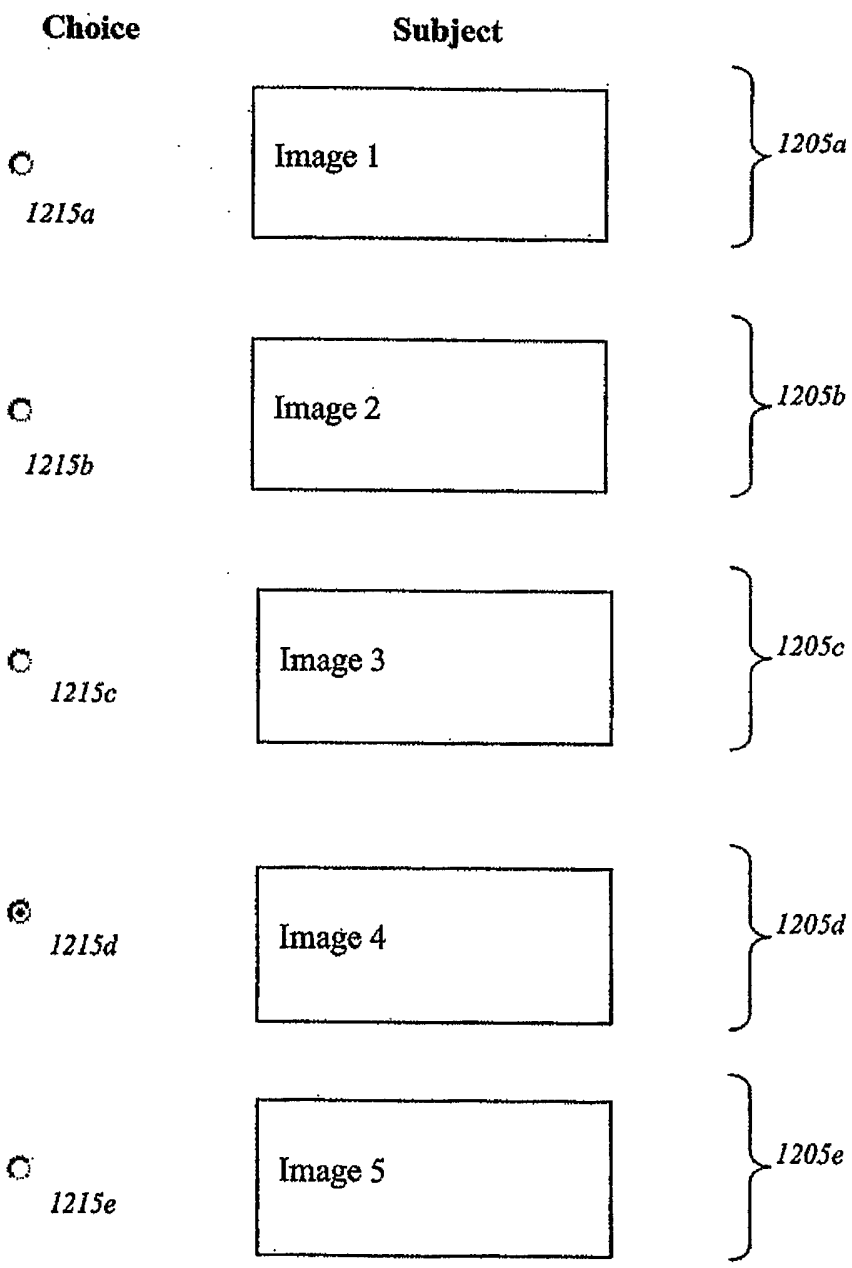

FIG. 12H

Example Task Results Manipulation Processing Information

```
<?xml version="1.0" encoding="UTF-8" ?>
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    version="1.0">
  <xsl:output method="xml" />
  <xsl:template match="/CGIData">
    <Answer>
      <xsl:for-each select="Parameter">
        <xsl:if test="@name='choice'">
          <Label>
            <xsl:value-of select="@value" />
          </Label>
        </xsl:if>
      </xsl:for-each>
    </Answer>
  </xsl:template>
</xsl:stylesheet>
```

FIG. 12I

Example Manipulated Task Results Provided to Task Requester

```
<?xml version="1.0" encoding="UTF-8" ?>
- <Answer>
    <Label>Image4</Label>
  </Answer
```

FIG. 12J

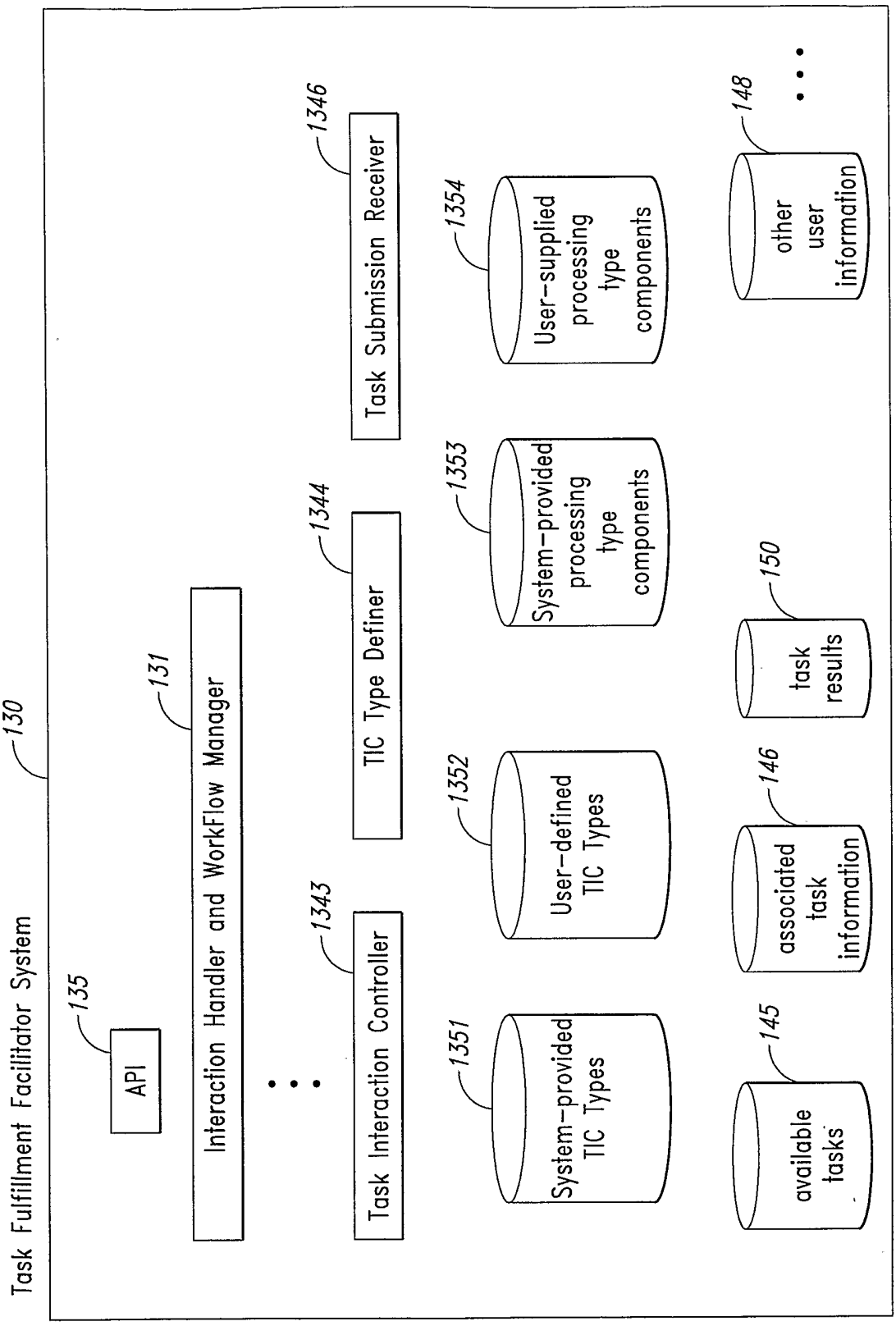
Task Fulfillment Facilitator System
130
API
135
Interaction Handler and WorkFlow Manager
131
Task Interaction Controller
1343
TIC Type Definer
1344
Task Submission Receiver
1346
System-provided TIC Types
1351
User-defined TIC Types
1352
System-provided processing type components
1353
User-supplied processing type components
1354
available tasks
145
associated task information
146
task results
150
other user information
148

FIG. 13