DOCUMENT MADE AVAILABLE UNDER THE
PATENT COOPERATION TREATY (PCT)

International application number:		**PCT/EP2011/071407**
International filing date:		**30 November 2011 (30.11.2011)**
Document type:		**Certified copy of priority document**
Document details:	Country/Office:	**DK**
	Number:	**PA 2010 70524**
	Filing date:	**01 December 2010 (01.12.2010)**
Date of receipt at the International Bureau:		**12 April 2012 (12.04.2012)**

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-*bis*)

34, chemin des Colombettes
1211 Geneva 20, Switzerland
www.wipo.int

Kongeriget Danmark

Patent application No.:	PA 2010 70524
Date of filing:	01 December 2010
Applicant: (Name and address)	Queue-It ApS Fruebjergvej 3 DK-2100 København Ø Denmark

Title: A method and a computer network system for controlling user access to a transactional site associated with a website

IPC: --

This is to certify that the attached documents are exact copies of the above mentioned patent application as originally filed.

Patent- og Varemærkestyrelsen
Økonomi- og Erhvervsministeriet

12 March 2012

Gitta Storch Priess

A METHOD AND A COMPUTER NETWORK SYSTEM FOR CONTROLLING USER ACCESS TO A TRANSACTIONAL SITE ASSOCIATED WITH A WEBSITE

Technical field

The present invention relates to a method for alleviating the load on transactional sites, i.e.
5   websites, deriving from a large number of simultaneous users. One specific field of
application of the present invention is on-line ticket sales sites, which are particularly
vulnerable to overload interruptions or crashes when advance sales of tickets to top-tier
music or sports events are initiated.

Background of the invention

10   It is well known that websites may fail due to excessive user volume. Further, slow response
times for accessing websites, retrieving data and performing actions, such as placing
purchasing orders, may cause users to leave the websites. These problems occur in particular
at on-line ticket box offices in the initial phase of advance sales of tickets to top-tier music or
sports events, at online retail promotion sales, at internet news sites following major events
15   of particular interest to a majority of the population, at tax authority sites following the
release of annual tax balances, etc.

US patent No. 7,099,933 discloses an internet customer access system comprising a redirect
receiving unit for generating a request for a capacity determination of a website. The system
20   further comprises a capacity determination unit for determining if the website has the
capacity to handle an additional customer and a notification unit for notifying the customer if
the website current has insufficient capacity to accommodate additional customers. A redirect
unit redirects the customer to the website if sufficient capacity is found. A scheduling
processor is disclosed for scheduling access of the customer to the website if the capacity
25   determination unit indicates that no capacity exists. A customer identification unit may be
provided for determining whether the customer has scheduled access to the website.

While the system of US 7,099,933 may at least partially solve some of the problems
associated with website overload, certain challenges remain unresolved by the prior art. The
30   system of US 7,099,933 relies on a capacity determination of the website. The associated
capacity request occupies computer and network resources and may delay redirect of
customers. No accurate estimate can be provided to customers as to when they may expect
to gain access to the website, because the redirect of customers to the website relies solely
on the current capacity of the website, which may vary significantly from one moment to
35   another. Accordingly customers must constantly monitor their redirect status. Further, a lost

internet connection of a customer can lead to the unfavourable effect that the customer's access tag expires, while the customer is offline. Still further, challenges remain with respect to avoiding overload of the redirect unit.

Summary of the invention

5   It is accordingly an object of embodiments of the invention to provide a method and a system, which is capable of providing an access estimate to users. It is a further object of embodiments of the invention to provide a method and a system, in which a user does not lose his right to website access while being temporarily offline. It is a still further object of embodiments of the invention to provide a system and a method, in which the notification or
10   queue system has a low risk of crashing or causing delays due to overload.

In a first aspect the invention provides a method for controlling user access to a transactional site associated with a website, comprising:
- receiving, at said website, user requests for access to the transactional site, said user
15   requests being transmitted from end-user systems connected to the website via a communications network;
- redirecting the user requests to a queue system;
- generating, at the queue system, a queue of user requests for access to the transactional site;
20   - allowing each user request to be redirected to the transactional site according to a predetermined redirect schedule.

In a second aspect, the invention provides a computer network system configured to control user access to a transactional site associated with a website, the computer network system comprising:
25   - a plurality of end-user systems;
- a first server hosting said website and configured to receive, from the end-user systems, user requests for access to the transactional site;
- a second server hosting said transactional site;
- a queue system configured to generate a queue of user requests for access to the
30   transactional site;
wherein:
- the website is configured to redirect the user requests to the queue system,
- the queue system is configured to generate a queue of said user requests and to redirect each user request to the transactional site according to a predetermined redirect schedule.

The predetermined redirect schedule is preferably determined before the user request is received by the queue system, or at the latest upon receiving the user request. Hence, an accurate estimate of queue time may be communicated to the user immediately as the user request is entered into the queue.

5   The website may typically include a page comprising a graphical user interface, in which users may choose to enter ticket sales, tax report interfaces, or the like. The end-user systems may comprise workstations, such as personal computers, operated by human operators and connected to the internet. The transactional site comprises functionality for performing actions, such as for receiving and processing purchasing orders, ticket sales, data

10   information requests, etc. The website and the transactional are typically provided by a web provider. The queue system may be provided by the web provider too, however in preferred embodiments the queue system is provided by a third party. The queue system may comprise a plurality of web servers in a distributed network, such as a cloud computing network. This allows the system to be scalable to match the number of users for any given

15   application and assures the availability of appropriate computer resources even for large-scale applications.

Embodiments of the invention

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

20   Fig. 1 schematically illustrates a computer network system according to the present invention, comprising functionality for carrying out the method according to the invention;

Fig. 2 schematically illustrates interaction between end-user systems and the queue system;

Fig. 3 is a flow chart illustrating steps performed by the queue system.

The system illustrated in Fig. 1 generally operates as follows:

25   1) User system 200, herein also referred to as end-user system 200, queries a name
                server 300 to resolve a http-address, such as www.site.com
           2) Name Server 300 returns TCP-IP address to the requested site
           3) End-user systems 200 request goes to the requested site 400
           4) From the site 400 the end-user system 200 is directed to the queue system 100

30   5) Queue system 100 returns information to end-user system 200 about queue status,
                such as queue identifier, queue number, estimated waiting time, i.e. estimated
                remaining time in queue

6) When first in queue end-user system 200 is redirected to transactional site 500,
whereby the user, i.e. operator, of the end-user system 200 experiences to be
redirected to the transactional site 500

7) End-user system 200 receives information from and interacts with transactional site

5   500

The queue id may be a globally unique identifier or a GUID (a type of identifier used in
software applications to provide a unique reference number. The value is represented as a 32
character hexadecimal string, such as {21EC2020-3AEA-1069-A2DD-08002B30309D} and
usually stored as a 128 bit integer).

10   The queue identifier may be represented in a HTTP representation, such as
http://queue.acme.com/page.html?qid=21EC2020-3AEA-1069-A2DD-08002B30309D.

The end-user system 200 may include a personal computer running the Microsoft Windows™,
PalmOS™, Unix, Linux, Solaris™, OS/2™, BeOS™, MacOS™, Android™ or any other
applicable operating system or platform. The end-user system 200 may include a

15   microprocessor such as an Intel based device, a MIPS, a Digital Equipment Corporation
Alpha™ RISC processor, a microcontroller or any other device operable under control of a
computer program. The end-user system 200 may additionally include an electronic storage
memory, such as RAM, EPROM, a hard drive, DVD or rewritable DVD, Blueray or rewriatable
Blueray, CDROM or rewritable CDROM.

20

The site 400 and the transactional site 500 may include, for instance, a workstation running
Microsoft Windows™ NT™, Windows™. 2000, Windows™Vista, Windows™ 7, Unix, Linux,
Xenix, IBM AIX., Hewlett-Packard UX™, Novell Netware™, Sun Microsystems Solaris™,
OS/2™, BeOS™, Mach, Apache, OpenStep™ or other operating system or platform

25   The interaction between the queue system and the end-user systems is generally illustrated
in Fig. 2.

The queue system relies on HTTP redirects, see W3C and RFC2616

1) A user has an open browser on a given page on the internet. A link to the

30   transactional site, such as a ticket sales site points to the queue system
a. The queue system saves information about the end-user in the queue
b. The queue system supplies a unique queue id
c. The queue system calculates the user's position in the queue

            d. The queue system offers the user the possibility to request information about the unique queue id

2) The forecaster calculates the speed of the queue and offers the user the possibility to request information about when to be served, i.e. estimated remaining time in the queue.

3) When the user is next to being served, i.e. at the front-end of the queue, the user enters into an "open window". The "open window" allows the user to be redirected to the transactional site within a predetermined time slot from the moment the user request has reached the front-end of the queue. The duration of the time slot may be configurable. It may, for example, be 10 minutes. When the end-user is in the "open window" the Redirector will allow him to be redirected to the transactional site for a configurable number of redirects, e.g. 5.

The queue system illustrated in Fig. 2 comprises the following modules:

- Queue front-end: receives the request from the end-user system 200 (see Fig. 1), returns information to end-user system about the queue system 100 and checks if a new queue identifier is to be generated or if existing queue identifier can read from the queue

- Queue: holds the total queue with each user's unique queue identifier as key. The queue holds information about each user, such IP address, browser, etc., creation time, aueue identifier, queue number, etc.

- Forecaster: calculates the speed of the queue

- Redirector: redirects the user to the transactional site via a configurable URL, when his turn is up, i.e. when he is at a front end of the queue

Notifier: can notify a user about his queue identifier and relevant information linked to the queue identifier, such as by sending an e-mail or a text message

Fig. 3 is a flow chart illustrating steps performed by the queue system of Figs. 1 and 2.

1) A user either has no queue identifier, i.e. an empty queue identifier, or a queue identifier. The queue identifier may be linked to the user's system either as an URI, i.e. a Uniform Resource Identifier, which is a string of characters used to identify a name or a resource on the Internet. The queue identifier may hence include a link on a webpage, persisted on the user system in a cookie or typed into a browser. The queue system receives a HTTP request with the queue identifier as path of the URI. Queue system checks if the received queue identifier exists, if it has been used for a number of times lower than a configured threshold number and if it is inside the "open window", i.e. inside a timeslot where queue identifiers can be redirected to the transactional site. The queue system concludes if the queue identifier is valid or not.

2) The user system receives a new queue id

3) Return information to user about queue identifier, queue number, such as an incremental number, starting e.g. from 1, and estimated time until the specific queue identifier inters into the "open window", i.e. estimated remaining time in the queue. This can for example be performed from a webpage

4) Check if the queue identifier is inside the "open window". The "open window" holds a range of queue identifiers that have the possibility to be redirected to the transactional site. A given queue identifier enters the "open window" when it is first in the queue (FIFO). The queue identifier is valid from the time it enters into the "open window" and a configurable time period, such as 10 minutes.

5) If the queue identifier is in the "open window" the user can be redirected to the transactional site as setup in the configuration of the queue system.

6) If the user for some reason drops out of the transactional site, he can retry and reuse his queue id

OPEN WINDOW

Normal queue behavior (as described in mathematics) will pull an element off queue when it reaches the first or last position in the queue.

For the purpose of giving the end-user system 200 an option to reenter the transactional site 500, a concept called "open window" is introduced. If the end-user system 200 interacts with the transactional site 500 and the transactional site 500 loses the end-user system's 200 connection, for example during a purchasing transaction, the "open window" concept allows the end-user system 200 to reenter the transactional site 500 for a configurable timeslot, such as for 10 minutes.

The "open window" concept is defined as a range of ordered queue numbers that can be redirected to the transactional site 500. A queue number outside this range will either be provided with information about status of the queue if queue number is higher that the range or needs to be renewed if it is lower than the range. queue numbers before the "open window" is said to be expired.

The Forecaster and the Redirector components work together with this logic.

On the basis of the above examples it will be generally appreciated that the queue system assigns a unique queue identifier to each user request, and that the queue system provides the queue identifier to the end-user system. The unique queue identifier may comprise a link

to a web page, the link being persisted on the end-user systems in cookies or typed into a browser.

The queue system may perform the step of determining whether said user request is linked to a unique queue identifier already in the queue, when one of the user requests is redirected
5 to the queue system. The step of assigning the unique queue identifier to the end-user system may be omitted if the user request is linked to a unique queue identifier in the queue, so that the step of assigning the unique queue identifier is only carried out if the user request is not linked to a unique queue identifier in the queue.

The queue system may determine an estimation of each user's remaining time in the queue.
10 The remaining time may be communicated to the user, e.g. via mail, display notification, sms or any other appropriate means of communication.

The redirect schedule may be determined on the basis of a predetermined maximum turnover of users at the transactional site. For example, it may be pre-decided that the transactional site will only accept a certain number of user requests per time unit. The
15 redirect schedule may alternatively be determined on the basis of a predetermined maximum number of simultaneous users being redirected to the transactional site. Generally, in order to be able to provide accurate queuing time estimates to users, the transactional site's current capacity is preferably not taken into account when allowing the user requests to be redirected. Accordingly, while the predetermined redirect schedule may in itself will be linked
20 to the transactional site's capacity, the actual step of allowing users to be redirected to the transactional site is carried out independently from the transactional site's current capacity.

The redirect schedule may based on an accumulated number of past users processed at the transactional site. It may, for instance, have been pre-decided that only a certain number of
25 users should be allowed at the transactional site during a certain time period. In respect of ticket advance sales, it may for example be desirable that only a certain number of tickets are sold via the internet at the initial phase of advance sales, in order to allow a given number of tickets to be sold in physical stores.

30 Any user who has reached a front-end of the queue may be allowed to be immediately redirected to the transactional site within a predetermined time slot from the moment the user request has reached the front-end of the queue. The time slot may be of duration from a few seconds to several hours. For most applications, a time slot of 5-30 minutes is appropriate. Accordingly, users are safeguarded against losing their position in the queue, in
35 case of loss of internet connection, malfunctions at the transactional site or in case of lack of attention.

The queue system may comprise a plurality of web servers, and each of the user requests may be redirected from the website to one of the web servers of the queue system, which may be selected on the basis of a web server distribution function. At least one of the plurality of web servers of the queue system may be located at a location remote from at least another one of the plurality of web servers. The plurality of web servers may be provided in a cloud-computing network or in a similar distributed system.

In the distributed system, the queue system is preferably able to handle the queue identifiers across the plurality of web servers. Such handling can be implemented with a distributed database known *per se*.

CLAIMS

1. A method for controlling user access to a transactional site associated with a website, comprising:
- receiving, at said website, user requests for access to the transactional site, said user
5   requests being transmitted from end-user systems connected to the website via a communications network;
- redirecting the user requests to a queue system;
- generating, at the queue system, a queue of user requests for access to the transactional site;
10   - allowing each user request to be redirected to the transactional site according to a predetermined redirect schedule.

2. A method according to claim 1, wherein the queue system assigns a unique queue identifier to each user request, and wherein the queue system further provides the queue identifier to the end-user system.

15   3. A method according to claim 2, wherein the unique queue identifier comprises a link to a web page, said link being persisted on the end-user systems in cookies or typed into a web browser.

4. A method according to claim 2 or 3, further comprising, at the queue system, the steps of:
- when one of said user requests is redirected to the queue system: determining whether
20   said user request is linked to a unique queue identifier already in the queue;
wherein
- said step of assigning the unique queue identifier to the end-user system is omitted if the user request is linked to a unique queue identifier in the queue, and wherein
- said step of assigning the unique queue identifier is only carried out if the user request is
25   not linked to a valid / non expired unique queue identifier in the queue.

5. A method according to any of the preceding claims, wherein the queue system determines an estimation of each user's remaining time in the queue, and wherein the queue system can optionally notifies the user of said remaining time.

6. A method according to any of the preceding claims, wherein the redirect schedule is
30   determined on the basis of a predetermined maximum turnover of users at the transactional site per time unit.

7. A method according to any of the preceding claims, wherein the redirect schedule is determined on the basis of a predetermined maximum number of simultaneous users to be redirected to the transactional site.

5   8. A method according to any of the preceding claims, wherein the transactional site's current capacity is not taken into account when allowing the user requests to be redirected.

9. A method according to any of the preceding claims, wherein the redirect schedule is based on an accumulated number of past users processed at the transactional site.

10

10. A method according to any of the preceding claims, wherein any user who has reached a front-end of the queue is allowed to be immediately redirected to the transactional site within a predetermined time slot from the moment the user request has reached the front-end of the queue.

15   11 A method according to any of the preceding claims, wherein the queue system comprises a plurality of web servers, and wherein each of the user requests is redirected from the website to one of the web servers of the queue system, which is selected on the basis of a web server distribution function.

20   12. A method according to claim 11, wherein at least one of the plurality of web servers of the queue system is located at a location remote from at least another one of the plurality of web servers.

13. A computer network system configured to control user access to a transactional site
25   associated with a website, the computer network system comprising:
- a plurality of end-user systems;
- a first server hosting said website and configured to receive, from the end-user systems, user requests for access to the transactional site;
- a second server hosting said transactional site;
30   - a queue system configured to generate a queue of user requests for access to the transactional site;
wherein:
- the website is configured to redirect the user requests to the queue system,
- the queue system is configured to generate a queue of said user requests and to redirect
35   each user request to the transactional site according to a predetermined redirect schedule.

14. A computer network system according to claim 13, wherein the queue system comprises a plurality of web servers in a distributed network, such as a cloud-computing network, and

wherein the queue system is configured to redirect each of the user requests from the website to one of the web servers of the queue system, which is selected on the basis of a web server distribution function.

12

ABSTRACT

A method for controlling user access to a transactional site associated with a website comprises receiving, at the website, user requests for access to the transactional site, the user requests being transmitted from end-user systems connected to the website via a communications network; redirecting the user requests to a queue system; generating, at the queue system, a queue of user requests for access to the transactional site; allowing each user request to be redirected to the transactional site according to a predetermined redirect schedule. Any user who has reached a front-end of the queue is allowed to be redirected to the transactional site within a predetermined time slot from the moment the user request has reached the front-end of the queue. The queue system may comprise a plurality of web servers in a distributed network, such as a cloud-computing network.
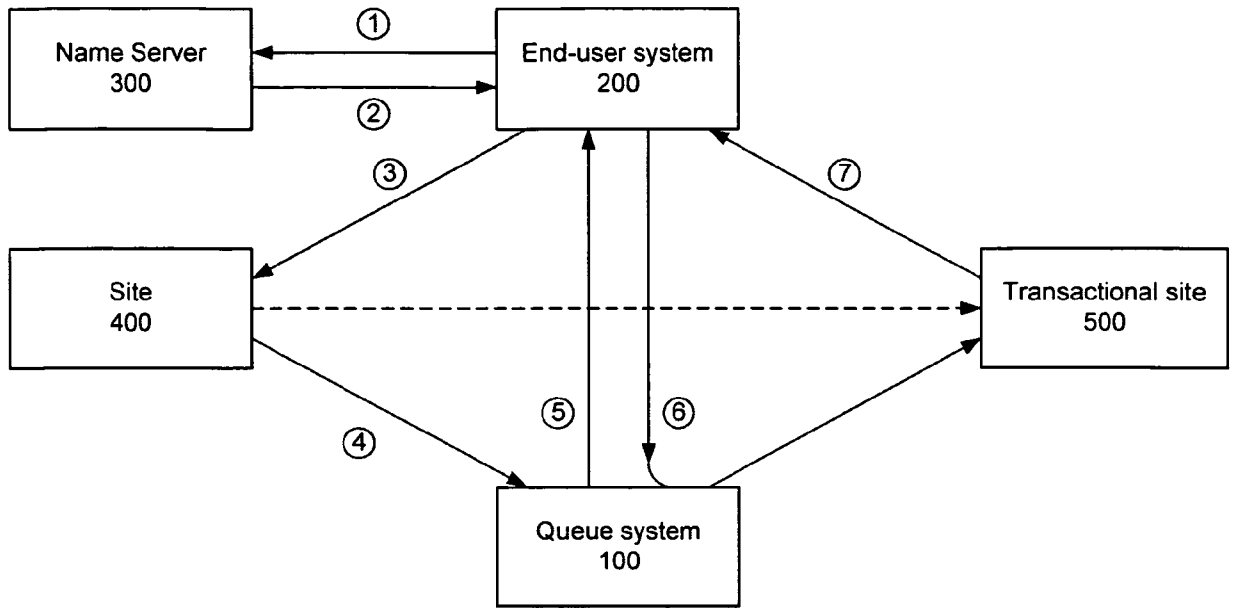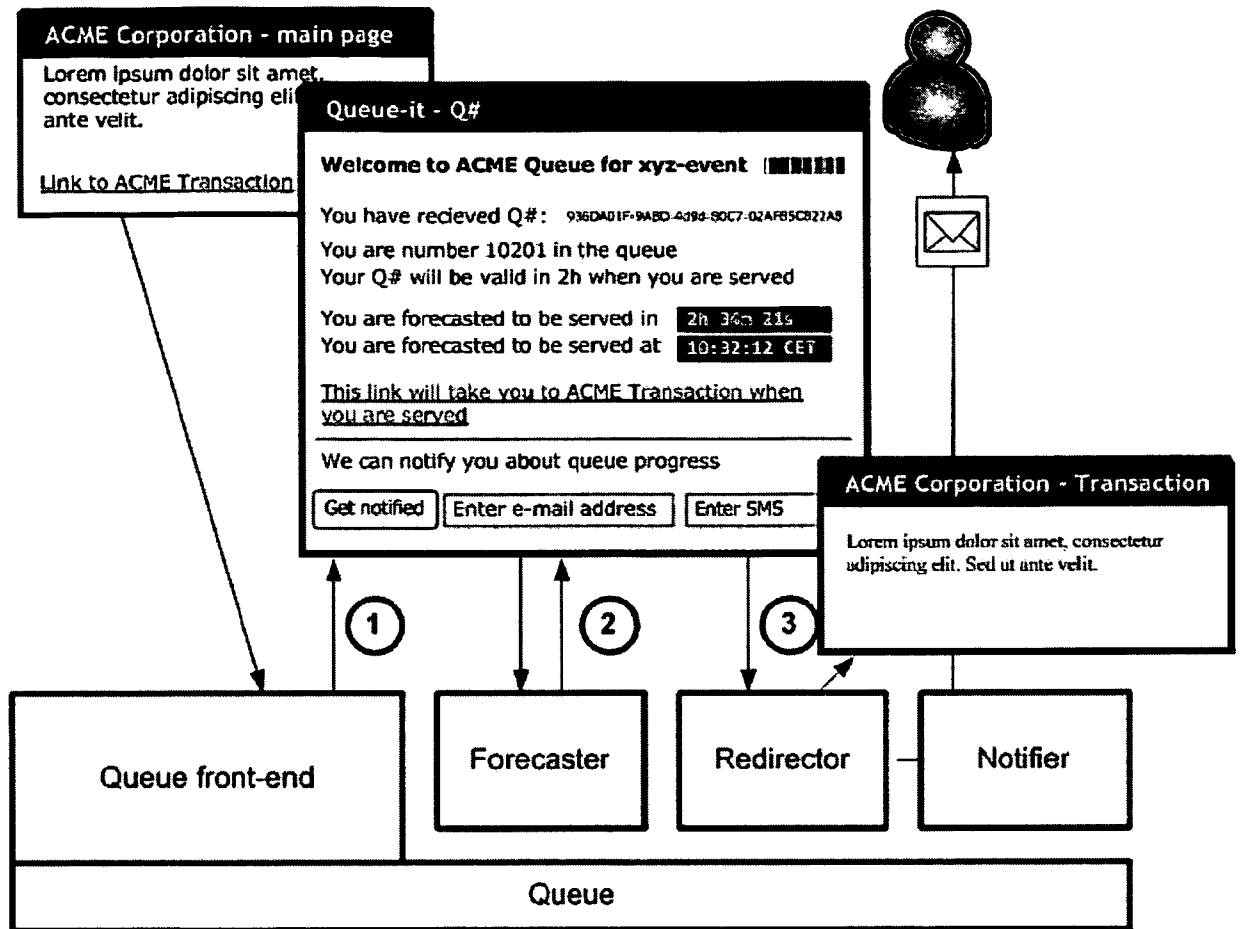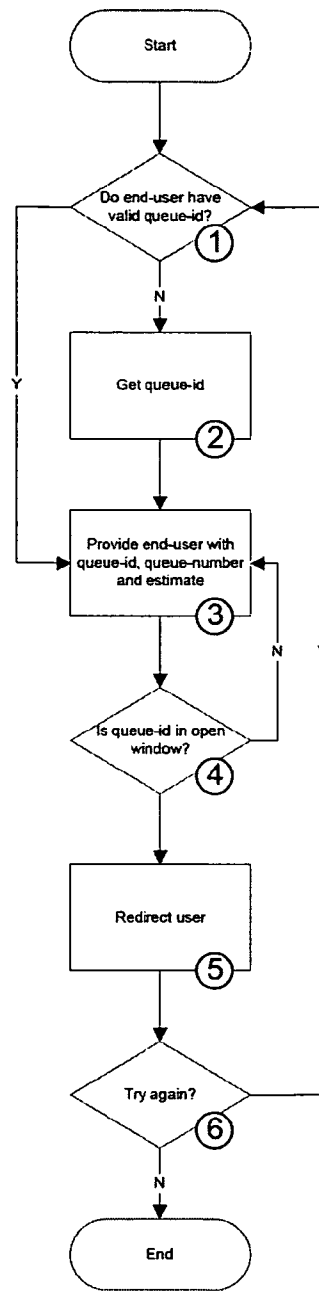
(Fig. 2 to accompany the abstract)

Fig. 1

Fig. 2

15

Fig. 3