**Title:** SYSTEM AND METHOD OF ELECTRONIC BILL PRESENTMENT AND PAYMENT WITH DATA MINING AND VISUALIZATION

**Abstract:** An on-line, Internet based B2B service offering for billing entities and their customers that provides core B2B EBPP solutions directed to invoice presentment, workflow, dispute management and payment functions to the user. Beyond these core B2B EBPP solutions, a more comprehensive B2B EBPP system and methodology includes additional features and functionality such as Data Mining and Visualization including advanced invoice drill-down capability capability including enforcement of user viewing entitlements.
SYSTEM AND METHOD OF ELECTRONIC BILL PRESENTMENT AND PAYMENT WITH DATA MINING AND VISUALIZATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates in general to the field of on-line billing and invoicing systems and more specifically, to an improved online, Internet-based electronic bill presentment and payment service that includes advanced functionality for, *inter alia*, data mining and visualization.

Discussion of the Prior Art

The need for B2B Electronic Bill Presentment and Payment (EBPP)

Despite the high level of importance given to accounts receivable (AR) and accounts payable (AP), the AR/AP processes are extremely time-consuming and inefficient. For many businesses, these processes entail multiple games of phone-mail tag, tracking down signatures and approvals, verifying statements and issuing payments. As with many industries and operational functions, the Internet, promises to bring greater efficiency to the process of bill or invoice presentment and payment. Embracing the Internet would allow AR and AP departments to streamline their processes and limit the difficulty of tracking key data, such as signatures and approvals. Because electronic bill presentment and payment (EBPP) has evolved to assist consumers (B2C) and many of their suppliers in streamlining these processes, it is not surprising that EBPP is now being applied to the business-to-business (B2B) market.

Demand for Efficiency

Both suppliers and buyers have specific demands that must be met in order to streamline their accounting processes. A solid B2B EBPP solution will benefit both the biller and the payer and address the demands summarized below in Table 1:
<table>
<thead>
<tr>
<th>Table 1: Demands Among Parties</th>
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<tbody>
<tr>
<td><strong>Biller Demands</strong></td>
</tr>
<tr>
<td>Create bills/invoices</td>
</tr>
<tr>
<td>Elimination of printing and equipment cost</td>
</tr>
<tr>
<td>Shortened time to deliver bill/invoices</td>
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<tr>
<td>Receipt for delivery of bill/invoice</td>
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<tr>
<td>Approve and reject line-item disputes and receive partial payment</td>
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<tr>
<td>Reduce employee/call center time by handling disputes electronically</td>
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<tr>
<td>Improved receivables</td>
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<tr>
<td>Compatibility with existing AR system</td>
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</tbody>
</table>

**Bills vs. Invoice**

In the past year, many acronyms have emerged, such as EIPP, EBPP, EIP, and IBPP, to represent various solutions for the B2B market. Although differences are sometimes slight, it is important to distinguish between them. For the sake of simplicity, the B2B market may be broken down into two segments, cyclical and discrete.

**Cost Benefit Analysis**

The cost savings of using a B2B EBPP solution are significant. From the biller’s standpoint, potential cost savings may be achieved in the following areas: Issuance of Invoices; Line Item Disputes; Dispute Resolution; Cash Flow Visibility; Customer Service; and Cash Flow and Days Sales Outstanding (DSO).

Businesses falling into the cyclical segment deliver goods or services such as rental space, utilities and cleaning services, on a regular basis. Cyclical businesses typically use bills to request payment since it is not always necessary to itemize every cost item. On account of their regularity, these bills are often easily recognizable by AP and therefore do not need special treatment. Telephone bills compromise one exception, but they are delivered on a regular basis and often businesses have a standard procedure in which to handle them. However, it is important to note that although cyclical bills are expected, they are not received or handled in the most efficient manner. Both IBPP (Internet bill presentment and payment) and EBPP are terms applicable to this market. Although EBPP may be used interchangeably for both market segments, it is sometimes used to distinguish cyclical from discrete.

Businesses falling in the discrete segment provide irregular products such as manufactured goods, reseller goods and consulting services. Although some of these
deliverables may be necessary for the normal course of business, they are unlikely to be the same each time making it difficult to allocate their cost to more than one cost center. Discrete businesses typically use detailed and itemized *invoices* to request payment. Discrete invoices are often unrecognizable by AP and so it is necessary to track down the parties who are responsible for the corresponding goods or services. In turn, these parties must carefully check the accuracy of the invoice by matching the invoice to the delivery receipts of the items. On the other hand, AR departments can handle cyclical bills more easily than discrete invoices because of the similarity and recurrence of cyclical payments. The discrete market may have the acronyms EIPP (electronic invoice presentment and payment), EIP (electronic invoice presentment) and EBPP associated with it. For the sake of this report, EBPP will be used interchangeably for the two segments. In the end, while exceptions create just a slight distinction between a bill and an invoice, it is important to note their differences and implications when considering a B2B EBPP system selection.

From the payer’s standpoint, potential cost savings are just as significant, and may be achieved in the following areas: Invoice Delivery and Analysis; Dispute Resolution; Invoice Approval and Management; and Unnecessary Fees.

**B2B EBPP is not B2C EBPP**

Movement in the B2B EBPP market has been slow compared to the B2C market. The lag is due primarily to the greater number of difficulties in developing a comprehensive and cost efficient solution for the B2B market, compared to those associated with a B2C solution. Despite a bird’s eye view of the B2B process, the demands from a B2B solution differ greatly from a B2C solution. Two extreme differences lie in the complexity and length of B2B invoices over B2C invoices, and the B2B need for compatibility with accounting programs or AR/AP systems to spur customer adoption rates. In addition, differences rest in both the motivations behind hosting a solution and the framework necessary to meet expectations (see Table 2).
<table>
<thead>
<tr>
<th>B2B</th>
<th>B2C</th>
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<tbody>
<tr>
<td>Enhanced Cash Management</td>
<td>Cross-selling and Up-selling Opportunities</td>
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<tr>
<td>Significant Cost Reduction to Both</td>
<td>Customer Service Focus</td>
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<tr>
<td>Invoice Payment and Issuance</td>
<td></td>
</tr>
<tr>
<td>Emphasis on Dispute Resolution</td>
<td>Personalization</td>
</tr>
<tr>
<td>Workflow and Network Management</td>
<td>Potential for Future Revenue Generation</td>
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<tr>
<td>ERP System Compatibility</td>
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</table>

Today, there are B2B EBPP solutions that closely resemble those of B2C. Essentially, there are two reasons for this similarity. First, some B2C vendors saw the potential of B2B EBPP and opted to leverage their B2C product line by applying a B2B patch. This enabled them to quickly offer the market a solution. The second reason is attributed to the fact that some vendors target the telecommunications and utility industries, both of which are part of the cyclical segment discussed earlier. Because the bill presentation and payment industry is less complex for cyclical bills and closely resembles the B2C EBPP targeted market, the solutions are similar. Today, there are few vendors that have embraced a solid and independent B2B EBPP solution that encompasses both the cyclical and discrete markets.

**Current B2B EBPP Functionalities**

Customer adoption is key to the growth and success of B2B EBPP and therefore, solutions that offer the most robust functionalities, the greatest opportunity for cost savings, and the greatest ease of use are the most desired. Adoption rates have been slow in the B2C EBPP market largely because of the lack of robust solutions and the few solutions, if any, that offer a complete end-to-end solution.

For instance, current B2B solutions and systems are offered by:

1) BCE Emergis (http://www.emergis.com) an e-Commerce service provider for the healthcare and financial services industries;

2) BillingZone.com™ a B2B service provider in transaction management and payment solutions;
3) Bottomline Technologies (http://www.bottomline.com) an e-service provider who offers B2B EBPP solution to financial institutions;

4) edocs® (http://www.edocs.com) who offers a closely integrated B2C and B2B EBPP solution that supports the needs of billers having both commercial customers and consumers;

5) iPlanet (http://wwws.sun.com/software/) a Sun-Netscape alliance, delivering e-commerce software and enterprise solutions; and,

6) Pitney Bowes docSense (http://www.docsense.com/) who targets the B2C, B2B and internal messaging markets and provides solutions for the creation and distribution of documents in paper and digital forms;

Each of these services offer a variety of robust B2C and B2B EBPP solutions of varying strengths and weaknesses however, none of them currently offer a complete end-to-end solution that would include functionalities more likely to spur customer adoption rates for both billers and payers. Such functionalities may be classified into four categories:

1) **Invoice Presentation**: including, but not limited to, functionality for **Invoice Creation**, i.e. the ability to easily upload invoice information to the Web interface; acceptance of multiple formats such as print stream data, Electronic Data Interchange (EDI) and text; **Invoice Notification**, i.e., ability to notify a payer via email or similar channel when a new invoice appears; **Line Item Detail**, i.e., the ability to check, analyze and approve invoices at summary level, as well as by line-item detail; and ability to sort, download, approve, search, and dispute individual invoice items; **Data Mining and Visualization**, i.e., the ability to evaluate hundreds or even thousands of line items of text and to rapidly draw meaningful conclusions or comparisons which is nearly impossible and not currently offered by existing solutions. Thus the need exists to provide a robust data-mining tool as well as a visualization system with highly graphical forms or presentation and very intuitive navigation; **Access To Historical Or Trend Data**, i.e., the ability to “mine” large amounts of current period line item detail data is critical in order to evaluate, detect misuse and abuse, and optimize the goods or services being purchased. However, in order to detect trends in spending or anomalies in patterns of purchase, it is a requirement that historical line item detail for earlier billing periods be included within the analysis capability of a EBPP system – for example, twelve (12) months of historical billing data is needed; **User Interface**, i.e.,
providing the ability for users to upload and review thousands of line items through a flexible, efficient, and easy-to-read (user-friendly) interface. In addition to easy to use text or line item presentation, the need exists to have available a graphical presentation or visualization facility; **Downloading and Reporting**, i.e., the ability to download invoices into accounting systems and allocate invoices appropriately to cost centers; downloadable detail can give users views of detailed reports derived from either an accounting system or EBPP solution; and **Global Support** for multiple currencies and languages.

2) **Workflow**: including, but not limited to, a provision of **Key Administrator(s)**, i.e., the assignment of one or more key administrators who can control the flow of information through the solution and have the ability to make payments and designate which employees have access to the invoice. Key administrators are also able to state the level of authorization for each employee, such as ability to approve, reject, dispute and pay an invoice; key administrators further can also set thresholds that designate how much employees are able to pay; **Distribution**, i.e., the ability for payers to electronically distribute an invoice to the necessary departments for approval; and they have the option to distribute portions of an invoice; **Invoice Management**, i.e., the ability for Key administrators to track the invoice process and see where the invoice is in the approval chain; they can have the ability to automatically route an invoice to an alternate, e.g., if an employee is away from the office.

3) **Dispute Management and Payment** for both payers and billers including, but not limited to, **Alerts**, i.e., the ability to notify, via email or similar channel, of a dispute, and automatically send the notification to the appropriate biller employee; **Biller Management**, i.e., the ability for billers to approve or reject dispute claims online; automatic dispute approvals can be set up by the biller for dispute claims that fall within a pre-determined threshold; billers can assign reason for dispute codes for the payers to use when filing a dispute - such codes will coordinate with an Enterprise Resource Planning (ERP) accounting system; and, **Payer Management**, i.e., the ability to dispute invoices at line-item level; readjust payment; and enter a brief statement describing reason for dispute; and

4) **Payment**: including, but not limited to, **Payment Channels**, i.e., ability to support multiple payment channels such as credit card, ACH, check and debit card; **Partial Payment**, i.e., ability to pay only a portion of the invoice when items are disputed;
Automatic Calculations, i.e. the ability to automatically adjust 'Amount due' lines for partial payments; e.g., if a quantity is changed, the adjusted amount reflects the original price minus price times adjusted quantity; Scheduled Payments, i.e., the ability for payers to automatically schedule payments without review for recurring invoices; payers can set payment for a specified day and time once an invoice is reviewed; and, Remittance, the ability for payment information to be downloaded into AP and AR systems.

It would thus be highly desirable to provide a robust B2B EBPP solution that meets each of these aforementioned capabilities.

It would be further highly desirable to provide, beyond the core B2B EBPP solutions directed to invoice presentment, workflow, dispute management and payment, a more comprehensive B2B EBPP system and methodology providing additional features and functionality such as Data Mining and Visualization capability and Entitlements.

SUMMARY OF THE INVENTION

The present invention is directed to an on-line, Internet based B2B service offering for customers that provides the core B2B EBPP solutions directed to invoice presentment, workflow, dispute management and payment functions to the user. Beyond these core B2B EBPP solutions, the present invention provides a more comprehensive B2B EBPP system and methodology including additional features and functionality such as Data Mining and Visualization capability and Entitlements.

Additional features provided by the on-line, Internet based B2B service offering includes: Invoice Format Support enabling payers to choose how they would like to receive their invoices, via paper (PDF format) or, electronically. From a usability and adoption rate perspective, the electronic form of the invoice is presented in a format that has a "look-n-feel" that is identical to that the customer may have been receiving in hard copy format. Options for electronic delivery include spreadsheet format such as Microsoft® Excel. This functionality also applies to payments since the system allows for paper or electronic receipts; Summary View of Invoice enabling the payer to view invoices from an aggregate level, thereby making it easier to see the total amount due and to download information; Complex Presentment enabling Data centric views in addition to the summary view offering.
Data-centricity is key to this solution in that it provides users with in-depth itemizations, single data points, and consolidation of multiple products and services; Data Mining and Visualization enabling exploitation of data-centricity by providing ability to apply data mining across the entire enterprise line item detail information – not just a single operating unit or limited geographical area of the business. Additionally, the system provides a significant archiving capability such that, historical invoicing/charges, for example, data from 12 to 24 months prior or beyond, can be data mined for trend and optimization opportunities. The results of the mining activity are presented in a highly visualized manner to the user; Notification, providing e-mail notifications for invoice alerts, disputes, workflow, administration, invoice status and payment timing; Multi-tiered Accounts enabling the allocation of portions of an invoice across complex, payer organizational structures; Invoice Management enabling the user to electronically route the invoice through the approval chain. This enables AP to pass the designated portions of an invoice to necessary parties for approval. AP can also track whether these parties have received the invoice and if the portion has been reviewed, approved or disputed which results in key cost-savings; Dispute Management enabling automatic dispute resolution by providing a biller with the opportunity to establish a threshold below which a dispute is automatically cleared; Payment and Remittance enabling the support of multiple payment options such as full payment, schedule payment and auto payment. The system also supports balance-forward accounting or open invoice accounting. Pre-scheduled payments are also supported by the system; Billing Inquiry (or Trouble Ticket) providing a complaint service allowing customers to communicate problems to the biller; and, Report Capabilities enabling users to track orders, disputes, billing inquires, payments and system usage. Preferably, this reporting function is driven by an on-line analytical processing (OLAP) tool that plugs into the user’s database. This text reporting capability complements the graphical representation of results that is the output of the data-mining tool.

Thus, according to a preferred aspect of the invention, there is provided an Internet/world-wide web-based system and methodology for enabling electronic bill presentation via a network comprising hardware and software elements for: automatically receiving invoice information issued to a plurality of customer entities from a billing entity over a networked connection, said invoice information provided in a first format; extracting
invoice information for invoices issued to said plurality of customers of said billing entity, and storing said extracted information in a memory storage in a second format; receiving user requests for invoice information from a requesting user at a terminal connected to said communications network; retrieving said invoice information from said memory storage and formatting said retrieved invoice information for presentation at a user display terminal, said invoice information retrieved in accordance with enforced viewing entitlements, and, enabling drill down of invoice information from said memory storage means to reveal invoice information at various levels of granularity at said user display terminal.

Thus, according to the invention, the comprehensive EBPP system and method includes a Mining and Visualization capability including: i) a Data Centric Framework whereby the line item detail related to invoices provide the basis for a hierarchical data structure that allows comprehensive access to both the current period detail and earlier periods of billing/invoicing; ii) an Archive Capability whereby in order to determine trends in uses of given types of goods or services, the system supports the ability and provide real time access to 12 to 24 months of historical line item detail; and iii) a Graphical Visualization capability whereby the traditional method of providing line item detail information to the user is via a spreadsheet or list of line item detail of purchasing transactions. Data mining results are provided via a highly graphical or visual presentment. The Entitlements framework includes: i) Multi-tier Rights and Privileges whereby the EBP&P system provides for a hierarchy of users and administrators within the system structure. For example, a user may have several levels of rights such as viewer, payer, and super user – a user with broad viewing rights. Another form of rights and privilege is that of a customer services representative (CSR); and, an Interoperability with Enterprise Registration Systems whereby the rights and privileges of a user must be able to be established through an enterprise wide registration system.

Advantageously, several other significant enhancements made to the system include: 1) an extensive “entitlement” capabilities that support a multi-tier authorization that establishes right and privileges unique to a given user of the system. These include the concept of “super user”, customer support representative, application owner, and viewer; 2) increased workflow management capability has been added; and, 3) worldwide deployment in terms of multiple language support.
BRIEF DESCRIPTION OF THE DRAWINGS

Further features, aspects and advantages of the apparatus and methods of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

Figure 1 illustrates a block diagram of the Invoice On-line System Architecture according to the present invention;

Figure 2 is a detailed block diagram illustrating the middleware component for data warehousing and data presentation according to the invention;

Figure 3 depicts an exemplary IOL™ web-based Home Page;

Figure 4 illustrates an example case depicting user selection of one or more customer numbers from customer number drop down box;

Figure 5 illustrates an example display presenting only a list of the invoices associated with the selected account;

Figure 6 is an exemplary Invoice detail page according to the preferred embodiment of the invention;

Figure 7 is the exemplary invoice detail page of Figure 6 expanded to present the next level of detail;

Figure 8 illustrates the exemplary invoice detail page of Figure 7 further expanded to present the next level of detail;
Figure 9 illustrates the exemplary invoice detail page of Figure 8 further expanded to present the lowest level of detail line item charges;

Figures 10(a) and 10(b) illustrate the exemplary invoice detail page of Figure 3 expanded to include search options by selecting Search icon and example search results;

Figure 11 illustrates a web-based display including a display of the actual invoice in PDF format for the newly selected invoice;

Figure 12 shows an example archived invoice display interface for searching archived invoices;

Figure 13 display a window presenting a specific archived invoice;

Figure 14 depicts an example user selection of an invoice from a list of invoices provided in any of the IOL presented invoice pages;

Figure 15 depicts the selection of data indicated by highlighting that is to be copied into an opened spreadsheet application;

Figure 16 depicts the result of a paste operation for copying the highlighted data into the opened spreadsheet application;

Figure 17 illustrates a drop down list of the entire hierarchy for the IOL History functionality shown in expanded form;

Figure 18 shows an example web-page display interface presenting user search/filter criteria upon selection of the audit trail link;

Figure 19 shows an example presentation of history information display available for user review;
Figure 20 is an example billing inquiry history display;

Figure 21 represents an example user’s selection of a particular Invoice Number, shown in drilled down form to a lower level of detail (expanded), and forming the basis for a billing inquiry;

Figure 22 depicts an example web-page presenting a Billing Inquiry Form in an overlaying window as a result of clicking on the “Inquire” icon;

Figures 23 and 24 depict example web-pages presenting a Billing Inquiry Form shown populated with invoice details;

Figure 25 depicts an example web-page presenting a “Billing Inquiry Requests Home” screen that invokes functionality for enabling the user to view all Billing Inquiries;

Figures 26-28 are example interface displays providing a user with the capability to make a request to add or remove Customer Numbers;

Figure 29 illustrating entitlement – Maintenance Functions provides an indication of the number of open user requests;

Figure 30 shows the various new user entitlement requests currently requiring an administrator’s approval or reject (denial);

Figure 31 is an example web page display enabling administrator approval or denial of a selected user’s entitlement request;

Figure 32 depicts an example Administration page fully expanded to provide all administrator capabilities;
Figure 33 depicts an exemplary display enabling an administrator report selection;

Figure 34 depicts an example screen displayed for Maintenance Utility to Add Customer Number(s) to User ID(s);

Figure 35 depicts a screen providing a "search utility" window opened to help find either the Customer Number or User ID;

Figure 36 depicts an exemplary display generated in response to an administrator user clicking on the link for "View Pending Billing Inquires" of Figure 25;

Figure 37 depicts an exemplary display showing a current list of hidden invoices generated in response to an administrator user clicking on the "View Hidden" link of Figure 32;

Figure 38 depicts an exemplary display generated in response to an administrator user clicking on the Hide New link from the interface of Figure 32;

Figure 39 depicts a screen providing a "search utility" window opened to help find the invoice number in question;

Figure 40 depicts a screen providing a "search utility" window opened to help find a User ID for a user or a number of users for which invoices are to be hidden;

Figure 41 is an exemplary screen display based on the administrator selection to Unhide invoices individually.

Figure 42 is an exemplary screen display providing interface to effect and administer administrative preferences.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 is a system diagram depicting the hardware architecture of the Invoice Online™ ("IOL") system according to the invention. As shown in Figure 1, the IOL™ system is an Internet/Web-based system 10 comprising the hardware/communications server and software components providing all IOL™ functionality including: a web front end subsystem; a data base processing subsystem; Date Mining and Visualization subsystem hereinafter referred to as “dbExpress”; an application support subsystem; a language processor subsystem; an input/extraction subsystem that extracts billing information from “Feeds”; and a presentation services subsystem that creates the “look-n-feel” or navigation. As will be described in greater detail herein, the system 10 offers the following EBP&P system features and functionality:

Drill-down Detail. The ability to drill down and view specifics about a bill or invoice. A solution with this ability is not only to be able to view the summary information for the bill or invoice, but view the actual detail for each item or service rendered;

Search Capability. The ability to call up a bill or invoice according to criteria such as, invoice number, date, amount, etc.;

Automatic Calculations. The ability to automatically calculate payment when the payer chooses to dispute a portion of the invoice which is in turn deducted from the amount due;

Customizable Reports. The ability to make reports based on any data category;

Dispute Email Notification. When the payer chooses to dispute an amount, the Biller’s customer service representative, or other applicable employee, is notified of the dispute via email;

Restricted Hierarchy Allocation. The ability to allocate a portion of the invoice to one or more cost centers. Different departments can therefore have restricted views of invoices and be kept unaware of spending in other departments. Not only does this enable a higher level of security, but also it limits the invoice items through which a department must sort;

Dispute Auto approval. The ability to approve a dispute without human interaction on the biller’s end;
Scheduled Payments. The ability to schedule payments on a specified date;

Data Mining and Visualization. The ability to query and then visualize billing data and not simply provide a link back to the biller’s Web site which is implemented in many current B2C EBPP solutions. It also represents the ability to search large amounts of current period and historical detail records and to present the results in a highly graphical or visual form. It further refers to the ability to have the user create multiple visual “file-scapes” or visual representation of the results of a query.

As shown in Figure 1, the system 10 includes all redundant connectivity routing and firewall sub-systems capability 15 to provide web-clients (“clients” or “users”) 50 with a secure on-line connection service over the Internet to the IOL™ web site 20. Wired or wireless communications between the clients and IOL web site 20 are via the public Internet 19 in accordance with standard TCP/IP protocols, for example, and preferably, over a secure communications link, e.g., secure sockets layer (SSL), BlueTooth or similar wired or wireless protocol. The web-site 20 comprises an interconnected network of server such as web-server cluster 22 comprising one or more computer devices providing Primary Web Services; a data warehousing sub-system 32, a report generation sub-system 42 and service support sub-system 52 interconnected via a Gigabit backbone 99. High-speed communication among the various components and sub-systems is provided by a communications tunneling function comprising a highly secure communication software utility.

According to the invention, the web-server cluster 22 provides Primary Web Services including three components of middleware including: 1) an application software middleware element, i.e., “application or applet” that is downloaded from the web services middleware to the client user’s desktop that causes the “look and feel” of the application to be generated locally on the user’s desktop PC 51; 2) an internet browser functionality such as provided by MicroSoft Internet Explorer®; and, 3) a middleware element comprising the web server software system that functions to pass the “pages” of information to be presented to the user’s desktop.

Clients 51 registered with the system include businesses desirous of having their bill presentment and payment systems automated. These clients are enabled to access the web site 20 remotely via wired or wireless connections to the Web/Internet 19. Preferably, clients
may access the Web/Internet via a personal computer/computing device 51, personal digital assistant, or like device implementing web-browser functionality, e.g., Netscape® or Internet Explorer®, or other browsing technology that may be compatible.

The IOL web-site 20 further includes a data warehousing sub-system 32 comprising database storage devices and data warehousing servers providing all the support necessary to provide IOL web-services including: database preparation and indexing; data presentation; analysis and reporting request dispatch; and, visual data mining. In an exemplary embodiment, these servers comprises Quad Processor Machines including 4096 MB Memory and include a MAX 35 TB of RAID5 Storage for each machine and may include a WINTEL (Compaq or IBM compatible).

Additionally provided are Component Services (COM) which function as a repository of custom Dynamic Link Libraries (dll’s) that allow custom applications to perform actions in data sources foreign to the application, e.g., enabling a web page to query data on a database. An SQL server enabling the IOL database query functionality is a data warehousing server.

Figure 2 illustrates a conceptual diagram of the middleware component used to generate the HTML pages and populate customer databases. For example, via client device 51, an HTTP request 29 is sent via the Internet 19 to a data-warehousing web-server 35, e.g., implementing a ColdFusion application (available from Macromedia.com). The web server, via Internet Information Services (IIS) application, accesses a prior generated ColdFusion template according to the user’s request. This template is processed by a ColdFusion application running in the web-server 35. Particularly, the application implements the parser 38 to parse out instructions, perform the necessary calls to one or more databases 36, perform any data manipulations required and prepare the HTML document as its response. The HTML document 29 is then returned to the client’s browser 51 via a secure Internet connection. It is understood that any business rules are implemented in the Database, Fuse Box and Cold Fusion and Parser components. It should be understood that the same middleware sub-system depicted in Figure 2 is additionally implemented to perform the data parsing and extraction function for populating datamarts and data structures with customer invoice data, as now explained.
Central to the system is the data input component 62 including components labeled “magic” and “cobra” which represent a generalized system input referred to as the “billing feed”. For example, an exemplary IOL application setup for a customer may comprise several profit and loss areas within a company (e.g., or any other corporate user) that have associated “accounts receivable” group that generates a “billing feed”. Within the billing feeds are all of the information needed to allow the system to produce the invoices to the user. The unique function included in the running application is a “middleware” component referred to as a “parser”. This “parser” is a software utility that has the ability to be given a wide variety of different billing feed “templates” and then is able to extract the related information from the feed 62 when the feed is “attached” to the parser at the front-end of the data warehousing infrastructure. The buffer element illustrated in Figure 2 is a staging area for the Feed (the feed consists of files containing the billing information in FTP (file transfer protocol)) before it goes into the data-warehousing application. The extracted billing information is then stored in various data bases and data structures, for example, within the applications, and is mined in accordance with the presentment, data mining/visualization and entitlement features/requirements according to the invention. For example, a scaling feature that enables drill down support is a “mechanism” designed into the applications hierarchy that allows the data to be structure and navigated through in a manner very similar to how the invoice itself is laid out.

Additionally, the IOL™ web-site 20 further includes a reporting sub-system 42 comprising processing ability for generating and downloading reports; and the support services sub-system 52 comprising servers to provide e-mail notifications and capability for providing archiving services, e.g., storing hardcopies on CD-ROM devices, for example.

As will be described in greater detail herein, an IOL™ application provided by the primary web-services running in the web-server cluster 22 is supported by a unique hierarchical data structure consisting of a series of linked data base structures. The access to these data structures is enabled by patented and proprietary directory and access control mechanisms such as provided by commonly-owned issued U.S. Patent Nos. 5,301,315 and 5,481,704 both entitled INDEXING/COMPRESSION SCHEME FOR SUPPORTING GRAPHICS AND DATA SELECTION, the whole contents and disclosure of each of which is incorporated by reference as if fully set forth herein. The unique data structure
implemented in the system comprises: a highest level that is referred to as the “company level”. By selecting this definition as the highest level enables the same code and same overall structure to simultaneously be used by multiple different companies, or different geographical areas within a given worldwide corporate structure. A novel aspect of this structure is that there are three related data structures linked to the “company” level. These are the language dictionary data base which is a series of different “strings” in different languages arranged in such a manner that in real time, when a user selects a given “company”, the user can simultaneously choose a given “language” with the result being that the language is linked to the company and the application instantly is enabled to be presented in one of five different languages. The second data base structure is the invoice and line item detail database. This database provides the application with the ability to provide a hierarchal method of accessing billing information such that invoice and a “nearly infinite” level of supporting detail can be provided to the user and navigated very efficiently. This structure is designed to include either a wide verity of different data types such as images, spreadsheets, or text data. This portion of the structure also allows the support of a “link to” structure that allows, for example, images of hotel receipts to be linked to through an Internet connection. The third and final database or linking function is related to the “entitlement of the user”. This means that not all information in the system is presented to all users. The system needs to restrict access to certain portions of information. This is accomplished by a third database and related linkage where the “entitlement” or rights and privileges associated with a given user is stored. This allows the enforcement of the rights and privileges of the individual to be implemented and enforced in a novel and efficient manner.

According to a further aspect of the invention, access is based upon the various business rules enforced. For example, in the IOL system of the invention, access is generally dependent upon Customer Number (CN), Invoice Number or Company Account ID. These methods of accessing the system will place the user into different parts of the system (e.g., "nodes"). How much of the system/database information a user is allowed to access (use or view) is referred to as "entitlement". For example, certain Customer Numbers (CN) will be entitled to access more of the system, more of the data (e.g., a customer number that belongs to a manager/division head vs. an employee). This entitlement creates a hierarchy - some users are allowed to access more.
In summary, the Invoices On-Line™ lets a customer see their invoices via their Internet browser, so that paper is eliminated, and advantages be taken of functions that allow the user to view, print, route, download invoice information to a spreadsheet and create reports for that customer's account. If the user has a problem with an invoice or a question, the user may create an electronic invoice inquiry while viewing the invoice at the same time. Thus, at login, the customer will be able to specify a customer number, invoice number (and optionally, a date range) to bring up a list of invoices that are associated to that user, for that user's account and select one to view. When the biller, e.g., IBM, issued a new invoice, the customer will receive an e-mail notification, so that the customer can login to Invoices On-Line™ and see it immediately.

The IOL™ functionality according to the present invention is now described as a logical sequence of scenarios illustrating the various features including: 1) Presentment - including web-based display interface describing the overall look and feel or navigation associated with the application and providing functions such as: user log on, selection of an invoice, searching for a specific invoice, and drilling down to obtain more detail; 2) Billing Inquiry – once the user finds a given invoice and, for example, wants to raise a dispute or ask a question about the invoice the user uses the “Billing Inquiry” function; 3) Distribution – describing how the user may download invoice related information or print such information; and 4) Entitlement – describing how the user can request a change in the rights and privileges a give user has.

Registration

A Registration web page is first displayed that provides a form that users are required to complete so as to obtain a User id and Password that will be required in order to login to the Invoices On-Line (IOL™) web-site. Existing users simply need to enter their user id and password. In an exemplary embodiment, user registration may be divided into three categories: "customer", "business partner" or billing company employee ("employee"). For a customer there are two additional possibilities. Namely, a previously registered user seeking authorization/entitlement on the Invoices On-Line system or, a user requesting authorization/entitlement on the Invoices On-Line system, having never registered on another
web site of the billing entity. Business partners have additional privileges, not normally granted to customers.

Although not shown, a user will typically select a hyperlink for either a Billing Customer or Biller Employee, depending on the user's status and fill out an information form on the subsequent web pages. As will be explained in further detail herein, the user completes Invoices On-Line registration by selecting at least one Customer Number, a CSO center and a user role. After this is done the user still does not have access to Invoices On-Line system until an IOL™ administrator reviews and approves. In effect, the user does not have access until authorization. When authorized by an administrator, the user will receive an e-mail message confirming registration.

Registered users will need to revalidate themselves if profile changes are made to the name, company or e-mail address.

Presentation

With regard to the Presentation function, there is provided exemplary displays generated in accordance with various client-initiated scenarios. Scenarios depicted in Figures 3-24 are directed to presentation functions for customer number select, invoice selection, drilling down, and subtotal and line item detail.

Assuming that the user has logged onto the system via their browser such as Microsoft Internet Explorer, version 5.x or higher, has registered, and is utilizing any user-defined preferences, the user will be directed to the IOL™ Home Page 100 as shown in Figure 3. The IOL™ Home page is the default view for the external user and empowers them to utilize different functions to view Invoices and drill down to the lowest level of detail. As shown in Figure 3, the user has many standard icon links and pull-down menus that can be selected to initiate and perform different tasks. Icons include a Search icon 102 that facilitates a user invoice search by a variety of search criteria; and Invoices icon 104 that enables display of all invoices for one or more customer numbers in a display view 108. A customer number pull-down menu 106, when selected with Invoices 104 enables functionality for retrieving from database one or more invoices in display view 108. As shown in the Figure 3, an invoice display view comprises a list of invoice lines 110, with
each line 110 including invoice characteristics organized as columns including an invoice number 112, invoice type 114, date issued 116, invoice amount 118, status 120, and associated select check boxes 122 for a particular customer. A default setting is to display invoices for all Customer Numbers as defined in that user’s entitlement.

The view in the home page of Figure 3 illustrates a typical Customer Number selection for a CSR or external user (non-system administrator) that has access to multiple customer numbers. However, users with the authority to view just one Customer Number have options to display all or their Customer Number, which results in the same number of invoices, displayed. Depending on account setup information, a user can have an unlimited number of customer numbers or just one.

Placing the mouse pointer over any invoice number in display view 110 displays a hyperlink to an Adobe PDF image as each invoice number is linked to an Image for viewing or printing. Clicking on a particular invoice will initiate functionality for retrieving a stored image in an IOL database of that selected invoice. After selecting one or more invoices, for example, by clicking a respective select box 122 on a particular invoice line 110, a user may click on an invoice icon 125 that provides functionality enabling a user to print (or view, for example, by an invoice viewer) invoices. If the user selects more than one invoice, they have the option to print all invoices.

As shown in Figure 3, when an Invoice Viewer has not viewed an invoice in Adobe PDF format, the information, i.e., invoice number 112 on the invoice line 110 is highlighted or displayed in bold and an envelope icon or graphic appears next to an Invoice icon. When an Invoice Viewer has viewed an invoice in Adobe PDF format, the information on the invoice line is not in bold and an envelope icon does not appear next to the Invoice picture. Further provided is a download icon 128, which when clicked after a user selects one invoice, implements a tool to enable the user to download one invoice to a text file for later import into a spreadsheet or database. After viewing an invoice, by an Invoice Viewer, the invoice is flagged as viewed by a visual clue.

Figure 3 further illustrates a case depicting how a user with many customer numbers can select just one customer numbers. Using the “Customer Number” drop down box 106 that includes all Customer Numbers 129 that the user id is entitled to view. By selecting a specific Customer Number 130, invoices for that particular Customer Number will be...
displayed, otherwise all invoices for all customer numbers will be displayed by default. However, by clicking the invoice number itself, a shortcut is provided to select the invoice and click the invoice hyperlink. A user can select one customer number, which is the highlighted number 130 depicted in Figure 3. In the example Figure 3, the user requested customer number “8263051-03”, and, as shown in Figure 4, only the invoices 132 associated with the selected account is presented in the invoice list view 108. The number of Invoices displayed on the web page is based on the users preferences, e.g., User Name, password, etc., as will be explained in greater detail hereinbelow.

As mentioned, before a user can drill down into any invoice details, the user selects one Invoice 132 by clicking on the appropriate check box under the Select column 122. Each click on the check box toggles from the “check” to “uncheck” status each time the user clicks on the check box. If the box is empty, clicking on the check box results in the box displaying checked, and will also highlight the invoice allowing the user to definitively recognize the Invoice selected such as invoice number 134 shown in Figure 5.

To display the detailed Invoice and statement information for the selected highlighted invoice, the user clicks on the "detail" button 135 at the bottom of the web page of Figure 5 and which was previously grayed out in the prior unselected view of Figure 4. Figure 6 is a sample of the Invoice detail page 150.

When viewing information, as shown in the example Invoice detail display 150 of Figure 6, preferably the information is arranged in a hierarchy. Information items within the hierarchy that are collapsed (has information beneath it that a user can not see) are represented by a right facing arrows 136. When this arrow type is clicked on, it reveals what is underneath it. When an item is fully expanded (does not have information beneath it) this is represented by an arrow 138 that faces downward. If there is more than one page of information, double-arrows (not shown) are used to move forward (down) or backward (up) respectively.

The invoice detail page 150 such as shown in Figure 6, like the invoice home page 100, has a number of standard icons and links for navigation purposes including links for display invoice information as required by the user. On the Invoice details web-page display 150, the user can collapse or expand information for obtaining Quick Help by selecting icon 152, Invoice Information by selecting icon 154, Invoice Summary by selecting icon 156,
Charges Summary by selecting icon 155, Address Summary by selecting icon 157, and Payment Summary by selecting icon 158. Each of these will be explained in further detail hereinbelow.

By clicking on a right facing arrow 136 of the invoice document list, e.g., example invoice number 159 (e.g., invoice “3717220-00”), functionality is initiated for expanding the view to the next level of detail of the invoice detail page 160 as illustrated in Figure 7 which illustrates invoice number 159 as comprising a contract 163. Although not shown, the displayed page of Figure 7 still provides the summary of charges, address information, the billing type, etc.. However, as Invoice number 159 (3717220-00) is made up of a number of associated charges, these may be displayed at a more granular level by clicking on the right arrow 165 adjacent to the Invoice Number. Thus, as shown in Figures 7 and 8, the user has the ability to drill down into the more detail information about the “Invoice”. By clicking on the arrow 165 (Figure 7) adjacent to the Invoice document, the selected Invoice continues to expand displaying additional level of details such as shown in drilled-down invoice display 170 in Figure 8 providing further detail, for the example shown, regarding individual charges 175 pertaining to contract 163. Preferably, the user is enabled to drill down even further ultimately arriving at the lowest level of detail of line item charges such as line item detail 178 shown in the example display 180 of Figure 9 which is generated in response to user selection of a line item charge 176 of Figure 8.

Searching

Figure 10(a) illustrates a portion 200 of the exemplary invoice detail web page 100 of Figure 3 expanded to include search options by selecting Search icon 102.

The Search portion 200 of the web page 100 may be used to apply a filter in order to display invoices that match the specified criteria. For example, in the example display of Figure 10(a), all invoices for all customers regardless of invoice status, billing type, geography and country are shown. It is possible that the resulting list could be hundreds of invoices, making it tedious for a user to find a particular one. Deselecting or selecting the all check allows a user to manipulate search criteria.
It is noted in Figure 10(a) the column 201 labeled “All” within the Search section of the Web page having all the boxes for the various types of searches checked, with the exception of beginning and ending invoice date 203, 206. Should a user press the search icon 208, the results will be exactly the same as selecting all records. The power of the search feature is to first uncheck the all option for the desired search option, then specify search criteria by entering a search string in one or more of the selected text boxes 210 or selecting options in the pull down boxes 220. Thus, it is understood that the string boxes or pull down boxes are unavailable until the appropriate “All” box is unchecked.

As a simple search example depicted in Figure 10(b), the payment status box 212 is unchecked and from the pull down box 222 all “opened” invoices may be selected. Further, billing type criteria box 214 is unchecked and from pull-down box 224 all “Education” type invoices are searched. Ultimately, a user clicks on the search criteria by clicking the Search button 208 to result in a web page 225 of Figure 10(b) that will particularly depict all Education billing type invoices that have a status of open. A further example shown in Figure 10(b) is based on “Invoice Date (Begin/End)” search criteria. When first presented with the search box, the display default is for the current month at the web server. The Ending date is the server’s current date and the default beginning date is one month less than the server date. The user has the ability to enter the required beginning or ending date by typing over the date or by using the available date drop down dialog boxes 203, 206 respectively. The drop down date dialog box presents the user with a calendar (not shown) starting with the current month based on the current date at the web Server. Once the desired date range is entered, the web page will present invoices based on the range. The user may continue the Search process until they find the particular invoice or invoices of interest.

Notice the search criteria remains displayed as an integral part of the web page. The search criteria acts as both informational display of the previous search performed as well as the starting point to create another, possible more refined or different search criteria. In addition, changing the search criteria and re-performing the Search function is accomplished by selecting the Search Icon 102 performs the search again with all invoices, not a sub-set of the previous search.

According to one embodiment of the invention, the invoice information can be presented to the user in two different formats. The first way is to view the actual paper
invoice in Adobe® PDF format. Viewing in this way presents the actual picture of the invoice with only the ability to view the invoice. (In addition, the user has all the options associated with the power of the browser such as saving the PDF file to the hard drive, e-mailing the PDF file to an e-mail address, etc. In this example, as shown in Figure 11, after selecting an invoice 229 in the list of invoices provided in view 225, when the user runs the mouse pointer over the invoice, the invoice hyperlink becomes visible (not shown) and the user can click on the hyperlink to display the PDF file. Clicking (left) on the hyperlink will open a new web page 240, displaying the actual invoice picture 250 assuming the user has the ability to display Adobe® PDF files. The user can view other invoices by selecting their respective hyperlinks. Note the system will display the newly selected invoice in the open web page 230, as shown in Figure 11, for example.

While PDF files present detailed invoice information, the image format of the data limits the functional capabilities for the user. Since invoices can be many multiple pages, the system allows a user to drill down through the invoice details, which under some circumstances can be many detail lines. Just like the use can navigate though many invoices, they also have the ability to navigate thought the many line items that may makeup an invoice. To select an invoice, the user checks one of the invoices in the column labeled "Select" and a web page is displayed presenting an invoice selected for further drill down detail as explained herein.

As mentioned, referring back to Figure 10(b), the Search portion of the web page may be used to apply a filter in order to display invoices that match specified criteria. The application supports four different Search/Filter types: Set Field Formats (Invoice Number 253 and Customer Number 255), Free Form Field Formats (Customer Reference information 257), Fixed Value Field Formats (such as Payment Status 222 and Billing Type 224) and Invoice Date Ranges (Beginning and Ending Dates). Deselecting or selecting the All check box 201 allows the user to manipulate search criteria. Once the user is satisfied with the search criteria he/she may clicks the Search button. As Customer Reference information is contained within three fields of the database, a pattern match in this field finds any occurrence of the string in any of the three different data fields allowing for "free form" customer comments or reference numbers. The search queries all three Customer Reference fields looking for a match included within any of the customer reference fields. All fixed
valued field formats are pull down boxes. Thus, for example, the Invoice Number 253, Customer Number 255 and Customer Reference 257 search fields return any value that includes the string that has been entered by the user. For example, entering "B682" in the Customer Reference field returns those invoices with Customer Reference "B682W67", XS5B6822DQ or "H4V4B682".

Preferably, the system allows the user to find one invoice if they know the invoice number. To find the invoice in question, in the view of Figure 10(a), a user begins the search will all Selection boxes 201 checked for “All” with the exception of the box labeled “Invoice Number”. The user may only enter one invoice number. If the Invoice numbers does not exist or if the Invoice is for another customer number not associated within the users profile, the system presents an “invoice not found” message (not shown).

It should be understood that the capability for sorting the data columns exists. That is, a web user can sort the columns as desired.

Searching the Archive Database

From the Invoice home page of Figure 10(a) with search options expanded, the user is presented with default availability of all available invoices for all available customer numbers as defined in the user profile. In some cases all customer numbers maybe just be one customer number. However, in the case of a CSR, they will be presented with invoices for all of their assigned customers as per the assigned users profile.

To search the Archive, a user selects the search archive button 258 which implements functionality for opening a new Web page window allowing searches of old invoice information. The archive information is data stored in an IOL system database of Figure 1. Figure 12 shows an example archived invoice display interface 270 which enables a user to enter archive invoice search/filter criteria, e.g., by date 276, invoice number274 or customer number 272. If the user clicks on the search button 275, all of the archived invoices are retrieved and displayed in a view list 280 of archived invoices as the default setting is all archived invoices. By clicking on an archive invoice (html) links, e.g., link 282, will cause display of the archived information as stored in the database as a window 290 shown in Figure 13.
Download

In an example Invoice web page 290 shown in Figure 14 showing all invoices for all customers entitled to be viewed by the user, a user is enabled to select an invoice 292 from the list provided in any of the pages. An Invoice user can download Invoice data using the download icon 128 which upon selection, causes data and instructions to be displayed in a new WEB browser screen 295 such as shown in Figure 15. In Figure 15, the data selected is highlighted and copied into an opened spreadsheet application 298 (for example, into a selected “A1” cell 299 in Lotus 1-2-3 or Microsoft®-Excel) by a paste operation as shown in the exemplary application view of a client PC shown in Figure 16. It should be understood that users may check more than one box.

Contact History/Viewed

The IOL system enables users to obtain history. To do so, a user clicks the History icon (hyperlink) 300 at the top of the window on any web-page such as a home page depicted in Figure 3. When viewing history it is important to understand that the information is arranged in the collapsible and expandable hierarchy represented by a right facing arrow (indicating a collapsed item within the hierarchy) or a downward facing arrow (indicating an expanded item within the hierarchy revealing the information beneath it). For simplicity, Figure 17 illustrates an entire history hierarchy 302 in expanded form. By selecting the Audit Trail link 305 functionality is invoked to identify the various user sessions and functions that have been completed by the user for that user's assigned accounts.

Particularly, upon selection of the audit trail link, a web-page is presented such as the portion 310 shown in Figure 18 which enables a user to search and apply a filter in order to limit the number of records returned or provide the user with a reference by individual attributes. The Invoice Number 312 and Customer Number 314 search fields return any value that contains the string that has been entered. The user may also select history by action date period that they wish to view details. The user can select a starting and ending date for the search period in the manner as described herein. The user can view system all usage/history
by clicking on the search button 315 which results in the display of history information based on the user's preference.

A sample history information display is available for review such as shown in the example display portion 320 of Figure 19 which depicts users activity including, but not limited to, the following information: a user session id 322, a date/time of the session 324, a group 326 and an action 328. As the history information can grow in size with heavy activity, the system allows the viewing of history by selecting/filtering information in a similar method as selecting/filtering invoice data described herein. Searching/filtering is available by Users, Invoice Number, Customer Number, Action and Date (Beginning and Ending). Thus, referring as shown in Figure 19, just like drilling down through invoice information, searching through history information by field, other than all records, requires the user to uncheck the “All” check box column 201 before the user can make a search/filter choice. Also, like Invoice Search/Filtering you may use any combination required to limit the information in any given search.

Although not shown in Figure 19, an administrator user can pick from a list of users from a drop-down menu 330 of users to review the history or actions performed by any given user. Only administrators can see history for a user other than him/her self. An Invoice user can only see history of activity based on their User ID. Another example of searching history functionality is a function that allows enables a user to review the history by a User’s action, such as, for example, “select” and “ViewInvoicePDF” (which would show the “viewed PDF invoice” activity for the selected user). In such an example, a user pulls down from a menu box 335 to select a User Action or, activity capable of being performed on the IOL site.

Referring back to Figure 17, by selecting the billing inquiry history function 308 the user is provided with a list of the inquiries that a user has submitted to the enterprise about their invoices. Figure 20 is an example billing inquiry history display 350 provided as a result of selecting the search button in Figure 18. By clicking on a particular inquiry number in the display of Figure 20, an inquiry web page will be displayed.

**Billing Inquiry**
Referring back to invoice home page 100 of Figure 3 a user may be presented with all available invoices for all available customer numbers as defined in the user's profile. The view in Figure 21 represents an example user's selection of Invoice Number SDA0801 in an example amount of $821,658.45, shown in drilled down form via web-based display 375 to a lower level of detail (expanded). The web-page presentation 375 shown in Figure 21 depicts expanded details for an example item labeled 8406729-00 on the chosen invoice (SDA0801) with a description of CONTRACT NUMBER CFTX18G in the total amount of $40,973.00 and, further expanded to the lower level which presents two example separate line items with a description of SERVICE: DATA PROCESSING SERVICES comprising CONTRACT NUMBER CFTX18G. As shown in Figure 21, by clicking on the "Select" boxes 376 associated with the SERVICE: DATA PROCESSING SERVICES line items 378, these charges may be isolated for a Billing Inquiry. Single or multiple line item charges may be selected to facilitate billing inquiry requests. Figure 21 shows two line item charges being selected.

The Invoice Details can now be expanded and chosen for a Billing Inquiry at the line item level, or chosen for Billing Inquiry at the Invoice level. Figure 22 depicts the Billing Inquiry Form web-page 380 presented as a result of clicking on the "Inquire" icon 379 located just above the "Select" column in Figure 21. The Billing Inquiry Form 380 appears in a separate/overlaying window that includes the invoice, charge and address summary information 381 and including the selected items 378 (from Figure 21) for dispute listed. In the preferred embodiment, the Billing Inquiry Form appears, pre-populated, and lists the items selected in the previous display. As shown, in one embodiment, the "Inquiry" column amounts 382 in the example display screen shown are 10% of the Invoice line item amount. The user can control what percentage/amount they want to submit for a billing inquiry. The administrator may preset the 10% adjustment calculation, however can be further adjusted by an administrator.

Figure 23 illustrates the screen 380a displayed as a result of the user clicking on the drop-down arrow 392 associated with the "Reason" window 394. The reasons for the inquiry are listed and can be selected by highlighting the appropriate description. As mentioned herein, the administrator can add, change or delete a Billing Inquiry reason.
The Billing Inquiry Form shown in Figure 24 also provides a screen 380b displayed as a result of the user entering comments relating to the billing dispute in “Comments” box 395. In the example scenario presented, the user is claiming an overcharge of 10% on two line item amounts such as shown in Figure 23. For exemplary purposes, the administrator has set a 10% adjustment calculation, i.e., which becomes a default inquiry setting, however, may be changed by an administrator. The “Inquiry” window further allows the user to adjust the amount being submitted for inquiry. The comments box 395 in Figure 24 allows the user to add any detail which may be required, including general questions, address corrections, etc. In this instance, as the example comments indicate, the user is claiming a 10% reduction as per renegotiated contract terms. In Figures 23 and 24, by clicking the “Send” button 398, the user initiates the forwarding of the Billing Inquiry to an appropriate CSO (customer support organization) Center associated with that user (a preference predetermined by the user). It is understood that the application automatically determines which CSO Center is to be assigned to the user profile by information provided through registration with the billing IOL. When a user initiates a billing inquiry and is presented with the Billing Inquiry Form, the form is already populated with the appropriate CSO Center.

Upon receipt of a successful submission of a Billing Inquiry form, a confirmation message is displayed including a reference number(s) stating that the CSO representative will be in contact.

After a user has submitted their Billing Inquiry Form to the appropriate CSO Center, the Inquiry is reviewed and given a “Status” by the CSO Center. Only authorized users can review this status. To do so, the user clicks on the “Administration” selection 400 on the menu bar 101 shown in the home page view of Figure 3. The result is the example screen display portion 401 shown in Figure 25 listing the Administration functions 405 including reports, entitlements, billing inquiries and invoice status links. By clicking on a “Status” link 404 listed below the “Billing Inquiry” 402 administrative task selection, the user is presented with a “Billing Inquiry Requests Home” screen 410 such as shown in Figure 25 that invokes functionality for enabling the user to view all Billing Inquiries, or view the Billing Inquiries by their status.

Figure 25 illustrates possible selection including: a user selection of “View Open Billing Inquiries” 412. By clicking option 412, the user can see all Billing Inquiries with a
status of "Open". By clicking "View All Billing Inquiries" option 415 in Figure 25, all inquiries with a status of "open", "closed", "pending", etc. would all be displayed.

**Entitlement**

It is understood that a first time user to the IOL system must first request a user identification (ID) and password before obtaining entitlement or access privileges to the system. User registration can be divided into three categories, customer, business partner or employee. Since a new user cannot provide a valid user ID and password, the only logical option on a Login page (not shown) is to click on the link to Register to receive a user id and password.

Once a user has cleared any security checks, the user needs to specify Customer Numbers, a CSO Center and User Type. The user must know all of their Customer Numbers to gain access to all of their Invoices on the IOL system. The IOL Administrator is the final checkpoint and they must verify each users' selection of Customer Numbers and not authorize a user access to information that they are not entitled. (This function is part of Administration.)

The Name, Email address, Address, City, Zip and Country information are obtained from the biller's Registration and displayed on the page to help the user verify they have entered the proper Registration ID. None of this information is authenticated on the IOL site.

Although not shown, Users select a Customer Support Organization via a pull down menu box, for example. Additionally, the user must select one role from the list provided in the pull down box. Such roles include: Invoice Viewer, Invoice User (e.g., employee of the biller) and System Administrator User roles. The role selected effects the users entitlement within the IOL system.

Users cannot change (add or remove) Customer Numbers without requesting a change. A user enters all requests and the request is placed for action by the CSO Center. Only an administrator can approve (or deny) a request. Entering a request for change is available through the "Preferences" link 500 on the Invoice Home page 100 shown in Figure 3 which results in the example screen display portion 501 shown in Figure 26 listing the Preferences functions 505 including appearance and user links. Clicking on the User link 504
causes for display the interface portion 510 shown in Figure 26, which provides users with the capability to make a request to add or remove Customer Numbers. The request to add or remove Customer Numbers is a Users request procedure. It is understood that an Administrator users can make changes to their entitlement without submitting a request. Also, an administrator can change Customer Numbers for any user on the system without a request for change. Clicking on the “Customer Numbers” link 504 of Figure 26 presents the user with two choices: a link to Request to addition of Customer Numbers 512 or a link to Request the removal of Customer Numbers 514.

Clicking on the link to Add additional Customer Numbers 512 opens a data entry screen 515 shown in Figure 27. The list on the dialog box 520 in Figure 27 is a list of the current Customer Numbers the user has in his/her user profile. The user makes a customer number request by adding a customer number to the right dialog box 525. A user is not allowed to request a Customer Number they already have in their profile. Also, the user cannot request a Customer Number that does not exist in the database. It is understood that the user has to know the Customer Number to enter it in this entitlement request. Providing a list of Customer Numbers provides an opportunity for a user to request Customer Numbers they should not have access too. By selecting the continue button 528, the users entries are verified. Once the Customer Numbers entered are verified, the application gives the user one last chance to review the list of Customer Numbers requested. The user can click the back button to go back one screen or submit the request.

In the display of Figure 26, clicking on the link 514 to make a request to remove Customer Numbers opens a data entry screen 530 such as shown in Figure 28. The list 532 on the dialog box 535 is a list of the current Customer Numbers the user has in his/her user profile. The list is provided as a selection list. Moving a Customer Number from the dialog box 535 to the box 538 by clicking on the button 537 selects the Customer Number for removal. A button 539 moves the selected Customer Number back to the Current Accounts list (and not removed).

When the user completes their selection, the user submits the request by clicking on the submit request button 540. A further screen display is then presented for user confirmation.
As mentioned, each Administrator has access to information/reports of users requesting access or change of access to the IOL system. From an Administration page, such as shown in Figure 25, an administrator can view user requests for access and perform any required user ID maintenance. User Requests are made by unauthorized or authorized IOL users for approval action by an administrator. These requests are separated into three categories: pending new user ID requests, pending add Customer Number(s) Requests and pending remove Customer Number(s) Requests.

Pending new user ID requests are requested on the login page wherein a user may register to receive a user id and password. Until approved by an administrator, the user does not have access to the IOL system.

Adding or removing Customer Numbers are made by existing and currently authorized users with valid User ID’s. As explained herein with respect to Entitlement Changes, requests are entered in the Preferences web page (Figure 26) under User tab with the link to Customer Numbers. The actual authentication to allow the adding or removal of a Customer Number(s) requires an administrator’s action. In this area, administrators can perform the following entitlement functions by approving or denying (pending) User ID Requests external (customers) or internal (employees), (pending) requests for adding Customer Numbers and (pending) requests for removing Customer Numbers.

Figure 29 illustrates a web-based display 550 providing an administrator with entitlement – Maintenance Functions. By selecting on link entitlement maintenance 552 there is provided links in display portion 555 to review each of the number of pending open user requests. Requests remain on the list until approved or denied by the administrator. An administrator with or without a specific user request can perform user maintenance at any point. However, for example, until a request for a “new” user ID is approved (authorized) maintenance on the “new” User ID is not maintainable. It should be understood that Administrators, without a request from a user, can modify (add or remove) Customer Numbers without a user request as explained herein. Administrators also may deactivate (and reactivate) a users account as explained herein.

Figure 30 is a screen display 560 depicting the various new user entitlement requests currently requiring an administrator’s approval or reject (denial). New user requests are broken into Internal (billing company) user requests 562 or external (customers) requests
565. Figure 30 additionally provides the administrator some indication as to the number of outstanding requests by numbers 563. By clicking on the link 565 to the register pending external new user ID requests, there is displayed a list (not shown) of unauthorized users. By clicking on any “Name” from that list, the administrator is linked to a web page display such as the example display 570 shown in Figure 31 to approve or deny this user's access. In the example shown, clicking on a user named “John Jones” displays that user’s information 572 and enables the administrator can approve or deny the request. Also, the administrator can change, remove and add Customer Numbers as they feel is appropriate. However, the user requires at least one Customer Number to function on the IOL system. In the display 570 of web page shown in Figure 31, the new user is requesting access to the system in the role of an “Invoice Viewer” as displayed at line 575. The user ID is “johnjones” and the requested Customer Numbers are listed in the pull down window 573. Additionally, the user information as collected during the request is presented for review only.

If the administrator authorizes the user, the IOL database is updated giving “johnjones” access and this user's information is stored in an IOL database for reporting purposes such as user history and to keep track of the users prior “user data”. For example, at a future date, the IOL system will “disable” a user if, since the last login, the company name has changes on the biller registration. Also, the system will not maintain passwords as the password authentication is performed using a master database maintained by the biller. Password changes may be made on the biller’s web site and are in effect the next time the user attempts to login to IOL.

If the administrator clicks on the deny button 577 the user's request is denied and a message is appropriately displayed. Denying the request removes the user request from the pending list. At sometime in the future, the very same user can make another request for access to the IOL system by resubmitting a request. The second request (and all future requests) are placed in pending folders for administrator action. The administrator is the final checkpoint for user authentication.

It is understood that the administrator can add or remove Customer Numbers as required before approval. Clicking on the approve button 578 in Figure 31 invokes functionality for setting up the user access. Once an approval message is displayed, the user has access to the system. If the administrator approves the user and then notices a Customer
Number needs to be changed, added or removed, the administrator may perform Customer Number maintenance as explained herein.

Referring back to Figure 29, an administrator can approve or deny pending requests for Adding Customer Numbers in addition to pending new user requests. Thus a web page display is provided (not shown) that shows the current users entitlement requests asking for additional access to additional Customer Numbers. The administrators can approve or reject (deny) the entire request. Until a pending request is approved, the user only has access to his/her current entitlement. Thus, in a like manner as described herein with respect to Figure 31, clicking on a user name link will display the request to Add Customer Numbers as entered by the user. The administrator can then perform editing before accepting this request. The administrator can remove any Customer Number from the request list or the administrator can add Customer Numbers to the users request list. The administrator may then approve (or correct) and adds the requested Customer Numbers as modified any of the Customer Number information, or deny the entire request by the administrator.

It should be understood that similar functionality is provided for enabling the administrator to approve, deny or modify Pending Requests for Removing Customer Numbers.

Administration and Reports

In the IOL home page of Figure 3, a user having administration privileges is presented with all available invoices for all available Customer Numbers as defined in the user profile. In some cases all Customer Numbers maybe just be one Customer Number. However, in the case of a CSR (customer support representative), they are presented with invoices for all of the assigned customers as per the users profile.

To be able to select an administration link 400, as shown in Figure 3, a user must have administrator privileges. A fully expanded Administration web-page 600 is shown in Figure 32 including a portion 601 providing links to enable an administration user's ability to run Reports, Entitlement, Billing Inquiry and Invoice Status (Hide or Delete an Invoice).

In one embodiment, a first required entry to have access reports is to enter a starting and ending date. The system default is based on the current date on the server. The ending
date is the current date on the server. The starting date is the 1st of the month. The user has the ability to change the date range as required.

However, before a user can view any of the reports, the user must accept or select a starting and ending date in display portion 603 as shown in Figure 33, and then click a view button 605 to get to a drop down box 610 where the user can select one of the above four reports. The reports link can run any of the following administration reports: 1) Transmission Control Report; 2) User Registration/Profile Activity Report; 3) Dispute Management Report; and 4) Hide/Deleted (Invoice) Report. An exemplary display 608 for selecting a report is shown in Figure 33. The “Choose a Report Type” pull down box 610 requires a report selection. Until a report is selected, the view button 605 is grayed out. Selecting a report opens the report in another browser instance.

As described herein, each Administrator has access to information/reports of users requesting access or change of access to the IOL system. From the Administration page, an administrator can view user requests for access and perform any required user ID maintenance. User Requests are made by unauthorized or authorized IOL users for approval action by an administrator. These requests are separated into three categories: pending new user ID requests, pending add Customer Number(s) Requests and pending remove Customer Number(s) Requests. Pending new user ID requests are requested on the login page in the “Register to receive your user id and password”. Until approved by an administrator, the user does not have access to the IOL system. Adding or removing Customer Numbers are made by existing and currently authorized users with valid User ID’s. The adding or removal of a Customer Number(s) requires an administrator’s action.

Display portion 555 of example web-page shown in Figure 25 depicts administrator maintenance functions. In this area, administrators can perform the following entitlement functions: User Requests including Pending User ID Requests for External (customers) and Internal (employees); Pending Requests for adding Customer Numbers; and, Pending Requests for removing Customer Numbers. These have been described in detail herein. Administrators can also perform the following entitlement functions: Administrator User Maintenance including Add Customer Number(s) for a user(s) and, Remove Customer Number(s) for a user(s).
With or without a user's request, the administrator can maintain User Customer number access. For one user or many users, a Customer Number or Customers Numbers can be added as required. It is understood that the Remove Customer Numbers from an Existing User ID works the same as adding.

Figure 34 depicts a screen 620 for Maintenance Utility to Add Customer Number(s) to User ID(s). The example magnifying glass icon 622 along side the Customer Number(s) and Select User(s) data windows 625, 627 respectively, operate as follows: clicking on the magnifying glass enables functionality to assist the administrator in looking up Customer Numbers and User ID's as available on the biller's IOL system. In the example shown in Figure 35, a new “search utility” window 630 is opened to help find either the Customer Number or User ID. For example, the administrator is searching for a user name “Dianne”, has selected the “search by user name” and has clicked on the search button 632 such as shown in Figure 35.

The user can click on the appropriate User login link, in the first column of the report, to add the user name or type a valid user name in the “Select User(s)” window 627. The administrator can add as many users to the list to change as required. However, for processing at least one valid user ID and one valid Customer Number are required.

The administrator can clear the existing selections and start over. The “add >>” button 635 when selected, updates the IOL system after verifying the User ID’s and Customer Numbers are all valid. The remove a Customer Number(s) from existing User ID(s) function works the same as add a Customer Number(s) from existing User ID(s).

The Billing Inquiry reports allow an administrator to report on Billing Inquiries such as described herein with respect to Figure 25. As described herein, four different reports are available: 1) View Open Billing Inquiries; 2) View Pending Billing Inquiries; 3) View Closed Billing Inquiries; and 4) View All Billing Inquiries. Billing Inquiry reports have a number of inquiries placed on the system by administrator. Clicking on any of the four links shown in the Figure 25 expands into the report details for administrator users.

The Billing Inquiry reports provide the administrator a quick summary page to get a quick look at the number of Billing Inquiries on the biller's IOL system. Clicking on one of the four lines expands into a detailed report. The example screen display portion 640 shown
in Figure 36 is generated in response to an administrator user clicking on the link 413 for “View Pending Billing Inquires” of Figure 25.

The administrator can further hide invoices for view for any user on the system. Once an invoice is hidden, it can be unhidden only by an administrator. The purpose of this function is to remove access to the Invoice on case-by-case bases. To view the current list of hidden invoices, the user clicks on the “View Hidden” link 645 of example web-based display of Figure 32 and the example web-based display screen 650 shown in Figure 37 is displayed. From this screen, the administrator can view the report grouped by Invoice Number 652, grouped by User 654, or in addition, the report is available for all hidden Invoices with no grouping 656.

The administrator can hide invoices from view from any user on the system. To do so, the administrator clicks on the Hide New link 646 from the interface of Figure 32, and a web-based display page 660 is generated as shown in Figure 38.

From the display 660 of Figure 38, if the user then clicks on the example magnifying glass icon 662, a new window 665 is opened such as shown in Figure 39 providing a search utility to find the invoice number in question, either by entering an invoice number, type, or invoice amount. The user may alternately just type the invoice number in the text box 668. In the example provided in Figure 39, the administrator search is by Invoice type “EDUCATION” and the selection made for Invoice “G099034”. This Invoice number is automatically placed in the “Select Invoice(s) to Hide” pull down window 664. The administrator can select as many invoices as required, but at least one invoice must be selected.

The invoice can be hidden for a user or a number of users. In a further example web-based display page 660 depicted in Figure 40, the magnifying glass icon 667 is selected to open a search window 670 to find a User ID. The example searches by User Name, and in the example shown, has selected the user ID “Dianne” entered in text box 673. The User ID is then placed in the “User(s) to Hide Invoice” pull down window 674. When the administrator clicks on the Hide button 675, the invoice is flagged as hidden for the list of users selected.

At any point the administrator/user can unhide an invoice by click on the “unhide” link 648 such as shown in the example web-based display page 680 depicted in Figure 41. An administrator can initiate functionality for viewing the hidden invoices by selecting one
of the following links: Unhide a Single Invoice for All Users link 682, Unhide All Invoices for a Single User link 684 or Unhide Individually link 686.

Figure 41 is an example screen display based on the administrator selection to Unhide invoices individually link 686. Selection of this link causes display a list 685 of those individuals associated with invoices that have been hidden. Clicking on an invoice link, e.g. link 689 in a report will display the invoice information in a pop-up window (not shown) so the user can verify they are making available (unhidden) the correct invoice. By clicking on the appropriate unhide link, functionality is implemented to unhide the invoice. It is understood that the report changes and removes the unhidden invoice on the screen.

The delete an invoice function works the same as the hide an invoice function. If a user hides an invoice and later deletes it, the invoice is flagged for deletion and no longer available for hiding. Invoices that are deleted are flagged for deletion and at any point before removal from the system; an administrator may undelete an invoice. It is understood that a business rule as been developed for handling deleted invoices by removing them from the system.

While administration functions have been disclosed, it is understood that reporting features are also available for non-administrator users. For instance, users to a limited extent as entitled can track orders, disputes, billing inquiries, payments and system usage. This reporting function is driven by an online analytical processing (OLAP) tool that is part of the database access functionality (Figure 1). This text reporting capability complements the graphical representation of results that is the output of the data-mining tool.

User/Administrator Preferences

Users have the ability to customize certain settings within the Invoice Home Page and empower the user to view Invoice Home Page information in an arranged format that is comfortable for them. When viewing settings it is important to understand that the information is arranged in a hierarchy. A user clicks on the setting as desired to obtain information about appearance, maintenance, and advanced.

The view in Figure 3 illustrates an external user that has mouse clicked on “Preferences” link 500 at the top of the Invoice Home Page” 100 to modify the viewing
threshold associated to the Invoice Page such as, number of Invoice paged into the system or the number of line items displayed when a “Service” is expanded.

Administrator’s preferences are very different from users preferences. Administrator preferences are divided into three main themes: Appearance, Maintenance and Advanced. The default view of the “Preferences” page is in three main themes of “Preferences” such as shown in the exemplary administrator preference screen display 700 depicted in Figure 42 including screen portion 702 comprising links to screens initiating functionality for effecting Appearance (links 702), maintenance (links 704) and advanced (links 706) functionality.

The Appearance changes function (not shown) provides Appearance changes as a non-administrator (user) can adjust. By clicking on the appearance icon a screen display (not shown) is displayed to present all the administrator’s appearance preference capabilities. Under the Appearances tab, the administrator has links to access functionality for changing Font and Color, etc. Administrators have additional capabilities over users are in the following areas: 1) Maintenance links 704, including Billing Inquiry Reasons, Invoice Status, Notifications and Entitlement; 2) Advertisement including Advertisement, Interest, Ad / Interest, User / Interest and Billing Inquiry including a category and priority code; and 3) Advanced links 706 including, Administrator, Announcements and User Status.

The Maintenance tab 712 when expanded, enables an administrator to change standard table information for Billing Inquiry Reasons (used by users when sending administrators Inquiries/Disputes) and Invoice Status (used to setup standard Invoice/Payment status code (internal/in the database or external/displayed on the IOL web site). Also, the administrator can adjust his/her Notification information.

With respect to Billing Inquiry Reasons, a Billing Inquiry Reasons is database table (Figure 1) is maintained within the billing entity’s IOL system. This table is used to display the various Billing Inquiry (disputes) or Reasons why a customer/user is questioning an Invoice. This database table is under administration control, so a Billing Inquiry Reason as described can be added, changed or deleted by a user without programmer intervention. Functionality (not shown) is thus provided for enabling an Administrator to select a Billing Inquiry Reason for edit.

With respect to Invoice Status, an Invoice Status database table (Figure 1) is maintained within the biller’s IOL system. This table is used to display the various Invoice
Status such as paid, open, etc. This database table is under administration control, so an Invoice Status and its display on the web page can be added, changed or deleted by a user without programmer intervention. Functionality (not shown) is thus provided for enabling an Administrator to select an Invoice Status for edit.

A system administrator can change various setting or business rules using the screen depicted in Figure 42. For example, the administrator can change his/her email address by edit box 720. Additionally, the administrator can set business rules 730 for Invoice/Billing Inquiries including: changing Max Dollars Per Cycle, Number of Credits Per Cycle and Max Percentage of Invoice. This field is used to display the default dispute amount. Currently, the first calculated Invoice Dispute amount is 10% of the Invoice Value. Further the d.b.Express® Settings are 740 links for changing Analysis/Data Mining functionality such as described in commonly-owned U.S. Patent Nos. 5,301,315 and 5,481,704 incorporated by reference herein is provided.

The System Announcements setting is an optional message provided on the “Login” page (not shown) and is intended to inform user of future system maintenance, new biller IOL functionality, holiday greeting or any other message purpose required of the system Administrator.

The system administrator can further change a users status from Active to Inactive and back again. This function is used to deny access to biller IOL on a user bases by providing a display enabling an administrator to select on a “UserName” pull down box to obtain a list of current users on the biller IOL web-site. Once a user is selected, the user can be changed from “Active” to “Inactive” or from “Inactive” to Active”. Once a Status setting is changed, an “Update” button is active and the database (Figure 1) is updated accordingly. Any “Inactive” user cannot login IOL system until made active by an Administrator.

While the invention has been particularly shown and described with respect to illustrative and preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention that should be limited only by the scope of the appended claims.
CLAIMS

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. An Internet/world-wide web-based system for enabling electronic bill presentation via a network comprising:
   - means for automatically receiving invoice information issued to a plurality of customer entities from a billing entity over a networked connection, said invoice information provided in a first format;
   - means for extracting invoice information for invoices issued to said plurality of customers of said billing entity, and storing said extracted information in a memory storage in a second format;
   - means for receiving user requests for invoice information from a requesting user at a terminal connected to said communications network;
   - means for retrieving said invoice information from said memory storage and formatting said retrieved invoice information for presentation at a user display terminal, said invoice information retrieved in accordance with enforced viewing entitlements; and,
   - means responsive to user selection for enabling drill down of invoice information from said memory storage means to reveal invoice information at various levels of granularity at said user display terminal.

2. The system according to Claim 1, wherein said means for extracting invoice information for received invoices fed issued to a plurality further including parsing means for parsing said information from input billing feeds and formatting said invoice information for storage in said memory storage means to facilitate drill down at said granular levels of invoice information.
3. The system according to Claim 1, wherein in response to user selection, a first granular level of invoice information includes a list of invoices for one or more customers entitled for user viewing.

4. The system according to Claim 3, further including means for selecting one invoice for further drill down, wherein in response to user selection, a second granular level of invoice information includes an aggregate level including the total amount due in an invoice and payment and charge summaries for a particular selected invoice.

5. The system according to Claim 4, wherein in response to user selection, a further granular level of invoice information includes a list of individual invoice items making up a total invoice amount for a particular selected invoice.

6. The system according to Claim 5, wherein in response to user selection, a further granular level of invoice information includes a list of individual line item charges comprising an individual invoice item.

7. The system according to Claim 5, further including means, responsive to user selection, for causing display at a customer terminal of a graphic presenting an invoice in its original issued format.

8. The system according to Claim 1, wherein a user is assigned administration privileges, said system further comprising means for associating a user with a user identifier, said user identifier recognized in said system for enforcing invoice viewing entitlements for a user.
9. The system according to Claim 8, wherein a user viewing entitlement includes ability of that user to view invoices associated with one or more billing entity customers having invoices issued by said billing entity.

10. The system according to Claim 1, further comprising means for selecting portions of billing information at a level of granularity directly from a displayed invoice at a user terminal, and downloading said selected invoice information for input into a second program executing at said user terminal.

11. The system according to Claim 1, further comprising means for enabling user generation of a billing dispute directly from a downloaded invoice information display, said generated billing dispute capable of being immediately forwarded over a network connection to a billing entity representative capable of handling said dispute.

12. The system according to Claim 11, further comprising means enabling the billing entity to establish a threshold below which a dispute is automatically resolved.

13. The system according to Claim 1, wherein said means for formatting said retrieved invoice information include presenting data-centric views of invoice information, said system further comprising means for applying data mining across an entire billing entity line item detail information.

14. The system according to Claim 1, further comprising means for providing archiving invoice information in said memory storage, said system providing means for retrieving historical invoicing data over a past period of time.
15. The system of claim 1, wherein said means for receiving said invoice information is a wired or wireless networked connection.

16. A method for enabling electronic bill presentation over a communications network comprising the step of:
   a) automatically receiving invoice information issued to a plurality of customer entities from a billing entity over a networked connection, said invoice information provided in a first format;
   b) extracting invoice information for invoices issued to said plurality of customers of said billing entity, and storing said extracted information in a memory storage means in a second format;
   c) receiving user requests for invoice information from a requesting user at a terminal connected to said communications network;
   d) retrieving said invoice information from said memory storage and formatting said retrieved invoice information for presentation at a user display terminal, said invoice information retrieved in accordance with enforced viewing entitlements, and,
   e) enabling drill down of invoice information from a memory storage means to reveal invoice information at various levels of granularity at said user display terminal in response to user selection.

17. The method according to Claim 16, wherein said extracting invoice information step further includes the step of parsing said information and formatting said invoice information for storage in said memory storage means to facilitate said drill down at said granular levels of invoice information.

18. The method according to Claim 16, wherein in response to user selection, a first granular level of invoice information includes a list of invoices for one or more customers entitled for user viewing.
19. The method according to Claim 18, further including the step of selecting one invoice for further drill down, wherein in response to user selection, a second granular level of invoice information includes an aggregate level including the total amount due in an invoice and payment and charge summaries for a particular selected invoice.

20. The method according to Claim 19, further including the step of drilling down to a further granular level of invoice information that includes a list of individual invoice items making up a total invoice amount for a particular selected invoice.

21. The method according to Claim 20, further including the step of causing display at a customer terminal of a graphic presenting an invoice in its original issued format.

22. The method according to Claim 16, wherein a user is assigned administration privileges, said method further comprising the step of associating a user with a user identifier, said user identifier recognized in said system for enforcing invoice viewing entitlements for a user.

23. The method according to Claim 22, wherein a user viewing entitlement includes ability of that user to view invoices associated with one or more billing entity customers having invoices issued by said billing entity.

24. The method according to Claim 16, further comprising the step of selecting portions of billing information at a level of granularity directly from a displayed invoice at a user terminal, and downloading said selected invoice information for input into a second program executing at said user terminal.
25. The method according to Claim 16, further comprising the step of enabling user generation of a billing dispute directly from a downloaded invoice information display, and immediately forwarding over a network connection said generated billing dispute to a billing entity representative capable of handling said dispute.

26. The method according to Claim 16, wherein said step of formatting said retrieved invoice information includes presenting data-centric views of invoice information, said method further implementing a step of applying data mining across an entire billing entity line item detail information.

27. The method according to Claim 16, further comprising the step of providing archiving invoice information in said memory storage, said method including the step of retrieving historical invoicing data over a past period of time.
Data Warehousing
- Database Preparation & Indexing
- Data Presentation
- Analysis & Reporting Request Dispatcher
- Visual Data Mining
- Quad Processor Machines - 4096 MB Memory
- MAX 35 TB of RAID5 Storage for each machine

Report Servers
- Report Generation
- Quad Processor Machines - 4096 MB Memory
- RAID5 100 GB drives

Service Support Servers
- CD-ROM Production
- Email Notification
- Standby Capacity Overflow

Figure 1
Figure 2
<table>
<thead>
<tr>
<th>Customer Numbers: 8253051-03</th>
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</thead>
<tbody>
<tr>
<td><strong>EDUCATION</strong></td>
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<tr>
<td>12/3/2001</td>
</tr>
<tr>
<td>($3,742.50)</td>
</tr>
<tr>
<td>Open</td>
</tr>
<tr>
<td><strong>SERVICES - SCORE...</strong></td>
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<tr>
<td>12/3/2001</td>
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<tr>
<td>$821,650.45</td>
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<tr>
<td>Open</td>
</tr>
<tr>
<td><strong>LICENSED PROGRAM.</strong></td>
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<tr>
<td>$8,953,416.00</td>
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<td><strong>EDUCATION</strong></td>
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<tr>
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<tr>
<td>($1,721.25)</td>
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<tr>
<td>$10,503,500.00</td>
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<tr>
<td>Open</td>
</tr>
</tbody>
</table>

**Legend:** Invoice

---

**Fig 4**

---

**Fig 5**
Fig. 9

Fig. 10(a)
<table>
<thead>
<tr>
<th>Customer</th>
<th>Monthly</th>
<th>Amount</th>
<th>Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERM</td>
<td>G939011</td>
<td>3.2200</td>
<td>Pending</td>
<td>d</td>
</tr>
<tr>
<td>AERM</td>
<td>G939011</td>
<td>6.2000</td>
<td>Pending</td>
<td>d</td>
</tr>
</tbody>
</table>

---

Please pay this amount: $821,058.45

---

Fig. 20

Fig. 21
Fig. 23

Fig. 24
Fig. 27

Provided is a list of your current Customer Number access. Please move the Customer Numbers you wish to remove to the Right SelectBox. Then click the "Continue" button.

Fig. 28
**Figure 29**

- User Request(s)
  - Pending New User ID Requests (1)
  - Pending Add Customer Number Requests (2)
  - Pending Remove Customer Number Requests (1)

- User Maintenance
  - Add Customer Number(s) to Existing User ID(s)
  - Remove Customer Number(s) from Existing User ID(s)

**Figure 30**

- Internal
  - Pending Internal New User ID Requests (0)

- External
  - Pending External New User ID Requests (1)
<table>
<thead>
<tr>
<th>Reports</th>
<th>List</th>
<th>601</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entitlement</td>
<td>Maintenance</td>
<td>603</td>
</tr>
<tr>
<td>Billing Inquiry</td>
<td>Status</td>
<td>610</td>
</tr>
<tr>
<td>Invoice Status</td>
<td>Hide</td>
<td>603</td>
</tr>
<tr>
<td></td>
<td>View Hidden</td>
<td>View Deleted</td>
</tr>
<tr>
<td></td>
<td>Hide New</td>
<td>Delete New</td>
</tr>
<tr>
<td></td>
<td>Unhide</td>
<td>Undelete</td>
</tr>
</tbody>
</table>

Choose a Start Date: 2001 - November - 1
Choose an End Date: 2002 - January - 10
Select the appropriate date range and then click "View".

Choose a Report Type: Select Report

---

Fig 33

Add Customer Number(s)
Customer Number(s):
Select User(s):

---

Fig 34
Fig 39
# INTERNATIONAL SEARCH REPORT

**International application No.**  
PCT/US03/13905

## A. CLASSIFICATION OF SUBJECT MATTER

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<tr>
<th>IPC(7)</th>
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</thead>
<tbody>
<tr>
<td>US CL</td>
<td>705/34</td>
</tr>
</tbody>
</table>

According to International Patent Classification (IPC) or to both national classification and IPC.

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

| U.S.       | 705/34 |

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

West - USPat, Pqpb, Dwppl, IEEE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>

Further documents are listed in the continuation of Box C.  

See patent family annex.

<table>
<thead>
<tr>
<th>*</th>
<th>Special categories of cited documents:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>document defining the general state of the art which is not considered to be of particular relevance</td>
</tr>
<tr>
<td>E</td>
<td>earlier application or patent published on or after the international filing date</td>
</tr>
<tr>
<td>L</td>
<td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td>
</tr>
<tr>
<td>O</td>
<td>document referring to an oral disclosure, use, exhibition or other means</td>
</tr>
<tr>
<td>P</td>
<td>document published prior to the international filing date but later than the priority date claimed</td>
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</table>

| * | "P" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| * | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
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Date of the actual completion of the international search: 14 July 2003 (14.07.2003)

Date of mailing of the international search report: 29 Aug 2003

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Form PCT/ISA/210 (second sheet) (July 1998)