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(54) **DATA EDITING AND VERIFICATION USER INTERFACE**

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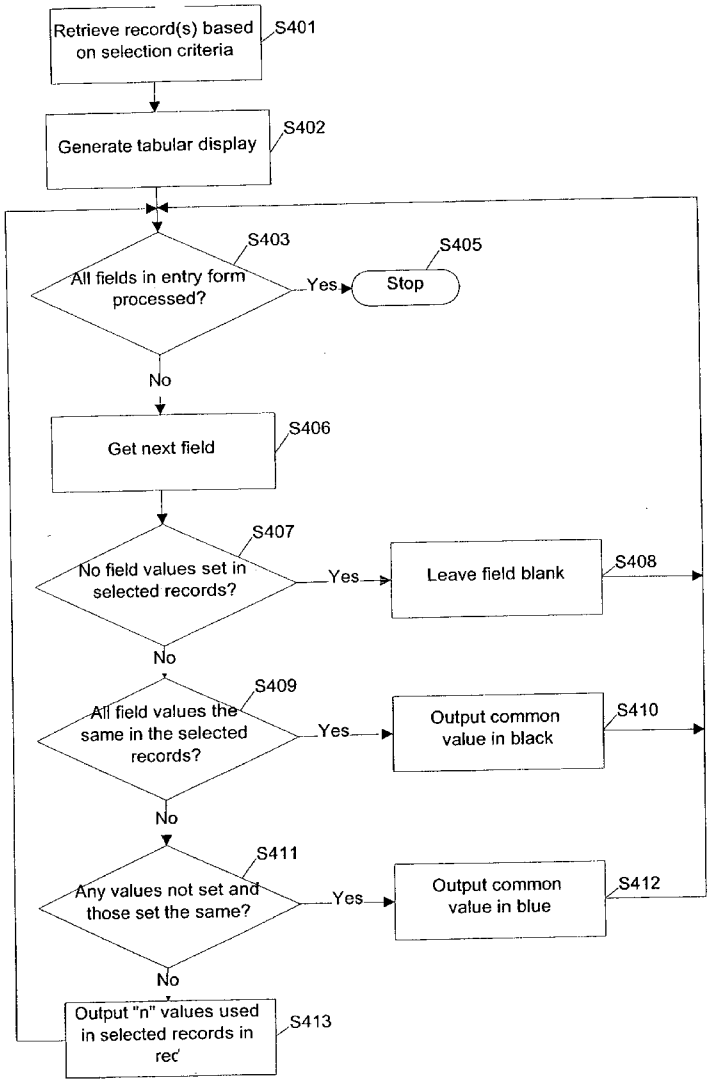
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(57) **ABSTRACT**

The present invention provides for simultaneous display of a tabular and a form view of the records, (b) displaying multiple disparate values in a single control, and (c) formatting the values based on characteristics of the records.



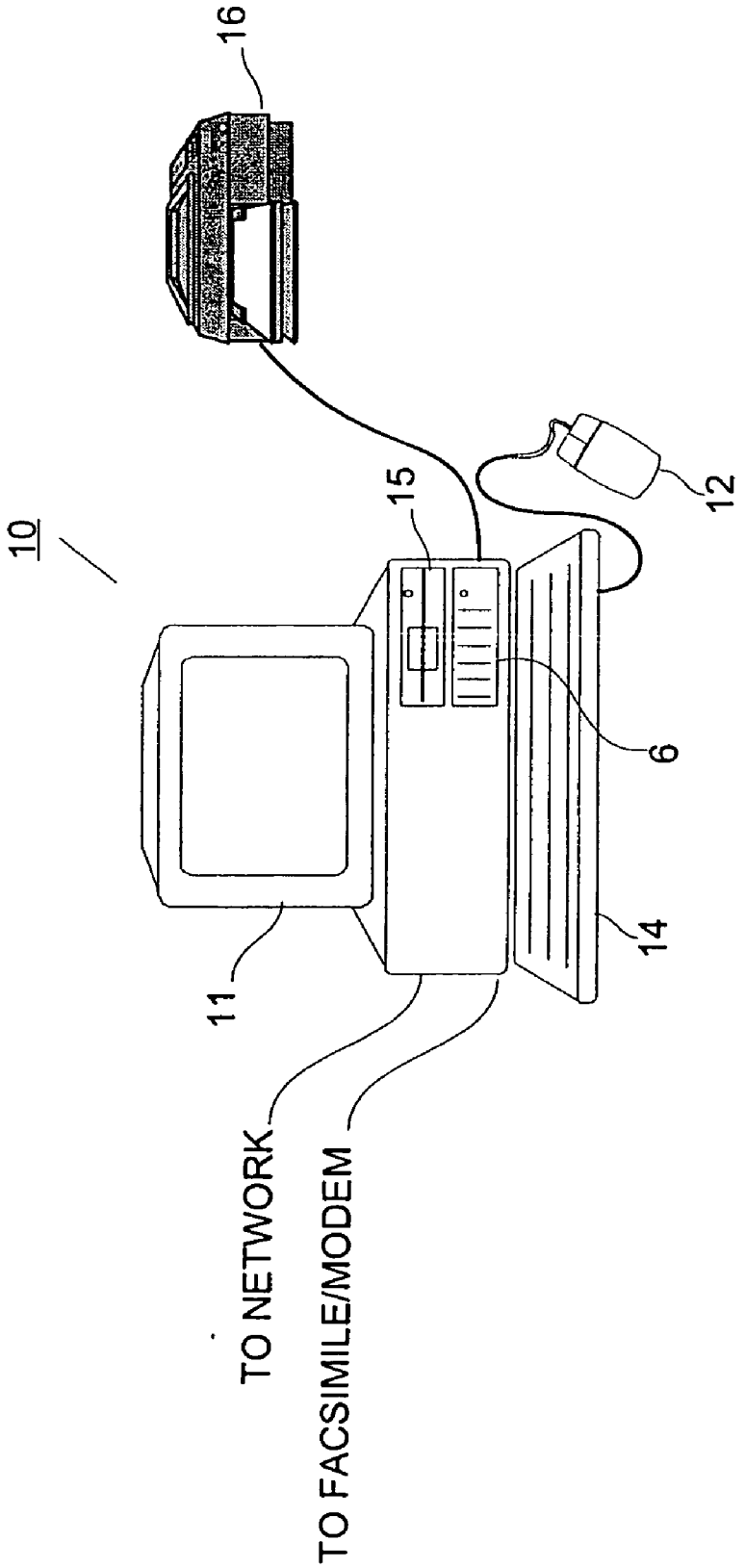


Fig. 1

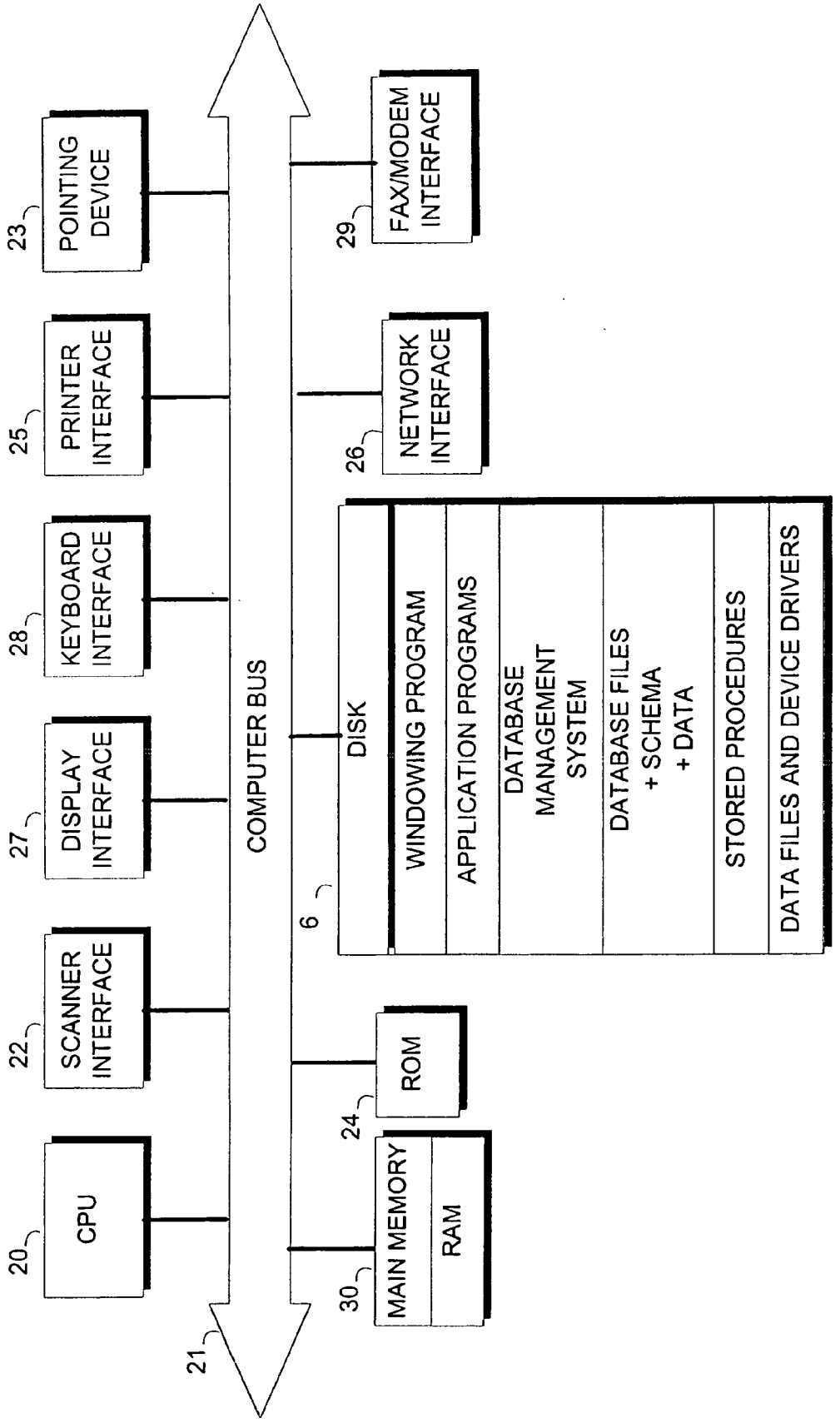

20
CPU
22
SCANNER INTERFACE
27
DISPLAY INTERFACE
28
KEYBOARD INTERFACE
25
PRINTER INTERFACE
23
POINTING DEVICE
21
COMPUTER BUS
30
MAIN MEMORY
RAM
24
ROM
6
DISK
WINDOWING PROGRAM
APPLICATION PROGRAMS
DATABASE MANAGEMENT SYSTEM
DATABASE FILES + SCHEMA + DATA
STORED PROCEDURES
DATA FILES AND DEVICE DRIVERS
26
NETWORK INTERFACE
29
FAX/MODEM INTERFACE

Fig. 2

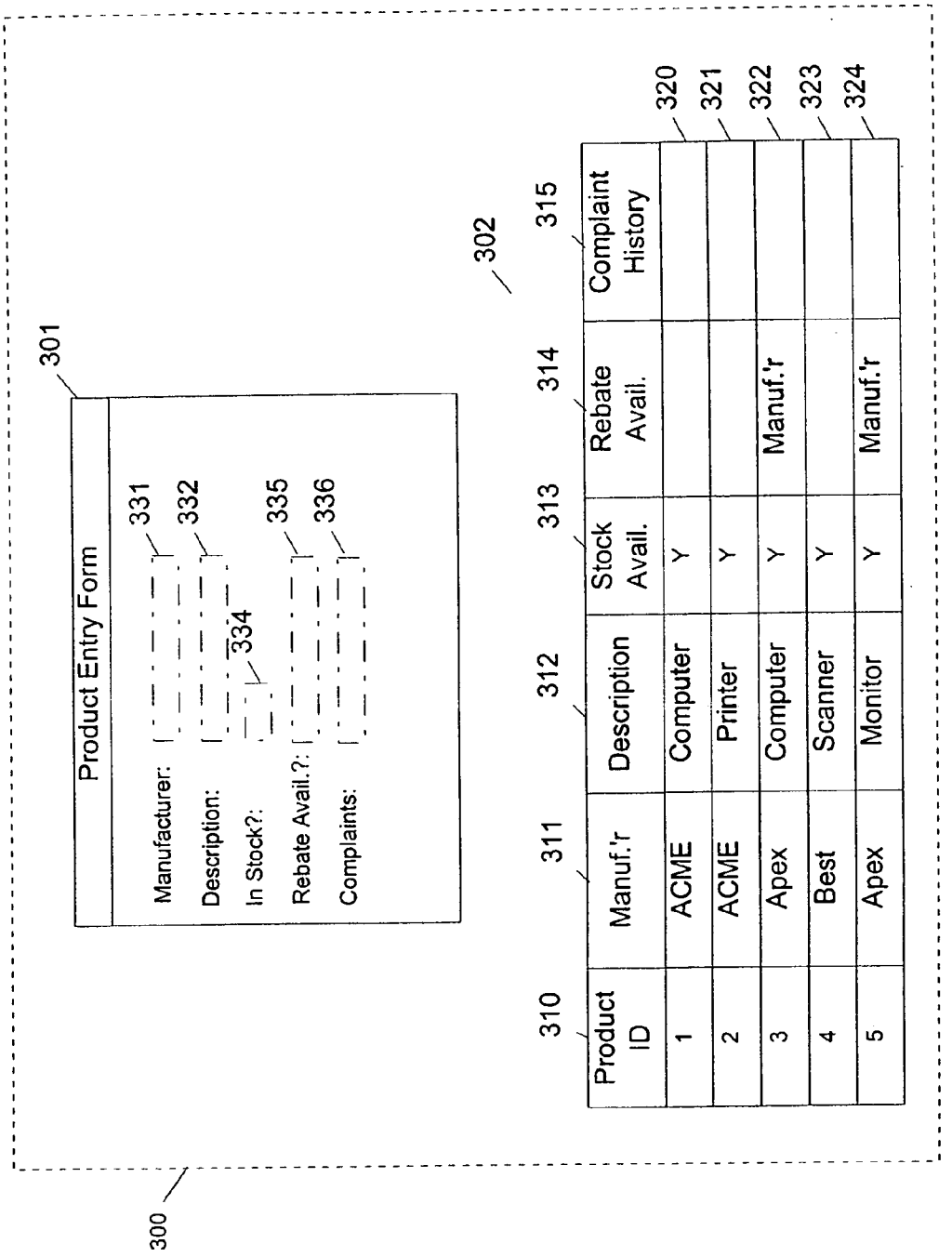

300
301
Product Entry Form
Manufacturer:
Description:
In Stock?:
Rebate Avail.?:
Complaints:
331
332
334
335
336
302
310
311
312
313
314
315
320
321
322
323
324
Product ID
Manuf.'r
Description
Stock Avail.
Rebate Avail.
Complaint History
1 ACME Computer Y
2 ACME Printer Y
3 Apex Computer Y Manuf.'r
4 Best Scanner Y
5 Apex Monitor Y Manuf.'r

Fig. 3

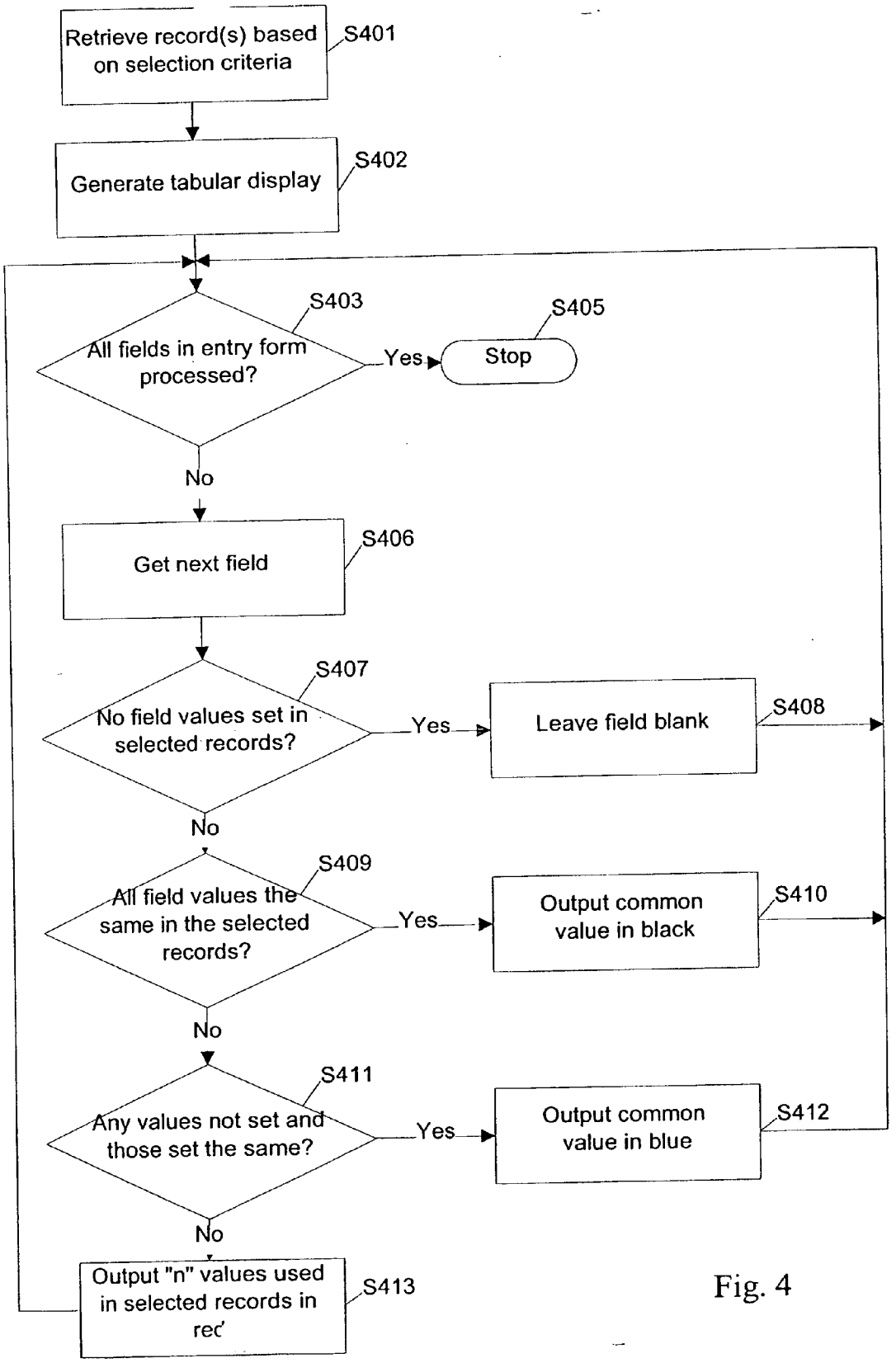

Retrieve record(s) based on selection criteria
S401
Generate tabular display
S402
All fields in entry form processed?
S403
Yes
Stop
S405
No
Get next field
S406
No field values set in selected records?
S407
Yes
Leave field blank
S408
No
All field values the same in the selected records?
S409
Yes
Output common value in black
S410
No
Any values not set and those set the same?
S411
Yes
Output common value in blue
S412
No
Output "n" values used in selected records in rec'
S413

Fig. 4

DATA EDITING AND VERIFICATION USER INTERFACE

[0001] This application claims the benefit of U.S. Provisional Application No. **60/[text missing or illegible when filed]**, filed Aug. 19, 2000.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a user interface for use in editing and verification of data, and, more particularly, to a user interface for use in editing and verifying data values wherein a format encoding is used for the values in the user interface to reflect characteristics of the underlying data used to populate the user interface.

[0004] 2. Description of the Related Art

[0005] A DBMS (Database Management System) is used to manage data and is comprised of computer-executable code that may be used to define the structure of data and to access data within the defined structure. One example of a DBMS is a relational DBMS, or RDBMS. An RDBMS manages tables that make up a relational database as well as the data contained in the tables. In an RDBMS, data is organized in rows (or records) and columns (or fields) of the tables, and two or more tables may be related based on like data values. The intersection of a row and column in a table is referred to as a cell and contains the data value for a particular field of a particular record.

[0006] A DML (data manipulation language) such as SQL (Structured Query Language) is typically used to store, retrieve and modify data in a table. A schema defines the structure of a database, i.e., each table and the fields within a record of a table. A schema is itself considered data that is stored in one or more tables. Therefore, like other data in a database, a DML may be used to store, retrieve and modify the data in the database as well as the structure of a database.

[0007] Most database management systems use convenient data entry forms to allow a user to add or modify a single database record at a time. A problem arises when attempting either to edit multiple records simultaneously or to verify that a particular field has the same data value in a large number of records.

[0008] The traditional method of adding or modifying records in an RDBMS is to use a data entry form to view and edit a single record at a time, where each field in the database corresponds to a single field in the form. When adding a new record, the fields in the form are empty, to be filled in from scratch by the user. When modifying an existing record, the RDBMS places the existing values of the record into each of the fields of the form, and any or all of them can be modified by the user.

[0009] Some systems extend this scheme to allow the user to indicate that a change to the value in a particular field be further applied to all of the records in a previously selected set of records. A problem is that the single control for each field in the data entry form can display only a single value at a time, which makes it impossible for the user to easily determine before applying the change whether or not the existing data values for the field are all the same across the entire set of records.

[0010] Many systems allow the user to view and edit multiple records simultaneously by offering a row/column tabular view of the records in a table. The advantage of this approach is that multiple values for each field can be displayed simultaneously, and the user can quickly eyeball all the values for a field across the entire set of records by examining the contents of a particular column.

[0011] An advantage of this approach is that multiple values for each field can be displayed simultaneously, and the user can quickly view all the values for a field across the entire set of records by examining the contents of a particular column.

[0012] This approach works well when the number of records is small. When the number is larger than what can be displayed on a computer monitor at the same time, the user must browse through the entire record set. When the number of records is very large (for example, hundreds or even thousands of records), browsing through the record set is impractical and, for all intents and purposes, may be impossible.

[0013] Thus, it would be beneficial to have a mechanism to edit and/or verify any size or amount of data that may or may not include diverse data values while minimizing the need to browse through an entire record set to identify data values.

SUMMARY OF THE INVENTION

[0014] The present invention addresses the foregoing problems and provides a user interface for simultaneous display of a tabular and form view of data records and setting appearance characteristics of a value displayed in the user interface to reflect characteristics of the underlying data (i.e., the data records). For example, the present invention provides for displaying multiple disparate values in a single control (e.g., a display field of the user interface), and using different formatting codes (e.g., color coding) for the values based on the characteristics of the underlying data (e.g., whether there are empty values or multiple values in the data records).

[0015] In an aspect of the present invention, a method of displaying record data in a user interface is provided that comprises displaying a tabular portion of the user interface comprising plural data records, displaying a form portion of the user interface comprising a display field that corresponds to a field of the plural data records, determining whether to place a value in the display field, and formatting a value in the display field to reflect characteristics of the data contained in the plural data records.

[0016] Thus, the user can select some or all of a large set of records and determine from the representation of a value in the data entry form whether or not conflicts exist in the underlying data (i.e., the data from the set of selected data records) and in so doing, quickly verify that the values have been properly set.

[0017] The present invention contemplates using any type of formatting and/or encoding including, but not limited to, color, font type and/or size, bold, italic, underline, etc. For example, a value may be represented in a particular color to highlight a difference or sameness of the values for a field across the entire record set without concern for the values themselves.

[0018] This brief summary has been provided so that the nature of the invention may be understood quickly. A more complete understanding of the invention can be obtained by reference to the following detailed description of the preferred embodiment(s) thereof in connection with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] **FIG. 1** is an outward view of a hardware environment embodying the present invention.

[0020] **FIG. 2** is a block diagram of the internal architecture of a typical computer for use in conjunction with the present invention.

[0021] **FIG. 3** illustrates a user interface according to the present invention.

[0022] **FIG. 4** provides a diagram of process steps for generating user interface **300** and responding to a selection of records of tabular display according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] **FIG. 1** is an outward view of representative computing hardware embodying the present invention. Shown in **FIG. 1** are computer **10** executing an operating system, display monitor **11** for displaying text and images to a user, keyboard **14** for entering text and commands into computer **10**, and mouse **12** for manipulating and for selecting objects displayed on display monitor **11**, or for output to an output device such as printer **16**. Also included with computer **10** are fixed disk drive **6**, in which are stored application programs, such as a DBMS and other applications, data files, and device drivers for controlling peripheral devices attached to computer **10**, floppy disk drive **15** for use in reading data from and writing data to floppy disks inserted therein. Data and/or applications may also be accessed from a CD-ROM via a CD-ROM drive (not shown) or over a network to which computer **10** may be connected (network connection not shown).

[0024] **FIG. 2** is a block diagram of the internal architecture of computer **10**. Shown in **FIG. 2** are CPU **20**, which may be any microprocessor including, but not limited to, a Pentium-type microprocessor, interfaced to computer bus **21**. Also interfaced to computer bus **21** are printer interface **25**, to allow computer **10** to communicate with printer **16**, modem interface **29** to enable communications between computer **10** and a modem, display interface **27** for interfacing with display monitor **11**, keyboard interface **28** for interfacing with keyboard **14**, mouse interface **23** for interfacing with mouse **12**, and network interface **26** for connecting to a network (e.g., Internet, intranet, local area network, etc.).

[0025] Read only memory (ROM) **24** stores invariant computer-executable process steps for basic system functions such as basic I/O, start up, or reception of keystrokes from keyboard **14**.

[0026] Main random access memory (RAM) **30** provides CPU **20** with memory storage which can be accessed quickly. In this regard, computer-executable process steps of a DBMS or other application are transferred from disk **6** over computer bus **21** to RAM **32** and executed therefrom by CPU **20**.

[0027] Also shown in **FIG. 2** is disk **6** which, as described above, includes a windowing operating system, a DBMS which includes data stored therein as well as schema and data stored in one or more tables defined in the schema. Further, disk **6** may be used to store executable-code (e.g., stored procedures) comprising steps described herein for simultaneous display of a tabular and form view of data records and color encoding values. Disk **6** further includes data files and device drivers as shown.

[0028] The present invention provides a user interface for displaying record data wherein a tabular display portion displays plural data records. A form portion of the user interface comprises a display field corresponding to one of the plural data records. A value placed in the display field is encoded using a formatting or encoding scheme to reflect, or identify, characteristics of the data contained in the plural data records.

[0029] Thus, it is possible to achieve the benefits of both a tabular display and a form display as well as a status of some or all of the data in the tabular display within fields of the form display.

[0030] The present invention is described herein with reference to a color encoding scheme for use in a user interface. However, it should be apparent that any type of formatting and/or encoding may be used to visually identify characteristics of data used to populate fields of the user interface. For example, color, font size, font type, bold, italic, underline, etc. formatting may be used in any combination to uniquely identify a characteristic of the underlying data.

[0031] When the user selects multiple records from the tabular view, each field in the data entry form is populated with one or more colored data values to reflect characteristics of the values that exist in the selected records.

[0032] In a preferred aspect of the present invention, if none of the selected records have a value set for the field, the field is left blank. If all the records have the same value set, the common value is placed into the field in black, which indicates that the corresponding value in the selected records are set to the same value. If all the records have either the same value or no value set, that value is placed into the field in blue, which indicates that all records are set to the same value or not set at all. If multiple values are set for the field, "n" number of the values are placed into the field in red, which indicates that the records are set to different values, where "n" may be all or some number of the different values.

[0033] Color thus highlights difference and sameness of the values for a field across the entire record set without concern for the values themselves. In this way, the user can select some or all of a large set of records and determine from the color coding in the data entry form whether or not conflicts exist in the data and in so doing, quickly verify that the values have been properly set.

[0034] A user interface example is provided that includes a form display and a tabular display. Preferably, the form and tabular displays are displayed simultaneously. However, it is possible to display them at different times as well.

[0035] **FIG. 3** illustrates a user interface according to the present invention. User interface **300** includes a form display **301** and a tabular display **302**. User interface **300** is depicted using an exemplary layout. However, it should be apparent that any layout may be used for user interface **300**. Further, while not depicted in user interface **300**, tabular display **302** may be modified to provide a scrolling capability to display additional records or fields of the records.

[0036] Tabular display **302** includes entries **320** through **324** that display data from plural records (e.g., records from a relational database). However, the data displayed in user interface **300** may be obtained from any source (e.g., a file system, etc.) Fields **310** through **315** of tabular display **302** contain values retrieved from the plural data records.

[0037] Form display **301** includes fields **331** through **336** for displaying values from records **320** through **324** (i.e., fields **310** through **315**, respectively). Fields **331** through **336** may display values from one or more of data records **320** through **324**, or be blank. Further, fields **331** through **336** may be display-only or update fields.

[0038] Upon selection of one or more of records **320** through **324**, the present invention populates fields **331** through **336** depending on the data contained in the selected records. Further, the values displayed in fields **331** through **336** are color encoded to further highlight the characteristics of the data of the selected records.

[0039] **FIG. 4** provides a diagram of process steps for generating user interface **300** and responding to a selection of records of tabular display according to the present invention.

[0040] At step S**401**, the record data used to populate tabular display **302** are retrieved based on a selection criteria (e.g., selection criteria specified by the user of the user interface). At step S**402**, tabular display **302** is populated with the retrieved data.

[0041] Forms display **301** is populated with data from records selected from tabular display **302**.

[0042] Thus, upon selection of one or more records from tabular display **302**, steps S**403** through S**413** are performed to generate forms display **301**.

[0043] Forms display **301** displays one or more fields that are populated with data from the selected records. Each one of the fields in display **301** is processed to determine a format for the value, or values, to be displayed in the field. Therefore, at step S**403**, a determination is made whether all of the fields in forms display **301** have been processed. If so, processing ends at step S**405**.

[0044] If not, processing continues at step S**406** to process the next field. At step S**407**, a determination is made whether any values have been set in the selected record fields (i.e., the fields from each of the selected records that correspond to the current display field) that corresponds to the current field of form display **301**. If not, processing continues at step S**403** to leave the display field blank. Processing continues at step S**403** to process any remaining fields.

[0045] If it is determined, at step S**407**, that there is at least one value set in the selected record fields corresponding to the display field, processing continues at step S**409**. At step S**409**, a determination is made whether the values set in the selected record field(s) are the same. If so, processing continues to output the common value in the display field in black at step S**410**, and processing continues at step S**403** to process any remaining display fields.

[0046] If it is determined, at step S**409**, that the selected records do not have a common value, processing continues at step S**411**. At step S**411**, a determination is made whether some of the selected record fields do not contain a value and those that do share the same value. If so, processing continues at step S**412** to output the shared value in blue in the display form, and processing continues at step S**403** to process any remaining display fields.

[0047] If it is determined that none of the criteria of steps S**408**, S**409** and S**411** are satisfied by the selected record fields, processing continues at step S**413**. That is, it is assumed that the selected record fields contain multiple, disparate values. In such a case, at step S**413**, "n" number of the values of the selected records field are displayed in the display field in red.

[0048] The number "n" (i.e., some or all of the values) values displayed in the display field may be determined by the size of the display field, the number of disparate values, etc. The size of the display field may be increased by providing a scrolling capability for scrolling through the values displayed in the display field. The selection of the values that are displayed may be determined by a preset criteria, or based on the values contained in the selected record fields. For example, the values selected may be based on the number of times a value appears in the record fields.

[0049] Assuming that all of records **320** through **324** are selected, display fields **331** through **336** are populated with blank, red, blue and black values as follows.

[0050] Since there are multiple values in fields **311** and **312**, some number "n" of the values are displayed in display fields **332** and **331** (respectively) in red. The common value from field **313** is displayed in display field **334** in black. The value of records **322** and **324** is displayed in display field **335** in blue. Display field **336** is left blank.

[0051] Thus, it is possible for the user to quickly and easily ascertain the characteristics of the data contained in the selected records without the need to browse the data and examine each the records and the fields within the records to determine whether none or more values are set for a given field and/or some or all of the multiple values used in the fields. Such information may be used to easily assess whether or not to apply a change made in a display field of display form **301** to each of the data records, for example. Using the present invention, for example, it is easy for a user to determine, before applying the change to each of the data records, whether or not the existing data values for the field are all the same across the entire set of records.

[0052] In this regard, the invention has been described with respect to particular illustrative embodiments. However, it is to be understood that the invention is not limited to the above-described embodiments and that various changes and modifications may be made by those of ordinary skill in the art without departing from the spirit and the scope of the invention.

What is claimed is:

1. A method of displaying record data in a user interface comprising:

displaying a tabular portion of the user interface comprising plural data records;

displaying a form portion of the user interface comprising a display field that corresponds to a field of the plural data records;

determining whether to place a value in the display field; and

formatting a value in the display field to reflect characteristics of the data contained in the plural data records.

2. A method according to claim 1, wherein formatting a value in the display field further comprises:

formatting a value for display using a first format when it is determined that the plural records share the same value;

formatting a value for display using a second format when it is determined that a portion of the plural records include a common value and a remaining portion of the plural records have no value;

formatting multiple values using a third format when it is determined that the plural records include multiple values; and

displaying a blank value when it is determined that none of the plural records include a value.

3. A method according to claim 2, wherein the first format is a color of black.

4. A method according to claim 2, wherein the second format is a color of blue.

5. A method according to claim 2, wherein the third format is a color of red.

6. A method according to claim 2, wherein "n" of the multiple values are displayed in the display field.

7. A method according to claim 6, wherein "n" is the total number of multiple values.

8. A method according to claim 6, wherein "n" is less than the total number of multiple values.

9. A computer-readable memory medium in which computer-executable process steps are stored, the process steps for displaying record data in a user interface, wherein the process steps comprise:

a displaying step to display a tabular portion of the user interface comprising plural data records;

a displaying step to display a form portion of the user interface comprising a display field that corresponds to a field of the plural data records;

a determining step to determine whether to place a value in the display field; and

a formatting step to format a value in the display field to reflect characteristics of the data contained in the plural data records.

10. A computer-readable medium according to claim 9, wherein formatting step to format a value in the display field further comprises:

a formatting step to format a value for display using a first format when it is determined that the plural records share the same value;

a formatting step to format a value for display using a second format when it is determined that a portion of the plural records include a common value and a remaining portion of the plural records have no value;

a formatting step to format multiple values using a third format when it is determined that the plural records include multiple values; and

a displaying step to display a blank value when it is determined that none of the plural records include a value.

11. A computer-readable medium according to claim 10, wherein the first format is a color of black.

12. A computer-readable medium according to claim 10, wherein the second format is a color of blue.

13. A computer-readable medium according to claim 10, wherein the third format is a color of red.

14. A computer-readable medium according to claim 10, wherein "n" of the multiple values are displayed in the display field.

15. A computer-readable medium according to claim 14, wherein "n" is the total number of multiple values.

16. A computer-readable medium according to claim 14, wherein "n" is less than the total number of multiple values.

17. Computer-executable process steps stored on a computer-readable medium, the process steps for displaying record data in a user interface, wherein the process steps comprise:

code to display a tabular portion of the user interface comprising plural data records;

code to display a form portion of the user interface comprising a display field that corresponds to a field of the plural data records;

code to determine whether to place a value in the display field; and

code to format a value in the display field to reflect characteristics of the data contained in the plural data records.

18. Computer-executable process steps according to claim 17, wherein the code to format a value in the display field further comprises:

code to format a value for display using a first format when it is determined that the plural records share the same value;

code to format a value for display using a second format when it is determined that a portion of the plural records include a common value and a remaining portion of the plural records have no value;

code to format multiple values using a third format when it is determined that the plural records include multiple values; and

code to display a blank value when it is determined that none of the plural records include a value.

19. Computer-executable process steps according to claim 18, wherein the first format is a color of black.

20. Computer-executable process steps according to claim 18, wherein the second format is a color of blue.

21. Computer-executable process steps according to claim 18, wherein the third format is a color of red.

22. Computer-executable process steps according to claim 18, wherein "n" of the multiple values are displayed in the display field.

23. Computer-executable process steps according to claim 22, wherein "n" is the total number of multiple values.

24. Computer-executable process steps according to claim 22, wherein "n" is less than the total number of multiple values.

* * * * *