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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: NATIONAL LANGUAGE DATABASE FOR OPERATING SYSTEMS

(57) Abstract: An operating system for a machine which displays text during machine operation includes a machine control operating system; a user operating system enabling operation of the machine control operating system by an operator of the machine, the user operating system including one or mores lines of code that incorporate text using unique identifiers; a library containing a plurality of lines of text in a first language for use by the user operating system, wherein each of the plurality of lines of text is referenced by one of the unique identifiers; a national language database storing a plurality of lines of text in a second language, the second language being different than the first language, wherein each of the plurality of lines of text is referenced by one of the unique identifiers; and an editor for specifying one of the first and second languages, so that the user operating system incorporates the text in the specified language.

-1-

NATIONAL LANGUAGE DATABASE FOR OPERATING SYSTEMS

BACKGROUND OF THE INVENTION

1.   Field of the Invention:

5   The present invention relates to software for
assembly machines, and in particular, to software for
assembly machines intended to be used with a plurality
of languages.

2.   Description of Related Art:

10   The present invention may have applicability to a
large number of machines or operating systems intended
to be operated by software which, from time to time,
requires text to be displayed on a screen, or in some
other format. In a particular application, the present

15   invention is used in assembly machines wherein text is
displayed in a menu or dialogue box, wherein the text is
relied upon by either an operator, service personnel, or
both. Although a particular embodiment of the present
invention is used on assembly machines intended to

20   assemble electronic components on a printed circuit
board, the present invention may have applications in
other types of machines, as well.

         Automated machinery is frequently shipped to
various countries all around the world. For example,

25   one particular model may be used in the United States,
as well as in South America, where Spanish is

-2-

predominantly spoken, and also in China or Taiwan where
Chinese is spoken. As a convenience to users in
respective countries, machines are frequently programmed
so that when text is displayed on a monitor, the text is
5   displayed in the local language of the machine
operators. Use of a local language reduces training
requirements and increases the convenience of the
machine for the operator. It also lowers the skill
level needed to operate the machine.

10   However, from time to time, it is necessary to
service the machine. In some cases, service personnel
from a different country may be dispatched to the
foreign country to service a machine in the foreign
country. In view of the fact that the service personnel
15   may not be able to read the local language in which the
particular machine is programmed, servicing of the
machine can be difficult.

In addition, if a machine which has been used in
one country is subsequently sold for use in another
20   country, wherein a different language is used,
reprogramming of the machine may be required in order to
maintain the above-mentioned convenience of having the
machine utilize the local language.

OBJECTS AND SUMMARY

25   Accordingly, it is an object of the present
invention in order to provide an operating system for a
machine, wherein text is displayed on the machine
monitor in a local language.

-3-

It is a further object of the present invention to provide an operating system for a machine, wherein the language used by the machine to interface with the operator can be easily changed from one language to
5   another.

For example, it is an object of the present invention to provide a system wherein the language used by the operator of the system can be changed without having to change, reinstall, or recompile the software.
10   According to one embodiment of the present invention, an operating system for a machine which displays text during machine operation comprises a machine control operating system; a user operating system enabling operation of the machine control
15   operating system by an operator of the machine, the user operating system including one or mores lines of code that incorporate text using unique identifiers; a library containing a plurality of lines of text in a first language for use by the user operating system,
20   wherein each of the plurality of lines of text is referenced by one of the unique identifiers; a national language database storing a plurality of lines of text in a second language, the second language being different than the first language, wherein each of the
25   plurality of lines of text is referenced by one of the unique identifiers; and an editor for specifying one of the first and second languages, so that the user operating system incorporates the text in the specified language.

-4-

A method of displaying text during operation of an
operating system according to one embodiment of the
present invention comprises specifying one of a first
language and a second language; running a user operating

5   system, the user operating system including one or mores
lines of code that incorporate text using unique
identifiers; a library containing a plurality of lines
of text in the first language for use by the user
operating system, wherein each of the plurality of lines

10   of text is referenced by one of the unique identifiers;
a national language database storing a plurality of
lines of text in the second language, the second
language being different than the first language,
wherein each of the plurality of lines of text is

15   referenced by one of the unique identifiers;
incorporating the text in the specified language; and
displaying the text in the specified language

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a schematic diagram illustrating an
20   assembly machine and a control system therefore
incorporating a preferred embodiment of the present
invention.

Figure 2 is a flowchart showing an operation of the
preferred embodiment of the present invention.

25   **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The present invention relates primarily to an
assembly machine, and more broadly to any type of

-5-

machine, wherein information concerning the operation or servicing of the machine is displayed on a monitor for the operator or service personnel to use. Although a specific application of the present invention relates to

5   assembly machines for assembling electronic components on circuit boards, the present invention may have applicability to a large number of other types of machines. In fact, the general principles of the present invention could be used on most types of

10   computer operating systems, even those that are not used to control a machine.

Figure 1 is a schematic diagram illustrating a particular application of the present invention. Figure 2 is a flowchart illustrating an operation sequence of a

15   preferred embodiment of the present invention. The assembly machine 10 is illustrated schematically by a blank box. However, in actual use, the assembly machine 10 can be any one of a number of machines.

A control system 12, referred to generally as the

20   Universal Platform System (UPS) is integral with the assembly machine, or, alternatively, connected thereto through an appropriate communications device, either wired or wireless. In the preferred embodiment, the control system 12 is included in a computer that is

25   built into the assembly machine 10.

The control system UPS 12 includes a number of software programs or packages. Such programs include at least two basic components. The first basic component, referred to as the Machine Control Operating System

-6-

MCOS) 16, directly controls the actual operation of the
assembly machine 10, including, for example, controlling
movement of the robotic arms on the machine 10. As used
herein, the MCOS 16 may be any conventional operating

5   system already known to those of skill in the art of
controlling machines. Accordingly, further details of
the MCOS 16 are omitted.

The second basic component, referred to as the
Universal Supervisory Operating System (USOS) 18,

10   contains code for interfacing the MCOS 16 with an
operator of the assembly machine 10. The USOS 18
includes a series of programs, some of which are known
as classes. These classes use C++. However, other
languages may be used instead of C++.

15   Many types of USOS are known to those of skill in
the art of controlling machines. Accordingly, some
details of the USOS 18 are omitted. Unless otherwise
indicated herein, the omitted details are conventional
and known to those of skill in the art.

20   The USOS 18 used in the preferred embodiment of the
present invention includes, among other things, four
classes that have been modified from the original
Microsoft MFC (Microsoft Foundation Class) format.
These four classes are referred to herein as CMenuNL,

25   CDialogNL, CStringNL, and CPropertySheetNL. Each of
those classes is used in place of the standard Microsoft
MFC class that it is designed to replace. Specifically,
CMenuNL is used to load and display the menus that are
normally displayed at the top of any application.

-7-

CDialogNL is used to load and display dialogs with which
that the user interacts. CStringNL is used to load
strings from a resource string table. And,
CPropertySheetNL controls the use of property sheets.

5   Each of the four classes is preferably included in the
same dynamic link library (dll) 20, referred to as
u_controls.dll. However, it is not necessary for all of
the classes to be in the same dll.

       Each of the four classes discussed above includes
10   strings of code, some of which correspond to text
intended for displaying useful information for the
operator or service personnel. In the classes, each
string of code has a unique identifier, referred to
herein as a numerical identification number, which
15   specifically identifies that particular string of code.
In the preferred embodiment, the text for a particular
string of code is stored with the corresponding
numerical identifier in the same dll 20 as the four
classes. However, the text may be in other dll files.
20   It is not necessary that it be in the same dll as the
class. In addition, it is not necessary that all of the
text be in one dll file. The text can be in two or more
dll files. Such text is usually written and stored in
English. In the preferred embodiment of the present
25   invention, the default language is English. However,
the default language could be any other language, if
desired.

       In operation, the program, relying on the numerical
identification number, obtains the appropriate text from

-8-

the appropriate dynamic link library, e.g.,
u_controls.dll 20, and displays the corresponding text.

One aspect of the present invention involves the
use of a national language database 22. The national
5   language database 22 includes a table having in one
column the numerical identification number for each
string of code used in any of the aforementioned classes
that corresponds to text. In another column is a
translation of the text in a foreign language. For
10   example, in the first column of the table are listed the
various numerical identifiers used in the USOS 18
classes to identify particular strings of code in the
operating system. In a second column is the appropriate
text relating to the particular string of code relating
15   to that numerical identifier expressed in a particular
language, such as Spanish or Chinese, for example. A
third column of the table in the National language
database 22 includes the appropriate text for each
particular numerical identifier in a second language,
20   such as Japanese.

Various embodiments of the present invention can be
envisioned by one of ordinary skill in the art, wherein
the national language database 22 might have a different
number of columns and a different combination of
25   languages. The present invention is not limited to use
with any particular languages. The national language
database 22 may support only one language, or it may
support a number of languages. In the preferred
embodiment, the national language database is created as

-9-

an access database. However, other formats may be used
for creating a national language database.

For convenience, the national language database may
also include a column for the default language.

5   However, such a column is primarily for the convenience
of the translator. The operating system does not use
the default text from the national language database in
the preferred embodiment.

The Universal Platform System 12 also includes an

10   interface software program, referred to herein as the
environment editor 24. The environment editor 24 is a
separate executable program, and is used during setup of
the machine 10. Among other things, the environment
editor 24 is used to set a flag in the systems registry

15   which identifies the language to be used by the machine
operator.

If the flag is set for the default language, e.g.,
English in the preferred embodiment, when a class
encounters a string that references text, the program

20   looks to the appropriate dll file for the corresponding
English text to be used.

However, if the flag is set for a language other
than the default language, when a class encounters a
string that references text, the program looks to the

25   national language database 22. The program finds the
text in the specified language that corresponds to the
numerical identifier in the string and uses that text.
If the specified language uses an alphabet other than

-10-

Roman, the system utilizes fonts from nationalized versions of Windows NT.

If a particular string cannot be located in the national language database 22, the system then looks to the default text in the appropriate dll.

With reference to Figure 2, when the operating system is being run (S8), the program will encounter one or more string loading functions (S10). The string loading function looks to the flag set in the system registry (S12) to determine whether the text to be used is the default language or some designated nondefault language (14). If the system registry flag designates the default language, the system obtains the appropriate string from the default string table in the appropriate dll (S20). If the designated language is other than the default language, the system obtains the appropriate string from the national language database (S16) and loads the string from the designated column in the national language database (S18). In either way, the string is displayed in the specified language (S22).

If the national language is to be changed, either to enable service personnel from another country to use the machine, or if an operator speaking a different language is to use the machine, the environment editor 22 is used to reset the flag in the systems editor so that it selects the appropriate text from a different column in the national language database, referencing a particular designated national language.

-11-

If a new language capability is to be added to the machine, it is not necessary to reprogram all of the software. It is only necessary to replace the national language database 22 with one that includes the desired

5   language. The national language database 22 can be downloaded from the internet or provided on a CD rom, or other appropriate medium.

The UPS 12 further includes a monitor 26 and a keyboard 28 for enabling the operator or service

10   personnel to use te system.

In an alternative embodiment of the invention, instead of having the default language stored in a separate file from the national language database, all of the translated strings are stored in one database.

15   Although only preferred embodiments are specifically illustrated and described herein, it will be appreciated that many modifications and variations of the present invention are possible in light of the above teachings and within the purview of the appended claims

20   without departing from the spirit and intended scope of the invention.

-12-

WHAT IS CLAIMED IS:

1.   An operating system which displays text during operation, the operating system comprising:

a user operating system including one or mores

5   lines of code that incorporate text using unique identifiers;

a national language database storing a plurality of lines of text in a first language and a second language, the second language being different than the first

10   language, wherein each of the plurality of lines of text is referenced by one of the unique identifiers; and

an editor for specifying one of the first and second languages, so that the user operating system incorporates the text in the specified language.

15   2.   The operating system of claim 1, wherein the user operating system includes a systems registry and the editor sets a flag in the systems registry identifying the specified language.

3.   An operating system for a machine which

20   displays text during machine operation, the operating system comprising:

a machine control operating system;

a user operating system enabling operation of the machine control operating system by an operator of the

25   machine, the user operating system including one or

-13-

mores lines of code that incorporate text using unique
identifiers;

a library containing a plurality of lines of text
in a first language for use by the user operating

5   system, wherein each of the plurality of lines of text
is referenced by one of the unique identifiers;

a national language database storing a plurality of
lines of text in a second language, the second language
being different than the first language, wherein each of

10   the plurality of lines of text is referenced by one of
the unique identifiers; and

an editor for specifying one of the first and
second languages, so that the user operating system
incorporates the text in the specified language.

15   4.   The operating system of claim 3, wherein the
library contains a default language which is to be used
if the text in the specified language cannot be found in
the national language database.

5.   The operating system of claim 3, wherein the
20   national language database further contains an
additional plurality of lines of text in a third
language, the third language being different than the
first language and the second language, wherein each of
the additional plurality of lines of text is referenced
25   by one of the unique identifiers.

-14-

6.   The operating system of claim 5, wherein the library contains a default language which is to be used if the text in the specified language cannot be found in the national language database.

5   7.   The operating system of claim 3, wherein the user operating system and the library are both contained in a same dynamic link library.

8.   The operating system of claim 6, wherein the user operating system and the library are both contained
10   in a same dynamic link library.

9.   The operating system of claim 3, wherein the user operating system includes a systems registry and the editor sets a flag in the systems registry identifying the specified language.

15   10.   The operating system of claim 8, wherein the user operating system includes a systems registry and the editor sets a flag in the systems registry identifying the specified language.

11.   An operating system for a machine which
20   displays text during machine operation, the operating system comprising:
         a machine control operating system;
         a user operating system enabling operation of the machine control operating system by an operator of the

-15-

machine, the user operating system including one or
mores lines of code that incorporate text using unique
identifiers;

5   a national language database storing a plurality of
lines of text in a first language and a second language,
the second language being different than the first
language, wherein each of the plurality of lines of text
is referenced by one of the unique identifiers; and

         an editor for specifying one of the first and
10   second languages, so that when the user operating system
is operating, the user operating system incorporates the
text in the specified language.

         12. The operating system of claim 11, wherein the
user operating system includes a systems registry and
15   the editor sets a flag in the systems registry
identifying the specified language.

         13. A method of displaying text during operation
of an operating system, the method comprising:
         specifying one of a first language and a second
20   language;
         running a user operating system, the user operating
system including one or mores lines of code that
incorporate text using unique identifiers;
         a library containing a plurality of lines of text
25   in the first language for use by the user operating
system, wherein each of the plurality of lines of text
is referenced by one of the unique identifiers;

-16-

a national language database storing a plurality of lines of text in the second language, the second language being different than the first language, wherein each of the plurality of lines of text is

5   referenced by one of the unique identifiers;

incorporating the text in the specified language; and

displaying the text in the specified language.

14.   The method of claim 13, wherein the operating

10   system includes a systems registry and the specifying step includes setting a flag in the systems registry to identify the specified language.

15.   A method of displaying text during operation of an operating system, the method comprising:

15   specifying one of a first language and a second language;

running a user operating system, the user operating system including one or mores lines of code that incorporate text using unique identifiers;

20   a national language database storing a plurality of lines of text in the first language and in the second language, the second language being different than the first language, wherein each of the plurality of lines of text is referenced by one of the unique identifiers;

25   incorporating the text in the specified language; and

displaying the text in the specified language.

-17-

16. The method of claim 15, wherein the operating system includes a systems registry and the specifying step includes setting a flag in the systems registry to identify the specified language.
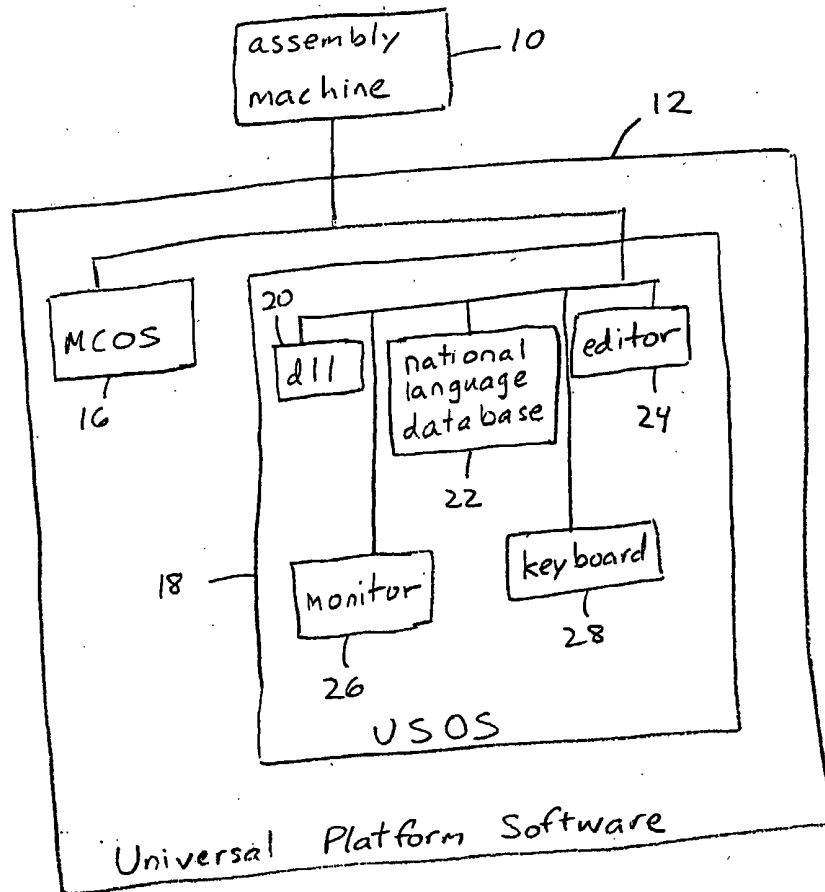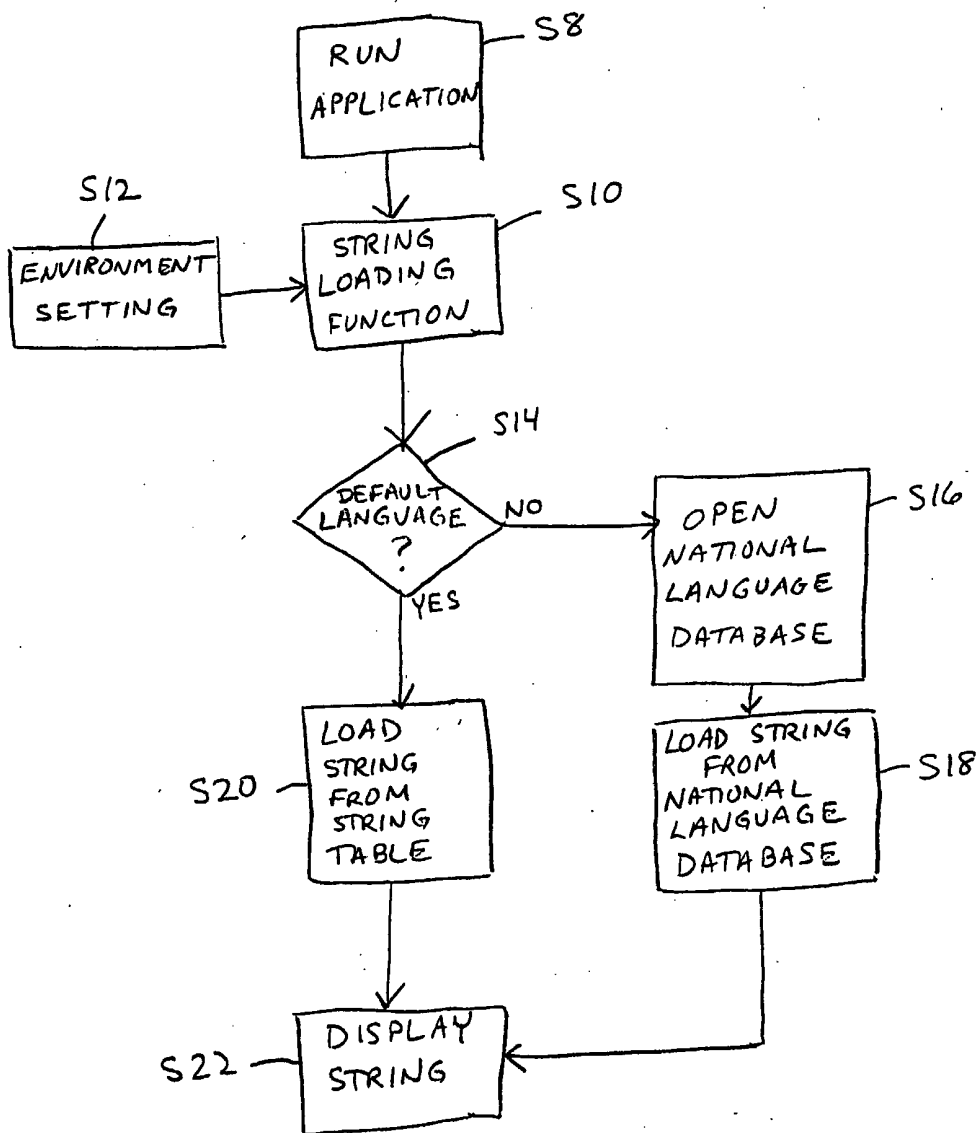
FIG. 1

FIG. 2

```
                          ┌──────────────┐
                          │    RUN       │── S8
                          │ APPLICATION  │
                          └──────┬───────┘
                                 │
    S12                          ▼
     ┌──────────────┐     ┌──────────────┐── S10
     │ ENVIRONMENT  │────▶│   STRING     │
     │  SETTING     │     │  LOADING     │
     └──────────────┘     │  FUNCTION    │
                          └──────┬───────┘
                                 │
                                 ▼      S14
                              ◇─────◇
                           ◇  DEFAULT  ◇  NO     ┌──────────────┐── S16
                          ◇  LANGUAGE    ◇──────▶│    OPEN      │
                           ◇     ?     ◇         │  NATIONAL    │
                              ◇─────◇            │  LANGUAGE    │
                                 │ YES           │  DATABASE    │
                                 │               └──────┬───────┘
                                 ▼                      │
                          ┌──────────────┐              ▼
                          │   LOAD       │       ┌──────────────┐
              S20 ────────│   STRING     │       │ LOAD STRING  │── S18
                          │   FROM       │       │    FROM      │
                          │   STRING     │       │  NATIONAL    │
                          │   TABLE      │       │  LANGUAGE    │
                          └──────┬───────┘       │  DATABASE    │
                                 │               └──────┬───────┘
                                 ▼                      │
                          ┌──────────────┐              │
              S22 ────────│  DISPLAY     │◀─────────────┘
                          │  STRING      │
                          └──────────────┘
```

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 17/30
US CL :Please See Extra Sheet.
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. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
GOOGLE, PLUR SEARCH

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

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,613,122 A (BURNARD et al) 18 MARCH 1997 whole document	1-16
X	US 5,835,768 A (MILLER et al) 10 NOVEMBER 1998, whole document	1-16
X	US 5,564,050 A (BARBER et al) 08 OCTOBER 1996, whole document	1-16
X	US 5,995,974 A (ANTON et al) 30 NOVEMBER 1999, whole document	1-16
A	US 6,008,806 A (NAKAJIMA et al) 28 DECEMBER 1999, whole document	1-16

[X] Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" 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
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier document published on or after the international filing date	"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
"L" 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)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 MARCH 2002	0 6 MAY 2002

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

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,E	US 6,332,219 A (CURTIS et al) 18 DECEMBER 2001, whole document	1-16

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

707/1-5,10,100-104.1,200; 709/2010203,219,220-222,315,320-321;713/1-2, 345/703,866;710/260

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

707/1-5,10,100-104.1,200; 709/2010203,219,220-222,315,320-321;713/1-2, 345/703,866;710/260;717/100,106-116,127-128,136

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

WEST 2.1, IEEE
search terms:operating system, display, text, code, unique identifier, uuid , uid, id, national language database, registry, flag,universal platform software