



(22) Date de dépôt/Filing Date: 2003/03/11

(41) Mise à la disp. pub./Open to Public Insp.: 2004/09/11

(45) Date de délivrance/Issue Date: 2008/08/05

(51) Cl.Int./Int.Cl. *H04L 29/02* (2006.01),  
*G06F 17/28* (2006.01), *G06F 9/445* (2006.01),  
*H04Q 7/32* (2006.01), *H04Q 7/36* (2006.01)

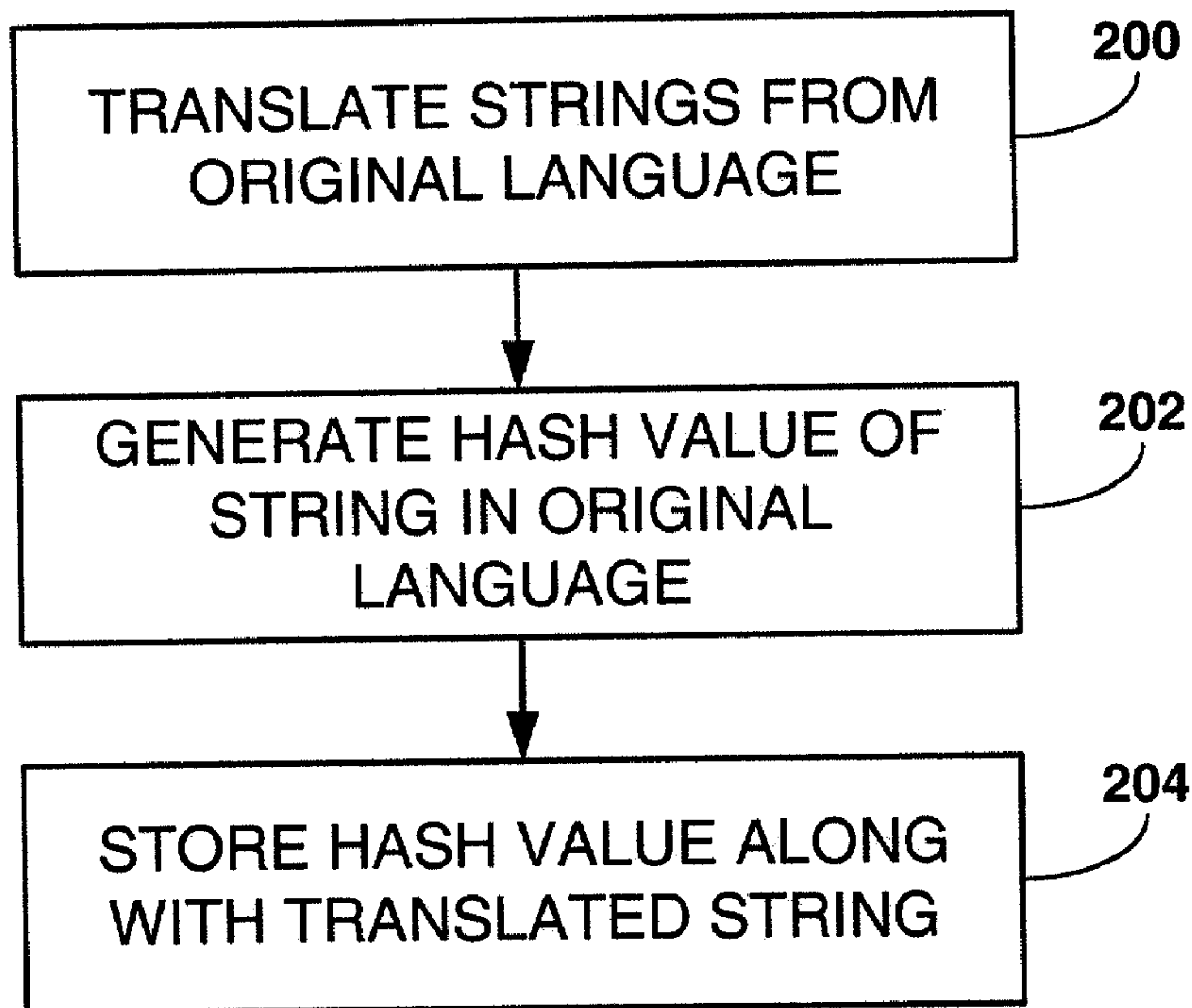
(72) Inventeurs/Inventors:  
MACKAY, JON, CA;  
BELLS, MATTHEW, CA

(73) Propriétaire/Owner:  
RESEARCH IN MOTION LIMITED, CA

(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : LOCALISATION DE RESSOURCES UTILISEES PAR DES APPLICATIONS SUR DES DISPOSITIFS  
ELECTRONIQUES PORTATIFS ET METHODES CONNEXES

(54) Title: LOCALIZATION OF RESOURCES USED BY APPLICATIONS IN HAND-HELD ELECTRONIC DEVICES AND  
METHODS THEREOF



(57) Abrégé/Abstract:

Resource bundles may be downloaded dynamically over a wireless network to a hand-held electronic device so that applications on the device may support locale-specific user-interface resources.

**ABSTRACT**

[0042] Resource bundles may be downloaded dynamically over a wireless network to a hand-held electronic device so that applications on the device may support locale-specific user-interface resources.

**LOCALIZATION OF RESOURCES USED BY APPLICATIONS IN HAND-HELD  
ELECTRONIC DEVICES AND METHODS THEREOF**

**BACKGROUND OF THE INVENTION**

A hand-held electronic device will have software applications installed on it. Localization for the software applications may be provided by way of resource bundles. However, since the hand-held electronic device has limited storage and memory, special considerations ought to be made with respect to the format, size, storage and downloading of the resource bundles.

**SUMMARY OF THE INVENTION**

In one aspect of the invention, there is provided a method of operation in a hand-held electronic device comprising the following steps: establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device; requesting from the enterprise server or gateway localized resources for use with an application on the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway; receiving via the wireless connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources; identifying a character sequence entered by a user of the hand-held electronic device that matches a predetermined sequence associated with the current locale of the hand-held device; choosing an article for use with a word that is entered by the user after the character sequence is entered, wherein the article is grammatically correct for the language associated with the current locale; and automatically replacing the character sequence with the article.

In another aspect, there is provided a method of operation in a wireless network that provides services for hand-held electronic devices comprising the following steps:



providing a communication channel for use by a hand-held electronic device in establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device; receiving a request for localized resources from the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway; and transmitting to the hand-held electronic device via the wireless connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources, wherein with use of the resource bundle, the hand-held electronic device can identify a character sequence entered by a user of the hand-held electronic device that matches a predetermined sequence associated with the current locale of the hand-held device, choose an article for use with a word that is entered by the user after the character sequence is entered, wherein the article is grammatically correct for the language associated with the current locale, and automatically replace the character sequence with the article.

In another aspect, there is provided a method of operating a wireless network comprising the steps of: providing a communication channel for use by a hand-held electronic device in establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device; receiving a request for localized resources from the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway; and transmitting to the hand-held electronic device via the wireless

connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources, wherein with use of the resource bundle, the hand-held electronic device can determine that the usage of an article associated with a word is grammatically incorrect in the current locale of the hand-held device after a user of the hand-held electronic device enters a sequence of characters that includes the article and the word and wherein the hand-held electronic device automatically replaces the incorrectly used article with a grammatically correct article for the current locale.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

The subject matter regarded as the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, together with objects, features and advantages thereof, may best be understood by reference to the following detailed description when read with the accompanied drawings in which:

FIGS. 1A and 1B are simplified diagrams of network communication systems;

FIG. 2 is a simplified flowchart of a method generate and store additional information relating to a string in an original language that is translated; and

FIG. 3 is a simplified flowchart of a method for determining whether a translated string is out of date.

It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

### **DETAILED DESCRIPTION OF THE INVENTION**

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention. However it will be understood by those of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures and components have not been described in detail so as not to obscure the present invention.

FIGS. 1A and 1B are simplified diagrams of network communication systems. The system of FIG. 1A may comprise a hand-held electronic device 100, one or more origin



servers 102, and an enterprise server 104. Hand-held electronic device 100 may be coupled to enterprise server 104 via a wireless network 106. Enterprise server 104 may be coupled to origin server 102 via a local-area-network or wide-area-network 108, such as, but not limited to, an Intranet or the Internet.

The system of FIG. 1B may comprise hand-held electronic device 100, one or more origin servers 102, and a gateway 105. Gateway 105 may be, for example, a direct Transmission Control Protocol (TCP) gateway or a Wireless Application Protocol (WAP) gateway, although the present invention is not limited in this respect. Hand-held electronic device 100 may be coupled to gateway 105 via a wireless network 106. Gateway 105 may be coupled to origin server 102 via a wide-area-network 108, such as, but not limited to, the Internet.

Hand-held electronic device 100 may be a personal data assistant (PDA), a personal information manager (PIM), a two-way pager, and the like. Hand-held electronic device 100 may have an operating system, a user-interface engine, and one or more specialized software applications, although the scope of the present invention is not limited to this particular architecture.

The software applications may have user-interface capabilities, implemented via the user-interface engine, which may be adaptable to specific locales. For example, the language of the user interface, and the formatting of numbers, data, currency and percents, may be locale-specific. In another example, the upper and lower casing of letters may be locale-specific. In a further example, the way a list is sorted, or which day is the one in the left column of a calendar may be locale-specific.

Resource bundles are a convenient way to provide locale-specific resources for use by a software application. Resource bundles may comprise, for example, translated strings, and formatting information. Resource bundles may also comprise any or all of images, string arrays, and lists of strings. For example, a list of strings may be defined as follows:

```
SAVE#0 = "Save";
CANCEL#0 = "Cancel";
DISCARD#0 = "Discard";
```

while an exemplary array of strings may be defined as follows:

```
CLOSE_OPTIONS#0={
    "Save",
    "Cancel",
```

**"Discard" ,**  
**};**

When an application is installed on hand-held electronic device 100, a default resource bundle and possibly some other resource bundles may be installed along with it. However, due to the limited storage and memory of hand-held electronic device 100, generally not all available resource bundles are installed for all applications on the device.

An origin server 102 may store resource bundles for various applications and various locales. For example, each resource bundle may be located by a universal resource locator (URL) of the form:

**"protocol://address/ vendor/ product/version/locale.resource"**

For example, origin server 102 may store the following resource bundles:

**http :// languages.rim.net / rim/ BlackBerryApps / 3.6.0 / en\_CA.rb**

**http :// languages.rim.net / rim/ BlackBerryApps / 3.6.0 / fr\_CA.rb**

**http :// languages.rim.net / rim/ BlackBerryApps / 3.6.0 / en\_US.rb**

**http :// languages.rim.net / rim/ BlackBerryApps / 3.6.0 / es\_US.rb**

**http :// languages.rim.net / rim/ BlackBerryBrowser / 3.6.0 / en\_CA.rb**

**http :// languages.rim.net / rim/ BlackBerryBrowser / 3.6.0 / fr\_CA.rb**

**http :// languages.rim.net / rim/ BlackBerryBrowser / 3.6.0 / en\_US.rb**

where, in this example, the protocol is "http" (although any other suitable protocol may be used), the address is "languages.rim.net", which is an example of the address of origin server 102, the vendor is "rim", the version is "3.6.0", and the locales are, in this example, as specified by Java convention. Resource bundles from different vendors may be stored on the same server.

The resource bundles may take any suitable form. For example, the resource bundles may be in the form of an uncompressed text file, or in the form of a compressed binary object, where any suitable compression algorithm or algorithms have been applied. Clearly compressed resource bundles will require less download time for a given bandwidth than uncompressed resource bundles.

Each application for which locale-specific resource bundles are stored may contain a configuration string that indicates where the resource bundles may be found. For example, resource bundles for third-party applications may be stored on a server operated by the third party, or, as described above, on a server along with applications from other parties.



In the event that a user of hand-held electronic device 100 wants to operate a particular application in a locale-specific manner for a particular locale, and the appropriate resource bundle is not currently installed on the device, the user may instruct hand-held electronic device 100 to download the desired resource bundle over wireless network 106. In some embodiments, the user may select a particular locale, and hand-held electronic device 100 will automatically download resource bundles for that locale for each application installed on device 100, if available. In some embodiments, the user may view all available resource bundles by having device 100 access the URL “protocol://address/”, or all available resource bundles for a particular application by having device 100 access the URL “protocol://address/vendor/product”, or all available resource bundles for a particular version of a particular application, by having device 100 access the URL “protocol://address/vendor/product/version”.

Similarly, fonts to properly display the language (e.g. currency symbols) or other locale-specific resources used in a resource bundle may be downloaded by device 100 over wireless network 106 from a server.

It is anticipated that the ability to selectively and dynamically download resource bundles for applications over a wireless network will serve many purposes. For example, a user habitually resident in Canada may travel to Switzerland for a short business trip, taking her hand-held electronic device along with her. Resource bundles for the locales en\_CA and/or fr\_CA may already be stored on the device, with one of the resource bundles serving as the default. While in Switzerland, she may wish to enable a German speaker to use the hand-held electronic device. She may download the resource bundles for the locale de\_CH, corresponding to the German language in Switzerland, for one or more applications installed on the device. The resource bundles will be downloaded over a wireless network, so that the user is not required to download the resource bundles to a computer and then sync the hand-held electronic device to the computer. Once her business trip is completed, the user may delete the resource bundles for the locale de\_CH from her device in order to free up storage and memory of the device.

Resource bundles may be grouped into families according to their application. If a resource bundle family for a particular application is installed on hand-held electronic device 100, then the application may switch languages without requiring new resource bundles. This may be implemented, for example, by having the application make reference to its resource bundle family, and access the appropriate reference bundle from within the



family on-the-fly by a reference to the current locale selected by the user, For example, user-interface components of an application may accept as a localized String pairs comprising an identifier of the resource bundle family and an identifier of the string to be accessed. The string will be resolved within the user-interface component in a locale-specific manner according to the current locale. Applications need not listen for a change-locale event. Rather, as described above, the application makes reference to the current locale. Consequently, when the locale changes, the application will start displaying information in a manner appropriate to the new locale, without having the application restart.

Hand-held electronic device 100 may store resource bundles or a resource bundle family comprising locale-specific translations of common user-interface resources, for example, translations of common strings such as “Open”, “Close”, “OK”, “Cancel”, etc. When the current locale of hand-held device 100 is not supported by an application installed on the device, any occurrences of common user-interface resources in the application may be replaced automatically by the translations in the appropriate resource bundle. Consequently, at least a portion of the user-interface resources of the application will appear in the appropriate language for the current locale.

Java encodes a locale as an object with 3 strings. This consumes at least 132 bytes of storage and may result in slow comparisons. In contrast, in some embodiments of the present invention, the language and country of a locale are encoded together as a 4-byte integer. The variant may be encoded as a 4-byte integer as well, so that a single locale requires no more storage than 8 bytes. Consequently, comparisons may be performed by an *int* or *long* comparison instruction of a processor of hand-held electronic device 100. Moreover, mapping each byte onto an ASCII value may enhance debugging.

Hand-held electronic device 100 may also comprise an autotext engine, which is a software application that extends the user interface and makes use of one or more databases to perform text insertions and other related activities. In addition to a standard autotext database comprising entries of “original string” and associated “replacement strings” pairs, an additional database comprising locale-specific entries could be stored on hand-held electronic device 100. A user of hand-held electronic device 100 may subscribe to a number of databases whose changes could be pushed to the device over wireless network 106.

For example, a health professional may subscribe to a database whose entries include, for example, some or all of the following pairs: (“cpe”, “complete physical examination”); (“bp”, “blood pressure”); (“cv”, “cardiovascular”); (“fh”, “family history”); (“infln”, “inflammation”); etc. In another example, a legal professional may subscribe to a database whose entries include, for example, some or all of the following pairs: (“cpas”, “contract of purchase and sale”); (“def”, “defendant”) (“pla”, “plaintiff”); (“sol”, “solicitor”); (“priv”, “privileged”); etc. Similarly, a company whose employees use hand-held electronic devices such as hand-held electronic device 100 may provide a database to employees whose entries include shortcuts of terminology related to the company’s business. Changes to the company-specific database could be pushed to the devices over wireless network 106. For example, a database for Research In Motion employees may include some or all of the following pairs: (“bb”, “BlackBerry”); (“cdma”, “CDMA”); (“rim”, “RIM”); (“rimo”, “Research In Motion”); etc.

Since a locale indicates not only a country and a language, but also a variant, a locale may be used to indicate the profession or industry or company to which the user belongs, thus identifying which databases are of interest, although the present invention is not limited in this respect.

The autotext engine, or alternatively a separate software application, may be able to implement an AutoArticle functionality. The user of hand-held electronic device 100 may enter a special character sequence (defined on a per-language basis) that triggers a dictionary and/or grammar lookup to determine whether a word of interest is masculine, feminine, plural, etc. This feature may be useful, for example, in a language such as French, Italian, or Danish.

In an auto-correct mode, articles may be inserted or corrected automatically as they are entered by the user. The user may use a special character sequence (defined on a per-language basis) to indicate that the article should be automatically inserted. For example, “Il lune” would become “la lune” while “Il soleil” would become “le soleil”, “Il bureaux” would become “les bureaux”, and “uu bureau” would become “un bureau”. Alternatively, instead of having the user enter a special character sequence, in auto-correct mode an incorrect article would be automatically corrected. For example, “le lune” would be automatically corrected to “la lune”. If the autotext engine were unable to determine the article of a word, a dialog may appear to enable the user to choose the article to use.



The autotext engine, or alternatively a separate software application, may be able to implement an AutoQuote functionality. For example, a user of hand-held electronic device 100 may enter a quote character. If the quote character is preceded by an empty or whitespace, then the quote character would be replaced with an open-quote character. Otherwise, the quote character would be replaced with a close-quote character. The open-quote character and close-quote character may be locale-specific. For example, when the current locale of hand-held electronic device 100 includes the French language, the open and close-quote characters may be guillemets (« and », respectively). In another example, when the current locale hand-held electronic device 100 includes the German language, the open- and close-quote characters may be guillemets, or else the open-quote character may be a lower quote („) and the close-quote character may be an upper quote (”).

In order to facilitate the localization of applications developed for electronic devices, such as hand-held electronic device 100, certain features may be incorporated into a development environment. For example, to determine whether a translation is current, a file or database record comprising translations of strings from an original language may also include additional information related to the strings in the original language. This may be used, for example, to track multiple versions of resource strings when working on a project where multiple versions are source control branched.

FIG. 2 is a simplified flowchart of a method to generate and store this additional information. One or more strings in an original language may be translated into a different language (200). A hash value may be generated for each string in the original language by using a hash code method (202). The hash value may be stored along with the translated string (204). As is known, the hash value for a particular input is statistically unique.

It may occur that during development of an application, a string in an original language is changed after having been translated. FIG. 3 is a simplified flowchart of a method to determine whether a translation is out of date. A hash value of the current string in the original language may be generated using the same hash code method of Fig. 2 (300). This newly generated hash value may be compared to the hash value stored with the translated string (302). If the hash values match, then in all likelihood, the string in the original language has not changed since the translation was done, and the translated string is current (304). If the hash values do not match, then the translated string is out of date (306). A viewer or editor application in the development environment may then visually indicate which information is current and which is not.

Another feature that may be incorporated into the development environment is to provide a resource bundle diagnostic tool. For example, a resource bundle may be defined using at least two separate files: a resource header file, that lists keys for each localized resource in the resource bundle, and a resource content file, that lists the keys and their localized resource values. A resource bundle diagnostic tool may perform any or all of the following operations:

**I. Validation operations**

a) checking for missing resources, by identifying keys listed in the resource header file that have no corresponding entry in the corresponding resource content file;

b) checking for empty resources, by identifying keys listed in the resource header whose corresponding entry in the corresponding resource content file has no localized resource value defined;

c) checking for undeclared resources, by identifying resources listed in the resource content file but whose key has not been listed in the resource header file;

d) checking for out-of-date resources as described above;

e) verifying that the original resource value and the localized resource value have the same format, for example, "name:" has been translated to "nom:", and the space after the colon has been included in the translated string;

f) checking that the display width of the resources (which may depend upon the widths of characters in a particular font) do not exceed the predefined display width of the screen of the hand-held electronic device;

g) validating hotkeys (used to quickly access different applications on the hand-held electronic device) to ensure that in a particular locale, the same hotkey is not assigned to more than one function, and to ensure that the hotkey is an allowed length;

**II. Statistical operations** - generating statistics for the number of new resources present, which may, for example, be used by the developer to gauge how much work still needs to be done; and

**III. Searching for unused resources** - identifying resources listed in the resource header file and resource content file, but not called by the application.

Software development is often tracked using a source code control system. As developers write software code, various branches are made for different releases to customers, so that developers can write new, untested code at the same time that a branch is being tested and stabilized for release. Since different branches of software code may



have many resources in common, it is generally not feasible for the resources of each branch to be translated separately.

Another feature that may be incorporated into the development environment is to have a resource “database” tool. For example, the tool may generate from resource files of a particular branch of code of a software application a resource “database”. The “database”, which may be a flat file or any other format for storing the information, may contain an identifier of a resource, for example, CLOSE#0, its value in various locales, for example, “Close” in the locale “en”, “Ferme” in the locale “fr”, the hash value of the resource value in its original language, as described hereinabove, and the name of the resource file(s) for these resources. In other embodiments, other information may be included in the “database”, and/or not all of the above-listed information may be included in the “database”.

The tool may enable a software developer or integrator to copy the resource “database” to another branch of code of the software application. If this other branch of the software application does not yet comprise localized resource files, the tool may then enable the creation of localized resource files comprising the resources whose information is stored in the copied resource “database”. The validation tools described hereinabove may then be used to determine whether translations of resources appearing in this branch are up to date or missing. Only those localized resources which are missing or out of date will then be marked for translation, rather than requiring all the resources for this branch to be translated.

Alternatively, this branch of the software application may already comprise resource files, and the tool may use the copied resource “database” to update translated resources when the hash value in the copied resource “database” does not match the hash value in this branch’s resource files, and to complete missing resource values in this branch’s resource files. Only those localized resources which are still missing or still out of date will then be marked for translation, rather than requiring all the resources for this branch to be translated.

The format of resources in a resource bundle may enable strings to display one of a predefined set of string options by matching the options with attributes in a text. This type of format may have several uses, only one of which will be described here for clarity. Moreover, although only one type of format is shown in the following examples, alternate formats that enable strings to display one of a predefined set of string options by matching

the options with attributes in text may be used instead and are within the scope of the present invention.

For example, the format may be used to match gender. The phrase “Repeats every {0}”, where {0} is replaced with either “week” or “month” will be translated in French to “Répète toutes les semaines” or “Répète tous les mois”. Depending on the gender of the insertion, the second word of the French phrase is different. For example, the translated phrase may use the following format:

“Répète {0,choiceattrib,m#tous|f#toutes} les {0}”

thus associating “tous” with the attribute “m” and “toutes” with the attribute “f” and the insertions may be “semaines\0f” and “mois\0m”, thus giving “semaines” the attribute “f” and giving “mois” the attribute “m”. Then the user interface of the hand-held electronic device may be extended to test the insertions for the attribute and to select the string associated with the attribute of the insertion.

While certain features of the invention have been illustrated and described herein, many modifications, substitutions, changes, and equivalents will now occur to those of ordinary skill in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.



**We Claim:**

1. A method of operation in a hand-held electronic device comprising the following steps:

establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device;

requesting from the enterprise server or gateway localized resources for use with an application on the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway;

receiving via the wireless connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources;

identifying a character sequence entered by a user of the hand-held electronic device that matches a predetermined sequence associated with the current locale of the hand-held device;

choosing an article for use with a word that is entered by the user after the character sequence is entered, wherein the article is grammatically correct for the language associated with the current locale; and

automatically replacing the character sequence with the article.

2. The method according to claim 1 wherein the hand-held electronic device requests localized resources in response to receiving an indication that the locale has changed.

3. The method according to claim 2 wherein the indication is received via a user's input.

4. The method according to claim 1 wherein the hand-held electronic device requests localized resources in response to a user's input.
5. The method according to claim 1 wherein the resource bundle includes one or more types of character fonts.
6. The method according to claim 1 further comprising the following step:  
receiving via the wireless connection a list of the contents of the resource bundle.
7. The method according to claim 1 wherein the receiving step comprises receiving a resource bundle that comprises localized resources for a plurality of applications installed on the hand-held electronic device.
8. The method according to claim 7 wherein at least two of the plurality of applications are from different vendors.
9. The method of claim 8 wherein the localized resources for the at least two of the plurality of applications from different vendors are stored on a common server on the wireless network.
10. The method of claim 1 wherein the resource bundle includes localized resources for more than one locale.
11. A method of operation in a wireless network that provides services for hand-held electronic devices comprising the following steps:  
providing a communication channel for use by a hand-held electronic device in establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device;



receiving a request for localized resources from the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway; and

transmitting to the hand-held electronic device via the wireless connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources,

wherein with use of the resource bundle, the hand-held electronic device can identify a character sequence entered by a user of the hand-held electronic device that matches a predetermined sequence associated with the current locale of the hand-held device, choose an article for use with a word that is entered by the user after the character sequence is entered, wherein the article is grammatically correct for the language associated with the current locale, and automatically replace the character sequence with the article.

12. A method of operating a wireless network comprising the steps of:

providing a communication channel for use by a hand-held electronic device in establishing a wireless connection between the hand-held wireless device and an enterprise server or gateway in a wireless network, wherein the wireless network comprises the enterprise server or gateway and wherein the enterprise server or gateway is connected via a communication path to a remotely located origin server that stores resource bundles containing localized resources that can be used with one or more applications on the hand-held electronic device;

receiving a request for localized resources from the hand-held electronic device, wherein the localized resources are related to a current locale of the hand-held wireless device and wherein the enterprise server or gateway requests the localized resources from the remotely located origin server and the origin server transmits a resource bundle containing localized resources to the enterprise server or gateway; and

transmitting to the hand-held electronic device via the wireless connection a resource bundle from the enterprise server or gateway that comprises at least some of the requested localized resources,

wherein with use of the resource bundle, the hand-held electronic device can determine that the usage of an article associated with a word is grammatically incorrect in the current locale of the hand-held device after a user of the hand-held electronic device enters a sequence of characters that includes the article and the word and wherein the hand-held electronic device automatically replaces the incorrectly used article with a grammatically correct article for the current locale.

13. The method according to any of claims 11 or 12 wherein the localized resources include information for more than one locale.

14. The method according to any of claims 11 or 12 wherein the localized resources include one or more types of character fonts.

15. The method according to any of claims 11 or 12 wherein a plurality of the applications are installed on the hand-held electronic device and wherein at least two of the plurality of applications are from different vendors.



Application number / numéro de demande: 242/656

Figures: 1a, 1b,

Pages: 1/2

Unscannable items  
received with this application  
(Request original documents in File Prep. Section on the 10<sup>th</sup> floor)

Documents reçu avec cette demande ne pouvant être balayés  
(Commander les documents originaux dans la section de préparation des dossiers au  
10<sup>ème</sup> étage)

2/2

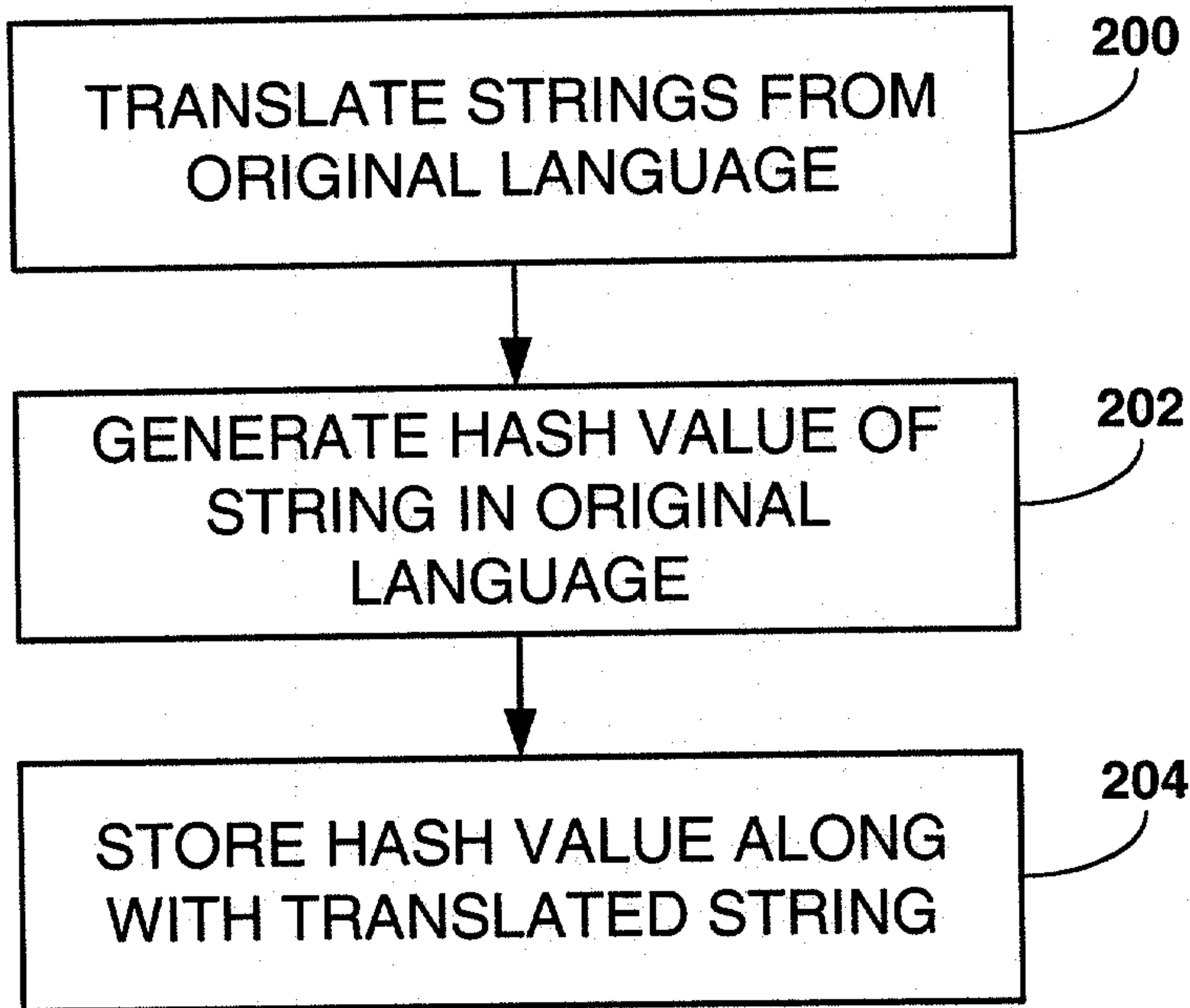


FIG. 2

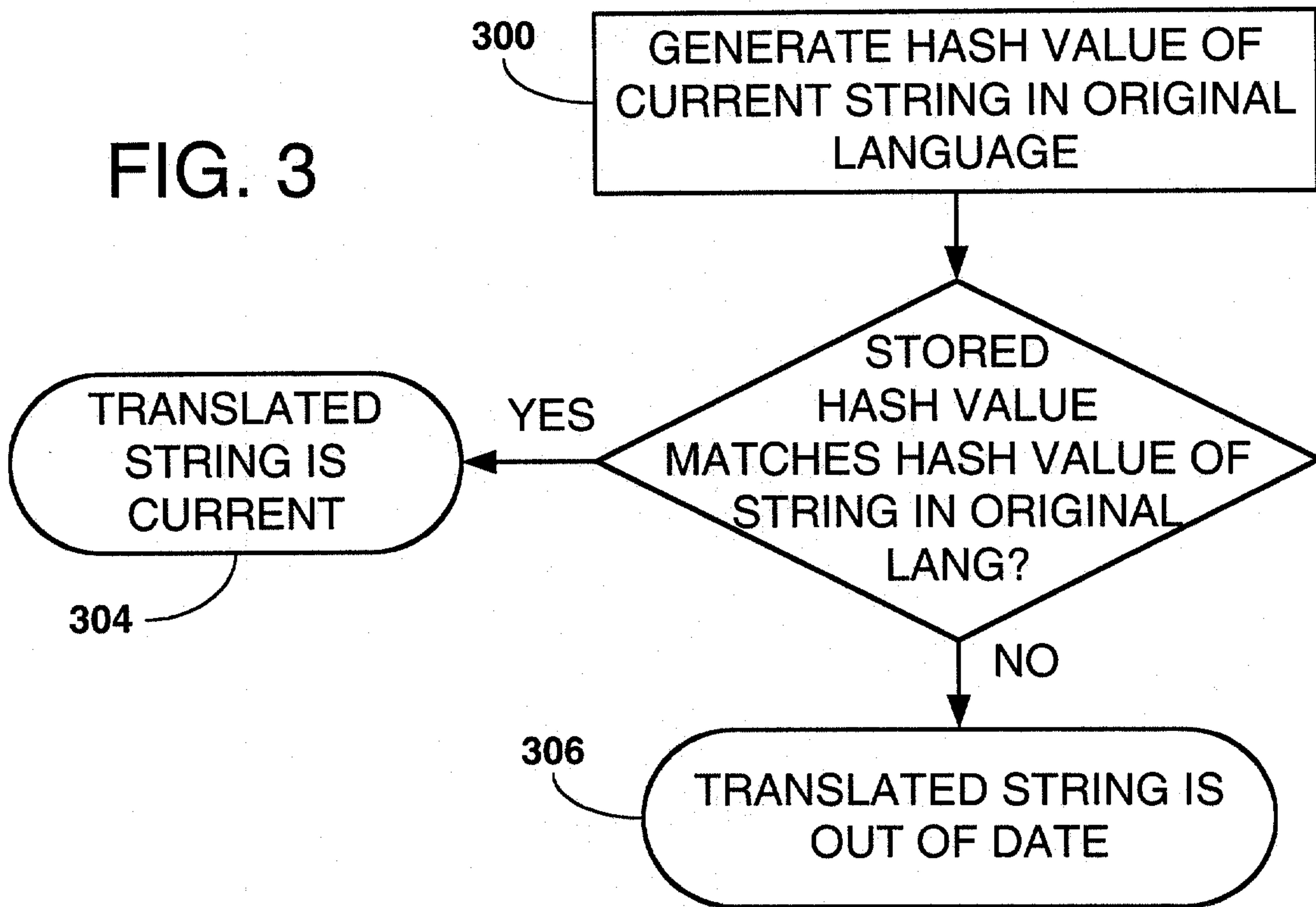


FIG. 3



200

TRANSLATE STRINGS FROM  
ORIGINAL LANGUAGE

```
graph TD; 200[TRANSLATE STRINGS FROM ORIGINAL LANGUAGE] --> 202[GENERATE HASH VALUE OF STRING IN ORIGINAL LANGUAGE]; 202 --> 204[STORE HASH VALUE ALONG WITH TRANSLATED STRING];
```

202

GENERATE HASH VALUE OF  
STRING IN ORIGINAL  
LANGUAGE

204

STORE HASH VALUE ALONG  
WITH TRANSLATED STRING