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**Dual Currency Handling in Locales with respect to the EURO
Expert Contribution**

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Dual Currency Handling in Locales with respect to the EURO

This document contains a set of recommendations for dealing with the dual currency requirements of the national currency and the EURO currency within the POSIX/XPG4 locale model.

1. Background

Problem

There is a dual currency requirement to support both the local currency and the EURO, in several European countries, for a period of time from the introduction of the EURO and before EURO notes and coins are generally available. That's currently pegged as a three-year period starting January 1, 1999.

As applied to locales, this would mean that for that three-year period, dual currencies (the local

national currency and the EURO) would have to be supported. The XPG4 and POSIX model, as currently defined, does not allow the usage of dual currencies within the same locale. It only allows a single currency per locale.

Guiding Principles

1. Be able to execute the following example:

Bank statements etc., at least during the transition period (three years, from 1999 to 2002), will show monetary amounts in both the local currency and the EURO. An example statement may be:

"Your balance as of today is 1 234,56 F or 4 938,24 €"

where the balance is stated in both French francs and the EURO.

2. Minimize impact on development by minimizing changes to APIs and utilities in current use.

2. Locale Management

Locale names are of the form "language_territory.codeset" as per POSIX/XPG4.

Recommendation 1

Locales, created to take advantage of the euro-sign in the codeset*, shall continue to set the LC_MONETARY category to carry information for formatting according to the current existing local/national currency. This is as per current practice.

The @**modifiers** shall be used to accommodate the invocation of an LC_MONETARY that reflects formatting according to the new EURO currency, provided that the codeset contains the "euro-sign". The name-style "language_territory.codeset@euro" is recommended for this modifier.

* Locales, whether created to take advantage of the new codeset identifiers being defined for the EURO (as in the case of the new FDIS 8859-15) or where the old codeset identifier is kept and the content is changed (for example, in the case of OS/2 where a new codeset identifier is not planned to be supported) or expanded (for example, in the case of the Windows codeset identifiers and the expanded UCS which contains the "euro-sign").

Modifier Details

Recall that the environment variables LANG, LC_ALL, LC_COLLATE, LC_CTYPE, LC_MESSAGES, LC_MONETARY, LC_NUMERIC, and LC_TIME (LC_*) provide for the support of internationalised applications. **If these variables specify locale categories that are not based upon the same underlying codeset, the results are unspecified.**

The values of the locale categories are determined by a precedence order. The value of a locale category is determined by the first condition met below:

1. If the LC_ALL environment variable is defined and is not null, the value of LC_ALL is used.
2. If the LC_* environment variable (LC_COLLATE, LC_CTYPE, LC_MESSAGES, LC_MONETARY, LC_NUMERIC, LC_TIME) is defined and is not null, the value of the environment variable is used to initialise the category that corresponds to the environment variable.
3. If the LANG environment variable is defined and is not null the value of the LANG environment variable is used.
4. If the LANG environment variable is not set or is set to the empty string, the implementation-dependent default locale is used.

From XPG4:

"..... LC_COLLATE, LC_CTYPE, LC_MESSAGES, LC_MONETARY, LC_NUMERIC, and LC_TIME are defined to accept an additional field ``@modifier", which allows the user to select a specific instance of localisation data within a single category (e.g., for selecting the dictionary as opposed to the character ordering of data). The syntax for these environment variables is thus defined as:

```
language_territory.codeset@modifier
```

For example, if a user wanted to interact with the system in French, but required to sort German text files, LANG and LC_COLLATE could be defined as:

```
LANG=Fr_FR  
LC_COLLATE=De_DE
```

This could be extended to select dictionary collation (say) by use of the ``@modifier" field; e.g.,

```
LC_COLLATE=De_DE@dict
```

At run-time, these values are bound to a program's locale by calling the `setlocale()` function."

Applying this to Recommendation 1 above:

- the locale source will contain monetary formatting as per the old local/national currency in the `LC_MONETARY` category e.g. in the locale source `Fr_FR.IBM-1147`
- the modifier source, containing the `LC_MONETARY` category, will specify monetary formatting as per the new EURO currency e.g. in the source `Fr_FR.IBM-1147@euro`

How does one handle multiple modifiers?

An example may be a user who wants to use the new Danish locale bound to the codeset IBM-1142, wants to collate data as per the dictionary collation (`@dict` modifier), and would like to format for the EURO currency (`@euro` modifier). This could be defined as:

```
LANG=Da_DK.IBM-1142
LC_COLLATE=Da_DK.IBM-1142@dict
LC_MONETARY=Da_DK.IBM-1142@euro
```

Note that the `@modifier` cannot be assigned to `LC_ALL` or `LANG`. It is intended to modify a category (or categories) individually.

Guiding Principle 1 Met:

The following illustrates how the above can be used to satisfy Guiding Principle 1 where the example statement to be printed was:

"Your balance as of today is 1 234,56 F or 4 938,24 €"

- (a) Load the French locale (`Fr_FR.IBM-1147`). The `LC_MONETARY` category contains information for formatting as per the French franc.
- (b) Call `strfmon()` to format the amount into the string "1 234,56 F".
- (c) Set `LC_MONETARY=Fr_FR.IBM-1147@euro` and load
- (d) Call `strfmon()` again to format the $(\text{amount} * 4)$, assuming that 4 is the conversion rate stipulated for French francs to EURO, into the string "4 938,24 €".
- (e) Set `LC_MONETARY=Fr_FR.IBM-1147` and load. Back to the French locale.
- (f) Print using the values obtained.

Guiding Principle 2 Met:

Impact on development has been minimized because there are no changes to any APIs (such as `strfmon()`) or utilities (such as `localedef`). Programmers do not have to learn any new tricks; they continue to use the POSIX/XPG4 locale model as before with the same invocation of `setlocale()` etc.

Recommendation 2

- Do not hardcode any conversions between the national local currency and the EURO in the locale. These are best treated outside of the locale.

3. Charmap Source

Recommendation 3

- For consistency between charmaps, the symbolic <euro-sign> shall be used for the EURO SIGN. This is consistent with ISO/IEC 10646.

1. Make new charmaps

New charmaps are to be built as per new codesets for accommodating the EURO. Existing charmaps can be used as a starting point. For consistency between charmaps, the symbolic name <euro-sign> is to be used.

2. Update existing charmaps

Affected charmap sources will have to be updated with the EURO. For consistency between the charmaps, the symbolic name <euro-sign>, is to be used. It will replace another symbolic but keep the original codepoint value associated with the replaced symbolic. This change should be noted in the "Change History" section in the charmap header.

4. Locale Source

1. LC_TIME, LC_NUMERIC, and LC_MESSAGE

These locale categories are not impacted by the <euro-sign>.

2. LC_CTYPE

The <euro-sign> is a printable and graphical character but it does not belong to the

alphabetic, digit, space, blank or control classes.

Recommendation 4

- The <euro-sign> shall appear under the following keywords:
 - graph
 - print

- The <euro-sign> shall NOT appear under the following keywords:
 - upper
 - lower
 - toupper
 - tolower
 - alpha
 - digit
 - space
 - cntrl
 - xdigit
 - blank

3. LC_COLLATE

The AIX 4.1 collation for ISO 8859-1 sorts the sterling, the international currency sign, the dollar-sign etc. as special characters. The order is:

```
....  
....  
commercial-at  
currency  
cent  
dollar-sign  
sterling  
yen  
asterisk  
....  
....
```

Where would one collate the <euro-sign>? It belongs logically within the grouping of the other currencies i.e. with the dollar_sign, the sterling and the yen. This grouping seems to be on an alphabetic ordering; therefore, following the same rule, the <euro-sign> would be after the dollar_sign and be ahead of the sterling. For FDIS 8859-15 the order would then be:

....
....
commercial-at
cent
dollar-sign
euro-sign
sterling
yen
asterisk
....
....

4. LC_MONETARY

Given that a language/country specific locale already exists, the LC_MONETARY category specifies rules for dealing with the national local currency within this locale. With the need to support the EURO, these specifications can:

- differ only in the values assigned to the "int_curr_symbol" and the "currency_symbol" keywords i.e. they will now carry the "EUR " and the <euro-sign> respectively. No other fields are changed and the country specific monetary formatting rules are assigned to the formatting of the EURO monetary values.
- differ in all fields, essentially creating totally separate and distinct formatting rules for the EURO as opposed to the country specific monetary formatting rules.

Recommendation 5

- Treat the EURO as a new currency, distinct from any national local currency. This means thinking that all fields can carry new rule information, even though most may inherit from the existing rules. The values assigned to the "int_curr_symbol" and the "currency_symbol" keywords shall be "EUR " and <euro-sign> respectively.

Note: Currently we are trying to get information from the countries and our EURO contacts as to how each country will format the EURO currency. For a number of countries, it appears that their current currency formatting will fit the EURO currency formatting. For other countries, the answer is not so clear. For example, Italy does not currently display or use currency sub-units. How will it handle the EURO which does have sub-units? What is the policy on the placement of the EURO symbol - prefixing the monetary value or suffixing the monetary value? It is for these reasons that the above recommendation (Recommendation 5) is made.

In the short term this means that an @modifier is created for every country (it will be

distinguishable and understood by its label). In the long term, if the EURO is mandated to be formatted in only a limited number of ways, then the number of @modifiers to be carried can be matched to these. Once information is obtained, the following table will have to be updated.

To encourage the countries to respond to the request to provide euro format information, we are providing the following table:

Monetary formats for the EURO

The respective table entries will be changed as countries approve their formats.

Country (ISO 3166)	National Currency (ISO 4217)	National Currency Positive Format Negative Format ----- +ve Format with ISO 4217 code -ve Format with ISO 4217 code	EURO Currency Positive Format Negative Format ----- +ve Format with ISO 4217 code -ve Format with ISO 4217 code	Comments/Approval
Austria (AT)	Austrian Schilling (ATS)	S 1.234.567,89 -S 1.234.567,89 ----- ATS 1.234.567,89 -ATS 1.234.567,89	€ 1.234.567,89 € - 1.234.567,89 ----- EUR 1.234.567,89 EUR - 1.234.567,89	-
Belgium (BE)	Belgian Franc (BEF)	For pricing: 1.234.567,89 BF -1.234.567,89 BF For paper/bank statements: BF 1.234.567,89 + BF 1.234.567,89 - ----- 1.234.567,89 BEF -1.234.567,89 BEF	For pricing: 1.234.567,89 € -1.234.567,89 € For paper/bank statements: € 1,234.567,89 + € 1,234.567,89 - ----- 1.234.567,89 EUR -1.234.567,89 EUR	-

Finland (FI)	Finnish Markka (FIM)	1 234 567,89 mk -1 234 567,89 mk ----- 1 234 567,89 FIM -1 234 567,89 FIM	1 234 567,89 € -1 234 567,89 € ----- 1 234 567,89 EUR -1 234 567,89 EUR	-
France (FR)	French Franc (FRF)	1 234 567,89 F -1 234 567,89 F ----- 1 234 567,89 FRF -1 234 567,89 FRF	1 234 567,89 € -1 234 567,89 € ----- 1 234 567,89 EUR -1 234 567,89 EUR	-
Germany (DE)	Deutsche Mark (DEM)	1.234.567,89 DM -1.234.567,89 DM ----- 1.234.567,89 DEM -1.234.567,89 DEM	1.234.567,89 € -1.234.567,89 € ----- 1.234.567,89 EUR -1.234.567,89 EUR	-
Ireland (IE)	Irish Punt (IEP)	£1,234,567.89 -£1,234,567.89 ----- IEP1,234,567.89 -IEP1,234,567.89	€ 1,234,567.89 -€ 1,234,567.89 ----- EUR1,234,567.89 -EUR1,234,567.89	-
Italy (IT)	Italian Lira (ITL)	L 1.234.567 L -1.234.567 ----- ITL 1.234.567 ITL -1.234.567	€ 1.234.567,89 € -1.234.567,89 ----- ITL 1.234.567,89 ITL -1.234.567,89	No subunits used in National currency formats. Subunits will be used for EURO
Luxembourg (LU)	Luxembourg Franc (LUF)	For pricing: 1.234.567,89 LU -1.234.567,89 LU For paper/bank statements: LU 1.234.567,89 + LU 1.234.567,89 - ----- 1.234.567,89 LUF -1.234.567,89 LUF	For pricing: 1.234.567,89 € -1.234.567,89 € For paper/bank statements: € 1,234.567,89 + € 1,234.567,89 - ----- 1.234.567,89 EUR -1.234.567,89 EUR	-

Netherlands (NL)	Dutch Guilder (NLG)	F 1.234.567,89 F 1.234.567,89- ----- NLG 1.234.567,89 NLG 1.234.567,89-	€ 1.234.567,89 € 1.234.567,89- ----- EUR 1.234.567,89 EUR 1.234.567,89-	-
Portugal (PT)	Portuguese Escudo (PTE)	1.234.567\$89 Esc. -1.234.567\$89 Esc. ----- 1.234.567\$89 PTE -1.234.567\$89 PTE	1.234.567\$89 € -1.234.567\$89 € ----- 1.234.567\$89 EUR -1.234.567\$89 EUR	-
Spain (ES)	Spanish Peseta (ESP)	Pts 1.234.567 -Pts 1.234.567 OR 1.234.567 Pts -1.234.567 Pts ----- ESP 1.234.567 -ESP 1.234.567	€ 1.234.567,89 -€ 1.234.567,89 OR 1.234.567,89 € -1.234.567,89 € ----- ESP 1.234.567,89 -ESP 1.234.567,89	No subunits used in National currency formats. Subunits will be used for EURO