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Subject: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [chivstyle](#) on Sun, 09 Aug 2020 08:40:17 GMT

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Hi,

?

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Tue, 11 Aug 2020 15:22:11 GMT

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chivstyle wrote on Sun, 09 August 2020 10:40Hi,

?

I am sorry, but we currently support just 16-bit unicode at the moment. Extended support was considered, but as there was not enough userbase pressure up until now, it was postponed.

But I guess it is time to fix this.

One problem is that going 32-bit codepoints is just the part of the problem, real solution should deal with all composing issues. But I guess it is a good start...

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Fri, 14 Aug 2020 23:02:03 GMT

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I would love to see in U++ too.

One problem is that going 32-bit codepoints is just the part of the problem, real solution should deal with all composing issues. But I guess it is a good start...

As a first step, I can send in the updated tables for `Upp::UnicodeCombine()` (full set of canonical compositions, including codepoints > 16 bit). Currently this function is missing a lot of compositions anyway...

They can replace the existing tables (and maybe we can cast down the dword table results (ignore cp > 65535) to word for the time being? Laer we can switch to dword)

But beware, it is a long list of tables, that would deserve another file (unicode.i maybe?)

comb300  
comb301  
comb302  
comb303  
comb304  
comb306  
comb307  
comb308  
comb309  
comb30a  
comb30b  
comb30c  
comb30f  
comb311  
comb313  
comb314  
comb31b  
comb323  
comb324  
comb325  
comb326  
comb327  
comb328  
comb32d  
comb32e  
comb330  
comb331  
comb338  
comb342  
comb345  
comb5b4  
comb5b7  
comb5b8  
comb5b9  
comb5bc  
comb5bf  
comb5c1  
comb5c2  
comb653  
comb654  
comb655  
comb93c  
comb9bc  
comb9be

comb9d7  
comba3c  
combb3c  
combb3e  
combb56  
combb57  
combbbbe  
combbd7  
combc56  
combcc2  
combcd5  
combcd6  
combd3e  
combd57  
combdca  
combdcf  
combddf  
combf72  
combf74  
combf80  
combfb5  
combfb7  
comb102e  
comb1b35  
comb3099  
comb309a  
comb110ba  
comb11127  
comb1133e  
comb11357  
comb114b0  
comb114ba  
comb114bd  
comb115af  
comb11930  
comb1d165  
comb1d16e  
comb1d16f  
comb1d170  
comb1d171  
comb1d172

What do you think?

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Fri, 14 Aug 2020 23:02:22 GMT

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comb342  
comb345  
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comb5b7  
comb5b8  
comb5b9  
comb5bc  
comb5bf  
comb5c1  
comb5c2  
comb653  
comb654  
comb655  
comb93c  
comb9bc  
comb9be  
comb9d7  
comba3c  
combb3c  
combb3e  
combb56  
combb57  
combbbe  
combbd7  
combc56  
combcc2  
combcd5  
combcd6  
combd3e  
combd57  
combdca  
combdcf  
combddf  
comb72  
comb74  
comb780  
combf5  
combf7  
comb102e  
comb1b35  
comb3099  
comb309a  
comb110ba  
comb11127  
comb1133e  
comb11357  
comb114b0  
comb114ba

comb114bd  
comb115af  
comb11930  
comb1d165  
comb1d16e  
comb1d16f  
comb1d170  
comb1d171  
comb1d172

What do you think?

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?  
Posted by [mirek](#) on Fri, 14 Aug 2020 23:39:21 GMT  
[View Forum Message](#) <> [Reply to Message](#)

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Oblivion wrote on Sat, 15 August 2020 01:02I would love to see in U++ too.

One problem is that going 32-bit codepoints is just the part of the problem, real solution should deal with all composing issues. But I guess it is a good start...

As a first step, I can send in the updated tables for Upp::UnicodeCombine() (full set of canonical compositions, including codepoints > 16 bit). Currently this function is missing a lot of compositions anyway...

They can replace the existing tables (and maybe we can cast down the dword table results to word for the time being? Later we can switch to dword)

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comb32e  
comb330  
comb331  
comb338  
comb342  
comb345  
comb5b4  
comb5b7  
comb5b8  
comb5b9  
comb5bc  
comb5bf  
comb5c1  
comb5c2  
comb653  
comb654  
comb655  
comb93c  
comb9bc  
comb9be  
comb9d7  
comba3c  
combb3c  
combb3e  
combb56  
combb57  
combbbbe  
combbd7  
combc56  
combcc2  
combcd5  
combcd6  
combd3e

combd57  
combdca  
combdcf  
combddf  
combf72  
combf74  
combf80  
combfb5  
combfb7  
comb102e  
comb1b35  
comb3099  
comb309a  
comb110ba  
comb11127  
comb1133e  
comb11357  
comb114b0  
comb114ba  
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comb1d165  
comb1d16e  
comb1d16f  
comb1d170  
comb1d171  
comb1d172

What do you think?

Best regards,  
Oblivion

Combine is fine, but..

After a lot of thinking, I believe that one step forward is to have

```
int GraphemeLength(const char *s);  
int GraphemeLength(const wchar *s);
```

functions...

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Sat, 15 Aug 2020 09:12:03 GMT

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Quote: `int GraphemeLength(const char *s);`  
`int GraphemeLength(const wchar *s);`

That requires width tables.

How about generating the width tables with uniset scripts (used by xterm et al.)?

They can generate width tables for doublewidth, ambiguous width, unknown width and combining chars from the unicode database (latest version).

They are quite comprehensive.

I already started using them here (For double width and combining chars, ATM):

<https://github.com/ismail-yilmaz/upp-components/blob/master/CtrlLib/Terminal/Cell.cpp>

We can put these into a generic `GetCharWidth(int c)` function, then utilize them in `GetGraphemeLength(const wchar *s)`?

This might not be the definitive solution, but it is the battle-tested one out in the wild.

Only real downside is that the tables might need updating albeit infrequently.

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Sat, 15 Aug 2020 09:33:01 GMT

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Oblivion wrote on Sat, 15 August 2020 11:12: `int GraphemeLength(const char *s);`  
`int GraphemeLength(const wchar *s);`

That requires width tables.

How about generating the width tables with uniset scripts (used by xterm et al.)?

They can generate width tables for doublewidth, ambiguous width, unknown width and combining chars from the `UnicodeData.txt` (latest version).

They are quite comprehensive.

I already started using them here (For double width and combining chars, ATM):  
<https://github.com/ismail-yilmaz/upp-components/blob/master/ CtrlLib/Terminal/Cell.cpp>

We can put these into a generic GetCharWidth(int c) function, then utilize them in  
GetGraphemeLength(const wchar \*s)?

This might not be the definitive solution, but it is the battle-tested one out in the wild.

Only real downside is that the tables might need updating albeit ifrequently.

Best regards,  
Oblivion

Just to make sure we are at the same page: I am not speaking about graphics width here, but a number of bytes (or words) that form a single grapheme ("combined character").

EDIT: Still not clear enough: Number of bytes of the first grapheme at s.

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?  
Posted by [Oblivion](#) on Sat, 15 Aug 2020 10:15:10 GMT  
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Ah yes, I was thinking about the graphical width (in units),sorry.

But don't we still need to detect base char + combining char(s), which will eventually require tables to be a fast operation? (also for decomposition?).

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?  
Posted by [mirek](#) on Sat, 15 Aug 2020 10:44:46 GMT  
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Oblivion wrote on Sat, 15 August 2020 12:15Ah yes, I was thinking about the graphical width (in units),sorry.

But don't we still need to detect base char + combining char(s), which will eventually require tables to be a fast operation? (also for decomposition?).

Very likely yes, to implement GetGraphemeLength. But I am not at the moment sure whether combining characters are the only source of multi-codepoint graphemes.

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Sat, 15 Aug 2020 11:15:23 GMT

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Quote: But I am not at the moment sure whether combining characters are the only source of multi-codepoint graphemes.

Yeah, there are at least surrogate pairs (Since U++ use 16-bit wchar), ligatures and IIRC some hangul graphemes. Anything else that I miss?

Surrogate pairs are rather well formed, but ligatures and multi-codepoint CJK/Devanagari stuff may pose problems...

Edit: Ah yes, what I miss is explained under the grapheme clusters section:

[http://www.unicode.org/reports/tr29/#Grapheme\\_Cluster\\_Boundaries](http://www.unicode.org/reports/tr29/#Grapheme_Cluster_Boundaries)

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Sat, 15 Aug 2020 12:07:08 GMT

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Oblivion wrote on Sat, 15 August 2020 13:15Quote: But I am not at the moment sure whether combining characters are the only source of multi-codepoint graphemes.

Yeah, there are at least surrogate pairs (Since U++ use 16-bit wchar), ligatures and IIRC some hangul graphemes. Anything else that I miss?

Correct me when I am wrong:

I do not think surrogate pairs are the thing - those are just a way to encode codepoints.

Also ligatures are probably not a concern too, these can be considered characters of its own.

But hangul graphemes is what worries me... Not that I have searched too much, but so far I have failed to find simple algo how to combine hangul characters...

Anyway, to explain my way of thinking: So far, in GUI, we have wchar == grapheme equivalency. That e.g. means that inside e.g. EditString, when user enters a character, it is simply inserted at cursor position in the text.

For full unicode, we will need to change 16bit wchars to graphemes. That means that "length" of text will now be number of graphemes, position of text the position of grapheme etc...

Of course, in later phase, we will need to deal with graphics too, but I think that might be relatively easy to changing all text edit routines. (To deal with graphics, Font::operator[](int chr) should probably change to something like Font::operator[](const char \*grapheme)...)

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Sat, 15 Aug 2020 13:11:14 GMT

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You are correct.

Quote:But hangul graphemes is what worries me... Not that I have searched too much, but so far I have failed to find simple algo how to combine hangul characters...

I'm no expert on Eastern-Asian languages either, but I've been studying unicode database for some time and related existing codes that deal with UC The one source code that can give an idea is in perl):

Maybe this could help (as a starter)?: <https://metacpan.org/pod/Lingua::KO::Hangul::Util>

Ps. The code does not support Hangul letters (jamo) assigned after Unicode 5.2, but it can serve as a starting point. (See also the references below the page).

Also: Hangul syllable types database for composition/decomposition:

<http://www.unicode.org/Public/UNIDATA/HangulSyllableType.txt>

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [chivstyle](#) on Mon, 17 Aug 2020 05:22:15 GMT

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You are right. The renderer dose not support UNICODE, it treats WCHAR as a character, it not always right. Some other routines such as GetWidth [Font] and subroutines in Font.cpp should be changed to support UNICODE.

Now, I have got a TTF font file that support almost all UNICODE codepoints. I rendered some CJK characters by FreeType, got it.

So, I think it's not a complicated job to support UNICODE.

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Mon, 17 Aug 2020 08:17:27 GMT

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chivstyle wrote on Mon, 17 August 2020 07:22

So, I think it's not a complicated job to support UNICODE.

Actually, this is not true :)

It is relatively easy to support 32-bit codepoints. But that is only a tiny part of the problem.

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Mon, 17 Aug 2020 09:01:35 GMT

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Oblivion wrote on Sat, 15 August 2020 13:15Quote: But I am not at the moment sure whether combining characters are the only source of multi-codepoint graphemes.

Yeah, there are at least surrogate pairs (Since U++ use 16-bit wchar), ligatures and IIRC some hangul graphemes. Anything else that I miss?

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Edit: Ah yes, what I miss is explained under the grapheme clusters section:

[http://www.unicode.org/reports/tr29/#Grapheme\\_Cluster\\_Boundaries](http://www.unicode.org/reports/tr29/#Grapheme_Cluster_Boundaries)

I guess this might be the path forward:

<https://en.wikipedia.org/wiki/HarfBuzz>

It looks like most toolkits simply use HarfBuzz anyway... :)

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Mon, 17 Aug 2020 09:50:50 GMT

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Quote:It looks like most toolkits simply use HarfBuzz anyway...

Well, this seems to be the best option but I was even afraid of suggesting it, as it means another dependency (and possibly a lot of work) :)

By the way, If you think it's ok, In the meantime we can have better precomposition support. I've attached CharSet.cpp with the patched UnicodeCombine for full precompositions support (for 16-bit UCS canonicals only).

(I can also send the extractor code for upbbox if needed)

Best regards,  
Oblivion

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#### File Attachments

1) [CharSet.cpp](#), downloaded 217 times

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Mon, 17 Aug 2020 12:04:20 GMT

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Oblivion wrote on Mon, 17 August 2020 11:50Quote:It looks like most toolkits simply use HarfBuzz anyway...

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(I can also send the extractor code for upbbox if needed)

Best regards,  
Oblivion

I am sorry to say that because it is mostly due to lack of docs, but I think all this is already better covered with

```
int UnicodeDecompose(dword codepoint, dword t[MAX_DECOMPOSED], bool only_canonical);  
Vector<dword> UnicodeDecompose(dword codepoint, bool only_canonical);
```

- the reason why this was not quite documented is that above functions are sort of abandoned effort in previous attempt at better Unicode support. Anyway, they are using quite effective z-compressed table (as not to increase .exe size too much). This (and other) tables are produced directly from Unicode tables by uppbox/unicode. And they should also support more than 1 combining marks...

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Mon, 17 Aug 2020 13:17:28 GMT

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80

I see. Until we have a better unicode support I think I can use this "undocumented" feature.  
Thanks!

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Tue, 18 Aug 2020 14:55:35 GMT

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I have optimised some UnicodeInfo routines and obsoleted UnicodeCombine, while changing its implementation it use UnicodeCompose.

Also I have checked the hangul issue and it rather seems like it is not an issue at all. First of all, algorithm is really trivial, second, maybe it is not even needed as korean texts probably typically contain composed characters anyway, so perhaps it is even better to treat jamo as individual graphemes.

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [deep](#) on Thu, 20 Aug 2020 05:10:00 GMT

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Hi,

As part of this can we have Indian char sets also working.  
There is some similarity between Korean and Indian scripts.

I am willing to work on this with some guidance.

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Sat, 22 Aug 2020 16:01:03 GMT

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I am now investigating the whole thing in Win32. Let us say we would want just to support 32-bit codepoints as the first step.

Now current model needs following info: a) that the font has glyph for required, b) at least advance width for the glyph.

If we do not want to use Uniscribe, just good old GDI, so far I have only found solution to b), but unfortunately it returns just dimensions of that "box" character that is used in case glyph is missing instead of indicating anyhow that it is actually missing....

```
void Test(int ch, Font fnt)
{
    TIMING("Glyph");
    HFONT hfont = GetWin32Font(fnt, 0);
    VERIFY(hfont);
    if(hfont) {
        HDC hdc = CreateIC("DISPLAY", NULL, NULL, NULL);
        HFONT ohfont = (HFONT) ::SelectObject(hdc, hfont);
        GLYPHMETRICS gm;
        memset(&gm, 0, sizeof(gm));
        MAT2 m_matrix;
        memset8(&m_matrix, 0, sizeof(m_matrix));
        m_matrix.eM11.value = 1;
        m_matrix.eM22.value = 1;
        int gsz = GetGlyphOutlineW(hdc, ch, GGO_NATIVE|GGO_UNHINTED|GGO_METRICS, &gm,
0, NULL, &m_matrix);
        if(gsz == GDI_ERROR)
            DLOG("Failed " << ch);
        if(gm.gmCellIncX != 75)
            DLOG(ch << " " << gm.gmCellIncX << ", " << gm.gmCellIncY << ", " << gm.gmptGlyphOrigin.x);
        ::SelectObject(hdc, ohfont);
        ::DeleteDC(hdc);
    }
}
```

GUI\_APP\_MAIN

```
{
```



```
for(int i = 32; i < 100000; i++)  
    Test(i, Font().Height(100).FaceName("MingLiU-ExtB"));  
}
```

---

Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Sat, 22 Aug 2020 17:29:23 GMT

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Quote:If we do not want to use Uniscribe, just good old GDI,

Why not? Does U++ also takes care of devices that rely exclusively on GDI?

I would even suggest moving to DirectWrite (IIRC, Novo did suggest moving to Directx some time ago...)

The only GDI function that comes to my mind (to determine if the glyph is missing) is  
GetGlyphIndices().

It takes a string and let you mark the non-existing ones.

<https://docs.microsoft.com/tr-tr/windows/win32/api/wingdi/nf-wingdi-getglyphindicesw>

Best regards,  
Oblivion

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Sun, 23 Aug 2020 08:06:49 GMT

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Oblivion wrote on Sat, 22 August 2020 19:29Quote:If we do not want to use Uniscribe, just good old GDI,

Why not? Does U++ also takes care of devices that rely exclusively on GDI?

I guess it is about a) minimising changes in the code b) implementing in other platforms.

I believe we should do this in several phases:

Phase 1: Moving to code to utf8 (that is String instead of WString) and 32-bit codepoints support.

Phase 2: Basic combining characters support

Phase 3: Advanced text layout

for phase 3, we can either decide to use platform specific library (Uniscribe/pango), which would mean encapsulating it to something platform independent, or just use Harfbuzz on all platforms, which I guess will require dealing with glyph metrics and presence.

Mirek

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [Oblivion](#) on Sun, 23 Aug 2020 08:52:24 GMT

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Quote:

for phase 3, we can either decide to use platform specific library (Uniscribe/pango), which would mean encapsulating it to something platform independent, or just use Harfbuzz

To my knowledge, the latest version of pango can be compiled on Windows too (but satisfying its dependencies might not worth the effort). Also, the latest version of it seems to support harfbuzz as a backend.

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Sun, 23 Aug 2020 11:15:56 GMT

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Oblivion wrote on Sun, 23 August 2020 10:52Quote:

for phase 3, we can either decide to use platform specific library (Uniscribe/pango), which would mean encapsulating it to something platform independent, or just use Harfbuzz

To my knowledge, the latest version of pango can be compiled on Windows too (but satisfying its dependencies might not worth the effort). Also, the latest version of it seems to support harfbuzz as a backend.

Well, pango is definitely using harfbuzz, it is AFAIK even developed by the same person...

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Subject: Re: Will UPP support full UNICODE (21bits long codepoint)?

Posted by [mirek](#) on Mon, 24 Aug 2020 09:31:21 GMT

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<https://stackoverflow.com/questions/54050095/how-to-tell-if-a-surrogate-pair-unicode-character-is-supported-by-the-font>

Looks like GetCharacterPlacement should do what we need...

Will test soon.

Mirek

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