A few tips for (beginning) font developers

Khmer Unicode fonts consist of the actual outlines of the letters as well as instructions for the rendering system how to assemble a string of characters into the visual image.

These are the steps for creating fonts:

1. Creating the basic font file (.ttf) with all the basic outlines.
2. Adding instructions for the OpenType rendering system with Microsoft VOLT.
3. Adding instructions for OS X functionality with OS X Font Tools, Release 4 beta 1.
4. Final improvements.

The basic font with all the basic outlines

To create a basic font file with all the outlines a font editor like FontLab (commercial) or FontForge (open source) is needed.

The instructions for the OpenType rendering system

The OpenType (OT) instructions for this font were created with the VOLT tool from Microsoft[1]. Once the basic font is opened in VOLT, the instructions can can be loaded with 'Import - Project' and compiled. Make sure glyph shapes and names match, using the Edit Glyphs window. If they don't match the glyphs in the font are not ordered in the same way as they were in the font with which the project was created (or glyphs were added or deleted). In that case the postscript names in the font need to be 'imported for all glyphs, then edited in regard to their type and number of components in the Glyph Editor. Then the Glyph Data can be exported and merged with the original project file in a text editor. Then the project can be imported (Using 'Import anchor by glyph name') for the new font. Before giving the font to other users the VOLT-readable tables should be removed with 'File - Ship Font'.

The Mondulkiri fonts require a version of VOLT 1.1.225 or earlier. Some newer versions refuse compilation because on the non-standard use of anchors in the font.

It may be necessary to add the OT tables before the AAT tables for the font to work properly.

The instructions for the AAT rendering system

Apple provides some tools for working with fonts. The version 7 Mondulkiri and Busra fonts have been produced using Release 4 beta 1 of the Apple Font Tools (http://www.microsoft.com/typography/tools/tools.aspx) on OS X 10.9.4.

To add the AAT instructions to the font, open Terminal, change to the directory with the font and the instruction files (enter 'cd ', drag a file from the desired directory into the window, delete the name of the file and press enter). The following commands add the composite glyphs needed for the AAT tables and then add the AAT tables. The case of the letters of the options is significant:

ftxglyphadder -A Khmer4add.xml fontfilename
ftxenhancer --mif Khmermif.txt fontfilename

---

[1] http://www.microsoft.com/typography/volt.mspx

Ftxglyphadder causes a number of wrong entries in the font tables, ftxenhancer repairs some of these entries, but sometimes the ‘hhea’ or the ‘head’ table retain a few wrong entires. They can be checked with the Microsoft Font Validator (see below). If there are any problems, run

ftxdumperfuser --table hhea -A d fontfilename

in Terminal to export (or ‘dump’) the hhea data, edit the .xml file created by ftxdumperfuser and use

ftxdumperfuser --table hhea -A f fontfilename

to write (or ‘fuse’) those changes back into the font file. Similar lines might be needed for the ‘head’ tables.

Finishing off

To finish the font off the following steps in Windows are recommended:

1. Recreate some of the tables in the font using the Micorsoft commandline tools cachett.exe and fastfont.exe (http://www.microsoft.com/typography/tools/tools.aspx). The case of the letters of the options and table names is significant, the programs need to be in the same folder as the font or the full path needs to be used (or they need to be in the path).
   cachett -TLTSH fontfilename x.ttf
   cachett -Thdmx x.ttf fontfilename
   fastfont fontfilename
   Sometimes cachett breaks the creation of hdmx tables off with a ‘width overflow’ message (e.g. ‘Warning: hdmx table records with ppem >= 11 not generated due to width overflow for glyph index xxx.’). These overflows appear to be the result of a bug in the calculation of the glyph width. The glyphs causing these messages are usually glyphs with zero advance width that either are completely (typically diacritics) or partially in the negative area of the x-axis or have one or more points with the x-value of 0-3. Moving such a glyph, or even just one or two nodes by a single point may solve the problem. Glyphs that cross the x-axis may no longer cause the problem if the beginning node is one particular node with a positive x-value. In Fontlab 4, glyphs causing this problem usually show up in the TrueType Preview with an unusually wide spacing around the particular ppm size – probably caused by the same calculation error.
2. As last step the font should be checked for errors with Microsoft’s free Font Validator (http://www.microsoft.com/typography/fontvalidator.mspx). The ftxenhancer may not update the values for xMin xMax yMin and yMax for the extreme points in all the glyphs when using the -A option. This error can be worked around by adding tiny outlines with these extreme points to an unused glyph in the font, so that those values are generated by the font editor.

In order for Stylistic Sets in fonts to work in Microsoft Word, these fonts need to be digitally signed. However, as of Word 2010 in June 2012 Microsoft Word does not appear to support Stylistic Sets for the Khmer script.

Note: Font Validator will consider the values of the VDMX table to be incorrect. However, the VDMX table should not be regenerated with cachett. The cause for this error is that some glyphs of Khmer letters that are rarely used, exceed the Ascender and Descender set in the font editor. If the VDMX table is regenerated, programs will later display the font much smaller than desired.