

OFF fvar: Representative Instance Proposal

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1 Background

A central aspect of support for variable fonts in OpenType is the default location, which has a normalized value of 0 on every axis. Variable glyph outline data and other values (e.g. for spacing and kerning) are specified as deltas relative to the value at the default location.

Many TTF variable fonts, with glyf outlines and deltas stored in the gvar table, can still be used on systems that have not yet been upgraded to support variable font functionality. Indeed, the split between glyf and gvar was specified to allow this. When designing a glyph for this sort of use, one would typically position the most “general” font instance as the default. For example, in a font with one wght axis, the “Regular” weight would be a good choice of default.

However, not all fonts are designed this way. The CFF2 table is not backward compatible, except in the sense that it is possible to include both a CFF and a CFF2 table in the same font, with the former serving as a fallback if the latter is not supported. And although one can choose to put the most general instance of a glyf-based font at the default location, one may not want to. For example, if the starting point in the design is two axes with four masters at four “extreme” locations, it might be preferable to choose one of those masters as the default, because doing so would substantially decrease the font file size compared with adding an extra pre-generated master there.

It is already possible to build a self-consistent variable font in this way. However, *not* putting the “most regular” instance at the default location poses an additional problem, as the OpenType *format* default location is also, at present, also the *interface* default location. That is, it is the location:

1. Rendered by default when no other location is specified.
2. Presented as the initial instance in a UI or font picker.

This hard link between the interface default and the format default is not inherent to variable font technology; it is just how things work now because there is currently no means of adjusting one without adjusting the other. Because providing that option would allow some fonts to be significantly smaller with no other drawback, we are proposing a format extension to do so.

2 Proposed Specification Changes

All references are relative to ISO/IEC 14496-22 Fourth edition 2019-01, and all changes are to “InstanceRecord” subpart of 7.3.3 “fvar — Font variations table”

1. The “Description” field of the “flags” row in the InstanceRecord table changes to “Instance qualifiers — see details below”.
2. The paragraphs starting with “The subfamilyNameID” and “The postScriptNameID” should be end with “should only be used if the REPRESENTATIVE_INSTANCE flag is set or if the instance corresponds to the font’s default instance.”
3. In the paragraph starting with “The default instance of a font is that instance”, the sentence “When enumerating named instances, the default instance should be enumerated even if there is no corresponding instance record.” should be changed to “When enumerating named instances, unless an instance has the REPRESENTATIVE_INSTANCE flag set, the default instance should be enumerated even if there is no corresponding instance record.”
4. The following text is added to the end of the subpart (before 7.3.3.2):

Flags can be assigned to indicate certain uses or behaviors for a given instance. The following flags are defined.

Mask	Name	Description
0x0001	REPRESENTATIVE_INSTANCE	The axis values of this instance should be used as the initial value for any axis not otherwise provided.
0xFFFE	Reserved	Reserved for future use — set to 0.

The REPRESENTATIVE_INSTANCE flag indicates that the respective axis values of this instance should be used in place of the axis defaultValue when its location is not otherwise specified. For example, if no axis values are specified then this instance should be chosen, and if all but one axis values are specified the remaining value should be taken from this instance. In effect, the instance with this flag overrides the axis defaults from a user-interface perspective (without otherwise affecting the role of axis defaults within the format). The flag must not be used more than once in the same font.

A REPRESENTATIVE_INSTANCE is only needed in a font where the defaultValue of one or more axes is not regular or paradigmatic, or (less commonly) in a font where what is regular may differ from what is paradigmatic. For example, the original sources for a font with one wght axis might consist of just two masters at the lightest and heaviest weight. One way to construct the variable font would be to interpolate a master at the Regular weight and place it at the defaultValue, but this will substantially increase the font’s file size. Another way is to put one extreme at the wght axis defaultValue and add an InstanceRecord for Regular with the REPRESENTATIVE_INSTANCE flag set.

Absent other relevant considerations, it is recommended that the `REPRESENTATIVE_INSTANCE`, when present, be used to display the font in font pickers and analogous user interfaces, at least initially.

5. In section 7.3.3.2, the sentence “If a value is not specified for any particular axis, the default value for that axis defined in the font is used.” changes to “If a value is not specified for any particular axis, and an instance has the `REPRESENTATIVE_INSTANCE` flag set, the value for that axis is taken from that instance. Otherwise the default value for that axis from the `VariationAxisRecord` is used.”

3 Suggested Cross-references

The specification discusses the default instance in a number of locations. We suggest that a note to the effect of “(However, note the fvar `InstanceRecord` `REPRESENTATIVE_INSTANCE` flag in section 7.3.3.1)” be added to:

1. The second to last paragraph of section 7.1.1 (“A variable font has a default instance ...”)
2. The eighth paragraph of 7.1.3 (“The font designer can determine which design is considered the default ...”)