

# White Paper: Guidelines for Creating High Quality Keyboards for Keyman Desktop

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## Overview

A high quality Keyman Desktop keyboard is more than just a keyboard layout. In order for a keyboard to be most useful, many things need to be considered. These range from the keyboard design itself, including character order, normalization forms, and validation, through to how the keyboard is distributed, and the documentation for the keyboard.

This document is a companion to the Keyman Keyboard Review System, which is accessible online at <https://secure.tavultesoft.com/account/home/keyboards/reviews/>

## The Rating Process

After you upload your keyboard to the Tavultesoft website, a keyboard reviewer will evaluate every aspect of your keyboard against the Keyboard Review Template (viewable at <https://secure.tavultesoft.com/account/home/keyboards/reviews/viewtemplate.php>) and will give a score to each item in the template. They will also add comments at any point where they think that the keyboard may need improvement, and refer back to this document. Finally, they will write an editorial review of the keyboard which will be made available to website visitors after approval from Tavultesoft, and write any final comments to you, the keyboard developer.

After the reviewer has completed writing the review, you will be notified so that you can address any shortcomings in your keyboard that they may have identified. When you have done this, and the review has been updated accordingly, Tavultesoft will then publish the review and the final star rating for your keyboard.

We want you to get a ★★★★★ rating for your keyboard! Tavultesoft Support ([support@tavultesoft.com](mailto:support@tavultesoft.com)) will always be available to assist you in improving your keyboard and we can also do development or polish for you on request.

## Keyboard Design

### Positional Style Keyboards

A positional style keyboard will typically follow a standardised layout such as a typewriter layout or a legacy system layout. Positional keyboards will usually utilise modifiers and deadkeys. However, even a positional keyboard will often use Keyman features such as reordering.

Items to consider when designing a positional style keyboard include:

- Normalization form. The Unicode Standard defines two normalization forms that are useful for a keyboard to support – NFC and NFD. Your keyboard should target one of these forms. Read the Unicode Standard for more details.
- Character input order: does the keyboard need to support input in a visual order as opposed to a logical storage order. For instance, Indic languages are stored in logical order (phonemic) – for a given syllable, the medial vowel is stored in the data after the initial consonant. However, some Indic vowels are written before the letter. The Unicode Standard describes the rendering and storage requirements for each script.

**Example:** Devanagari Vowel Sign I ि (U+093F) is stored after the initial consonant in the syllable. हिन्दी (Hindi) is stored as H I N halant D II but written I H N halant D II

- Character splitting: many keyboards have shortcuts for input of more than one character at a time. These may need to be split into separate characters in the storage.

**Example:** A Lao standard keyboard has a vowel and tone combination as shown in the two diacritic marks here: ັ. This combination can be typed with Shift+U. When stored, it will need to be split into ັ ັ.

- Character grouping: conversely, some legacy keyboards will let you type the components of a single phoneme separately – and these will need to be combined as they are typed.

**Example:** In Tamil, the vowel sign o is be written as ொ (U+0BCA). On a legacy layout, it would be typed as ொ (U+0BC6), then a consonant, and then finally ோ (U+0BBE). These two vowel letters will need to be reordered and combined into a single letter.

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## Documentation

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[Keyboard Tutorial](#) – step-by-step instructions on creating a keyboard layout

[Keyman Keyboard Language Guide](#) – information on advanced features such as constraints, reordering and normalization

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## Phonetic Style Keyboards

A phonetic style keyboard is the most sophisticated type of layout generally used in Keyman Desktop. These keyboards will use Latin characters and punctuation to represent the target language, and as the user types, the Latin characters will be transformed into the final script. This technique has been widely used for Chinese language input, using systems such as Pinyin, and is now very commonly used for Indic languages as well. However, any non-Latin script language can benefit from having a phonetic style layout, especially if the user must type in more than one script.

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## Documentation

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[Keyboard Tutorial](#) – step-by-step instructions on creating a keyboard layout

[Keyman Keyboard Language Guide](#) – information on advanced features such as constraints, reordering and normalization

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## Validation

Many languages have sequences that just don't make sense. Most keyboards should prevent these sequences from being input. Diacritic marks and joining or invisible characters are the most important letters to check. You may wish to include support for typing diacritics standalone, even if the keyboard prevents them from being overlaid.

**Example:** Thai has a number of vowels that are written above or below the consonant: <sup>๑๑๑๑๑๑</sup>๑. It should not be possible to input more than one of these vowels together with a consonant because it will never be correct.

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### Documentation

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[Constraints](#) – How to do validation in your keyboard

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## Caps Lock

Think about how your keyboard will use the caps lock key. If Caps Lock is not required or does not make sense, you can disable it in the keyboard with a special rule. You may also need special casing rules for keys that do not normally get modified by Caps Lock, for instance, if you have additional letters on what would be punctuation keys on a US keyboard.

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### Documentation

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[Caps Lock statements](#)

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## Optimizations

A well designed keyboard will take into account the most frequently used combinations and commonly used letters in the target language for the keyboard.

**Example:** Dinka has a common vowel combination of *ëëu*. While this could be typed as **e ; e ; u** it could also be typed as **e e u ;**. This is much faster and the user is less likely to end up with a missing dieresis.

## Backspace

It is sensible to manage how Backspace works. Handling backspace often takes some thought – it often does not make sense to simply delete the last character in the text store. This particularly applies when reordering or normalization of text has already been performed.

**Example:** Dinka has a common vowel combination of *ëëu*. It is typed with **e e u ;**. Pressing backspace should delete the dieresis rather than the u.

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### Documentation

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[Keyman Keyboard Language Guide](#)

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## Layout Standards

Many languages have a standardised keyboard layout. If your keyboard uses this layout, make sure you include this standard in the standards field when uploading the keyboard to the Tavultesoft website. You must include a "(modified)" suffix if you have diverged from the standard in any way. If you have diverged from the standard, it is important to document how your keyboard differs from the standard.

## Languages Header

If a keyboard is designed for a single language, and this language is supported by Windows (any version), include a **store(&language)** statement in the header of the keyboard. This will tell Keyman to automatically install the Windows language and associate the keyboard with the language for optimum usability when the keyboard is installed. A current list of language identifiers is available from [http://msdn2.microsoft.com/en-us/library/ms776294\(VS.85\).aspx](http://msdn2.microsoft.com/en-us/library/ms776294(VS.85).aspx)

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### Documentation

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Language system store

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## Keyboard Download Experience

For most users, the first contact they will have with your keyboard is when they try to download it from the Internet. The keyboard download experience is very important – we want to make life as easy as possible for the keyboard user and remove unnecessary stumbling blocks to accessing the keyboard.

As part of the Keyboard Review System, Tavultesoft requires the keyboards to be downloadable from the tavultesoft.com website in order to qualify for a star rating. This ensures that the keyboard can be easily downloaded, both from within Keyman Desktop itself and as a separate download. It also reduces the dependence on 3rd party websites that may or may not be available at the time that the user wishes to download the keyboard.

Some other advantages of hosting the keyboard on tavultesoft.com include statistics on downloads and usage, automatic updates of keyboards (under development), and linking downloads through to the Tavultesoft Affiliate Program.

All keyboards hosted on tavultesoft.com are available both as a standalone download, and as a self-extracting installation with Keyman Desktop, with a digital signature verifying the authenticity of the download.

You may host keyboards on other websites and distribute via other means, but you must upload your keyboard to tavultesoft.com to receive a star rating. Many keyboards will also benefit from having a website for the keyboard. It is suggested that the tavultesoft.com page for the keyboard is made the primary download site. In the future, Tavultesoft may offer web space on the tavultesoft.com website for keyboard homepages.

## Keyboard Metadata

The tavultesoft.com keyboard hosting site includes a number of metadata fields that contain important information about the keyboard. These are listed below.

## Keyboard Languages

It is important to list the languages and scripts that a keyboard supports. Without this, it will be impossible to find your keyboard in the listings on [tavultesoft.com](http://tavultesoft.com). Many keyboards are designed for more than one language - if this is the case for your keyboard, list all the languages that you know your keyboard is designed for or works for.

You may choose to not list certain languages for a keyboard if you have an alternative keyboard that is specifically designed for those languages, and upload that at the same time.

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### Documentation

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[\*Ethnologue\*](#)[Code](#) system store

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## Keyboard Script

Some languages use more than one script. This also helps for transliteration or phonetic transcription keyboards.

The keyboard upload system allows you to specify a script for each language that you have selected. This is helpful for languages which use more than one script, or if you have a phonetic transcription keyboard. You can include keyboards for multiple scripts in the same package.

In many cases, the script will be the same as the name of the language – for instance, Thai. This metadata is important where the script is not the same as the name of the language.

A keyboard intended for phonetic transcription of a language will be less generally useful than a keyboard intended for writing in the language's script, so in this instance, marking the script of the keyboard as Phonetic rather than the actual script of the language helps to guide the end user in the right direction.

## Unicode Character Set

The character set designation for the keyboard will be either **Unicode**, or **Code Page**. Tavultesoft recommends designing all keyboards for Unicode, even if Unicode does not currently support the script of the language you are working with. The Private Use Area in Unicode is a space where you can encode the letters of your language temporarily, without having to reuse characters that may have overloaded meanings, such as the 128-255 8 bit character set range typically used historically.

Remember that Unicode support is more than just supporting the characters in the Unicode Standard. Don't forget about normalization, character order, and following recommendations on legacy characters in the Unicode Standard.

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### Documentation

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[\*begin\*](#) *statement*

[\*The Unicode Standard\*](#) *(external site)*

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## Licence Type

Tavultesoft now only support Freeware, Public Domain or Open Source licence of keyboards designed for Keyman Desktop. Tavultesoft must have permission to distribute your keyboards in order for them to be



hosted on the Tavultesoft website. You will be required to agree to a straightforward agreement in order to publish the keyboards on Tavultesoft.com.

Keyboards that are shareware or commercial should be published using the Branding Pack, which allows you to protect your keyboard intellectual property with copy protection and product licensing tools.

### Version Number

Your package should make use of the Version Number field. This field will be used to check for updated versions of your keyboard by Keyman Desktop, if the keyboard is hosted on the Tavultesoft website.

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**Documentation**

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[Package Tutorial](#)

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### Author

The author of the keyboard, whether you choose to use an individual or corporate name should be clearly specified, along with the copyright and any additional acknowledgements.

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**Documentation**

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[Package Tutorial](#)

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### Contact Details

If possible, the keyboard metadata should include an email address where you can be contacted to provide support for your keyboard. If you are not willing or able to support your keyboard, please talk to Tavultesoft Support ([support@tavultesoft.com](mailto:support@tavultesoft.com)) to discuss how Tavultesoft can provide support for your keyboard.

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**Documentation**

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[Package Tutorial](#)

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### Homepage

If you have created a web site for your keyboard, make sure you include a link to it.

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**Documentation**

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[Package Tutorial](#)

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### Keyboard Description

Make sure that the description of the keyboard is clear and concise. The keyboard description is a simple paragraph or two that a prospective user will first read when selecting a keyboard. Try not to include promotional material or marketing text. Ideally, this description should mention the key languages that the keyboard is designed for, the keyboard layout style, and the script and fonts that are included. Don't try and make this description the manual or usage notes.

The description should be in English. Basic HTML formatting is permitted but avoid complex formatting.

Additionally, you can include a description of the keyboard in the language of the keyboard. A translation of the English description (or vice-versa) is clearly helpful to end users who do not speak English. This translation must be stored in Unicode and should currently be entered into the same box as the English description.

## Keyboard Installation

The keyboard must be uploaded as a Keyman Package File (.kmp) rather than as a plain Keyman Keyboard File (.kmx). A .exe installer file or a .zip file is not a valid upload. There should be no need to upload a .zip file. The package file can contain any additional files that are associated with the keyboard.

A package file has many advantages: it can include documentation, fonts, on screen keyboard, and version information.

Furthermore, the [tavultesoft.com](http://tavultesoft.com) website will automatically generate a package installer file – bundling your keyboard with Keyman Desktop in a single downloadable file – for your package when it is uploaded.

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**Documentation**

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[Package Tutorial](#)

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## Multiple Keyboards in One Package

If there are multiple keyboards in the package, make sure that they clearly differentiated and related. You should not include multiple unrelated keyboards in a single package. It is sensible to include multiple keyboards covering multiple languages as long as there is some geographic or linguistic relationship between the languages. Remember that Keyman Desktop Light users will only be able to use 2 of the keyboards from your package - they will need to choose the keyboards they want during installation.

## Keyboard Name

The name of the keyboard should not be just the name of the language as there may be multiple keyboards available for a language. Conversely, "Universal Keyboard" is not an appropriate name for a keyboard for a single or even multiple languages. You may choose to include the name of the language in the keyboard name, but this is not a requirement.

## Included Files

### Fonts

Fonts should be included in the keyboard package so that the keyboard user does not need to locate these separately.

Keyman Desktop can install included fonts automatically and make them available, even if the user does not have Administrator permissions. If the fonts are not included, the end user will need to install the fonts manually as an Administrator.

Fonts should be TrueType or OpenType format. Free distribution of the fonts must be explicitly permitted by the copyright holder of the fonts. Font available under licences such as GPL or SIL Open Font Licence are ideal.

If fonts are not included because compatible fonts are included with Windows, the documentation must specify which fonts are compatible with the keyboard, and in which versions of Windows these fonts are available.

See also Getting Started documentation requirements.

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### **Documentation**

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#### **[Package Tutorial](#)**

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## **Uniscribe**

This is not a requirement as there is nothing a keyboard developer can do about it. Nonetheless, it is an important issue to address as many languages require an updated Uniscribe to render properly on older operating systems. If a specific version of Uniscribe is required, this should be documented, and preferably information on which version of Windows or components the updated Uniscribe can be sourced from. Information on Uniscribe script support is available at <http://scripts.sil.org/UniscribeVersions>.

## **On Screen Keyboard**

Most keyboards should include an on screen keyboard (.kvc file) – the exception would be some Latin script keyboards that use a mnemonic approach to input. The On Screen Keyboard can be automatically generated in Keyman Developer and should use a font that is either included in the package, or available with Windows.

## **Keyboard Icon**

A unique icon for the keyboard is required. It does not need to be complex – a simple letter is usually sufficient. If no icon is included, Keyman Desktop displays a “?” icon – which is unclear to the end user and provides no visual feedback on the selected keyboard.

## **Install Dialog Graphic**

A graphic for the install dialog shows a level of attention to detail and polish across the keyboard package. This is not a requirement but we do recommend it.

## **Localized User Interface**

The package may include a locale.xml for each language it covers. This file should be named locale-xxx.xml, where xxx is a ISO639-3 identifier.

Keyman Desktop includes the option to translate the user interface into another language. This feature means that when the user installs the keyboard, they also have the option to view the Keyman user interface in their language.

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### **Documentation**

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#### **[Editing locale.xml Files](#)**

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[Including locale.xml in packages](#)

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## Start Menu

The package may include Start Menu Items for documentation. The Start Menu is not as important for Keyman Desktop 7 as in earlier versions, due to the integrated 'Getting Started' links and Welcome screens. However, a Start Menu item for documentation will assist users in locating the documentation and is also a good place to include shortcuts to your website. A keyboard uninstall shortcut is no longer recommended, as per Windows Logo guidelines.

If you do include a Start Menu item, make sure that you add a link to the Welcome/Getting Started documentation as a first point of reference for your users.

## Documentation

### Readme Documentation

A HTML readme file that can be displayed in the Install dialog should be included with in the package. The readme file should contain some basic information about the keyboard, for example, the keyboarding style, copyright information, acknowledgements, etc. It should not include instructions on how to use the keyboard – this information belongs in the Welcome documentation. The readme may be the same as the Keyboard Description on the [tavultesoft.com](http://tavultesoft.com) website.

### Getting Started Documentation

The Getting Started documentation for your keyboard is the most important documentation for the keyboard. It is automatically displayed when the keyboard is installed, and is accessible through:

- The Keyman Desktop Welcome screen
- A menu item in the Options button for your keyboard in Keyman Configuration
- Right-clicking the Keyman icon and selecting "Active Keyboard Help"
- Clicking the "Active Keyboard Help" button in the toolbar in the On Screen Keyboard
- Optionally, through a Start Menu item.

The Getting Started documentation is written in HTML and stored a file called "welcome.htm". This documentation on how to get started using the keyboard does not need to be a 100% guide to all features in the keyboard, but the expectation is that a user familiar with the language will be able to use the keyboard to write basic documents after reading the Getting Started documentation.

You should avoid including documentation on how to use Keyman Desktop itself, apart from perhaps some very basic steps. If you believe that the Keyman Desktop documentation needs additional information, please tell the Tavultesoft Support team.

The names of the fonts that are included in the package, or the fonts in Windows that the keyboard works with should be included in the Welcome documentation.

If possible, include links in the Welcome document to additional documentation, websites and even email addresses. These can be opened in a new browser window by using the **\_blank** target for the link.

The welcome.htm file can be localized by appending a 3 letter ISO639-3 language code to the name as welcome-xxx.htm, and including this file in the package. Keyman will automatically select the correct Welcome document according to the current user interface language. This is most useful where a locale translation is also included in the package.

## General Documentation

The documentation should be written in HTML format, optimised for both screen and print. Any HTML document included should be easily printable. You can use CSS styles to define print styles if necessary. If you use Javascript in your documentation to improve the user experience, make sure that the non-Javascript version works adequately for display and printing.

It is important to author your documentation in such a way that it will display correctly in all the major Windows-based browsers. Keyman Desktop uses an embedded Internet Explorer window to display documentation, but the user may view documentation in their favourite browser if you include Start Menu entries. It is especially important to check text in languages other than English as many HTML generation tools do not use Unicode by default and may garble your text.

You may opt to also include a PDF version of the documentation, which should be linked to in the HTML document. However, PDF documentation does require Adobe Reader or a similar product, making it less accessible to the basic user. If PDF documentation is included, then a link from the Getting Started documentation (see Getting Started) is important.

## Documentation Languages

Documentation should be available in English. You may choose to include only an overview of the documentation in English or the complete documentation. However, Tavultesoft need to be able to read the documentation in order to support the keyboard.

Documentation in the end user's language is clearly helpful. Together with the locale.xml user interface translation, this makes it possible for a user to start working with your keyboard with virtually no understanding of English required.

## Documentation Completeness

The documentation should cover how to use the keyboard in detail. If the keyboard is complex to use, then the documentation must be clear on how to best use the keyboard. Conversely though, a simple keyboard also needs complete documentation – there is nothing more frustrating to a user than being unable to find a particular letter on the keyboard. Incomplete documentation on the keystrokes required for a keyboard is one of the most common complaints for a keyboard.

## Copyright and terms of use

Some basic copyright and terms of use for the keyboard are required. The terms can be that the keyboard is public domain.

Some frequently asked questions about your keyboard (or what you think may be frequently asked) will be helpful to many users.

## System Requirements

Some scripts require additional Windows settings or application settings for optimum use. These settings will be dependent on the script, but some examples are: Complex Script Support in Windows, Updated Uniscribe version, MS Office Language Settings, Associating keyboards with languages for Right to Left or complex script support. Make sure you document as clearly as possible any of the settings that a user may need to change in Windows or applications in order to successfully use your keyboard.

## Summary

Writing the keyboard is only the first step. Much of the additional work around the keyboard does not take very long but dramatically increases the usability of the keyboard. Each of the points covered in this document is used in the Keyboard Review system to give a rating to your keyboard – the more points you can cover, the higher the rating your keyboard will receive.

## Glossary

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Modifier key	A key that is pressed in combination with another key to modify the output of the second key. Common modifier keys include Shift, Control and Alt.
Deadkey	A keystroke that has no visible output but modifies the next key stroke. For instance, pressing ['], followed by [a], may result in á.
Phonetic Keyboard	A phonetic keyboard is typically used for a non-Latin script language. With these keyboards, it is assumed that user has a keyboard with Latin letters on their desk. When the Latin letters are pressed, equivalent letters in the target script are produced on the screen. Phonetic keyboards often contain complex code to allow multiple Latin letters to represent a single letter in the target script, and vice-versa.
Transcription keyboard	A transcription keyboard produces phonetic Latin script or International Phonetic Alphabet (IPA) letters instead of the normal script for the target language. It will typically be used by linguists and language learners.
Positional keyboard	A positional keyboard places the letters of the target script into specific locations on the keyboard, regardless of the user's hardware keyboard layout. For convenience and ease of design, positional Keyman keyboards are designed with reference to the US English keyboard, but work with any physical keyboard.
Mnemonic keyboard	A mnemonic keyboard is closely related to a phonetic keyboard. With these keyboards, instead of referencing a specific key position on the keyboard, the developer specifies a letter on the key cap to match. This means that a mnemonic keyboard can be used on any European Latin script hardware keyboard, and will organize itself to match the user's expectations.

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## Document History

Version	Published	Changes
1.0	24 January 2008	
1.0.1	12 February 2008	Added recommendations for LANGUAGE header