

New Features in mPDF v6.0

Advanced Typography

Many TrueType fonts contain OpenType Layout (OTL) tables. These Advanced Typographic tables contain additional information that extend the capabilities of the fonts to support high-quality international typography:

- OTL fonts support ligatures, positional forms, alternates, and other substitutions.
- OTL fonts include information to support features for two-dimensional positioning and glyph attachment.
- OTL fonts contain explicit script and language information, so a text-processing application can adjust its behavior accordingly.

mPDF 6 introduces the power and flexibility of the OpenType Layout font model into PDF. mPDF 6 supports GSUB, GPOS and GDEF tables for now. mPDF 6 does not support BASE and JSTF at present. Other mPDF 6 features to enhance complex scripts:

- improved Bidirectional (Bidi) algorithm for right-to-left (RTL) text
- support for Kashida for justification of arabic scripts
- partial support for CSS3 optional font features e.g. font-feature-settings, font-variant
- improved "autofont" capability to select fonts automatically for any script
- support for CSS :lang selector
- dictionary-based line-breaking for Lao, Thai and Khmer (U+200B is also supported)
- separate algorithm for Tibetan line-breaking

Note: There are other smart-font technologies around to deal with complex scripts, namely Graphite fonts (SIL International) and Apple Advanced Typography (AAT by Apple/Mac). mPDF 6 does not support these.

What can OTL Fonts do?

Support for OTL fonts allows the faithful display of almost all complex scripts:

- Arabic (السلام عليكم), Hebrew (שלום), Syriac (ܐܠܫܠܡܐܢܝܡܝܢ)
- Indic - Bengali (স্বাগতম), Devanagari (स्वागतम्), Gujarati (સ્વાગતમ્), Punjabi (ਸੁਆਗਤਮ), Kannada (ಸ್ವಾಗತಮ್), Malayalam (സ്വാഗതം), Oriya (ସ୍ବାଗତମ୍), Tamil (ஸ்வாஹிதம்), Telugu (స్వాహితమ్)

- Sinhala (සිංහල), Thai (ไทย), Lao (ລາວ), Khmer (ខ្មែរ), Myanmar (မြန်မာ), Tibetan (བོད་)

Joining and Reordering

$$\square + \square + \square + \square + \square + \square + \square + \square + \square + \square + \square + \square + \square =$$

$$\square\square\square\square\square\square\square\square\square\square\square\square$$

cf. <http://www.microsoft.com/typography/OpenTypeDev/bengali/intro.htm>

Ligatures

ffj ffl fj ffl ffl fj

Language-dependent substitutions

Arabic: ﺉ ﺉ ﺉ Urdu: ﺉ ﺉ ﺉ Arabic: ﻩ ﻭ ﻯ ﻩ Kurdish: ﻩ ﻭ ﻯ ﻩ

Font features - Optional substitutions

Stylistic Alternatives (salt)

Arabic: هـ- هـ- هـ- ع ك ئ Farsi: هـ- هـ- هـ- ع ك ئ Arabic: گ Turkish: گ

CSS control of discretionary OTL features

salt: (off) **all** (on) **all**

frac: (off) $\frac{1}{4} \frac{3}{10}$ (on) $\frac{1}{4} \frac{3}{10}$

zero: (off) 1,000 (on) 1,000

onum: (off) 0123456789 (on) 0123456789

sup: (off) (32) (on) (32)

Stylistic Alternatives (ss03,ss04): (off) ☐ ☐ ☐ ☐ ☐ (on) ☐ ☐ ☐ ☐ ☐

A full list of feature tags is at <http://www.microsoft.com/typography/otspec/featurelist.htm>

In mPDF, the following features are on by default:

- GSUB features: locl ccmp pref blwf abvf pstf pres abvs blws psts hain rlig calt liga clig mset (all scripts)
- GSUB features: isol fina fin2 fin3 medi med2 init nukt akhn rphf rkrf half vatu cjct cfar (for appropriate scripts e.g. Indic, Arabic)
- GPOS features: abvm blwm mark mkmk curs cspc dist requ [kern]

NB 'requ' is not listed in the Microsoft registry of Feature tags; however it is found in the Arial Unicode MS font (it repositions the baseline for punctuation in Kannada script).

Kern is used in some fonts to reposition marks etc. and is essential for correct display, so in mPDF

kern is on by default when any non-Latin script is used.

Mark repositioning (and diacritics)

Ṛ Ṛ̣ Ṛ̤ Ṛ̥ Ṛ̦ Ŗ̣ Ṛ̨ Ṛ̩ Ṛ̪ Ṛ̫ Ṛ̬ Ṛ̭ Ṛ̮ Ṛ̯ Ṛ̰ Ṛ̱ Ṛ̲ Ṛ̳ Ṛ̴ Ṛ̵ Ṛ̶ Ṛ̷ Ṛ̸ Ṛ̹ Ṛ̺ Ṛ̻ Ṛ̼ Ṛ̽ Ṛ̾ Ṛ̿ Ṛ̿̄ Ṛ̿̅ Ṛ̿̆ Ṛ̿̇ Ṛ̿̈ Ṛ̿̉ Ṛ̿̊ Ṛ̿̋ Ṛ̿̌ Ṛ̿̍ Ṛ̿̎ Ṛ̿̏ Ṛ̿̐ Ṛ̿̑ Ṛ̿̒ Ṛ̿̓ Ṛ̿̔ Ṛ̿̕ Ṛ̖̿ Ṛ̗̿ Ṛ̘̿ Ṛ̙̿ Ṛ̿̚ Ṛ̛̿ Ṛ̜̿ Ṛ̝̿ Ṛ̞̿ Ṛ̟̿ Ṛ̠̿ Ṛ̡̿ Ṛ̢̿ Ṛ̣̿ Ṛ̤̿ Ṛ̥̿ Ṛ̦̿ Ŗ̣̿ Ṛ̨̿ Ṛ̩̿ Ṛ̪̿ Ṛ̫̿ Ṛ̬̿ Ṛ̭̿ Ṛ̮̿ Ṛ̯̿ Ṛ̰̿ Ṛ̱̿ Ṛ̲̿ Ṛ̳̿ Ṛ̴̿ Ṛ̵̿ Ṛ̶̿ Ṛ̷̿ Ṛ̸̿ Ṛ̹̿ Ṛ̺̿ Ṛ̻̿ Ṛ̼̿ Ṛ̿̽ Ṛ̿̾ Ṛ̿̿ Ṛ̿̿̄ Ṛ̿̿̅ Ṛ̿̿̆ Ṛ̿̿̇ Ṛ̿̿̈ Ṛ̿̿̉ Ṛ̿̿̊ Ṛ̿̿̋ Ṛ̿̿̌ Ṛ̿̿̍ Ṛ̿̿̎ Ṛ̿̿̏ Ṛ̿̿̐ Ṛ̿̿̑ Ṛ̿̿̒ Ṛ̿̿̓ Ṛ̿̿̔ Ṛ̿̿̕ Ṛ̖̿̿ Ṛ̗̿̿ Ṛ̘̿̿ Ṛ̙̿̿ Ṛ̿̿̚ Ṛ̛̿̿ Ṛ̜̿̿ Ṛ̝̿̿ Ṛ̞̿̿ Ṛ̟̿̿ Ṛ̠̿̿ Ṛ̡̿̿ Ṛ̢̿̿ Ṛ̣̿̿ Ṛ̤̿̿ Ṛ̥̿̿ Ṛ̦̿̿ Ŗ̣̿̿ Ṛ̨̿̿ Ṛ̩̿̿ Ṛ̪̿̿ Ṛ̫̿̿ Ṛ̬̿̿ Ṛ̭̿̿ Ṛ̮̿̿ Ṛ̯̿̿ Ṛ̰̿̿ Ṛ̱̿̿ Ṛ̲̿̿ Ṛ̳̿̿ Ṛ̴̿̿ Ṛ̵̿̿ Ṛ̶̿̿ Ṛ̷̿̿ Ṛ̸̿̿ Ṛ̹̿̿ Ṛ̺̿̿ Ṛ̻̿̿ Ṛ̼̿̿ Ṛ̿̿̽ Ṛ̿̿̾ Ṛ̿̿̿ Ṛ̿̿̿̄ Ṛ̿̿̿̅ Ṛ̿̿̿̆ Ṛ̿̿̿̇ Ṛ̿̿̿̈ Ṛ̿̿̿̉ Ṛ̿̿̿̊ Ṛ̿̿̿̋ Ṛ̿̿̿̌ Ṛ̿̿̿̍ Ṛ̿̿̿̎ Ṛ̿̿̿̏ Ṛ̿̿̿̐ Ṛ̿̿̿̑ Ṛ̿̿̿̒ Ṛ̿̿̿̓ Ṛ̿̿̿̔ Ṛ̿̿̿̕ Ṛ̖̿̿̿ Ṛ̗̿̿̿ Ṛ̘̿̿̿ Ṛ̙̿̿̿ Ṛ̿̿̿̚ Ṛ̛̿̿̿ Ṛ̜̿̿̿ Ṛ̝̿̿̿ Ṛ̞̿̿̿ Ṛ̟̿̿̿ Ṛ̠̿̿̿ Ṛ̡̿̿̿ Ṛ̢̿̿̿ Ṛ̣̿̿̿ Ṛ̤̿̿̿ Ṛ̥̿̿̿ Ṛ̦̿̿̿ Ŗ̣̿̿̿ Ṛ̨̿̿̿ Ṛ̩̿̿̿ Ṛ̪̿̿̿ Ṛ̫̿̿̿ Ṛ̬̿̿̿ Ṛ̭̿̿̿ Ṛ̮̿̿̿ Ṛ̯̿̿̿ Ṛ̰̿̿̿ Ṛ̱̿̿̿ Ṛ̲̿̿̿ Ṛ̳̿̿̿ Ṛ̴̿̿̿ Ṛ̵̿̿̿ Ṛ̶̿̿̿ Ṛ̷̿̿̿ Ṛ̸̿̿̿ Ṛ̹̿̿̿ Ṛ̺̿̿̿ Ṛ̻̿̿̿ Ṛ̼̿̿̿ Ṛ̿̿̿̽ Ṛ̿̿̿̾ Ṛ̿̿̿̿

Mark repositioning (and Contextual substitution)

À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã

Complex syllables

Note that the text displayed is dependent on the font's design/capabilities. These are both "correct" representations of the same string, using:

FreeSerif: [FreeSerif] and FreeSans font: [FreeSans]

cf. <http://www.microsoft.com/typography/OpenTypeDev/devanagari/intro.htm>

Complex Typography

An example which utilises many different GSUB and GPOS features together - first without GSUB and GPOS:

تَسْمُؤَا أُو كَبِيْرًا إِلَىٰ لِّلَّهِ وَأَذْنَىٰ أَلَّا إِلَّا
بَيْنَ كُمْ غَلَيٰ كُمْ أَلَّا يَغْتُمُّ

With GSUB and GPOS:

تَسْمُؤَا أُو كَبِيْرًا إِلَىٰ لِّلَّهِ وَأَذْنَىٰ أَلَّا إِلَّا
بَيْنَ كُمْ غَلَيٰ كُمْ أَلَّا يَغْتُمُّ

Text Justification using Kashida

يٰٓـَٔيُّهَا ٱلَّذِيْنَ ءَامَنُوا إِذَا
تَدَايَنَ تُمْ بَدِيْنِ إِلَىٰ أَجَلٍ
مُّسَمًّى فَاكْتُبُوهُ

يٰٓـَٔيُّهَا ٱلَّذِيْنَ ءَامَنُوا إِذَا
تَدَايَنَ تُمْ بَدِيْنِ إِلَىٰ أَجَلٍ

مُسَمِّى فَاكُنْتُ بُوهُ

What is "correct"?

There are a number of factors which determine how the input text is displayed in an application. The font's capabilities/design (this example shows the same text input shown in 2 fonts):

FreeSerif: □□□□□□ and FreeSans font: □□□□□□

Complex scripts require a "shaping engine" to re-order glyphs and apply the OTL features by syllable. MS Word and Wordpad run on the Windows platform use "Uniscribe", whereas some browsers such as FireFox and OpenOffice use Pango/HarfBuzz. The different shaping engines (and indeed different versions of them) can produce different results.

Different applications have different defaults (on/off) for some of the features e.g. kerning.

When testing mPDF 6, if text does not appear as you expect, ensure that the font is installed on your computer, and view the HTML in a browser. Also try copying/pasting the text into Wordpad/Word/OpenOffice and ensure that the correct font has been applied.

Note that Wordpad sometimes substitutes a different font if it does not like the one you have chosen, and does not even indicate that the substitution has occurred.

CSS control of font features

See <http://www.w3.org/TR/css3-fonts/#font-rend-props> for information about CSS3 and font-features.

The following are supported in mPDF 6:

- font-variant-position
- font-variant-caps
- font-variant-ligatures
- font-variant-numeric
- font-variant-alternates - Only [normal | historical-forms] supported (i.e. most are NOT supported) e.g. stylistic, styleset, character-variant, swash, ornaments, annotation (use font-feature-settings for these)
- font-variant - as above, and except for: east-asian-variant-values, east-asian-width-values, ruby
- font-language-override
- font-feature-settings

font-variant-east-asian is NOT supported

NB @font-face is NOT supported

NB @font-feature-values is NOT supported

Note that font-variant specifies a single property in CSS2, whereas in CSS3 it has become a shorthand for all the other font-variant-* properties. font-variant: small-caps was the only one supported in mPDF <v6, and will still work in mPDF 6.

See notes later about font kerning.

Some examples

```
/* use small-cap alternate glyphs */
.smallcaps { font-feature-settings: "smcp" on; }

/* convert both upper and lowercase to small caps (affects punctuation also) */
.allsmallcaps { font-feature-settings: "c2sc", "smcp"; }

/* enable historical forms */
.hist { font-feature-settings: "hist"; }

/* disable common ligatures, usually on by default */
.noligs { font-feature-settings: "liga" 0; }

/* enable tabular (monospaced) figures */
td.tabular { font-feature-settings: "tnum"; }

/* enable automatic fractions */
.fractions { font-feature-settings: "frac"; }

/* use the second available swash character */
.swash { font-feature-settings: "swsh" 2; }

/* enable stylistic set 7 */
.fancystyle {
font-family: Gabriola; /* available on Windows 7, and on Mac OS */
font-feature-settings: "ss07";
}
```


SYRIAC - Estrangelo Edessa

MYANMAR (Burmese) Padauk Book (SIL Font)

KHMER

HEBREW - with Niqud and T'amim (cantillation)

NKo

THAANA

[illegible]

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ (ຄຳເຄົ້າ: ສາທາຣນຣັຖປຊາທິປັຍປຊາຊົນລາວ[໑]) ຫຼື ສປປ ລາວ
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ແລະ ເສ້ນແວງທີ 100-108 ອົງສາ ສປປ ລາວມີເນື້ອທີ່ທັງໝົດ 236.800 ຕາລາງກິໂລແມັດ
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(2.069 ກິໂລແມັດ), ທິດຕາເວັນຕົກຕິດກັບລາຊະອານາຈັກໄທ (1.385 ກິໂລແມັດ), ແລະ
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ເປັນປະເທດດຽວໃນພາກພື້ນນີ້ທີ່ບໍ່ມີຊາຍແດນຕິດກັບທະເລ.

LAO

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THAI

"ซัดมิง" เป็นเพลงของวงเดอะบิตเทิลส์ ในปี ค.ศ. 1969 เป็นเพลงที่บรรจุกู่ในอัลบั้มชุด แอบบิโรรด

เพลงนี้เป็นเพลงแรกที่ซึ่งเกิดหน้าเอที่จอร์จ แฮร์ริสันเขียน

และถือเป็นซึ่งเกิดแรกของเดอะบิตเทิลส์ที่มีเพลงที่มีอยู่แล้วในอัลบั้มบรรจุกู่ด้วย ทั้งเพลง "ซัดมิง"

และเพลง "คัมทูกเกตเตอร์" ที่อยู่ในอัลบั้ม แอบบิโรรด และเพลง "ซัดมิง"

ถือเป็นเพลงเดียวที่แฮร์ริสันแต่งแล้วขึ้นอันดับ 1 บนชาร์ตอเมริกันขณะที่ยังอยู่ในวงเดอะบิตเทิลส์

SINHALA

සාທාලະනະලັද ප්‍රජාතීප්‍රදාය ජාතීප්‍රදාය (කඳව්‍ර්ත: සාතාරනර්ථප්‍රජාතීප්‍රදාය[1]) ක්‍රී සප්ප ලාච
තීග්‍රුතීදතාච්චනච්චසර්ග්‍රව්‍රදාය, ග්‍රුච්චරාග්‍රදායච්චනච්චසර්ග්‍රව්‍රදායච්චනච්චසර්ග්‍රව්‍රදායච්චනච්චසර්ග්‍රව්‍රදාය
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TIBETAN

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ (ຄຳເຄົ້າ: ສາທາຣນຣັຖປຊາທິປັຍປຊາຊົນລາວ[໑]) ຫຼື ສປປ ລາວ
ຕັ້ງຢູ່ທິດຕາເວັນອອກສຽງໃຕ້ຂອງທະວີບອາຊີ, ຢູ່ໃຈກາງຂອງແຫຼມອິນດູຈີນລະຫວ່າງເສ້ນຂະໜານທີ 14 - 23 ອົງສາເໜືອ
ແລະ ເສ້ນແວງທີ 100-108 ອົງສາ ສປປ ລາວມີເນື້ອທີ່ທັງໝົດ 236.800 ຕາລາງກິໂລແມັດ
ເປັນປະເທດທີ່ບໍ່ມີທາງອອກສູ່ທະເລ, ມີຊາຍແດນຕິດກັບ ສາທາລະນະລັດປະຊາຊົນຈີນ (505 ກິໂລແມັດ),
ທິດໃຕ້ຕິດກັບລາຊະອານາຈັກກຳປູເຈຍ (435 ກິໂລແມັດ), ທິດຕາເວັນອອກຕິດກັບ ສາທາລະນະລັດສິງຄົມນິຍົມຫວຽດນາມ
(2.069 ກິໂລແມັດ), ທິດຕາເວັນຕົກຕິດກັບລາຊະອານາຈັກໄທ (1.385 ກິໂລແມັດ), ແລະ
ທິດຕາເວັນຕົກສຽງເໜືອຕິດກັບ ສາທາລະນະລັດແຫ່ງສະຫະພາບມຽນມາ (236 ກິໂລແມັດ), ສ.ປ.ປ.ລາວ
ເປັນປະເທດດຽວໃນພາກພື້ນນີ້ທີ່ບໍ່ມີຊາຍແດນຕິດກັບທະເລ.

TAI THAM

[illegible][illegible]

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Dictionary Line breaking

Lao, Thai and Khmer text does not have space between words. By default, mPDF 6 uses word dictionaries to determine appropriate opportunities for line-breaks. Users may turn this function off using the configurable variable `useDictionaryLBR`.

Alternatively users can insert the character U+200B (zero-width space) in the text to mark line-breaking opportunities manually.

Similarly for Tibetan script, mPDF 6 uses a simple algorithm to identify line-breaking opportunities after the characters U+0F0B (Tsheg) or U+0F0D. This can be overridden using the configurable variable `useTibetanLBR`.

Myanmar Fonts

Myanmar (Burmese) on the web is quite frequently written for fonts which are not strictly unicode-compliant. This includes common applications such as WordPress and a number of official Burmese government websites.

Ayar fonts (<http://www.ayarunicodegroup.org>) are based on text input where the vowel preceeds the consonant (which is contrary to Unicode specification).

ZawGyi-One is another very common font in use. This font has some characters incorrectly coded e.g. U+103A as U+1039.

There are also fonts available which are fully unicode compliant, such as Padauk, Tharlon, Myanmar3, and Microsoft's Myanmar Text.

As long as you select the right font for the input text, all of them work fine in mPDF:

[illegible]

from <http://www.myanmarlanguage.org/unicode>

Zawgyi-one: □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□
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from <http://www.commerce.gov.mm/>

[illegible]

from <https://mya.wordpress.org/>

lang selector

mPDF 6 supports use of the lang selector in CSS. All of the following are supported:

- :lang(fr)
- p:lang(fr)
- span:lang("syr")
- [lang="fr"]
- [lang='fr']
- p[lang=fr]
- p[lang="zh-TW"]

Note: [lang=zh] will match lang="zh-TW" and lang="zh-HK"

Limitation: class selectors and attribute selectors should be of equal specificity in CSS specification e.g.

```
:lang(syr) { color: blue; }  
.syriac { color: red; }
```

should be of equal specificity, and thus apply whichever comes later in the CSS stylesheet. mPDF 6 however gives :lang priority over .class

The use of the lang attribute and CSS selector is now the recommended method for handling multi-lingual documents in mPDF 6.

lang HTML attribute

The HTML lang attribute has a number of uses:

- when OTL tables are being used for a font, the language from the lang attribute is used to select which OTL features are applied;
- used in conjunction with CSS lang selector to allow CSS styles to be applied;
- can be used in conjunction with autoLangToFont and autoScriptToLang (see below)

IETF tags should be used for lang which comply with the following:

- a 2 or 3 letter Language code, followed optionally by
- a hyphen and a 4 letter Script code, and or
- a hyphen and a 2 letter Region code
- i.e. [xx|xxx]{-Xxxx}{-XX}
- mPDF deals with IETF tags as case insensitive

Automatic font selection

Note: This functionality of mPDF has changed considerably in mPDF v6 and is not backwards compatible.

mPDF 6 has two functions which can be used together or separately:

`autoScriptToLang` - marks up HTML text using the `lang` attribute, based on the Unicode script block in question, and configurable values in `config_script2lang.php`.

`autoLangToFont` - selects the font to use, based on the HTML `lang` attribute, using configurable values in `config_lang2font.php`.

For automatic font selection, ideally we would choose the font based on the language in use. However it is actually impossible to determine the language used from a string of HTML text. The Unicode script block can be ascertained, and sometimes this tells us the language e.g. Telugu. However, Cyrillic script is used for example in many different languages. So the best we can do is base it on the script used. However, mPDF 6 does this in two stages via the "lang" attribute, because this allows the options of using either of the stages alone or together:

```
<p>English ру'сский язы'к وپښتو</p>
```

↓ **autoScriptToLang** (`config_script2lang.php`) ↓

```
<p>English <span lang="und-Cyrl">ру'сский язы'к</span>
<span lang="ps">وپښتو</span></p>
```

↓ **autoLangToFont** (`config_lang2fonts.php`) ↓

```
Uses "lang" to select font, and to determine OTL features applied
```

autoScriptToLang

```
$mpdf->autoScriptToLang = true;
$mpdf->baseScript = 1;
$mpdf->autoVietnamese = true;
$mpdf->autoArabic = true;
```

`$mpdf->baseScript = 1;` tells mPDF which Script to ignore. It is set by default to "1" which is for Latin script. In this mode, all scripts *except* Latin script are marked up with "lang" attribute. To select other scripts as the base, see the file `/classes/ucdn.php`

Using `autoScriptToLang`, mPDF detects text runs based on Unicode script block; using the values in `config_script2lang.php` it then encloses the text run within a span tag with the appropriate language attribute. For many scripts, the language cannot be determined: see the example above which recognises Cyrillic script and marks it up using `und-Cyrl`, which is a valid IETF tag, coding for `language="undetermined", script="Cyrillic"`.

Two optional refinements are added: Vietnamese text can often be recognised by the presence of certain characters which do not appear in other Latin script languages, and similarly analysis of the text can attempt to distinguish Arabic, Farsi, Pashto, Urdu and Sindhi. If active, the text will then be marked with a specific language tag e.g. "vi", "pa", "ur", "fa" etc.

These features can be disabled or enabled (default) using the variables `$mpdf->autoVietnamese` `$mpdf->autoArabic`, either in `config.php` or at runtime.

autoLangToFont

```
$mpdf->autoLangToFont = true;
```

You can edit the values in `config_lang2font.php` to specify which fonts are used for which "lang".

Using text with multiple languages

Recommended ways to use multiple languages in mPDF:

1. If you have full control over the HTML, mark-up the text with the "lang" attribute and use CSS (:lang selector preferably); this method means that the language information can also be used by OTL for language dependent substitutions.
2. If you have no control over (user) HTML input and want to output faithfully, use both `autoScriptToLang` and `autoLangToFont`

It is preferable not to use `autoScriptToLang` and `autoLangToFont` unless they are necessary: they will result in increased processing time, and OTL tables will not be able to use language dependent substitutions when undefined languages are set e.g "und-Cyrl".

Updating from previous mPDF versions

As a brief summary, to update from previous versions of mPDF:

Use `$this->autoScriptToLang=true` instead of `$this->SetAutoFont()`

Use `$this->autoLangToFont` instead of `$this->useLang`

Bidi Bidirectional text

The algorithm to handle bi-directional text (right to left) has been completely rewritten. Text is now processed across the whole paragraph ignoring inline tags. There is also full support for the methods to control/override the display.

1) The following Unicode characters are supported, and can be inserted directly in the text as HTML entities:

LRE U+202A LEFT-TO-RIGHT EMBEDDING	‪
RLE U+202B RIGHT-TO-LEFT EMBEDDING	‫
LRO U+202D LEFT-TO-RIGHT OVERRIDE	‭
RLO U+202E RIGHT-TO-LEFT OVERRIDE	‮
PDF U+202C POP DIRECTIONAL FORMATTING	‬
LRI U+2066 LEFT-TO-RIGHT ISOLATE	⁦
RLI U+2067 RIGHT-TO-LEFT ISOLATE	⁧
FSI U+2068 FIRST STRONG ISOLATE	⁨
PDI U+2069 POP DIRECTIONAL ISOLATE	⁩
LRM U+200E LEFT-TO-RIGHT MARK	‎
RLM U+200F RIGHT-TO-LEFT MARK	‏

2) The following HTML tags are supported:

- `<bdo>` (NB the "dir" attribute is mandatory on `<bdo>`)
- `<bdi>` (HTML5)

3) The CSS property "unicode-bidi" is supported with the following (CSS3) values: normal | embed |

isolate | bidi-override | isolate-override | plaintext.

See <http://www.w3.org/TR/css3-writing-modes/#unicode-bidi> for more details.

"unicode-bidi" is supported on block level elements as well as in-line elements, but note that:

- the value is not inherited to child blocks
- using "embed" or "isolate" has no effect on block level boxes
- "isolate-override" is equivalent to "bidi-override" on block level boxes

NB dir="auto" is not supported generally, but it is supported for <bdi> (has the same effect as if omitted) to use First Strong Isolate (FSI).

Directionality can now be set on individual table cells <td style="direction:rtl;unicode-bidi:embed;"> or <td dir="rtl">

Equivalent methods

The following are equivalent methods:

EMBED

```
<span dir="rtl">...</span>
&#x202B;...&#x202C;
<span style="direction: rtl; unicode-bidi: embed">...</span>
```

OVERRIDE

```
<bdo dir="rtl">...</bdo>
&#x202E;...&#x202C;
<span dir="rtl" style="unicode-bidi: bidi-override">...</span>
<span style="direction: rtl; unicode-bidi: bidi-override">...</span>
```

ISOLATE

```
<bdi dir="ltr">...</bdi>
&#x2067;...&#x2069;
<span dir="rtl" style="unicode-bidi: isolate">...</span>
<span style="direction: rtl; unicode-bidi: isolate">...</span>
```

First Strong Isolate (FSI)

```
<bdi>...</bdi>
<bdi dir="auto">...</bdi>
&#x2068;...&#x2069;
<span dir="rtl" style="unicode-bidi: plaintext">...</span>
<span style="direction: rtl; unicode-bidi: plaintext">...</span>
```

First strong isolate (FSI)

FSI is useful when including text within a paragraph where the directionality of the text is unknown. For example, if you are printing out a catalogue from a database of book titles and the number of readers, when some book titles are in right-to-left script, you may use this template:

```
<li>Title: {TITLE} - {READERS} readers</li>
```

This would result in the following:

- Title: Alice in Wonderland - 12390 readers
- Title: 17890 - עליסה בארץ הפלאות, סיפור-ילדים מאת לואיס קרול readers

```
<li>Title: <bdi>{TITLE}</bdi> - {READERS} readers</li>
```

Using BDI will result in the following:

- Title: Alice in Wonderland - 12390 readers
- Title: עליסה בארץ הפלאות, סיפור-ילדים מאת לואיס קרול - 17890 readers

Kerning

Kerning is a bit complicated! CSS3 allows for 2 methods of specifying kerning. In mPDF 6, these 2 methods have exactly the same effect:

- `font-kerning: normal;`
- `font-feature-settings: 'kern' on;`

TrueType fonts allow for 2 possible ways of including kerning data:

- OTL GPOS table may contain kerning information
- A separate kern table

Most fonts contain both or none, but they may exist independently.

If kerning is set to be active (by either of the CSS methods):

- if the `useOTL` value means that OTL GPOS tables are applied, then this method will be used;
- if not, then the separate kern table will be used - if it exists.

In Latin script, kerning will only be applied if specified by CSS. The configurable variable `useKerning` determines behaviour if `font-kerning: auto` is used (the default).

When using OTL tables, kerning is set to be on by default for non-LATIN script; this is because a number of fonts use information in the kern feature to reposition glyphs which are essential for correct display in complex scripts.

Limitation: if `useOTL` is set, but not for Latin script (e.g. = 0x02), and the text string contains more than one script, then kerning will not be applied to the Latin script text e.g. [Cyrillic text][Latin text][Cyrillic text]. This is because mPDF uses the presence of any repositioning applied to determine if kerning has been applied, otherwise using the alternative kern tables.

Small-Caps

Small Caps should be selected using:

```
<p style="font-variant-caps:small-caps">This is in small caps</p>
```

and will appear as: THIS IS IN SMALL CAPS

Note: `font-variant:small-caps` will also be recognised as `font-variant` is now considered the shorthand version cf. above.

If the font has `useOTL` enabled (to any value), and the font OTL tables contain the "smcp" feature, then the OTL feature will be used to substitute purpose-designed glyphs from the font. Otherwise, mPDF generates small capitals as in previous version.

Superscript and Subscript

```
<p>This is in <span style="font-variant-position:super">superscript</span></p>
```

will appear as superscript (only) if the font is OTL-capable and contains specific glyphs for superscript.

Note that font-variant:super will also be recognised as font-variant is now considered the shorthand version cf. above.

If the font has useOTL enabled (to any value), and the font OTL tables contain the "sup" feature, then the OTL feature will be used to substitute purpose-designed glyphs from the font.

The same for subscript using font-variant-position:sub.

If you wish to use a superscript/subscript which will work with any font, continue to use the tags `<sup>` and `<sub>` which (through the default CSS in config.php) will generate superscript using CSS `vertical-align=super` and `font-size=55%`.

How to use OTL in mPDF

In config_fonts.php there are 2 new variables which affect OTL features e.g.:

```
"dejavusanscondensed" => array(
    'R' => "DejaVuSansCondensed.ttf",
    'B' => "DejaVuSansCondensed-Bold.ttf",
    'I' => "DejaVuSansCondensed-Oblique.ttf",
    'BI' => "DejaVuSansCondensed-BoldOblique.ttf",
    'useOTL' => 0xFF,
    'useKashida' => 75,
),
```

mPDF is published with a large collection of fonts, and all configured to use their full OTL capabilities.

useOTL

useOTL should be set to an integer between 0 and 255. Each bit will enable OTL features for a different group of scripts:

Bit	dec	hex	Enabled
-----	-----	-----	---------

1	1	0x01	GSUB/GPOS - Latin script
---	---	------	--------------------------

2	2	0x02	GSUB/GPOS - Cyrillic script
---	---	------	-----------------------------

3	4	0x04	GSUB/GPOS - Greek script
---	---	------	--------------------------

4	8	0x08	GSUB/GPOS - CJK scripts (excluding Hangul-Jamo)
---	---	------	---

5	16	0x10	(Reserved)
---	----	------	------------

6	32	0x20	(Reserved)
---	----	------	------------

7	64	0x40	(Reserved)
---	----	------	------------

8	128	0x80	GSUB/GPOS - All other scripts (including all RTL scripts, complex scripts etc)
---	-----	------	--

Setting useOTL to 0 (or omitting it) will disable all OTL features. Setting useOTL to 255 or 0xFF will enable OTL for all scripts. Setting useOTL to 0x82 will enable OTL features for Cyrillic and complex scripts.

In a font like Free Serif, it may be useful to enable OTL features for complex scripts, but disable OTL for Latin scripts (to save processing time). However, see above - this may disable kerning in Latin scripts in certain circumstances.

useKashida

useKashida should be set for arabic fonts if you wish to enable text justification using kashida. The value should be an integer between 0 and 100 and represents the percentage of additional space required to justify the text on a line as a ratio of kashida/inter-word spacing.

Choosing fonts to add to mPDF 6

Fonts with OTL need to have GDEF, GSUB and GPOS tables in the font file. Although TrueType font files are binary files, the table names and script/feature tags are written as ASCII characters; open the .ttf or .otf file in a text editor such as Windows Notepad, and you will see GDEF, GSUB and GPOS in the first few lines if they are present. You can also search the file to see if the script tags are present for your desired scripts cf. <http://www.microsoft.com/typography/otspec/scripttags.htm>.

Note: The OTL specification for Indic fonts was updated in 2005 to version 2. The v2 script tag for Bengali is "bng2" whereas prior to this it was "beng". Many open-source font files are still written for the old specification. This is supported by mPDF, although v2 fonts give better results.

Note: mPDF does not support Graphite or AAT font features.

Configuring new fonts for mPDF 6

To add a font, first copy the font file to the /ttfonts/ folder.

Then edit config_fonts.php to add. See the manual for details if you are not already familiar with this.

If you wish to use this font with autoLangToFont, you also need to edit config_lang2fonts.php

Setting OTL use at runtime

mPDF caches some font information in the /ttfontdata/ folder to improve performance. This is regenerated if you change the value of useOTL for a font.

There may be circumstances when you wish to use OTL features with different scripts depending on the document e.g. for everyday use you may want to disable OTL for FreeSerif to save processing time, but on occasions use OTL for Indic and/or Arabic scripts. The recommended way to do this is to create 2 instances of the font e.g. in config_fonts.php:

```
"freeserif" => array(
    'R' => "FreeSerif.ttf",
    'B' => "FreeSerifBold.ttf",
    'I' => "FreeSerifItalic.ttf",
    'BI' => "FreeSerifBoldItalic.ttf",
    'useOTL' => 0x00,
),
"freeserif2" => array(
    'R' => "FreeSerif.ttf",
    'B' => "FreeSerifBold.ttf",
    'I' => "FreeSerifItalic.ttf",
    'BI' => "FreeSerifBoldItalic.ttf",
    'useOTL' => 0xFF, /* Uses OTL for all scripts */
    'useKashida' => 75,
),
```

You could then either use this second font name in your stylesheets e.g.

```
<p style="font-family:freeserif2;">Hallo World (in Arabic)</p>
```

or, you could use font translation e.g.

```
$mpdf->fonttrans['freeserif'] = 'freeserif2';
```

Page breaking

Types of page break

The handling of borders and padding at page breaks has been updated. mPDF has three types of page breaks:

- 1) "slice" - no border and no padding are inserted at a break. The effect is as though the element were rendered with no breaks present, and then sliced by the breaks afterward
- 2) "cloneall" - each page fragment is independently wrapped with the borders and padding of all open elements.
- 3) "clonebycss" - open elements which have the (custom) CSS property "box-decoration-break" set to "clone" are independently wrapped with their border and padding.

The difference between 2) and 3) is illustrated by this example:

```
<style>
div { border: 1px solid black; padding: 1em; }
.level1 { box-decoration-break: slice; }
.level2 { box-decoration-break: clone; }
.level3 { box-decoration-break: clone; }
</style>

<div class="level1">
<div class="level2">
<div class="level3">
<p style="page-break-after:always">...</p>
<p>...</p>
</div>
</div>
</div>
```

At the forced pagebreak which occurs after the P element:

If the page break type is "cloneall" - the three DIV elements will all be closed, by drawing the border and padding for each at the end of the page; the three DIV elements will be re-opened, drawing the borders and padding, at the top of the next page.

If the page break type is "clonebycss" - starting from the innermost element (div.level3) the DIV elements will have a border and padding at the end of the page if "box-decoration-break" is clone. In this case level2 and level 3 will be closed/cloned and level 1 will be sliced; the opposite will occur at the top of the next page.

Control of page breaks

Automatic page breaks (in flow of text)	Always "slice"
<toCPageBreak>	Always "cloneall"
<formFeed>	Always "slice"
If using columns	Always "cloneall"
Page break forced by change of @page selector	Always "cloneall"

<pagebreak>	Always "cloneall" if a change in page size or margins is specified. Otherwise page break type is determined by value of configurable variable: \$this->defaultPagebreakType. Default is "cloneall". Default can be overridden by attribute "page-break-type" e.g. <pagebreak page-break-type="clonebycss" />
Page breaks forced by: page-break-before or page-break-after	Page break type determined by value of configurable variable: \$this->defaultPagebreakType. Default is "cloneall".

Notes on page breaking

"box-decoration-break: slice | clone" was proposed for CSS3 in <http://www.w3.org/TR/2012/CR-css3-background-20120417/#the-box-decoration-break> but it appears that it may be withdrawn. Default is "slice"; it is not inherited.

"page-break-before" is not supported on <table>.

"page-break-before|after" is ignored if set on block elements inside a table.

mPDF functions e.g. AddPage() are not affected by the changes in mPDF 6.

Background images and gradients are not sliced.

\$this->restoreBlockPagebreaks in config.php is now redundant.

Line breaking

The algorithm for determining automatic line breaks has been completely rewritten, ignoring inline tags (except for some cases of CJK line-breaking, and autohyphenation).

Line breaks will be allowed at:

- Spaces U+0020
- Word break U+200B
- Hyphen-minus U+002D when CSS hyphens set to "manual" or "auto", except when in a URL, or when following character is a > or numeral
- Hard hyphen U+2010 when CSS hyphens set to "manual" or "auto"
- Soft hyphen U+00AD "" when CSS hyphens set to "manual" or "auto"
- Automatic hyphenation when CSS hyphens set to "auto"
- Between CJK characters, except CJK numerals, before "CJK-following" or after "CJK-leading" characters

See also "Dictionary Line breaking" above.

Line-height and Text Baseline

Using font metrics

mPDF 6 can (optionally) use font metrics derived from each font file to:

- Determine the height of a line when line-height is set to 'normal'
- Determine the glyph baseline (previously a fixed value)

Options are set by configurable variables in the `config.php` file:

Default settings in mPDF versions 6 - recommended especially for complex scripts with marks used above or below characters:

- `$this->useFixedNormalLineHeight = false;`
- `$this->useFixedTextBaseline = false;`
- `$this->adjustFontDescLineheight = 1.14;`

Settings to be backwards compatible with mPDF versions < 6:

- `$this->useFixedNormalLineHeight = true;`
- `$this->useFixedTextBaseline = true;`
- `$this->normalLineheight = 1.33;`

Examples

Using the font metrics will give approximately the same result as the fixed value for many standard Latin script fonts e.g. DejaVu Sans Condensed:

line-height: normal; based on font metrics

line-height: normal; using fixed value

However, for some fonts the normal line-height using font metrics will be significantly taller, to account for the design of the font glyphs e.g. Khmer font:

line-height: normal; based on font metrics; ក្រុង ភ្នំពេញ ប្រទេស កម្ពុជា ប្រជាជន ប្រមាណ ១០ លាន

line-height: normal; using fixed value; ក្រុង ភ្នំពេញ ប្រទេស កម្ពុជា ប្រជាជន ប្រមាណ ១០ លាន

For more information on how complex normal lineheights are, see Eric Meyers' website:

<http://meyerweb.com/eric/thoughts/2008/05/06/line-height-abnormal/> and

<http://typophile.com/node/13081>

CSS control of line-height

There are also new controls for line-height using draft CSS3 properties. These can be set on all block level elements (P, DIV etc) and tables (TABLE/TD/TH).

line-stacking-strategy = inline-line-height | block-line-height | max-height | grid-height

- `inline-line-height` - [default] lineheight is initially calculated from the block-level font[-size]; the height is expanded by any inline content, including the calculated lineheight of that inline content;
- `block-line-height` - lineheight is fixed as the lineheight of the block-level font[-size];
- `max-height` - lineheight is initially calculated from the block-level font; the height is expanded by any inline content, EXCLUDING the calculated lineheight of that inline content;
- `grid-height` - lineheight is initially calculated from the block-level font; the height is expanded - AS MULTIPLES OF INITIAL LINEHEIGHT - by any inline content, EXCLUDING the calculated lineheight of that inline content;

Note: XSL has a similar property with the same name, which uses different but equivalent values: line-height instead of inline-line-height, font-height instead of block-line-height. It also uses max-height. The value grid-height is new to the CSS3 property.

Examples

```
line-height: normal; DejaVu Sans Condensed
```

```
line-height: normal; 16pt font-size Â with line-stacking-strategy: inline-line-height
```

```
line-height: normal; 16pt font-size Â with line-stacking-strategy: block-line-height
```

```
line-height: normal; 16pt font-size Â with line-stacking-strategy: max-height
```

```
line-height: normal; 16pt font-size Â with line-stacking-strategy: grid-height
```

line-stacking-shift = consider-shifts | disregard-shifts

This property determines whether to include or disregard the adjusted top- and bottom-edge of any characters that have a baseline-shift (e.g. superscript) when calculating lineheight.

Note: XSL has a similar property with a different name: line-height-shift-adjustment which uses the same values.

Examples

In the table below, the line-height is set to 1em throughout the table; line-stacking-shift is set as 'disregard-shifts' in the first row, and has default setting (consider-shifts) in the second row.

Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed
Normal text DejaVu Sans ^[53] Condensed	Normal text DejaVu Sans Condensed

For more details see the [CSS3 draft specification](#).

Note for Advanced users

There are actually three possible metrics that can be used in a TrueType font file. The differences are summed up quite well in this article at <http://typophile.com/node/13081>. mPDF will by default use the usWinAscent and usWinDescent values to determine a 'normal' line-height, with two variations:

- if either the usWinAscent or usWinDescent are greater than the font bounding box (yMin yMax), then the values are reduced to equal the yMin/yMax values. NB this works as a fix with Myanmar Text (Windows 8 version) to give a line-height normal that is equivalent to that produced in browsers.
- if the USE TYPO METRICS bit is set on fsSelection (OS/2 table), this is telling the font to use the sTypo values and not the usWinAscent values. NB this works as a fix with Cambria Math font to

give a normal line-height; at present, this is the only font I have found with this bit set; although note that MS WordPad and Windows Firefox browser use the big line-height from usWinAscent, whilst MS Word 2007 observes the fSelection value.

You can change the font metrics used by mPDF, by editing the defined constant (`_FONT_DESCRIPTOR`) at the top of the `mpdf.php` file:

- 'winTypo' uses sTypoAscender etc from the OS/2 table and is the one officially recommended - BUT
- 'win' use usWinAscent etc from OS/2 and in practice seems to be used most commonly in Windows environment; this is the default in mPDF;
- 'mac' uses Ascender etc from hhea table, and may be used to give results consistent with a Mac/OSX environment.

Finally, you can override values for Ascent, Descent and Leading for any specific font, by setting values in `config_font.php` e.g.

```
"cambriamath" => array(
    'R' => "cambria.ttc",
    'useOTL' => 0xFF,
    'TTCfontID' => array(
        'R' => 2,
    ),
    'Ascent' => 950,
    'Descent' => -222,
    'Leading' => 0,
),
```

Note - The same values are used for all styles of the font-family. Descent values should be negative. All values should be given using a 1000 units per em scale, regardless of the UnitsPerEm used in the font design.

Notes

Remember that line-height for a TABLE has a default value (1.2) set in the `config.php` default CSS. This is left in for backwards compatability. You can change this value to 'normal' for results consistent with most browsers.

Line-height in a `<textarea>` is fixed and defined in `classes/mpdfform.php` (= 1.2)

Details of the font metrics can be seen by inspecting the temporary font files e.g. `/ttfontdata/[fontname].mtx.php`.

Index style and layout

Indexes have been completely rewritten for mPDF 6, and are not backwards compatible:

- Reference() is now removed - use IndexEntry() instead.
- CreateReference() and CreateIndex() are both removed - replaced by: InsertIndex() [or recommend <indexinsert>] cf. below.
- <indexinsert> and InsertIndex() no longer set styles - appearance must be controlled using CSS, even if using function InsertIndex().
- <indexinsert> and InsertIndex() no longer control columns - these must be specified separately.

When an Index is inserted in the PDF document, the Index is now generated (internally) as HTML code in the following format:

```
<div class="mpdf_index_main">
<div class="mpdf_index_letter">A</div>
<div class="mpdf_index_entry">Aardvark<a class="mpdf_index_link"
href="#page37">37</a>
</div>
...
</div>
```

CSS stylesheets can thus be used to control the layout of the Index e.g.:

```
/* For Index */
div.mpdf_index_main {
    line-height: normal;
    font-family: sans-serif;
}
div.mpdf_index_letter {
    line-height: normal;
    font-family: sans-serif;
    font-size: 1.8em;
    font-weight: bold;
    text-transform: uppercase;
    page-break-after: avoid;
    margin-top: 0.3em;
    margin-collapse: collapse;
}
div.mpdf_index_entry {
    line-height: normal;
    font-family: sans-serif;
    text-indent: -1.5em;
}
a.mpdf_index_link {
    color: #000000;
    text-decoration: none;
}
```

A default stylesheet for Indexes is included in mpdf.css (see note later for more information).

Index Collation

In order to generate an Index with non-ASCII characters, entries need to be sorted accordingly (collation), and non-ASCII characters should map to the appropriate Dividing letter e.g.:

A

Alonso, Fernando
Álvarez, Isaac
Arroyo Molino, David

B

Benítez, Carlos

Entries in an Index can now be sorted using any of the Locale values available on your system. Set it using the "collation" property/parameter e.g.:

```
<indexinsert usedivletters="on" links="off" collation="es_ES.utf8" collation-  
group="Spanish_Spain" />  
- or -  
$mpdf->InsertIndex(true, false, "es_ES.utf8", "Spanish_Spain");
```

NB You should always choose a UTF-8 collation, even when you are using Core fonts or e.g. charset=win-1252, because mPDF handles all text internally as UTF-8 encoded.

You can see which Locales are available on your (Unix) system: `<?php system('locale -a') ?>`

Note: Index collation will probably not work on Windows servers because of the problems setting Locales under Windows.

If you have set your index to use Dividing letters, you can also determine how letters are grouped under a dividing letter. In the example index above, we want Á to be grouped under the letter a/A. Set the "collation-group" using:

```
<indexinsert usedivletters="on" links="off" collation="es_ES.utf8" collation-  
group="Spanish_Spain" /> - or -  
$mpdf->InsertIndex(true, false, "es_ES.utf8", "Spanish_Spain");
```

Values should be selected from the available file names in folder /collations/.

Note: This will not affect the overall order of entries, which is determined by the value of "collation".

Note: The groupings do not always match the order set by locale. This is because the data for collations has come from different sources. The files in /collations/ can be edited.

The array consists of [index]: unicode decimal value of character => unicode decimal value of character to group under: e.g. Á [A tilde] (U+00C3) (decimal 195) => a (U+0061) (decimal 97). The target character should always be the lowercase form.

Non-ASCII characters in Index entries

Note: htmlspecialchars_encode should be used to encode the text of content in <indexentry> - although not when using \$mpdf->IndexEntry().

Columns

Columns are no longer specified as part of the <indexinsert>, so a typical 2-column index might be produced by:

```
<pagebreak type="next-odd" />  
<h2>Index</h2>  
<columns column-count="2" column-gap="5" />  
<indexinsert usedivletters="on" links="on" collation="en_US.utf8"  
collationgroup="English_United_States" />  
</columns column-count="1" />
```

Index Sub-entries

Index entries can contain sub-entries, separated by colons e.g.

```
<indexentry content="Mammals:elephants" />
```

A shorthand way of displaying subentries is set by default, which suppresses the main entry if > 1 subEntry. It can be disabled/enabled using the configurable variable `$this->indexUseSubentries` in `config.php`.

This is the default appearance, with `$this->indexUseSubentries = false;` -

```
Mammals 73
- elephants 142
- humans 173
Marsupials
- kangaroos 75
- wombats 86
```

Index entries can also include simple mark-up tags and/or more than one colon e.g:

```
<indexentry content="Mammals:&lt;b&gt;elephants&lt;/b&gt;: breeding" />
```

which appears as:

```
Mammals
- elephants: breeding 15
```

This is the appearance with `$this->indexUseSubentries = false;` -

```
Mammals 73
Mammals, elephants 142
Mammals, elephants: breeding 15
Mammals, humans 173
Marsupials, kangaroos 75
Marsupials, wombats 86
```

Customised appearance

Several variables set at beginning of function `InsertIndex()` in `mpdf.php` which could be changed to alter appearance of Index. e.g. `spacer`, and `joiner` characters.

Lists

Lists are now handled as for other block level tags, so you can apply any CSS properties usable on blocks (e.g. border, background, padding) to UL/OL and LI tags.

CSS property "list-style" is now handled properly as a shorthand, and there is full support for "list-style-image", "list-style-type", and "list-style-position".

There are two modes for lists in mPDF 6: "mpdf" mode and "browser" mode. Mode is set using the configurable variable `$this->list_auto_mode` in `config.php`

1) Browser mode gives the same display as most browsers. In this mode, the default list indentation is set by padding "0 auto" in the default CSS in `config.php`. "auto" equates to the value of `$this->list_indent_default` in `config.php` - this is a "magic" value for padding, which is applied to either left or right depending on directionality of the list (rtl/ltr).

2) mPDF mode gives results compatible with previous versions of mPDF. In this mode, the indentation is calculated differently: the outside edge of the list item is considered to be the outside edge of the bullet or number. For numbered lists, mPDF calculates the width of the largest number and this width is used to set the outside edge. The default list indentation of "auto" in mPDF mode is set by `$this->list_indent_default_mpdf`. This value is added to the automatic calculated indentation. For backwards compatibility, `$this->list_indent_first_level = 0`; can be used to prevent any indentation of the first list level.

The automatic indentation only works for bullets or numbered lists, and is ignored if "list-style-position: inside" is set, or images are used for markers.

Browser mode is set as the default - for backwards compatibility, change this to "mpdf".

List top & bottom margins

The default in browsers is to add a top and bottom margin to the outermost list only. This can be defined using CSS as:

```
ul, ol { margin-top: 0.83em; margin-bottom: 0.83em; }
ul ul, ul ol, ol ul, ol ol { margin-top: 0; margin-bottom: 0; }
```

This style is included in file `mpdf.css` (see later).

Previous versions of mPDF always added a top and bottom margin to the outermost list, (but no variation from this was possible). mPDF 6 is therefore backwards compatible re. the margins.

[NB The CSS styles are included in `mpdf.css`, because the defaultCSS values set in `config.php` only works on basic elements, and cannot use selectors such as "ol ol".]

Other new configurable variables

Configurable variables are used to define size and offset for list bullets (i.e. disc, circle or square). The values can be any valid CSS size.

To specify a fixed bullet size and offset to give a similar appearance to most browsers, the default is set as:

- `$this->list_marker_offset = '5.5pt';`
- `$this->list_symbol_size = '3.6pt';`

To specify size and offset proportional to the list item's font size (compatible with previous versions of mPDF), use:

- `$this->list_marker_offset = '0.45em';`
- `$this->list_symbol_size = '0.31em';`

Notes on Lists

The attribute `type=""` is case sensitive (whereas it is case insensitive in CSS). This allows the use of shorthand versions e.g. `type="A"` for uppercase alpha-numeric.

"list-style-type" is only inherited to child LI (not to child UL/OL); list-style-image and -position are fully inherited.

Lists in tables remain basic, as block-level elements are not supported inside tables.

Properties like `text-align:justify` will now be inherited from surrounding elements, which will change the appearance of lists designed with earlier versions of mPDF.

The attribute `start="3"` (integer) works for "OL"; it is an official (though deprecated) HTML attribute.

List bullets (`type = disc`, `circle` or `square`) are now drawn rather than using font glyphs, for better consistency.

List examples

This demonstrates the appearance when `list_auto_mode` is set to 'mpdf', compatible with previous mPDF versions. Indentation is set to zero (`list_indent_default_mpdf`). Note the top and bottom margin on the first list level only.

I.	First item
II.	Second item
I.	Next list level
II.	Second item

This demonstrates the same default settings, but list numbering is set to start at 32. Note how the indentation is adjusted to fit the maximum width of the numbering.

XXXII.	First item
XXXIII.	Second item
XXXII.	Next list level
XXXIII.	Second item

This demonstrates the appearance when `list_auto_mode` is set to 'browser', compatible with browsers. Indentation is set to 40px (`list_indent_default`)

I.	First item
II.	Second item
I.	Next list level
II.	Second item

This demonstrates the same as the previous example, but list numbering is set to start at 32. Note that the default indentation remains fixed at 40px (`list_indent_default`)

XXXII.	First item
XXXIII.	Second item
XXXII.	Next list level
XXXIII.	Second item

This demonstrates control of the list-style-type, list-style-position and list-style-image.	
1.	First item in list
2.	Second item
	• List style set as 'disc'
	List style set as 'none'
	Using an image.
6.	List-style-position: inside.
😊	User defined list bullet

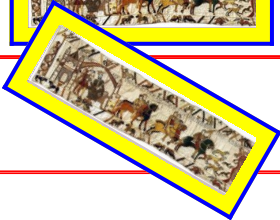
Image transform

The CSS property "transform" is supported on images (only). All transform functions are supported except matrix() i.e. translate(), translateX(), translateY(), skew(), skewX(), skewY(), scale(), scaleX(), scaleY(), and rotate()

Transforms cannot be used when using columns or Keep-with-table (use_kwt).

The CSS property background-color is now supported on images.

In the following examples, note the difference between transform (which is applied after layout) and image-orientation (which is applied before layout):

Hallo world		Hallo world
Hallo world		Hallo world
Hallo world		
Hallo world		Hallo world (image-orientation)

CSS overline

The CSS property "text-decoration: overline" is supported. Note that since mPDF 5.7.3 text-decoration

use the parent inline block baseline/fontsize/color for child inline elements, and allows nested use of these values and superscript/subscript.

1st place and compare with 1st

He won 1st place

Headers and Footers

Headers and Footers are all now written internally as HTMLheaders/footers. The use of non-HTML headers and footers is deprecated, but remains supported. Non-HTML headers and footers are converted in mPDF to HTML equivalents.

Layout: This may mean that there will be a change in the resulting PDF. The main change is that an HTML table is created with three cells for left, right and middle; if you had a very long Left header item, it will not overwrite the center item, but it may wrap center onto 2 lines.

Naming: Default non-HTML headers will not clash with HTML headers, but named non-HTML headers WILL clash with (and overwrite) HTML headers of the same (equivalent) name e.g. `html_MyFooter == MyFooter` (non-HTML).

Aliases: `{nb}` or `{nbpq}` now only work in Headers or Footers, and not in the main text. `{PAGENO}` and `{DATE ...}` continue to only work in Headers or Footers.

ToC: Can now set the `pagenumbering/style/reset/suppress` for the ToC separately (see section on ToC).

The following are all deprecated (but still supported) in favour of HTMLheader/footers:

- `SetHeader()`
- `SetFooter()`
- `<pageheader>`
- `<pagefooter>`
- `DefHeaderByName()`
- `DefFooterByName()`
- `<setpageheader>`
- `<setpagefooter>`
- `SetHeaderByName()`
- `SetFooterByName()`

If document direction is RTL (body `dir=rtl`, html `dir=rtl`), then you need to set directionality before setting non-HTML headers e.g.

```
$mpdf = new mPDF();
$mpdf->SetDirectionality('rtl'); // i.e. add this in
$mpdf->SetHeader($h);
$mpdf->SetFooter($f);
$mpdf->WriteHTML('<body dir="rtl">...');
```

Table of Contents (ToC)

Page numbering can now be applied and controlled for the pages containing a ToC.

There are three new parameters to control pagenumbers in the ToC: `toc-resetpagenum`, `toc-pagenumstyle`, and `toc-suppress`. These are set as attributes in `<tocpagebreak>` or as the last 3 parameters in `TOCpagebreak()`; they set the pagenumbers and pagenumbers style for the ToC, and whether to suppress pagenumbers in ToC.

The default setting for all is to continue pagenumbers and pagenumstyle (and suppression) from pages preceding the ToC.

Note: Page numbering will **always** reset following a ToC. By default it will set it to 1, unless a value for `resetpagenum` is specified in `TOCpagebreak` or `<tocpagebreak>`.

Backwards compatibility: page numbers are no longer suppressed by default in ToC.

Although "suppress" and "toc-suppress" are supported, the recommended way to control whether page numbering appears is by using different headers and footers for each section.

Note: If you have 2 ToCs immediately following each other, and wish to use `pagenumstyle` or suppress to control the following text, then you need to set those values on both of the `<tocpagebreak>` elements.

The default CSS styles for ToCs and Indexes are now set in `mpdf.css` (see later).

See notes later on page numbering.

Other changes from mPDF 5

Setting up mPDF 6

mPDF 6 has changed significantly from earlier version and it is recommended that a fresh install is used. You may wish to copy your previous `config_*` files and use them to update the new config files.

config_fonts.php - values of "indic" and "unAglyphs" from previous versions are now redundant.

config_lang2fonts.php - this is similar to the previous `config_cp.php` file; note however that `$unifont` (NOT `$unifonts`) must be only one font (not a comma-separated list as before).

Included fonts - the Indic fonts e.g. `ind_bn_001.ttf` are no longer required (nor do they work properly with mPDF 6).

useLang - this configurable variable, which used to be true by default, is now redundant. You may need to set: `$mpdf->autoLangToFont = true`; for the same results.

SetAutoFont() - is now redundant. You may need to set: `$mpdf->autoScriptToLang = true`; for the same results.

Indexes - have been largely redefined. See the section above.

Lists - have been rewritten. See the section above.

Headers and Footers - have been rewritten. See the section above.

A number of old deprecated aliases will no longer be supported. Warning errors have been added to prompt you to change to the updated form:

- `$mpdf->useOddEven` - should now use - `$mpdf->mirrorMargins`
- `$mpdf->useSubstitutionsMB` - should now use - `$mpdf->useSubstitutions`
- `$mpdf->AliasNbPg` - should now use - `$mpdf->aliasNbPg`
- `$mpdf->AliasNbPgGp` - should now use - `$mpdf->aliasNbPgGp`
- `$mpdf->BiDirectional` - should now use - `$mpdf->biDirectional`
- `$mpdf->Anchor2Bookmark` - should now use - `$mpdf->anchor2Bookmark`
- `$mpdf->KeepColumns` - should now use - `$mpdf->keepColumns`
- `$mpdf->UnvalidatedText` - should now use - `$mpdf->watermarkText`
- `$mpdf->TopicsUnvalidated` - should now use - `$mpdf->showWatermarkText`
- `$mpdf->Reference` - should now use - `$mpdf->IndexEntry`

The following functions have been removed:

- `setUnvalidatedText` - should now use - `SetWatermarkText()`
- `AddPages` - should now use - `AddPage()` or HTML code methods
- `startPageNums`
- `CreateReference` and `CreateIndex` - cf. Index section above

Default style sheet

A new `mpdf.css` file includes defaults for LISTS top/bottom margins, and also examples for Indexes and ToCs. This now acts like a normal CSS file, including cascading selectors i.e. not just main tags. This is always read (if present), so acts as a secondary default CSS, but one which allows selectors. Styles added to this act like a user stylesheet when considering precedence e.g. `cellSpacing` and `border-spacing`.

Direct writing methods and OTL

`WriteText()` `WriteCell()` `Watermark()` `AutoSizeText()` and `ShadedBox()` DO support complex scripts and right-to-left text (RTL).

Write() does NOT support complex scripts or RTL (NB this is a change - Write() used to support RTL).
CircularText() does NOT support complex scripts or RTL.
MultiCell() DOES support complex scripts and RTL, but complex-script line-breaking MAY NOT be accurate.

MultiCell() does not support kerning and justification. NB This includes <textarea> in forms which uses MultiCell() internally.

<select> form objects also do NOT support kerning.

Page numbering

Page numbering i.e. by including {PAGENO} or {nbpg} in a header/footer, can use any of the number types as used for list-style e.g.

```
<pagebreak pagenumstyle="arabic-indic">
```

Short codes are recognised for the 5 most common:

- "1" - decimal
- "A" = upper-latin or upper-alpha
- "a" = lower-latin or lower-alpha
- "I" = upper-roman
- "i" = lower-roman

or any of the following: arabic-indic, hebrew, bengali, devanagari, gujarati, gurmukhi, kannada, malayalam, oriya, persian, tamil, telugu, thai, urdu, cambodian, khmer, lao, cjk-decimal

Note: A suitable font must be used in the header/footer in order to display the numbers in the selected script.

You can now set the pagenumstyle from the beginning of the document by changing the configurable variable:

```
$this->defaultPageNumStyle = "arabic-indic"; // in config.php  
$mpdf->defaultPageNumStyle = "arabic-indic"; // at runtime
```

Other Minor changes in mPDF 6

'hebrew', 'khmer', 'cambodian', 'lao', and 'cjk-decimal' are recognised as values for "list-style-type" in numbered lists.

CSS "text-outline" is now supported on TD/TH tags

Text wrapping in tables has been improved when using CJK scripts (chinese-japanese-korean).

Text underline and strikethrough can be used together: ~~Hallo world~~. Either <u><s>...</s></u> or ... can be used

Added support for style="opacity:0.6;" in SVG - equivalent to: style="fill-opacity:0.6; stroke-opacity:0.6;"

Added support for opacity="0.6" (as attribute) in SVG - previously only supported fill-opacity="0.6" stroke-opacity="0.6"

CSS position:absolute or fixed - rotate extended now to include rotate: 180; (previously just 90 or -90)

The default value of \$this->keep_table_proportions = true; in config.php has been changed (see effect on Example 6 - nested table in top right cell).

Limited support has been added for SVG fonts embedded in SVG images (but not using @font-face rules) - see the separate Images demo file.

When using columns, the top margin is now collapsed at top of every column (not just first column of page).

The way mPDF handles optional end tags has been updated to be consistent with the [HTML5](#)

[specification](#) - previously not well defined for HTML4.

Changes to the way lists are handled means that text-align:justify may be inherited by lists from surrounding block elements (which did not happen previously). See LISTS above for more information.

Backwards Compatibility

For maximum backwards compatibility with older versions of mPDF, change the following configurable variables in the config.php file:

	mPDF 6.0 Default (Browser compatible)	Backwards Compatible
Normal Line-height	<code>\$this->useFixedNormalLineHeight = false;</code> <code>\$this->useFixedTextBaseline = false;</code> <code>\$this->adjustFontDescLineheight = 1.14;</code>	<code>\$this->useFixedNormalLineHeight = true;</code> <code>\$this->useFixedTextBaseline = true;</code> <code>\$this->normalLineheight = 1.33;</code>
Lists	<code>\$this->list_auto_mode = 'browser';</code> <code>\$this->list_marker_offset = '5.5pt';</code> <code>\$this->list_symbol_size = '3.6pt';</code>	<code>\$this->list_auto_mode = 'mpdf';</code> <code>\$this->list_marker_offset = '0.45em';</code> <code>\$this->list_symbol_size = '0.31em';</code>

More Information

For more information, see:

- About OTL: <http://www.microsoft.com/typography/otspec/TTOCHAP1.htm>
- OTL tag Registry: <http://www.microsoft.com/typography/otspec/ttoreg.htm>
- OTL Features list: <http://www.microsoft.com/typography/otspec/featurelist.htm>
- CSS3 Font Features: <http://dev.w3.org/csswg/css-fonts/#font-rend-desc>

Font Information

The following fonts are included with mPDF 6:

Font(s)	Download URL	Copyright / License	Coverage
DejaVuSans DejaVuSansCondensed DejaVuSerif DejaVuSerifCondensed DejaVuSansMono	http://dejavu-fonts.org	© Bitstream http://dejavu-fonts.org/wiki/License	[Numerous]
FreeSans FreeSerif FreeMono	http://www.gnu.org/software/freefont/	GNU GPL v3	[Numerous incl. Indic]
Quivira	http://www.quivira-font.com/	<i>free for any use</i>	Coptic Buhid Tagalog Tagbanwa Lisu
Abyssinica SIL	http://www.sil.org/resources/software_fonts/abyssinica-sil	SIL Open Font License	Ethiopic
XBRIyaz	http://www.redlers.com/downloadfont.html (XW Zar fonts) http://wiki.irmug.org/index.php/XWZar	SIL Open Font License	Arabic
Taamey David CLM	http://opensiddur.org/tools/fonts/	GNU GPL 2	Hebrew
Estrangelo Edessa	http://www.bethmardutho.org/index.php/resources/fonts.html (SyrCOMEdessa.otf)	Adapted licence (free to use/share)	Syriac
Aegean	http://users.teilar.gr/~g1951d/	<i>free for any use</i>	Carian Lycian Lydian Phoenecian Ugaritic Linear B Old Italic
Jomolhari	https://sites.google.com/site/chrisfynn2/home/fonts/jomolhari	SIL Open Font License	Tibetan
Lohitkannada	https://fedorahosted.org/lohit/	SIL Open Font License	Kannada
Kaputaunicode	http://www.kaputa.com/slword/kaputaunicode.htm http://www.locallanguages.lk/sinhala_unicode_converters	Free Sri Lanka Web Community Center	Sinhala
Pothana2000	https://fedoraproject.org/wiki/Pothana2000_fonts	GNU GPL v2+	Telugu
Lateef	http://www.sil.org/resources/software_fonts/lateef	SIL Open Font License	Sindhi
Khmeros	http://www.khmeros.info/en/fonts (http://www.cambodia.org/fonts/)	LGPL Licence	Khmer
Dhyana	Google Fonts http://www.google.com/fonts/earlyaccess	SIL Open Font License	Lao
Tharlon	Google Fonts http://code.google.com/p/tharlon-font/	SIL Open Font License	Myanmar Tai Le
Padauk Book	http://www.sil.org/resources/software_fonts/padauk	SIL Open Font License	Myanmar
Ayar fonts	http://eng.ayarunicodegroup.org/	SIL Open Font License	Myanmar
ZawgyiOne	http://code.google.com/p/zawgyi/wiki/MyanmarFontDownload	Freely available. No licence information available	Myanmar
Garuda	http://www.hawaii.edu/thai/thaifonts/	Freely available. No licence information available	Thai
Sundanese Unicode	http://sabilulungan.org/aksara/	GNU GPL	Sundanese
Tai Heritage Pro	http://www.sil.org/resources/software_fonts/tai-heritage-pro	SIL Open Font License	Tai Viet
Sun-ExtA Sun-ExtB	http://www.alanwood.net/downloads/index.html	Freeware (Beijing ZhongYi Electronics Co)	Chinese Japanese Runic
Unbatang	http://kldp.net/projects/unfonts/download	GNU GPL	Korean
Aboriginal Sans	http://www.languagegeek.com/font/fontdownload.html	GNU GPL 3	Cree Canadian Aboriginal Inuktitut

Font(s)	Download URL	Copyright / License	Coverage
MPH 2B Damase	http://www.alanwood.net/downloads/index.html	(Public domain)	Glagolitic Shavian Osmanya Kharoshthi Deseret
Aegyptus	http://users.teilar.gr/~g1951d/	<i>free for any use</i>	Egyptian Hieroglyphs
Akkadian	http://users.teilar.gr/~g1951d/	<i>free for any use</i>	Cuneiform
Eeyek Unicode	http://tabish.freeshell.org/eeyek/download.html	Freeware	Meetei Mayek
Lannaalif	http://www.geocities.jp/simsheart_alif/taithamunicode.html	(Unclear)	Tai Tham
Daibanna SIL Book	http://www.sil.org/resources/software_fonts/dai-banna-sil	SIL Open Font License	New Tai Lue
KFGQPC Uthman Taha Naskh	http://fonts.qurancomplex.gov.sa/?page_id=42	https://www.ohloh.net/licenses/KFGQPC	Arabic (Koran/Quran)