

# The arabluatex package

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## Abstract

This package provides for Lua $\TeX$  an Arab $\TeX$ -like interface to generate Arabic writing from an ASCII transliteration. It is particularly well-suited for complex documents such as technical documents or critical editions where a lot of left-to-right commands intertwine with Arabic writing. `arabluatex` is able to process any Arab $\TeX$  input notation. Its output can be set in the same modes of vocalization as Arab $\TeX$ , or in different roman transliterations. It further allows many typographical refinements. It will eventually interact with some other packages yet to come to produce from `.tex` source files, in addition to printed books, TEI xml compliant critical editions and/or lexicons that can be searched, analyzed and correlated in various ways.

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Please send error reports and suggestions for improvements to Robert Alessi:

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- comments, feature requests, bug reports: <https://notabug.org/ralessi/arabluatex>

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This release of `arabluatex` consists of the following source files:

- `arabluatex.ins`
- `arabluatex.dtx`
- `arabluatex.lua`
- `arabluatex_voc.lua`
- `arabluatex_fullvoc.lua`
- `arabluatex_novoc.lua`
- `arabluatex_trans.lua`

## 1 Introduction

In comparison to Prof. Lagally's outstanding Arab $\TeX$ ,<sup>1</sup> ArabLua $\TeX$  is at present nothing more than a modest piece of software. Hopefully—if I may say so—it will eventually provide all of its valuable qualities to the Lua $\TeX$  users.

---

<sup>1</sup>See <http://ctan.org/pkg/arabtex>

arabtex dates back to 1992. As far as I know, it was then the first and only way to typeset Arabic texts with  $\text{\TeX}$  and  $\text{\LaTeX}$ . To achieve this, arabtex provided—and still does—an Arabic font in *Nashī* style and a macro package that defined its own input notation which was, as the author stated, “both machine, and human, readable, and suited for electronic transmission and e-mail communication”.<sup>2</sup> Even if the same can be said about Unicode, Arab $\text{\TeX}$  ASCII input notation still surpasses Unicode input, in my opinion, when it comes to typesetting complex documents, such as scientific documents or critical editions where footnotes and other kind of annotations can be particularly abundant. It must also be said that most text editors have trouble in displaying Arabic script connected with preceding or following  $\text{\LaTeX}$  commands: it often happens that commands seem misplaced, not to mention punctuation marks, or opening or closing braces, brackets or parentheses that are unexpectedly displayed in the wrong direction. Of course, some text editors provide ways to get around such difficulties by inserting invisible Unicode characters, such as LEFT-TO-RIGHT or RIGHT-TO-LEFT MARKS (U+200E, U+200F), RTL/LTR “embed” characters (U+202B, U+202A) and RLO/LRO “bidi-override” characters (U+202E, U+202D).<sup>3</sup> Nonetheless, it remains that inserting all the time these invisible characters in complex documents rapidly becomes confusing and cumbersome.

The great advantage of Arab $\text{\TeX}$  notation is that it is immune from all these difficulties, let alone its being clear and straightforward. One also must remember that computers are designed to process code. Arab $\text{\TeX}$  notation is a way of encoding Arabic language, just as  $\text{\TeX}$  “mathematics mode” is a way of processing code to display mathematics. As such, not only does it allow greater control over typographical features, but it also can be processed in several different ways: so without going into details, depending on one’s wishes, Arab $\text{\TeX}$  input can be full vocalized Arabic (*scriptio plena*), vocalized Arabic or non-vocalized Arabic (*scriptio defectiva*); it further can be transliterated into whichever romanization standard the user may choose.

But there may be more to be said on this point, as encoding Arabic also naturally encourages the coder to vocalize the texts—without compelling him to do so, of course. Accurate coding may even have other virtuous effects. For instance, hyphens may be used for tying particles or prefixes to words, or to mark inflectional endings, and so forth. In other words, accurate coding produces accurate texts that can stand to close grammatical scrutiny and to complex textual searches as well.

Having that in mind, I started arabluatex. With the help of Lua, it will eventually interact with some other packages yet to come to produce from `.tex` source files, in addition to printed books,  $\text{\TeX}$   $\text{\LaTeX}$  compliant critical editions and/or lexicons that can be searched, analyzed and correlated in various ways.

## 1.1 arabluatex is for Lua $\text{\LaTeX}$

It goes without saying that arabluatex requires Lua $\text{\LaTeX}$ .  $\text{\TeX}$  and  $\text{\LaTeX}$  have arabtex, and  $\text{\XeLaTeX}$  has arabxetex. Both of them are much more advanced than arabluatex,

<sup>2</sup>Lagally (2004, p. 2).

<sup>3</sup>Gáspár Sinai’s Yudit probably has the best Unicode support. See <http://www.yudit.org>.

as they can process a number of different languages,<sup>4</sup> whereas arabluatex can process only Arabic for the time being. More languages will be included in future releases of arabluatex.

In comparison to arabxetex, arabluatex works in a very different way. The former relies on the [TECKit](#) engine which converts Arab $\TeX$  input on the fly into Unicode Arabic script, whereas the latter passes Arab $\TeX$  input on to a set of Lua functions. At first,  $\TeX$  commands are taken care of in different ways: some, as `\emph`, `\textbf` and the like are expected to have Arabic text as arguments, while others, as `\LR`, for “left-to-right text”, are not. Then, once what is Arabic is carefully separated from what is not, it is processed by other Lua functions which rely on different sets of correspondence tables to do the actual conversion in accordance with one’s wishes. Finally, Lua returns to  $\TeX$  the converted strings—which may in turn contain some other Arab $\TeX$  input yet to be processed—for further processing.

## 2 The basics of arabluatex

### 2.1 Activating arabluatex

As usual put in your preamble:

```
\usepackage{arabluatex}
```

The only requirement of arabluatex is Lua $\TeX$ ; it will complain if you try to compile your document with another engine. That aside, arabluatex does not load packages such as polyglossia or luabidi. It can work with polyglossia though, but does not require it.

**Font setup** If you wish to use your own Arabic font, you can define it before loading arabluatex. Assuming that fontspec is loaded, put this in your preamble just above the line that loads arabluatex:

```
\newfontfamily\arabicfont[Script=Arabic]{\fontname}
```

where `\fontname` is the standard name of the Arabic font you wish to use.

By default, if no Arabic font is selected, arabluatex will issue a warning message and attempt to load the Amiri font<sup>5</sup> like so:—

```
\newfontfamily\arabicfont[Script=Arabic]{Amiri}
```

REM. By default Amiri places the *kasra* in combination with the *tašdid* below the consonant, like so:  $\text{ك}$ . This is correct, as at least in the oldest manuscripts  $\text{ك}$  may stand for  $\text{ك}$  as well as  $\text{ك}$ . See Wright (1896, i.14.C–D). The placement of the *kasra* above the consonant may be obtained by selecting the `ss05` feature of the Amiri font, like so:—<sup>6</sup>

```
\newfontfamily\arabicfont[Script=Arabic,RawFeature={+ss05}]{Amiri}
```

Other Arabic fonts may behave differently.

<sup>4</sup>To date, both packages support Arabic, Maghribi, Urdu, Pashto, Sindhi, Kashmiri, Uighuric and Old Malay; in addition to these, arabxetex also has a Hebrew mode, including Judeo-Arabic and Yiddish.

<sup>5</sup>Hosny (2015).

<sup>6</sup>See the documentation of amiri, Hosny (2015, p. 5).

## 2.2 Options

arabxet may be loaded with four mutually exclusive global options, each of which may be overridden at any point of the document (see below section 2.3.1 on the following page):

voc default

In this mode, which is the one selected by default, every short vowel written generates its corresponding diacritical mark: *ḍamma* (◌ُ), *fatha* (◌َ) and *kasra* (◌ِ). If a vowel is followed by ⟨*uN*, *aN*, *iN*⟩, then the corresponding *tanwīn* (◌ْ, ◌̣, ◌̤ or ◌̥) is generated. Finally, ⟨*u*, *a*, *i*⟩ at the commencement of a word indicate a “connective ‘alif” (*‘alifu* *’l-waşli*), but voc mode does not show the *waşla* above the ‘alif; instead, the accompanying vowel is expressed (◌ِ ◌̣ ◌̤ ◌̥).

fullvoc In addition to what the voc mode does, fullvoc expresses the *sukūn* and the *wasla*.

None of the diacritics is showed in novoc mode, unless otherwise specified (see “quoting” technique below [section 4.4](#) on [page 16](#)).

This mode transliterates the Arab<sub>TEX</sub> input into one of the accepted standards. At present, two standards are supported (see below section 6 on page 21 for more details):

**dmg** *Deutsche Morgenländische Gesellschaft*, which is selected by default;

**loc** *Library of Congress.*

More standards will be included in future releases of arabluatex.

### 2.3 Typing Arabic

\arb Once arabuatex is loaded, a command `\arb{Arabic text}` is available for inserting Arabic text in paragraphs, like so:—

1 From \textcite[i. 1 A]{Wright}:--- Arabic, like Hebrew and  
2 Syriac, is written and read from right to left. The letters  
3 of the alphabet (\arb{.hurUfu 'l-hijA'i}, \arb{.hurUfu  
4 'l-tahajjI}, \arb{al-.hurUfu 'l-hijA'iyyaTu}, or \arb{.hurUfu  
5 'l-mu`jami}) are twenty-eight in number and are all  
6 consonants, though three of them are also used as vowels  
7 (see §~3).

From Wright (1896, i. 1 A):— Arabic, like Hebrew and Syriac, is written and read from right to left. The letters of the alphabet (أحرف الهجاء, حروف التهجي, الحروف) are twenty-eight in number and are all consonants, though three of them are also used as vowels (see § 3).

arab      Running paragraphs of Arabic text should rather be placed inside an *Arabic environment*

```

1 \begin{arab}
2 [...]
3 \end{arab}

```

like so:—

```

1 \begin{arab}
2 'at_A .sadIquN 'il_A ju.hA ya.tlubu min-hu .himAra-hu
3 li-yarkaba-hu fI safraTiN qa.siraTiN. wa-qAla la-hu:
4 \enquote{sawfa 'u`Idu-hu 'ilay-ka fI 'l-masA'i
5 wa-'adfa`u la-ka 'ujraTaN.} fa-qAla ju.hA:
6 \enquote{'anA 'AsifuN jiddaN 'annI lA 'asta.tI`u 'an
7 'u.haqqiqa la-ka .garbata-ka fa-'l-.himAru laysa hunA
8 'l-yawma.} wa-qabla 'an yutimma ju.hA kalAma-hu bada'a
9 'l-.himAru yanhaqu fI 'i.s.tabili-hi. fa-qAla la-hu
10 .sadIqu-hu: \enquote{'innI 'asma`u .himAra-ka yA ju.hA
11 yanhaqu.} fa-qAla la-hu ju.hA: \enquote{.garIbuN
12 'amru-ka yA .sadIqI 'a-tu.saddiqu 'l-.himAra
13 wa-tuka_d_dibu-nI?}
14 \end{arab}

```

أَتَى صَدِيقٌ إِلَى جَحَا يَطْلُبُ مِنْهُ حِمَارَهُ لِيَرْكَبَهُ فِي سَفَرَةٍ قَصِيرَةٍ. وَقَالَ لَهُ: "سَوْفَ أُعِيدُهُ إِلَيْكَ فِي الْمَسَاءِ  
وَأَدْفَعُ لَكَ أُجْرَةً." فَقَالَ جَحَا: "أَنَا آسَفٌ جِدًّا أَنِّي لَا أُسْتَطِيعُ أَنْ أَحَقِّقَ لَكَ غَرَبَتَكَ فَالْحِمَارُ لَيْسَ هُنَا  
الْيَوْمَ." وَقَبْلَ أَنْ يُتِمَّ جَحَا كَلَامَهُ بَدَأَ الْحِمَارُ يَنْهَقُ فِي إِصْطِلِلِهِ. فَقَالَ لَهُ صَدِيقُهُ: "إِنِّي أَسْمَعُ حِمَارَكَ يَا جَحَا  
يَنْهَقُ." فَقَالَ لَهُ جَحَا: "غَرِيبُ أَمْرِكَ يَا صَدِيقِي أَتَصَدِّقُ الْحِمَارَ وَتُكَذِّبُنِي؟"

### 2.3.1 Local options

As seen above in section 2.2 on page 5, arabluatex may be loaded with four mutually exclusive global options: `voc` (which is the default option), `fullvoc`, `novoc` and `trans`. Whatever choice has been made globally, it may be overridden at any point of the document, as the `\arb` command may take any of the `voc`, `fullvoc`, `novoc` or `trans` modes as optional arguments, like so:—

```

voc      - \arb[voc]{\langle Arabic text \rangle};
fullvoc  - \arb[fullvoc]{\langle Arabic text \rangle};
novoc    - \arb[novoc]{\langle Arabic text \rangle};
trans    - \arb[trans]{\langle Arabic text \rangle}.

```

The same optional arguments may be passed to the environment `arab`: one may have `\begin{arab}[\langle mode \rangle] \dots \end{arab}`, where `\langle mode \rangle` may be any of `voc`, `fullvoc`, `novoc` or `trans`.

### 3 Standard ArabTeX input

#### 3.1 Consonants

Table 1 gives the ArabTeX equivalents for all of the Arabic consonants.

Letter	Transliteration <sup>7</sup>		ArabTeX notation
	dmg	loc	
ا <sup>8</sup>	<i>a</i>	<i>a</i>	a
ب	<i>b</i>	<i>b</i>	b
ت	<i>t</i>	<i>t</i>	t
ث	<i>ṭ</i>	<i>th</i>	_t
ج	<i>ǧ</i>	<i>j</i>	^g or j
ح	<i>ḥ</i>	<i>ḥ</i>	.h
خ	<i>ḫ</i>	<i>kh</i>	_h or x
د	<i>d</i>	<i>d</i>	d
ذ	<i>ḍ</i>	<i>dh</i>	_d
ر	<i>r</i>	<i>r</i>	r
ز	<i>z</i>	<i>z</i>	z
س	<i>s</i>	<i>s</i>	s
ش	<i>š</i>	<i>sh</i>	^s
ص	<i>ṣ</i>	<i>ṣ</i>	.s
ض	<i>ḍ</i>	<i>ḍ</i>	.d
ط	<i>ṭ</i>	<i>ṭ</i>	.t
ظ	<i>ẓ</i>	<i>ẓ</i>	.z
ع	<i>ʿ</i>	<i>ʿ</i>	`
غ	<i>ǧ</i>	<i>gh</i>	.g
ف	<i>f</i>	<i>f</i>	f
ق	<i>q</i>	<i>q</i>	q
ك	<i>k</i>	<i>k</i>	k
ل	<i>l</i>	<i>l</i>	l
م	<i>m</i>	<i>m</i>	m
ن	<i>n</i>	<i>n</i>	n
ه	<i>h</i>	<i>h</i>	h
و	<i>w</i>	<i>w</i>	w
ي	<i>y</i>	<i>y</i>	y
ة	<i>a</i>	<i>ah</i>	T

Table 1: Standard ArabTeX (consonants)

<sup>7</sup>See below section 6 on page 21.

<sup>8</sup>For 'alif as a consonant, see Wright (1896, i. 16 D).

## 3.2 Vowels

### 3.2.1 Long vowels

Table 2 gives the ArabTeX equivalents for the Arabic long vowels.

Letter	Transliteration <sup>9</sup>		ArabTeX notation
	dmg	loc	
ا	$\bar{a}$	$\bar{a}$	A
و	$\bar{u}$	$\bar{u}$	U
ي	$\bar{i}$	$\bar{i}$	I
آ <sup>10</sup>	$\bar{a}$	$\acute{a}$	_A or Y
أ	$\bar{a}$	$\bar{a}$	_a
أ	$\bar{u}$	$\bar{u}$	_u
أ	$\bar{i}$	$\bar{i}$	_i

Table 2: Standard ArabTeX (long vowels)

REM. *a*. The long vowels  $\bar{a}$ ,  $\bar{u}$ ,  $\bar{i}$ , otherwise called *hurūfu 'l-maddi*, the letters of prolongation, involve the placing of the short vowels *a*, *u*, *i* before the letters ا, و, ي respectively. arablutex does that automatically in case any from `voc`, `fullvoc` or `trans` modes is selected e.g. قَالَ *qāla*, قِيلَ *qīla*, يَقُولُ *yaqūlu*.

REM. *b*. Defective writings, such as ا, *al-'alifu 'l-mahḍūfatu*, or defective writings of  $\bar{u}$  and  $\bar{i}$  are encoded \_a \_u and \_i respectively, e.g. \_d\_alika ذَلِكَ, al-mal\_a'ikaTu 'l-ra.hm\_anu الْمَلِكُ الرَّحْمَنُ, .hu\_dayfaTu bnu 'l-yamAn\_i الْحَذِيفَةُ بْنُ الْيَمَانِ for *Ḥuḍayfatu bnu 'l-Yamānī*, etc.

### 3.2.2 Short vowels

Table 3 gives the ArabTeX equivalents for the Arabic short vowels.

Letter	Transliteration <sup>11</sup>		ArabTeX notation
	dmg	loc	
ا	<i>a</i>	<i>a</i>	a
و	<i>u</i>	<i>u</i>	u
ي	<i>i</i>	<i>i</i>	i
اَ	<i>an</i>	<i>an</i>	aN
وَ	<i>un</i>	<i>un</i>	uN
يَ	<i>in</i>	<i>in</i>	iN

Table 3: Standard ArabTeX (short vowels)

<sup>9</sup>See below section 6 on page 21.

<sup>10</sup>= *al-'alifu 'l-maqṣūratu*.

<sup>11</sup>See below section 6 on page 21.



Whether Arabic texts be vocalized or not is essentially a matter of personal choice. So one may use voc mode and decide not to write vowels except at some particular places for disambiguation purposes, or use novoc mode, not write vowels—as novoc normally does not show them—except, again, where disambiguation is needed.<sup>12</sup>

However, it may be wise to always write the vowels, leaving to the various modes provided by arabluatex to take care of showing or not showing the vowels.

That said, there is no need to write the short vowels *fatha*, *damma* or *kasra* except in the following cases:

- at the commencement of a word, to indicate that a connective ‘*alif*’ is needed, with the exception of the article (see below section 4.4 on page 16);
- when arabluatex needs to perform a contextual analysis to determine the carrier of the *hamza*;
- in the various transliteration modes, as vowels are always expressed in romanized Arabic.

## 4 arabluatex in action

### 4.1 The vowels and diphthongs

**Short vowels** As said above, they are written ⟨*a*, *u*, *i*⟩:

\_halaqa (or xalaqa) خَلَقَ *halaqa*, ^samsuN شَمْسٌ *samsun*, karImuN كَرِيمٌ *Karimun*.

bi-hi بِهٍ *bi-hi*, 'aqi.tuN أَقِطْ *'aqiṭun*.

la-hu لَهُ *la-hu*, .hujjaTuN حُجَّةٌ *huḡḡatun*.

**Long vowels** They are written ⟨*U*, *A*, *I*⟩:

qAla قَالَ *qāla*, bI`a بَاعَ *bī'a*, .tUruN طُورٌ *tūrun*, .tInuN طِينٌ *ṭinun*,  
murU'aTuN مَرْوَةٌ *murū'atun*.

**‘*alif maqṣūra*** It is written ⟨*\_A*⟩ or ⟨*Y*⟩:

a1-fat\_A الْفَتَى *al-fatā*, a1-maqh\_A الْمَقْهَى *al-maqhā*, 'i1\_A إِلَى *'ilā*.

**‘*alif otiosum*** Said ‘*alifu*’ *l-wiqāyati*, “the guarding ‘*alif*”, after و at the end of a word, both when preceded by *damma* and by *fatha* is written ⟨*UA*⟩ or ⟨*aW*, *aWA*⟩:

na.sarUA نَصَرُوا *naṣarū*, katabUA كَتَبُوا *katabū*, ya.gzUA يَغْزُوا *yaḡzū*,  
ramaW رَمَوْا *ramaw*, banaWA بَنَوْا *banaw*.

<sup>12</sup>See below section 4.4 on page 16.

**‘alif maḥdūfa and defective ū, ī** They are written ⟨\_a, \_i \_u⟩:

al-l\_ahu اللهُ *al-lāhu*, 'il\_ahuNإله *ilāhun*.  
 al-ra.hm\_anuالرَّحْمَنُ *ar-raḥmānu*, l\_akinلَٰكِن *lākin*, h\_ahunAهَٰهُنَا *hāhunā*,  
 .hunaynu bnu 'is.h\_aqaحَنِينُ بْنُ إِسْحَاقَ *Hunaynu bnu 'Ishāqa*, rabb\_i  
 رَبِّ *rabbī*, al-`A.s\_iالْعَاصِ *al-‘Āṣī*.

**Silent ي/و** Some words ending with َء are usually written حَوَّة or حَوَة instead of َء: see Wright (1896, i. 12 A). arabluatex preserves this particular writing; the same applies to words ending in يَّة for َء. Long vowels ⟨U, I⟩ shall receive no *sukūn* after a ‘alif maḥdūfa and are discarded in trans mode:

.hay\_aUTuNحَيَوَة *hayātun*, .sal\_aUTuNصَلَوَة *ṣalātun*, mi^sk\_aUTuN  
 مَشْكَوَة *miškātun*, tawr\_aITuNتَوْرِيَة *tawrātun*.

And so also: al-rib\_aITuالرِّبْيَة *ar-ribātu*

**‘Amrun, and the silent و** To this name a silent و is added to distinguish it from ‘Umarun: see Wright (1896, i. 12 C). In no way this affects the sound of the *tanwīn*, so it has to be discarded in trans mode:

`amruNUعَمْرُو *‘amrun*, `amraNUعَمْرُوا *‘amran*, `amriNUعَمْرُو *‘amrin*.

When the *tanwīn* falls away (Wright 1896, i. 249 B): `amruU bnu mu.hammadinعَمْرُو بْنُ مُحَمَّدٍ *‘Amru bnu Muḥammadin*, mu.hammadu bnu `amriU bni \_hAlidinعَمْرُو بْنُ خَالِدٍ *Muḥammadu bnu ‘Amri bni Ḥālidin*.

And so also: al-rib\_aUAالرِّبَا *ar-ribā*, ribaNUرِبَا *riban*.

**tanwīn** The marks of doubled short vowels, َـ, ِـ, ُـ, are written ⟨uN, aN, iN⟩ respectively. arabluatex deals with special cases, such as َ taking an | after all consonants except ة, and *tanwīn* preceding ى as in هُدًى, which is written ⟨aN\_A⟩ or ⟨aN\_Y⟩:

mAluNمَالٌ *mālun*, bAbaNبَابًا *bāban*, madInaTaNمَدِينَةً *madīnatan*, bintinبِنْتٍ *bintin* maqhaN\_Aمَقَاهِي *maqḥan*, fataNYفَتًى *fataṇ*.

arabluatex is aware of special orthographies: ^say'uNشَيْءٌ *šay’un*, ^say'anشَيْئًا *šay’an*, ^say'inشَيْءٍ *šay’in*.

## 4.2 Other orthographic signs

**tā' marbūṭa** It is written ⟨T⟩:

madInaTuN مَدِينَةٌ *madīnatun*, madInaTaN مَدِينَةٌ *madīnatan*, madInaTiN مَدِينَةٍ *madīnatin*.

**hamza** It is written ⟨'⟩, its carrier being determined by contextual analysis. In case one wishes to bypass this mechanism, he can use the “quoting” feature that is described below in section 4.4 on page 16.

**Initial hamza:** 'asaduN أَسَدٌ *'asadun*, 'u\_htuN أُخْتُ *'uhtun*, 'iqlIduN إِقْلِيدٌ *'iqlīdun*, 'anna أَنْ *'anna*, 'inna إِنْ *'inna*.

hamza followed by the long vowel و is encoded '\_U: '\_U1\_A أُولَى *'ulā*, '\_U1U أُولُو *'ulū*, '\_U1A' ika أُولَئِكَ *'ulā'ika*.

hamza followed by the long vowel ي is encoded '\_I: '\_ImAnuN إِيْمَانٌ *'imā-nun*.

**Middle hamza:** xA.ti'Ina خَاطِئِينَ *hāṭi'ina*, ru'UsuN رُؤُوسٌ *ru'ūsun*, xa.tI'aTuN خَاطِئَةً *hāṭi'atun*, su'ila سُئِلَ *su'ila*, 'as'ilaTuN أَسْئَلَهُ *'as'ilatun*, mas'alaTuN مَسْأَلَهُ *mas'alatun*, 'as'alu أَسْأَلَ *'as'alu*, yataSa'alUna يَتَسَاءَلُونَ *yatasā'alūna*, murU'aTuN مُرُوءَةٌ *murū'atun*, ta'xIruN تَأْخِيرٌ *ta'hīrun*, ta'axxara تَأْخَرُ *ta'aḥḥara*, ji'tu-ka جِئْتُكَ *gi'tu-ka*, qA'iluN قَائِلٌ *qā'ilun*.  
From Wright (1896, i. 14 B):— All consonants, whatsoever, not even 'alif hēmzatum excepted, admit of being doubled and take *tašdid*. Hence we speak and write ra'AsuN رَأْسٌ *ra'āsun*, sa'AluN سَأَلَ *sa'ālun*, na'AjuN نَأَجٌ *na'aḡun*.

**Final hamza:** xa.ta'uN خَطَأٌ *ḥaṭa'un*, xa.ta'aN خَطَأٌ *ḥaṭa'an*, xa.ta'iN خَطِئًا *ḥaṭa'in*, 'aqra'u أَقْرَأُ *'aqra'u*, taqra'Ina تَقْرَأِينَ *taqra'ina*, taqra'Una تَقْرَأُونَ *taqra'ūna*, yaqra'na يَقْرَأْنَ *yaqra'na*, yaxba'Ani يَخْبَأَنِ *yahba'āni*, xaba'A خَبَأَ *ḥaba'a*, xubi'a خُبِيَ *hubi'a*, xubi'UA خُبُوا *hubi'ū*, jA'a جَاءَ *ḡā'a*, ridA'uN رَدَأَ *ridā'un*, ridA'aN رَدَأَ *ridā'an*, jI'a جِئَ *ḡī'a*, radI'in رَدِيَ *radī'in*, su'uN سُوءٌ *sū'un*, .daw'uN دَوُّ *daw'un*, qay'in قِيَ *qay'in*.

^say'uN شَيْءٌ šay'un, ^say'aN شَيْئاً šay'an, ^say'iN شَيْئِي šay'in, al-^say'u  
 الشَّيْءُ aš-šay'u, 'a^syA'u أَشْيَاءُ ašyā'u, 'a^syA'a أَشْيَاءُ ašyā'a, .zim'an  
 ظِمْنًا zim'an.

**taḥfīfu 'l-hamzati:** if the *hamza* has *ḡazma* and is preceded by 'alifhamza-  
 tum, it must be changed into the letter of prolongation that is homoge-  
 neous with the preceding vowel; hence: 'a'mana آمَنَ āmana, 'u'minu  
 أُؤْمِنُ ūminu, 'i'manuN إِيْمَانٌ īmānun. For other possible ways of encod-  
 ing such sequences, see on page 11 (*hamza* followed by و and ي) and the  
*madda* on the current page.

**madda** At the beginning of a syllabe, 'alif with *hamza* and *fathḥa* (أ) followed by 'alifu  
 'l-maddi ('alif of prolongation) or 'alif with *hamza* and *ḡazma* (إ) are both represented  
 in writing 'alif with *madda*: آ (see Wright 1896, i. 25 A–B).

Hence one should keep to this distinction and encode 'a'kuLu أَكُلُ ākulu and  
 'Akilun أَكِلُ ākilun respectively.

arabluatex otherwise determines *al-'alifu 'l-mamdūdatu* by context analysis.

'is'AduN إِسَادٌ is'ādun, 'AkilUna أَكِلُونُ ākilūna, 'a'manna آمَنَّا āmannā,  
 al-qur'Anu الْقُرْآنُ al-qur'ānu.  
 jA'a'gā'gā'a, yataSa'alUna يَتَسَاءَلُونَ yatasā'alūna, riDA'uN رِدَاءُ ridā'un,  
 xaba'A حَبَا'ā, yaxba'Ani يَخْبَأُ yahba'āni.

**šadda** *tašdīd* is either *necessary* or *euphonic*.

**The necessary *tašdīd*** always follows a vowel, whether short or long (see Wright  
 1896, i. 15 A–B). It is encoded in writing the consonant that carries it twice:

`allaqa عَلَّقَ allaqa, mAdduN مَادَّ māddun, 'ammara أَمَّرَ ammara, murrun  
 مُرَّرَ murrun.

**The euphonic *tašdīd*** always follows a vowelless consonant which is passed over  
 in pronunciation and assimilated to a following consonant. It may be found (Wright  
 1896, i. 15 B–16 C):—

(a) With the *solar* letters ت, ث, د, ذ, ر, ز, س, ش, ص, ض, ط, ظ, ل, ن, after the article أَلْ:—

Unlike arabtex and arabxetex, arabluatex never requires the solar letter to be  
 written twice, as it automatically generates the euphonic *tašdīd* above the let-

ter that carries it, whether the article be written in the assimilated form or not, e.g. al-<sup>^</sup>samsu الشَّمْسُ aš-šamsu, or a<sup>^</sup>s-<sup>^</sup>samsu الشَّمْسُ aš-šamsu.

al-tamru التَّمْرُ at-tamru, al-ra.hm\_anu الرَّحْمَنُ ar-raḥmānu, al-.zulmu الظُّلْمُ az-ẓulmu, al-lu.gaTu اللُّغَةُ al-luḡatu.

- (b) With the letters ر, ل, م, و, ي after ن with ḡazma, and also after the tanwīn:—

Note the absence of *sukūn* above the passed over ن in the following examples, each of which is accompanied with a consistent transliteration:

min rabbi-hi مِنْ رَبِّيَّةِ, mir rabbi-hi, min laylin مِنْ لَيْلٍ mil laylin, 'an yaqtula أَنْ يَقْتُلَ ay yaqtula.

With tanwīn: kitAbuN mubInuN كِتَابٌ مُبِينٌ kitābum mubīnun.

- (c) With the letter ت after the dentals ث, د, ذ, ط, ض, ظ in certain parts of the verb: this kind of assimilation, e.g. لَبِثْتُ for لَبِثْتُ labiṭtu, will be discarded here, as it is largely condemned by the grammarians (see Wright 1896, i. 16 B–C).

**The definite article and the 'alifu 'l-waṣli** At the beginning of a sentence, ا is never written, as الحمد لله; instead, to indicate that the 'alif is a connective 'alif ('alifu 'l-waṣli), the hamza is omitted and only its accompanying vowel is expressed:

al-.hamdu li-l-l\_ahi اَلْحَمْدُ لِلّٰهِ al-ḥamdu li-llāhi.

As said above on page 5, fullvoc is the mode in which arabluatex expresses the *sukūn* and the *waṣla*. arabluatex will take care of doing this automatically provided that the vowel which is to be absorbed by the final vowel of the preceding word is properly encoded, like so:—

- (a) Definite article at the beginning of a sentence is encoded `al-`, or `a<solar letter>-` if one wishes to mark the assimilation—which is in no way required, as arabluatex will detect all cases of assimilation.
- (b) Definite article inside sentences is encoded `'l-` or `'<solar letter>-`.
- (c) In all remaining cases of elision, the 'alifu 'l-waṣli is expressed by the vowel that accompanies the omitted hamza: ⟨u, a, i⟩.

**Article:** baBu 'l-madrasaTi الْمَدْرَسَةُ bābu 'l-madrasati, al-maqAlaTu

'l-'\_U1\_A الْمَقَالَةُ al-maqālatu 'l-'ulā, al-lu.gaTu 'l-'arabiyyaTu فِي صِنَاعَةِ الْعَرَبِيَّةِ al-luḡatu 'l-'arabiyyatu, fI .sinA`aTi 'l-.tibbi فِي صِنَاعَةِ الطِّبِّ fī šinā'ati 't-tibbi, 'il\_A 'l-intiqA.di إِلَى الْإِنْتِقَاضِ 'ila 'l-intiqādi, fI 'l-ibtida'i فِي الْإِبْتِدَاءِ fī 'l-ibtidā'i, 'abU 'l-wazIri أَبُو الْوَزِيرِ abu



ramaW 'l-.hiJAraTa رَمَوْا الْحِجَارَةَ ramawu 'l-ḥiğārata, fa-lamma ra'aW 'l-najma  
فَلَمَّا رَأَوْا النِّجْمَ fa-lammā ra'awu 'n-nağma.

**'alifu 'l-waṣli preceded by a consonant with sukūn** The vowel which the consonant takes is either its original vowel, or that which belongs to the connective 'alif or the kasra; in most of the cases (Wright 1896, i. 22 A–C), it is encoded explicitly, like so:—

'antumū 'l-ka\_dibUnā أَنْتُمْ الْكَاذِبُونَ 'antumū 'l-kāḏibūna, ra'aytumū  
'l-rajula رَأَيْتُمُ الرَّجُلَ ra'aytumū 'r-rağula, mani 'l-ka\_d\_dAbu مَنِ  
الْكَذَّابِ mani 'l-kaddābu, qatalati 'l-rUmu قَتَلَتِ الرُّومُ qatalati 'r-Rūmu.

However, the Arabic script does not show the *kasra* which is taken by the nouns having *tanwīn* although it is explicit in pronunciation and must appear in some transliteration standards. arabluatex takes care of this automatically:—

mu.hammaduN 'l-nabI مُحَمَّدُ النَّبِيّ Muḥammaduni 'n-nabī.

### 4.3 Special orthographies

**The name of God** The name of God, اللَّهُ, is compounded of the article اَلْ, and إِلَٰه (noted إِلَٰه with the defective 'alif) so that it becomes اِلَٰلَٰه; then the *hamza* is suppressed, its vowel being transferred to the ل before it, so that there remains اَلله (I refer to Lane, *Lexicon*, I. 83 col. 1). Finally, the first ل is made quiescent and incorporated into the other, hence the *tašdīd* above it. As arabluatex never requires a solar letter to be written twice (see above, on page 12), the name of God is therefore encoded a1-l\_ahu or 'l-l\_ahu:—

a1-l\_ahu اَلله al-lāhu, yA |<sup>14</sup> a1-l\_ahu يَا اَلله yā al-lāhu, 'a-fa |<sup>15</sup> -a1-l\_ahi  
la-ta.g`alanna لَتَعْلَنَّ اَفَالله 'a-fa-al-lāhi la-tag`alanna, bi-'l-l\_ahi  
بِاَلله bi-'l-lāhi, wa-'l-l\_ahi وَالله wa-'l-lāhi, bi-smi 'l-l\_ahi بِسْمِ اَلله bi-  
smi 'l-lāhi, a1-.hamdu li-l-l\_ahi اَلْحَمْدُ لِلّٰهِ al-ḥamdu li-llāhi, li-l-l\_ahi  
'l-qA' ilu اَللّٰهُ الْقَائِلُ li-llāhi 'l-qā'ilu.

**The conjunctive اَلَّذِي** Although it is compounded of the article اَلْ, the demonstrative letter ل and the demonstrative pronoun ذَا, both masculine and feminine forms that are written defectively are encoded a1la\_dI and a1latI respectively. Forms starting with the connective 'alif are encoded 'l1a\_dI and 'l1atI:—

<sup>14</sup>Note the “pipe” character '|' here after yA and below after fa before footnote mark 15: it is needed by the dmḡ transliteration mode as in this mode any vowel at the commencement of a word preceded by a word that ends with a vowel, either short or long, is absorbed by this vowel viz. 'ala 't-ṭarīqi. See section 4.5 on page 19 on the “pipe” and section 6 on page 21 on dmḡ mode.

<sup>15</sup>See footnote 14.

أَخَافُ مِنَ الْمَلِكِ الَّذِي يَظْلِمُ النَّاسَ 'a\_hAfu mina 'l-maliki 'lla\_dI ya.zlimu 'l-nAsa  
 عُدْتُ الشَّيْخَ الَّذِي هُوَ مَرِيضٌ 'l-^say\_ha 'lladI huwa marI.duN  
 مَا أَنَا بِالَّذِي قَاتِلُكَ شَيْئًا mā 'anā bi-'lla\_dI qA'iluN la-ka  
 'ari-na 'lla\_dayni 'a.dallA-nA mina 'l-jinni wa-'l-'insi  
 أَرِنَا الَّذِينَ أَضَلَّانَا مِنَ الْجِنَّ وَالْإِنْسِ 'ari-nā 'lla\_dayni 'aḍallā-nā mina 'l-ḡinni wa-'l-'insi.

The other forms are encoded regularly as a1-l or 'l-l:—

فَأَنَا نَذْكُرُ الصَّوْتَيْنِ اللَّذَيْنِ رَوَيْنَاهُمَا عَنْ بَحْظَةَ 'an ja.h.zaTa  
 فَأَنَا نَذْكُرُ الصَّوْتَيْنِ اللَّذَيْنِ رَوَيْنَاهُمَا عَنْ بَحْظَةَ fa-'innā naḍkuru 'ṣ-  
 sawtayni 'l-laḍayni rawaynā-humā 'an Ḡaḥẓata.

And also: al-la\_dAni اللَّذَانِ al-laḍāni, al-la\_dayni اللَّذَيْنِ al-laḍayni,  
 al-latAni اللَّتَانِ al-latāni, al-latayni اللَّتَيْنِ al-latayni, al-latI اللَّاتِي al-  
 lātī, al-lA' |Ati<sup>16</sup> اللَّاءَاتِ al-lā'āti, al-lA' I اللَّاءِي al-lā'i, and so forth.

## 4.4 Quoting

It is here referred to “quoting” after the package arabtex.<sup>17</sup> The “quoting” mechanism of arabluatex is designed to be very similar in effect to the one of arabtex.

To start with an example, suppose one types the following in novoc mode: عِلْمَ علم  
 الهيئة; is it عِلْمَ, he was taught the science of astronomy, or عِلْمَ, he taught the science of as-  
 tronomy? In order to disambiguate this clause, it may be sensible to put a *damma* above  
 the first عِلْمَ, which is achieved by “quoting” the vowel u, like so: `u11ima,  
 or, with no other vowel than the required u: `u11m.

This is how the “quoting” mechanism works: metaphorically speaking, it acts as a *toggle switch*. If something, in a given mode, is supposed to be visible, “quoting” hides it; conversely, if it is supposed not to, it makes it visible.

As shown above, “quoting” means inserting one straight double quote (") *before* the letter that is to be acted upon. Its effects depend on the mode which is currently selected, either novoc, voc or fullvoc:—

novoc In this mode, “quoting” essentially means make visible something that ought not to be so.

<sup>16</sup>Note here the “pipe” character '|': as already stated on page 12, the sequence 'A usually encodes 'alif with *hamza* followed by 'alif of prolongation, which is represented in writing 'alif with *madda*: 'ā. The “pipe” character prevents this rule from being applied. See section 4.5 on page 19.

<sup>17</sup>See Lagally (2004, p. 22)



- (a) Quoting a vowel, either short or long, makes the *ḍamma*, *fatha* or *kasra* appear above the appropriate consonant:—

ʿullima ʿilma 'l-hay'aTi علم الهيئة 'ullima 'ilma 'l-hay'ati,  
ya.gz"UA يغزوا yağzū.

- (b) The same applies when “quoting” the *tanwīn*:—

wa-'inna sawfa tudriku-na 'l-manAya muqadd"araT"aN وَأَنَا  
wa-'innā sawfa tudriku-na 'l-manāyā muqaddaratan. سوف تدركنا المنيا مقدرةً

- (c) If no vowel follows the straight double quote, then a *sukūn* is put above the preceding consonant:—

qAla isma`" قال اسمع qāla 'sma', jA'at" hinduN جَاءَتْ هِنْدُ hinduN  
Hindun, ^sabIhuN bi-man q"u.ti`at" qadamA-hu شبيه بمن قُطِعَتْ  
šabihun bi-man quṭi'at qadamā-hu. قدماه

- (d) At the commencement of a word, the straight double quote is interpreted as 'alifu 'l-waṣli:—

wa-"ust"u`mila وأستعمل wa-'stu'mila, huwa "inhazama هو أنهزم huwa  
'nhazama, al-"intiqA.du الـانتقاض al-intiqādu.

voc In accordance with the general rule, in this mode, “quoting” makes the vowels and the *tanwīn* disappear, should this feature be required for some reason:—

- (a) Short and long vowels:—

q"Ala q"A' iluN قَالَ قَائِلٌ qāla qā'ilun, ibnu 'abI 'u.saybi`aT"a  
Ibnu 'Abī 'Uṣaybi'ata. ابن أبي أُصْبَيْعَةَ

- (b) *tanwīn*:—

madInaT"aN مَدِينَةٌ madīnatan, bAb"aN بَابًا bāban, hud"aN\_A هُدًى hudan,  
^say'"iN شَيْءٌ šay'in.

One may more usefully “quote” the initial vowels to write the *waṣla* above the 'alif or insert a straight double quote after a consonant not followed by a vowel to make the *sukūn* appear:—

- (a) 'alifu 'l-waṣli:—

fI "istisqA'a أَسْتَسْقَأُ فِي 'stisqā'a, wa-"istisqA'u وَأَسْتَسْقَأُ wa-'stisqā'u,  
qAla "uhrub fa-lan tuqtala قَالَ أَهْرُبُ فَلَنْ تُقْتَلَ qāla 'hrub fa-lan tuq-  
tala.

- (b) *sukūn*:—

qAla "uqtul" fa-lan tuqtala قَالَ أَقْتُلُ فَلَنْ تُقْتَلَ qāla 'qtul fa-lan tuq-  
tala, mA jA'at" mini imra'aTiN مِمَّا جَاءَتْ مِنْ إِمْرَأَةٍ mini



## 4.5 The “pipe” character (|)

In the terminology of ArabTeX, the “pipe” character ‘|’ is referred to as the “invisible consonant”. Hence, as already seen above in section 4.4.1 on page 18, its usage to encode the *hamza* alone, with no carrier: | " ' ء.

Aside from that usage, the “pipe” character is used to prevent almost any of the contextual analysis rules that are described above from being applied. Two examples have already been given to demonstrate how this particular mechanism works in footnote 14 on page 15 and in footnote 16 on page 16. One more example follows:—

bi-qraN|nUna بِقْرَانُونْ *bi-Qrānnūna*, “in Crannon” (Thessaly, Greece).<sup>19</sup>

As one can see, the “pipe” character between the two ⟨*n*⟩ prevents the necessary *tašdid* rule (page 12) from being applied.

## 4.6 Stretching characters: the *taṭwīl*

A double hyphen ⟨--⟩ stretches the ligature in which one letter is bound to another. Although it is always better to rely on automatic stretching, this technique may be used to a modest extent, especially to increase legibility of letters and diacritics which stand one above the other:—

.hunaynu bnu 'is.h--\_aqa حُنَيْنُ بْنُ إِسْحَاقَ *Hunaynu bnu 'Ishāqa*

## 4.7 Digits

### 4.7.1 Numerical figures

The *Indian numbers*, *ar-raqamu 'l-hindiyyu*, are ten in number, and they are compounded in exactly the same way as our numerals:—

1874 ١٨٧٤, 123-456, 789 ١٢٣-٤٥٦, ٧٨٩, fI sanaTi 1024 ١٠٢٤ فِي سَنَةِ

### 4.7.2 The *abjad*

The numbers may also be expressed with letters from right to left arranged in accordance with the order of the Hebrew and Aramaic alphabets (see Wright 1896, i. 28 B–C). The *'abjad* numbers are usually distinguished from the surrounding words by a stroke placed over them.

`\abjad` *'abjad* numbers are inserted with the command `\abjad{⟨number⟩}` in any of the `voc`, `fullvoc` and `novoc` modes, where ⟨*number*⟩ may be any number between 1 and 1999, like so:—

`\abjad{45}` kitAbu-hu fI 'l-`AdAti كِتَابُهُ فِي الْعَادَاتِ 45 *kitābu-hu fi 'l-`ādāti*.

<sup>19</sup>See more context on page 18.

REM. *a.* As can be seen in the above given example, arabluatex expresses the 'abġad numbers in Roman numerals if it finds the command \abjad in any of the transliteration modes.

REM. *b.* \abjad may also be found outside Arabic environments. In that case, arabluatex does not print the stroke as a distinctive mark over the number for it is not surrounded by other Arabic words. In case one nonetheless wishes to print the stroke, he can use the \aemph command that is described below in section 4.9:—

The \arb[trans]{ 'abjad} number for 1874 is \abjad{1874} The 'abġad number for 1874 is غضعد.

The \arb[trans]{ 'abjad} number for 1874 is \aemph{\abjad{1874}} The 'abġad number for 1874 is غَضْعَد.

## 4.8 Additional characters

In the manuscripts, the unpointed letters, *al-ḥurūfu 'l-muhmalatu*, are sometimes further distinguished from the pointed by various contrivances, as explained in Wright (1896, i. 4 B–C). One may find these letters written in a smaller size below the line, or with a dot or another mark below. As representing all the possible contrivances leads to much complexity and also needs to be agreed among scholars, new ways of encoding them will be proposed and gradually included as arabluatex will mature.

For the time being, the following is included:—

Letter	Transliteration <sup>20</sup>		ArabTeX notation
	dmg	loc	
ب	<i>ḅ</i>	<i>b</i>	.b
د	<i>ḍ</i>	<i>d</i>	^d
ف	<i>f̣</i>	<i>f</i>	.f
ق	<i>q̣</i>	<i>q</i>	.q
ك	<i>ḳ</i>	<i>k</i>	.k
ن	<i>ṇ</i>	<i>n</i>	.n
ⵍ	(	(	((
ⵍ	)	)	))

Table 5: Additional Arabic codings

'afAman . tUs Gal.(M) . fmn . n . ts (sic) Gal.(E1), أفامنطوس Gal.(M) فننطس (sic) Gal.(E1), 'afāmanṭūs Gal.(M) fmnṇṭs (sic) Gal.(E1).

## 4.9 Arabic emphasis

As already seen in section 4.7.2 on page 19, the 'abġad numbers are distinguished from the surrounding words by a stroke placed over them. This technique is used to distinguish further words that are proper names or book titles.

\aemph One may use the command \aemph{⟨Arabic text⟩} to use the same technique to emphasize words, like so:—

<sup>20</sup>See below section 6 on the next page.

`\abjad{45} : kitAbu-hu \aemph{fI 'l-`AdAti}` كِتَابُهُ فِي الْعَادَاتِ 45:م  
*kitābu-hu fi 'l-Ādāti.*

## 5 Special applications

**Linguistics** The same horizontal stroke as the *taṭwīl* (see section 4.6 on page 19) may be encoded  $\langle B \rangle$ ;  $\langle BB \rangle$  will receive the *tašdīd*. This is useful to make linguistic annotations and comments on vowels:—

Bu Ba Bi BuN BaN BiN ..... u a i un an in, BBu BBa BBi ..... u a i, B--aN  
 ُ an, B ..

## 6 Transliteration

It may be more appropriate to speak of “romanization” than “transliteration” of Arabic. As seen above in section 2.2 on pages 5–6, the “transliteration mode” may be selected globally or locally.

This mode transliterates the ArabTeX input into one of the accepted standards. As said above on page 5, two standards are supported at present:

**dmg** *Deutsche Morgenländische Gesellschaft*, which was adopted by the International Convention of Orientalist Scholars in Rome in 1935.<sup>21</sup> dmg transliteration convention is selected by default;

**loc** *Library of Congress*: this standard is part of a large set of standards for romanization of non-roman scripts adopted by the American Library Association and the Library of Congress.<sup>22</sup>

More standards will be included in future releases of arabluatex.

`\SetTranslitConvention` **Convention** The transliteration mode, which is set to dmg by default, may be changed at any point of the document by the command `\SetTranslitConvention{mode}`, where  $\langle mode \rangle$  may be either dmg or loc. This command is also accepted in the preamble should one wish to set the transliteration mode globally, eg.:—

```
1 \usepackage{arabluatex}
2 \SetTranslitConvention{loc}
```

`\SetTranslitStyle` **Style** Any transliterated Arabic text is printed in italics by default. This also can be changed either globally in the preamble or locally at any point of the document by the command `\SetTranslitStyle{style}`, where  $\langle style \rangle$  may be any font shape selection command, eg. `\upshape`, `\itshape`, `\slshape`, and so forth. Any specific font may also be selected using the font-selecting commands of the fontspec package.

<sup>21</sup>See Brockelmann et al. (1935).

<sup>22</sup>See <http://www.loc.gov/catdir/cpsd/roman.html> for the source document concerning Arabic language.

`\cap` **Proper names** Proper names or book titles that must have their first letters uppercased may be passed as arguments to the command `\cap{⟨word⟩}`. `\cap` is a clever command, for it will give the definite article *al-* in lower case in all positions. Moreover, if the initial letter, apart from the article, cannot be uppercased, viz. ‘ or ‘, the letter next to it will be uppercased:—

```
\cap{.hunaynu} bnu \cap{'is.h_aqa} حُنَيْنُ بْنُ إِسْحَقَ Hunaynu bnu
'Ishāqa, \cap{'u_tm_anu} عُثْمَنُ 'Uṭmānu, .daraba \cap{zaydu} bnu
\cap{_h_alidiN} \cap{sa`da} bna \cap{'awfi} bni \cap{'abdi}
\cap{'l-l_ahi} خَلْدٌ سَعْدُ بْنُ عَوْفٍ عَبْدِ اللَّهِ daraba Zaydu bnu
Hālidin Sa'da bna 'Awfi bni 'Abdi 'l-Lāhi.
```

However, `\cap` must be used cautiously in some very particular cases, for the closing brace of its argument may prevent a rule from being applied. To take an example, as seen above on page 15, the transliteration of مُحَمَّدُ النَّبِيُّ must be *Muḥammaduni 'n-nabī*, as nouns having the *tanwīn* take a *kasra* in pronunciation before ‘*alifu*’ *l-waṣli*. In this case, encoding مُحَمَّد like so: `\cap{mu.hammaduN}` is wrong, because the closing brace would prevent arabxatex from detecting the sequence ⟨-uN⟩ immediately followed by ⟨’-l⟩. Fortunately, this can be circumvented in a straightforward way by inserting only part of the noun in the argument of `\cap` viz. up to the first letter that is to be uppercased, like so: `\cap{m}u.hammaduN`.

## 6.1 Examples

Here follows in transliteration the story of Ġuḥā and his donkey (جُحَا وَحَمَارُهُ). See the code on page 6:—

**‘dmg’ standard:** ‘atā ṣadīqun ‘ilā Ġuḥā yaṭlubu min-hu ḥimāra-hu li-yarkaba-hu fī safratin qaṣīratin. wa-qāla la-hu: “sawfa ‘u’idu-hu ilay-ka fī ‘l-masā’i wa-’adfa’u la-ka ‘uḡratan.” fa-qāla Ġuḥā: “anā ‘āsifun ḡiddan ‘annī lā ‘aṣṭaṭī’u ‘an ‘uḥaqqiqa la-ka ḡarbata-ka fa-’l-ḥimāru laysa huna ‘l-yawma.” wa-qabla ‘ay yutimma Ġuḥā kalāma-hu bada’a ‘l-ḥimāru yanhaqu fī ‘iṣṭabili-hi. fa-qāla la-hu ṣadīqu-hu: “innī ‘asma’u ḥimāra-ka yā Ġuḥā yanhaqu.” fa-qāla la-hu Ġuḥā: “ḡarībun ‘amru-ka yā ṣadīqī ‘a-tuṣaddiqu ‘l-ḥimāra wa-tukaddibu-nī?”

**‘loc’ standard:** atā ṣadīqun ilā Juḥā yaṭlubu min-hu ḥimāra-hu li-yarkaba-hu fī safratin qaṣīratin. wa-qāla la-hu: “sawfa u’idu-hu ilay-ka fī al-masā’i wa-adfa’u la-ka ujratan.” fa-qāla Juḥā: “anā āsifun jiddan annī lā aṣṭaṭī’u an uḥaqqiqa la-ka ḡarbata-ka fa-al-ḥimāru laysa hunā al-yawma.” wa-qabla an yutimma Juḥā kalāma-hu bada’a al-ḥimāru yanhaqu fī iṣṭabili-hi. fa-qāla la-hu ṣadīqu-hu: “innī asma’u ḥimāra-ka yā Juḥā yanhaqu.” fa-qāla la-hu Juḥā: “ḡharībun amru-ka yā ṣadīqī a-tuṣaddiqu al-ḥimāra wa-tukadhdhibu-nī?”

## 7 L<sup>A</sup>T<sub>E</sub>X Commands in Arabic environments

**General principle**  $\text{\LaTeX}$  commands are accepted in Arabic environments. The general principle which applies is that single-argument commands ( $\backslash\text{command}\{\langle arg \rangle\}$ ) such as  $\backslash\text{emph}\{\langle text \rangle\}$ ,  $\backslash\text{textbf}\{\langle text \rangle\}$  and the like, are assumed to have Arabic text as their arguments:—

$\backslash\text{abjad}\{45\}$  kitAbu-hu  $\backslash\text{emph}\{\text{fi } 'l-\text{\textasciicircum{c}}\text{AdAti}\}$  مَهْ كِتَابُهُ فِي  
لَعَادَاتٍ 45 kitābu-hu fi 'l-Ādātī.<sup>23</sup>

The same applies to footnotes:—

```
1 \renewcommand{\footnoterule}%
2   {\hfill\noindent\rule[1mm]{.4\textwidth}{.15mm}}
3 \begin{arab}
4 'inna 'abI kAna mina 'l-muqAtilaTi\footnote{al-muqAtilaTi:
5 al-muqAtilIna.}, wa-kAnat 'ummi min `u.zamA'i buyUti
6 'l-zamAzimaTi\footnote{al-zamAzimaTu: .tA'ifaTu mina
7 'l-fursi.}.
8 \end{arab}
```

إِنَّ أَيْ كَانَ مِنَ الْمُقَاتِلَةِ، وَكَانَتْ أُمِّي مِنْ عُظَمَاءِ بُيُوتِ الزَّمَازِمَةِ -

المُقاتلة: المُقاتِلين -  
الزَّمَازِمَةُ: طَائِفَةٌ مِنَ الْفُرْسِ -

Some commands, however, do not expect running text in their arguments, or one may wish to insert English text eg. in footnotes or in marginal notes. arabluatex provides a set of commands to handle such cases.

$\backslash\text{LR}\{\langle arg \rangle\}$  is designed to typeset its argument from left to right. It may be used in an Arabic environment, either  $\backslash\text{arb}\{\langle Arabic\ text \rangle\}$  or  $\backslash\text{begin}\{\text{arab}\}\langle Arabic\ text \rangle\backslash\text{end}\{\text{arab}\}$ , for short insertions of left-to-right text, or to insert any  $\text{\LaTeX}$  command that would otherwise be rejected by arabluatex, such as commands the argument of which is expected to be a dimension or a unit of measurement.

$\backslash\text{RL}\{\langle arg \rangle\}$  does the same as  $\backslash\text{LR}\{\langle arg \rangle\}$ , but typesets its argument from right to left. Even in an Arabic environment, this command may be useful.

For example, to distinguish words with a different color, one may proceed like so:—

```
1 \begin{arab}
2 _tumma "intalaqa _dU 'l-qarnayni 'il_A 'ummaTiN 'u_hr_A fi
3 \LR{\textcolor{red}\arb[fullvoc]{((ma.tli`i 'l-^samsi))}}
4 wa-la bina'a la-hum yu'amminu-hum mina 'l-^samsi.
5 \end{arab}
```

<sup>23</sup>This is odd in Arabic script, but using such features as  $\backslash\text{emph}$  or  $\backslash\text{textbf}$  is a matter of personal taste.

ثُمَّ اتَّخَذَ ذُو الْقَرْنَيْنِ إِلَى أُمَّةٍ أُخْرَىٰ فِي «مَطْلَعِ الشَّمْسِ» وَلَا بِنَاءَ لَهُمْ يَوْمَئِذٍ مِنَ الشَّمْسِ -

`\LRfootnote` and `\RLfootnote` typeset left-to-right and right-to-left footnotes respectively in Arabic environments. Unlike `\footnote{<text>}`, the arguments of both `\LRfootnote` and `\RLfootnote` are not expected to be Arabic text. For example, `\LRfootnote` may be used to insert English footnotes in running Arabic text:—

```
1 \arb[fullvoc]{\cap{z}aydu\LRfootnote{\enquote{Zayd
2 is the son of Amr}: the second noun is not in
3 apposition to the first, but forms part of
4 the predicate\ldots} "ibnu \cap{`amriNU}}
```

زَيْدٌ ابْنُ عَمْرٍو

<sup>24</sup>Zayd is the son of ‘Amr’: the second noun is not in apposition to the first, but forms part of the predicate...

When footnotes are typeset from right to left, it may happen that the numbers of the footnotes that are at the bottom of the page be typeset in the wrong direction. For example, instead of an expected number 18, one may get 81. `arabluatex` is not responsible for this, but should it happen, it may be necessary to redefine in the preamble the  $\LaTeX$  macro `\thefootnote` like so:—

```
\renewcommand*{\thefootnote}{\textsuperscript{\LR{\arabic{footnote}}}}
```

`\FixArbFtnmk` Another solution is to put in the preamble, below the line that loads `arabluatex`, the command `\FixArbFtnmk`. However, for more control over the layout of footnotes marks, it is advisable to use the package `scrextend`.<sup>24</sup>

`\LRmarginpar` The command `\LRmarginpar` does for marginal notes the same as `\LRfootnote` does for footnotes. Of course, it is supposed to be used in Arabic environments. Note that `\marginpar` also works in Arabic environments, but it acts as any other single-argument command inserted in Arabic environments. The general principle laid on page 22 applies.

`\setRL` and `\setLR` may be used to change the direction of paragraphs, either from left to right or from right to left. As an example, an easy way to typeset a right-to-left sectional title follows:—

```
1 \setRL
2 \section*{\arb{barzawayhi li-buzurjumihra bni 'l-buxtikAni}}
3 \setLR
4 \begin{arab}
5 qAla barzawayhi bnu 'azhara, ra'su 'a.tibba'i fArisa...
```

<sup>24</sup>See <http://ctan.org/pkg/koma-script>; read the documentation of KOMA-script for details about the `\deffootnotemark` and `\deffootnote` commands.



```
6 \end{arab}
```

بَرْزَوِيهِ لِبَرْجُمِهِرَ بْنِ الْبُخْتِكَانِ  
قَالَ بَرْزَوِيهِ بْنُ أَزْهَرَ، رَأْسُ أَطْبَاءِ فَارِسٍ---

## 7.1 csquotes

The recommended way of inserting quotation marks in running Arabic text is to use `csquotes`. With the help of the `\DeclareQuoteStyle` command, one can define an Arabic style, like so:—

```
1 \usepackage{csquotes}
2 \DeclareQuoteStyle{arabic}
3 {\rmfamily\textquotedblright}{\rmfamily\textquotedblleft}
4 {\rmfamily\textquoteright}{\rmfamily\textquoteleft}
```

Then, use this newly defined style with `\setquotestyle`, like so:—

```
1 \setquotestyle{arabic}
2 \begin{arab}
3   fa-qAla la-hu ju.hA: \enquote{.garIbuN 'amru-ka yA .sadIqI
4     'a-tu.saddiqu 'l-.himAra wa-tuka_d_dibu-nI?}
5 \end{arab}
6 \setquotestyle{english}
```

فَقَالَ لَهُ جَحَا: ”غَرِيبٌ أَمْرُكَ يَا صَدِيقِي أَتَصَدِّقُ الْجَمَّارَ وَتَكْذِبُنِي؟“

REM. Do not forget to set back the quoting style to its initial state once the Arabic environment is closed. See the last line in the code above.

## 7.2 reledmac

The two-arguments command `\edtext{<lemma>}{<commands>}` is supported inside `\begin{arab} ... \end{arab}`. As an example, one may get `arabluatex` and `reledmac` to work together like so:—

```
1 \beginnumbering
2 \pstart
3 \begin{arab}
4   wa-ya.sIru ta.hta 'l-jildi
5   \edtext{\arb{.sadIduN}}{\Afootnote{M: \arb{.sadIdaN} E1}}
```

```

6 \end{arab}
7 \pend
8 \endnumbering

```

## 8 Future work

A short, uncommented, list of what is planned in the versions of arabluatex to come follows:

- (a) Short-term:
  - i. Support for typesetting Arabic poetry.
  - ii. The *Qur'ān*: support for typesetting the *Qur'ān*.
  - iii. TEI xml support: arabluatex will interoperate with TEI xml through new global and local options that will output Arabic in a TEI xml compliant file in addition to the usual PDF output: see on page 3.
- (b) Medium-term:
  - i. More languages: the list of supported languages will eventually be the same as arabtex: see footnote 4 on page 4.
  - ii. Formulate propositions for extending the ArabTeX notation and the transliteration tables. Include them in arabluatex. See section 4.8 on page 20.

## 9 Implementation

The most important part of arabluatex relies on Lua functions and tables. Read the .lua files that accompany arabluatex for more information.

```

1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{arabluatex}%
3 [2016/04/27 v1.1.1 ArabTeX-like interface for LuaLaTeX]
4 \RequirePackage{ifluatex}

```

arabluatex requires LuaTeX of course. Issue a warning if the document is processed with another engine.

```

5 \ifluatex\else
6 \PackageError{arabluatex}{lualatex needed}{%
7 Package `arabluatex' needs LuaTeX.\MessageBreak
8 So you should use `lualatex' to process your document.\MessageBreak
9 See documentation of `arabluatex' for further information.}%
10 \expandafter\expandafter\expandafter\csname endinput\endcsname
11 \fi

```

Declare the global options, and define them:

```

12 \DeclareOption{voc}{\def\al@mode{voc}}
13 \DeclareOption{fullvoc}{\def\al@mode{fullvoc}}
14 \DeclareOption{novoc}{\def\al@mode{novoc}}
15 \DeclareOption{trans}{\def\al@mode{trans}}
16 \ExecuteOptions{voc}

```

```

17 \ProcessOptions\relax
18 \def\al@mode@voc{voc}
19 \def\al@mode@fullvoc{fullvoc}
20 \def\al@mode@novoc{novoc}
21 \def\al@mode@trans{trans}

```

The following line will be used in the next release of arabluatex:

```
22 % \newif\ifal@mode@defined
```

Packages that are required by arabluatex:

```

23 \RequirePackage{fontspec}
24 \RequirePackage{amsmath}
25 \RequirePackage{etoolbox}
26 \RequirePackage{luacode}
27 \RequirePackage{xparse}
28 \RequirePackage{environ}

```

Here begins the real work: load arabluatex.lua:

```
29 \luadirect{dofile(kpse.find_file("arabluatex.lua"))}
```

This is needed by the current versions of polyglossia and luabidi. luabidi provides a `\Footnote` command. Use it as well if it is loaded.

```
30 \luadirect{tex.enableprimitives("luatex",tex.extraprimitives("omega"))}
```

Font setup. If no Arabic font is selected, issue a warning message and attempt to load the Amiri font which is included in TeXlive:

```

31 \AtBeginDocument{\ifdefined\arabicfont\relax\else
32 \PackageWarning{arabluatex}{\string\arabicfont\ is not defined.^JJI
33 will try to load Amiri}%
34 \newfontfamily\arabicfont[Script=Arabic]{Amiri}\fi}%

```

`\setRL` This neutralizes what is defined by the same command in luabidi:

```
35 \AtBeginDocument{\def\setRL{\pardir TRT\textdir TRT}}
```

`\setLR` The same applies to `\setLR`:

```
36 \AtBeginDocument{\def\setLR{\pardir TLT\textdir TLT}}
```

`\LR` This command typesets its argument from left to right. As `\LR` may be already defined, we need to redefine for it to suit our purpose:

```

37 \AtBeginDocument{\ifdef{\LR}%
38 {\RenewDocumentCommand{\LR}{m}{\bgroup\textdir TLT\rmfamily#1\egroup}}
39 {\NewDocumentCommand{\LR}{m}{\bgroup\textdir TLT\rmfamily#1\egroup}}}

```

`\RL` This one typesets its argument from right to left. Same remark as above regarding the need of redefinition.

```

40 \AtBeginDocument{\ifdef{\RL}%
41 {\RenewDocumentCommand{\RL}{m}{\bgroup\textdir TRT\rmfamily#1\egroup}}
42 {\NewDocumentCommand{\RL}{m}{\bgroup\textdir TRT#1\rmfamily\egroup}}}

```

`\aemph` Arabic emphasis. Needs to be redefined as well.

```

43 \AtBeginDocument{\ifdef{\aemph}%
44   {\RenewDocumentCommand{\aemph}{m}{$\overline{\text{#1}}$}}
45   {\NewDocumentCommand{\aemph}{m}{$\overline{\text{#1}}$}}}
```

`\SetTranslitStyle` By default any transliterated Arabic text is printed in italics. This can be changed globally in the preamble or at any point of the document:

```

46 \def\al@trans@style{\itshape}%
47 \NewDocumentCommand{\SetTranslitStyle}{m}{\def\al@trans@style{#1}}
```

`\SetTranslitConvention` `\SetTranslitConvention{<convention>}` may be used to change the transliteration convention, which is `dmg` by default:

```

48 \def\al@trans@convention{dmg}
49 \NewDocumentCommand{\SetTranslitConvention}{m}{\def\al@trans@convention{#1}}
```

`\cap` Proper Arabic names or book titles should be passed to the command `\cap` so that they have their first letters uppercased. `\cap` is actually coded in Lua.

```

50 \DeclareDocumentCommand{\cap}{m}%
51   {\luairect{tex.sprint(cap(\luastringN{#1}))}}
```

`\txarb` `\txarb` sets the direction to right-to-left and selects the Arabic font. As it is supposed to be used internally by several Lua functions, this command is not documented, but available to the user should he wish to insert utf8 Arabic text in his document.

`\txtrans` `\txtrans` is used internally by several Lua functions to insert transliterated Arabic text.

```

52 \DeclareDocumentCommand{\txarb}{+m}{\bgroup\textdir
53   TRT\arabicfont#1\egroup}
54 \DeclareDocumentCommand{\txtrans}{+m}{\bgroup\textdir
55   TLT\rmfamily#1\egroup}
```

`\arb` The `\arb` command detects which Arabic mode is to be used, either globally if no option is set, or locally, then passes its argument to the appropriate Lua function.

```

56 \DeclareDocumentCommand{\arb}{O{\al@mode} +m}%
57 {\edef\@tempa{#1}%
58   \ifx\@tempa\al@mode@voc%
59     \bgroup\textdir TRT\arabicfont%
60     \luairect{tex.sprint(processvoc(\luastringN{#2}))}\egroup%
61   \else%
62     \ifx\@tempa\al@mode@fullvoc%
63       \bgroup\textdir TRT\arabicfont%
64       \luairect{tex.sprint(processfullvoc(\luastringN{#2}))}\egroup%
65     \else%
66       \ifx\@tempa\al@mode@novoc%
67         \bgroup\textdir TRT\arabicfont%
68         \luairect{tex.sprint(processnovoc(\luastringN{#2}))}\egroup%
69       \else%
70         \ifx\@tempa\al@mode@trans%
```

```

71 \bgroup\textdir TLT\al@trans@style%
72 \luadirect{tex.sprint(processstrans(\luastringN{#2},
73   \luastringO{\al@trans@convention}))}\egroup%
74 \else%
75 \fi\fi\fi\fi}

```

arab The arab environment does for paragraphs the same as \arb does for short insertions of Arabic text.

```

76 \NewEnviron{arab}[1][\al@mode]%
77 {\par\edef\@tempa{#1}%
78   \ifx\@tempa\al@mode@voc%
79   \bgroup\pdir TRT\textdir TRT\arabicfont%
80   \luadirect{tex.sprint(processvoc(\luastringO{\BODY}))}\egroup%
81   \else%
82   \ifx\@tempa\al@mode@fullvoc%
83   \bgroup\pdir TRT\textdir TRT\arabicfont%
84   \luadirect{tex.sprint(processfullvoc(\luastringO{\BODY}))}\egroup%
85   \else%
86   \ifx\@tempa\al@mode@novoc%
87   \bgroup\pdir TRT\textdir TRT\arabicfont%
88   \luadirect{tex.sprint(processnovoc(\luastringO{\BODY}))}\egroup%
89   \else \ifx\@tempa\al@mode@trans%
90   \bgroup\pdir TLT\textdir TLT\al@trans@style%
91   \luadirect{tex.sprint(processstrans(\luastringO{\BODY},
92     \luastringO{\al@trans@convention}))}\egroup%
93   \else \fi\fi\fi\fi}\par]

```

\abjad \abjad{<number>} expresses its argument in Arabic letters in accordance with the 'abjad arrangement of the alphabet. <number> must be between 1 and 1999. It is now coded in Lua so that polyglossia is no longer needed. See arabluatex.lua for more information.

```

94 \NewDocumentCommand{\abjad}{m}%
95 {\luadirect{tex.sprint(abjadify(#1))}}

```

\LRmarginpar \LRmarginpar is supposed to be inserted in an Arabic environment. It typsets his argument in a marginal note from left to right.

```

96 \DeclareDocumentCommand{\LRmarginpar}{m}{\marginpar{\textdir TLT #1}}

```

\LRfootnote \LRfootnote and \RLfootnote are supposed to be used in Arabic environments for insertions of non Arabic text. \LRfootnote typesets its argument left-to-right...

\RLfootnote while \RLfootnote typesets its argument left-to-right.

```

97 \DeclareDocumentCommand{\LRfootnote}{m}{\bgroup\pdir
98   TLT\LR{\footnote{#1}}\egroup}
99 \DeclareDocumentCommand{\RLfootnote}{m}{\bgroup\pdir
100   TRT\LR{\footnote{#1}}\egroup}

```

\FixArbFtnmk In the preamble, just below \usepackage{arabluatex}, \FixArbFtnmk may be of some help in case the footnote numbers at the bottom of the page are printed in the wrong direction. This quick fix uses and loads scrextend if it is not already loaded.

```

101 \NewDocumentCommand{\FixArbFtnmk}{ }{%
102   \@ifpackageloaded{scrextend}%
103   {\AtBeginDocument{\deffootnote{2em}{1.6em}{\LR{\thefootnotemark}.\enskip}}}%
104   {\RequirePackage{scrextend}
105    \AtBeginDocument{\deffootnote{2em}{1.6em}{\LR{\thefootnotemark}.\enskip}}}}

```

That is it. Say goodbye before leaving.

```

106 \endinput

```

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## Change History

v1.0		v1.1
General: Initial release . . . . .	1	\abjad: New and more flexible
v1.0.1		\abjad command. . . . .
General: Minor update of the		29
documentation . . . . .	1	

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