User's Guide of ض (ḍād), a Simple Arabic Typesetting System for Mixed Latin/Arabic Alphabet Documents

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New features of version 1.2

I added support for LuaTeX 0.95 by including package `luatex85` and by changing `\luatextextdir` into `\textdir`.

1 Introduction

ض is a package for typesetting Arabic in the simplest possible way. It is particularly well suited for mixed Arabic/Latin documents. "Simplest possible" means:

- it is compatible with all LaTeX style files, since the code is minimal and all the complexity is in the font;

- input can be done in Unicode or in transliteration, the latter being often the best choice when mixing left-to-right and right-to-left scripts;

- the only TeXnical requirement is LuaTeX, not because of the Lua language (which is not used, for the moment), but because of features that have survived from LuaTeX's Ω origins: bidirectionality and use of large fonts (OVF, OFM).

Choose LuaTeX as your TeX engine, load the package into your document, and اهلاً وسهلاً!, just start writing in Arabic using command `\arab`.

More information about ض (history, evolution, rationale of technical choices, TeXnicalities) can be found in [1].

2 The name

Thanks to the Internet, search engines, social media, and the like, people are becoming more and more aware of other languages and writing systems. Why not give this package an Arabic name, be it a single letter?

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The author has chosen letter ض, called *ḍād*, because Arabic is traditionally called the "language of the *ḍād*," since this sound was considered as being unique to Arabic.

The reader is probably wondering how to pronounce this letter, technically a "voiced velarized alveolar stop" [3, p. 16]. Here is how [4, p. 10] describes its pronunciation:

> Pronounce the regular sound 'd' and you will find that the tip of your tongue will touch in the region of the upper front teeth/gum. Now pronounce the sound again and at the same time depress the *middle* of the tongue. This has the effect of creating a larger space between the tongue and the roof of the mouth and gives the sound produced a distinctive 'hollow' characteristic, which also effects the surrounding vowels. It is difficult to find a parallel in English, but the difference between 'Sam' and 'psalm' (standard English pronunciation) gives a clue. Tense the tongue muscles in pronouncing 'psalm' and you are nearly there. Now pronounce the a-vowel of 'psalm' before and after 'ḍ', saying 'aḍa', keeping the tongue tense, and that's as near as we can get to describing it in print.

3 How to use ض

The package provides three PostScript Type 1 fonts (plain, bold and typewriter), "real" fonts (regular TFM) and large virtual fonts (OVF and OFM files). There are also rudimentary FD and STY files, a MAP file, Perl scripts for conversion to (and from) UTF-8, the Perl script which builds the font and finally adjustment files, in case the user wants to change kerning and diacritic placement.

Once the package is installed, to use it just call

\usepackage{dad}

Notice however that it requires LuaTEX (for change of direction and OVF/OFM compliance).

To typeset in Arabic, one uses the command \arab (which is "long": paragraph changes are allowed in its argument).

Arabic text can be input in transliteration, as described in Table 1 or in Unicode UTF-8 (§ 3.2).

For example, to obtain الكتاب one would write in transliteration \arab{AlkitAb} or in Unicode \arab{الـكـتـاب}. By writing \arabtt{AlkitAb} one obtains the typewriter version الـكـتـاب (which is less appealing, but fits quite nicely with the Computer Modern Typewriter font).

3.1 Rationale of the transliteration

Here are the rules of the proposed transliteration:

1. pharyngeal ح = H, emphatic ص = S, ض = D, ط = T, ظ = Z and velar غ = R are *uppercased*—do not confuse them with glottal ه = h, non-emphatic س = s, د = d, ت = t, ز = z, and alveolar ر = r;

2. long vowels (ا = A, و = U, ي = Y) and *ʾalif maqṣūra* (ى = I) are also *uppercased*;

3. some consonants are modified by adding a character h (ذ = dh, ث = th, ش = sh);

Table 1: Transliteration of ض system

ء			آ	'A	أ	'a	ؤ	'u	إ	'i	ئ	'I
ا	A	ب	b	ة	t*	ت	t	ث	th	ج	j
ح	H	خ	x	د	d	ذ	dh	ر	r	ز	z
س	s	ش	sh	ص	S	ض	D	ط	T	ظ	Z
ع	`	غ	R	ف	f	ق	q	ك	k	ل	l
م	m	ن	n	ه	h	و	U	ى	I	ي	Y
آ	A*	ْ	o	َ	a	َ	i	ُ	u	ً	aN
ٍ	iN	ٌ	uN	ّ	+	ّ	+a	ّ	+i	ّ	+u
ً	+aN	ٍ	+iN	ٌ	+uN	ٰ	a*	ٰ	+a*	لله	LLh
پ	p	گ	g	چ	C	ژ	J	ۀ	e	ڤ	v
ٮ	'b	ں	'n	ڡ	'f	ۅ	'q	ٖ	a**	ّ	+a**

4. the stand-alone *hamza* is obtained by a vertical bar | and letter ayn by a grave accent (which, in legacy TEX produces an inverted curly apostrophe, which is sometimes used to transliterate this letter);

5. to avoid confusion between pairs of letters and letters obtained by digraphs, one has to use a dash to separate characters: compare سه = s-h and ش = sh, or ته = t-h and ث = th;

6. more generally, the dash plays the rôle of *zero-width joiner*[1]: when writing ب = -b, the letter *bā'* will be in final form; ب = b- and ب = -b- will produce initial and middle letters, provided of course the letter is quadriform (as is letter *bā'* in this example). This is very useful when describing grammar rules, to signify that a letter (or letter group) is an affix;

7. the dash can also be used to reestablish contextual forms when combined with TEX commands, for example, to colorize letters. There is only one special case: when we want to colorize a letter of an isolated ligature لا, instead of a dash, we use digit 4. For the final ligature لا it will be a digit 5. Example: to colorize the *lām*s of تلا, write

```
\arab{t-\textcolor{red}{-l5-}-A5%
```

---

[1]Except for the case of letter ذ = dh which is biform and hence is not connected with the following letter. By writing ده = d-h one obtains letters *dāl* and *hā'*, but the *hā'* is not in medial form, as it would be in any other case when preceded by a dash.

```
\textcolor{red}{l4-}-A4}
```

8. finally, there is yet another use of the dash: when doubled, it produces a kashida stroke: compare ليل = `lYl` and ليـل = `l--Y--l`. There is also a `\kesh` command for extensible kashida (it is equivalent to a `\hrulefill` using the default rule thickness font dimension `\fontdimen8`): `l--\kesh--Y--\kesh--l.` will produce:

ﻟـــيـــﻞ.

9. some digraphs start with an apostrophe: it is the case of *hamza*-carriers أ = `'a`, إ = `'i`, ؤ = `'u`, ئ = `'I`, آ = `'A` but also of undotted letters *bā'* ٮ = `'b`, *nūn* ں = `'n`, *fā'* ڡ = `'f` and *qāf* ٯ = `'q`;

10. other digraphs end with one or more asterisks: the most frequent one is the *tā' marbuṭa* ة = `t*` (which can be used also in initial and medial, and then becomes a regular *tā'*). The asterisk is also used for the *Uaṣla* (which is only placed on the *alif*) ٱ = `A*` as well as for the vertical *fatḥa* (as in هٰذا = `ha*dhA`) and the *madda*. The latter is normally used only on the *alif* (آ = `'A`) but can be found also in the notorious *muqaṭṭaʿāt* in the Koran, as in عٓسٓقٓ (*Koran* 42:2) or كٓهٓيٓعٓصٓ (*Koran* 19:1)—sometimes it is even combined with a *šadda* (as in الٓمّٓصٓ, *Koran* 7:1 and [5, p. 111] for the *šadda*);

11. there is a special transcription for the ligature ﷲ = `LLh` used for the اسم الجلالة "noun of majesty," which is the name of God الله: in this case—and in this case only—an uppercase `L` is used. The reason is that we wish to avoid ambiguity with other uses of the trigram *lām-lām-hā'*, for example يُضْلِلْهُ (*Koran* 6:39) where we encounter letters لله but not with the meaning "God." Contrarily to other systems, the ﷲ ligature is available also in final form (for فَلِلّٰهِ which occurs six times in the Koran, for example *Koran* 6:149), and it is possible to add diacritics to its first glyph (as in وَلِلّٰهِ, *Koran* 2:115 or لِلّٰهِ, *Koran* 2:165).

3.2 Unicode input

Input can be transliterated or provided directly in Unicode Arabic: `\arab{YAnis}` or `\arab{يانـس}` or even `\arab{يـnis}` or `\arab{YAنـس}` will produce the same result: يانِس.

All cells of Table 1 can be obtained by the corresponding Unicode characters (mostly via a single character, except for *šadda* + vowel combinations which require two characters). There is a special case, though: the ﷲ ligature (see next section).

For the convenience of the user who wants to write kashida (so that Arabic input is not disrupted) we have defined a command (in Arabic characters) تط\ (تط are the first two letters of تطويل = *taṭUyl*, the Arabic name of kashida) which is exactly equivalent to `\kesh` and has to be placed between Unicode U+0640 ARABIC TATWELL characters.

3.2.1 The ﷲ ligature and Unicode

The ﷲ ligature is traditionally used for writing the name of God: الله. It can be found in religious texts, but also in expressions (for example, إن شاء الله which means "hopefully" appears even in French language as *inchallah* and in Portuguese as *oxalá*) and in the very common surname عبد الله Abdallah.

رباعيات الخيام

سمعت صوتا هاتفا في السحـــــر نـــــادى من الغيب رفات البشـــــر
هبوا املأوا كأس المنى قبـــــل أن تملأ كـــــأس العمـــــر كف القـــــدر
لا تشغل البال بماضي الزمـــان ولا بـــــآت العيـــــش قبـــــل الأوان
وأغــــنم من الحاضــــر لذاتــه فليس فـــي طبـــع الليالـــي الأمـــان
غد بظهر الغيب واليوم لـــــي وكم يخيب الظـــــن فـــــي المقبـــــل
ولســـــت بالغافـــــل حتـــــى أرى جمـــال دنيـــاي و لا اجتلـــــى
القلب قد أضناه عشق الجمـــال والصـــدر قـــد ضـــاق بمـــا لا يقـــال
يا رب هل يرضيك هذا الظلمـــا والمـــــاء ينســـــاب أمـــامـــي زلال
أولى بهذا القلب أن يخفقـــــا و في غرام الحـــــب أن يحترقـــــا
ما أضيع اليوم الذي مـــــر بـــــي من غير أن أهوى و أن أعشقـــــا
أفق خفيف الظل هذا السحـــــر نـــــادى دع النـــــوم ونـــــاغ الوتـــر
فمـــا أطـــال النـــوم عمـــرا ولا قصر من الأعمار طول السهـــر
فكـــم تولـــى الليـــل بعـــد النهـــار وطـــال بالأنجـــم هـــذا المـــدار
فأمش الهوينة أن هذا الثـــرى مـــــن أعيـــــن ساحـــــرة الاحـــورار
لا توحش النفس بخوف الظنـــــون وأغنم من الحاضر أمن اليقيـــــن
فقد تساوى في الثرى راحـــــل غدا وماض من الوف السنيـــــــن
اطفئ لظى القلب بشهد الرضـــاب فإنمـــا الأيـــام مثـــل السحـــاب
وعيشنـــا طيـــف خيـــال فنـــل حظـــك منـــه قبـــل فـــوت الشبـــاب
لبست ثوب العيش لم استشـــر وحـــــرت فيـــه بيـــــن شتـــــى الفكـــر
وسوف أنضو الثوب عني ولـــم أدرك لمـــــاذا جئـــت أيـــــن المغـــر
يا من يحار الفهم في قدرتـــك وتطلـــــب النفـــس حمـــى طاعتـــك
اسكرنـــي الإثـــم و لكنـــي صحـــــوت بالأمـــال فـــي رحمتـــك
إن لم أكن أخلصت في طاعتـــك فإننـــي أطمـــــع فـــي رحمتـــك
وإنمـــا يشفـــع لـــي بأننـــي قـــد عشـــت لا أشـــرك في وحدتـــك
نخفي عن الناس سنى طلعتـــك فإننـــي أطمـــــع فـــي رحمتـــك
فأنـــــت مجـــلاه وأنـــت الـــذي تـــرى بديـــع الصنـــع فـــي آيتـــك
ان تفضل القطرة من بحرهـــا ففـــي مـــداهـــا منتهـــى أمرهـــا
تقاربـــــت يـــا رب مـــا بيننـــا مسافـــة البعـــد علـــى قدرهـــا
يا عالم الأسرار علم اليقيـــــن يـــا كاشـــف الضـــر عـــن البائسيـــن
يـــا قابـــل الأعـــذار عدنـــا إلـــى ظلـــك فأقبـــل توبـــة التائبيـــن

Figure 1: The lyrics of the song رباعيات الخيام (Oum Kalthoum, 1950) [2]

```
\documentclass{article}
\usepackage{dad}
\begin{document}
\arab{
\begin{center}
\textbf{rbA`YAt AlxYAm}

\medskip

\begin{minipage}{10cm}
sm`t SUtA hAtfA fY AlsH--\kesh--r n--\kesh--AdI mn AlRYb rfAt Albsh--\kesh--r\\
hbUA Aml'aUA k'as AlmnI qb--\kesh--l 'an tml'a k--\kesh--'as Al`m--\kesh--r kf
Alq--\kesh--dr\\
lA tshRl AlbAl bmADY Alzm--\kesh--An UlA b--\kesh--'At Al`Y--\kesh--sh qb--\kesh--l
Al'aUAn\\
U'aR--\kesh--nm mn AlHAD--\kesh--r ldhAt--\kesh--h flYs f--\kesh--Y Tb--\kesh--`
AllYAl--\kesh--Y Al'am--\kesh--An\\
Rd bZhr AlRYb UAlYUm l--\kesh--Y Ukm YxYb AlZ--\kesh--n f--\kesh--Y Almqb--\kesh--l\\
Uls--\kesh--t bAlRAf--\kesh--l Ht--\kesh--I 'arI jm--\kesh--Al dnY--\kesh--AY U
lA Ajtl--\kesh--I\\
Alqlb qd 'aDnAh `shq Aljm--\kesh--Al UAlS--\kesh--dr q--\kesh--d D--\kesh--Aq bm--\kesh--A
lA Yq--\kesh--Al\\
YA rb hl YrDYk hdhA AlZlm--\kesh--A UAlm--\kesh--A| Yns--\kesh--Ab 'am--\kesh--Am--\kesh--Y
zlAl\\
'aUlI bhdhA Alqlb 'an Yxfq--\kesh--A U fY RrAm AlH--\kesh--b 'an YHtrq--\kesh--A\\
mA 'aDY` AlYUm AldhY m--\kesh--r b--\kesh--Y mn RYr 'an 'ahUI U 'an 'a`shq--\kesh--A\\
'afq xfYf AlZl hdhA AlsH--\kesh--r n--\kesh--AdI d` Aln--\kesh--Um Un--\kesh--AR
AlUt--\kesh--r\\
fm--\kesh--A 'aT--\kesh--Al Aln--\kesh--Um `m--\kesh--rA UlA qSr mn Al'a`mAr TUl
Als-h--\kesh--r\\
fk--\kesh--m tUl--\kesh--I AllY--\kesh--l b`--\kesh--d Alnh--\kesh--Ar UT--\kesh--Al
bAl'anj--\kesh--m h--\kesh--dhA Alm--\kesh--dAr\\
f'amsh AlhUYnt* 'an hdhA Alc--\kesh--rI m--\kesh--n 'a`Y--\kesh--n sAH--\kesh--rt*
AlAH--\kesh--UrAr\\
lA tUHsh Alnfs bxUf AlZn--\kesh--Un U'aRnm mn AlHADr 'amn AlYqY--\kesh--n\\
fqd tsAUI fY AlcrI rAH--\kesh--l RdA UmAD mn AlUf AlsnY--\kesh--n\\
ATf'I lZI Alqlb bshhd AlrD--\kesh--Ab f'inm--\kesh--A Al'aY--\kesh--Am mc--\kesh--l
AlsH--\kesh--Ab\\
U`Yshn--\kesh--A TY--\kesh--f xY--\kesh--Al fn--\kesh--l HZ--\kesh--k mn--\kesh--h
qb--\kesh--l f--\kesh--Ut Alshb--\kesh--Ab\\
lbst cUb Al`Ysh lm Astsh--\kesh--r UH--\kesh--rt fY--\kesh--h bY--\kesh--n sht--\kesh--I
Alfk--\kesh--r\\
UsUf 'anDU AlcUb `nY Ul--\kesh--m 'adrk lm--\kesh--AdhA j'I--\kesh--t 'aY--\kesh--n
AlmR--\kesh--r\\
YA mn YHAr Alfhm fY qdrt--\kesh--k UtTl--\kesh--b Alnf--\kesh--s Hm--\kesh--I TA`t--\kesh--k\\
Askrn--\kesh--Y Al'ic--\kesh--m U lknn--\kesh--Y SH--\kesh--Ut bAl'am--\kesh--Al
f--\kesh--Y rHmt--\kesh--k\\
'in lm 'akn 'axlSt fY TA`t--\kesh--k f'inn--\kesh--Y 'aTm--\kesh--` f--\kesh--Y
rHmt--\kesh--k\\
U'inm--\kesh--A Yshf--\kesh--` l--\kesh--Y b'ann--\kesh--Y q--\kesh--d `sh--\kesh--t
lA 'ash--\kesh--rk fY UHdt--\kesh--k\\
nxfY `n AlnAs snI Tl`t--\kesh--k f'inn--\kesh--Y 'aTm--\kesh--` f--\kesh--Y rHmt--\kesh--k\\
f'an--\kesh--t mj--\kesh--lAh U'an--\kesh--t Al--\kesh--dhY t--\kesh--rI bdY--\kesh--`
AlSn--\kesh--` f--\kesh--Y 'AYt--\kesh--k\\
An tfDl AlqTrt* mn bHrh--\kesh--A ff--\kesh--Y m--\kesh--dAh--\kesh--A mnt-h--\kesh--I
'amrh--\kesh--A\\
tqArb--\kesh--t Y--\kesh--A rb m--\kesh--A bYnn--\kesh--A msAf--\kesh--t* Alb`--\kesh--d
`l--\kesh--I qdrh--\kesh--A\\
YA `Alm Al'asrAr `lm AlYq--\kesh--Y--\kesh--n Y--\kesh--A kAsh--\kesh--f AlD--\kesh--r
`--\kesh--n AlbA'IsY--\kesh--n\\
Y--\kesh--A qAb--\kesh--l Al'a`--\kesh--dhAr `dn--\kesh--A 'il--\kesh--I Zl--\kesh--k
f'aqb--\kesh--l tUb--\kesh--t* AltA'IbY--\kesh--n
\end{minipage}
\end{center}
}
\end{document}
```

Figure 2: T_EX code of Fig. 1, transliterated input

```
\documentclass{article}
\usepackage{dad}
\begin{document}
\arab{
\begin{center}
\textbf{رباعيات الخيام}

\medskip

\begin{minipage}{10cm}
```

سمعت صوتا هاتفا في السحـ\تط ـر نـ\تط ـادى من الغيب رفات البشـ\تط ـر\\
هبوا املأوا كأس المنى قبـ\تط ـل أن تملأ كـ\تط ـأس العمـ\تط ـر كف القـ\تط ـدر\\
لا تشغل البال بماضي الزمـ\تط ـان ولا بـ\تط ـآت العيـ\تط ـش قبـ\تط ـل الأوان\\
وأغـ\تط ـنم من الحاضـ\تط ـر لذا تـ\تط ـه فليس فـ\تط ـي طبـ\تط ـع الليالـ\تط ـي الأمـ\تط ـان\\
غد بظهر الغيب واليوم لـ\تط ـي وكم يخيب الظـ\تط ـن فـ\تط ـي المقبـ\تط ـل\\
ولسـ\تط ـت بالغافـ\تط ـل حتـ\تط ـى أرى جمـ\تط ـال دنـ\تط ـاي و لا اجتلـ\تط ـي\\
القلب قد أضناه عشق الجمـ\تط ـال والصـ\تط ـدر قـ\تط ـد ضـ\تط ـاق بمـ\تط ـا لا يقـ\تط ـال\\
يا رب هل يرضيك هذا الظلمـ\تط ـا والمـ\تط ـاء ينسـ\تط ـاب أمـ\تط ـامـ\تط ـي زلال\\
أولى بهذا القلب أن يخفقـ\تط ـا و في غرام الحـ\تط ـب أن يحترقـ\تط ـا\\
ما أضيع اليوم الذي مـ\تط ـر بـ\تط ـي من غير أن أهوى و أن أعشقـ\تط ـا\\
أفق خفيف الظل هذا السحـ\تط ـر نـ\تط ـادى دع النـ\تط ـوم ونـ\تط ـاغ الوتـ\تط ـر\\
فمـ\تط ـا أطـ\تط ـال النـ\تط ـوم عمـ\تط ـرا ولا قصر من الأعمار طول السهـ\تط ـر\\
فكـ\تط ـم تولـ\تط ـى الليـ\تط ـل بعـ\تط ـد النهـ\تط ـار وطـ\تط ـال بالأنجـ\تط ـم هـ\تط ـذا المـ\تط ـدار\\
فأمش الهوينة أن هذا الثـ\تط ـرى مـ\تط ـن أعيـ\تط ـن ساحـ\تط ـرة الاحـ\تط ـورار\\
لا توحش النفس بخوف الظنـ\تط ـون وأغنم من الحاضر أمن البقيـ\تط ـن\\
فقد تساوى في الثرى راحـ\تط ـل غدا وماف من الوف السنيـ\تط ـن\\
اطفئ لظى القلب بشهد الرضـ\تط ـاب فإنمـ\تط ـا الأيـ\تط ـام مثـ\تط ـل السحـ\تط ـاب\\
وعيشنـ\تط ـا طيـ\تط ـف خيـ\تط ـال فنـ\تط ـل حظـ\تط ـك منـ\تط ـه قبـ\تط ـل فـ\تط ـوت الشبـ\تط ـاب\\
لبست ثوب العيش لم استشـ\تط ـر وحـ\تط ـرت فيـ\تط ـه بيـ\تط ـن شتـ\تط ـى الفكـ\تط ـر\\
وسوف أنفو الثوب عني ولـ\تط ـم أدرك لمـ\تط ـاذا جئـ\تط ـت ـاذا جئـ\تط ـت أيـ\تط ـن المغـ\تط ـر\\
يا من بحار الفهم في قدرتـ\تط ـك وتطلـ\تط ـب النفـ\تط ـس حمـ\تط ـى طاعتـ\تط ـك\\
أسكرنـ\تط ـي الإثـ\تط ـم و لكننـ\تط ـي صحـ\تط ـوت بالأمـ\تط ـال فـ\تط ـي رحمتـ\تط ـك\\
إن لم أكن أخلصت في طاعتـ\تط ـك فإننـ\تط ـي أطمـ\تط ـع فـ\تط ـي رحمتـ\تط ـك\\
وإنمـ\تط ـا يشفـ\تط ـع لـ\تط ـي بأنـ\تط ـي قـ\تط ـد عشـ\تط ـت لا أشـ\تط ـرك في وحدتـ\تط ـك\\
نخفي عن الناس سنى طلعتـ\تط ـك فإنـ\تط ـع أطمـ\تط ـع فـ\تط ـي رحمتـ\تط ـك\\
فأنـ\تط ـت مجـ\تط ـلاه وأنـ\تط ـت الـ\تط ـذي تـ\تط ـرى بديـ\تط ـع الصنـ\تط ـع فـ\تط ـي آيتـ\تط ـك\\
ان تفصل القطرة من بحرهـ\تط ـا ففـ\تط ـي مـ\تط ـداهـ\تط ـا منتهـ\تط ـى أمرهـ\تط ـا\\
تقاربـ\تط ـت يـ\تط ـا رب مـ\تط ـا بيننـ\تط ـا مسافـ\تط ـة البعـ\تط ـد علـ\تط ـى قدرهـ\تط ـا\\
يا عالم الأسرار علم البقـ\تط ـى يـ\تط ـن يـ\تط ـا كاشـ\تط ـف الفـ\تط ـر عـ\تط ـن البائسيـ\تط ـن\\
يـ\تط ـا قابـ\تط ـل الأعـ\تط ـذار عدنـ\تط ـا إلـ\تط ـى ظلـ\تط ـك فأقبـ\تط ـل توبـ\تط ـة التائبيـ\تط ـن\\

```
\end{minipage}
\end{center}
}
\end{document}
```
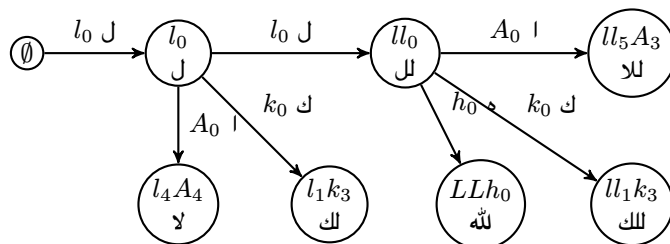
Figure 3: TₑX code of Fig. 1, Unicode input

Figure 4: Finite state automaton starting with an isolated *lām* (*àlif* ا stands for the set of letter $\mathcal{A}$ = { ا, أ, إ, آ, ٱ }; ك stands for any Arabic letter besides ه and set $\mathcal{A}$.

The problem with this ligature is that it contains a rather rare diacritic (a *šadda* combined with a vertical *fatḥa*—the latter us available on Apple Arabic keyboard layout but not on the Microsoft one) and, as a convenience, most standard fonts will replace the character string *lām-lām-hā'* (which would normally look like للﻪ) by the complete ligature ﷲ (in other words: the font not only changes the glyphs but, at the same time, also adds the diacritics). This behavior is barely legitimate: a ligature (as in 'fi' or 'لا') is normally limited to a change of glyphs, and should not add new characters (in this case, characters U+0651 ARABIC SHADDA and U+0671 ARABIC LETTER SUPERSCRIPT ALEF) since this means that what is rendered does not correspond anymore to the underlying Unicode character string.

Nevertheless, for the user's convenience, we have adopted that behavior also in ض, but only in the case of Unicode input. Therefore when the user types Unicode *lām-lām-hā'* (the first *lām* must not be preceded by a quadriform letter), the system will produce the ﷲ ligature.

This method will not work if a diacritic is inserted between the two *lām*s, or if the first *lām* follows a quadriform letter and hence will be medial. For that case, we have defined a macro للﻪ/ (the macro name is in Arabic script so that right-to-left direction is not disrupted) which takes an argument: the vowel between the two *lām*s. Hence, to obtain فَلِلّﻪ the user can choose between one of the following two:

فـ{ِ}ه‍ل‍ل/ِ

```
faLiLhi
```

(The dotted circle, used to show the combining nature of short vowels and other diacritics, can be obtained by the macros \arabdottedcircle or دائرة/ with the macro name in Arabic script.)

4 TEXnicalities

More information about ض (history, evolution, rationale of technical choices, TEXnicalities) can be found in [1].

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[4] John R. Smart. *Arabic.* Teach yourself books, 1986.

[5] Barakat Ahmad Syed. *Introduction to Quranic script.* Curzon Press, 1984.