

## *Arabic Morphology*

The Arabic Morphology module uses a simple approach of dividing the Arabic word into three parts

**Prefix:** consist of as many as four concatenated prefixes, or could be null

**Stem:** it is composed of root and pattern morphemes

**Suffix:** consist of as many as three concatenated suffixes, or could be null

Because the Arabic prefixes and suffixes are finite number, their respective lexicons could be considered complete, the Stem lexicon needs

Using the approach the word “wsyktbwnhA” (See Table for Arabic Transliteration) would be analyzed as follows:

Prefix	Stem	Suffix
wsy	ktb	wnhA

The tree-part approach entails the use of three lexicons: Prefixes lexicon, Stem lexicon, and Suffixes lexicon. For a word to be analyzed its parts must have an entry in each lexicons. Assuming the both null prefix and null suffix are both possible. Here some example of valid words:

Prefix	Stem	Suffix
Al	ktAb	(null)
(null)	ktAb	An
wAl	ktAb	yn
y	ktb	(null)
t	ktb	yn
st	ktb	hA

Any combinations of Prefix-Stem-Suffix is not necessarily valid or a legal word. In order to confirm if the composition Prefix-Stem-Suffix is a valid Arabic word Morphological categories were assigned to each entry in the lexicons (See PREFIX/STEM/SUFFIX CATEGORIES Tables below).

The category assignment was based on compatibility and the part of speech of the Suff/Stem/Prefix

When a prefix, stem, suffix found in their respective lexicons, the morphology analysis extract the morphological category assigned to every one and than use the categories for a validation process. The validation process uses three truth tables Prefix-Stem, Stem-Suffix, and Prefix-Suffix each tables is a two dimensional array of 0 or 1, 0 indicate incompatibility and 1 compatibility once the combination checked and confirmed valid the morphological analyzer output the valid combination (Prefix-Stem-Suffix) that composes the word.

## **Arabic Morphological Categories**

### **PREFIX CATEGORIES**

001 nulp;	010 imvp; imperfect verb prefix
002 conj; conjunction	011 imvp; imperfect verb prefix
003 prep; preposition	012 imvp; imperfect verb prefix
004 prep; preposition	013 imvp; imperfect verb prefix
005 defi; definite article	014 imvp; imperfect verb prefix
006 ppda; preposition + definite article	015 imvp; imperfect verb prefix
007 ppda; preposition/particle + definite article	016 imvp; imperfect verb prefix
008 imvp; imperfect verb prefix	017 imvp; imperfect verb prefix
009 imvp; imperfect verb prefix	

## STEM CATEGORIES

001..025	Common noun stems without orthographic change
026..055	Common noun stems with orthographic change
056..057	Function words
058..059	Proper noun stems
060..081	Perfect verbs stems
082..088	Perfect/Imperfect verb stems
089..129	Imperfect verb stems

## SUFFIX CATEGORIES

001 nuls; null suffix
002 fmdl; feminine dual
003 fmdl; feminine dual
004 fmdl; feminine dual
005 fmdl; feminine dual
006 fmsl; feminine singular
007 fmsl; feminine singular
008 msdl; masculine dual
009 msdl; masculine dual
010 msac; masculine accusative
011 msdl; masculine dual
012 msdl; masculine dual
013 fmpl; feminine plural
014 fmpl; feminine plural
015 pspn; possessive pronoun
016 mspl; masculine plural
017 mspl; masculine plural
018 pspn; possessive pronoun
019 msdl; masculine dual
020 mspl; masculine plural
021 mspl; masculine plural
022 dopn; direct object pronoun
023 pvst; perfect verb suffix

024 dopn; direct object pronoun
025 pvsf; perfect verb suffix
026 dopn; direct object pronoun
027 pvsf; perfect verb suffix
028 dopn; direct object pronoun
029 msdl; masculine dual
030 mddo; masculine dual + direct object pronoun
031 mspl; masculine plural
032 mpdo; masculine plural + direct object pronoun
033 dopn; direct object pronoun
034 dopn; direct object pronoun
035 fmpl; feminine plural
036 fpdo; feminine plural + direct object pronoun
037 fpdo; feminine plural + direct object pronoun
038 dual; dual
039 ddop; dual + direct object pronoun
040 dual; dual
041 ddop; dual + direct object pronoun
042 mspl; masculine plural
043 mpdo; masculine plural + direct object pronoun
044 mpdo; masculine plural + direct object pronoun
045 mspl; masculine plural
046 mpdo; masculine plural + direct object pronoun
047 mpdo; masculine plural + direct object pronoun
048 fmsl; feminine singular
049 fsdo; feminine singular + direct object pronoun
050 fmsl; feminine singular
051 fsdo; feminine singular + direct object pronoun

أ	P013
أ	P012
ا	P012
ال	P005
ب	P003
بال	P006
ت	P010
تأ	P013
تأ	P012
تا	P012
تت	P010
تن	P016
تي	P008
ف	P002
فأ	P013
فأ	P012
فا	P012
فال	P005
فب	P003

فيال	P006
فت	P010
فسأ	P013
فسأ	P012
فسا	P012
فست	P010
فسن	P016
فسي	P008
فك	P003
فكال	P006
فل	P004
فلأ	P015
فلأ	P014
فلا	P014
فلت	P011
فلل	P007
فلن	P017
فلي	P009
فن	P016
في	P008
ك	P003
كال	P006
ل	P004
لأ	P015
لأ	P014
لا	P014
لنت	P011
لل	P007
لن	P017
لي	P009
ن	P016
و	P002
وآ	P013
وأ	P012
وا	P012
وال	P005
وب	P003
وبال	P006
وت	P010
وسأ	P013
وسأ	P012
وسا	P012
وست	P010
وسن	P016
وسي	P008
وك	P003
وكال	P006
ول	P004
ولأ	P015
ولأ	P014



انه	S041	تموهما	S026	نكما	S037	وهما	S032		
انها	S041	تموهن	S026	نكن	S024	وهما	S043		
انهم	S041	تن	S025	نكن	S037	وهن	S021		
انهما	S041	تنا	S007	ننا	S024	وهن	S032		
انهن	S041	تنا	S026	ننا	S036	وهن	S043		
اني	S030	تنا	S028	نني	S024	ي	S009		
اني	S039	تننا	S026	نني	S036	ي	S009		
اه	S012	تنني	S026	نه	S024	ي	S017		
اه	S030	تنه	S026	نه	S036	ي	S017		
اه	S039	تنها	S026	نها	S024	ي	S018		
اها	S012	تنهم	S026	نها	S036	ي	S048		
اها	S030	تنهما	S026	نهم	S024	يك	S009		
اها	S039	تنهن	S026	نهم	S036	يك	S017		
اهم	S012	تنني	S026	نهما	S024	يكم	S009		
اهم	S030	تنني	S028	نهما	S036	يكم	S017		
اهم	S039	ته	S007	نهن	S024	يكما	S009		
اهما	S012	ته	S026	نهن	S036	يكما	S017		
اهما	S030	ته	S028	ني	S022	يكن	S009		
اهما	S039	تها	S007	ني	S034	يكن	S017		
اهن	S012	تها	S026	ه	S015	ين	S008		
اهن	S030	تها	S028	ه	S022	ين	S016		
اهن	S039	تهم	S007	ه	S033	ين	S050		
اي	S012	تهم	S026	ها	S015	ينا	S009		
ة	S006	تهم	S028	ها	S022	ينا	S017		
ت	S025	تهما	S007	ها	S033	ينا	S049		
ت	S027	تهما	S026	هم	S015	يننا	S051		
تا	S004	تهما	S028	هم	S022	ينني	S051		
تا	S027	تهن	S007	هم	S033	ينه	S051		
تاك	S004	تهن	S026	هما	S015	ينها	S051		
تاك	S028	تهن	S028	هما	S022	ينهم	S051		
تاكم	S004	تي	S005	هما	S033	ينهما	S051		
تاكم	S028	تي	S005	هن	S015	ينهن	S051		
تاكما	S004	تي	S007	هن	S022	يه	S009		
تاكما	S028	تيك	S005	هن	S033	يه	S017		
تاكن	S004	تيكم	S005	و	S021	يه	S049		
تاكن	S028	تيكما	S005	وا	S031	يها	S009		
تان	S003	تيكن	S005	وا	S042	يها	S017		
تانا	S004	تين	S002	وك	S021	يها	S049		

### Arabic Transliteration Table

ء ˆ	ذ *	ل l
أ ا	ر r	م m
أ >	ز z	ن n
ؤ &	س s	ه h
إ <	ش \$	و w
ئ }	ص S	ي Y
ا A	ض D	ي Y
ب b	ط T	ـ F
ة p	ظ z	ـ N
ت t	ع E	ـ K
ث v	غ g	ـ a
ج j	ـ _	ـ u
ح H	ف f	ـ i
خ x	ق q	ـ ~
د d	ك k	ـ o