

Draft Proposal for a Second-Level Balinese Script Zone Label Generation Rule-Set (LGR)

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1. General Information/ Overview/ Abstract

The development of the Internet has mainly taken place in one language namely English leading to language barriers for non-English speakers. The Internet was mostly designed based on the ‘simple English alphabet of the 26 Latin letters, the 10 “Arabic” digits (0-9), and the hyphen (plus, of course, the dots).

ITEF has brought out the implementation standards for non-Latin and non-Roman characters how the domain name is converted into puny code and how it resolves in the root zone files. The process of supporting multilingual script and other linguistic and cultural needs on the Internet is generally known as Internationalization. Internationalized Domain Names (IDNs) are domain names or web addresses represented in local language characters.

Internationalized Domain Names or Domain Names in Balinese Language/Script is one of the effective ways of further promoting the Internet among the Balinese Populace. For the proliferation and preservation of heritage, culture and content creation in multiple languages, it is essential to have the domain names in their scripts. The process of Internationalization involves the identification of the Character Set in the respective Script for each language, the identification of the Variant Set (similar-looking characters within the Script) and a Language-based implementation rule set. This is then followed by the process of normalization and coding for inclusion in the Domain Name System. An interface for Registrars for the issuance of Domain Names is then developed for the launch of Domain Name Registrations.

IDN is a societal issue as much as a technical challenge. Considering that a large number of users are not scholars of the language and hence can be easily cheated by homographs, spoofing, pharming as well as phishing will occur to a large extent in the Balinese language/script. This calls for great care and caution in supporting local languages and scripts in the domain names.

This document lays down the for a Second Level Balinese Script Zone Label Generation Ruleset for Balinese script. Three main components of the Balinese Script LGR i.e., Code point repertoire, Variants and Whole Label Evaluation Rules have been stated in detail here.

2. Script for which the Second Level LGR is proposed.

ISO 15924 Code: Bali

ISO 15924 Key N°: 360

ISO 15924 English Name: Balinese

SNI: 9047:2021

Uni-code: [Balinese – 1B00-1B7F](#)

Latin transliteration of native script name: Balinese Native name of the script: ꦧꦶꦤꦺꦱꦺ

3. Background

3.1. History of the Balinese Language and Script

Language is the most important part of human life because, with language, humans can communicate more perfectly. Language and script are media for expressing thoughts, feelings (emotional), spirituality, behaviour, ethnic origins, civilization, art and so on.

Bali is one of the thousands of islands in Indonesia. Bali and Indonesia are recognized internationally for their rich, diverse, and deep cultural heritage. The population of Bali in 2023 will be 4.3 million people an average growth of 1, 01 % per year. In 2023, the number of elementary, middle school and high school/vocational/SLB students will reach 758,174 people with nearly 3200 schools available on this island. The Balinese language is a mandatory subject to be taught at any school in Bali as a local content curriculum. The Balinese language curriculum delivers both in Latin and in Balinese script. The students in Bali start practising the

Balinese language at school from the elementary to high school level. The number of students who use Balinese names is 595,931 people (79%), and students 162,243 people use non-Balinese names (21%). The Bali Province Central Statistics Agency released the percentage of the Balinese population who use the Balinese language in their families and neighbours or relatives based on generations. 78.82% of the Post Gen Z generation or those who are currently nine years old use Balinese languages at home and 75.89% use Balinese languages among relatives or neighbors. Meanwhile, 88.07% of Generation Z or those currently aged 25-10 years use Balinese languages at home and 84.20% use regional languages among relatives or neighbours (Candrawati, 2023).

Education in the Balinese language existed during the time of the kingdoms; however, its nature was still traditional and in the family environment. The first school was founded in 1875 in Singaraja (Agung & Musta, 1991). Moreover, the first textbook for school was published in 1913 with the title *Tjatoer Perenidanâ, Peratamaning tjakepan pâpeladjahan sang mâmanah maoeroek mâmaos aksarâ Belanda* (Purnama & Yasa, 2020).

In Indonesia, there are more than 600 ethnic groups and 719 mother-tongue languages spoken. The latest study by the Summer Institute of Linguistics (SIL) found that a significant 13 Indonesian mother-tongue languages have vanished and been forgotten as they are no longer used for daily communication (Widiyanto, 2018). In a mother-tongue language, the beliefs, philosophical values, rules, and traditions of a community can be understood and learned by the next generations and others (Dixon, 1997). When a language is forgotten, the loss is not only of the structural aspect of the language, which is the main focus of the linguistic domain but also the cultural and historical knowledge attached to the language.

The Balinese language is one of 719 living languages spoken in Indonesia and is mainly used on the islands of Bali and Lombok. People in Bali practice three different levels of Balinese language: high tongues (*Basa Bali Alus*), common tongues (*Basa Bali Madya*) and low tongues (*Base Bali Sor*). In the Balinese social system, there are four hierarchy levels that are highly related to how the Balinese language is used: common people (*Sudra*), traders or government officials (*Waisya*), the royal family (*Kshatriya*), and high priests (*Brahmana*). “The high and low tongues are distinct, unrelated languages with separate roots, different words, and extremely dissimilar characters” (Covarrubias, 2008). Up until today, many of the Balinese people have learned and transferred their cultural knowledge through socialization, where the

Balinese let others experience the culture to understand it (Pramartha & Davis, 2016). This can be seen in every traditional practice, such as the *banjar adat* and costume village (*desa adat*) ceremonies, which always involve a large number of people from the community (Pramartha, Davis, & Kuan, 2018).

The Balinese language, including its script and literary elements, is the intellectual property of the Balinese people which animates every aspect of life, both in cultural and religious activities. Balinese language with dignity and grammar becomes a medium reliable for building the character and identity of Balinese people. Bali Gubernatorial Regulation Number 80 of 2018 mandates that on Thursday, full moon, no moon (*tilem*), and Bali Provincial Government Anniversary must use the Balinese language and Balinese dress. Also, this regulation concerns Balinese literature and Balinese Script. For instance, the use of Balinese script in institutional markers, roads, government official letterhead, and information media as seen in Figure 1Figure 2Figure 3



Figure 1. The use of Balinese script in institution marker/name



Figure 2. Balinese script utilized to write KFC at the American fast food in Bali



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 JALAN BASUKI RAHMAT DENPASAR – BALI (80235), TELEPON (0361) 224671
 Website : www.baliprov.go.id

Bali, 20 Mei 2021

Kepada

Yth. Kepala Perangkat Daerah di lingkungan
Pemerintah Provinsi Bali.

di –
Tempat

SURAT EDARAN
 NOMOR 13409 TAHUN 2021
 TENTANG
 PENULISAN AKSARA BALI
 PADA KOP SURAT NASKAH DINAS
 DI LINGKUNGAN PEMERINTAH PROVINSI BALI

Menindaklanjuti Peraturan Gubernur Bali Nomor 80 Tahun 2018 tentang
 Perlindungan Dan Penggunaan Bahasa, Aksara, dan Sastra Bali serta
 Penyelenggaraan Bulan Bahasa Bali, maka perlu dilakukan penyesuaian pelaksanaan
 Tata Naskah Dinas di lingkungan Pemerintah Provinsi Bali, khususnya pada bagian
 Kop Surat yang wajib menggunakan tulisan Aksara Bali di atas tulisan Latin. (contoh
 terlampir).

Figure 3. Bali Province instructed to use of Balinese script on every official letterhead

The Brāhmī script had developed approximately around 300 BC (Bühler, 1962). Brāhmī spread to northern and southern parts of India and it developed very widely geographically. There were two major waves in the spread of the Brāhmī script. The

northern Brāhmī script later developed into various scripts, such as Siddhamatrka, Kuṭiḷa, Proto-Bangla, Devanāgarī, Gujarātī, Śārada, Tibetan, Nepālākṣara/Raṅjana, and so on. Meanwhile, the southern Brāhmī script itself developed into the Tamil, Kannada, Telugu, Malayalam, Sinhala, Khmer, Lao, Cham, Thai, Kawi, Batak, Sundanese, Javanese and other Indonesian archipelago scripts, including Bali.

Balinese is a Malayo-Polynesian language spoken by about 3.3 million people mainly in Bali in Indonesian. there are now more than 3 million speakers of Balinese. Around 80,000 live on the neighbouring island of Lombok while, largely due to transmigration, 40,000 speakers are found in southern Sumatra, and 60,000 in Sulawesi (Clynes,1995). According to the Bali Cultural Agency, a million or so people use Balinese in their everyday lives. However, in urban areas Balinese-speaking parents speak Indonesian to their children. The Balinese language is classified as an Austronesian language. The development of the Balinese language can be divided into three periods, namely *Bahasa Bali Kuna* (the ancient Balinese language), *Bahasa Bali Tengahan* (the middle age of the Balinese language) and *Bahasa Bali Baru* (the new Balinese language).

The Balinese language is written either in the Latin alphabet or the Balinese script. The Latin alphabet is generally used to write in the modern context, while the Balinese script is used for more traditional narratives and original manuscripts were written on palm leaves (Rita Widiadana, 2011). The usage of Balinese script in traditional manuscripts known as Lontar (palm leave) is still prevalent today. Lontars are still copied, read, and appreciated in Bali. Many activities utilize the Balinese script, both cultural and religious, and are taught in schools as a mandatory subject.

The Balinese script, or *Aksara Bali*, is one out of 30 scripts available in Indonesia. This script is used for writing the native Balinese language known as *Basa Bali*. The Balinese script is derived from the Pallava and Devanagari scripts of India, and it has many similarities with modern scripts of South Asia and Southeast Asia. The Balinese script is mainly used for writing Kawi, or Old Javanese, which had a strong influence on the Balinese language (Everson, 2005; Sudewa, 2003).

The Balinese script is called Hanacaraka and it has been used since the 11th century AD (Nala, 2006). The script has its own unique writing rules called *Pasang Aksara*. Words are written from left to right. Balinese script has 18 basic syllables, 5 vowels, 10 numbers and punctuation that are scripted through 185 characters (Suwija,

2013). The Balinese Script of Hanacaraka has only 18 consonant characters inherent to the syllables as shown in Figure 4.



Figure 4 The basic Balinese script - Hanacaraka

Vowel characters can be attached either after, before, above or below the main script or syllable (Tinggen, 1993) as illustrated in Figure 5. However, only one vowel is attached to the syllable ha. Furthermore, there are only two punctuations, that is, coma and period (Figure 6). Finally, the script is continuous and has no spaces between the words. The complex structures and rules for writing the script are known as *pasang aksara*. Due to the complex structure of the *pasang aksara*, other academics have researched the development of digital tools for auto-correction for Balinese script on Android operation systems (Iswara et al., 2019).



Figure 5 Vowels positions (Pramartha & Dwidasmar, 2014)

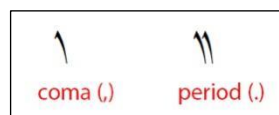


Figure 6 Balinese punctuation

Though everyday use of the script has largely been supplanted by the Latin alphabet, the Balinese script has a significant prevalence in many of the island's traditional ceremonies and is strongly associated with the Hindu religion. The script is mainly used today for copying *lontar* or palm-leaf manuscripts containing religious texts.

In total, there are more than 185 unique characters to represent Balinese script, which are categorized into 18 basic syllables, 5 vowels, 10 numbers and punctuation (Suwija, 2013). Balinese script is written from left to right, and there are no spaces

between words or sentences, which means that those who would like to read Balinese script should understand Balinese words.

3.2. Balinese Script Categorization

Balinese script (Table 1) can be divided into two major classifications (Pramartha et al., 2021):

1. Vowel script (*Aksara Suara*) with two classifications:

a. Dependent vowel. Dependent vowels can be utilized to write Balinese script in any language and need to be combined with consonants or independent vowels. For example:

- *Melali*: ꦩꦺꦭꦭꦶ (vacation)

U+1B2B U+1B42 U+1B2E U+1B2E U+1B36

- *Perpustakaan*: ꦥꦺꦫꦸꦱꦠꦏꦤ꧀ (library)

U+1B27 U+1B42 U+1B03 U+1B27 U+1B38 U+1B32 U+1B44

U+1B22 U+1B13 U+1B35 U+1B26 U+1B44

b. Independent vowel. The independent vowel mainly being used for other languages other than Balinese language, for example, Indonesian and English. The independent vowel utilized with the combination with *aksara wreastra*. For example, writing the word Ida Ayu

- ꦶꦢꦢꦸ

U+1B07 U+1B24 U+1B05 U+1B2C U+1B38

- ꦶꦢꦸꦪꦸ

U+1B33 U+1B36 U+1B24 U+1B33 U+1B2C U+1B38

- ꦶꦢꦸꦪꦸꦪꦸ

U+1B33 U+1B36 U+1B24 U+1B05 U+1B2C U+1B38

- ꦶꦢꦸꦪꦸꦪꦸꦪꦸ

U+1B07 U+1B24 U+1B33 U+1B2C U+1B38

However, for the IDN purpose, all examples above will be accepted.

Note: According to the rules (*pasang pageh*) to write the Balinese script:

- Independent vowel ꦢ (1B0D) will be used when consonant ꦢ (1B2E) combines with vowel sign *pepet* ꦠꦥꦺꦥꦺꦠ (1B42). Example *lekad* (born)

- ꦠꦥꦺꦥꦺꦠ (correct)

U+1B0D U+1B13 U+1B24 U+1B44

- ꦠꦠꦥꦺꦥꦺꦠ (wrong)

U+1B2E U+1B42 U+1B13 U+1B24 U+1B44

The example above is the same case as color vs colour in English

- Independent vowel ꦢ (1B0B) will be used when consonant ꦢ (1B2D) combines with vowel sign *pepet* ꦠꦥꦺꦥꦺꦠ (1B42). Example *rereh* (find)

- ꦠꦥꦺꦥꦺꦠ (correct)

U+1B0B U+1B0B U+1B04

- ꦠꦠꦥꦺꦥꦺꦠ (wrong)

U+1B2D U+1B42 U+1B2D U+1B42 U+1B04

The example above is the same case as color vs colour in English

- However, for the IDN purpose, all examples above will be accepted because the IDN is not required to completely cover a language or a script, and may not form labels which are words in a language:

- Not restricted to “correct” spellings
- It may not carry meaning in the “lexical” sense.

2. The consonant script, the writing system of Balinese script is the abugida system which is a segmental writing in Balinese script in which consonant–vowel sequences are written as units. Balinese consonants have an inherent -a vowel sound. The Balinese script system consists of between 18 to 33 basic characters, depending on the language spoken. Each consonant, like in other Brahmi scripts, constitutes a syllable with an inherent vowel /a/ that could be modified by adding particular diacritics (Sound Script).

- a. *Aksara Wreastra* is a Balinese script that is used to write the common Balinese language, which consists of Ha Na Ca Ra Ka Da Ta Sa Wa La Ma Ga Ba Nga Pa Ja Ya Nya

- b. *Aksara Swalalita* is a Balinese script used to write letters that derived from Sanskrit and Old Javanese, for example, in literature purposes like *Kekawin* and *Kidung*.
- c. *Aksara Modre* is a Balinese script is used to write mantra (*rerajahan*).
- d. Numbers. 1 2 3 4 5 6 7 8 9 0

For the purpose of the Second Level Balinese Script Zone Label Generation Rule-Set (LGR) only two types of script (*Aksara Wreastra* and *Aksara Swalalita*) will be allowed due to these scripts are the common scripts that are used for everyday life in Bali.

In the Balinese script, signs (see Table 1) can be used for multiple purposes:

- a. Two dependent vowels i are excluded in the repertoire 1B00 *ulu ricem* ◌ and 1B01 *ulu candra* ◌ where these vowels are used to write a prayer or holy script such as *om*. For example:
 - *Om sang naga raja*
 - *Om swastiastu* is a word to welcome and greet people in Bali.
- b. The behaviour of ra. 1B03 Balinese sign *surang* typically represents a final consonant -r. For example, *pasar* (market)
- c. The behaviour of *nga* becomes *ng cecek* (1B02) instead of (1B17) + (1B44).
 - When the end of the syllable of the basic word is *ng*. For example
 - *pucung* =
 - *barang* =
 - When the end of the syllable of the basic word is *ng* gets a suffix, for instance *ne*. For example
 - *siungne* =

U+1B32 U+1B36 U+1B2C U+1B38 U+1B02 U+1B26
 U+1B3E 8

- pedangne = ꦥꦢꦁꦤꦺ

U+1B27 U+1B42 U+1B24 U+1B02 U+1B26 U+1B3E

- When the basic word consists of two identical syllables. For example

- cangcang = ꦕꦁꦕꦁ

U+1B18 U+1B02 U+1B18 U+1B02

- kungkung = ꦏꦸꦏꦸꦁ

U+1B13 U+1B38 U+1B02 U+1B13 U+1B38 U+1B02

- When we want to avoid using the below 2-base (see Figure 7). For example

- angklung = ꦲꦁꦏꦭꦸꦁ

U+1B33 U+1B02 U+1B13 U+1B44 U+1B2E U+1B38
 U+1B02

- sungklit = ꦱꦸꦁꦏꦭꦶꦠ

U+1B32 U+1B38 U+1B02 U+1B13 U+1B44 U+1B2E
 U+1B36 U+1B22 U+1B44

- d. The sign 1B34 *nukta* ꦏꦸꦏꦿ is not included in the repertoire due to this sign seldom found being used today.

Table 1. Balinese Script

Type	Numbers	Subtype	Characters
Consonants	18	<i>Wreastra</i>	ꦱ(1B33), ꦱ(1B26), ꦱ(1B18), ꦱ(1B2D), ꦱ(1B13), ꦱ(1B24), ꦱ(1B22), ꦱ(1B32), ꦱ(1B2F), ꦱ(1B2E), ꦱ(1B2B) ꦱ(1B15), ꦱ(1B29), ꦱ(1B17), ꦱ(1B27), ꦱ(1B1A), ꦱ(1B2C)

			ꦱ(1B1C)
	15	<i>Swalalita</i>	ꦱ(1B21), ꦱ(1B19), ꦱ(1B14), ꦱ(1B16), ꦱ(1B1B), ꦱ(1B1D), ꦱ(1B1E), ꦱ(1B1F), ꦱ(1B20), ꦱ(1B23), ꦱ(1B25), ꦱ(1B28), ꦱ(1B2A), ꦱ(1B30), ꦱ(1B31)
Vowel	14	Independent Vowel	ꦱ(1B05), ꦱ(1B06), ꦱ(1B07), ꦱ(1B08), ꦱ(1B09), ꦱ(1B0A), ꦱ(1B0B), ꦱ(1B0C), ꦱ(1B0D), ꦱ(1B0E), ꦱ(1B0F), ꦱ(1B10), ꦱ(1B11), ꦱ(1B12)
	15	Dependent Vowel Signs	ꦱꦱ(1B35), ꦱꦱ(1B36), ꦱꦱ(1B37), ꦱꦱ(1B38), ꦱꦱ(1B39), ꦱꦱ(1B3A), ꦱꦱꦱ(1B3B), ꦱꦱ(1B3C), ꦱꦱꦱ(1B3D), ꦱꦱꦱ(1B3E), ꦱꦱꦱ(1B3F), ꦱꦱꦱ(1B40), ꦱꦱꦱ(1B41), ꦱꦱ(1B42), ꦱꦱꦱ(1B43)
Signs	5	Various Signs	ꦱꦱ(1B00) ꦱꦱ(1B01) ꦱꦱ(1B03), ꦱꦱ(1B02), ꦱꦱ(1B04)
	2	Signs	ꦱꦱ(1B34) ꦱꦱ(1B44)
Numbers	10	Numbers	ꦱꦱ(U+1B51) ꦱꦱ(U+1B52) ꦱꦱ(U+1B53) ꦱꦱ(U+1B54)

			ꦲ(U+1B55)	ꦲ(U+1B56)
			ꦲ(U+1B57)	ꦲ(U+1B58)
			ꦲ(U+1B59)	ꦲ(U+1B50)

Note: red script will not be included in the code point repertoire (refer to section 5.1)

3.3. Features and Categories of Characters

The traditional Balinese script can be written with six components (see Figure 7 (a)), namely:

1. Baseline
2. Pre-base
3. Post-base
4. Above-base
5. Below 1-base
6. Below 2-base

However, based on the agreement among the Balinese people to make it easy to write and read the script, since 2002 and forward all the Balinese script should be written without the Below 2-base (Bali, 2002). Moreover, to utilise the Balinese script for the Internet domain name need, we also recommend using only five components (see Figure 7 (b)) due to the limitation of presenting the Internet domain name in the Internet browser URL address.

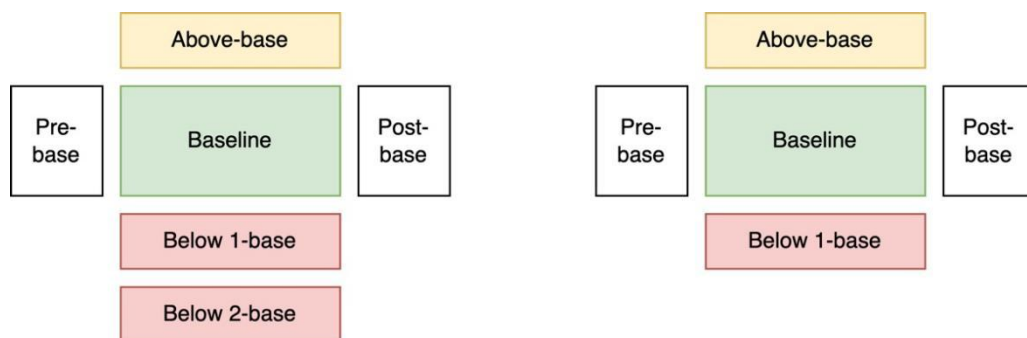


Figure 7. (a) Character position of the Balinese Script (Habibi, 2005), (b) Propose Character Position of Balinese script for the Internet domain name

Example of using all positions in the Balinese script

1. *Om Swastiastu* = [Balinese characters] (greeting in Balinese) (type a)
2. *Dumogi becik* = [Balinese characters] (hoping everything ok) (type b)
3. *Matur Suksma* = [Balinese characters] (thank you) (type b)



Figure 8. Example using type (a) of the Balinese script character position on the Chrome browser

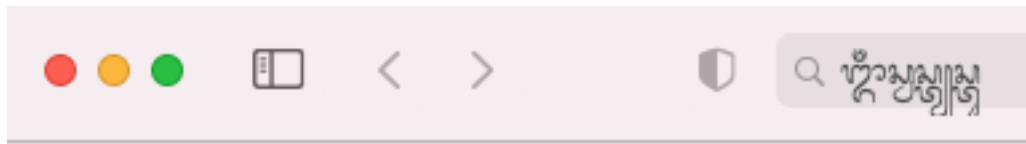


Figure 9. Example using type (a) of the Balinese script character position on the Safari browser



Figure 10. Example using type (b) of the Balinese script character position on the Chrome browser.

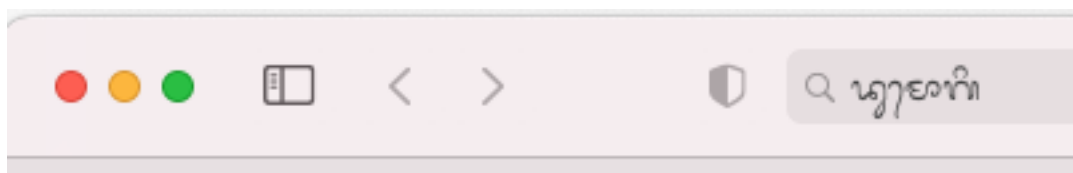


Figure 11. Example using type (b) of the Balinese script character position on the Safari browser

3.4. Fonts in Balinese Script

Several types of Balinese script fonts have been developed by the communities, namely:

Developed by Aditya and David Kamholz ([source](#)):

1. [Vimala](#) = ꦲꦩꦭ
2. [Pustaka Bali](#) = ꦲꦸꦠ
3. [Kadiri](#) = ꦏꦢꦶ

Developed by Google:

[Noto Sans Balinese](#) = ꦏꦤ꧀ꦱꦤ꧀ꦧꦭꦶꦱꦺ

Developed by [I Wayan Sukanta](#) and David Kamholz:

[Natya](#) = ꦤꦂꦶ

[Developed by Balinese Language instructors](#):

1. ꦲꦨꦠ = Bali Banat
2. ꦲꦫꦁ = Bali Raung
3. ꦩꦁꦸꦱꦱꦠꦫ = Mangu sastra
4. ꦤꦫꦢ = Narada
5. ꦱꦲꦸꦃꦭꦸꦶꦃ = Sapuh Luih
6. ꦱꦸꦢꦩꦭ = Sudamala
7. ꦠꦸꦠꦸꦢꦧꦭ = Tutud Bali
8. ꦸꦂꦢꦱꦱꦠꦫ = Urdhasastra
9. ꦱꦶꦁꦲꦩꦧꦫ = Singhambara

The recommended font for the Balinese script is Natya due to this font has been approved for use as the Indonesian national standard (SNI: 9047:202)

3.5. The Balinese Script Computer Keyboard (Tamiang)

This invention relates to a computer input device, namely a computer keyboard with a Balinese script layout interface for writing Balinese script on a computer application with Microsoft Windows and Mac operating systems without auto-correction if there is a mistake in writing the Balinese script. This keyboard invention is comprised of a frame, a circuit board mounted within the frame, and a plurality of

keys placed on top of the circuit board. In addition, each variation key on the keyboard consists of two to four related letter variations. Furthermore, the output of variation letters is generated from the button combinations of GANTASURI, GANTAPA, and GANTACEM to display the Balinese script that the user desires. This invention is in the form of a computer keyboard with a Balinese script layout that can be used to type 93 Balinese script characters (F) and the resulting document can be copied and shared without changing the appearance of the document that was previously created (Pramartha et al., 2021). This keyboard was introduced to the public by the governor of Bali in 2021¹ and has been distributed to many schools around Bali. More information about this product can be found at <https://tamiang.oss.web.id>.

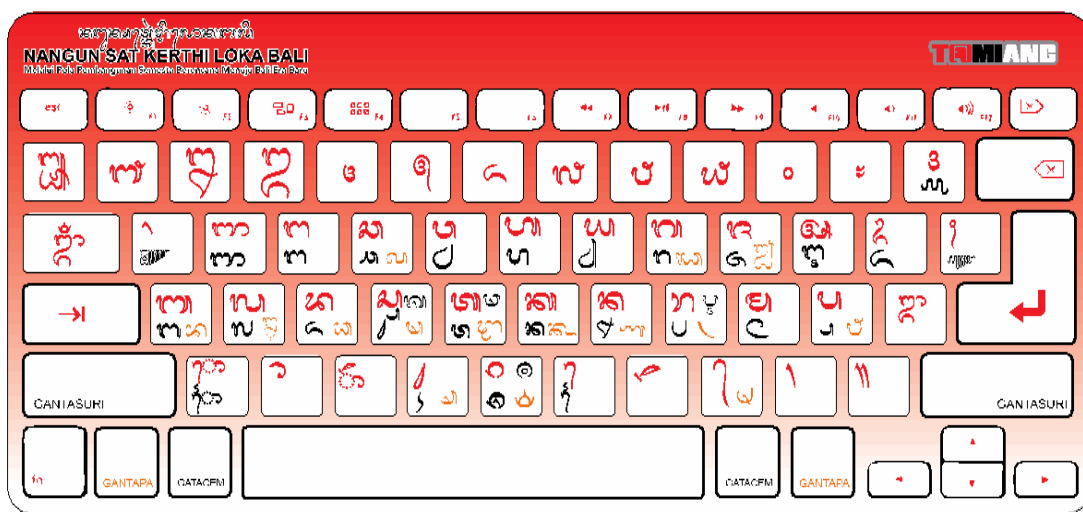


Figure 12. The Balinese script keyboard (Tamiang)

At the beginning of developing the Balinese keyboard, the glyphs for 1B11 □ (Okara) and 1B53 □ (digit 3) have the same shape/glyphs (user view) and the developer doesn't want to confuse users about the same shape with different purposes. However, the 1B11 □ will be included in the next shipping of the keyboard

4. Resolving IDN in the Existing Domain Name Server (DNS)

IDNA is a mechanism defined in 2003 for handling internationalized domain names containing non-ASCII characters. Rather than redesigning the existing DNS infrastructure, it was decided that non-ASCII domain names should be converted to a

¹ <https://bmc.baliprov.go.id/news/title/gubernur-bali-luncurkan-keyboard-aksara-bali>

suitable ASCII-based form by web browsers and other user applications. IDNA was designed for maximum backward compatibility with the existing DNS system, which was designed for use with names using only a subset of the ASCII character set.

ASCII Compatible Encoding: Punycode

To conform to the current DNS standard, the Unicode string needs to be converted to an intermediate ASCII string, called ASCII compatible encoding (ACE). This intermediary code is called the Punycode.

Punycode is a Bootstring algorithm enabled by IDNA and defined in RFC 3492, which uniquely and reversibly converts the Unicode string into an ASCII string, i.e., between the restricted ASCII (LDH) and non-ASCII representations of a domain. The algorithm consists of two components, viz. called ToASCII (Encoding) and ToUnicode (Decoding), both central to the working of IDNA. Each of these algorithms is not applied to a domain name as a whole but to the individual labels that compose a domain name.

ToASCII leaves unchanged any ASCII label. If given a label containing at least one non-ASCII character, ToASCII will apply the Nameprep algorithm which converts a label to lowercase and performs other normalizations. Then it translates the result to ASCII using Punycode before prepending the four-character string “xn--”. This four-character string is called the ACE prefix and is used to distinguish between Punycode encoded labels from ordinary ASCII labels.

ToUnicode reverses the action of ToASCII, stripping off the ACE prefix and applying the Punycode decode algorithm. It does not have any effect on any string that does not begin with the ACE prefix.

5. Repertoire

5.1. Code Point Repertoire

Balinese script is written with compound signs stacked above or below the consonants, apart from that it is also written before and after the consonants (see section 3.3). We only include code points that are currently available on the Balinese Keyboard (refer to section 3.5); otherwise, the user will be unable to type the script on the computer.

Table xx. Code point repertoire

No.	Code Point	Glyph	Script	Name	Ref	Tags	Required	Comment
1	U+002D	-	Common	HYPHEN-MINUS		hyphen	not-when: hyphen-minus-disallowed	
2	1B02	◌̘	Balinese	BALINESE SIGN CECEK = anusvara		as	follows-consonant, dependent vowel, independent vowel	Various Signs
3	1B03	◌̙	Balinese	BALINESE SIGN SURANG = final r • also used for repha in transliteration of Kawi → A982		as	Follows-consonant, dependent vowel, independent vowel.	Various Signs

				ꦱꦺꦤ꧀ꦗꦮꦺꦤꦺꦱꦶꦁꦭꦪꦫ				
4	1B04	ꦱꦺꦤ꧀ꦗꦮꦺꦤꦺꦱꦶꦁꦭꦪꦫ	Balinese	BALINESE SIGN BISAH = visarga		as	follows-consonant, dependent vowel, independent vowel	Various Signs
5	1B05	ꦱꦤ	Balinese	BALINESE LETTER AKARA = a		pre-v		Independent Vowel
6	1B06	ꦱꦱ	Balinese			pre-v		Independent Vowel
7	1B07	ꦱꦶ	Balinese	BALINESE LETTER IKARA = i		pre-v		Independent Vowel
8	1B08	ꦱꦶꦠꦺꦁ	Balinese	BALINESE LETTER IKARA TEDUNG = ≡ 1B07 ꦱ 1B35 ꦺꦴ		pre-v		Independent Vowel
9	1B09	ꦱꦸ	Balinese	BALINESE LETTER UKARA = u		pre-v		Independent Vowel
10	1B0A	ꦱꦸꦠꦺꦁ	Balinese	BALINESE LETTER UKARA TEDUNG = ≡ 1B09 ꦱ 1B35 ꦺꦴ		pre-v		Independent Vowel

11	1B0B	ꦫ	Balinese	BALINESE LETTER RA REPA = vocalic r		s-c		Independent Vowel
12	1B0C	ꦫꦠ	Balinese	BALINESE LETTER RA REPA TEDUNG = vocalic rr ≡ 1B0B □ 1B35 ○□		s-c		Independent Vowel
13	1B0D	ꦭ	Balinese	BALINESE LETTER LA LENGA = vocalic l		s-c		Independent Vowel
14	1B0E	ꦭꦠ	Balinese	BALINESE LETTER LA LENGA TEDUNG = vocalic ll ≡ 1B0D □ 1B35 ○□		s-c		Independent Vowel
15	1B0F	ꦺ	Balinese	BALINESE LETTER EKARA = e		pre-v		Independent Vowel
16	1B10	ꦲ		BALINESE LETTER AIKARA		pre-v		Independent Vowel
17	1B11	ꦺꦴ	Balinese	BALINESE LETTER OKARA = o		pre-v		Independent Vowel

18	1B12	ꦲ	Balinese	BALINESE LETTER OKARA TEDUNG = au ≡ 1B11 □ 1B35 ○□		pre-v		Independent Vowel
19	1B13	ꦏ	Balinese	BALINESE LETTER KA		consonant		<i>Wreastra</i>
20	1B14	ꦏꦲ	Balinese	BALINESE LETTER KA MAHAPRANA = kha		consonant		<i>Swalalita</i>
21	1B15	ꦒ	Balinese	BALINESE LETTER GA		consonant		<i>Wreastra</i>
22	1B16	ꦒꦲ	Balinese	BALINESE LETTER GA GORA = gha		consonant		<i>Swalalita</i>
23	1B17	ꦒꦏ	Balinese	BALINESE LETTER NGA		consonant		<i>Wreastra</i>
24	1B18	ꦑ	Balinese	BALINESE LETTER CA		consonant		<i>Wreastra</i>
25	1B19	ꦑꦲ	Balinese	BALINESE LETTER CA LACA = cha		consonant		<i>Swalalita</i>
26	1B1A	ꦗ	Balinese	BALINESE LETTER JA		consonant		<i>Wreastra</i>
27	1B1B	ꦗꦲ	Balinese	BALINESE LETTER JA JERA = jha		consonant		<i>Swalalita</i>

28	1B1C	ꦤ	Balinese	BALINESE LETTER NYA		consonant		<i>Wreastra</i>
29	1B1D	ꦠ	Balinese	BALINESE LETTER TA LATIK = tta		consonant		<i>Swalalita</i>
30	1B1E	ꦠ	Balinese	BALINESE LETTER TA MURDA MAHAPRANA		consonant		<i>swalalita</i>
31	1B20	ꦢ	Balinese	BALINESE LETTER DA MURDA MAHAPRANA		consonant		<i>swalalita</i>
32	1B21	ꦤ	Balinese	BALINESE LETTER NA RAMBAT = nna		consonant		<i>Swalalita</i>
33	1B22	ꦠ	Balinese	BALINESE LETTER TA		consonant		<i>Wreastra</i>
34	1B23	ꦠ	Balinese	BALINESE LETTER TA TAWA = tha		consonant		<i>Swalalita</i>
35	1B24	ꦢ	Balinese	BALINESE LETTER DA		consonant		<i>Wreastra</i>
36	1B25	ꦢ	Balinese	BALINESE LETTER DA MADU = dha		consonant		<i>Swalalita</i>
37	1B26	ꦤ	Balinese	BALINESE LETTER NA		consonant		<i>Wreastra</i>

38	1B27	ᮘ	Balinese	BALINESE LETTER PA		consonant		<i>Wreastra</i>
39	1B28	ᮙ	Balinese	BALINESE LETTER PA KAPAL = pha		consonant		<i>Swalalita</i>
40	1B29	ᮚ	Balinese	BALINESE LETTER BA		consonant		<i>Wreastra</i>
41	1B2A	ᮛ	Balinese	BALINESE LETTER BA KEMBANG = bha		consonant		<i>Swalalita</i>
42	1B2B	ᮜ	Balinese	BALINESE LETTER MA		consonant		<i>Wreastra</i>
43	1B2C	ᮝ	Balinese	BALINESE LETTER YA		consonant		<i>Wreastra</i>
44	1B2D	ᮞ	Balinese	BALINESE LETTER RA		consonant		<i>Wreastra</i>
45	1B2E	ᮟ	Balinese	BALINESE LETTER LA		consonant		<i>Wreastra</i>
46	1B2F	ᮠ	Balinese	BALINESE LETTER WA		consonant		<i>Wreastra</i>
47	1B30	ᮡ	Balinese	BALINESE LETTER SA SAGA = sha		consonant		<i>Swalalita</i>
48	1B31	ᮢ	Balinese	BALINESE LETTER SA SAPA = ssa		consonant		<i>Swalalita</i>

49	1B32	ꦱ	Balinese	BALINESE LETTER SA		consonant		<i>Wreastra</i>
50	1B33	ꦲ	Balinese	BALINESE LETTER HA		consonant		<i>Wreastra</i>
51	1B35	ꦱꦠꦸꦁ	Balinese	BALINESE VOWEL SIGN TEDUNG = aa		post-v	follows-consonant, independent vowel	Dependent Vowel Signs
52	1B36	ꦱꦸꦭꦸ	Balinese	BALINESE VOWEL SIGN ULU = i		av	follows-consonant, independent vowel	Dependent Vowel Signs
53	1B37	ꦱꦸꦭꦸꦱꦫꦶ	Balinese	BALINESE VOWEL SIGN ULU SARI = ii		av	follows-consonant, independent vowel	Dependent Vowel Signs
54	1B38	ꦱꦸꦏꦸ	Balinese	BALINESE VOWEL SIGN SUKU = u		bv	follows-consonant, independent vowel	Dependent Vowel Signs
55	1B39	ꦱꦸꦏꦸꦭꦸꦠ	Balinese	BALINESE VOWEL SIGN SUKU ILUT = uu		bv	follows-consonant, independent vowel	Dependent Vowel Signs
56	1B3A	ꦱꦸꦏꦸꦫꦺꦴ	Balinese	BALINESE VOWEL SIGN RA REPA = vocalic r		bv	follows-consonant, independent vowel	Dependent Vowel Signs
57	1B3B	ꦱꦸꦏꦸꦫꦺꦴꦠꦸꦁ	Balinese	BALINESE VOWEL SIGN RA REPA TEDUNG = vocalic rr ≡ 1B3A ꦱ ꦱꦠꦸꦁ ꦱꦸꦫꦸꦁ		b-post-v	follows-consonant, independent vowel	Dependent Vowel Signs

58	1B3C	ꦱꦺꦴꦭꦺꦁ	Balinese	BALINESE VOWEL SIGN LA LENGA = vocalic ɪ		b-a-v	follows-consonant, independent vowel	Dependent Vowel Signs
59	1B3D	ꦱꦺꦴꦭꦺꦁꦠꦺꦢꦸꦁ	Balinese	BALINESE VOWEL SIGN LA LENGA TEDUNG = vocalic ɪ ≡ 1B3C ◯◻ 1B35 ◯◻		b-a-post-v	follows-consonant, independent vowel	Dependent Vowel Signs
60	1B3E	ꦱꦺꦴꦭꦺꦁꦠꦺꦴꦁ	Balinese	BALINESE VOWEL SIGN TALING = e		prev	follows-consonant, independent vowel	Dependent Vowel Signs
61	1B3F	ꦱꦺꦴꦭꦺꦁꦠꦺꦴꦁꦫꦺꦴꦥ	Balinese	BALINESE VOWEL SIGN TALING REPA = ai		prev	follows-consonant, independent vowel	Dependent Vowel Signs
62	1B40	ꦱꦺꦴꦭꦺꦁꦠꦺꦢꦸꦁꦺ	Balinese	BALINESE VOWEL SIGN TALING TEDUNG = o = 1B3E ◻◯ 1B35 ◯◻		pre-post-v	follows-consonant, independent vowel	Dependent Vowel Signs
63	1B41	ꦱꦺꦴꦭꦺꦁꦠꦺꦢꦸꦁꦫꦺꦴꦥꦠꦺꦢꦸꦁ	Balinese	BALINESE VOWEL SIGN TALING REPA TEDUNG = au ≡ 1B3F ◻◯ 1B35 ◯◻		pre-post-v	follows-consonant, independent vowel	Dependent Vowel Signs
64	1B42	ꦱꦺꦴꦭꦺꦁꦠꦺꦴꦁꦥꦺꦥꦺꦠ	Balinese	BALINESE VOWEL SIGN PEPET = ae		av	follows-consonant, independent vowel	Dependent Vowel Signs

65	1B43	◌̊◌̋	Balinese	BALINESE VOWEL SIGN PEPET TEDUNG = oe ≡ 1B42 ◌̊◌̋ 1B35 ◌̊◌̋		a-post-v	follows-consonant, independent vowel	Dependent Vowel Signs
66	1B44	◌̣	Balinese	BALINESE ADEG ADEG = virama		posts	follows-consonant, dependent vowel, independent vowel	Sign

Table xx Character Classes

Name	Definition	Count	Members of Ranges	Ref	Comment
Above-sign	Tag=as	3	{1B02-1B03}		Any Balinese above sign
Pre-vowel	Tag=prev	10	{1B05-1B0A, 1B0F-1B12}		Any Balinese pre vowel
Same-consonant	Tag=s-c	4	{1B0B-1B0E}		Any Balinese same consonant
Consonant	Tag=cons	30	{1B13-1B33}		
Post-vowel	Tag=postv	1	{1B35}		Any Balinese post-vowel
Above-vowel	Tag=av	3	{1B36, 1B37, 1B42}		
Below-vowel	Tag=bv	3	{1B38-1B3A}		
b-a-v	<i>Combined</i> =[[:below-vowel:] ∪[:above-vowel:]]	1	{1B3C}		

b-a-post-v	<i>Combined</i> =[[[:below-vowel:]] ∪ [[:above-vowel:]] ∪ [[:post-vowel:]]]	1	{1B3D}		
b-post-v	<i>Combined</i> =[[[:below-vowel:]] ∪ [[:post-vowel:]]]	1	{1B3B}		
Pre-post-v	<i>Combined</i> =[[[:pre-vowel:]] ∪ [[:post-vowel:]]]	2	{1B40-1B41}		
a-post-v	<i>Combined</i> =[[[:above-vowel:]] ∪ [[:post-vowel:]]]	1	{1B43}		
Post-sign	Tag=posts	1	{1B44}		Any Balinese post sign

Table xx...Whole label evaluation and context rules

Name	Regular Expression	Used as Trigger	Anchor	Used as Context	Ref	Comment
follows-consonant	([:consonant:])← ⚓	True	False	False		
follows-consonant, dependent vowel, independent vowel	([:consonant:][:dependent vowel:] [[:independent vowel:]]← ⚓	True	False	False		
precedes-consonant	⚓ → ([:consonant:])	True	False	False		

precedes-follows- consonant	⚓ →([:consonant:]) ← ⚓	True	False	False		
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5.2. Normalization Forms

[Unicode Normalization Forms](#) are formally defined normalizations of Unicode strings which make it possible to determine whether any two Unicode strings are equivalent to each other. Depending on the particular Unicode Normalization Form, that equivalence can either be a canonical equivalence or a compatibility equivalence.

Essentially, the Unicode Normalization Algorithm puts all combining marks in a specified order and uses rules for decomposition and composition to transform each string into one of the Unicode Normalization Forms. A binary comparison of the transformed strings will then determine equivalence.

Table xx. Normalization Forms

Form	Description
Normalization Form D (NFD)	Canonical Decomposition
Normalization Form C (NFC)	Canonical Decomposition, followed by Canonical Composition

Table xx. Normalization Forms of Balinese Script

Source	NFC	NFD
1B06 ☐	1B06 ☐	1B05 ☐ 1B35 ○☐
1B08 ☐	1B08 ☐	1B07 ☐ 1B35 ○☐
1B0A ☐	1B0A ☐	1B09 ☐ 1B35 ○☐
1B0C ☐	1B0C ☐	1B0B ☐ 1B35 ○☐

1B0E □	1B0E □	1B0D □ 1B35 ○□
1B12 □□	1B12 □□	1B11 □ 1B35 ○□
1B3B ○□□	1B3B ○□□	1B3A ○□ 1B35 ○□
1B3D ○□□	1B3D ○□□	1B3C ○□ 1B35 ○□
1B40 □○□	1B40 □○□	1B3E □○ 1B35 ○□
1B41 □○□	1B41 □○□	1B3F □○ 1B35 ○□
1B43	1B43	1B42 1B35 ○□

Sources

- <https://www.unicode.org/Public/UCD/latest/ucd/NormalizationTest.txt>
- <https://unicode.org/reports/tr15/>

5.3. Exclude To Be Included for Future Development

These 22 Balinese Scripts are excluded from current consideration, to be included for future development.

Table xx Balinese script that might be included in the future development

No.	Code Point	Glyph	Name
6	1B1F	□	BALINESE LETTER DA MURDA ALPAP
10	1B00	○□	BALINESE SIGN ULU RICEM
11	1B01	○□	BALINESE SIGN ULU CANDRA
12	1B34	○□	BALINESE SIGN REREKAN

13	1B50	<input type="checkbox"/>	BALINESE DIGIT ZERO
14	1B51	<input type="checkbox"/>	BALINESE DIGIT ONE
15	1B52	<input type="checkbox"/>	BALINESE DIGIT TWO
16	1B53	<input type="checkbox"/>	BALINESE DIGIT THREE
17	1B54	<input type="checkbox"/>	BALINESE DIGIT FOUR
18	1B55	<input type="checkbox"/>	BALINESE DIGIT FIVE
19	1B56	<input type="checkbox"/>	BALINESE DIGIT SIX
20	1B57	<input type="checkbox"/>	BALINESE DIGIT SEVEN
21	1B58	<input type="checkbox"/>	BALINESE DIGIT EIGHT
22	1B59	<input type="checkbox"/>	BALINESE DIGIT NINE

6. Variants

The *Aksara Swalalita* are included in the variant (Table 2) because it has the same sound but a different form and different usage rules, as explained in section 3.2.

Table xx. Variants

Unicode Code Point	Glyph	Unicode Code Point	Glyph	Sound
1B14	☐	1B13	☐	Ka
1B16	☐	1B15	☐	Ga
1B19	☐	1B18	☐	Ca
1B1B	☐	1B1A	☐	Ja
1B1D	☐	1B22	☐	Ta
1B1E	☐	1B22	☐	Ta
1B25	☐	1B24	☐	Da
1B20	☐	1B24	☐	Da
1B21	☐	1B26	☐	Na
1B23	☐	1B22	☐	Ta
1B28	☐	1B27	☐	Pa
1B2A	☐	1B29	☐	Ba
1B30	☐	1B32	☐	Sa
1B31	☐	1B32	☐	Sa

Consonant F, Q, X, Z, V does not present in Balinese script as Latin script. Because the Balinese script is written according to pronunciation, the Balinese Congress decided to display certain consonants using comparable sounds.

The consonant V, for example, sounds like P and is represented by the script “ꦧ”, the consonant F also sounds like P and is represented by the script “ꦧ”. Consonant Z sounds like S, which is represented by the script “ꦱ”, and consonant Q sounds like K, which is represented by the letter “ꦏ”. consonant X sounds like S, which is represented by script “ꦱ”

Example of using F, Q, X, Z, V:

Fani “ꦒꦤꦶ”

Qory “ꦒꦺꦴꦫꦺ”

Xavi “ꦱꦩꦶ”

Zakarya “ꦱꦏꦪꦫ”

Vanya “ꦲꦶꦪ”

In addition to scrutinizing distinctions within the Balinese script variants, we extended our analysis to encompass a cross-script variant check, including comparisons with the [Sinhala](#), [Myanmar](#), and [Javanese](#) scripts. Our comprehensive investigation, to the best of our knowledge, revealed no discernible similarities in shape that could compromise the security of Balinese Internationalized Domain Names (IDNs) from the user's perspective. This thorough examination provides reassurance regarding the visual distinctiveness and security integrity of Balinese IDNs.

7. Whole Label Evaluation Rules

This section describes the WLE rules that are required by all languages. The Balinese script has its own rules called pairs of scripts and is divided into two, namely *pasang jajar* (without spacing between words) and *pasang palas* (with space between words). Pairing (*pasang*) is a style of writing a manuscript called *scripto continua* or writing continuously or without using spaces. *Pasang jajar* is usually used in writing manuscripts, such as lontar manuscripts, while *pasang palas* are the writing method that has undergone modernisation and supports use in the public domain. The use of *adeg-adeg* “ꦲꦶꦪ” (U+1B44) in *pasang palas* is a separator symbol between syllables. For the second-level domain, users are permitted to use both rules (*pasang jajar* and *pasang palas*). The space in *pasang palas* will be utilized 1B44 as a separator (space) symbol.

The utilization of the *adeg-adeg* “ꦲꦶꦪ” (U+1B44) and hyphens "-" in the Balinese Script for Internationalized Domain Names (IDNs) differs in their usage. The character “ꦲꦶꦪ” (U+1B44) is frequently used to suppress the vowel when the preceding word ends with a consonant. Both “ꦲꦶꦪ” (U+1B44) and hyphens (U+002D) can be simultaneously used in one or more words. For instance, the term "**Batas Desa**" (meaning "village's border") could be represented as

1. □□□□□□

U+1B29 U+1B22 U+1B32 U+1B44 U+200C U+1B24 U+1B3E U+1B32

2. □□□□□□

U+1B29 U+1B22 U+1B32 U+1B44 U+1B24 U+1B3E U+1B32

3. □□□□-□□□

U+1B29 U+1B22 U+1B32 U+1B44 U+002D U+1B24 U+1B3E U+1B32

7.1. Permissible Entities

- The Letter Hyphen shall be the only entity permitted. The hyphen shall belong to the ASCII.

Example:

- www.dumogi-becik.id : `www.ꦠꦸꦩꦒꦶ-ꦧꦺꦕꦶꦏꦱ.ꦶꦢ`
 - www.i-gusti.id : `www.ꦶ-ꦒꦸꦱꦠꦶꦱ.ꦶꦢ`
 - i-gusti.id : `ꦶ-ꦒꦸꦱꦠꦶꦱ.ꦶꦢ`
- All letters (characters) will be of the pertinent script.

7.2. Not Permissible

7.2.1. Code-Page mixing:

Mixing of scripts at the second level will NOT be allowed

Example:

- `www.ꦠꦸꦩꦒꦶꦧꦺꦕꦶꦏꦱ.ꦶꦢ` (not allowed)
- `www.ꦠꦸꦩꦒꦶꦧꦺꦕꦶꦏꦱ.ꦶꦢ` (allowed)

7.2.2. Digits

Digits in Balinese script will NOT be allowed.

ꦠꦸꦩꦒꦶꦧꦺꦕꦶꦏꦱ

Digits in ASCII will NOT be allowed.

1 2 3 4 5 6 7 8 9 0

The digit in Balinese script is not included because some of them share a similar shape, which could pose a security risk. For example:

- Balinese digit two ꦠꦸꦩꦒꦶꦧꦺꦕꦶꦏꦱ (1B52) vs letter *la lenga* ꦶꦒꦸꦱꦠꦶꦱ (1B0D)
- Balinese digit eight ꦠꦸꦩꦒꦶꦧꦺꦕꦶꦏꦱ (1B58) vs letter *pa kapal* ꦶꦒꦸꦱꦠꦶꦱ (1B28)

If users wish to express numbers, they should use words for the representation. For instance, one (siki in Balinese) ꦱꦶꦏꦶ (U+1B32 U+1B36 U+1B13 U+1B36) instead of 1 ꦱ (U+1B51).

7.2.3. Punctuation

Punctuation in Balinese script will NOT be allowed.

ꦱꦶꦏꦶꦱꦶꦏꦶꦱꦶꦏꦶ

7.2.4. Three stacks (Below 2-Base)

Balinese script domain names employing three stacks of consonants (Below 2-Base) will NOT be permitted, allowing for a maximum of two consecutive consonants.

For example:

Cangklang

- ꦱꦶꦏꦶꦱꦶꦏꦶꦱꦶꦏꦶ (NOT allowed)

U+1B18 U+1B17 U+1B44 U+1B13 U+1B44 U+1B2E U+1B02

- ꦱꦶꦏꦶꦱꦶꦏꦶ (Allowed)

U+1B18 U+1B02 U+1B13 U+1B44 U+1B2E U+1B02

7.3. Sequence for Typing in Balinese Script

As previously mentioned, consonants, like in other Brahmi scripts, constitute a syllable with an inherent vowel /a/ that could be modified by adding particular diacritics (Sound Script).

- Typing in Balinese script dependent vowels, for example, ꦱꦶ ꦱꦺ ꦱꦺꦴ ꦱꦺꦴ ꦱꦺꦴ (i, u, e, o, ê) should be typed after the consonant or independent vowel.

Example

○ pesu: $\text{ꦱ} + \text{ꦱꦶ} + \text{ꦱ} + \text{ꦱꦺ} = \text{ꦱꦶꦱꦺ}$

U+1B27 U+1B42 U+1B32 U+1B38

○ inget: ꦲ + ꦺ + ꦲ + ꦺ + ꦲ + ꦺ = ꦲꦺꦲꦺꦲꦺ

U+1B33 U+1B36 U+1B17 U+1B42 U+1B22 U+1B44

- Typing sequence in Balinese script for independent vowels, for example, ꦲ ꦺ ꦺ

ꦲ ꦺꦺ (a, i, u, e, o) can be written before and after the consonant.

Example

○ I gusti: ꦲ + ꦲ + ꦺ + ꦲ + ꦲ + ꦺ = ꦲꦺꦲꦺꦲꦺꦺ

U+1B07 U+1B15 U+1B38 U+1B32 U+1B44 U+1B22 U+1B36

○ aget: ꦲ + ꦲ + ꦺ + ꦲ + ꦺ = ꦲꦺꦲꦺꦺ

U+1B33 U+1B15 U+1B42 U+1B22 U+1B44

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References

- Agung, A. A. G. P., & Musta, I. N. (1991). *Sejarah Pendidikan Daerah Bali*: Departemen Pendidikan dan Kebudayaan, Direktorat Jendral Kebudayaan.
- Bali, D. K. P. (2002). *Pedoman Pasang Aksara Bali*.
- Candrawati, I. A. (2023, 20/02/2023). Bahasa Bali di Era Digitalisasi. *Balipost.com*. Retrieved from <https://www.balipost.com/news/2023/02/20/324115/Bahasa-Bali-di-Era-Digitalisasi.html>
- Covarrubias, M. (2008). *Island of Bali*. Singapore: Periplus Editions (HK) Limited.
- Dixon, R. M. (1997). *The rise and fall of languages*. Cambridge: Cambridge University Press.
- Everson, M. S., I Made. (2005). *Proposal for encoding the Balinese script in the UCS*. Retrieved 02 July from <https://www.unicode.org/L2/L2005/05008-n2908-balinese.pdf>
- Habibi, I. (2005). *Pemrosesan Teks Berbasis Standar Unicode Aksara Bali* Institut Teknologi Bandung]. Bandung. [https://informatika.stei.itb.ac.id/~rinaldi.munir/TA/Makalah_TA%20Imam%20Habibi%20\(Indonesian\).pdf](https://informatika.stei.itb.ac.id/~rinaldi.munir/TA/Makalah_TA%20Imam%20Habibi%20(Indonesian).pdf)
- Iswara, I. B. A. I., Santika, P. P., & Wijaya, I. N. S. W. (2019, 9-11 Oct. 2019). An Algorithm for Auto-Correction in PaTik Bali Using Pasang Pageh Aksara Wianjana. 2019 5th International Conference on New Media Studies (CONMEDIA),
- Nala, N. (2006). *Aksara Bali dalam USADA*. Paramita.
- Pramartha, C., & Dwidasmar, I. B. G. (2014, 1-4 June 2014). The composition approach non-QWERTY keyboard for Balinese script. Humanitarian Technology Conference - (IHTC), 2014 IEEE Canada International, Montreal, Canada.
- Pramartha, C., & Davis, J. G. (2016). Digital Preservation of Cultural Heritage: Balinese Kukul Artefact and Practices. In M. Ioannides, E. Fink, A. Moropoulou, M. Hagedorn-Saupe, A. Fresa, G. Liestøl, V. Rajcic, & P. Grussenmeyer (Eds.), *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection: 6th International Conference, EuroMed 2016, Nicosia, Cyprus, October 31 – November 5, 2016, Proceedings, Part I* (pp. 491-500): Springer International Publishing.

- Pramartha, C., Davis, J. G., & Kuan, K. K. Y. (2018). A Semantically-Enriched Digital Portal for the Digital Preservation of Cultural Heritage with Community Participation. In *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection: 7th International Conference, EuroMed 2018, Nicosia, Cyprus, October 29 – November 3, 2018, Proceedings*: Springer International Publishing.
- Pramartha, C., Iswara, I. B. A. I., Suputra, I. P. G. H., & Dwidasmara, I. B. G. (2021). Digital Humanities: Prototype Development for Balinese Script. In M. Ioannides, E. Fink, L. Cantoni, & E. Champion (Eds.), *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection* (pp. 205-214). Springer International Publishing.
https://doi.org/https://doi.org/10.1007/978-3-030-73043-7_17
- Purnama, I. G. G., & Yasa, I. P. E. G. (2020). Melacak Jejak Kepengarangan Sastrawan Bali Modern Pra-Kemerdekaan. *Humanis*(4), 457-463%V 424.
 doi:10.24843/JH.2020.v24.i04.p15
- Rita Widiadana, N. K. E. (2011). Ancient 'lontar' manuscripts go digital. *The Jakarta Post*. <http://www.thejakartapost.com/news/2011/01/29/ancient-‘lontar’-manuscripts-go-digital.html>
- Sudewa, I. B. A. (2003). “Contemporary use of the Balinese script. [Http://www.unicode.org/L2/L2003/03118-balinese.pdf](http://www.unicode.org/L2/L2003/03118-balinese.pdf).
- Suwija, I. N. (2012). *Ngiring Nulis Bali*. Wineka Media.
- Tinggen, I. N. (1993). *Pasang aksara Bali: celah-celah kunci*.
- Widiyanto, N. (2018, 24 July). Badan Bahasa Petakan 652 Bahasa Daerah di Indonesia. Retrieved from <https://www.kemdikbud.go.id/main/blog/2018/07/badan-bahasa-petakan-652-bahasa-daerah-di-indonesia>

The Balinese Script Dataset

<https://s.id/balinesescriptdataset>