Proposal to Encode the Grantha Script in the Basic Multilingual Plane (BMP)
of ISO/IEC 10646

Naga Ganesan
Houston, Texas, USA
naa.ganesan@gmail.com

1.0 Introduction

This is a proposal to encode the Grantha script in the Universal Character Set (ISO/IEC 10646). The Grantha script which ultimately derives from the ancient Asokan Brahmi script is a major script living in South India, especially in the State of Tamil Nadu, India and in Sri Lanka and is used to print Sanskrit (Indo-Aryan) language books used by Hindus and Jains in their temples, Jaina basti centers, Yoga camps, etc., Inscriptions exist on the huge walls of Hindu temples, Buddhist vihars, Jain bastis and palaces spanning for over a millennium from South India. Many thousands of printed books also exist in south Indian and Sri Lankan libraries in the Grantha script. In computers, many types of Grantha fonts have begun to appear and it is appropriate to encode the Grantha script in Unicode at the present time. It is proposed that the Grantha script code chart follows the same pattern laid out originally in ISCII-1988 just like the other major scripts of India such as Devanagari, Tamil and Malayalam in Unicode.

2.0 History of the Grantha Script

There are several thousands of Grantha script printed works and palm-leaf manuscripts (~ 200 K) in the libraries of south India such as Adyar Theosophical Society Library at Chennai, Tamil Sangam Library at Madurai, National Library at N. Delhi, French Institute of Indology at Pondicheri, Jaffna Library in Sri Lanka, Royal Collections Library in Thailand, British Library in London, U.K. and so on. Oriental Collections at Mysore, Karnataka and The Trivandrum Palace Manuscripts Library, Kerala etc., are depositories of vast collections of palm-leaf manuscripts in the Grantha script. The non-availability of reliable and across-the-platform electronic ways to communicate in the Grantha script in computers and in the Web, and the *only* availability of a mono-script (Devanagari) to non-specialist common public in south India and their Diaspora has been a major disadvantage for the users of the Grantha script. Once Grantha script is encoded in Unicode and aesthetically pleasing Grantha Unicode fonts with as many consonant clusters as possible become available, the study of Sanskrit and Tamil in the Grantha script will receive a major boost worldwide, and it is desired that Western universities start giving equal importance to the southern script, Grantha as much as the northern Devanagari script as different Indian states use their own script to write Sanskrit texts and passages. While Telugu, Malayalam or Kannada scripts are adequate to write Indo-Aryan languages such as Hindi or Sanskrit, Tamil script does not have the aspirated and voiced letters and so, encoding Grantha script in Unicode is needed to fill the gap.

Traditionally Tamils employ the Grantha script to write Indo-Aryan language texts such as those in Sanskrit, Pali or Prakrit. The Grantha script is genetically related to scripts such as Tamil, Malayalam, Telugu, Sinhala and Kannada or even the Thai script.

Once the Grantha script becomes available in Unicode, South India's booming Computer industry, in a noble gesture of reverence to the subcontinent cultural heritage, will bestow with resources to propagate the Grantha script's future much further and on par with the use of Indic scripts like Devanagari or Tamil in the Net. Referring to the origin of the Grantha script, Art L. Basham in his famous book, *The Wonder that was India* (1959, Reprint:1980 edition, Delhi, pg. 400) noted that in Central India, a script evolved in the 5th and 6th centuries mostly having a square shape whereas the one that was evolved in the South India was more angular in form. Referring to the Grantha script Prof. A. L. Basham stated that "the Tamils on the other hand, evolved an angular script known as Grantha, which is still sometimes used in the Tamil country for writing Sanskrit, and from which the modern Tamil script is derived." Though nowadays, with more discovery of Tamil Brahmi inscriptions in the caves, dated to 3rd century BC to 4th century AD, and decipherment of those cave inscriptions, the general scholarly opinion is that both Tamil and Grantha scripts originate in the Tamil Brahmi inscriptions found in Tamil Nadu state (Iravatham Mahadevan, *Early Tamil Epigraphy*, Harvard Oriental Series, 2003).

Like the ancient Tamil script encoded in Unicode, the origin of the Grantha script is from the Tamil Cave Brahmi script, a variety of Dravidi script belonging to the Southern Brahmi family (page 64, Ref. [2]). Among the many scripts of India and South East Asia that originated from Brahmi, Grantha script has the unique distinction of preserving a good number of Brahmi characteristics. The term, *Grantha*, refers to a bundle of palm-leaves, and hence it originally means a *book* in India as Guru Granth Saheb means the holy book of the Sikh religion in Punjab, India. Grantha script evolved from writing on palm leaf manuscripts using an *iron stylus* technology, and Grantha (as well as Telugu, Tamil, Kannada, Oriya and Malayalam scripts) have their curved letter shapes due to the stylus writing on palm leaves. Scripts of northern India, such as Devanagari script evolved from writing on pre-industrial paper using *ink-quill* technology.

3.0 Encoding Model of the Grantha Script in Unicode

Grantha script is an abugida of the Brahmic type. Like all major scripts of India in the Unicode such as Devanagari, Bengali or Tamil, it is requested that the Grantha script be encoded with a similar code layout originating in ISCII-1988 in the Basic Multilingual Plane of Unicode. The parallel code layout for Grantha script will emphasize the structural similarity of the Brahmic scripts of India and follows the stated intention of the Indian coding standard to enable one-to-one mappings between analogous coding positions in different scripts in the Brahmic family. Like the official use of "Mother tongue" languages in different states of India, computer and web technology aids in the development and survival of various "Mother script" readability and education using auto-transliteration from other scripts such as Roman or Devanagari plug-ins in web browsers, etc.,

The Grantha script, as the four major Dravidian scripts of south India and also the Sinhala script of Sri Lanka had their patronage from Pallava dynasty of south India. Later, kings from Chola, Pandya and Chera lands contributed to its growth substantially. The revival of the Grantha script can be seen in the growth of printing presses using Grantha fonts in Tamil Nadu and Sri Lanka. Because of the complex conjunct characters present, Grantha has to wait till the development of OpenType font technologies. Grantha script use in computers is expected to grow substantially as south Indians in general will be more comfortable with Grantha script as a substitute for Devanagari script using transliteration software (e.g. Extensions in Firefox browsers). The current situation of Grantha script in the Web resembles the situation of Devanagari script right after the Indian Independence in 1947. When good Unicode fonts and text editors are provided, the Grantha script use as a viable alternative for Devanagari script for South Indians in the computers and web will naturally develop in widespread usage. Cf. Christopher King, One Language, Two Scripts, Oxford University Press, 1994 describes the analogous situation between Hindi and Urdu scripts in North India.

Like the code chart layout parallel to major scripts of India such as Devanagari, the Grantha script, being a living contemporary script, is requested to be placed in the Unicode BMP. This will facilitate development and easy adaptation of classical Sanskrit, Hindi, … web pages in Grantha script from Devanagari pages and vice-versa. Students of Sanskrit, Hindi in Western universities will have a choice to read the texts in Grantha script itself. It is requested that Grantha script not be placed in SMP along with extinct scripts of India. Grantha script is living, and its use growing as seen in the growth of printing presses in many towns of South India. In the Internet, Grantha script has a good future as an alternate for Devanagari script web pages.

4.0 Dravidian Language letters in the Grantha Script Block

Devanagari script in Unicode allows for the transcription of Dravidian language letters – vowels short *e*, short *o*, consonants *RRA, LLLA* and *NNNA*. In a similar fashion, in order to facilitate the transliteration from the four Dravidian language scripts and Devanagari script, these five letters from Dravidian languages need to be encoded in the Grantha script block. Samples are included in Section 14.0 (pages 20, 21). Adding the capability to transcribe the Dravidian language letters is called "extended" Devanagari or Grantha script in literature. These Dravidian letters in Grantha script, as in Devanagari, are essential to write down nouns such as personal, river and place names and so on.

R. Gruenendahl, Ref. [1], page xiiv, states the need for short *e* and short *o* vowels: "Both long and short diphthongs (*elē, olō*), the distinction of which is a characteristic of several Dravidian languages and scripts, have found their way into South Indian Sanskrit manuscripts and prints." These short letters are usually indicated using a dot (*puLLi*) sign over the corresponding long vowels.

On the transcription of Dravidian language letters – vowels short *e*, short *o*, consonants *RRA, LLLA* and *NNNA* in the Grantha script, P. Visalakshy (ref. [2]. Page 66) states that

" The variety of Grantha script suitable enough to represent both Tamil and Sanskrit is known as 'Tamil Grantha' or 'Grantha Tamil.' The earliest form of Grantha characters so far noticed is from the Pallava kings of the 5th and 6th centuries". These letters usually form conjunct cluster letters in words.

5.0 Grantha Chillu Marker code point

Malayalam has a few number of prepausal consonants (known as *chillus*) where the inherent letter, *a* is killed and six of these Chillu letters have been atomically encoded in Unicode 5.1. Since Grantha script has the potential of creating a chillu consonant form almost on any consonant, atomic code point for every Grantha Chillu consonant is unnecessary and impractical. A combining Chillu marker sign is proposed in the Grantha code chart. Its properties are: 1134E;GRANTHA SIGN CHILLU MARKER; Mc;0;L;;;;;;N;;;;; (see Section 12.0).

The following are the 22 chillu consonants commonly known to exist in the Grantha script (page 16, R. Gruenendahl, Ref. [1]).

Prepausal Consonants (cf. Conjuncts)

k		n		
g		p		
ṅ		b		
c		m		
j		y		
ñ		r		
ṭ		v		
ḍ		ś		
ṇ		ṣ		
t		s		
d		h		

There is a difference in meaning of phrases with a Chillu form and a conjunct with letters stacked together. For example, (a) *janmam* (with "nma" conjunct) and *san-maargam* with chillu-n in the middle of the words, and (b) *utkaTa* (with "tka" conjunct) and *bhagavat-kaaryam* (with chillu-t).

There are many words where the meaning is lost if the contrast between chillu consonant and consonant conjunct with vertical stacking of consonants or consonant with explicit virama (produced using ZWNJ). There are whole books (e.g., Raaghava PaaNDaviiyam) written with different chillu consonants occurring in the middle of words. If the chillus are converted to something else (e.g., stacked conjunct) the meaning will change producing a punning effect. Often in manuscripts there is no gap between words in the Grantha script, and a unique chillu-consonant encoding is essential for proper representation of plain-text data. For example, in the famous Bhagavat-giitaa, different commentaries change the meaning depending on the chillu presence or absence, to bring out various philosophical points. Also, there are words like *kaNvalayam* and *vanyavanikaa* that can be split with or without a chillu depending on whether a unit taken as Dravidian word etymologically. These family of words have been discussed in great detail during chillu encoding in UTC documents, and to represent these kinds of double-meaning words and Malayalam web pages in one-to-one transliteration, Grantha chillu marker sign encoding is necessary.

6.0 Grantha post-consonantal *r*, post-consonantal *y* and pre-consonantal *r* forms

Font makers need to implement post-consonantal *r*, post-consonantal *y* and pre-consonantal *r* forms as shown in page 95, Ref. [2] which is reproduced below. Virama combining sign is used for this purpose in Indic scripts. For example, the Grantha script sequences will be: tra = <TA, VIRAMA, RA>, rta = <RA, VIRAMA, TA> and kya = <KA, VIRAMA, YA>.

The symbol ழ் uniformly represents ' y ' and is added to the base consonant letters.

eg:-. கழ் (kya), தழ் (tya), நழ் (nya), பழ் (pya)". ' r ' is represented by two subsidiary symbols ᗣ and ৳. When ' r ' follows a consonant the subsidiary symbol ᗣ is used. eg. தூ (tra), பூ (pra), கூர (kra). When ' r ' precedes a consonant, the symbol ' ৳ ' is used. However unlike most other Indian writing systems, in Grantha script the symbol for preceding ' r ' ৳ is used after the consonant letter. Eg:- உ৳(rma), ப৳ (rca), க৳ (rka).

From 20th century printed books, an example is given at

Conjucation of ka and ca vargas with ra

Conjucation of ka and ca vargas with ya

Conjucations of ra with the ka and ca vargas

7.0 Grantha Script Danda Signs Encoding

UTC document *ISO/IEC JTC 1/SC 2/WG 2 N3452*, Section F.7.2. (**For new scripts proposed for encoding**) states that "The existence of the use of Dandas in orthographies for a script proposed for encoding is generally taken as sufficient justification for encoding of script-specific Dandas for that script."

Grantha is a newly proposed script in Unicode and the justification exists for providing Grantha-specific danda signs in Unicode encoding. Danda signs are NOT a recent borrowal from Devanagari signs as Indologists affirm the danda presence in palm-leaf manuscripts. The existence of Danda signs in Grantha script in ancient palm-leaf manuscripts and paper manuscripts has been confirmed from the communication with many Indologists. For example, Prof. Asko Parpola, University of Helsinki (asko.parpola@helsinki.fi) wrote in reply to our query: "Definitely both single and double daNDa occurs in handwritten palm-leaf and paper mss of the grantha script." Because Grantha is *newly* encoded script in Unicode, single and double danda signs could be encoded. In height and the tip shapes, these signs should be made something larger than Sourashtra script Danda signs and different from Devanagari danda signs in code chart.

8.0 Grantha Script – Digits and Numerics

Grantha digits are the original source numbers from which Tamil script numbers are a loan item. Grantha digits are more archaic in *shape* and *functionality.* Grantha numbers differ from Tamil numbers just as the Kannada and Telugu digits differ from each other. The shapes are different especially for 2, 3, 7 and 10. The shapes in the Grantha code chart are given from a Grantha font available at a Press in Chennai, India [Ref. 6], and they represent more ancient glyph shapes and not the modern shapes of Tamil digits and numerics in Unicode Tamil or Malayalam code charts. There is a variant shape, something like Greek omega letter, for Grantha Number Ten, �. However, in the proposed Grantha code chart, note the form taken from manuscripts and Grantha script books which is chosen to represent Grantha Number Ten glyph shape in standard Unicode Grantha font. However, it is possible and can be allowed so that some other font maker can use a shape close to � for Grantha number ten. The multiplier-arithmetic used in different ancient civilizations, for example, Mayas in central America, used a multiplier of 20, is explained in Classification of Positional Number-systems, Chapter 23, The universal history of Numbers, G. Ifrah, 2000: New York (J. Wiley & Sons).

The important point is that Grantha digits do not use the decimal place-value system at all where as Tamil digits use the place-value system. The Grantha system is based on a principle which is at once additive and multiplicative. To express multiples of tens, or hundreds or thousands in Grantha digits, the sign for 10, etc., is preceded by that of the corresponding units, which thus play the part of the multiplier. It is to be noted that Tamil digits do not employ this quasi-decimal system either in the web or in printed books, and hence encoding of Grantha digits is necessary for the multiplier basis of Grantha

arithmetic. Also, for IDN and ability to protect from phishing, Grantha numerals can be separated from Tamil numerals by their atomic encoding in Unicode standard.

9.0 Grantha Vowel Sign *AU*

Like South Indian scripts that have two part vowel signs, Grantha vowel sign AU has two parts.

Sometimes the AU vowel sign is written using its right part alone as shown in examples here. To explain this, an annotation for the right part AU sign has been added to the code chart.

10.0   Grantha Script – Proposed Unicode Chart

Grantha - Proposed Unicode Chart

	1130	1131	1132	1133	1134	1135	1136	1137
0		ஷெ	௦	௶	ீ	௦	ஜ3	௦
1	்ி		௸	௱	ௗ	௦	ௗ3	௱
2	௦ஂ	ஷ்	௸	௨	௦ஓ	௦	௦ள	௦த
3	௦ஂ	ஓ	ண	ஐ	௦ஜ		௦ரி	
4		ஔ	த	ழ	௦ஜ		∣	
5	ச	கூ	ழூ	வ		ஂ	∥	
6	சூ	வ	ழ	௶	௦	௬	O	
7	ஐ	ற	ய	ஷ	௦	௦ள	க	
8	௪	வ	ங	ஸ	௦	௯	௨	
9	உ	ஜ	ன	ஹ		௶	௱	
A	ஊ	ச	ப		௦ா	௶	௪	
B	ஜ	ஷ	ஹ		௦ா	௶	௫	
C	௭	ஜ	ப		௦ள		சூ	
D		ஈ	ஹ	�	௦		எ	
E	ஷ்	ஞ	உ	�ா	௦		அ	
F	ஷ	ட	ய	ௗ			கூ	

11.0   Grantha Script Character Names in Unicode Code Chart

Various signs

11301   GRANTHA SIGN ANUNASIKA
          = candrabindu
11302   GRANTHA SIGN ANUSVARA
11303   GRANTHA SIGN VISARGA

Independent vowels

11305   GRANTHA LETTER A
11306   GRANTHA LETTER AA
11307   GRANTHA LETTER I
11308   GRANTHA LETTER II
11309   GRANTHA LETTER U
1130A   GRANTHA LETTER UU
1130B   GRANTHA LETTER VOCALIC R
1130C   GRANTHA LETTER VOCALIC L
1130E   GRANTHA LETTER E
          ・ for transcribing Dravidian short e
1130F   GRANTHA LETTER EE
11310   GRANTHA LETTER AI
11312   GRANTHA LETTER O
          ・ for transcribing Dravidian short o
11313   GRANTHA LETTER OO
11314   GRANTHA LETTER AU

Consonants

11315   GRANTHA LETTER KA
11316   GRANTHA LETTER KHA
11317   GRANTHA LETTER GA
11318   GRANTHA LETTER GHA
11319   GRANTHA LETTER NGA
1131A   GRANTHA LETTER CA
1131B   GRANTHA LETTER CHA
1131C   GRANTHA LETTER JA
1131D   GRANTHA LETTER JHA
1131E   GRANTHA LETTER NYA
1131F   GRANTHA LETTER TTA
11320   GRANTHA LETTER TTHA
11321   GRANTHA LETTER DDA
11322   GRANTHA LETTER DDHA
11323   GRANTHA LETTER NNA
11324   GRANTHA LETTER TA

11325   GRANTHA LETTER THA
11326   GRANTHA LETTER DA
11327   GRANTHA LETTER DHA
11328   GRANTHA LETTER NA
11329   GRANTHA LETTER NNNA
  · for transcribing Dravidian alveolar n
1132A   GRANTHA LETTER PA
1132B   GRANTHA LETTER PHA
1132C   GRANTHA LETTER BA
1132D   GRANTHA LETTER BHA
1132E   GRANTHA LETTER MA
1132F   GRANTHA LETTER YA
11330   GRANTHA LETTER RA
11331   GRANTHA LETTER RRA
  · for transcribing Dravidian trilled alveolar r
11332   GRANTHA LETTER LA
11333   GRANTHA LETTER LLA
11334   GRANTHA LETTER LLLA
  · for transcribing Dravidian retroflex continuant l
11335   GRANTHA LETTER VA
11336   GRANTHA LETTER SHA
11337   GRANTHA LETTER SSA
11338   GRANTHA LETTER SA
11339   GRANTHA LETTER HA

Various signs

1133D   GRANTHA SIGN AVAGRAHA

Dependent vowel signs

1133E   GRANTHA VOWEL SIGN AA
1133F   GRANTHA VOWEL SIGN I
11340   GRANTHA VOWEL SIGN II
11341   GRANTHA VOWEL SIGN U
11342   GRANTHA VOWEL SIGN UU
11343   GRANTHA VOWEL SIGN VOCALIC R
11344   GRANTHA VOWEL SIGN VOCALIC RR
11346   GRANTHA VOWEL SIGN E
  · stands to the left of the consonant
  · for transcribing Dravidian short e matra
11347   GRANTHA VOWEL SIGN EE
  · stands to the left of the consonant
11348   GRANTHA VOWEL SIGN AI
  · stands to the left of the consonant

Two-part dependent vowel signs

These two-part dependent vowel signs have glyph pieces which stand on both sides of the consonant. These vowel signs follow the consonant in logical order, and should be handled as a unit for most processing.

1134A   GRANTHA VOWEL SIGN O
      · for transcribing Dravidian short o matra
1134B   GRANTHA VOWEL SIGN OO
1134C   GRANTHA VOWEL SIGN AU

Various signs

1134D   GRANTHA SIGN VIRAMA
1134E   GRANTHA SIGN CHILLU MARKER
11350   GRANTHA OM
11351   GRANTHA STRESS SIGN UDATTA
11352   GRANTHA STRESS SIGN ANUDATTA
11355   GRANTHA STRESS SIGN DIIRGHA SVARITA
11356   GRANTHA PLUTA
11357   GRANTHA AU LENGTH MARK
      · sometimes used alone to write the /au/ dependent vowel
11358   GRANTHA JIHVAMULIYA
11359   GRANTHA UPADHMANIYA
1135A   GRANTHA SIGN GUM
1135B   GRANTHA SIGN GGU

Generic additions

11360   GRANTHA LETTER VOCALIC RR
11361   GRANTHA LETTER VOCALIC LL
11362   GRANTHA VOWEL SIGN VOCALIC L
11363   GRANTHA VOWEL SIGN VOCALIC LL
11364   GRANTHA DANDA
      = puurna viraama
11365   GRANTHA DOUBLE DANDA
      = diirgha viraama

Digits

11366   GRANTHA DIGIT ZERO
11367   GRANTHA DIGIT ONE
11368   GRANTHA DIGIT TWO
11369   GRANTHA DIGIT THREE
1136A   GRANTHA DIGIT FOUR
1136B   GRANTHA DIGIT FIVE

1136C   GRANTHA DIGIT SIX
1136D   GRANTHA DIGIT SEVEN
1136E   GRANTHA DIGIT EIGHT
1136F   GRANTHA DIGIT NINE

Grantha numerics

11370   GRANTHA NUMBER TEN
11371   GRANTHA NUMBER ONE HUNDRED
11372   GRANTHA NUMBER ONE THOUSAND

12.0   Grantha Script Character Properties

The properties of the Grantha characters are the same as their parallel characters in other Indian scripts such as Devanagari or Tamil scripts, and those properties can be obtained by looking at the properties of characters in Unicode Character Database for Devanagari and Tamil scripts. The collating order for Grantha script is dependent upon the language represented by it, and in general, Devanagari collation order for Sanskrit texts and dictionaries is recommended for use in the Grantha script also.

11301;GRANTHA SIGN ANUNASIKA;Mn;0;NSM;;;;;N;;;;;
11302;GRANTHA SIGN ANUSVARA;Mc;0;L;;;;;N;;;;;
11303;GRANTHA SIGN VISARGA;Mc;0;L;;;;;N;;;;;

11305;GRANTHA LETTER A;Lo;0;L;;;;;N;;;;;
11306;GRANTHA LETTER AA;Lo;0;L;;;;;N;;;;;
11307;GRANTHA LETTER I;Lo;0;L;;;;;N;;;;;
11308;GRANTHA LETTER II;Lo;0;L;;;;;N;;;;;
11309;GRANTHA LETTER U;Lo;0;L;;;;;N;;;;;
1130A;GRANTHA LETTER UU;Lo;0;L;;;;;N;;;;;
1130B;GRANTHA LETTER VOCALIC R;Lo;0;L;;;;;N;;;;;
1130C;GRANTHA LETTER VOCALIC L;Lo;0;L;;;;;N;;;;;
1130E;GRANTHA LETTER E;Lo;0;L;;;;;N;;;;;
1130F;GRANTHA LETTER EE;Lo;0;L;;;;;N;;;;;
11310;GRANTHA LETTER AI;Lo;0;L;;;;;N;;;;;
11312;GRANTHA LETTER O;Lo;0;L;;;;;N;;;;;
11313;GRANTHA LETTER OO;Lo;0;L;;;;;N;;;;;
11314;GRANTHA LETTER AU;Lo;0;L;;;;;N;;;;;

11315;GRANTHA LETTER KA;Lo;0;L;;;;;N;;;;;
11316;GRANTHA LETTER KHA;Lo;0;L;;;;;N;;;;;
11317;GRANTHA LETTER GA;Lo;0;L;;;;;N;;;;;
11318;GRANTHA LETTER GHA;Lo;0;L;;;;;N;;;;;
11319;GRANTHA LETTER NGA;Lo;0;L;;;;;N;;;;;
1131A;GRANTHA LETTER CA;Lo;0;L;;;;;N;;;;;
1131B;GRANTHA LETTER CHA;Lo;0;L;;;;;N;;;;;

1131C;GRANTHA LETTER JA;Lo;0;L;;;;;N;;;;;
1131D;GRANTHA LETTER JHA;Lo;0;L;;;;;N;;;;;
1131E;GRANTHA LETTER NYA;Lo;0;L;;;;;N;;;;;
1131F;GRANTHA LETTER TTA;Lo;0;L;;;;;N;;;;;
11320;GRANTHA LETTER TTHA;Lo;0;L;;;;;N;;;;;
11321;GRANTHA LETTER DDA;Lo;0;L;;;;;N;;;;;
11322;GRANTHA LETTER DDHA;Lo;0;L;;;;;N;;;;;
11323;GRANTHA LETTER NNA;Lo;0;L;;;;;N;;;;;
11324;GRANTHA LETTER TA;Lo;0;L;;;;;N;;;;;
11325;GRANTHA LETTER THA;Lo;0;L;;;;;N;;;;;
11326;GRANTHA LETTER DA;Lo;0;L;;;;;N;;;;;
11327;GRANTHA LETTER DHA;Lo;0;L;;;;;N;;;;;
11328;GRANTHA LETTER NA;Lo;0;L;;;;;N;;;;;
11329;GRANTHA LETTER NNNA;Lo;0;L;;;;;N;;;;;
1132A;GRANTHA LETTER PA;Lo;0;L;;;;;N;;;;;
1132B;GRANTHA LETTER PHA;Lo;0;L;;;;;N;;;;;
1132C;GRANTHA LETTER BA;Lo;0;L;;;;;N;;;;;
1132D;GRANTHA LETTER BHA;Lo;0;L;;;;;N;;;;;
1132E;GRANTHA LETTER MA;Lo;0;L;;;;;N;;;;;
1132F;GRANTHA LETTER YA;Lo;0;L;;;;;N;;;;;
11330;GRANTHA LETTER RA;Lo;0;L;;;;;N;;;;;
11331;GRANTHA LETTER RRA;Lo;0;L;;;;;N;;;;;
11332;GRANTHA LETTER LA;Lo;0;L;;;;;N;;;;;
11333;GRANTHA LETTER LLA;Lo;0;L;;;;;N;;;;;
11334;GRANTHA LETTER LLLA;Lo;0;L;;;;;N;;;;;
11335;GRANTHA LETTER VA;Lo;0;L;;;;;N;;;;;
11336;GRANTHA LETTER SHA;Lo;0;L;;;;;N;;;;;
11337;GRANTHA LETTER SSA;Lo;0;L;;;;;N;;;;;
11338;GRANTHA LETTER SA;Lo;0;L;;;;;N;;;;;
11339;GRANTHA LETTER HA;Lo;0;L;;;;;N;;;;;

1133D;GRANTHA SIGN AVAGRAHA;Lo;0;L;;;;;N;;;;;
1133E;GRANTHA VOWEL SIGN AA;Mc;0;L;;;;;N;;;;;
1133F;GRANTHA VOWEL SIGN I;Mc;0;L;;;;;N;;;;;
11340;GRANTHA VOWEL SIGN II;Mn;0;NSM;;;;;N;;;;;
11341;GRANTHA VOWEL SIGN U;Mc;0;L;;;;;N;;;;;
11342;GRANTHA VOWEL SIGN UU;Mc;0;L;;;;;N;;;;;
11343;GRANTHA VOWEL SIGN VOCALIC R;Mc;0;L;;;;;N;;;;;
11344;GRANTHA VOWEL SIGN VOCALIC RR;Mc;0;L;;;;;N;;;;;
11346;GRANTHA VOWEL SIGN E;Mc;0;L;;;;;N;;;;;
11347;GRANTHA VOWEL SIGN EE;Mc;0;L;;;;;N;;;;;
11348;GRANTHA VOWEL SIGN AI;Mc;0;L;;;;;N;;;;;

1134A;GRANTHA VOWEL SIGN O;Mc;0;L;11346 1133E;;;;N;;;;;
1134B;GRANTHA VOWEL SIGN OO;Mc;0;L;11347 1133E;;;;N;;;;;
1134C;GRANTHA VOWEL SIGN AU;Mc;0;L;11347 11357;;;;N;;;;;

1134D;GRANTHA SIGN VIRAMA;Mn;9;NSM;;;;;N;;;;;
1134E;GRANTHA SIGN CHILLU MARKER;Mc;0;L;;;;;N;;;;;
11350;GRANTHA OM;Lo;0;L;;;;;N;;;;;
11357;GRANTHA AU LENGTH MARK;Mc;0;L;;;;;N;;;;;
11358;GRANTHA JIHVAMULIYA;So;0;ON;;;;;N;;;;;
11359;GRANTHA UPADHMANIYA;So;0;ON;;;;;N;;;;;

11360;GRANTHA LETTER VOCALIC RR;Lo;0;L;;;;;N;;;;;
11361;GRANTHA LETTER VOCALIC LL;Lo;0;L;;;;;N;;;;;
11362;GRANTHA VOWEL SIGN VOCALIC L;Mn;0;NSM;;;;;N;;;;;
11363;GRANTHA VOWEL SIGN VOCALIC LL;Mn;0;NSM;;;;;N;;;;;
11364;GRANTHA DANDA;Po;0;L;;;;;N;;;;;
11365;GRANTHA DOUBLE DANDA;Po;0;L;;;;;N;;;;;

11366;GRANTHA DIGIT ZERO;Nd;0;L;;0;0;0;N;;;;;
11367;GRANTHA DIGIT ONE;Nd;0;L;;1;1;1;N;;;;;
11368;GRANTHA DIGIT TWO;Nd;0;L;;2;2;2;N;;;;;
11369;GRANTHA DIGIT THREE;Nd;0;L;;3;3;3;N;;;;;
1136A;GRANTHA DIGIT FOUR;Nd;0;L;;4;4;4;N;;;;;
1136B;GRANTHA DIGIT FIVE;Nd;0;L;;5;5;5;N;;;;;
1136C;GRANTHA DIGIT SIX;Nd;0;L;;6;6;6;N;;;;;
1136D;GRANTHA DIGIT SEVEN;Nd;0;L;;7;7;7;N;;;;;
1136E;GRANTHA DIGIT EIGHT;Nd;0;L;;8;8;8;N;;;;;
1136F;GRANTHA DIGIT NINE;Nd;0;L;;9;9;9;N;;;;;

11370;GRANTHA NUMBER TEN;No;0;L;;;;10;N;;;;;
11371;GRANTHA NUMBER ONE HUNDRED;No;0;L;;;;100;N;;;;;
11372;GRANTHA NUMBER ONE THOUSAND;No;0;L;;;;1000;N;;;;;

13.0   References

[1] R. Gruenendahl, 2001, South Indian Scripts in Sanskrit Manuscripts and Prints
Grantha Tamil – Malayalam – Telugu – Kannada – Nandinagari
O. Harrassowitz, Wiesbaden

[2] P. Visalakshy, 2003, The Grantha Script, Dravidian Linguistics Association,
St. Xavier's College, University of Kerala, Trivandrum, India.

[3] K. Venugopalan, 1983, A primer in Grantha characters,
 St. Peter, Minn: James H. Nye.
http://dsal.uchicago.edu/digbooks/dig_toc.html?BOOKID=PK419.V468_1983

[4] Iravatham Mahadevan, 2003, Early Tamil Epigraphy from the Earliest Times to the
Sixth Century A.D, Harvard University Press.

[5] C. King, 1994, One Language, Two Scripts: The Hindi Movement in Nineteenth Century North India, Oxford University Press**.**

[6] Granthakshara Kaiyezhuththu Payirchi Puththakam,
Publisher: Ms. Lakshmi Muthuswamy, 2004: Madras.

[7] T.P. Mahadevan, On the Southern Recension of the Mahābhārata, Brahman Migrations, and Brahmi Paleography, Electronic Journal of Vedic Studies (EJVS) 2008, Vol.15, Issue 2.
http://www.ejvs.laurasianacademy.com/SouthernRec.pdf
[History of Grantha script can trace the Brahmin migrations such as Chozhiyars and Nambudiris in south India.]

[8] Sugata Srinivasaraju, Year Of The Guru. It's hundred years since the discovery of Chanakya's great work from a manuscript
http://www.outlookindia.com/article.aspx?250522
[Many ancient Indian literary texts have only been preserved in the Grantha script. For example, 2009 is the centenary year of the publication of Kautilya's Arthashastra from Grantha manuscripts.]

14.0   Grantha script samples from Printed books

shuklaambaradharaM vishNuM shashivarNam chaturbhujaM .
prasannavadanam dhyaayet sarvavighnopa shaantaye

Words with conjuncts:

añcitaḥ	आञ्चित :	
kuñjaraḥ	कुञ्जर :	
ākarṣaṇam	आकर्षणम	
agniḥ	अग्नि :	
ātmā	आत्मा	
piṅgalaḥ	पिङ्गल :	
kuṇḍalam	कुण्डलम	
tāmbūlam	ताम्बूलम्	
induḥ	इन्दु :	
vijñānam	विज्ञानम्	
śrutvā	श्रुत्वा	
indrāṇī	इन्द्राणी	
dantī	दन्ती	
pārthivaḥ	पार्थिव :	
kārṣṇyam	काष्ण्यॅम्	
pārṣṇiḥ	पार्ष्णि :	
kasmiṃścit	कस्मिंश्चित्	
dhārṣṭyam	धाष्ट्यॅम्	
karpūraḥ	कर्पूर :	
parvan	पर्वन्	
bandhūkaḥ	बन्धूक :	
vandyaḥ	वन्द्य :	
ucchritam	उच्छ्रितम्	
dāridryam	दारिद्र्यम्	
pārśvam	पार्श्वम्	
dhairyam	धैर्यम्	
chandas	छन्दस	
udaraḥ	उदर :	

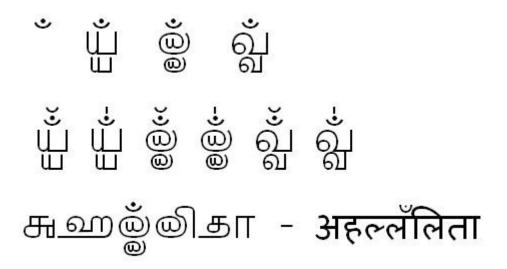# Passages for Reading Practice

From the Bhagavadgītā:

1.1-5

4.33-35

15.1-2

The Grantha character glyphs and names in Sections 10.0 and 11.0 have been selected from the source material listed in Section 13.0 References. All the Indo-Aryan language characters are listed in Gruenendahl and Visalakshy's useful study. For example, the Vocalic Vowels and Vowel Signs are from Gruenendahl's book [Ref. 1]. The Grantha numerics and digits are taken from P. Visalakshy's book [Ref. 2]. The glyphs for Pluta, Jihvamuliya and Upadhmaniya letters are given in Ref. [1].

Grantha anunasika sign is taken from Grantha dictionary and the following is from the e-GranTamil font used widely in Grantha publishing houses in Chennai, Tamil Nadu, India.Grantha Anunasika sign can take udatta and anudatta stress signs on top of it

The Grantha script code chart also includes the Dravidian letters (Section 4.0) needed for transcribing Dravidian texts and nouns such as place names inscribed in other Indian scripts such as Tamil or Devanagari. J. R. Marr, ("Some Manuscripts in the Grantha Script in Bangkok", Bulletin of the School of Oriental and African Studies, XXXII, pt. 2, 1969. pp. 281-322) describes several Tamil/Dravidian texts written in the Grantha script in Thailand and are still used in royal coronation rituals. Some samples provided from Samskrita Granthalipi Sabha, Chennai (Madras), India are included as samples in the next page.

Capt. Henry Harkness, M.R.A.S, Ancient and Modern alphabets of the Popular Hindu Languages of the Southern peninsula of India, Royal Asiatic Society, London, 1838 uses the dot, called *puLLi*, symbol on top of the vowel signs for short e and short o vowels. This practice is seen in inscriptions of the temples of Tamil Nadu and grammars like Tolkaappiyam.

Harkness, 1838, page 2:

Naalaayira Divya Prabandham, a Tamil text in Grantha script

ce (short e) — cennai → (RRA)

Poṟaiyūr

(ṄṆNA) ← kuṉṟattūr

palaiyaṉūr

kīḻpākkam

muciṟi

ko (short o) — koṅkunāṭu

naṉṉaṉ

āḻvār

↓ (LLLA)

oṟṟiyūr (short o)

Dravidian nouns in the Grantha script

Next, Vedic combining stress signs, Udatta, Anudatta, Diirgha Svarita are shown from a printed book example. Also, given are the Grantha signs, GUM and GGU which are proposed in the Grantha Code Chart (Section 10.0).

All the Grantha characters and their glyph shapes have been checked with user community in India, and USA, and also from various printed books, manuscripts and web resources. It is requested from Unicode Tech Committee to assign a block in the BMP for this contemporary Grantha script which has ancient origins and contributed to the literacy not only in India but also many countries in South East Asia. Grantha script in Unicode will assure it a bright future in the 21st century in the Web.

Naga Ganesan   Revised version: August 1, 2009

<table>
<tr><td colspan="2">
<div align="center">
ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646[1]
Please fill all the sections A, B and C below.
Please read Principles and Procedures Document (P & P) from http://www.dkuug.dk/JTC1/SC2/WG2/docs/principles.html for guidelines and details before filling this form.
Please ensure you are using the latest Form from http://www.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html.
See also http://www.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html for latest Roadmaps.
</div>
</td></tr>
</table>

A. Administrative

1. **Title:**	Proposal to Encode the Grantha Script in the Basic Multilingual Plane (BMP) of ISO/IEC 10646
2. Requester's name:	*Dr. Naga Ganesan (naa.ganesan@gmail.com), Houston, Texas*
3. Requester type (Member body/Liaison/Individual contribution):	*Individual contribution*
4. Submission date:	*April 22, 2009*
5. Requester's reference (if applicable):	*N/A*
6. Choose one of the following:	
This is a complete proposal:	*Yes*
(or) More information will be provided later:	

B. Technical – General

1. Choose one of the following:
   - a. This proposal is for a new script (set of characters):   *Yes*
     - Proposed name of script: *Grantha*
   - b. The proposal is for addition of character(s) to an existing block: *No.*
     - Name of the existing block: *N/A*
2. Number of characters in proposal: *99*
3. Proposed category (select one from below - see section 2.2 of P&P document):

A-Contemporary	X	B.1-Specialized (small collection)		B.2-Specialized (large collection)	
C-Major extinct		D-Attested extinct		E-Minor extinct	
F-Archaic Hieroglyphic or Ideographic			G-Obscure or questionable usage symbols		

4. Is a repertoire including character names provided?   *Yes*
   - a. If YES, are the names in accordance with the "character naming guidelines" in Annex L of P&P document?   *Yes*
   - b. Are the character shapes attached in a legible form suitable for review?   *Yes*
5. Who will provide the appropriate computerized font (ordered preference: True Type, or PostScript format) for publishing the standard?   *James Kass, OpenType format*
   - If available now, identify source(s) for the font (include address, e-mail, ftp-site, etc.) and indicate the tools used: *Original design by jameskass@code2000.net, tools used – proprietary software*
6. References:
   - a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided?   *Yes*
   - b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?   *Yes*
7. Special encoding issues:
   - Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)?   *Yes.*
   - *See text of proposal*

8. Additional Information:

Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples of such properties are: Casing information, Numeric information, Currency information, Display behaviour information such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related information. See the Unicode standard at http://www.unicode.org for such information on other scripts. Also see http://www.unicode.org/Public/UNIDATA/UCD.html and associated Unicode Technical Reports for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

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[1]. Form number: N3152-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09, 2003-11, 2005-01, 2005-09, 2005-10, 2007-03, 2008-05)

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? *No*
   If YES explain

2. Has contact been made to members of the user community (for example: National Body,
   user groups of the script or characters, other experts, etc.)? *Yes*
   If YES, with whom? *Sri. Rajarathna Bhattar & South Indian Archakar Association, Madurai*
   If YES, available relevant documents: *See the proposal*

3. Information on the user community for the proposed characters (for example:
   size, demographics, information technology use, or publishing use) is included? *Tamil community in India and abroad*

   Reference: *Tamils are a large ethnic group (75+ million worldwide) and Grantha script is used by them to write Indo-Aryan languages such as Sanskrit, Hindi.*

4. The context of use for the proposed characters (type of use; common or rare) *Common*
   Reference: *Mainly used to print Sanskrit religious texts, but can be used for any Indo-Aryan texts in e-mail and Web applications.*

5. Are the proposed characters in current use by the user community? *Yes*
   If YES, where? Reference: *In India, Sri Lanka, Singapore etc., there are Grantha presses in Srirangam, Madurai, Tirunelveli cities. Grantha fonts (8-bit & non-Unicode) have begun to appear in the Web.*

6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely
   in the BMP? *Yes*
   If YES, is a rationale provided? *Yes*
   If YES, reference: *See text of proposal*

7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)? *Yes*

8. Can any of the proposed characters be considered a presentation form of an existing
   character or character sequence? *No*
   If YES, is a rationale for its inclusion provided?
   If YES, reference:

9. Can any of the proposed characters be encoded using a composed character sequence of either
   existing characters or other proposed characters? *No*
   If YES, is a rationale for its inclusion provided?
   If YES, reference:

10. Can any of the proposed character(s) be considered to be similar (in appearance or function)
    to an existing character? *No*
    If YES, is a rationale for its inclusion provided?
    If YES, reference:

11. Does the proposal include use of combining characters and/or use of composite sequences? *Yes*
    If YES, is a rationale for such use provided? *Yes*
    If YES, reference: *See text of proposal*
    Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided? *Yes*
    If YES, reference: *See text of proposal*

12. Does the proposal contain characters with any special properties such as
    control function or similar semantics? *Yes*
    If YES, describe in detail (include attachment if necessary)
    (a) Virama and (b) Chillu Marker signs. See text of proposal for the rationale to encode

13. Does the proposal contain any Ideographic compatibility character(s)? *No*
    If YES, is the equivalent corresponding unified ideographic character(s) identified?
    If YES, reference: