Developing the root zone Label Generation Rules for Neo-Brahmi Scripts

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What is Brahmi?

- An ancient script
- Most of the modern scripts in Indian subcontinent have been derived from Brahmi.
  - Geographically the scripts being used in Central Asia, South Asia and South-East Asia
- These scripts are used by multiple language families: Largely by Indo-Aryan and Dravidian

Why Brahmi?

- Despite their variations in the visual forms, the basic philosophy in their usage is common
- They all are “akshar” driven, and follow a specific syntax
  - Analogical reference can be made to Indian National standard, IS 13194:1991 – Section 8
- This syntax being the implicit foundation in representation of these scripts in the digital medium, adherence to the structure acts as a obligatory security consideration even in the case of Internationalized Domain Names.

Why Neo-Brahmi?

- Of all the scripts derived from “Brahmi”, not all are in modern usage

- Approach is in consonance with the *“Conservatism Principle"* of the LGR procedure.

Neo Brahmi GP - Current Status

- Mixed bag expertise like linguistic, Unicode

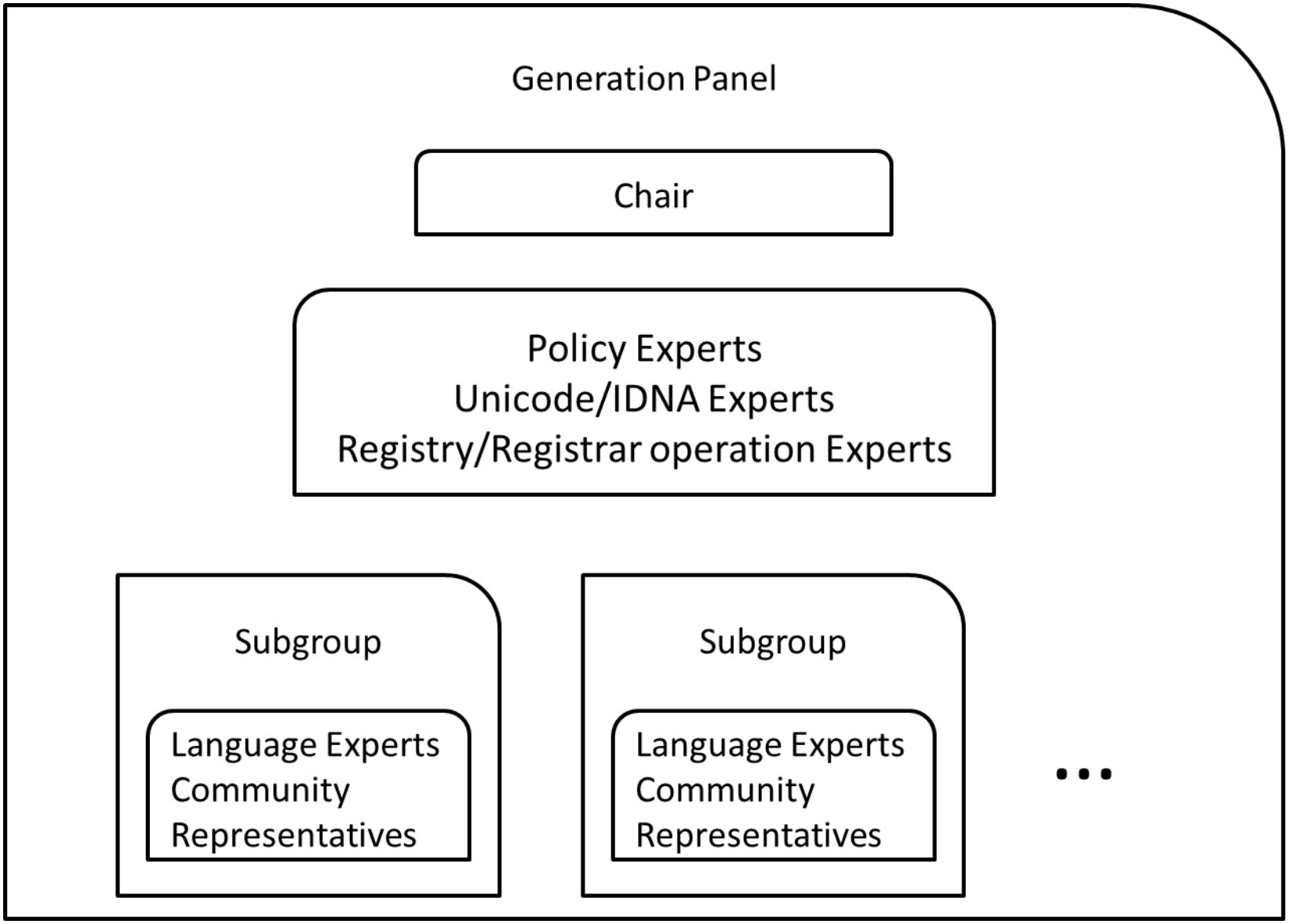
- **(Chair)** Udaya Narayana Singh - Bangla, Maithili,Hindi, English
- Anupam Agrawal - Hindi, Bangla
- Akshat Joshi - Hindi, Marathi
- Abhijit Dutta - Bengali, Hindi
- Mahesh Kulkarni - Marathi, Hindi
- Neha Gupta - Hindi
- Nishit Jain - Hindi
- Prabhakar Pandey - Hindi
- Raiomond Doctor - English, Hindi, Marathi, Gujarati
- N. DeivaSundaram - Tamil
- Shantaram Walawalikar - Konkani
- Bal Krishna Bal - Nepali
- Ganesh Murmu – Santali
- Balaram Prasain - Nepali
- Rajib Chakraborty - Bangla
- Gurpreet Singh Lehal - Panjabi
- Saroja Bhate - Sanskrit
- Shambhu Kumar Singh - Maithili
- SwarnaPrabha Chainary - Bodo
- Ghanashyam Nepal - Nepali
- Kalyan Vasudeo Kale - Marathi
- Shashi Pathania - Dogri
- Santhosh Thottingal - Malayalam, Sourashtra, Tamil
- Uma Maheshwar G - Telugu
- Girish Chandra Mishra - Odia
- K. C. Tikayat ray - Odia
- Debajit Sharma - Assamese
- Basanta Kumar Panda - Odia
- Arvind Bhandari - Gujarati
- Harish Chowdhary - Hindi

Neo Brahmi GP – Approach

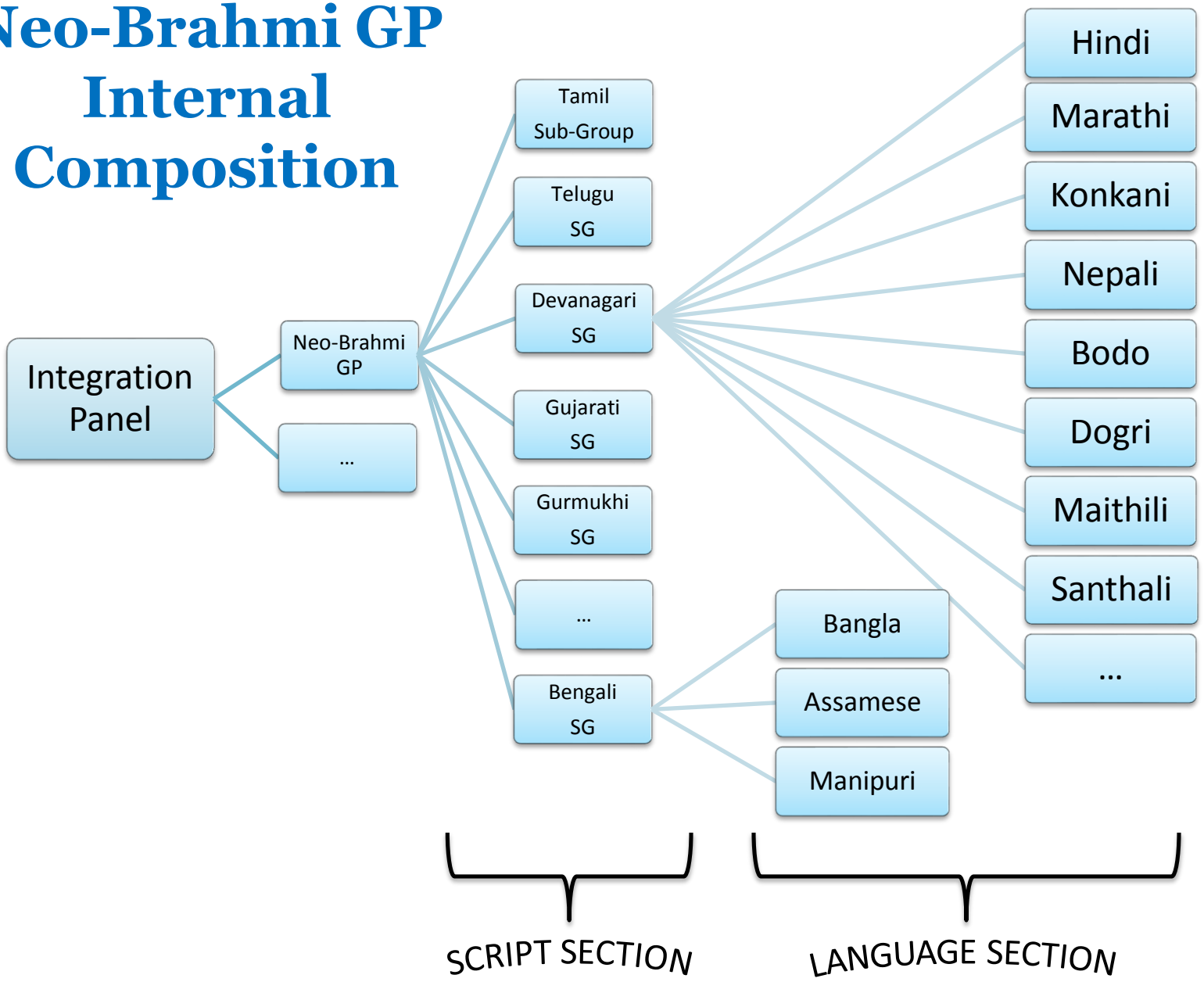
- There are cases of
  - one script one language
  - one script multiple languages
    - In this case, multiple sub-groups may exist to ensure proper representation of each language

- Each sub-group ideally would comprise of
  - Language expert(s)
  - Community representative(s)

Neo Brahmi GP – Approach



Neo-Brahmi GP Internal Composition

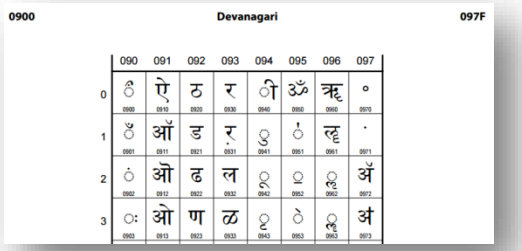


Neo Brahmi GP – Outreach Efforts

- Conducted a workshop in AprIGF-2014 for awareness and call for participation in LGR procedure.
  - Topic: "*Bringing diverse linguistic communities together for a unified IDN ruleset*"
  - The panel discussion touched upon the various aspects of creation of the LGR for the Neo-Brahmi scripts
  - http://2014.rigf.asia/agenda/workshop-proposals/workshop-proposal-13/
- Participation and presentation in 49th ICANN Public meeting at Singapore
- Participation and presentation in 50th ICANN Public meeting at London

Root LGR procedure

- **Fundamental Blocks:**
  - Code point repertoire
  - Variant Rules
  - Whole Label Evaluation rules



ICANN String Similarity Assessment Tool

Previous similar work

- For IDN version of ".in" ccTLD, (.bharat) equivalent in 22 Official Indian Languages, similar exercise had been carried out

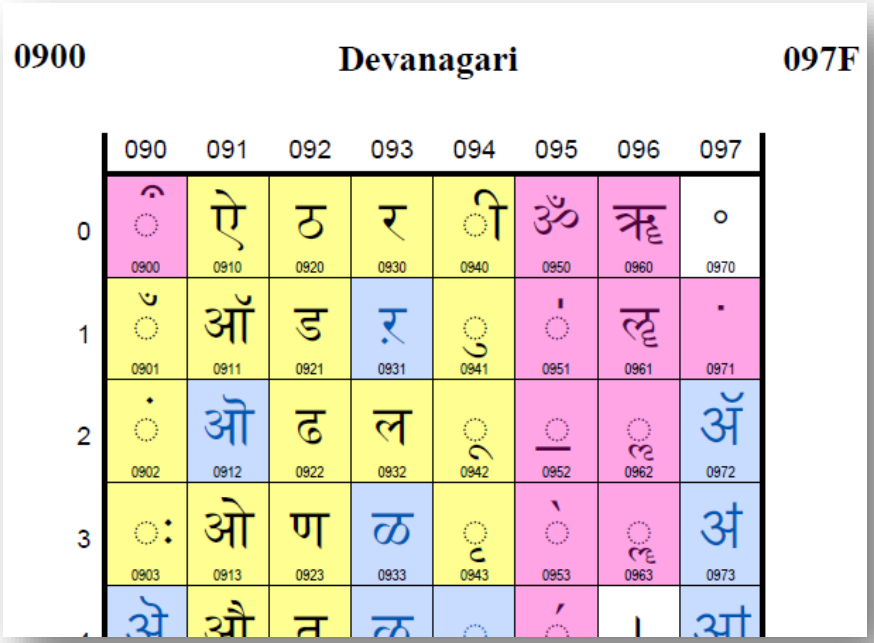
- Following things were finalized for each language
  - Permissible set of code points
  - Visually similar variant strings
  - Complex whole label evaluation rules

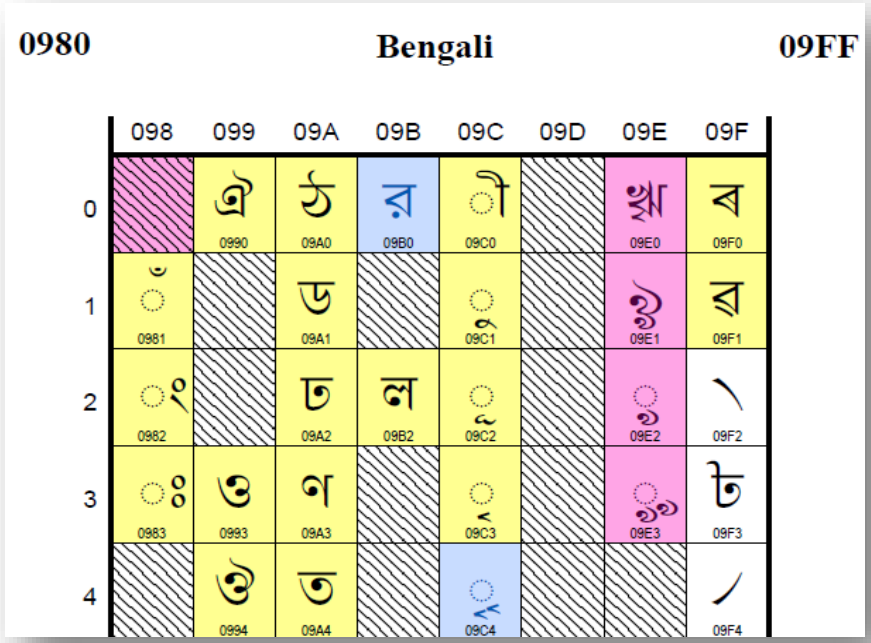
Revisiting the rules in context of LGR framework

- LGR work is different in following contexts
  - Wider stakeholder group
  - Overarching principles in the LGR procedure
    - Especially *Simplicity* and *Predictability* principles
- This revision however would not change
  - the need for the well-formedness of the label in terms of Akshar formalism

Status of current work

- In the process of finalizing the code-point repertoires:





Future undertakings: Cross-Script Similarities

DEVANĀGARĪ SCRIPT	COGNATE SCRIPT	CODEPOINT IN COGNATE SCRIPT
घ U+0918	Gujarati	ઘ U+0A98
उ U+0909	Gurmukhi	ਉ U+0A24
र U+0930	Gujarati	ર U+0AAE

- Code point similarity across scripts

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U+0918 U+0930 U+0A98 U+0AAE

- Cases where Devanagari-Gujarati and Devanagari-Gurumukhi strings look similar.

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0918 091F 0940 0A2C 0A1F 0A40

Future undertakings: Whole Label Evaluation Rules

- Most crucial aspect of Neo-brahmi Label Generation Ruleset

- Details in the following slides.

Before starting with the

Whole Label Evaluation Rules for LGR (The global approach)

let us take a look at

Whole Label Evaluation Rules for .bharat policy (The Indian approach)

.bharat policy

- Why understanding the .bharat policy is important?
  - It is founding work connecting IDNs and Indian languages
  - It has been demonstrated and appreciated at various National and International forums
  - It has **all the basic components that are required by the "Root LGR" work**, albeit in different forms.

Character classification

Components of the Syllable

- **–Consonants(C) :**
  क ख ग घ ङ च छ ज झ ञ ट ठ ड ढ ण त थ द ध न ऩ य य़ र ऱ ल ळ ऴ व श ष स ह
- **–Vowels (V) :**
  अ आ इ ई उ ऊ ऋ ऌ ऐ ऍ ऑ ओ औ ऑ
- **–Matras (M) :**
  ा ि ी ु ू ृ ॆ े ै ॅ ॊ ो ौ ॉ
- **–Vowel modifiers (D) :**
  ँ ं ः
- **–Halant (H) :**
  ्
- **–Nukta (N) :**
  ़

Formalism at a glance …

Formalism Illustrated…

- **Variables :**

Dash →	Hyphen -	
Digit →	Indo-Arabic digits [0-9]	
C	→	Consonant
V	→	Vowel
M	→	Matra
D	→	Anusvara/Bindi/Tippi/Sunna
B	→	Chandrabindu/Anunasika/Arasunna
X	→	Visarga/Aytham
H	→	Halant/Chandrakala/Virama
A	→	Addak
N	→	Nukta
Y	→	Avagraha/Praslesham
L	→	Chillu
Z	→	Khanda Ta
k	→	Number of possible Consonant Halanta Sequences

Formalism Illustrated…

- **Formalism Operators :**

|	→	Alternative
[ ]	→	Optional
*	→	Variable Repetition
( )	→	Sequence Group

Formalism Illustrated…

The Formalism:

Consonant-Syllable →

*k(C[N]H) C[N] [H|D|B|X|BD|BX|M[D|B|X|BD|BX]]
| [CH]Z
| L[HC[D|H|M[D]]]
| AC[D|X|M[D|X]]

Vowel-Syllable → V[D|B|X|BD|BX]

Syllable → Consonant-Syllable [Y] | Vowel-Syllable[Y]

IDN-Label → (Syllable | digit)*([dash](Syllable | digit))

Fundamental differences .bharat and Root LGR

.bharat zone

- It is a focused zone – only the domain names under .bharat TLD
- Restricted only to Indian languages
- Policies can be strict
- Can define our own categories

Root Zone

- It is the most generic zone on the Internet. The root zone.
- Cannot be restricted. Encompasses all the scripts/languages of the world
- Policies have to be simple, yet sufficiently tight
- Have to rely on the Unicode Character properties

Character classes - Differences

.Bharat character classes

C → Consonant

V → Vowel

M → Matra

D → Anusvara/BindiSunna

B → Chandrabindu/Arasunna

X → Visarga/Aytham

H → Halant/Chandrakala

A → Addak

N → Nukta

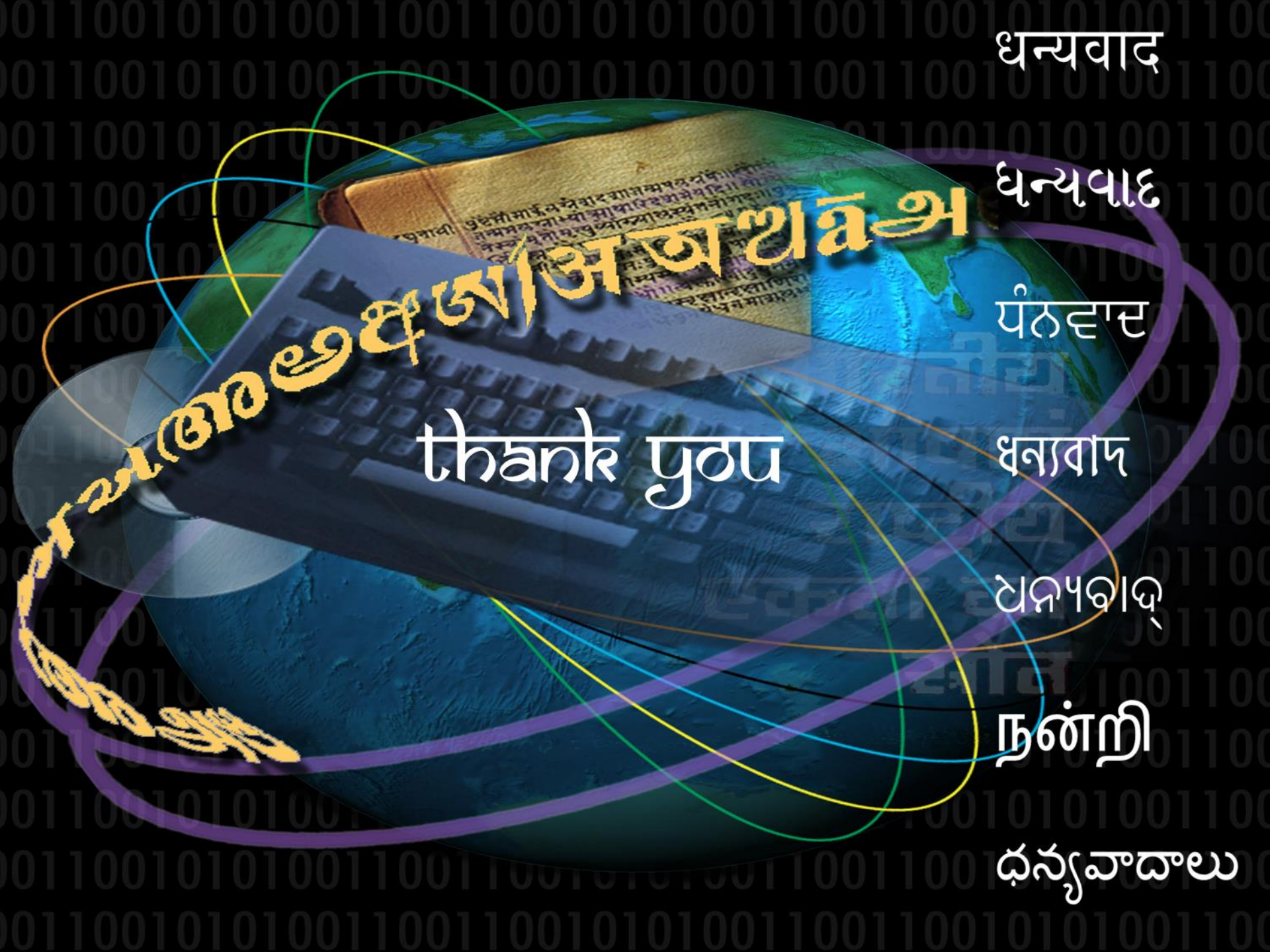
Y → Avagraha/Praslesham

L → Chillu

Z → Khanda Ta

Unicode character classes

- Mn - Mark, Non-Spacing
  - 0901;DEVANAGARI SIGN CANDRABINDU
  - 093A;DEVANAGARI VOWEL SIGN OE
  - 093C;DEVANAGARI SIGN NUKTA
  - 094D;DEVANAGARI SIGN VIRAMA
- Mc - Mark, Spacing Combining
  - 0903;DEVANAGARI SIGN VISARGA
  - 093E;DEVANAGARI VOWEL SIGN AA
- Lo - Letter, Other
  - 0905;DEVANAGARI LETTER A
  - 0915;DEVANAGARI LETTER KA
  - 093D;DEVANAGARI SIGN AVAGRAHA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