INTRODUCTION

This project aims at helping the students and teachers of Sanskrit, to learn or teach Sanskrit in a more student and tech friendly manner, by providing them a user friendly interface and an easy way to access the dictionary, reference material and Books.

The mobile app and website will feature links to fifty plus, Sanskrit help websites and keep a collection of reference materials from trusted sources. An online dictionary will also made available through us, and a Sanskrit grammar checker indigenously developed by us which will be hosted directly on our local server. New features can be added as per requirement.

BACKGROUND STUDY

Sanskrit originated in an oral society, and the oral tradition was maintained through the development of early classical Sanskrit Literature. Writing was not introduced to India until after Sanskrit had evolved into the Prakrits; when it was written, the choice of writing system was influenced by the regional scripts of the scribes. Therefore, Sanskrit has no native script of its own. As such, virtually all the major writing systems of South Asia have been used for the production of Sanskrit manuscripts.

The Sanskrit grammatical tradition, Vyākaraṇa, one of the six Vedangas, began in the late Vedic period and culminated in the Aṣṭādhyāyī of Pāṇini, which consists of 3990 sutras (ca. fifth century BCE). About a century after Pāṇini (around 400 BCE), Kātyāyana composed Vārtikas on the Pāṇini sũtras. Patanjali, who lived three centuries after Pāṇini, wrote the Mahābhāṣya, the "Great Commentary" on the Aṣṭādhyāyī and Vārtikas. Because of these three ancient Vyākaraṇins (grammarians), this grammar is called Trimuni Vyākarana. To understand the meaning of the sutras, Jayaditya and Vāmana wrote a commentary, the Kāsikā, in 600 CE. Pāṇinian grammar is based on 14 Shiva sutras (aphorisms), where the whole mātrika (alphabet) is abbreviated. This abbreviation is called the Pratyāhara.

Sanskrit verbs are categorized into ten classes, which can be conjugated to form the present , imperfect, imperative, optative, perfect, aorist, future, and conditional moods and tenses. Before Classical Sanskrit, older forms also included a subjunctive mood. Each conjugational ending conveys person , number, and voice.

Nouns are highly inflected, including three grammatical genders, three numbers, and eight cases. Nominal compounds are common, and can include over 10 word stems.

Word order is free, though there is a strong tendency toward subject–object–verb, the original system of Vedic prose.

REQUIREMENT ANALYSIS

Hardware and Software Requirements:

Following Hardware will be required for implementation of this project :-

- Desktop(Windows 7+/Mac OS)
- Android Smartphone (Jellybeans 1.0 +)

Following Software will be needed and put to use for development of this project :-

- Android Studio-for app development
- Apache Tomcat Server- for local web deployment
- Eclipse- for android and Java Development
- Common Browsers e.g. Chrome, Firefox, Opera etc.

Following Technologies will be used for implementation of this project:-

- JSP and J2ee (Java Server Pages and Java Enterprise Edition)
- JSE7 and JDK (Java Software Edition and Java Development Kit)
- Android SDK and Default Emulator(Software Development Kit)
- Google's API (Application Package Installer)

Functional Requirements:

Following are some of the functional requirements of or project:-

- It should have a search bar which will ask you to enter any article/ reference category which you are looking for.
- Provide different sorting criteria to help the user to look for a discussion or article, with better options according to his choice such as: most relevant, most viewed etc.
- Website tour for any first time users/ sellers.
- A new user is asked necessary details, like name email and password, or register the new user in our database.
- The registered users/ seller are given a special feature of uploading his/her items images and edit his/her details/product details if they want.
- Keyboard input will be used to type in the content of the mail and mouse input to click on the send key.
- The mail will be sent to our address.
- There should be Devanagari keyboard available everywhere where there is need for it.

Non Functional Requirements:

These are the following non-functional requirements:-

Performance Requirements

Some performance requirements are listed below:-

1. Several users can use the program at one time.
2. User can review any category they wish.
3. The system must be interactive and the delays involved must be less .So in every action-response of the system, there are no immediate delays.

Safety and Security Requirements

Following are some Safety and Security requirements:-

1. Access to the database should be restricted to people that are required to view information about personal details of vendors/sellers and users.
2. Passwords and ID's should be regulated to be at least a certain length and must contain non-alphanumeric characters in both the password and ID.
3. Reliability will be ensured by a thorough verification and validation plan devised.

Software Quality Attributes

These are few of the Software Quality Attributes:-

1. The Quality of the System is maintained in such a way so that it can be very user friendly to all the users.
2. The software quality attributes are assumed as under:
    a. Accurate and Reliable
    b. Secured
    c. Fast Speed

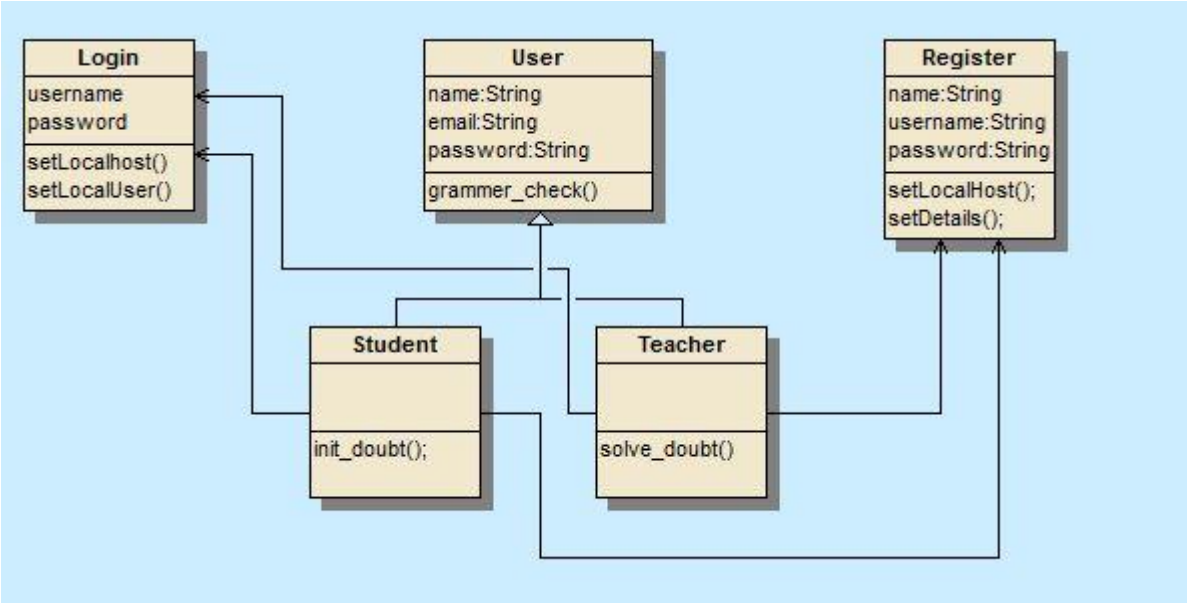
User Requirements:

Following are the expected requirements from the users of this project:-

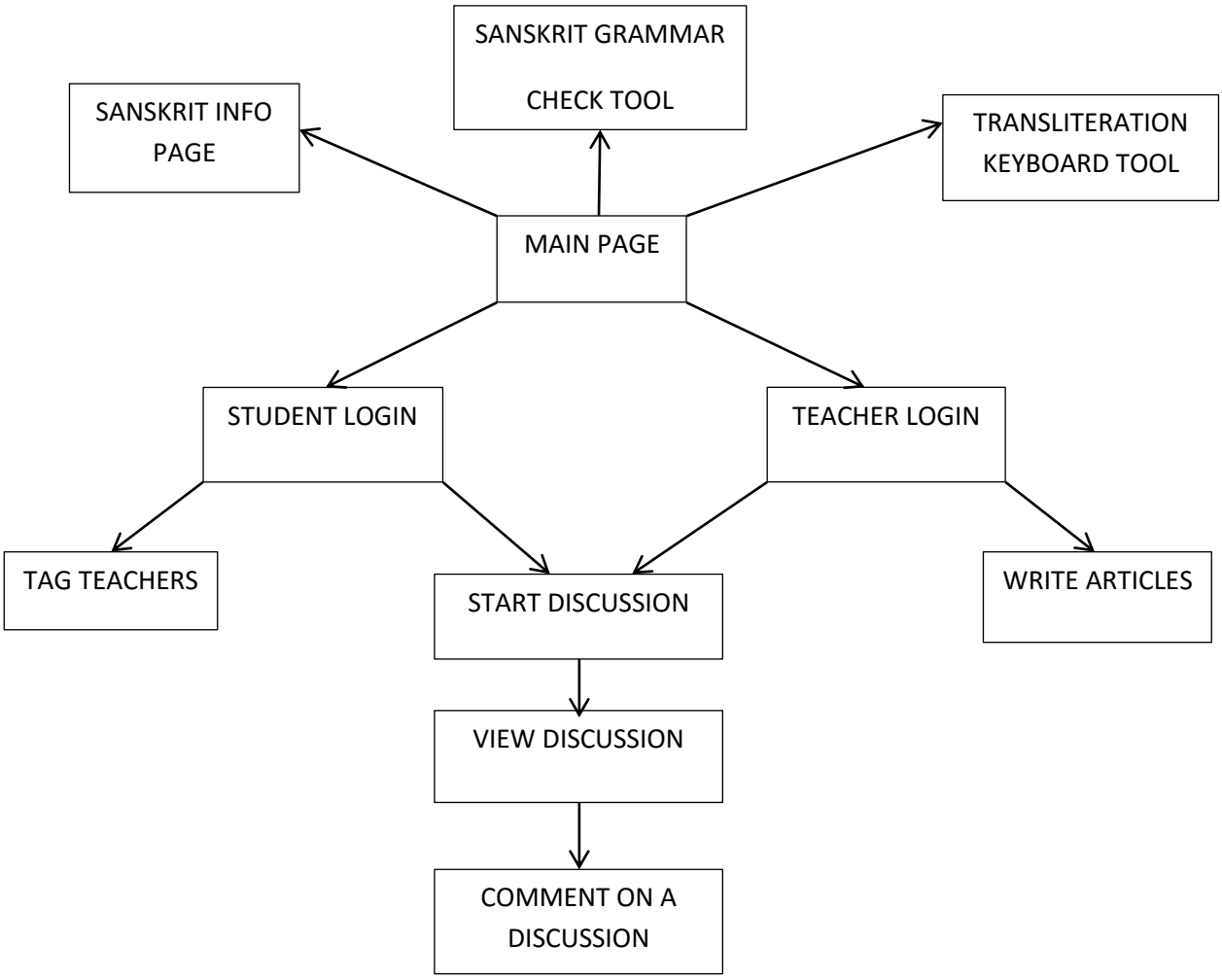
- Basic knowledge on how to operate a computer.
- Basic knowledge on how to operate a mobile application.
- Able to perform operations requiring net.
- Basic knowledge of Sanskrit, and its grammatical structure.

UML Diagram:

Class Diagram



DETAILED DESIGN



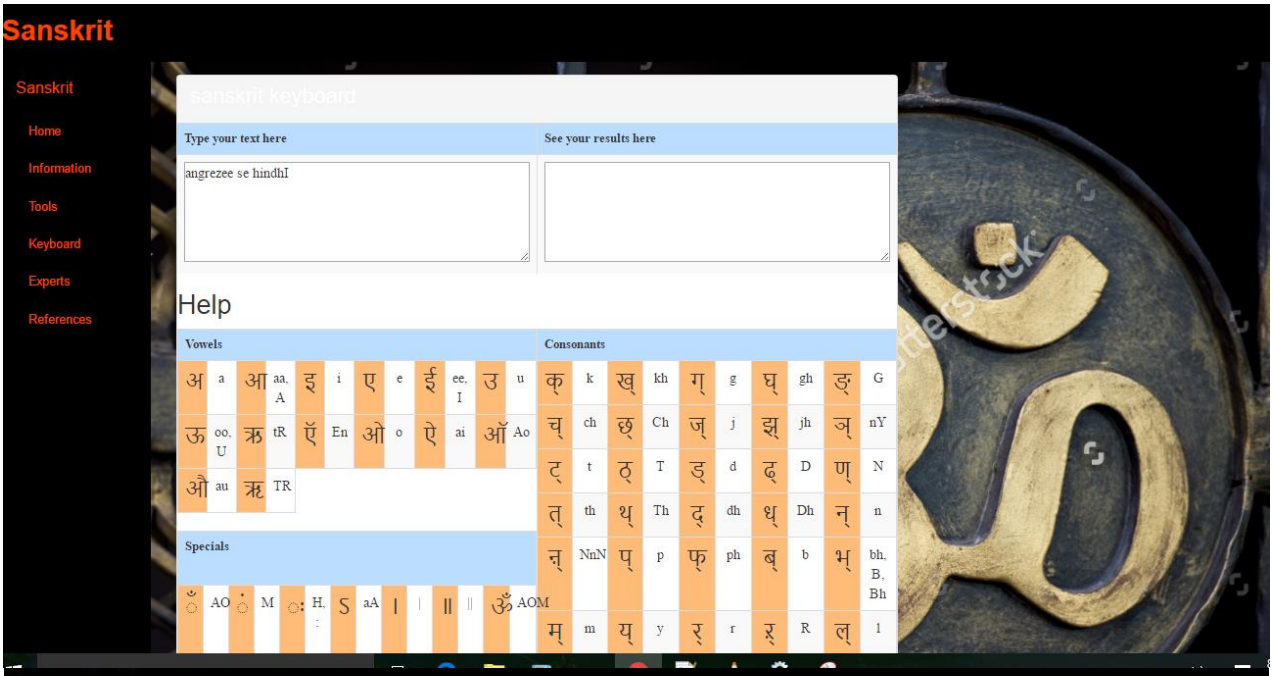
Discussion Forum Structure

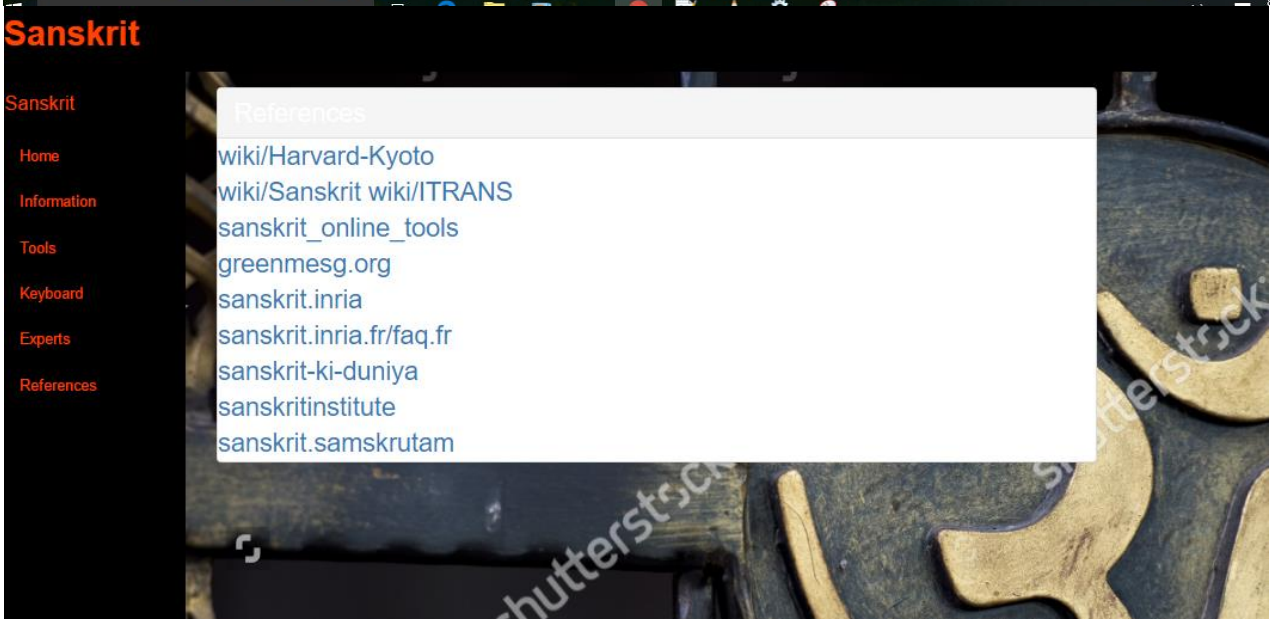
IMPLEMENTATION

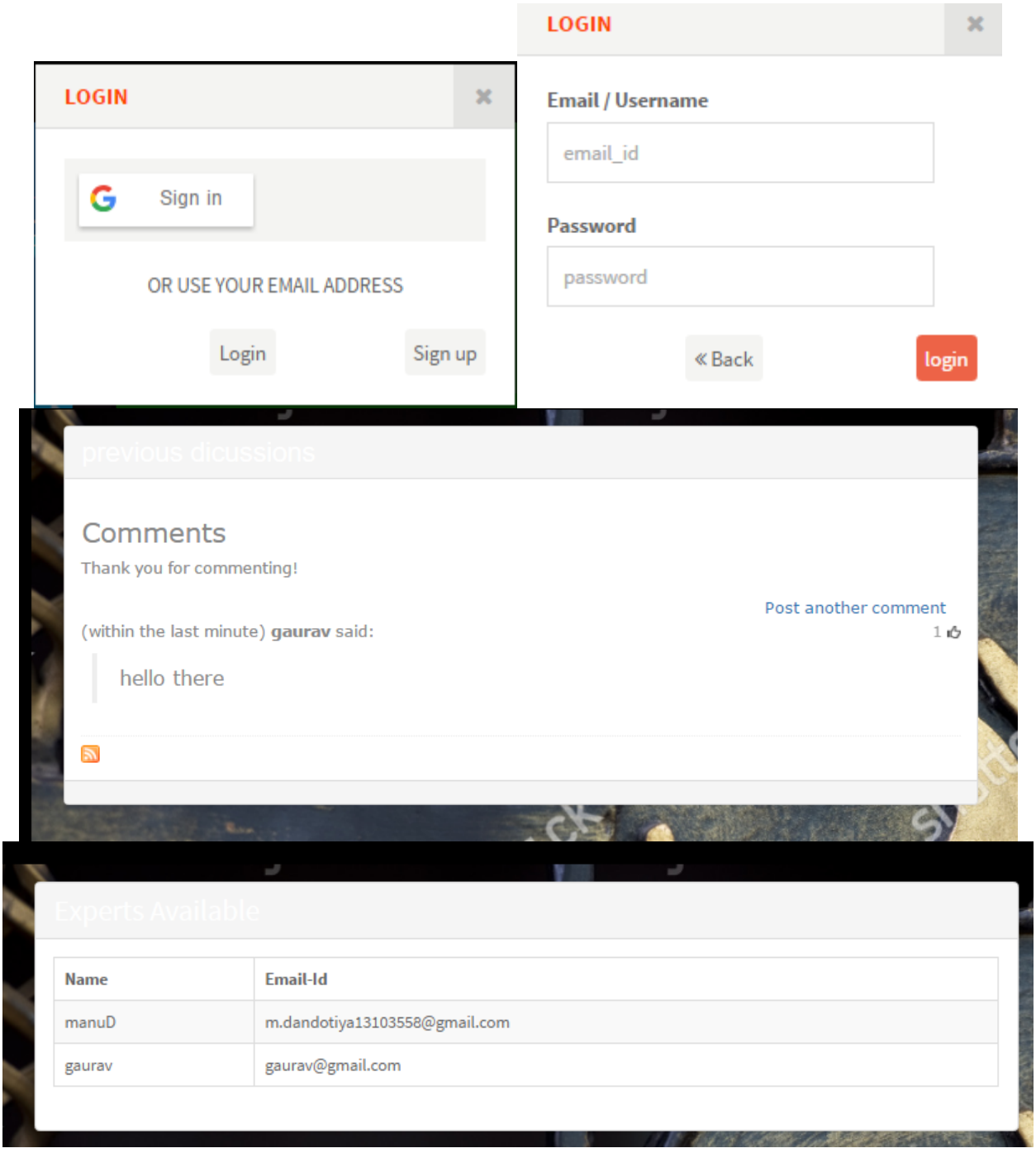
Throughout the project Java is the core language that is used, in different forms for website development JSP will be put to use, for Mobile Application Android will be used, and for networking part and Socket Programming we will be making use of the Socket class of Java. Two approaches for java based compiler have been implemented for grammar checking and text verifying, one is Top Down Recursive Parser, and a Deterministic Finite Automata. We also present the efficiency comparison between them by comparing the time taken by the two ways for parsing the same verb. This Parser/Grammar Checker will be made available through our local Client-Server interactions and directly through app and Website. Both app and website will be provided a Materialized look feel and interface, for user friendly and interactive front-end.

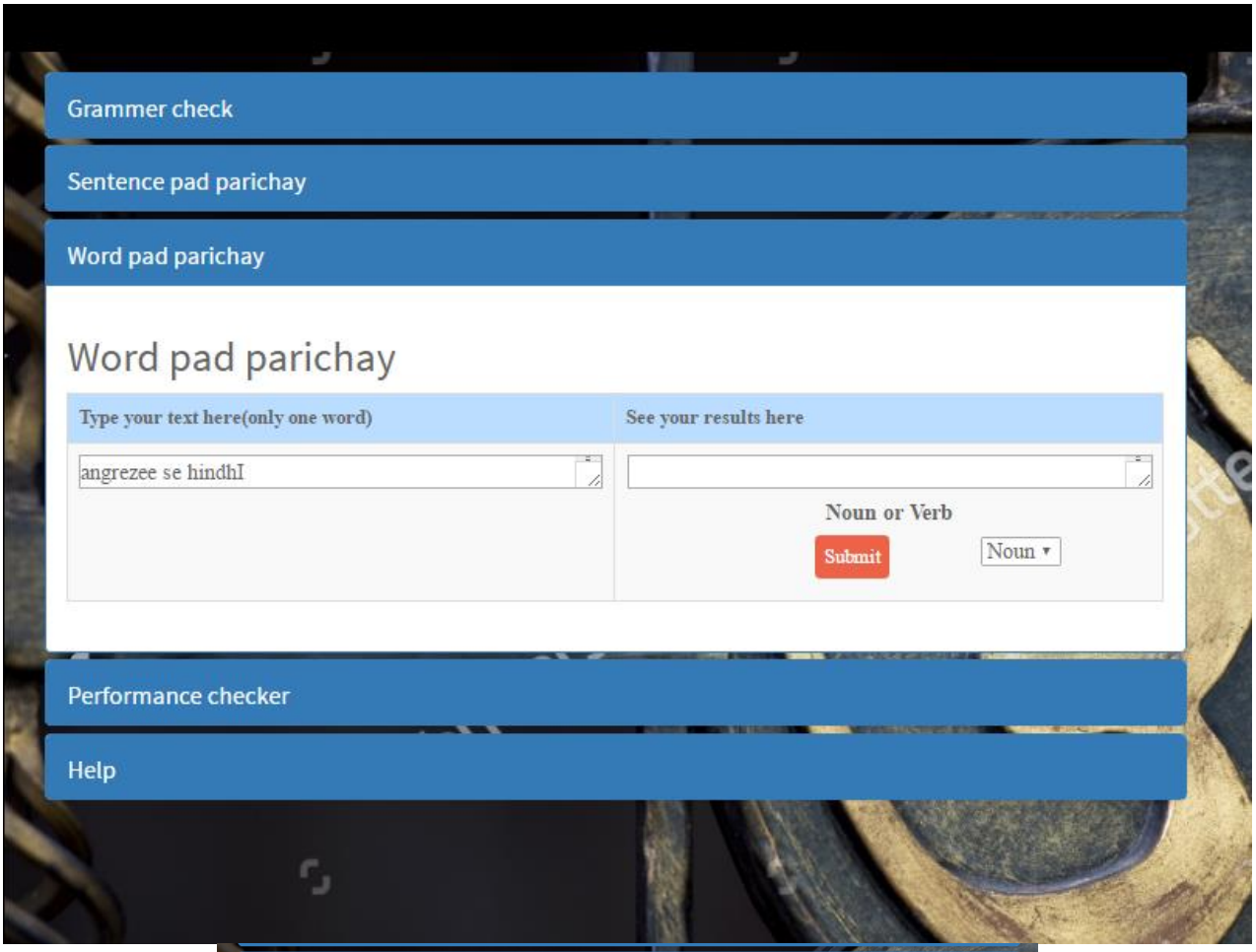
The Language Used for Top Down Recursive Parser Have been mentioned in Appendices Section, and the Directed Finite Automaton Chart drawn.

.Website Previews:

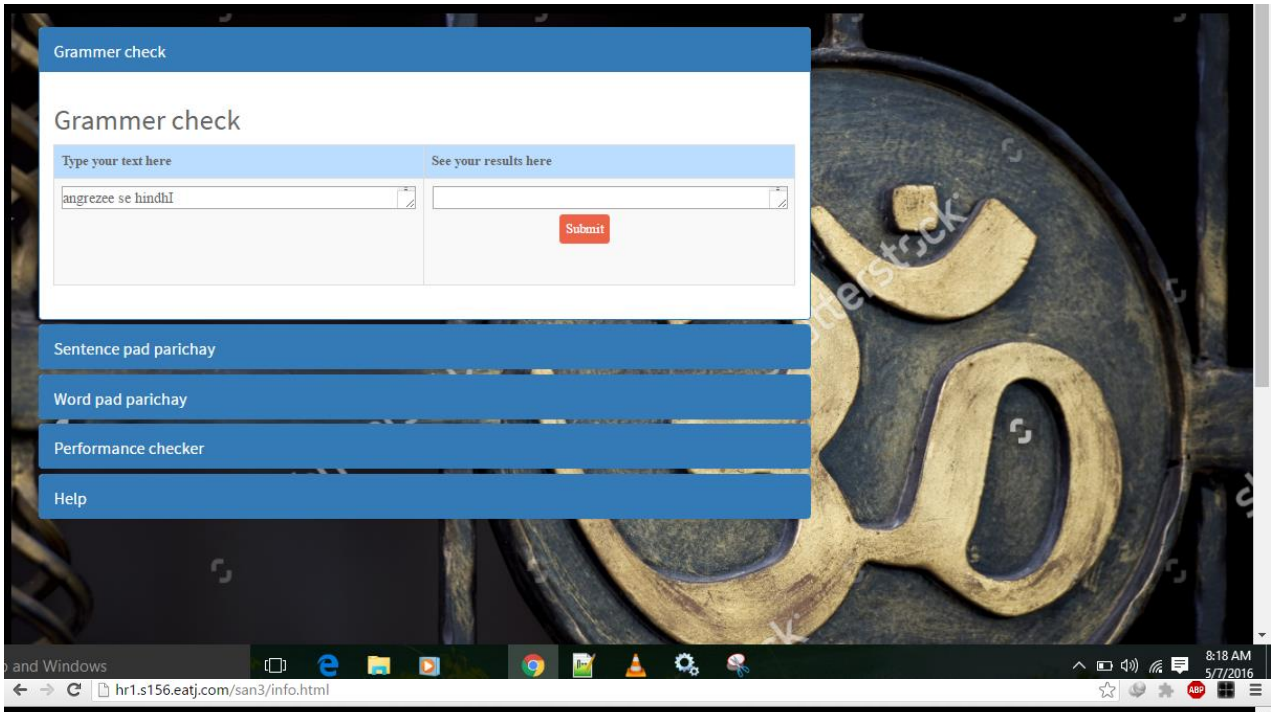

Sanskrit
Sanskrit
Home
Information
Tools
Keyboard
Experts
References
sanskrit keyboard
Type your text here
See your results here
angrezee se hindhI
Help
Vowels
Consonants
Specials

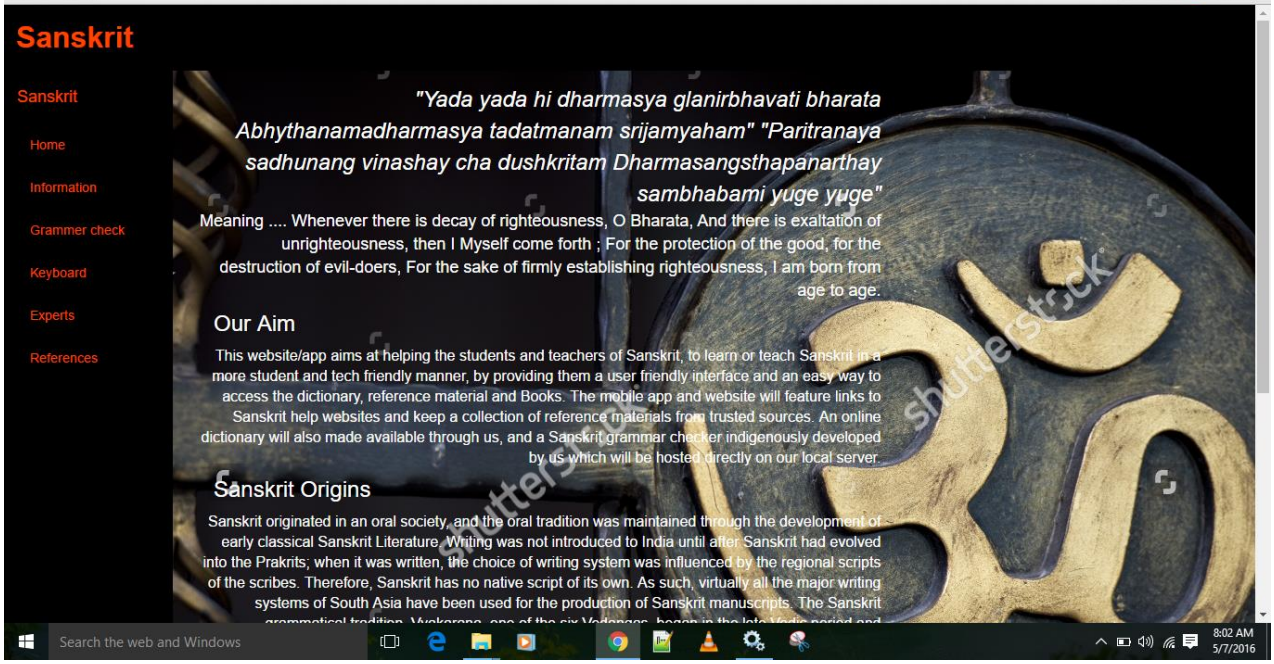

Sanskrit
Sanskrit
Home
Information
Tools
Keyboard
Experts
References
References
wiki/Harvard-Kyoto
wiki/Sanskrit wiki/ITRANS
sanskrit_online_tools
greenmesg.org
sanskrit.inria
sanskrit.inria.fr/faq.fr
sanskrit-ki-duniya
sanskritinstitute
sanskrit.samskrutam


LOGIN
Sign in
OR USE YOUR EMAIL ADDRESS
Login
Sign up
LOGIN
Email / Username
email_id
Password
password
« Back
login
previous dicussions
Comments
Thank you for commenting!
Post another comment
(within the last minute) gaurav said:
1
hello there
Experts Available
Name
Email-Id
manuD
m.dandotiya13103558@gmail.com
gaurav
gaurav@gmail.com


Grammer check
Sentence pad parichay
Word pad parichay
Word pad parichay
Type your text here(only one word)
See your results here
angrezee se hindhI
Noun or Verb
Submit
Noun
Performance checker
Help


Word pad parichay
Performance checker
Help
Help
Vowels
Consonants
Specials


Grammer check
Grammer check
Type your text here
See your results here
angrezee se hindhI
Submit
Sentence pad parichay
Word pad parichay
Performance checker
Help
and Windows
8:18 AM
5/7/2016


hr1.s156.eatj.com/san3/info.html
Sanskrit
Sanskrit
Home
Information
Grammer check
Keyboard
Experts
References
"Yada yada hi dharmasya glanirbhavati bharata
Abhythanamadharmasya tadatmanam srijamyaham" "Paritranaya
sadhunang vinashay cha dushkritam Dharmasangsthapanarthay
sambhabami yuge yuge"
Meaning .... Whenever there is decay of righteousness, O Bharata, And there is exaltation of unrighteousness, then I Myself come forth ; For the protection of the good, for the destruction of evil-doers, For the sake of firmly establishing righteousness, I am born from age to age.
Our Aim
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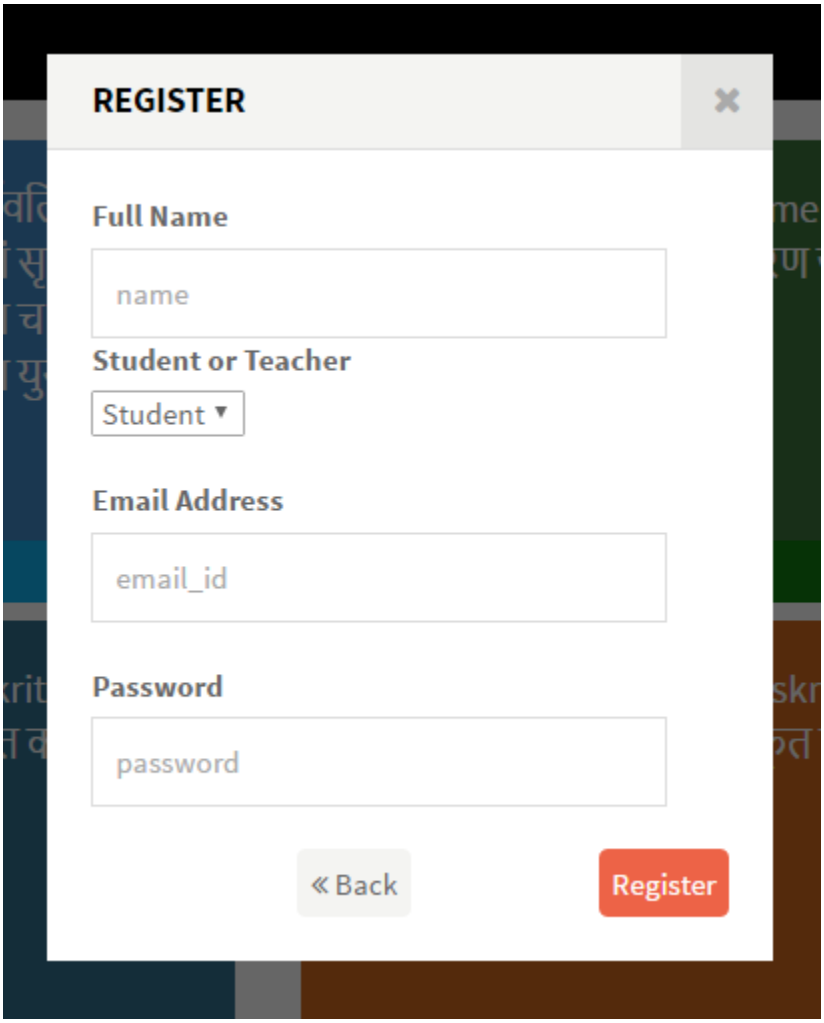
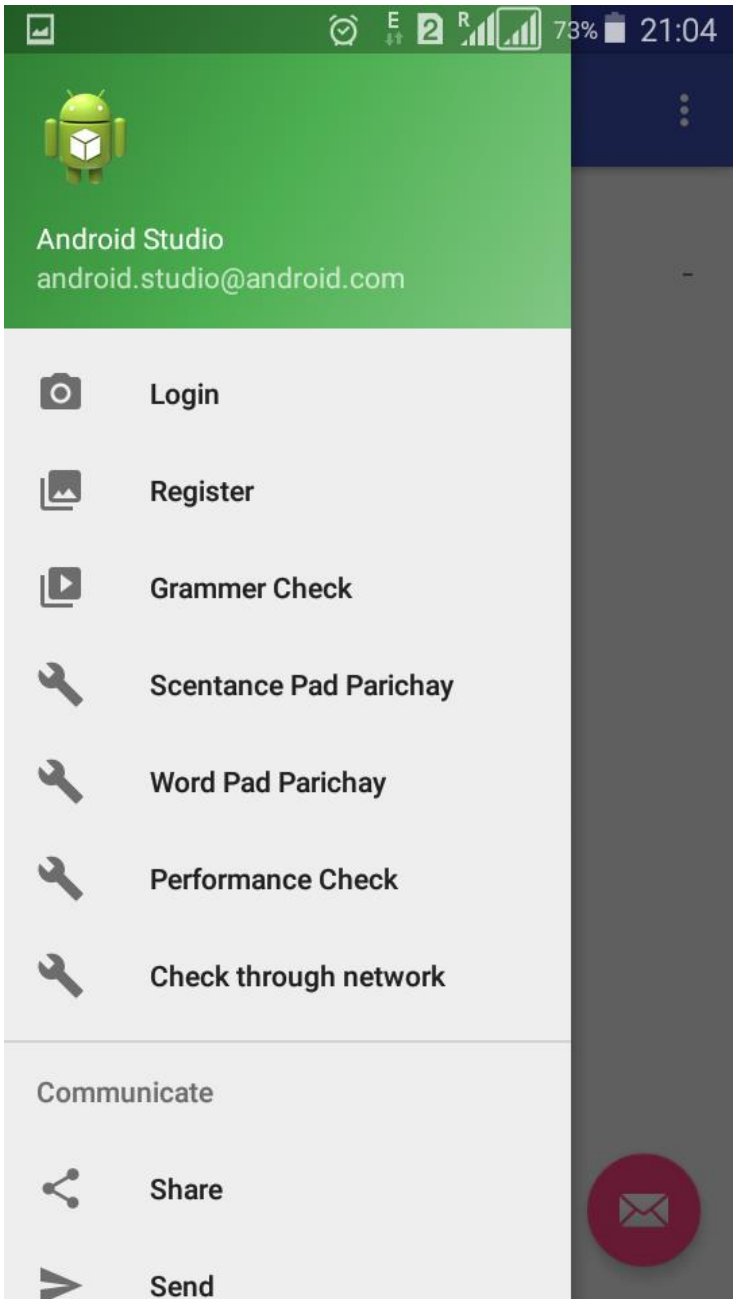
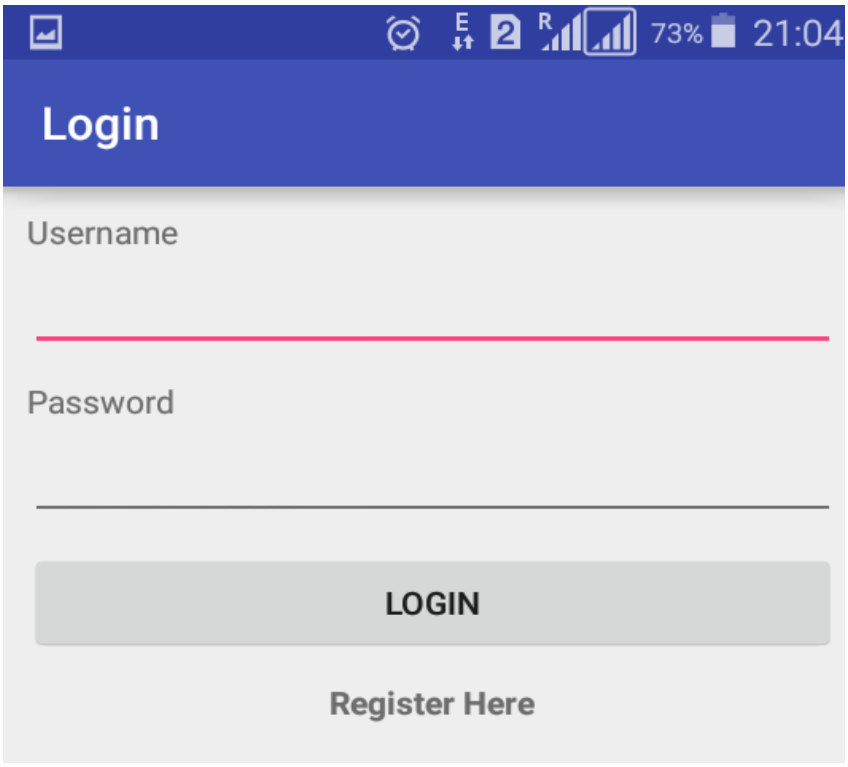
Search the web and Windows
8:02 AM
5/7/2016

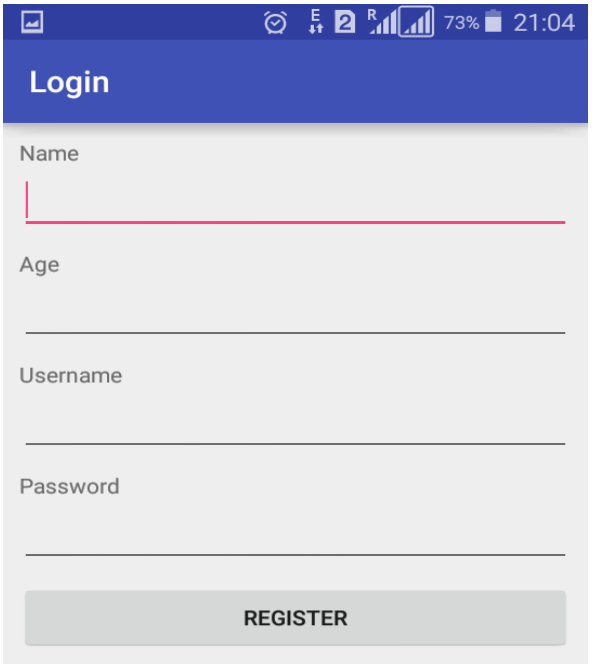

REGISTER
Full Name
name
Student or Teacher
Student
Email Address
email_id
Password
password
« Back
Register

App Previews:

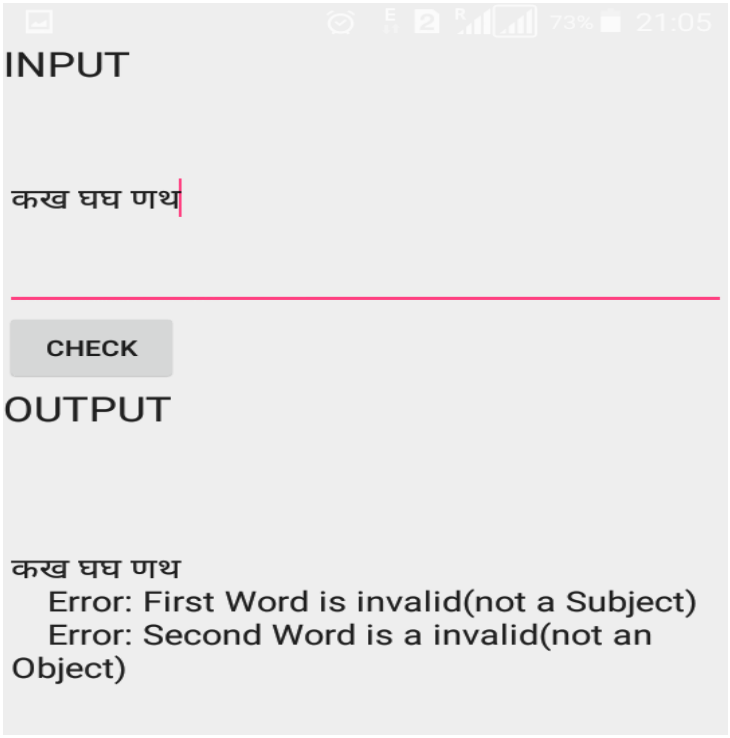


Navigation Drawer


73%
21:04
Login
Username
Password
LOGIN
Register Here


73%
21:04
Login
Name
Age
Username
Password
REGISTER

Tools:



Grammer Check

Comparision between Top-Down Recursive Parser and DFA performance

TESTING REPORT

Type of test	Will test be performed?	Comments /Explanations	Software Components
Requirements	Yes	This testing is required because we need to verify whether our selected attributes are able to solve the current problem or not.	Complete
Unit	Yes	This testing allows us to test whether individual attributes affect the website's/ app's performance or not	Individual Attributes
Integration	Yes	This test is important to check whether the combinations of attributes are affecting website's/app's performance or not.	Attribute's Combinations
Performance	Yes	This test is important to check whether the rules determined are giving correct results, and in an efficient manner.	Rules
Load	No	Since the database site and app are hosted on free hosting websites and servers it is difficult to judge the load handling capacity of the website/app.	Traffic
Security	Yes	This test is performed to check whether the user sensitive data such as passwords is secure in the database.	Effectively secure

Component decomposition and type of testing required:-

S. No.	Various Modules that require testing	Type of Testing required	Technique for writing test cases
1	Data Collection	Requirement	Black Box
2	Data Preparation	Unit	Black Box
3	Pattern Extraction	Requirement, Unit, Performance, Integration	Black Box

Test cases for all components:

Test Case Id	Input	Expected Output	Status
1	path pan kaThs	Output Would be: Perfect!!	Pass
2	संस्कृत	Through keyboard the output is correct	Pass
3	English text.	Sanskrit language transliteration	Pass
4	Text other than English.	Desired language translation	Fail

Input Field Test Cases:

No.	Input	Expected Output	Actual Output
1	**Login** Email id="a@gmail.com" Password ="!@#$%"	Invalid password	Invalid password
2	Email:"a@.com"	Invalid email	Invalid email
1	**Signup** Email:"a@gmail.com"	valid email	valid email
2	Password==confirm	valid	Valid

CONCLUSION AND FUTURE SCOPE

This Project aims at bringing Sanskrit language back to pace, by making it and its reference materials books and its support websites all available at one place, and easy to access. This project will prove to be beneficial for all the aspirants who are interested in learning or practicing Sanskrit . The grammar checker will provide the users with ample practice to help them learn and practice Sanskrit more and more. In Future, we wish to improve on our existing Grammar Checker to cover more of the Sanskrit language, and be more swift and accurate.

REFERENCES

Book

Dr. Ashok Sharma,Dr. Ramgopal Sharma, Sanskrit Gyaanoday. Ghaziabad: Anmol Books, 2015.

Online:

The Computational Linguistics R&D at Special Centre for Sanskrit Studies J.N.U., since 2002
http://sanskrit.jnu.ac.in/index.jsp

jaypal.chandran, vikku.info, Indian Languages Unicode Converter
http://vikku.info/indian-language-unicode-converter/hindi-unicode-converter.html

Sanskrit Linguistic Resources, by Gerard Huet
http://sanskrit.inria.fr/**DATA**/XML/

Proceedings paper

Proceedings of First International,Symposium on Sanskrit Computational Linguistics,Ed. G´erard Huet & Amba Kulkarni, INRIA, October 2007 Proc. FISSCL, Paris,October, 29-31-2007.

APPENDICES

1. *Harvard-Kyoto Protocol for Transliteration*

क	ख	ग	घ	ङ	Velar
k	kh	g	gh	G	
च	छ	ज	झ	ञ	Palatal
c	ch	j	jh	J	
ट	ठ	ड	ढ	ण	Retroflex
T	Th	D	Dh	N	
त	थ	द	ध	न	Dental
t	th	d	dh	n	
प	फ	ब	भ	म	Labial
p	ph	b	bh	m	
य	र	ल	व		Semi-vowel
y	r	l	v		
श	ष	स	ह		Fricative
z	S	s	h		

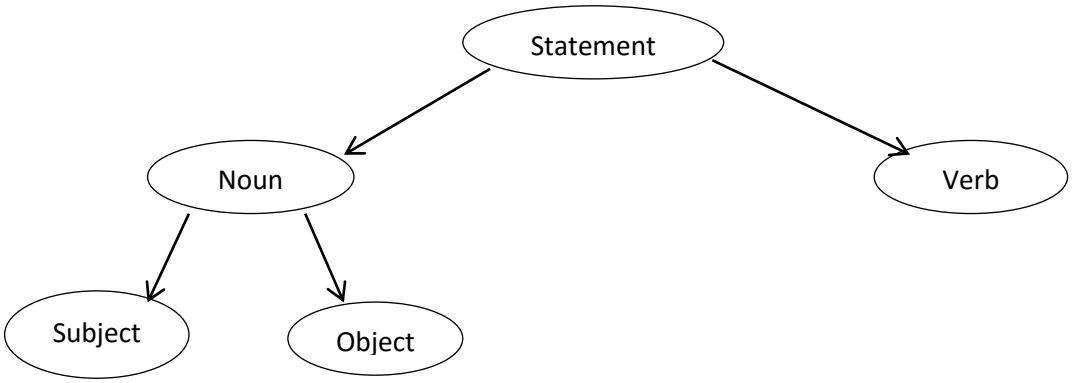
2. *iTRANS Convention for Tansliteration*

Vowels											
अ	a	आ	A	इ	i	ई	I	उ	u	ऊ	U
ऋ	R	ऌ	lR	ए	e	ऐ	ai	ओ	o	औ	au

Specials									
ः	H, :	ं	M	ऽ	'	॥	"	ॐ	oM

Consonants									
क्	k	ख्	kh	ग्	g	घ्	gh	ङ्	G
च्	c	छ्	C	ज्	j	झ्	jh	ञ्	J
ट्	T	ठ्	Th	ड्	D	ढ्	Dh	ण्	N
त्	t	थ्	th	द्	d	ध्	dh	न्	n
प्	p	फ्	ph	ब्	b	भ्	bh	म्	m
य्	y	र्	r	ल्	l	व्	v	श्	z
ष्	S	स्	s	ह्	h				

3. *General form of use grammar in Sanskrit*



4. *Devanagari characters Unicode list.*

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0900	ँ	ं	ः	ऄ	अ	आ	इ	ई	उ	ऊ	ऋ	ऌ	ऍ	ऎ	ए	
0910	ऐ	ऑ	ऒ	ओ	औ	क	ख	ग	घ	ङ	च	छ	ज	झ	ञ	ट
0920	ठ	ड	ढ	ण	त	थ	द	ध	न	ऩ	प	फ	ब	भ	म	य
0930	र	ऱ	ल	ळ	ऴ	व	श	ष	स	ह	ऺ	ऻ	़	ऽ	ा	ि
0940	ी	ु	ू	ृ	ॄ	ॅ	ॆ	े	ै	ॉ	ॊ	ो	ौ	्	ॎ	ॏ
0950	ॐ	॑	॒	॓	॔	ॕ	ॖ	ॗ	क़	ख़	ग़	ज़	ड़	ढ़	फ़	य़
0960	ॠ	ॡ	ॢ	ॣ	।	॥	०	१	२	३	४	५	६	७	८	९

5. Tables Referenced for the DFA.

Tables Referenced for the DFA(Verb)			
	1st Position	*2nd Position*	*3rd Position*
1	**Past**	**Third Person**	**Singular**
2	**Present**	**Second Person**	**Dual**
3	**Future**	**First Person**	**Plural**

Tables Referenced for the DFA(Noun)			
	1st Position(type)	*2nd Position*	*3rd Position*
1	**Akarant Masculine**	**Third Person (Subject)**	**Singular**
2	**ikarant Masculine**	**Second Person (Object)**	**Dual**
3	**Ukarant Masculine**		**Plural**
4	**Aakarant Feminine**		
5	**ikarant Feminine**	*For 2nd sub-DFA*	
6	**Ikarant Feminine**		
7	**ukarant Feminine**	**1**	**Ikarant Neuter**
8	**Ukarant Feminine**	**2**	**Ukarant Neuter**
9	**Akarant Neuter**		