GNU *groff* interface for
Bangla Font (SGAON)

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ABSTRACT

This document describes how *bangla* font is implemented with GNU *groff* software. The *bangla* font *sgaon* is a HP Laserjet softfont. This font is developed by *Anisur Rahman*. In this implementation, the softfonts are converted to *PostScript* and the *groff* fonts are also generated from the *Adobe Font Matrics*, *encoding*, and *map* files. The reason for implementing fonts with *groff* is to take advantage of it's inherent document processing power. This document is prepared with *groff* **mm** macros package using the *vi* editor on a SPARC 10 running SunOS 4.1.4 and *groff 1.09*.

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1. GNU *groff* **Interface**

If you already have *groff* and do not want to know bangla font is implemented, please skip to section **Installing Bangla Fonts**.

GNU *groff* software is freely available on Internet from *prep.ai.mit.edu*. The location is *pub/gnu/groff-1.09.tar.gz*. The current version of groff is 1.09. It requires a C++ compiler to compile. The *groff* software is written by James Clark *(jjc@jclark.com)*.

The *bangla* HP softfont file *SGAON.ZIP* is available through anonymous *ftp* from various sites around the world. After extracting the files, the softfont is converted to *PostScript*. This can be done with the program supplied with *SGAON*, HPTOPS.EXE or some other program freely available on Internet, e.g., *pk2ps* available with *psroff* software. Let's say the *PostScript* font file name is **bangla10.pfa**. The *Adobe Font Matrics* (AFM) file also needs to be generated. HPTOPS.EXE can also generate AFM file for the same font.

Once the AFM file is generated, GNU *groff* fonts can be generated with the program *afmtodit* supplied with *groff* software. *aftodit* is a perl script. This program requires the encoding and map files for the *PostScript* font. The encoding and map files have to generated by hand.

The encoding file consist of a sequence of the lines of the form:

> *ps_char code*

where *ps_char* is the *PostScript* name of the character and *code* is it's position in the encoding expressed as a decimal integer. The code for each character given in the font file must correspond to the code for the character in the encoding file.

The map should contain a sequence of lines of the form:

> *ps_char groff_char*

where *ps_char* is the *PostScript* name of the character and *groff_char* is the groff name of the character (as used in the groff font file). Please look at *aftodit(1)* and *grops(1)* man pages for details.

Let's say, the encoding file name is **bangla.enc**. After generating the GNU *groff* font, (let's say the name of the font is **BNG10**), follow the steps:

1. copy GNU *groff* font file **BNG10** file to **/usr/local/lib/groff/font/devps**.

2. copy the encoding file **bangla.enc** to **/usr/local/lib/font/groff/devps**.

3. copy the *PostScript* font file **bangla10.pfa** to **/usr/local/lib/groff/devps**.

4. edit the file **/usr/local/lib/font/groff/devps/download**, and put an entry like this:

   Bangla-Sgaon10   bangla10.pfa

   where **Bangla-Sgaon10** is the *PostScript* font name and *bangla10.pfa* is the name of the *PostScript* file.

Once the above steps are followed, you are done with installing *bangla* font with *groff*. Now the font can be accessed from any macro e.g., *mm, ms, me*. You only can install font this way if you have *root* access. **The bangla font CAN be used if you do not have** *root* **access**. Please look at the section **Installing Bangla Fonts** for details.

Fortunately, you do not have to do many of the things mentioned above. I already generated the *PostScript*, GNU *groff* fonts, and the encoding file. So, you only have to copy these files to the place described above. Please look at the **Installing Bangla Fonts** section for the exact steps you have to follow.

1.1 Installing Bangla Fonts

1.2 You DO NOT Have root Aceess

You are looking at this document, so you must have extracted the necessary files from the *shar* archive. The extraction procedure will place the fonts and necessary files at the correct hierarchy. You only have to set a environment variable called **GROFF_FONT_PATH**, and you **must** do it.

If your shell is *csh, tcsh* or a variant of *csh*, set the environment variable like this:

setenv GROFF_FONT_PATH $HOME/bangla_font

You can put it in your *.cshrc* file, so you will not have to type it all the time.

If you are using *sh, bash* or a variant of *sh*, set the environment variable like this:

GROFF_FONT_PATH=$HOME/bangla_font
export GROFF_FONT_PATH

You can put these line in your *.profile* for permanent use.

NOTE: I am assuming *bangla_font* directory is located at your **home** directory. If it is somewhere else, use the correct path.

1.3 You Have root Access

If you do not have root access or do not wish to install bangla fonts as *root*, you can skip to the next section. The advantage of installing fonts as root is that everyone will have access to the fonts without doing anything special.

If you have root access, change directory to `bangla_font/devps` (If you are already not there), then follow these steps:

1. `/bin/cp ./BNG10 /usr/local/lib/groff/font/devps`

2. `/bin/cp ./BNG10i /usr/local/lib/groff/font/devps`

3. `/bin/cp ./bangla10.pfa /usr/local/lib/groff/font/devps`

4. `/bin/cp ./bangla10i.pfa /usr/local/lib/groff/font/devps`

5. `/bin/cp ./bangla.enc /usr/local/lib/groff/font/devps`

6. `edit the file` **/usr/local/lib/groff/font/devps/download** `and put two`
    `entries at the end of the file like this:`

    ```
    Bangla-Sgaon10      bangla10.pfa
    Bangla-Sgaon10i     bangla10i.pfa
    ```

where,

      `BNG10` is the groff font file (10 point normal),
      `BNG10i` is the groff font file (10 point italic),
      `bangla10.pfa` is the PostScript font file (10 point normal),
      `bangla10i.pfa` is the PostScript font file (10 point italic),
      `bangla.enc` is the encoding file.

NOTE: the standard location of *PostScript* fonts for *groff* is `/usr/local/lib/groff/font/devps`, if it is different in your machine, please use that location instead.

2. Keyboard Mapping

The layout of a Sun Type 5 keyboard is shown in Figure 1 and the corresponding mapping among english and bangla characters are shown in Figure 2. The characters shown on the keyboard can be typed directly as shown. Please look at section **Higher ASCII assignment** to access compound characters (যুক্তাক্ষর).

Figure 1. Sun *Type 5* Keyboard Layout

The equivalent map among english and bangla characters are shown in Figure 2.

Figure 2. Map Among English and Bangla Characters

3. Higer ASCII assignment

As shown in Figure 2, 94 bangla characters are mapped to the main keyboard, that means, those characters can be typed directly from the keyboard. The rest of the characters are mapped to **ASCII** decimal codes from 161-209. The characters mapped from **ASCII** 161-209 have to be accessed by their code. The following tables shows the higher ASCII assignment of the *bangla* characters. Please look at the section **How to Access Compound Characters** to know how to use them.

Higher ASCII assignment for Bangla font [10 pt]

ASCII Assignment					
Decimal	Character	Decimal	Character	Decimal	Character
১৬১	ঙ্গ	১৬২	স্তু	১৬৩	ঞ্জ
১৬৪	ক্ষ্ম	১৬৫	ষ্ণ	১৬৬	ন্ড
১৬৭	ক্রু	১৬৮	জ্ঞ	১৬৯	ম্ন
১৭০	ৗ	১৭১	শ	১৭২	ছ
১৭৩	দ	১৭৪	ঢ	১৭৫	৯
১৭৬	ত	১৭৭	ঘ	১৭৮	ড
১৭৯	ঞ	১৮০	ঙ	১৮১	ত
১৮২	ন	১৮৩	ঞ্চ	১৮৪	ব
১৮৫	চ	১৮৬	ল	১৮৭	ট
১৮৮	ক	১৮৯	উ	১৯০	ন্দ
১৯১	্	১৯২	ৈ	১৯৩	
১৯৪	স্র	১৯৫	ন্দ	১৯৬	ক্র
১৯৭	হু	১৯৮	ক্র	১৯৯	ক্ষ
২০০	ট্র	২০১	দ্ধ	২০২	ট্রেল্প
২০৩	ব্র	২০৪	ক্ষ্ম	২০৫	প্র
২০৬	ন্ধ	২০৭	ড্র	২০৮	প্র
২০৯	গ্র				

3.1 How to Access Compound Charcaters

In *groff*, the special characters can be accessed by their code. As for example to access bangla ক্র, you access the character by it's code like this: \ N´198´. You have to be careful about one thing here if you are not a veteran *roff* user. If you have selected an english font before e.g. character in the middle of **english** text, you have to change font to bangla. As for example, to access ষ্ণ in the middle of english as you are seeing here you have to change font to bangla like this: \ f[BNG10]\ N´165´\ fP. \ fP will change back to the font whatever font you are using before.

4. Example

Input text:

```
.ft BNG10
bA\\lA<dS
.R
bA\\lA<dS
```

will produce out put:

বাংলাদেশ bA\lA<dS

Also,
\ f[BNG10]bA\\lA<dS\ fP bA\\lA<dS

will produce the same output:

বাংলাদেশ bA\lA<dS

Now you know how to use bangla and english fonts together. The following examples show the input and bangla output:

The following table shows many examples of english input and bangla output.

Examples	
\ N´ 208'<k^ Sl	প্রকৌশল
k\ N´ 174´ pYtAr	কম্পিউটার
ju\ N´ 167´ b\ N´ 193´	যুক্তবর্ণ
a\ N´ 161´ l	অঞ্চল
xAMd	চাঁদ
gu\ N´ 163´ n	গুঞ্জন
H\ N´ 164´ A	ঝঞ্ঝা
b\ N´ 165´	বঞ্ঝ
l\ N´ 170´ \ N´ 190´	লগ্ন
\ N´ 209´ hn	গ্রহন
\ N´ 203´ \ N´ 169´	ব্রহ্ম
isi\ N´ 173´ dkI	সিদ্দিকী
<mAhA\ N´ 174´ md	মোহাম্মদ
k<\ N´ 186´ lAl	কল্লোল
a\ N´ 200´	অট্ট
aA\ N´ 184´ bA	আব্বা
Y\ N´ 182´ \ N´ 190´ q	উন্নত
Y\ N´ 182´ mAd	উন্মাদ
ib@An	বিজ্ঞান
Y\ N´ 185´ xqA	উচ্চতা
ibh\ N´ 184´ l	বিহ্বল
b>AW	ব্যাঙ
\ N´ 206´ m	ভ্রম
x\ N´ 196´	চক্র

Examples	
x\ N´ 200´ \ N´ 209´ A m	চট্টগ্রাম
aCr	অক্ষর

5. Copyright

My employer **SEMCOR, Inc.** has nothing to do with this implementation of bangla font with *groff*. This work is done over few weekends and in my own time. I disclaim all warranties with regard to this implementation, including all implied warranties of merchantability and fitness, in no event shell me or my employer SEMCOR, Inc. be liable for any special, indirect or consequential damages or any damages whatsoever resulting from loss of use, data or profits, whether in an action of contract, negligence or other tortious action, arising out of or in connection with the use or performance of this implementation of bangla font.

6. Acknowledgment

Thanks to Dr. Anisur Rahman† for his SGAON font. Without his font this work would not be possible. Thanks to Dr. Shameem Siddiqui‡ for suggesting many things and encouraging me to implement bangla font with *groff*.

If you have any problem with installing fonts, you are welcome to send me e-mail.

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