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Braille at Your Fingertips: Automated Text-to-Braille Conversion

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Abstract:

This study presents an automated system for converting Word documents to Braille format. It details how the translation engine uses Word Object Model to convert print formatting to Braille equivalents. The paper discusses making print and digital content accessible to visually impaired persons in various formats, based on individual vision needs.

Keywords: BANA Braille, Braille, Divyangjan, SWIFT, Word Processing, Word Object Model

1. Introduction:

Braille remains the main tactile reading/writing system for visually impaired individuals. Building on Blenkhorn's work (1995), this study assumes basic Braille knowledge. Current software can convert between Braille and computer text, with output via Braille printers or displays. This paper focuses on helping non-experts create Braille documents through Word Processing.

2. Study Significance:

While not the first solution, our approach uniquely integrates the translator with Word Processing, offering user-friendly menu-based translation. Though limited to one Word Processing version, its widespread accessibility justifies this constraint. Our system uniquely preserves original document layouts.

3. Objectives:

To introduce:

- Word Processing mark-up tools for Braille production

- Compatible digital file sources

- Conversion tools for online content to Word Processing/Unicode

- Systems for sharing master files to prevent duplicate work

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4. Braille Document Format Design:

Per British National Uniform Type Committee (1955), Braille documents comprise an optional cantered title page followed by uniformly formatted pages. Braille characters maintain consistent size and spacing, without size variations or super/subscripts.

Standard page layout includes:

4.1 Title line containing:

- Left: Print page number

- Centre: Document header/footer

- Right: Current Braille page number (justified)

4.2 Section Formatting:

Sections start with either two-space indentation or blank lines. While some prefer blank lines, the official standard recommends indentation.

4.3 Font Styling:

The italic marker ("I") indicates font changes (italics, bold, underline). For single words, one marker precedes the word. For multiple words, two markers precede the first word and one marker precedes the last word. This system, though under review, remains current, with updates easily implemented.

5. Word Processing Guidelines:

Reformat tables and spreadsheets to ensure screen readers can convey both text and visual concepts to visually impaired users. Keep reformatted sections updated during document revisions.

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Do	Don't
Use tabs and hanging indents instead of the spacebar.	Avoid pressing the Enter key to break lines, as done on a typewriter.
Always use numerals where appropriate, e.g., "1" instead of the letter "I" and "0" instead of the letter "O."	Don't use column in the document.
Insert hard page breaks at correct positions rather than repeatedly pressing the Enter key to shift to a new page.	
Apply page numbering codes instead of manually typing page numbers.	
Use style codes for formatting text, such as bold, italics, or underlining, ensuring large print readers can easily read boldface for better contrast.	

6. Document Formats:

Content must transfer accurately to large print, braille, and digital formats, with clear audio presentation.

For tables of contents, indices, glossaries, and notes, include both accessible format and print version page numbers to facilitate group discussions. Complex formatted sections need careful review during conversion. HTML format with internal links can enhance navigation.

For images, provide clear textual descriptions, including specific location details and tactile features when relevant. Well-written descriptions benefit both sighted and visually impaired readers.

7. Large Print Guidelines:

- Use 18-point font (3 pages per standard page)

- Choose plain fonts with normal spacing

- Bold text for contrast

- Left-justify text with 1-inch margins

- Use non-glossy, off-white paper

- Page numbers at top/bottom left

- 1.5 line spacing

- Remove columns and hyphenation

- Convert tables/charts to linear format

- Enlarge or describe graphics separately

8. Braille Translation Software:

Advanced braille translation software supports various file formats. The Duxbury Braille Translator is versatile, capable of converting documents created in word processors like Microsoft Word® and Corel WordPerfect®. It can also process HTML files designed for the web and data from spreadsheets. However, such software currently cannot handle documents generated using graphical desktop publishing tools like QuarkXPress™, Adobe® PageMaker®, or other Adobe products that produce Portable Document Format® (PDF) files. For effective translation, files must consist of text-based characters, as graphical representations of text are incompatible. Unsupported formats require conversion to a compatible type before translation.

Adhering to proper word processing practices is crucial when creating Braille documents. Braille translation software interprets styles and formatting cues from word processors. For instance, a tab stop at the beginning of a paragraph is converted into two blank spaces in braille. Similarly, the software accurately translates bulleted lists, italics, boldface, underlining, and related styles into configurations familiar to braille readers.

8.1.1 SWIFT (Sending Word Document Immediately for Translation)

SWIFT is a Microsoft Word add-on that introduces specialized commands and styles for Braille formatting. It adds a "Braille" menu to the Word ribbon upon installation. With SWIFT, documents can be sent directly for embossing without opening them in Duxbury. It supports DBT version 11.3 or later.

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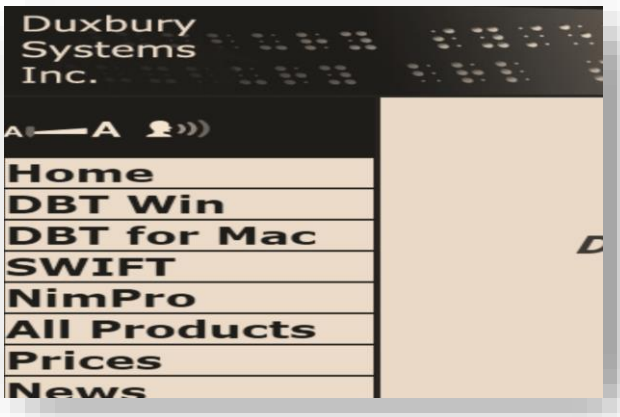
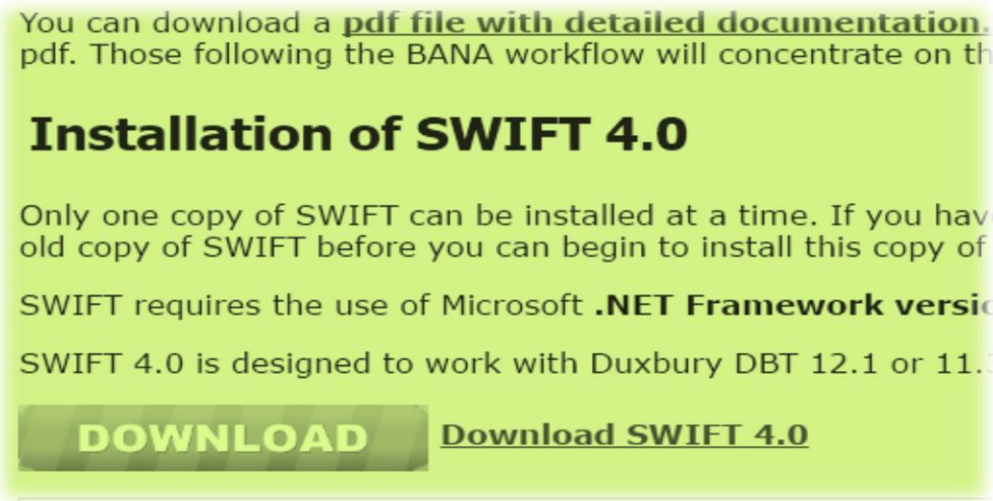
8.1.1.1 Linking of SWIFT to MS Word: (http://www.duxburysystems.com/)



Click on "SWIFT" located on the left side of the page and then download "SWIFT" as shown below:



Installation of SWIFT

SWIFT requires DBT 11.3 SR1 or later and Microsoft Word 2007 or newer. To install, locate the SWIFT setup file, double-click it, and follow the on-screen instructions starting with the Welcome dialog.

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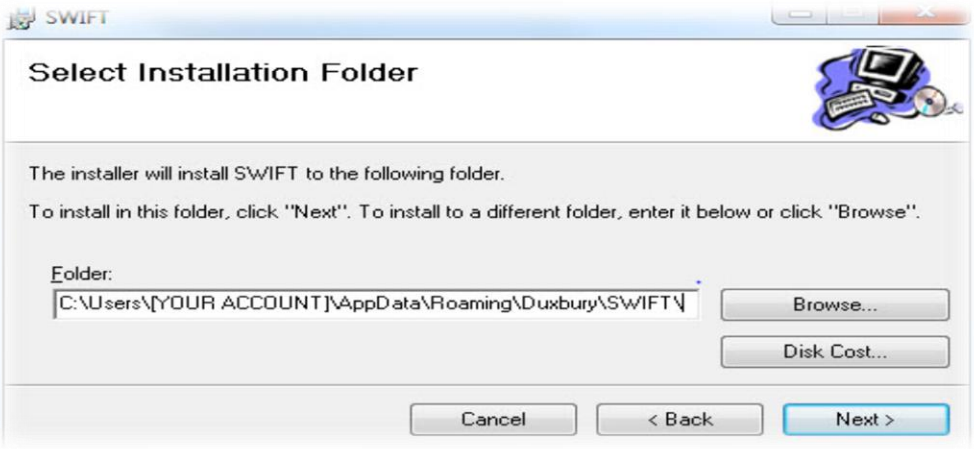
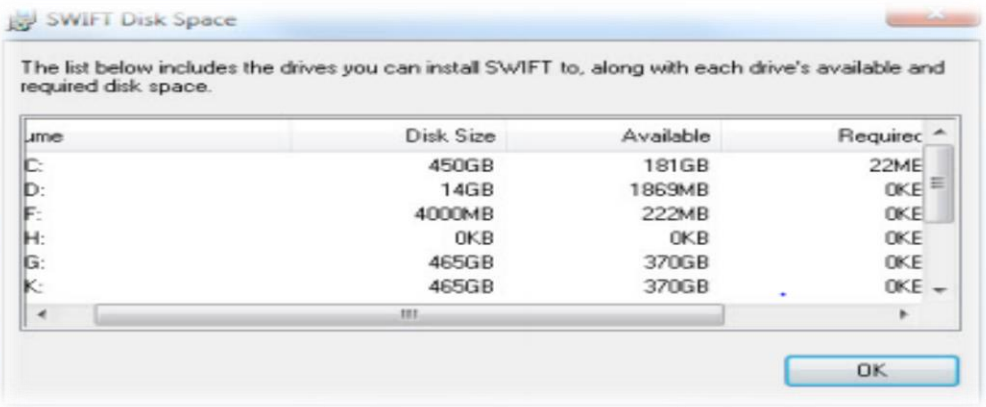
The installer checks for Word and DBT compatibility. When prompted, verify and proceed. Accept the EULA by selecting "I Agree." SWIFT installs in your user account's default folder—we recommend keeping default settings.



When clicking "Disk," you'll see available drives, their capacity, free space, and SWIFT's space requirements. The default installation path usually works fine.



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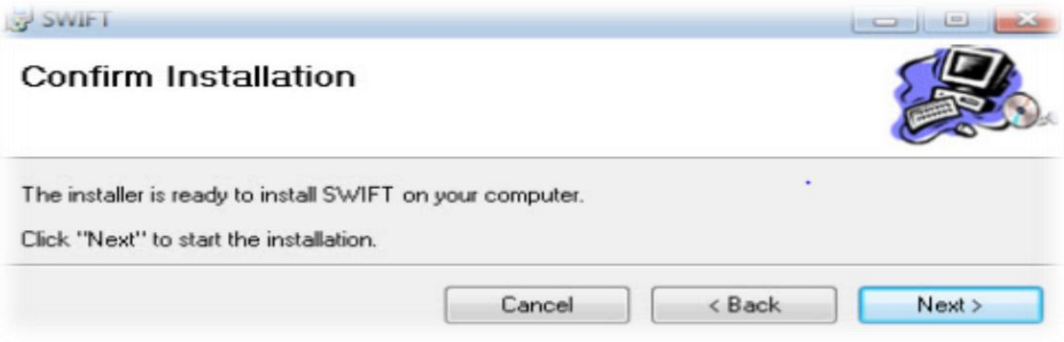
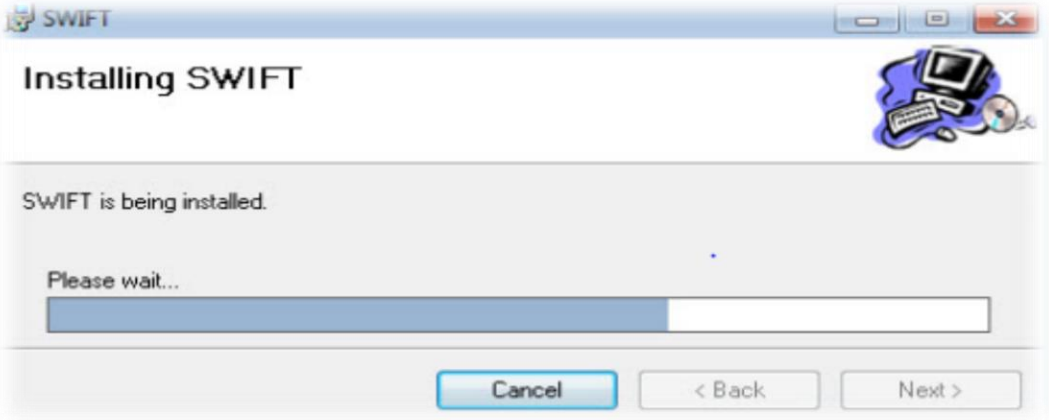
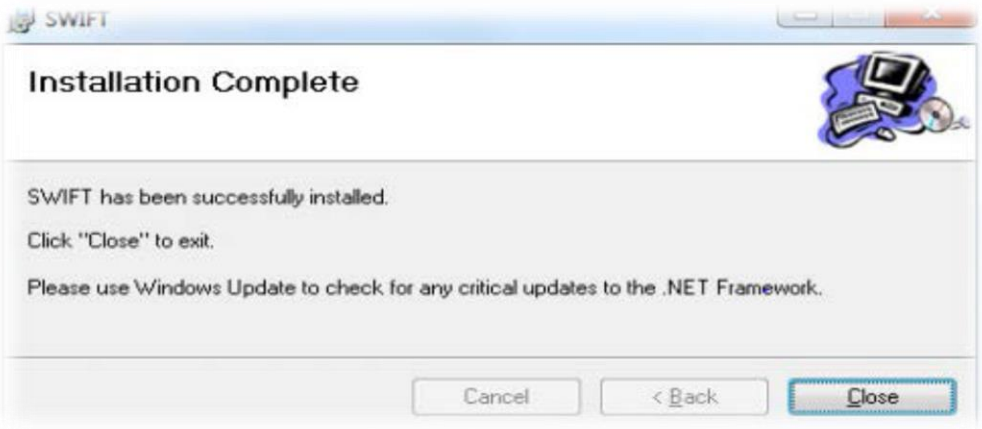
The next dialog is simply to Confirm Installation. This is our last chance to abort the installation.



The usual progress bar will be displayed as SWIFT is installing.



When the installation is complete, we will receive a confirmation as shown below. We may then click the "Close" button.



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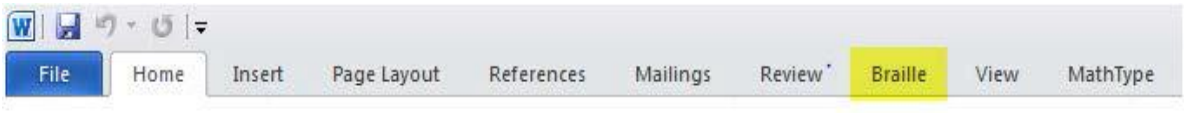
SWIFT is now installed and we can click the Close button. After we have installed SWIFT, we should now find an additional "Braille" ribbon when we run Word for Windows, as shown here./ After installation, a new "Braille" ribbon appears in Word (newer versions) or as a menu/toolbar (Word 2003). Click Close to finish setup. (A Braille menu and toolbar will appear if we are using Word 2003, which has no ribbon).



8.1.2 BANA Braille:

A Microsoft Word macro template that uses tags and styles to format documents according to BANA braille guidelines.

Template Installation:

- Included with Duxbury installation

- Select "Yes" when prompted to install BANA Template

Using with Microsoft Word:

1. for new files:

  - Create desktop shortcut to BANA template

  - Opening template adds "BRAILLE" menu in Word

2. To show all controls:

  - Access BRAILLE menu > Options

  - Choose "All Controls" > OK

Note: BRAILLE menu combines both BANA and SWIFT template controls after this setup.

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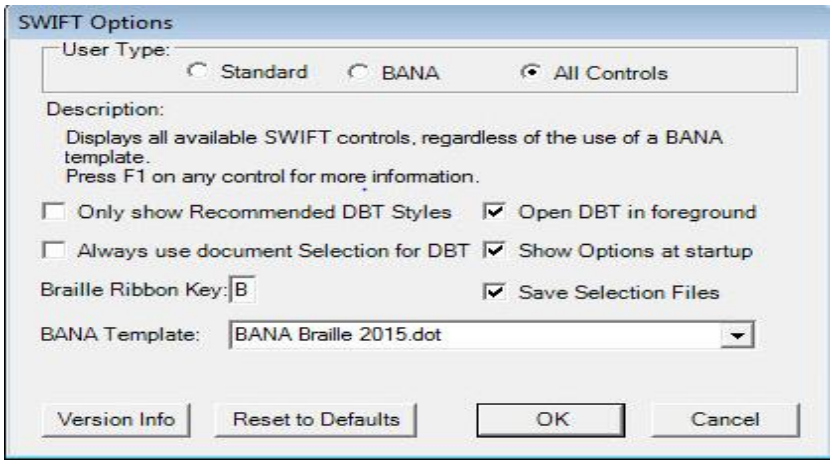

Using BANA and SWIFT for Existing Files

Follow these steps for existing files:

- Open the BANA template from your desktop.
- Open the file you want to convert.
- Press **Ctrl+A** to select the entire content.
- Copy the selected text.
- Paste it into a blank document opened using the BANA template.

This transfers your existing file's content into the BANA template. You can now explore styles and tags to format the document for Braille.

8.2 Heading Styles:

- Use Heading-1 for titles/chapters
- Use Heading-2 for sub-sections
- Use Heading-3 for further subdivisions
- Shortcut: Alt+Control+[number] for respective heading levels

For Automatic Table of Contents in DBT:

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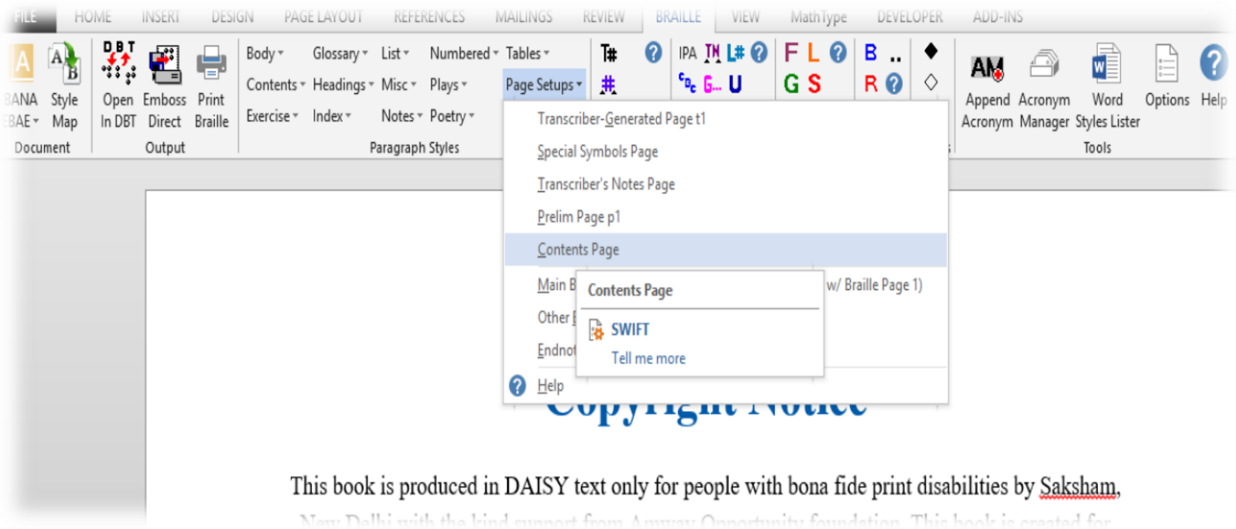
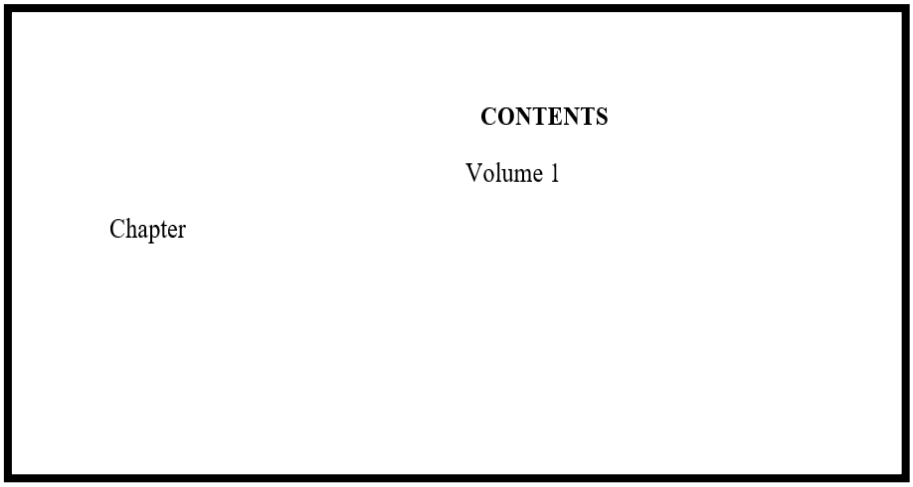
1. Apply heading styles in Word
2. Delete existing TOC
3. Add TOC section using templates
4. Use Braille Add Ins > Page setup & Contents Page for mark-up



A "Contents" section will be generated in Microsoft Word, as shown below with heading style1.



In addition, apply the basic formatting in Microsoft Word (which includes removal of images, modifying bullets, etc.).

Import the document into the Duxbury Braille translator by following the below steps:

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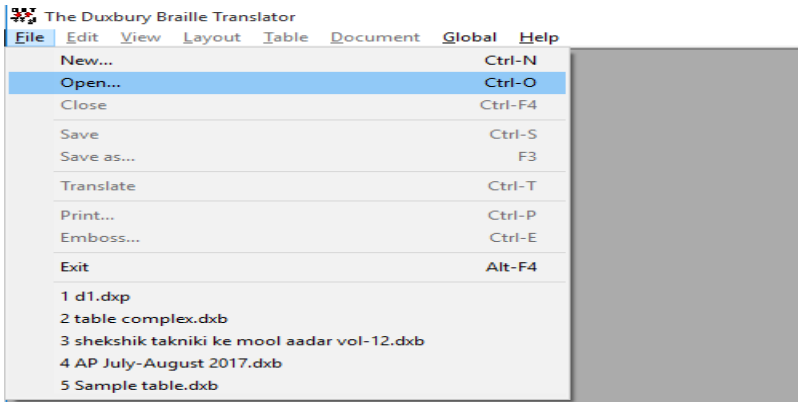
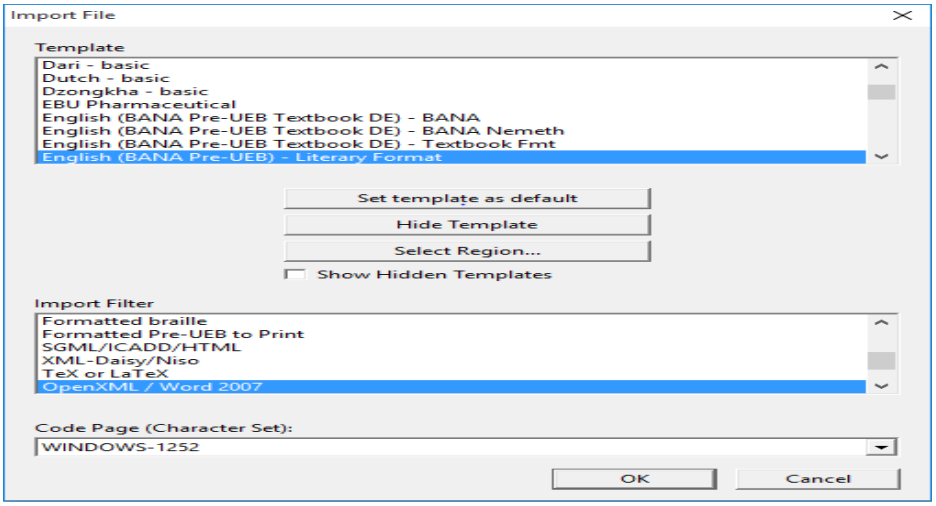
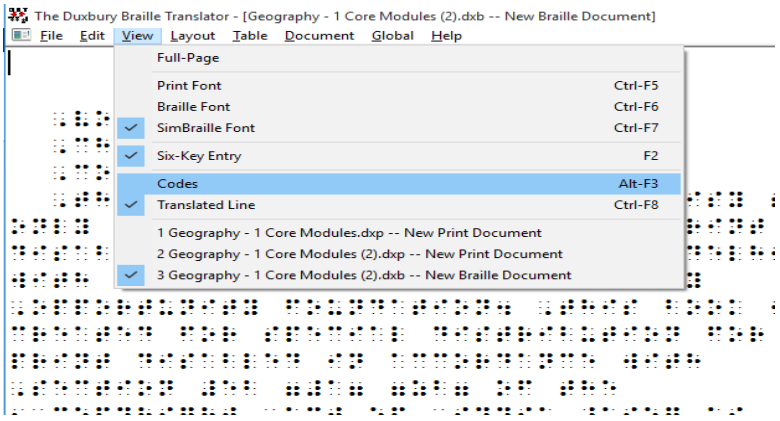
1. Launch DBT
2. Go to file: Open



3. Select the desired library, depending upon the language. In this case, it is "English (BANA Pre-UEB) - Literary Format".



4. Translate the document to generate the braille output.



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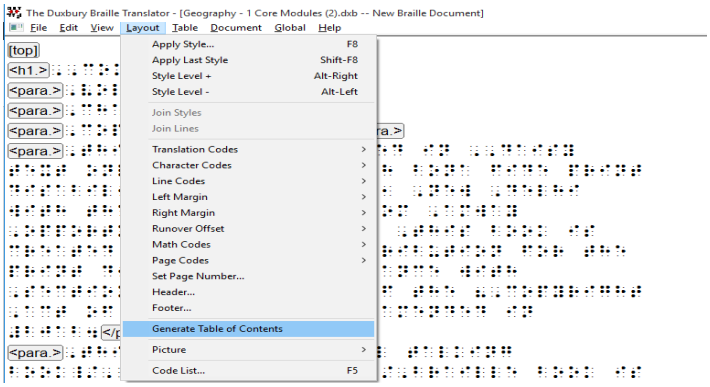
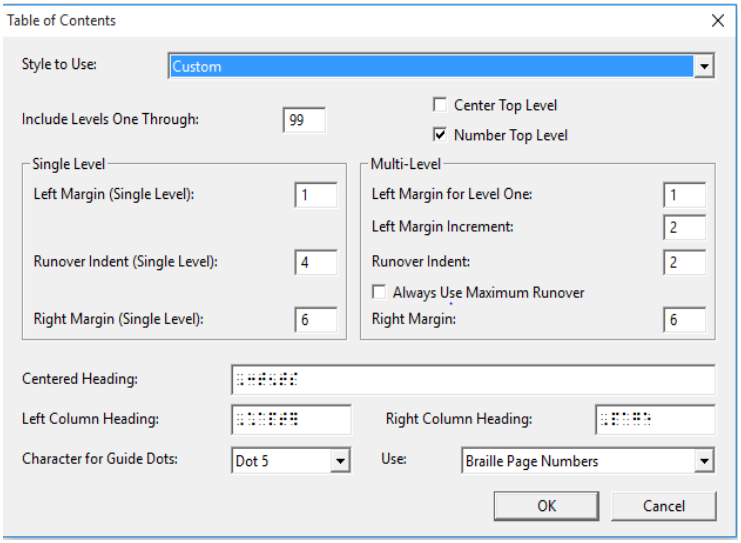
5. View codes under the "View" tab or use Alt +F3.
6. Move the cursor to the position where the TOC page is to be generated.
7. Under the Layout tab, click "Generate Table of Contents".



This option enables the automatic generation of a Table of Contents. It can produce Braille or Print Page numbers.

(Note: This option is only available when a Braille document is in focus.)



- Remove braille content from "Centered Heading", "Left Column Heading" and "Right Column Heading" as it has already been added in the reference page.

  (Note: In case the mark-up for the Contents page is not added in Microsoft Word, this option within Duxbury can be used).
- "Character for Guide Dots" can be modified depending upon the requirement.
- In the "Use" section, click on the dropdown list to change from Print Page numbers to braille page numbers, as we have braille content.

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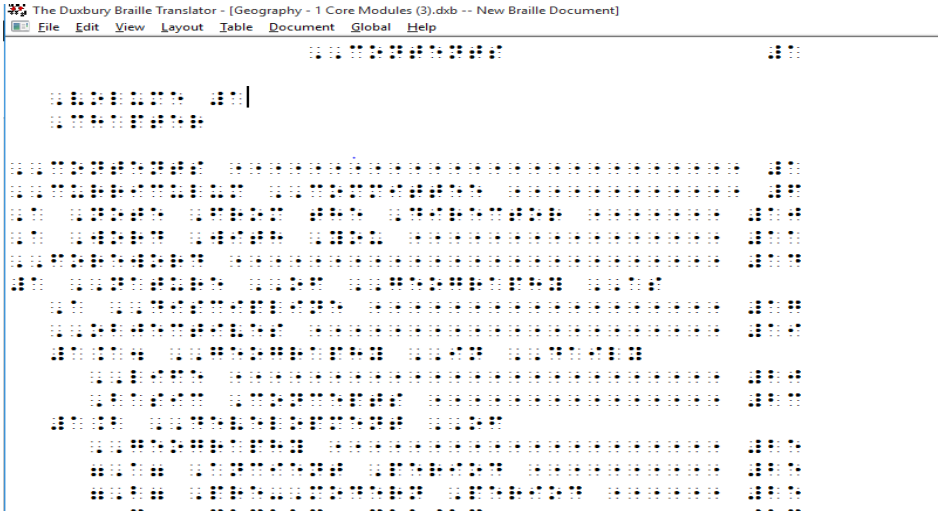
- Braille output after the generation of the Table of Contents page:/ Remove Braille content from “Cantered Heading,” “Left Column Heading,” and “Right Column Heading” since it is already included on the reference page.
  (*Note: If the mark-up for the Contents page is missing in Microsoft Word, use this option in Duxbury*.)

- Adjust the “Character for Guide Dots” as needed.

- In the “Use” section, select the dropdown menu to switch from Print Page numbers to Braille page numbers to match the Braille content.

- Braille output after generating the Table of Contents:



After modifications following TOC creation in Duxbury, braille pagination might shift without automatic TOC updates. We advise deleting and recreating the TOC after edits to maintain accurate page references.

Conclusion:

This study shows creating alternate format materials appears initially intimidating and complex. It aids braille generation from electronic sources under Indian copyright rules. Extended texts require multiple hours processing, for undetermined reasons. For Braille Out, we suggest limiting document size. Word generates braille text and adds page numbering in headers via automated numbering systems. A challenge arises as Word displays numerical figures (12) instead of proper braille notation (#AB). Yet user responses suggest this isn't crucial since braille readers comprehend the intended numbers. We plan fixes in upcoming

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software versions. Office 2000 enables multilingual braille conversion by marking text sections with specific languages. Though our conversion system supports multiple languages, automatic language switching isn't yet implemented.

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