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Version 2.0 Microsoft Word Template
for Creating Internet Drafts and RFCs

Abstract

This document describes the properties and use of a revised Microsoft Word template (.dot) for writing Internet Drafts and RFCs. It replaces the initial template described in RFC 3285 to more fully support Word's outline modes and to be easier to use. This template can be direct-printed and direct-viewed, where either is line-for-line identical with RFC Editor-compliant ASCII output. This version obsoletes RFC 3285.

The most recent version of this template and post-processing scripts are available at <http://www.isi.edu/touch/tools>.

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Table of Contents

1. Introduction	3
2. Use	3
2.1. Setting up Your Version of Word to Edit RFCs	4
2.2. Editing	4
2.3. Saving the File	6
2.4. Generating Output	6
2.4.1. Printing Direct to a Printer	6
2.4.2. Printing the Text File	6
2.4.3. XML Support	7
3. Changes from RFC 3285	7
3.1. Heading Styles	7
3.2. References Style	8
3.3. Boilerplate	9
3.4. Simplification	9
3.5. Ability to Direct Print and Direct View	9
4. Compatibility Issues	10
5. Security Considerations	10
6. Acknowledgments	10
Appendix A. Template Configuration Details	11
A.1. Configure Styles	11
A.1.1. Redefine Existing Styles	11
A.1.2. Add New Styles	12
A.1.3. Hidden Styles	13
A.2. Define Page Layout	13
A.3. Insert Boilerplate	14
A.4. Automatic Fields	15
Appendix B. Post-Processor Script (Perl)	17
Informative References	20

1. Introduction

Internet Drafts and RFCs are predominantly written in embedded-text, compile-based formatting systems [1][4][5]. The primary and first such system is NROFF, a text-formatting utility based on manual entry of embedded configuration commands, such as ".p" for new paragraphs. XML is a more recent alternative that uses structure tags instead of explicit formatting commands to allow a single file (.xml) to be 'compiled' into ASCII output, HTML, or a variety of other formats as desired [7].

Although XML adds more modern semantic information to the structure tags, neither system supports modern WYSIWYG (what-you-see-is-what-you-get) editing. Editors such as Microsoft Word and Corel WordPerfect provide not only WYSIWYG editing, but also semantic tags as well as outline-mode capabilities. To that end, a Word template called 2-Word.template.rtf was created that supports authoring RFCs, as described in RFC 3285 [6]. That version succeeded in enabling Word-based RFC editing, but did not support Word's outline mode renumbering capabilities.

This document describes the properties and use of a revised Microsoft Word template (.dot) file that supports Internet Draft and RFC formatting, intended as an update to that of RFC 3285. This version, called 2-Word-v2.0.template.dot, addresses a number of issues with the preliminary version:

- o redefines basic styles (Normal, Heading1, etc.) rather than creating new styles,
- o updates the boilerplate according to BCP 78,
- o uses more conventional methods for autonumbered references and figures, including support for name-based references (e.g., "[Tou2005]"), and
- o supports direct output to a printer from the .doc source, as well as RFC-3285-style 'print to text' with post-processing on Windows-based PCs.

This document assumes familiarity with Microsoft Windows operating systems and the Word application.

2. Use

To use this template, double-click on it in Windows (it may work in MacOS and/or OpenOffice, but this has not been confirmed). The result should be a 'new' document. Do NOT open this document from

within Word, e.g., via the File->Open menu; this will edit the template, rather than using the template to create a new template-based document.

2.1. Setting up Your Version of Word to Edit RFCs

Unfortunately, Word does not have a way to save some useful settings in a template. It may be useful to configure autoformatting to avoid using smart quotes or hyphens. However, this template is compatible with these features as its post-processor script translates such non-standard character codes into their RFC-compatible ASCII equivalents.

2.2. Editing

The template provides a number of styles for use (for details, see Appendix A). Some are redefined internal styles and some are new, as follows. Throughout the document, avoid the use of bold, italics, or any other character formatting, as well as any graphics or paragraph or table borders. Smart hyphens and quotes need not be avoided and will be translated during post-processing.

The current styles allow existing hyphens to break (wrap) across lines, but do not add hyphenation. To insert a non-breaking hyphen, type <CTL-underscore> (control-underscore); this is particularly useful in URLs, which are more readable if not line-wrapped.

Note that it is critical NOT to use any styles other than those provided by this template.

- o Redefined internal styles for general use:

Normal, Heading1-9, Caption, Header, Footer:

Use in the normal fashion. Tabs can be used as desired.

- o New styles:

RFC Title:

For the document title only.

RFC Figure:

For ASCII-art figures. Single spaced, kept together.

RFC List Bullet:

For bulleted lists.

RFC List Numbered:

For numbered lists. Use 'restart numbering' as desired for new list sequences.

RFC References:

For normative and informative references. Do not restart numbering for informative references.

NOTE: references can use an alternate unnumbered style that relies on use of Word's bookmark feature to set cross-reference tags.

RFC App:

For appendix titles, using "Appendix A." format. Starts at the top of a new page. If appendices are used, start the references (after appendices) at the top of a new page (insert 'page break').

RFC App H1-5:

For appendix headings ("A.1." format).

NOTE: these headings will NOT auto-renumber when promoted/demoted in outline mode.

- o Redefined internal styles not generally accessed by users:

TOC1-9:

For table of contents entries.

RFC Instructions:

For instructions to authors. These notes must be deleted.

RFC H1 - no num:

For unnumbered headings in end boilerplate text.

RFC H1 - no TOC no num:

For unnumbered, unlisted (in TOC) headings in front boilerplate text.

2.3. Saving the File

The template is provided as a Word 97-2003 ".dot" template; Word 2007 uses an XML-based variant called ".dotx". Word 2007 can use ".dot" templates in "Compatibility Mode". If the file is saved in that mode, it has a ".doc" suffix; if saved in native Word 2007 mode, it has a ".docx" format. It does not matter which saved file format is used.

2.4. Generating Output

This template supports printing similar output both to regular printers (8.5 x 11 inch paper) and as Internet-Draft/RFC-compatible text files. Printing to a printer is designed for Windows XP and Vista and may work with earlier versions of Windows; it has not been tested with other OS's. The template is currently in a Word 97-2003 format (.dot); this can be used in "Compatibility Mode" in Word 2007.

Printing to text is supported only for Windows at this time. There is no current support for XML. Details are provided as follows.

2.4.1. Printing Direct to a Printer

The template produces output direct to a printer that is line-for-line, page-for-page identical with the text-only version, with a few minor exceptions:

- o Single and double quotes may be angled (left quote, right quote), rather than straight, depending on whether 'smart quotes' are enabled in Tools->Autocorrect options.
- o Hyphens may print as an em dash or en dash, depending on whether 'smart hyphens' are enabled in Tools->Autocorrect options.

2.4.2. Printing the Text File

Printing to an ASCII text file is currently known to work only on Windows-XP and Windows-Vista PCs; appropriate ASCII-output drivers for MacOS or Unix boxes running OpenOffice are not currently known.

To generate .txt output on a Windows-XP or Windows Vista PC, use a two-step process. First, generate a .prn file by printing the document to a text-only printer. Second, apply post-processing to clean up the text and apply 'new page' characters.

Install the "Generic/Text Only" printer, as found under "Generic" in the available print drivers list. Configure the printer to save to a file or click 'save to file' when printing. A printed file will have a .prn file suffix.

The printed output needs to be run through a post-processor to generate valid Internet-Draft or RFC formatted text. Run the .prn file through the post-processing as described in Appendix B. This performs the following operations:

- o Omits <CR>s (converts <CR><LF> to <LF> and omits bare <CR>s).
- o Converts smart quotes and hyphens to their ASCII counterparts.
- o Omits blank lines between the footer of one page and the header of the next, and inserts a <CTL-L> (form-feed) between the two.
- o Checks for remaining illegal characters (not printable ASCII, CR, LF), as required.

2.4.3. XML Support

There is no current support for XML in this template. Although Word 2003 provides XML support, its use is counterintuitive to most Word users. XML fields are edited using a separate database editor, rather than in the native Word input screen. Future support for XML is being considered for a future revision of this template.

3. Changes from RFC 3285

This document and the ".dot" template borrow heavily from RFC 3285 [6]. Notably, all specifics of point sizes, tab locations, and the automatic date fields are directly from that template. This document builds on that information as follows.

3.1. Heading Styles

This document redefines Normal, Heading1-9, Header, Footer, and Caption, rather than defining new RFC-named styles as in RFC 3285. The use of internal style names is required for proper operation of outline mode, notably when promoting/demoting sections of text with subsequent renumbering of headings therein.

Note that this use of redefined standard styles is the common practice, both in Microsoft-supplied templates as well as templates from the IEEE and ACM, among others.

Additional heading styles RFC App and RFC App H1-9 were added to support alternate numbering used in appendices, although these styles exhibit the previous deficiency of custom styles in outline mode (will not auto-renumber on promote/demote).

3.2. References Style

There are two different reference styles -- RFC References, and RFC References Bookmark. The former cross-references using numbers (e.g., [1]); the latter uses Word's bookmarking cross-reference features to support name/year cross-references (e.g., [Tou2005]). The latter is expected to be the preferred format for future I-Ds and RFCs.

RFC References is a body text paragraph style that autonumbers based on the "[1]" format. Again, it is common practice, both among Microsoft-supplied templates as well as templates from the IEEE and ACM, to use autonumbered paragraphs in the body text for references. This differs from RFC 3285, in which references were inserted as endnotes, rather than as main body text.

Putting references in endnotes has unexpected behavior. In particular, the reference is defined by its first use as a citation and is cross-referenced by subsequent citations. Removing the first citation removes the reference entirely, despite other cross-references. This is not the case with body text autonumbered paragraphs, which persist regardless of which cross-references are deleted.

Note that Word does not provide a way to ensure that all RFC Reference paragraphs are cross-referenced, i.e., users can insert references that are not cited. This can be desired, however, e.g., for bibliographies of supplemental material.

RFC References Bookmark is a body text paragraph style that does not use autonumbering. Currently, authors are expected to manually format their references using name-based tags between square brackets ("[]"). There is no required format, but a suggested format would use the first three letters of the first author, together with the four numbers of the document year, e.g., for this document's reference "[2]", the reference would now appear as:

[Bra2004] Bradner, S., "IETF Rights..."

The author is expected to select the text of the reference "[Bra2004]" and insert a bookmark at that point with whatever name is convenient for the author. It can then be cited as usual as a cross-reference to the bookmark: [Bra2004]. Note that Word bookmark names must start with a letter, and may include numbers but not spaces.

When two references collide, e.g., for two papers written by Bradner in 2004, a trailing lowercase letter should be used to distinguish them, e.g., [Bra2004a] and [Bra2004b].

3.3. Boilerplate

The boilerplate in this template was updated to conform with current RFC Editor requirements, notably BCP 78 rights statements, as well as pending guidelines for Internet Draft and RFC authors [2][3][5].

The boilerplate is written in regular text, and can be easily edited by authors to keep the template up-to-date as BCP 78 is revised.

3.4. Simplification

Headers and footers use more conventional tabbing to control formatting, rather than tables.

Users no longer need to avoid the use of smart quotes or hyphens; these are automatically translated to RFC-compliant ASCII characters during post-processing.

A number of styles include grouping configuration, designed to provide more readable output. In particular, all headings are "keep with next" to avoid widowed heading lines, and all list items, references, and figure lines are "keep together" to avoid inadvertent splitting across page boundaries.

3.5. Ability to Direct Print and Direct View

This template can print directly to a printer, generating output that is line-for-line, page-for-page identical with the compliant ASCII text output, excepting minor formatting of hyphens and quotes.

Further, this template can be previewed in File->Print Preview or View->Print Layout, again generating screen images that are line-for-line, page-for-page identical with the compliant ASCII text output. This allows true WYSIWYG (what-you-see-is-what-you-get) editing and printing.

4. Compatibility Issues

There are no known compatibility issues at this time. This version of the template was designed under Windows XP and Word 2002, and has also been tested under Windows Vista and Word 2007. It is not yet known whether previous versions of Windows/Word are supported using this template.

As noted in Sec. 3.1, this template redefines predefined styles, which is common practice.

5. Security Considerations

There are many security issues in the general use of Microsoft operating systems and applications. This template is not known to expose any new security issues; it contains no macros as developed and deployed. The author considered including the MD5 signatures of the current versions of the .dot template and .pl post-processor files. The current processor .pl file is included in this document as an appendix. The .dot file is updated to track the current requirements of the IETF boilerplate, so its MD5 signature cannot be included here, but is posted on our website for verification.

6. Acknowledgments

The author acknowledges the substantial efforts of the authors of the previous version of the Word template, Mike Gahrns and Tony Hain [6]. This document is intended to build upon their work. Thanks also to Lars-Erik Jonsson for feedback on this template and post-processor script, as well as suggestions on making it more generic to support earlier versions of Windows, and to Jixiong Dong for finding an obscure bug in the formatting.

This document was prepared using 2-Word-v2.0.template.dot.

Appendix A. Template Configuration Details

The Word 97-2003 ".dot" template, compatible with Word 2007, consists of a set of default configuration settings, a set of modified and newly-defined styles, and an initial template of text. This section in particular assumes familiarity with Microsoft Word configuration and modification of styles. Note that use of the template does not require understanding this section; this merely documents the settings already in the ".dot" file.

A.1. Configure Styles

Modify paragraph styles as indicated. In general use, only the redefined existing styles Normal, Heading1-9, Header, Footer, and Caption, and new styles RFC Figure, RFC References, RFC List Bullet, RFC List Numbered, RFC App, and RFC App H1-5 need be used by authors.

Other styles, such as redefined TOC1-9, RFC Hidden, RFC H1 - no num, and RFC H1 - no TOC no num are used by the template, but are typically hidden in the styles list, and need not be explicitly applied by authors.

All measurement units below are in points. Change measurement units to points to set.

A.1.1. Redefine Existing Styles

Redefine the Normal style first; all others are based on Normal, except as noted.

1. Normal: font Courier New, font size 12 point, next style Normal, line spacing EXACTLY 12 point, spacing before 0 pt, spacing after 12 pt, indent left 21.6 pts, widow/orphan control, left tabs at every 3 spaces (1 space = 7.2 points, given 72 points/inch and 10 characters/inch): 21.6, 43.2, 64.8, 86.4, 108, 129.6, 151.2, 172.8, 194.4, 216, 237.6, 259.2, 280.8, 302.4, 324, 345.6, 367.2, 388.8, 410.4, 432, 453.6, 475.2, 496.8.

NOTE: 12 point fonts are 12 points tall, i.e., 6 lines/inch vertically; 12-point Courier is 10 characters/inch horizontally.

2. Heading 1-9: Normal + indent left 0 pt, hanging 21.6 pts, keep with next, set autonumbering as "1. ", "1.1. ", "1.1.1. ", etc. Note the space after the right-most period; type this in the

"number format" field, and leave the "follow number with" field as 'nothing' (click on the 'more' button to see this field if it is not already visible).

NOTE: change the autonumbering ONCE and in ONE format; in that format, change all subsequent levels.

3. TOC 1-9: Normal + paragraph flush, clear tabs, add new Right tab at 504 pts that includes a "... " leader. Add indent left as follows: TOC 1: 21.6, TOC 2: 43.2, TOC 3: 64.8, TOC 4: 86.4, TOC 5: 108, TOC 6: 129.6, TOC 7: 151.2, TOC 8: 172.8, TOC 9: 194.4.
4. Header: Normal + space after 0 pts, next style Header, clear tabs, and add centered tab at 252 pts, tab right at 504 pts.
5. Footer: Header + next style Footer.
6. Caption: Normal + centered, autonumbered "Figure #".

A.1.2. Add New Styles

NOTE: "keep lines together" is optional for lists and references; it helps avoid breaking individual items across pages.

1. RFC Figure: Normal + space after 0 pts, keep with next, keep lines together, next style RFC figure (also used for authors' addresses).
2. RFC List Bullet: Normal + custom bulleted, "o" bullet style, aligned at 21.6 pts, bullet tab after 43.2 pts, bullet indent at 43.2 pts, next style RFC List Bullet, keep lines together.
3. RFC List Numbered: Normal + custom numbered, "1. " number format, aligned at 21.6 pts, bullet tab after 43.2 pts, bullet indent at 43.2 pts, next style RFC List Numbered, keep lines together.
4. RFC References: Normal + hanging 43.2 pts, outline level body text, remove tabs at 21.6 and 43.2 pts, custom numbering with format "[1]", numbering left aligned 21.6 pts, number tab space after at 64.8 pts, number text indent at 64.8 pts, next style RFC References, keep lines together (used for both normative and informative references).
5. RFC References Bookmark: Normal + hanging 72 pts, no num, remove tabs less than 72 pts, keep lines together (used for both normative and informative references).
6. RFC Title: Normal + space after 24 pts, centered (used for document title).

7. RFC App: RFC H1 - no num + page break before, custom outline numbered, outline number style "Appendix A.", outline level 1, follow number with nothing, outline number at 0 pts, outline indent text at 0 pts, (used for Appendix titles).
8. RFC App H1-5: RFC H1 - no num + paragraph level 2-6, custom outline numbered, outline number style "A.1." - "A.1.1.1.1.1.", follow number with nothing, outline number at 0 pts, outline indent text at 0 pts, (link with RFC App at level 2-6), (used for Appendix heading levels).

A.1.3. Hidden Styles

These are used for pre-formatted components or instructions and are configured to be hidden from the list of available styles.

1. RFC H1 - no num: Normal + indent left 0 pts, outline Level 1, keep with next (used for base template trailer headers -- Copyright, etc.).
2. RFC H1 - no TOC nonum: Normal + indent left 0 pts, (outline level body text, as with Normal), keep with next (used for base template front matter headers -- Abstract, Status, TOC header, etc.).
3. RFC Instructions: Normal, character bold. This style is not normally shown and is used for instructions that should be removed before publication.

A.2. Define Page Layout

Configure Page Setup as follows:

1. Margins:

Portrait orientation.

```

Top:      72   pts
Bottom:   60   pts (72 + 60 +_660 [55 lines] = 792 [11 in])
Left:     36   pts (5 characters at 7.2 pts/char)
Right:    57.6 pts (8.5"-7.2" = 1.3in = 93.6 pts - 36 for left)
Gutter:   0    pts
Header:   0    pts
Footer:   0    pts

```

If the error message "One or more margins are outside the printable area" appears, select Ignore. This may depend on the printer currently selected.

2. Paper size:

Paper size "letter".

Width: 612 pts

Height: 792 pts (55 lines/page + 132 for top and bottom margins)

3. Layout:

Different headers and footers on the first page.

Header: 72 pts from edge

Footer: 60 pts from edge

A.3. Insert Boilerplate

See below for definitions of {ACDt}, {ACDy}, {AEM}, {AEY}, {AP}.

First page header:

```
{blank line}
{blank line}
<Working Group Name>{tab}<Initial. Lastname>
Internet Draft{tab}<Affiliation>
Intended status: <e.g., Informational>{tab}{ACDy}
Expires: {AEM}{AEY}
{blank line}
{blank line}
```

Footer (same on first and subsequent pages):

```
{blank line}
{blank line}
{blank line}
<Lastname>{tab}Expires: {AEM} {ACDy}, {AEY}{tab}[Page {AP}]
{blank line}
```

The front text and end text are as specified in BCP 78 [2]. For Internet Drafts, the sentence declaring the expiration dates uses automatic fields as needed, as with the headers and footers. Note that some of these fields will not be updated properly until the document has been saved and/or printed.

A basic document outline with examples is provided in the Word template to demonstrate the use of automatic fields, including a table of contents.

A.4. Automatic Fields

Most of these are self-explanatory; the expiry month is set 6 months in advance. The expiry year rolls-over (+1), if needed. The expiry day is a copy of the current date.

NOTE: expiry date can generate invalid dates, e.g., April 31, February 30, etc.

- o {AEM} means auto expiry month, and is a field code =

```
{ IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 1
July
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 2
August
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 3
September
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 4
October
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 5
November
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 6
December
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 7
January
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 8
February
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 9
March
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 10
April
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 11
May
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } = 12
June
  "Fail" *\ MERGEFORMAT
} *\ MERGEFORMAT } *\ MERGEFORMAT } *\ MERGEFORMAT } *\ MERGEFORMAT }
*\ MERGEFORMAT } *\ MERGEFORMAT } *\ MERGEFORMAT } *\ MERGEFORMAT
} *\ MERGEFORMAT } *\ MERGEFORMAT } *\ MERGEFORMAT }
```

- o {ACDt} means auto current date, and is a field code =

```
{ SAVEDATE \@ "MMMM d, yyyy" }
```

- o {ACDy} means auto current day, and is a field code =

```
{ SAVEDATE \@ "d " }
```

- o {AEY} means auto expiry year, and is a field code =

```
{ IF { SAVEDATE \@ "M" \* MERGEFORMAT } < 7
  { SAVEDATE \@ "YYYY" \* MERGEFORMAT }
  { IF { SAVEDATE \@ "M" \* MERGEFORMAT } > 6
    { = { SAVEDATE \@ "YYYY" \* MERGEFORMAT } + 1
      \* MERGEFORMAT }
    "FAIL" \* MERGEFORMAT \* MERGEFORMAT
  } \* MERGEFORMAT
}
```

- o {AP} means auto page, and is a field code =

```
{ Page }
```


Appendix B. Post-Processor Script (Perl)

```
#!/local/bin/perl
# -----
#                               2-Word-post-v2.0
# Perl post-processor for MS Word RFC/Internet-draft template output
#
#                               J. Touch
#                               touch@isi.edu
#                               http://www.isi.edu/touch
#
#                               USC Information Sciences Institute (USC/ISI)
#                               Marina del Rey, California 90292, USA
#                               Copyright (c) 2004-2009
#
# Revision date: May 5, 2009
# -----
#
# usage:
#       2-Word-post-v2.0.pl [inputfile.txt] > [outputfile.txt]
#
# function:
#   removes indent on each line (blank print margin, typ. 5 chars)
#   converts cr/lf to cr
#   converts 'smart quotes' to regular quotes (single and double)
#   converts 'smart hyphens' (em dash, en dash) to regular hyphen
#   omits blank lines between footer and next-page header
#   inserts formfeed (ff) between footer and next-page header
#   removes end-of-line whitespace
#   checks for illegal chars (not printable ASCII, cr, lf, ff)
#   checks for page lengths exceeded
#   checks for line lengths exceeded
#   prints errors indicating page and line on that page
#
#       illegal character errors are posted to STDERR
#
#       returns the logical OR of codes indicating errors found:
#           0x00 no error
#           0x01 if any illegal characters found
#           0x02 if any page length exceeds $maxpagelen
#           0x04 if any line length exceeds $maxlinelen
# -----
```

```

# -----
# VARIABLES
# -----

$pagenum = 1;          # start on page 1, not 0

$maxpagelen = 66;     # max lines per page

$maxlinelen = 72;     # max chars per line

                        # specific error codes
%codes = (
    'none' => 0x00,
    'char' => 0x01,
    'page' => 0x02,
    'line' => 0x04,
);

%codestrings = (
    'none' => '(no error)',
    'char' => 'invalid character code',
    'line' => 'exceeded $maxpagelen lines per page',
    'page' => 'exceeded $maxlinelen chars per line',
);

$errorcode = $codes{'none'};

$indentlen = -1;      # how many spaces to eat from the beginning
                    # of each line; ought to be 5. negative flag
                    # means it is not yet initialized

$indentstr = "      "; # until known otherwise, assume 5 spaces

$killwhite = 1;      # flag kills space between footer, header
                    # start in 'between footer and header' mode,
                    # so eats all whitespace before the first line

# -----
# ERROR SUBROUTINE
# -----
sub printerr ($) {
    my ($errstring) = shift;

    print STDERR "ERROR: $codestrings{$errstring} ",
        "on line $linenum on page $pagenum of text input file\n";
    $errorcode |= $codes{$errstring};
    return;
}

```

```

# -----
# MAIN
# -----

while ($line = <>) {
    $line =~ s/\r//g;          # remove Unix-style end-of-line
    # if this line is NOT empty, start printing again (see below)
    if ($line !~ /\s*$/) {
        $killwhite = 0;
        if ($indentlen < 0) {
            # discover margin indent
            $line =~ /\s*/;
            $indentstr = $1;
            $indentlen = length($indentstr);
        }
        # remove the margin indent
        $line =~ s/^(($indentstr)//;
        # change special hyphens, quotes to regular ones
        $line =~ tr/\221\222\223\224\226\227/\'\'\''\"\"-\-/;
        # omit end-of-line whitespace
        $line =~ s/\s+\n\n/g;
        # print unless we're between the end of one page
        # and the beginning of the next
        if ($killwhite != 1) {
            # check to see if we have any invalid characters left
            # 012 = new line, 014 = form feed, 015 = carriage return
            # 040-176 = printable ASCIIIs
            if ($line !~ /\s*([\012\014\015\040-\176])*$/) {
                printerr('char');
                # note -- we don't stop here, so we can find all the
                # unprintable characters in one pass
            }
            $linenum++;
            if ($linenum > $maxpagelen) {
                printerr('page');
            }
            if ($#line > $maxlinelen) {
                printerr('line');
            }
            print $line;
        }
        # check to see if this is the end of a page;
        # if so, then print a form feed (ctl-L), and
        # kill the printing of subsequent empty lines
        if ($line =~ /\s*[\Page \d+\s]*$/) {
            print "\f\n";
            $killwhite = 1;
        }
    }
}

```

```
    $linenum = 0;  
    $pagenum++;  
  }  
}  
exit($errorcode);
```

Informative References

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