



# USB Portable Japanese T<sub>E</sub>X Environment for Windows

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**ABSTRACT** This paper describes a method for developing a Japanese T<sub>E</sub>X environment on a USB drive for Windows users. In order to sufficiently support the Japanese T<sub>E</sub>X environment, not only W32T<sub>E</sub>X, which contains upL<sup>A</sup>T<sub>E</sub>X and T<sub>E</sub>Xworks, but also Ghostscript, which can handle TrueType/OpenType CJK fonts, GSview, and the Perl execution environment are installed.

## 1 Introduction

This paper aims to describe a method to install a T<sub>E</sub>X environment on a USB drive, which will benefit a wide range of T<sub>E</sub>X users, especially when their computers are down, and are forced to use another computer on which T<sub>E</sub>X is not installed. Furthermore, it will also assist out users who need to edit T<sub>E</sub>X documents that require special packages. Although a portable version of MiK<sub>T</sub><sub>E</sub>X [8] is available for European T<sub>E</sub>X, it cannot easily handle CJK characters.

In Japan, pT<sub>E</sub>X and pL<sup>A</sup>T<sub>E</sub>X, developed by ASCII MEDIA WORKS [12], are used by the most T<sub>E</sub>X users who write in Japanese [4, 1, 2]. W32T<sub>E</sub>X, developed by Akira Kakuto [5], is commonly used on the Windows platform.

W32T<sub>E</sub>X includes not only plain T<sub>E</sub>X, L<sup>A</sup>T<sub>E</sub>X, pT<sub>E</sub>X, and pL<sup>A</sup>T<sub>E</sub>X, but also upT<sub>E</sub>X and upL<sup>A</sup>T<sub>E</sub>X, which are the Unicode versions of pT<sub>E</sub>X and pL<sup>A</sup>T<sub>E</sub>X, respectively, developed by Takuji Tanaka [13, 14]. W32T<sub>E</sub>X also includes many related utilities, for example, BibT<sub>E</sub>X, dvipdfmx, dvips, METAFONT, METAPOST, and T<sub>E</sub>Xworks [6]. T<sub>E</sub>Xworks is an integrated T<sub>E</sub>X document writing environment that consists of a text editor, a PDF viewer, and a calling function for typesetting. Kakuto's T<sub>E</sub>Xworks uses UTF-8 encoding for text editing, pdfpl<sub>a</sub>tex.bat, which calls pL<sup>A</sup>T<sub>E</sub>X, followed by dvipdfmx, for typesetting; however, this system has two issues. One is the limitation of the PDF viewer of T<sub>E</sub>Xworks, that is, it cannot display any CJK characters unless they are embedded. Therefore, the user must in advance set up a map file of dvipdfmx for CJK font embedding. The other issue concerns character-codes; Japanese document created by some word processors often use circled numbers (e.g., ①, ②), multibyte Roman numerals (e.g., I, II), and multibyte symbols (e.g., (株), 〒, Ⅲ). As for pT<sub>E</sub>X and pL<sup>A</sup>T<sub>E</sub>X,

TABLE 1. Required disk size in the case of 4 KB cluster size

| Item                             | file size | disk size |
|----------------------------------|-----------|-----------|
| W32T <sub>E</sub> X (2010/11/16) | 399 MB    | 428 MB    |
| Ghostscript 9.00 and GSview 4.9  | 39.8 MB   | 41.4 MB   |
| Strawberry Perl v5.12.1          | 179 MB    | 192 MB    |

these characters may not be used because they are platform dependent characters. Although that is correct for traditional Shift\_JIS encoding, these characters now achieve platform independency with UTF-8 encoding. Therefore, these characters can be handled directly when the user uses T<sub>E</sub>Xworks with upT<sub>E</sub>X and upL<sub>A</sub>T<sub>E</sub>X.

## 2 Installation

### 2.1 Preparation

Table 1 shows the file and disk sizes required to install W32T<sub>E</sub>X, Ghostscript/GSview, and Strawberry Perl. The minimum and recommended sizes of the USB drive are one gigabyte and two or more gigabytes, respectively. The term “file size” refers to the sum of the net file size, and the term “disk size” refers to the sum of the required size to contain it. The difference between disk size and file size depends on cluster size, which represents the smallest allocation size to contain a file [7]. In the case of Table 1, a 2 GB USB drive was formatted with FAT32 and a 4 KB cluster size. The disk size increases rapidly when the drive is formatted by conventional FAT (32 KB cluster for a 2 GB drive). Therefore, FAT32 is strongly recommended in order to install W32T<sub>E</sub>X, which comprises over one thousand files.

The drive letter dynamically assigned to the target USB drive is assumed to be U:, and the installation directories of W32T<sub>E</sub>X and Ghostscript/GSview are assumed to be U:\w32tex and U:\gsview, respectively.

To embed CJK characters into a PDF file by using dvipdfmx, and to handle CJK characters in Ghostscript, some TrueType/OpenType fonts without license restrictions should be prepared. As for Japanese, IPA fonts [15] are recommended. In the following text, IPAex fonts (“IPAex 明朝” and “IPAex ゴシック”) are assumed to be installed into U:\Resource\fonts\IPAexfont.

If the user wants to use a utility that requires Perl (e.g., epstopdf), the portable edition of Strawberry Perl for Windows [10] could be installed into U:\sp.

### 2.2 Downloading Files of W32T<sub>E</sub>X

Because W32T<sub>E</sub>X [5] consists of more than forty archive files, it may be somewhat difficult for inexperienced users to select and download the correct files. To download the recommended files, the WSH (Windows Script Host) script file can be used. The WSH script interpreter platform has been supported since Windows 98 [3, 11]. By default, a WSH script is written in either Visual Basic Script (VBScript) or JavaScript (JScript). It is more powerful than a batch file in the traditional MS-DOS environment, because it can utilize Graphical User Interface elements, such as dialog boxes, and it can control Windows Applications via ActiveX technology. Although a successor technology,

Windows PowerShell, is more powerful and secure than WSH, PowerShell's program (cmdlet) cannot be run without Microsoft .NET Framework 2.0, which requires installation of Windows XP or its previous versions. Therefore, WSH currently seems to be adequate for portable scripting.

The following script file, `getW32TeX.vbs`, automatically downloads the recommended files into the same directory as the script file (e.g., `c:\temp`):

```

1 Option Explicit
2 Dim objHTTP,objStream,objWshShell,strURL,strSrc,aryFile,i
3 Const adTypeBinary = 1
4 Const adSaveCreateOverWrite = 2
5 strURL = InputBox( _
6   "Designate the URL of file server of W32TeX", "Designate URL" , _
7   "http://www.ring.gr.jp/pub/text/TeX/ptex-win32/current/")
8 If strURL="" Then WScript.Quit
9 ' List of downloading files (You can add/delete/modify files, if necessary).
10 aryFile = Array( _
11   "unzip.exe", _
12   "texinst2010.zip",      "latex.tar.bz2",      "mftools.tar.bz2", _
13   "pdftex-w32.tar.bz2",  "platex.tar.bz2",    "ptex-3.1.11-w32.tar.bz2", _
14   "web2c-2010-lib.tar.bz2", "web2c-2010-w32.tar.bz2", "dviptdm-w32.tar.bz2", _
15   "dvipsk-w32.tar.bz2",  "ltxpks.tar.bz2",    "makeindex-w32.tar.bz2", _
16   "manual.tar.bz2",      "oldformat.tar.bz2",  "oldinputs.tar.bz2", _
17   "t1fonts.tar.bz2",    "timesnew.tar.bz2",  "txpx-pazofonts.tar.bz2", _
18   "uptex-w32.tar.bz2",  "vf-a2bk.tar.bz2",   "sam2p-w32.tar.bz2" )
19 Set objWshShell = WScript.CreateObject("WScript.Shell")
20 i = objWshShell.Popup("Now start downloading", 0, "Downloading", 1)
21 If i = 2 Then WScript.Quit
22 Set objHTTP = WScript.CreateObject("Msxml2.XMLHTTP")
23 Set objStream = WScript.CreateObject("Adodb.Stream")
24 objStream.Type = adTypeBinary
25 For i = 0 to uBound(aryFile)
26   strSrc = strURL & aryFile(i)
27   objHTTP.Open "GET", strSrc, False
28   objHTTP.Send
29   objStream.Open
30   objStream.Write objHTTP.responseBody
31   objStream.Savetofile aryFile(i), adSaveCreateOverWrite
32   objStream.Close
33 Next
34 WScript.Echo "Complete"

```

This script file is set to download files from Ring Server in Japan, the URL of which is given in line 7. If a neighboring mirror server is available, the user should substitute the correct URL in order to save download time. Alternatively, the user can change the URL at runtime, as described below.

Lines 11 to 18 are the list of download file names. The user should confirm whether the list is valid by checking Kakuto's website [5], because W32 $\TeX$  is updated very frequently and the name of the file may sometimes be changed.<sup>1</sup> The user who wants to download extra file can add the name to the list. For example, if the user wants to download the OTF package developed by Shuzaburo Saito [16], additionally, line 11 can be alternatively written as follows:

```
"unzip.exe", "otfdevel.tar.bz2", _
```

1. The extension of some files was already changed from `.tar.bz2` to `.tar.xz` in December 2010.

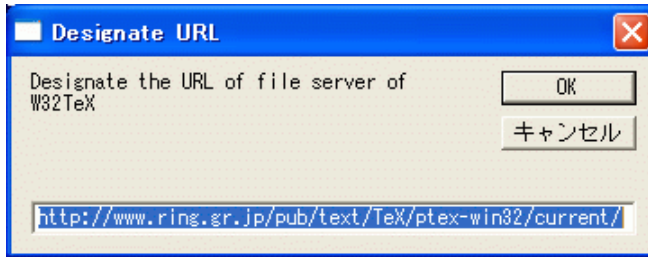


FIGURE 1. Designate the URL of W32T<sub>E</sub>X

Note that the last character of the line, underbar (`_`), should never to be deleted, because it signifies to line continuation.

Once the script file has been executed, a dialog box (Figure 1) is displayed and the user can change the URL. If the user wants to download a specific version of W32T<sub>E</sub>X that is designated by date, the archive server maintained by Susumu Kanemune can be used:

```
http://eplang.jp/w32tex/archive/YYYY/MM/DD/current/,
```

where YYYY/MM/DD denotes year/month/date. If the user wants to choose the exact same version as described in this paper, YYYY/MM/DD should be set to 2010/11/16.

When the user clicks the OK button, a dialog box confirming the start of downloading is displayed. By clicking the OK button again, the files listed in lines 11 to 18 of the script file are downloaded one-by-one into the same directory as the script file. After a while, a dialog box is displayed to notify the user that the download is complete.

### 2.3 Installation of W32T<sub>E</sub>X

Let `c:\temp` be the path of a directory in which downloaded files are saved, and let `U:\w32tex` be the installation path of W32T<sub>E</sub>X.

Installation is performed by opening a command prompt window, and then typing in the following commands [5]:

```
U:
md w32tex
cd w32tex
c:\temp\unzip c:\temp\texinst2010.zip
texinst2010 c:/temp
```

It will require more than a quarter hour to run `texinst2010`.

The executable files extracted in `U:\w32tex` are very useful for handling many kinds of compressed files. Therefore, it is recommended to copy them into `U:\w32tex\bin`. In addition, it is recommended to copy `unzip.exe` from `c:\temp` into `U:\w32tex\bin` because it is required in the next section.

### 2.4 Installation of Ghostscript and GSview

To install Ghostscript and GSview, the files `gs900w32full-gpl.zip` and `gsv49w32.exe` are required. The former can be downloaded from Kakuto's website [5], and the latter can be downloaded from the Ghostscript home page [9].

The installation method for GSview and Ghostscript is almost the same as described in the “Installation–Portable Application” section of

<http://pages.cs.wisc.edu/~ghost/gsview/gsviewen.htm>,

but `gvNNw32.exe` should be replaced with `gs900w32full-gpl.zip`. Some users may need to replace `unzip` with `U:\w32tex\bin\unzip` (see Section 2.3).

Note that the downloaded files should never be executed, and that `gsv49w32.exe` should never be double-clicked.

At this point, GSview can display PS/EPS files that contain no CJK characters. In order to verify this, the user can execute `U:\GSview\GSviewPortable.exe`, and then open the wellknown `tiger.eps`, which is located in `U:\GSview\gs9.00\examples`. The additional settings described in Section 3.2 and Section 3.3 are required to display PS/EPS file with CJK characters.

### 3 Portable Settings

#### 3.1 Settings for W32 $\TeX$

To retrieve the path to the TrueType/OpenType font on the USB drive, the environment variable `GS_FONTPATH` is used (see Section 3.3 for detail).

Lines 296 to 303 of `U:\w32tex\share\texmf\web2c\texmf.cnf` should be modified as follows:

```
% OS font directories
OSFONTS = $SystemRoot/fonts//

% TrueType outline fonts.
TTFONTS = .;$TEXMF/fonts/{truetype,opentype}//;$OSFONTS;$GS_FONTPATH//

% Opentype outline fonts.
OPENTYPEFONTS = .;$TEXMF/fonts/{opentype,truetype}//;$OSFONTS;$GS_FONTPATH//
```

`Kpathsea` that is a file searching mechanism of W32 $\TeX$  will refer to this file. The value of `OSFONTS`, `$SystemRoot`, is one of the built-in system environment variables that denotes the Windows system folder for Windows NT or its later versions.

Next, `U:\w32tex\share\texmf\fonts\map\dvipdfmx\base\cid-x.map` is modified to embed the IPAex fonts [15]. The most convenient method is to replace all instances of “Ryumin-Light” and “!Ryumin-Light” with “ipaexm,” and all instances of “GothicBBB-Medium” and “!GothicBBB-Medium” with “ipaexg,” for example, lines 486 to 491 could be modified as follows:

```
uprml-h UniJIS-UTF16-H ipaexm
uprml-v UniJIS-UTF16-V ipaexm
upgbm-h UniJIS-UTF16-H ipaexg
upgbm-v UniJIS-UTF16-V ipaexg
uprml-hq UniJIS-UCS2-H ipaexm
upgbm-hq UniJIS-UCS2-H ipaexg
```

Then, following batch file named `updflatex.bat` is created in `U:\w32tex\bin`

```
@echo off
uplatex -synctex=1 %1
updvipdfmx %~n1
```

This batch file is required in Section 3.4.

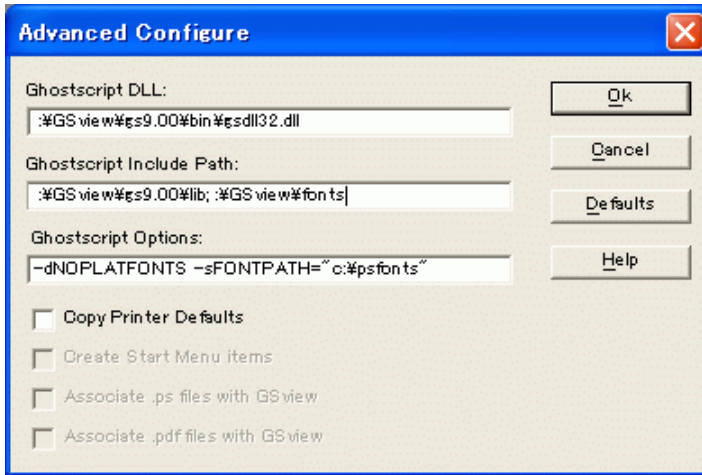


FIGURE 2. Advanced Configure dialog box of GSview

### 3.2 Settings for Ghostscript and GSview

To handle Japanese characters in PS/EPS files, `U:\gsview\gs9.00\lib\cidfmap` is modified as follows:

```
% Aliases
/Ryumin-Light /IPAMincho ;
/GothicBBB-Medium /IPAGothic ;
/HeiseiKakuGo-W5 /IPAMincho ;
/HeiseiMin-W3 /IPAMincho ;
/Ryumin-Medium /IPAMincho ;
%
% IPA Fonts
/IPAMincho << /FileType /TrueType /CSI [(Japan1) 6] /Path (IPAexfont/ipaexm.ttf) >> ;
/IPAGothic << /FileType /TrueType /CSI [(Japan1) 6] /Path (IPAexfont/ipaexg.ttf) >> ;
```

The operation check can be performed as follows:

1. Execute `U:\GSview\GSviewPortable.exe`.
2. Select [Options]-[Advanced Configure] to open the dialog box (Figure 2).
3. Fill into the “Ghostscript Include Path” field without line break as follows:
 

```
U:\GSview\gs9.00\lib;U:\GSview\gs9.00\Resource\Init;
U:\GSview\gs9.00\kanji;U:\Resource\fonts
```
4. Open `article9.ps` in `U:\GSview\gs9.00\kanji`.
5. If no error occurs and PS file is displayed, change the “Ghostscript Options” filed of the dialog box (Figure 2) as follows:
 

```
-dNOPLATFONTS -dWINKANJI
```
6. Open `article9.ps` again, and compare the displayed file to the previous one.

Unfortunately, the setting in the dialog box is not preserved in a portable GSview, although the standard (nonportable) GSview preserves it.

TABLE 2. Types of environment variables in Windows

| Type     | Scope           | Volatile | Administrative rights |
|----------|-----------------|----------|-----------------------|
| System   | All users       | No       | Needed                |
| User     | Current user    | No       | Not needed            |
| Volatile | Current logon   | Yes      | Not needed            |
| Process  | Current process | Yes      | Not needed            |

### 3.3 Script of Environment Settings

On the Windows platform, there are four types of environment variables (Table 2). The system environment variable is applicable for all users on the computer. Once it is set, the value will be stored even after the computer is shutdown or restarted. In addition, only users who belong to the administrator group can set this variable. On the other hand, the process environment variable is applicable for only the current process (e.g., the command prompt window), and disappears when the process is terminated.

Therefore, it is adequate to use process environment variables for T<sub>E</sub>X portable settings. The following WSH script file named W32TeXenv.vbs should be created in U:\.

```

1 Option Explicit
2 Dim objWshShell,objFS,objEnv
3 Dim strDrv,strTeXPath,strGSPath,strPerlPath
4 Set objWshShell = WScript.CreateObject("WScript.Shell")
5 Set objFS = WScript.CreateObject("Scripting.FileSystemObject")
6 strDrv = objFS.GetDriveName(WScript.ScriptFullName)
7 strTeXPath = strDrv & "\w32tex"
8 strGSPath = strDrv & "\GSview"
9 strPerlPath = strDrv & "\sp\perl"
10 Set objEnv = objWshShell.Environment("Process")
11 objEnv.Item("PATH") = strTeXPath & "\bin;" & strTeXPath & "\share\texworks;" & _
12   & strGSPath & ";" & strGSPath & "\gs9.00\bin;" & strGSPath & "\gs9.00\lib;" & _
13   & strPerlPath & "\site\bin;" & strPerlPath & "\bin;" & _
14   & strDrv & "\sp\c\bin;" & objEnv.Item("PATH")
15 objEnv.Item("GS_LIB") = strGSPath & "\gs9.00\Resource\Init;" & _
16   & strGSPath & "\gs9.00\Resource;" & strGSPath & "\gs9.00\lib;" & _
17   & strGSPath & "\gs9.00\kanji;"
18 objEnv.Item("GS_FONTPATH") = strDrv & "\Resource\fonts"
19 objEnv.Item("GS_OPTIONS") = "-dWINKANJI"
20 objEnv.Item("TERM") = "dumb"
21 objWshShell.Run "%COMSPEC%"

```

This script file retrieves the drive letter assigned to a USB drive in which the script file is saved, and substitutes it with the parameter `strDrv` in line 6 [3, 11]. Some paths to the executable files on the USB drive are prepended to the environment variable `PATH` in lines 11 to 14. The environment variables of Ghostscript, `GS_LIB`, `GS_FONTPATH`, and `GS_OPTIONS`, are set in lines 15 to 19. For more details about these variables, refer to the “Summary of environment variables” section of `Use.htm` in `U:\GSview\gs9.00\doc`.

When the user connects the USB drive to a computer, and then runs abovementioned script file, a customized command prompt window will open. The `set` command can be used if the user wants to examine whether the environment variables were set collectly, for example, the user enters “`set path`” to display the value of the environment variable `PATH`, and “`set /?`” is entered to display the online help of the `set` command.

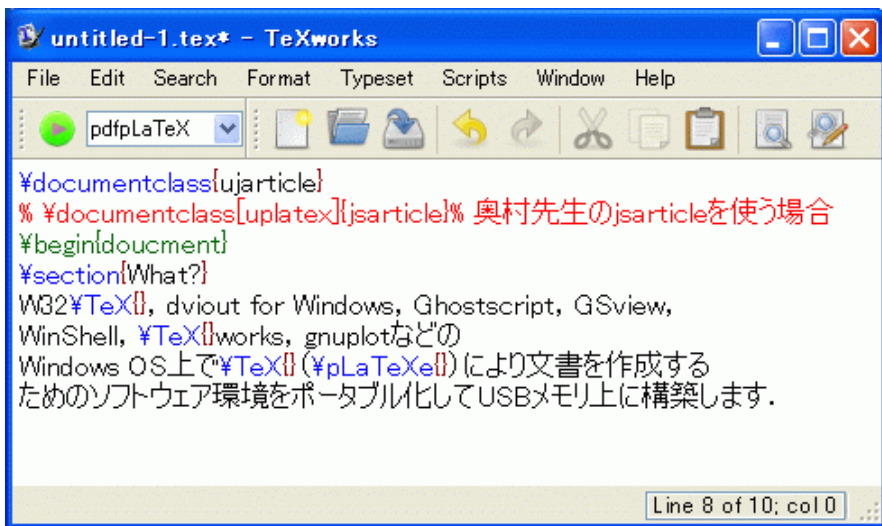


FIGURE 3. TeXworks's editing window

From the window opened by the WSH script shown above, the user can execute TeXworks by entering `texworks`, or execute GSview by entering `gsviewportable`. The user can also use commands of W32TeX, such as `platex`, `dvipdfmx`, and `bibtex`.

### 3.4 Initial Settings to Using upL<sup>A</sup>T<sub>E</sub>X in TeXworks

The user who will not be using upL<sup>A</sup>T<sub>E</sub>X can skip this section. The settings for using `pdfplatex.bat` as a typesetting tool are set by default in Kakuto's TeXworks [5].

When TeXworks is executed, the editing window (Figure 3) will appear. When it is first used, the registration of `updfplatex.bat` (made in Section 3.1) as typesetting tool is required:

1. Select [Edit]–[Preferences] from the menu bar of Figure 3. The “TeXworks Preferences” dialog box is displayed. Then, select the “Typesetting” tab (Figure 4).
2. Click the “+” button on the right side of “Processing tools” to add a new item. The “Tool Configuration” dialog box is displayed (Figure 5).
3. Fill in the dialog box (Figure 5) as follows:
  - Name:* updfpLaTeX
  - Program:* updfplatex.bat
  - Arguments:* \$fullname
4. Click the OK button to close the dialog box (Figure 5).
5. To arrange the processing tools in the desired order, use “↑” and/or “↓” buttons (Figure 4). Then, click the OK button to close the dialog box (Figure 4).
6. Select “updfpLaTeX” from the drop-box menu in the toolbar (Figure 3).

For end users, the only difference between pL<sup>A</sup>T<sub>E</sub>X and upL<sup>A</sup>T<sub>E</sub>X seems to be the designation of documentclass. In upL<sup>A</sup>T<sub>E</sub>X document, `ujarticle` should be designated



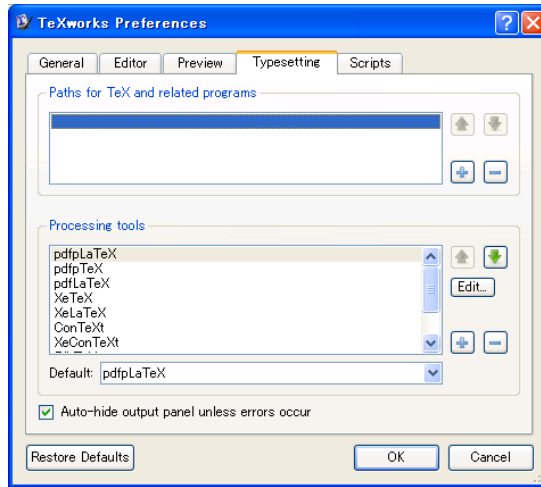


FIGURE 4. “TeXworks Preferences” dialog box

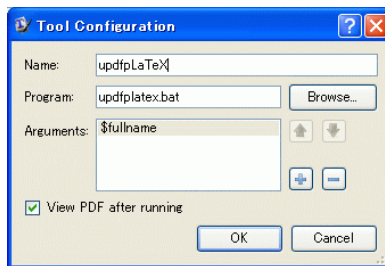


FIGURE 5. Tool Configuration

instead of `article`. If the user wants to use Okumra’s `jsarticle`, the `uplax` option should be added as follows:

```
\documentclass[uplax]{jsarticle}
```

Refer to Yato’s website [14] for more information.

## 4 Conclusion

Although it may seem difficult to install  $\text{T}_{\text{E}}\text{X}$  and related software without a well-designed all-in-one installer, the difficulties experienced will enhance the user’s skill and improve understanding of  $\text{T}_{\text{E}}\text{X}$ .

Adding Chinese and/or Korean fonts to  $\text{u}_{\text{p}}\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  and Ghostscript does not seem so difficult [4, 2, 14]. None of the software installed on the USB drive must harm the host system and all software must coexist with  $\text{T}_{\text{E}}\text{X}$  and Ghostscript already installed on the host system. The user can use this USB drive not only in case of emergency, but also for comparing operations while troubleshooting or for experimental use when studying  $\text{T}_{\text{E}}\text{X}$ .

It may be convenient to add portable software such as OpenOffice.org, graph plotting software, drawing software, and a web browser. The author's website [17] provides some additional information regarding portable software.

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