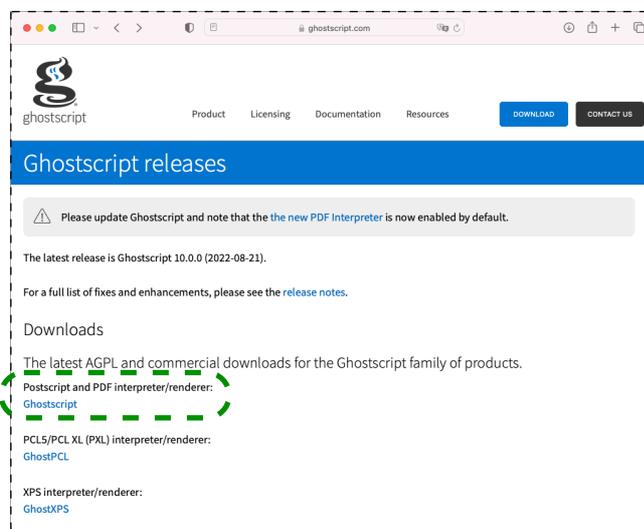


APPENDIX C: GHOSTSCRIPT PDF INTERPRETER/RENDERER

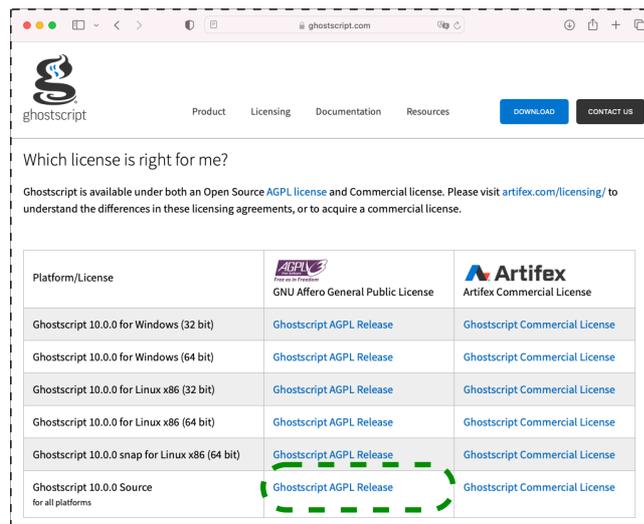
To be correctly processed by PressPerCent, the jobs in composite PDF format that contain spot color inks should be converted into one of pre-separated file formats. This task could be performed in number of ways, one of which is to use 'Ghostscript RIP'. **Ghostscript** is an interpreter and renderer for files in PostScript or PDF formats that is being developed by Artifex Software, Inc. It is available under the GNU GPL Affero license that allows users to download software as a 'source code' and to make it into an 'executable' that will serve for in-house purposes. This Appendix describes few simple steps that could be followed to build Ghostscript executable and use it to convert composite PDF files into pre-separated TIFF format.

STEP 1: DOWNLOAD

The first step to create Ghostscript executable is to get its source code from the official Ghostscript website. Open <https://www.ghostscript.com/> in your browser, go to **Download** section and select '**Postscript and PDF interpreter/renderer Ghostscript**' in the list of available options.

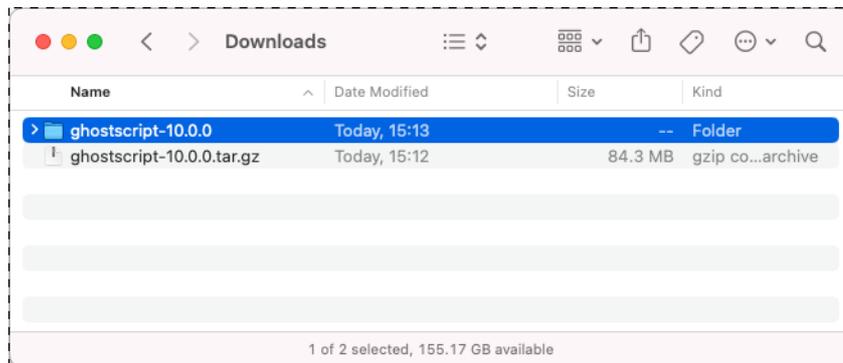


On the following page choose to download '**Ghostscript AGPL Release**' version of '**Ghostscript Source Code (for all platforms)**'



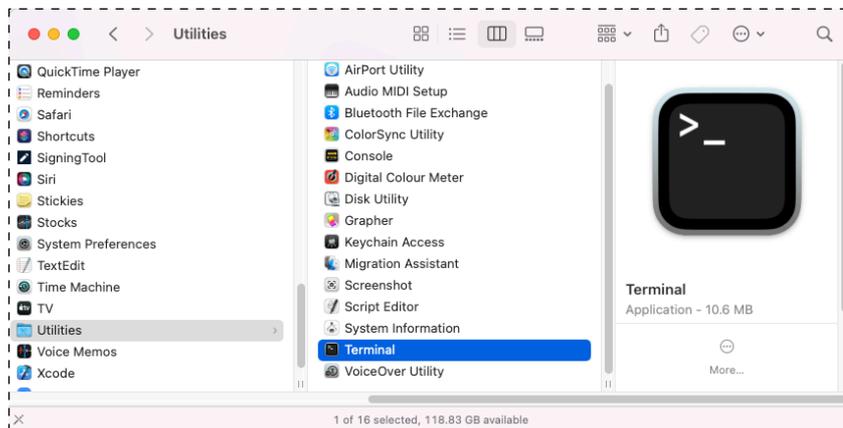
Note that design and navigation system on the website may change with time. Do not be surprised or discouraged if it looks different than screenshot images above.

Once the download is complete you will find new *'ghostscript-version.number'* archive with *'tar.gz'* file extension in *'Downloads'* folder on your system. Double-click this archive to expand it into a folder that will have the same name (but without *'tar.gz'* on its end). This folder contains all the source code that is required to build Ghostscript interpreter/renderer.



STEP 2: BUILD

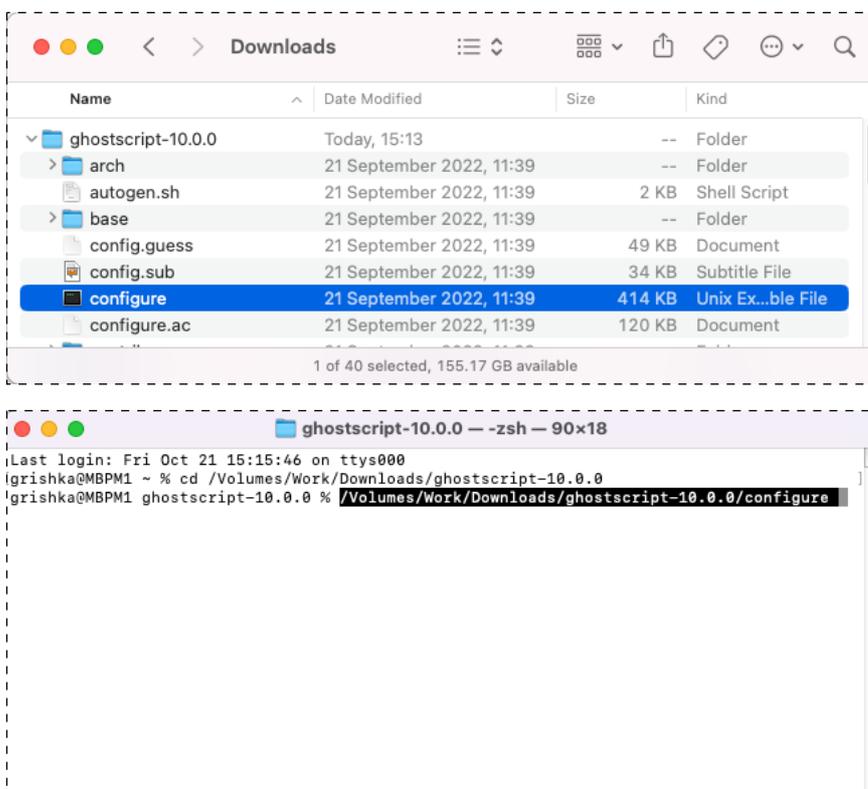
To build Ghostscript executable from the source code you will have to enter three commands using macOS system tool called *'Terminal'*. **Terminal** could be found in *'/Applications/Utilities/'* folder.



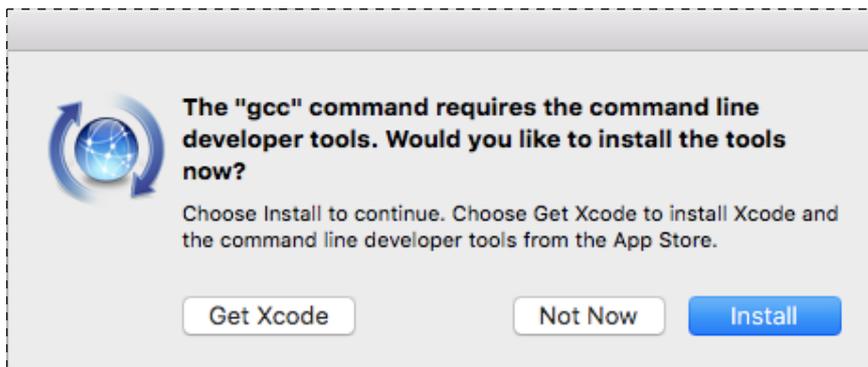
- ◆ Start **Terminal** by clicking its icon twice in Finder. New window with command prompt will appear on your screen. Use keyboard to type two characters: *'cd'* (without quotes). Then press *Space* key to add one space character and drag the icon of the folder that contains Ghostscript source code from Finder's window into Terminal's window. This will add full path of the folder to the end of the command line. Press *Enter* key to execute the resulting command. This first command changes the current working directory to that of Ghostscript's source code. It is required for correct execution of two subsequent commands.



- ◆ To execute next command find the file called '**configure**' in the folder with Ghostscript's source code and drag it into the same **Terminal** window. Press *Enter* key after that.



Configure is a script that searches for all components that will be needed to build Ghostscript executable. As a result of its work it generates a makefile — a file named '*Makefile*' that will appear in the folder with Ghostscript's source code (if the execution of **configure** script has finished without errors). One of the essential components that are required to create Ghostscript executable is C programming language compiler **GCC**. If it is not present on your computer, you will see the window with two options: either to install the full set of Apple's **Xcode** development tools or just a small subset of them for command line development. The second option represents a smaller and faster download, press **Install** button to choose it. After the installation of development tools is over you should make another attempt to run **configure** script. Press *Up Arrow* key in Terminal window to resurrect the previous command line, then press *Enter* to execute it again.

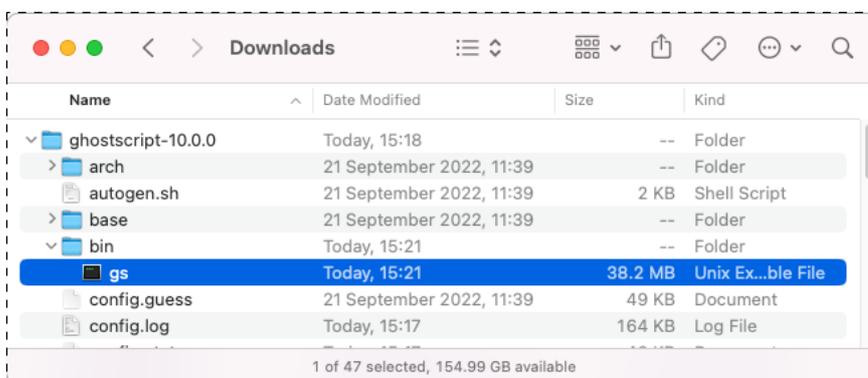


- ◆ After successful execution of the configuration script comes the time to enter the third and final command in Terminal. Type four letters — '**make**' (without quotes) and press *Enter* key. (See the picture on next page.)

```

ghostscript-10.0.0 -- zsh -- 90x18
checking for pow... yes
checking for putenv... yes
checking for rint... yes
checking for setenv... yes
checking for sqrt... yes
checking for strchr... yes
checking for strrchr... yes
checking for strspn... yes
checking for strstr... yes
checking minimum memory pointer alignment... done
checking for sqrtf... yes
checking for strlen... yes
checking byteswap support... yes
checking for byteswap.h... no
checking whether to explicitly disable strict aliasing... yes
configure: creating ./config.status
config.status: creating Makefile
grishka@MBP M1 ghostscript-10.0.0 % make
    
```

It takes several minutes to compile and link Ghostscript executable from the source code. If the process was successful (and it should be) you will be able to find the new file with 'gs' name in 'bin' subfolder of the folder that contains Ghostscript's source code.



STEP 3: USE

Copy **gs** executable to any convenient location on your computer. (The folder that contains PressPerCent application and its settings files is a perfect choice for such location.) Now it is time to test that Ghostscript executable works. Start it by clicking **gs** file twice in Finder. New window that displays a basic information about Ghostscript interpreter/renderer version should appear. It waits for commands to be entered after 'GS>' prompt. Since this is only a test type **'quit'** to end the process (or just close the window, for example by pressing the small round red button in left part of its titlebar).

```

grishka -- gs -- 90x18
Last login: Fri Oct 21 15:26:02 on ttys003
grishka@MBP M1 ~ % /Volumes/Work/Downloads/ghostscript-10.0.0/bin/gs ; exit;
GPL Ghostscript 10.0.0 (2022-09-21)
Copyright (C) 2022 Artifex Software, Inc. All rights reserved.
This software is supplied under the GNU AGPLv3 and comes with NO WARRANTY:
see the file COPYING for details.
GS>quit

Saving session...
...copying shared history...
...saving history...truncating history files...
...completed.

[Process completed]
    
```

Conversion of a composite PDF job into pre-separated format could be performed with a help from Ghostscript's **tiffsep** output device. As the name implies it can create files with spot colors separations in TIFF format. To convert a file you can launch Ghostscript executable in Terminal with the following line:

```
gs -dSAFER -dBATCH -dNOPAUSE -r144 -dMaxSpots=25 -sDEVICE=tiffsep
-sOutputFile=outputTIFFsetname-%04d.tif inputPDFfilename.pdf
```

In the string above '*outputTIFFsetname*' should contain a name and path for the new set of TIFF files that will be created while '*inputPDFfilename.pdf*' is a path and name to the source PDF file that will be processed. Two useful options that are shown in this string: '-r144' that sets TIFF files resolution to 144 dpi and '-dMaxSpots=25' that increases a number of spot colors in the job to 25 (if the job contains more than 25 colors, extra colors will be converted into CMYK colorspace). By default (when explicit '-r' and '-dMaxSpots=' options are absent from a command line) the resolution is set to 72 dpi and the maximum number of spot colors is 10. You can find a detailed description of these and others **gs** command line options (and examples of their usage) in **Documentation** section of the official Ghostscript website.

If the prospects of composite PDF files conversion using Terminal tool with complex command line options do not look exciting to you, you can use PressPerCent to automate the task. To do this open **Processing** panel of PressPerCent's **Preferences** dialog, choose Ghostscript instead of built-in macOS engine for PDF processing and select **gs** executable that was just built. (You can also configure other options like resolution or maximum number of spot colors to suit your needs.) After that PressPerCent will be able to launch Ghostscript executable with all required command line arguments and will present you with graphic results when PDF file processing will be finished.

