Ezy De-Identifier Tool

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User Guide – Software Version V1.1

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# Introduction

The Ezy De-Identifier is an Open Source tool built using the R language, with the capability to de-identify text-based datasets in a medical operations and public health setting. The software is a tool that processes data in a reproducible way using a user friendly interface from the point of source ingestion, and does not require any programming knowledge. The software can be run in a browser on the user’s desktop or can be configured into a portable solution which can run from a USB stick without requiring software installation on a given PC. Our aim in the development of this tool was to lower the barrier of entry and speed up efforts to de-identify data, while promoting data privacy, reproducibility and compliance with existing medical privacy standards.

The software will operate on Windows and Mac computers and is provided for free under an academic non-commercial license.

The current version of the software can be downloaded [here](https://github.com/dasasmk/EzyDeident/archive/master.zip)

# Notes on Dataset Compliance

This tool should be used as part of a workflow based around a legal and ethical framework, dependent on the country of operation. It is also essential to ensure that any additional required measures, such as, data sharing agreements, are established between collaborators. As part of fulfilling the necessary requirements in a given country it may be necessary to modify/adapt the rules followed when using the tool. When used in isolation the software alone cannot guarantee compliance. This software is not intended to be used to create datasets for public release.

For the security of the resulting dataset, the password used the generate the dataset, as well as any mapping tables created should be considered confidential by the data provider and not shared with the recipient of the de-identified dataset.

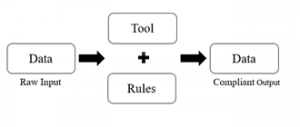
[](https://blog.nus.edu.sg/dasa/files/2016/01/flow-218v0yj.png)

Illustration of the need for the tool and health privacy rules to create compliant output

# Ezy De-Identifier Tool Software Requirements

To use the Ezy De-Identifier Tool software requires the following minimum specifications

* PC running Microsoft Windows 7, 8.1 or 10 1\*
* Mac running OS X 10.112\*
* Intel Core 2 Duo or better 3\*
* 2GB System Memory 3\*
* Free hard disk space equivalent to twice the data being de-Identified
* One free USB Port if using the PortableEnv Feature 4\*
* Default web browser set to Microsoft Internet Explorer 11 or Google Chrome

Note 1\*: This software is not supported or tested on earlier versions, such as Windows XP.

Note 2\*: This software has only been tested on this release of Mac OS X.

Note 3\*: To improve performance when using larger data sets a faster processor and more memory is recommended.

Note 4\*: PortableEnv is only available under Microsoft Windows

# Execution Mode

This software can be run in a number of ways depending on the user requirements, please consult the table below to identify the method to use.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Use from GitHub as an application** | **Use from ZIP as an application** | **Use ZIP version with R Studio (for development)** | **Use with PortableEnv as an application** |
| **Admin rights needed to install** | X | X | X |  |
| **Internet needed to run** | X |  |  |  |
| **Internet needed to setup** | First run only | First run only | First run only | First run only, can be on a separate system |
| **Always latest version** | X |  |  |  |
| **Launch as an application** | X | X |  | X |
| **Launch from Rstudio** |  |  | X |  |

# Using the Ezy De-Identifier Tool for use with PortableEnv

To create a portable USB stick of the software

1. Download the latest version of the software from <https://github.com/dasasmk/EzyDeident/archive/master.zip>
2. Download the PortableENV from <http://bit.ly/1ZodFNl>
3. Unzip the downloaded files and move the whole PortableEnv folder to the root of a USB stick.
4. Copy the De-identification Tools EzyDeident folder to the root of a USB stick.
5. In the EzyDeident folder run (double click) the command ‘Download Components for PortableEnv.cmd’. The PortableEnv will be customized for use with the Ezy De-Identifier tool (internet required).
6. Execute the file ‘Run with PortableEnv.cmd’ to start the tool. In future you can start the application using Run with PortableEnv.cmd without needing an internet connection

The folder structure created during this process should be as follows

X:\

|

── X:\EzyDeident-master\

────| X:\EzyDeident-master\Sample\_Data

────| X:\EzyDeident-master\www

── X:\PortableEnv\

────| X:\PortableEnv\miktex-portable-2.9.5719

────| X:\PortableEnv\Pandoc

────| X:\PortableEnv\R-Portable

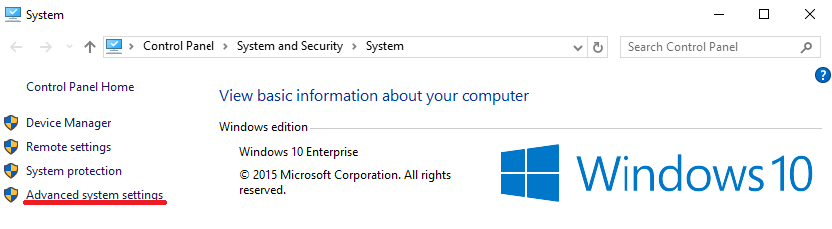
# Prepare a new PC to use the Ezy De-Identifier Tool from GitHub or Zip as an application

For first time use on a new PC

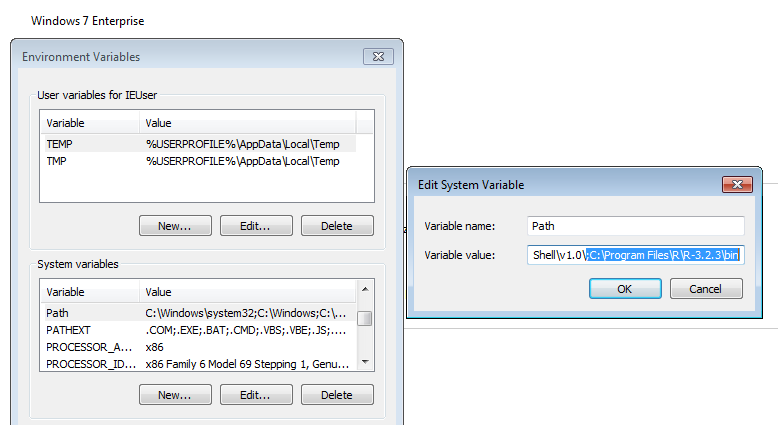
1. Install R and R Studio on your PC.

<https://cran.r-project.org/bin/windows/base/>

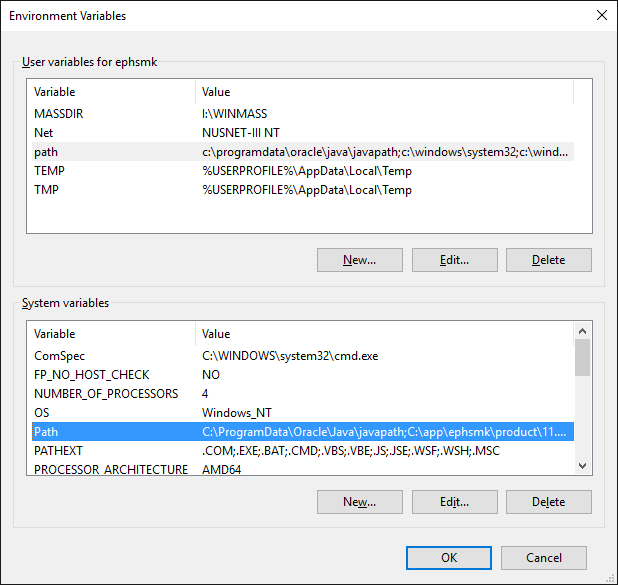
<https://www.rstudio.com/products/rstudio/download/> (optional if only running the program)

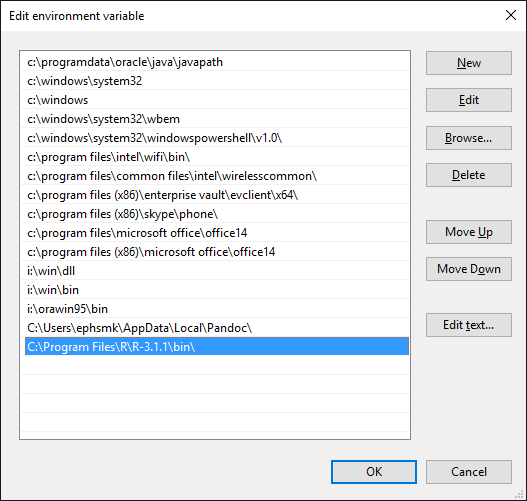
1. Install Pandoc and Miktex  
   <https://github.com/jgm/pandoc/releases/download/1.15.2/pandoc-1.15.2-windows.msi> <http://mirrors.ctan.org/systems/win32/miktex/setup/basic-miktex-2.9.5823.exe>
2. Under the Windows Control Panel go to System and Security and select system. When the System Control Panel opens click the option for Advanced system settings  
   
3. On the window which opens click Environmental Variables
4. Click the system variable for path and click edit. Add your R bin folder to the path (e.g. append “;C:\Program Files\R\R-3-X-X\bin”)

**Under Windows 7 or 8 the screen is shown as below:**



**Under Windows 10 the screen is shown as below:**



Click New and enter the path to your R bin directory.  


1. Depending on execution method
   1. For Github: Copy the Github Launcher folder to this PC, open the folder and click runme.cmd. The first time this is executed you must right click and run with administrator rights. On subsequent runs of the software you do not need to do this and can run as a standard user.
   2. For a local copy: open the EzyDeident folder and click “Run with Local R.cmd”. The first time this is executed you must right click and run with administrator rights. On subsequent runs of the software you do not need to do this and can run as a standard user.
2. The software will attempt to download all required R components needed to run the software.
3. A web browser should now open showing the application.

Note 1: Please use the close button at the end of the masking process to close the console window.  
Note 2: On first run of a new pc when selecting to create a masking report MikteX may prompt for installation of additional component. Please allow this. In this event it may be necessary to press the download button for a second time to ensure generation of the output zip file.

# Prepare a new PC to use the Ezy De-Identifier Tool (ZIP version) with R Studio (for development)

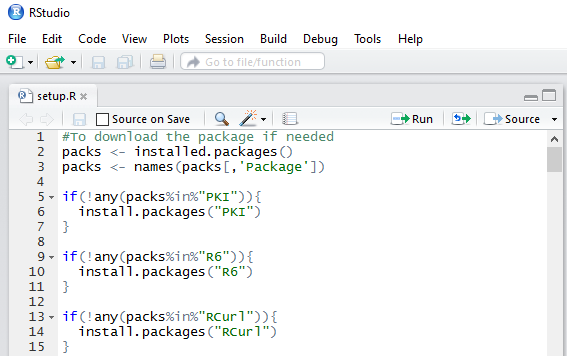
For first time use on a new PC

1. Download the latest version of the software from <https://github.com/dasasmk/EzyDeident/archive/master.zip>
2. Install R and R Studio on your PC.

<https://cran.r-project.org/bin/windows/base/>

<https://www.rstudio.com/products/rstudio/download/>

1. Install Pandoc and Miktex  
   <https://github.com/jgm/pandoc/releases/download/1.15.2/pandoc-1.15.2-windows.msi> <http://mirrors.ctan.org/systems/win32/miktex/setup/basic-miktex-2.9.5823.exe>
2. Start R Studio by running “Open with RStudio using Local R.cmd”.
3. Select File > Open File
4. Select ‘setup.R’
5. In the UI click the button ‘Source’



1. The software will attempt to download all required components needed to run the software.
2. Follow the instructions under the section “Starting the Ezy De-Identifier Tool with from R Studio (ZIP version)” to start the software.

Required R Packages:

PKI,R6,RCurl,Rcpp,base64enc,bitops,caTools,digest,evaluate,formatR,highr,htmltools,httpuv,  
jsolite,knitr,magrittr,markdown,mime,plyr,rmarkdown,shiny,stringi,stringr,xtable,yaml,pander, data.table

# Prepare a new Mac to use the Ezy De-Identifier Tool (ZIP version) with from R Studio, Github or Local Zip

For first time use on a new Apple Mac

1. Download the latest version of the software from <https://github.com/dasasmk/EzyDeident/archive/master.zip>
2. Install R and R Studio on your Mac.

<https://cran.r-project.org/bin/macosx/>

<https://download1.rstudio.org/RStudio-0.99.491.dmg>

1. Install Pandoc and Miktex  
   <https://github.com/jgm/pandoc/releases/tag/1.16.0.2>

<https://tug.org/mactex/mactex-download.html> (download size 2.5GB)

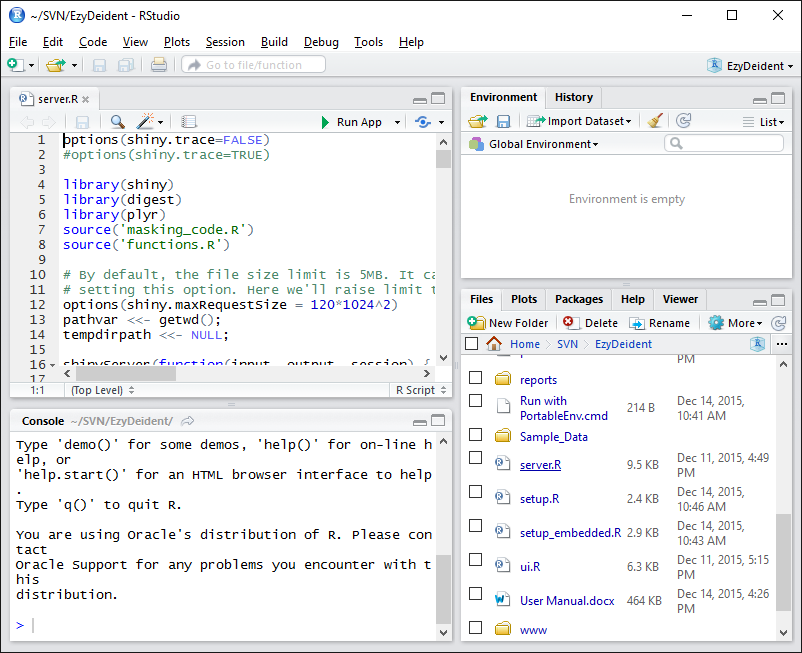
1. Start R Studio from the Applications folder
2. Select File > Open File
3. Select ‘setup.R’
4. In the UI click the button ‘Source’
5. The software will attempt to download all required components needed to run the software.
6. Once the system has been configured the software can then be started in a number of ways\*
   1. Following the instructions under the section “Starting the Ezy De-Identifier Tool with from R Studio (ZIP version)”.
   2. Launch a terminal window and navigate to the EzyDeident folder. Execute run\_local\_unix.sh to execute the local zip version.
   3. Launch a terminal window and navigate to the Github Launcher Unix folder. Execute run\_github\_unix.sh to execute the latest version directly from github.

Note: When executing on a new system for the first time it is best to use method 9a to ensure that any missing components can be detected and installed.

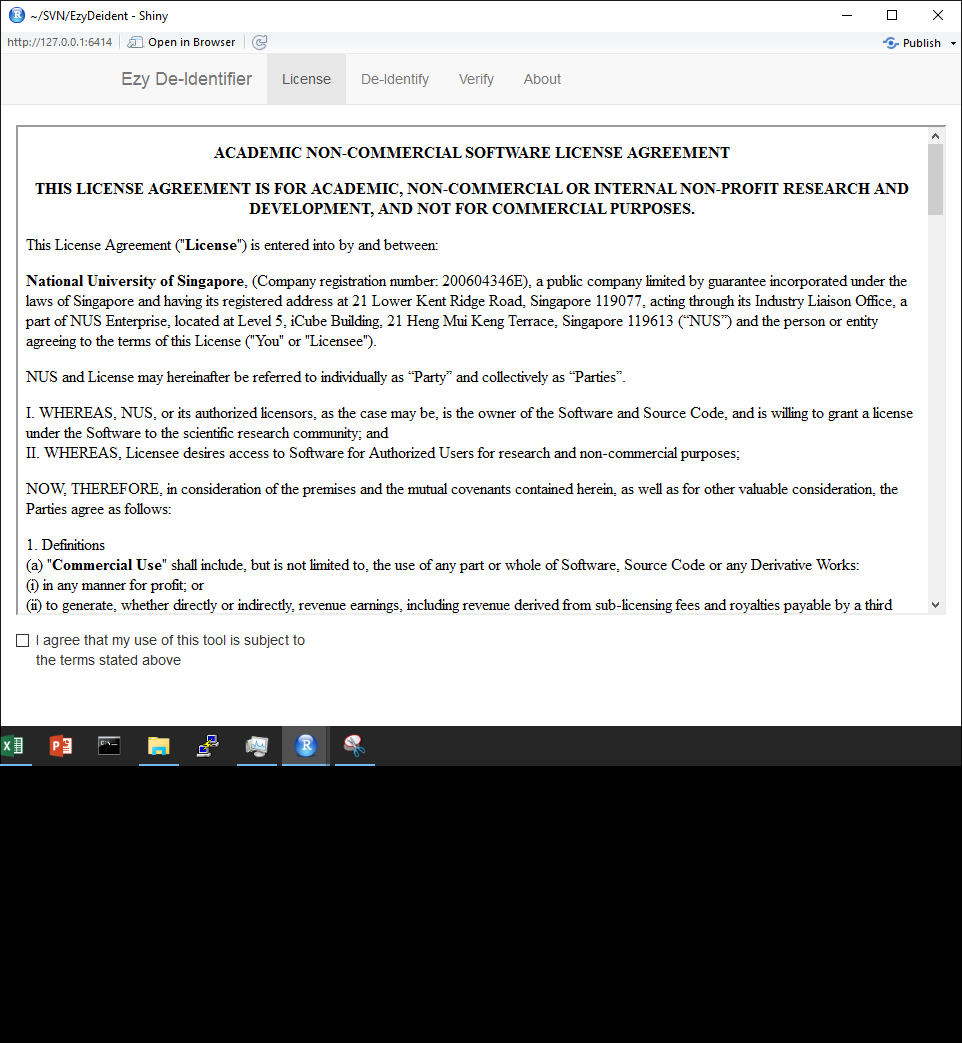
# Starting the Ezy De-Identifier Tool from R Studio (ZIP version)

Once the system has been prepared

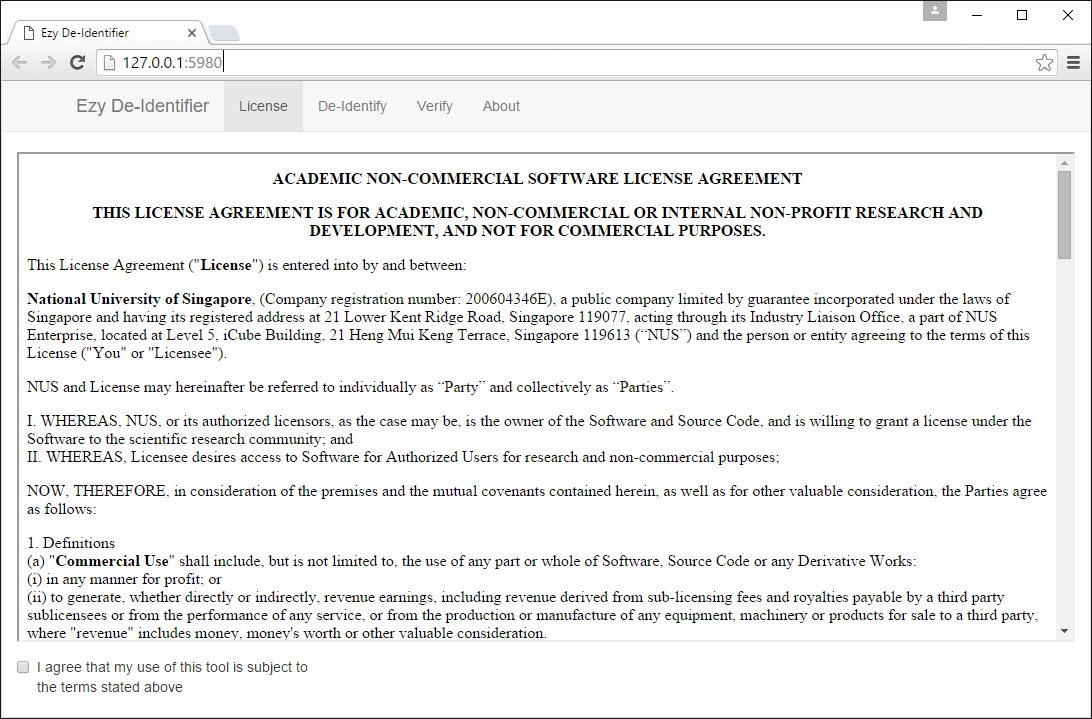
1. On a PC start R Studio by running “Open with RStudio using Local R.cmd”.   
   On a Mac select RStudio from the applications folder.
2. Select File > Open Project
3. Navigate to the EzyDeident folder
4. Select to open MUI.Rproj
5. Click on Server.R in the bottom left of the R Studio Window. If you are prompted to install or update shiny please accept this.



1. Click ‘Run App’
2. A new window will open showing the first page of the application, however do not use this. Click the button which reads ‘Open in Browser’ to maximize compatibility.

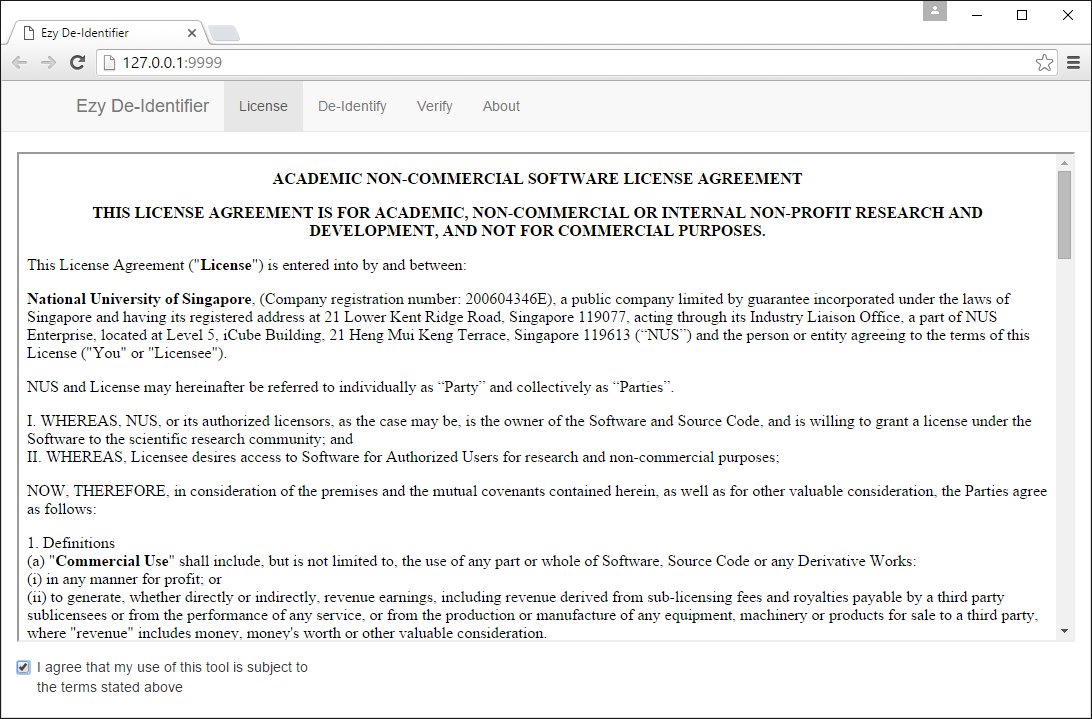


1. The application will launch in the web browser and data can be processed.

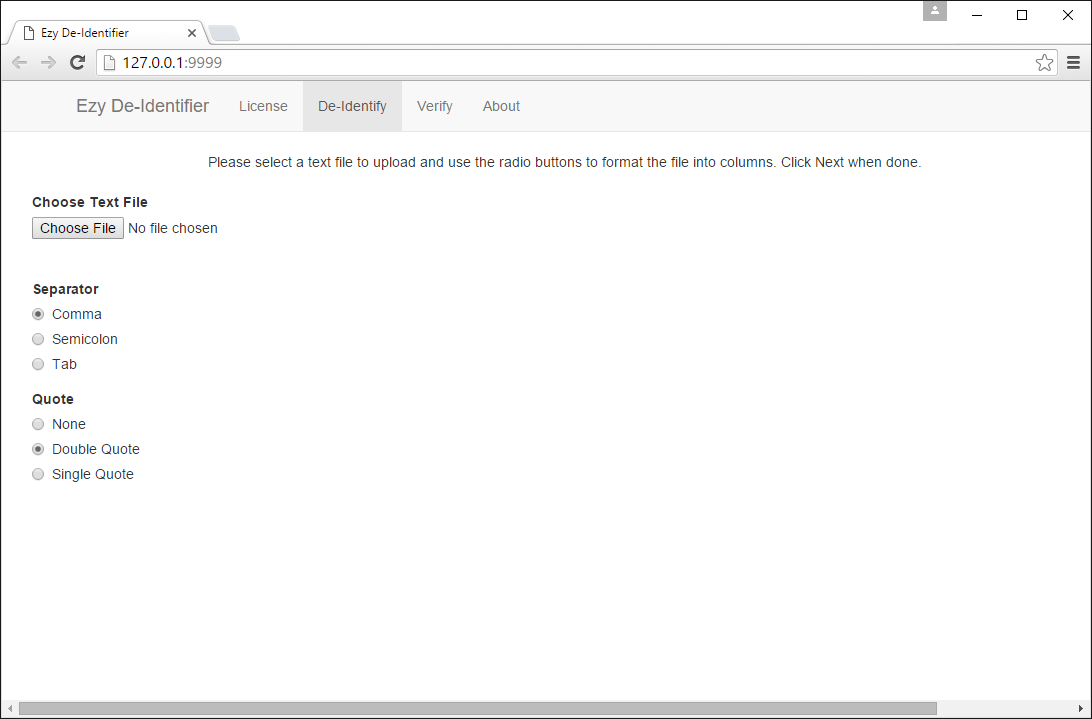


# Protecting Data using the Ezy De-Identifier Tool

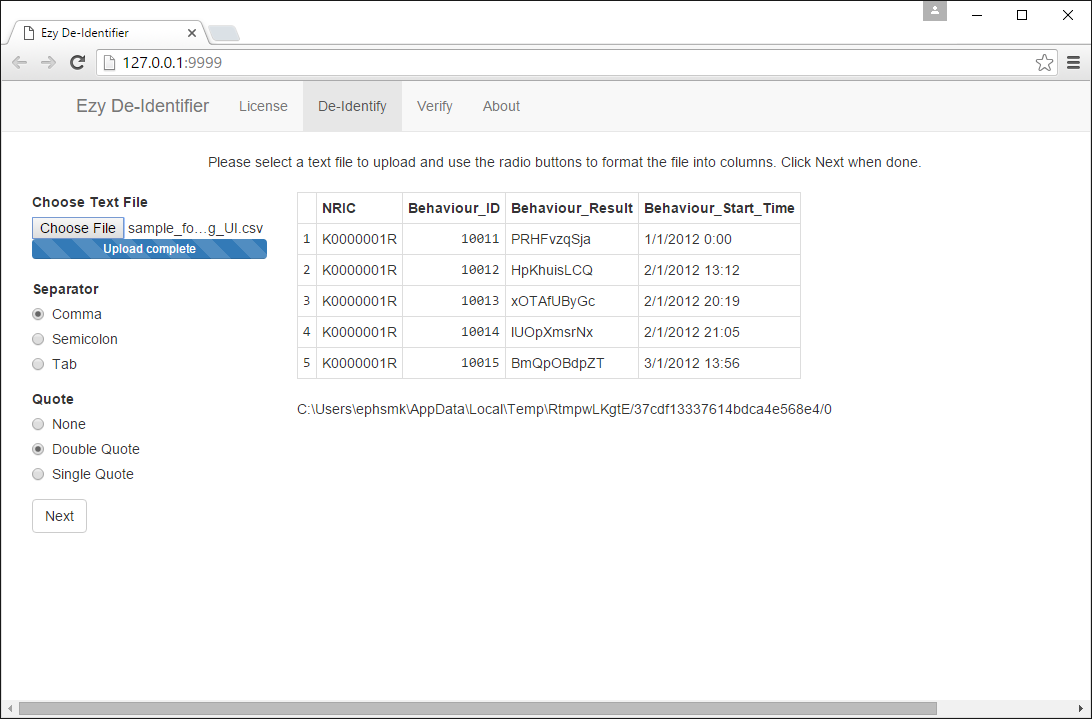
1. Read and accept the license agreement on the first page of the application



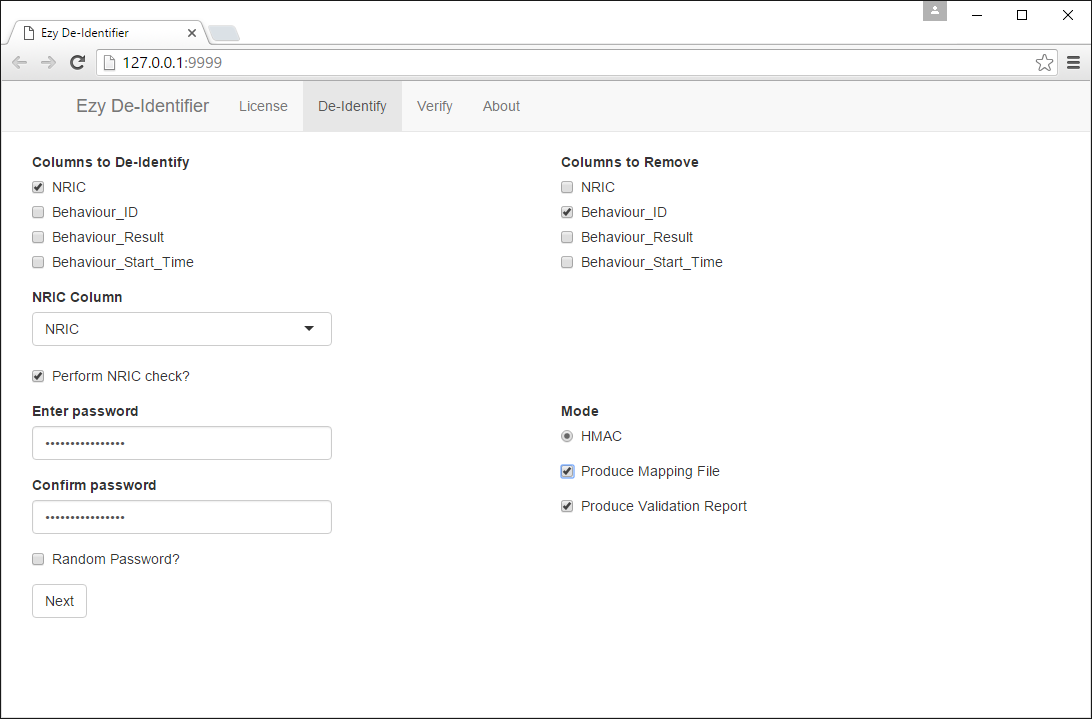
1. Click the De-Identify tab



1. In the top left click the Choose File Button, a dialog will appear allowing you to select a text file to import. Once uploaded a preview of the first 5 lines of data will be shown. Use the Separator and Quote radio buttons to change the input settings to match the file uploaded. Once the data is shown as a table click Next

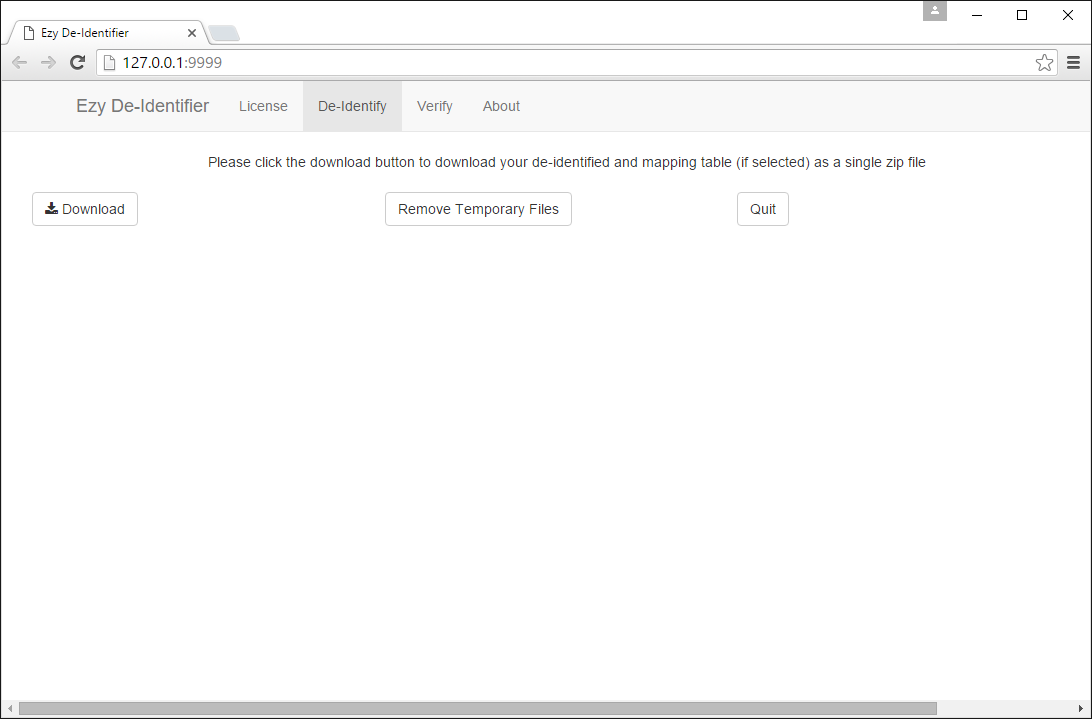


1. On the next screen you must specify how the application will de-identify the data, the requirements for this is stated in the table below. Once the application is configured click next.



|  |  |
| --- | --- |
| **Item** | **Requires** |
| Columns to de-identify | At least one |
| Columns to remove | Zero or more |
| NRIC Column / Perform NRIC Check | Optional |
| Enter Password | Required (recommend long password) |
| Confirm Password | Required (recommend long password) |
| Random Password? | Optional |
| Produce Mapping File | Optional |
| Produce Validation Report | Optional |

1. On the final page click the download button, after some time a zip file will be downloaded by the browser. The time to generate this file is dependent on the size of the data and speed of the PC being used.



## NRIC Column Check

If the NRIC column check is enabled an additional column of data will be added to the output utilizing the following coding system

|  |  |
| --- | --- |
| **Condition** | **Result** |
| NRIC Meets all Checks | 0 |
| NRIC is not starting with S,T,F,G | 1 |
| NRIC starts with X | 2 |
| NRIC is not 9 digits | -1 |

## Random Password

If the random password tick box is checked the software will automatically generate a 16-character password which includes special characters. For maximum security in a scenario where the data de-identification does not need to be recreated selected this option.

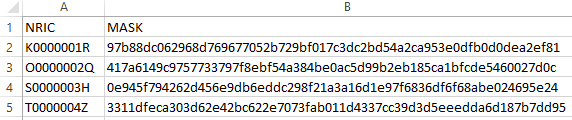
## Product Mapping File

When selected enabling this option will create mapping tables to allow the reverse identification of protected data. In the example below the user has selected to de-identify the column ‘NRIC’. This column will be protected in the main output product in the field NRIC\_masked. An additional file will be created called Mapping-NRIC.csv which will contain the unique combinations of the original value of NRIC and the de-identified value now present in the output.csv. For security do not generate a mapping table if there is no requirement to recover the original data.

Output.csv

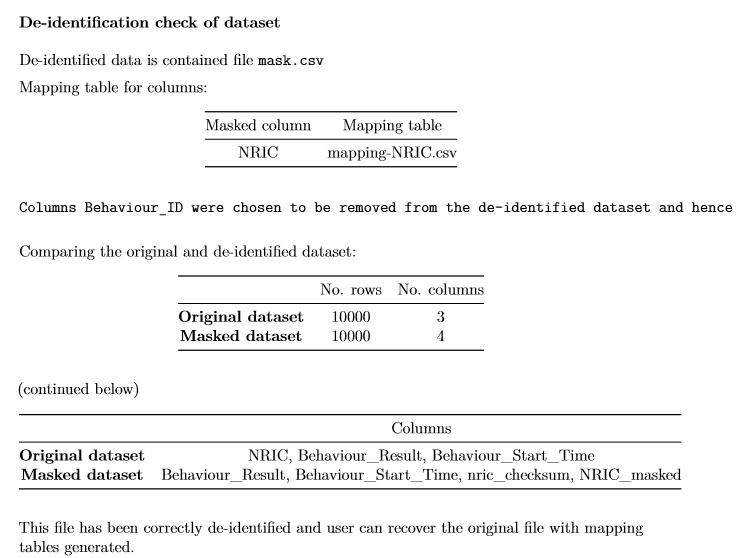


Mapping-NRIC.csv



## Produce Validation Report

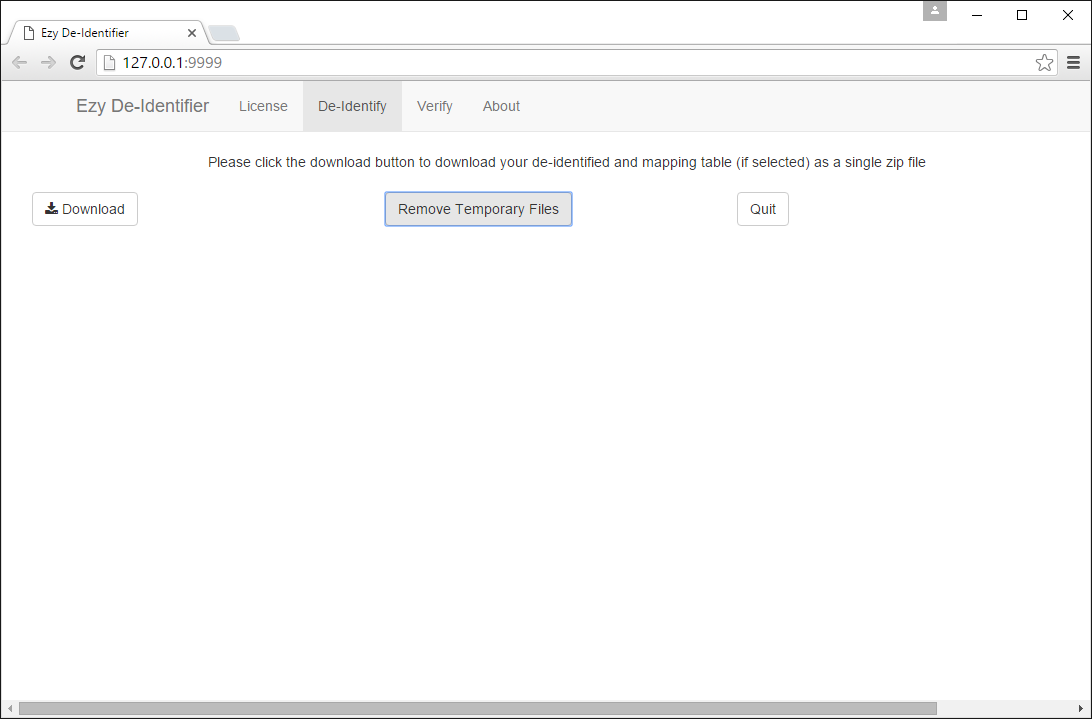
When selected enabling this option will generate a PDF report to validate that the software has been able to reconstruct the input data using the de-identified data and mapping tables. Selecting this option provides a check that the protection has been applied correctly, but will increase processing time.

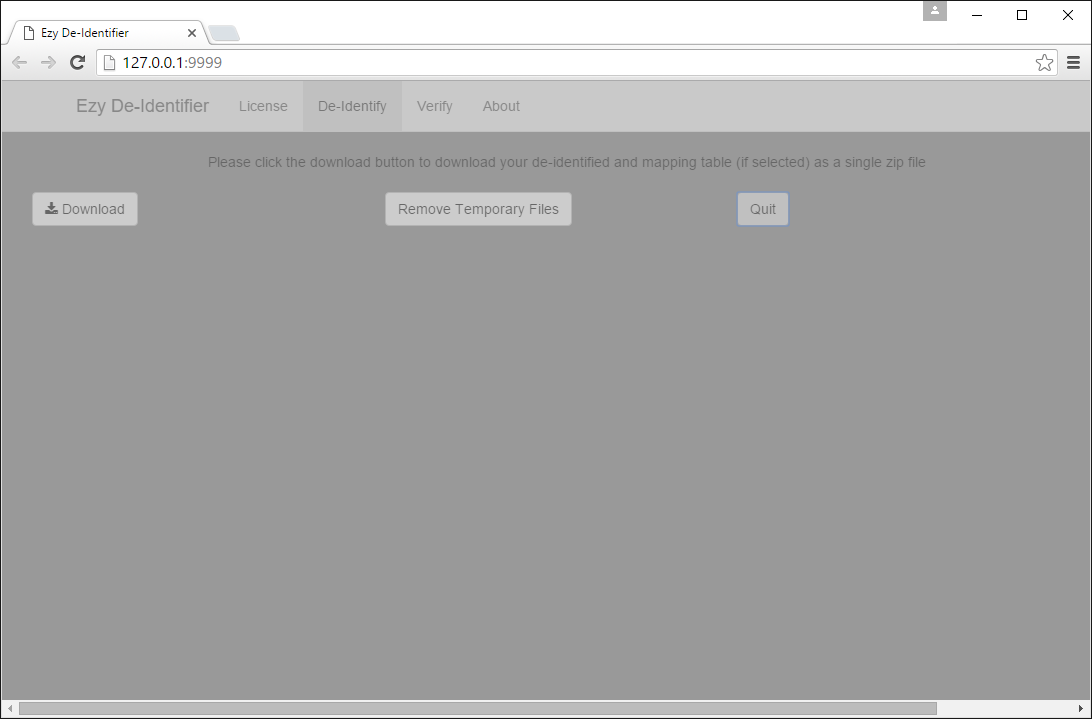


# Shutting Down the Ezy De-Identifier Tool

To close the application and remove temporary files from the system

1. Once the zip file of de-identified data has been downloaded click on the button to Remove Temporary Files.
2. Click the Quit button
3. Once the browser window dims, close your web browser.





# Frequently Asked Questions

1. Q: When executing the cmd files included in the software Windows asks me which application should they be opened with?  
   A: CMD file are a built in script file format which should automatically run in Windows when double clicked. The use of some registry cleaning utilities might lead to this being removed from your machine. For Windows 7 this can be restored by downloading the cmd file type from <http://www.sevenforums.com/tutorials/19449-default-file-type-associations-restore.html>
2. Q: When performing de-identification I receive a message on screen asking if you meant to de-identify column x, or the validation reports some columns were changed during de-identification?  
   A: When generating a validation report the column headers within the source file should not contain spaces. These will automatically be renamed, replacing the spaces with a . which will cause a failure of the name checking. To work around this issue remove spaces from the headers or uncheck the box to create a validation report. This issue will be corrected in a later release.
3. Q: When I upload my data I am shown a message stating that the file size is too large.  
   A: The max file size set by default is 500MB. This can be changed by editing the file server.R, however has only been tested at the default value. For example to change from 500MB to 700MB the following change would be made

options(shiny.maxRequestSize = 500\*1024^2)

options(shiny.maxRequestSize = 700\*1024^2)

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