REDUCE

Installation Guide

for Personal Computers

Winfried Neun
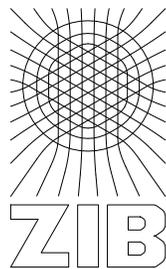
REDUCE Installation

Guide

for Personal Computers

Version 3.8

by

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August 2004

Abstract

This document describes operating procedures for installing REDUCE specific to personal computers running Microsoft Windows XP, 2000, NT, and MS Windows 95, MS Windows 98. A MS-DOS, OS/2, or Windows 3.1 version is NOT supported.

Contents

1   Introduction

This guide describes the REDUCE version 3.8 distribution CD–ROM and procedures for installing, testing and maintaining REDUCE on a personal computer with an Intel[1] processor or Digital Equipment (Compaq) Alpha processor based computer with DOS[2] Version 3.3 or higher or any version of MS Windows. Please note: This version will **NOT** run on any 8086, 8088, 80186 or 80286 based machines no matter how much memory they have. (This remark is mostly for historical reasons.)

The Intel 32 bit versions of REDUCE have a lot of features in common. Therefore, in the following, we denote by Windows XP/2000/95/98 one of the operating systems Windows 95, Windows 98, Windows XP, or Windows 2000. There are a few special features in the Windows NT version.

The following names are used for the operating systems in the REDUCE file tree and on the distribution disks:

operating system	system name	binary archive file
MS Windows NT (Intel):	win32	win32.zip
MS Windows 95/98/2000/XP:	win32	win32.zip
MS Windows NT (DEC Alpha):	alphant	alphant.zip

REDUCE is based on Standard LISP, and this version requires the availability of Portable Standard Lisp (PSL), version 4.2. The PSL files necessary to run REDUCE are included on the system CD–ROM. This is not however a complete PSL system and in particular does not include PSL sources. A complete PSL, if needed, is available separately from the Konrad-Zuse-Zentrum; contact:

> Konrad-Zuse-Zentrum für Informationstechnik Berlin
> Takustrasse 7
> D 14195 Berlin–Dahlem
> Fed. Rep. of Germany
> Electronic Mail: neun@ZIB.de
> Facsimile: (+49) 30 84185 125

The distributed version of REDUCE takes its execution size from the command line. The minimum size of installed memory for executing REDUCE is 32 Megabytes, but for more advanced calculations more memory is necessary. The complete set of binaries requires approximately 14 million bytes of disk space for one of the Intel based operating systems. For the DEC Alpha binaries approximately 25 million bytes are needed. As usual, the REDUCE systems runs better the more physical memory is installed, up to 128 MBytes can be used on 32 bit systems.

Under all operating systems there is a small binary executable, the PSL loader, which loads the REDUCE kernel preserved in a binary file, called the "image" file with suffix .IMG.

The Intel architecture based versions of REDUCE use the 32 bit mode of this processor.

Under **Windows 95/98/2000/XP or Windows NT** REDUCE operates in the native modes of these systems. Both versions use an individual loader which loads an individual image file. Under Windows NT and Windows 95/98/2000/XP the program BPSLW.EXE organizes at the same time the interactive window support which is very similar to that offered by the MS Windows version.

The load modules, sources and scripts are compatible among the Intel based systems - only the executables and image files are individual for the operating system and are kept in separate subdirectories.

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[1]Throughout this document "Intel processors" mean the 32 bit processors of the Intel x86 family, namely i386(SX and DX) (optionally with i387 coprocessor), i486 and Pentium or compatibles, e.g., AMD processors. Intel Itanium Processors are currently not supported by this implementation.

[2]MS, MS-DOS, Windows and Windows NT are registered trademarks of Microsoft Corporation, OS/386 is a product name reserved by ERGO Computing, Inc, OS/2 is a registered trademark of International Business Machines

On the DEC Alpha under Windows NT the 64 bit mode is supported.

There are two levels of REDUCE available,

- professional version
- personal version

Compared to the professional version the following items are missing from the personal version:

- compiler
- rebuild scripts
- sources

This guide can be used for both versions. Differences are marked by notes $^{(prof)}$ for features which are available in the professional version only.

2   Description of the Distribution CD–ROM

The material is distributed as a set of files on a CD–ROM. In order to make the installation process easy to handle, one REDUCE version is kept in one (compressed) file.

The CD-ROM contain files

win32.zip	REDUCE version for Windows NT, Windows 95, 98, 2000, or XP
alphant.zip	REDUCE version for DEC Alpha Windows NT
packages.zip	REDUCE sources of packages. In the personal version there is a miniset of source files needed for the installation of the system.
doc	a folder which contains documents (not compressed) mostly in TEX form.
docextra	a folder which contains documents (not compressed) which are already processed and ready for printing or browsing, resp.
others	a folder which contains software which may be useful for browsing documents or displaying graphics. This software is NOT part of REDUCE in any form. It is put on the CD-ROM in case the network connection of your system is not powerful enough to fetch large data files. Please consult the README file in this folder.
setup	containing setup.exe and scripts
disk1	unzip and some utilities

3   Installing REDUCE

3.1   Preparations

You have to select a directory name for the root of the REDUCE file tree. We recommend you either select a new directory, or empty in advance the directory for the REDUCE installation, as interferences of the new packages with any older code might cause failures. Do not use a directory with too long a path name: the directory path will be included in several command line parameters and with a long name you may run into problems with the limited DOS command line length. Also, it is not recommendable to include special characters in the REDUCE file tree name, even though the operating system might allow this. If the reduce directory itself is a subdirectory, you must create the upper part of the path before manually, if it does not yet exist.

3.2 Setting environment variable

REDUCE uses five environment variables at runtime, namely

REDUCE, MACHINE, LISP, GNUPLOT and HELPDIR

these have to be set to the following values

```
set REDUCE=<root of the REDUCE file tree>
set HELPDIR=%reduce%\help
set LISP=psl
set MACHINE=<win32, win31 or alphant>
set GNUPLOT=%reduce%\wutil\%MACHINE%
```

depending on the installed version of REDUCE. Using these variables allows you to keep several version of REDUCE in the same file tree.

Please add these settings to the file `c:\autoexec.bat` under Windows 95 or Windows 98 and use the $Settings > ControlPanel > System > Environment$ mechanism under Windows NT, Windows 2000 or Windows XP.

If all or some of the settings are missing, there is a risk of malfunction of some components. Under Windows 95 or 98 you have to reboot the system in order to make the new settings work.

3.3 Automatic Installation using Setup

Following these installation steps is recommended.

If your CD–ROM drive supports the autorun feature, setup is started automatically after mounting the CD–ROM into the drive.

Under MS Windows 95/98 and Windows NT, 2000, XP the installation material is prepared to be used by the MS Setup program.

In Windows 95/98 or NT/2000/XP, if the autorun feature is not supported, please

1. press the **Start** Button of the taskbar.
2. Select **Run...** from the menu.
3. Enter `DriveLetter:\Setup\Setup` as command for execution, e.g.

    `d:\setup\setup`

This will start the Setup Program which takes over control on the installation process and will offer a choice of options for the installation. At all stages of this installation it is possible to exit the ongoing process by pressing the Cancel or Exit button. It is also possible to install additional parts of the software or text files in a secondary installation step.

The installation steps are as follows:

After Setup has been started (either automatically via autorun or manually), you will see this window:
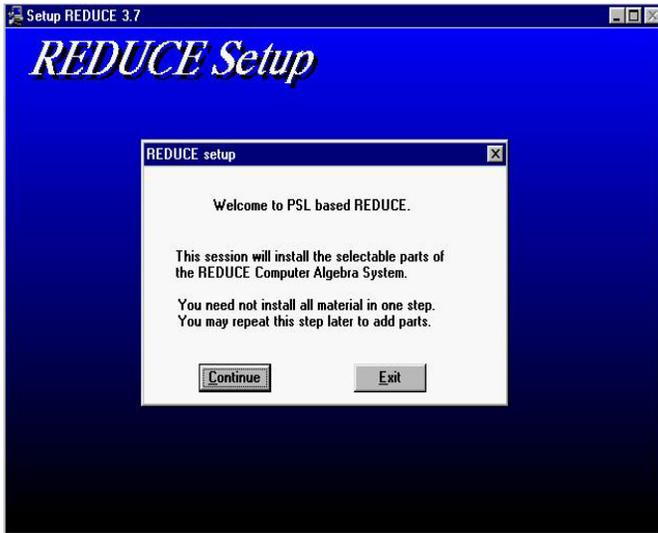
1. Enter your choice of the REDUCE path, e. g. `C:\REDUCE`.
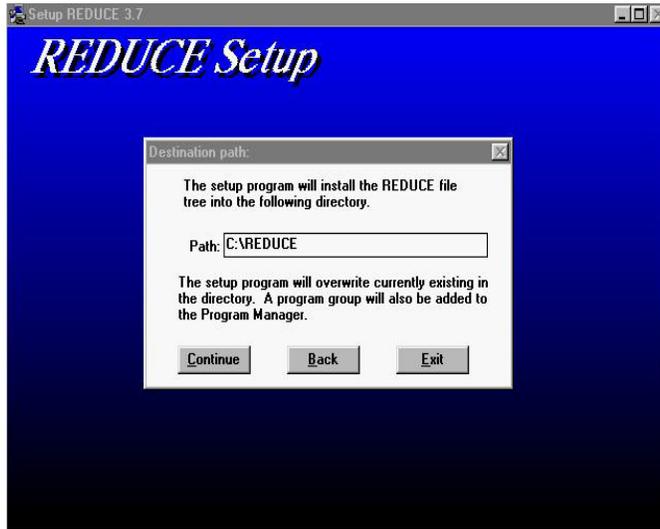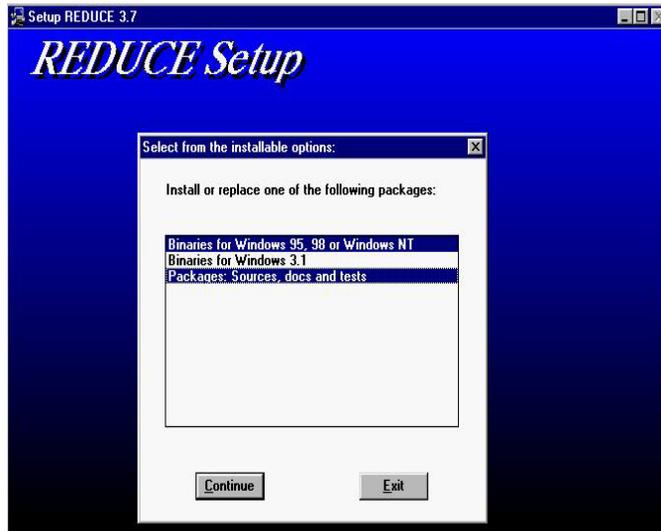

2. Select the parts of the software which you want to install. In order to produce a running system, one has to choose one of the binary version suited for the actual operating system.

3. After reading the CD–ROM files, the REDUCE files will be unpacked and put into the approriate places in the REDUCE homedir tree. If you are reinstalling the software to a non–empty directory, please allow overwriting of files when prompted.

4. As final step a group (called "REDUCE 3.8") of Windows icons is generated which allows the user to start REDUCE by double clicking the icon.

5. To test the installation double click the REDUCE icon. This will open a window where the message:

```
loading ....
REDUCE 3.8, 15-Apr-2004 ...
1:
```

appears followed by an input prompt. Enter `bye;`. This will end the first session.

The installation is now complete.

3.4   The shortcuts in the REDUCE group

The structure of the shortcuts in the automatically generated REDUCE group is as follows:

An example with Windows user interface:

Command Line:
`%reduce%\lisp\psl\win32\psl\bpslw -f %reduce%\lisp\psl\win32\red\reduce.img -td 12000000`

or an example for batch processing (reading from infile)

Command Line:
`%reduce%\lisp\psl\win32\psl\bpsl -f %reduce%\lisp\psl\win32\red\reduce.img -td 12000000 -i infile -o outfile`

If you want to modify existing or add new shortcuts, please use the

$Settings > Taskbar > StartMenu > Advanced$ mechanism as described in the Windows documentation.

The number following the -td parameter represents the total memory size in bytes as a decimal number. If your computer is equipped with large real memory, you may consider arranging for an icon with huge memory usage. The maximum for the td value is 128Mb on 32 bit systems.

BPSLW is equipped with several icons; you can select one of them by pushing the button ⟦ Change Icon ⟧.

After pushing ⟦ OK ⟧ the REDUCE icon appears in the group.

3.5   Mixing Operating Systems

On an Intel processor based machine you can install the binaries for Windows 95/98/2000/XP and Windows NT in one file tree without problems. Simply run the installation script under each operating system separately with the same root. Please note that **.img** files which are produced during the installation are not compatible between Windows 95/98/2000 and Windows NT. If you want to use both operation systems on the same machine or access the software from a server disk, please copy the specific image files and update the items in the REDUCE 3.8 folder in the taskbar.

4   Printing Documents

The distributed documents can be found in the DOC folder in the REDUCE file tree or in printable form in the DOCEXTRA folder on the CD–ROM.

The documents with suffix `.TXT` may be printed using standard DOS utilities. They are paginated and formatted with standard ASCII control characters. A maximum of sixty print lines per page are assumed. The left margin offset must be supplied by the user.

The documents with suffix `.TEX` need the LaTeX program system for printing. You can find a LaTeX implementation called MiKTeX in the `others` directory of the installation CD-ROM.

In order to browse files with a suffix .pdf you need ADOBE(R)'s Acrobat(R) [3] reader. If you did not yet install the Acrobat Reader, you can download it from

http://www.adobe.com.

5 Testing REDUCE

To test the REDUCE installation enter:

```
REDUCE
in "$reduce\packages\alg\alg.tst";
```

or use the script

```
util\tstpckge alg
```

which generates a session log in the directory LOG. This requires about 1 second on a 133 MHz Pentium system under Windows 95.

Other programs for testing the REDUCE system assembly may also be found in the packages folders included in %reduce%\packages .

6 Running REDUCE Programs

Prototypical instructions for using the 386 implementation of REDUCE are available in the directory DOC as the file OPER.TEX. You should edit this to reflect your site-specific implementation. Site independent instructions for the use of REDUCE are given in the *REDUCE User's Manual*. More collections of examples can be found in the packages folder in files ith the .tst suffix.

7 Utilities

In the subdirectory $util$ there are several scripts available. They can all be executed with all supporting systems. Under DOS they will switch to Windows automatically if either the file $reduce\backslash bin\backslash psll.exe$ is missing or if

```
set rbase=WIN
```

had been set before.

7.1 Tests

The script UTIL\TSTPCKGE be used to execute one of the tests in the packages subdirectories. Simply call e.g.

```
util\tstpckge int
```

for invoking the integrator test. A log is then written to the directory LOG, e.g. as `log\int.rlg`.

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[3]Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated.

7.2   Rebuilding REDUCE FASL Files$^{(prof)}$

Because of its organization into independently compilable packages and the packges into modules, the current REDUCE system is fairly easy to maintain. If any source updates are necessary, they can be incorporated into the appropriate files using a convenient editor. Once any system source file has been updated, it is necessary to rebuild (compile) the equivalent fast loading modules in order to utilize the changes. The `mkpckge` script can be used to update a packages fasl files belonging to a package. The parameter is the name of the package to be compiled; the path and the suffix `.red` is appended automatically.

Examples:

```
util\mkpckge int
util\mkpckge assist
```

7.3   Maintaining REDUCE

The `util` directory includes a number of scripts that are useful for the ongoing maintenance of RE-DUCE. Most of these are only of interest to the system maintainer, and several have been described earlier in this guide. However, for completeness, they are all documented in this section. All are associated with a file with a `bat` extension and some have one with a `dat` extension. They are as follows:

buildpsl$^{(prof)}$ This is used to rebuild the complete REDUCE fast-loading (fasl) file system from scratch. It first uses the script `dbuild` to build a version of REDUCE suitable for compiling all packages. After that, mkpckge is run for all packages defined in upackage.bat.

checkall$^{(prof)}$ This can be used to check the logs generated by `testall` with the "exemplary" versions found in the packges folders. This uses a `perl` script to compare a log generated by `tstpckge` with the equivalent "exemplary" version found in the packages `rlg` file.

dbuild$^{(prof)}$ This is used by `buildpsl` to build a version of REDUCE suitable for compiling all packages.

mkpckge$^{(prof)}$ This creates a single fasl file from a package file. It is used in the form `mkpckge` `<package-name>` for files in the `packages` directory. The location of the packages in the file tree is defined in `packages\support\packages.red`.

mkreduce   This creates the REDUCE executable from PSL and REDUCE fasl files. Under Windows NT or Windows 95/98/2000, it is recommended to use the MKREDUCE icon from the REDUCE 3.8 group folder instead. This script definitely requires the variables REDUCE and MACHINE to be set properly.

remake$^{(prof)}$ This creates new fasl files in case of local changes or a new patches.red file. Under Windows NT or Windows 95/98/2000, it is recommended to use the REMAKE icon from the REDUCE 3.8 group folder instead. This script definitely requires the variables REDUCE and MACHINE to be set properly.

tstpckge This can be used to run one of the test files in the packages directory. `tstpckge <package>` will run a test file, `<package\package>`.tst. `tstpckge` generates a log file, `<package>`.rlg, in the `log` directory.

testall This script runs all the tests contained in the packages directories, using the `tstpckge` script on each one. This script takes considerable time to complete (at least an hour on a 486 system, for example).

8   Patches for REDUCE

The REDUCE system is equipped with a mechanism for correcting bugs *in situ*. The basis for such corrections is the file `packages\support\patches.red`. It contains individual patches for the REDUCE core modules and for REDUCE packages. Its header contains the actual date of the file and gives information about the repaired bugs. A version of this file is delivered with all REDUCE disk sets, including Personal REDUCE. The installed binary includes the contents of this file in compiled form. The most recent version of the file `patches.red` can be obtained from the REDUCE Web site at **www.reduce-algebra.com** in the directory *patches*. To install a new version on your system please perform the following steps:

- **professional REDUCE**:
    1. copy `patches.red` to the directory `packages\support`,
    2. run the script `util\remake`. This script compiles the patches file. Alternatively (and easier) you can double click the REMAKE icon in the REDUCE 3.8 group.
    3. run the script `util\mkreduce` in order to build a new binary (or doubleclick the MKRE-DUCE icon in the REDUCE 3.8 group).

- **personal REDUCE, with ftp access**:
    1. use anonymous ftp to fetch the file `patches.b` from the server `ftp.zib.de`. It can be found in `pub/reduce/patches/` or `pub/reduce/patches/alphant`. Use **binary** mode for the transfer.
    2. copy this file to the directory `lisp\psl\%MACHINE%\red`.
    3. run the script `util\mkreduce` in order to build a new binary (or doubleclick the MKRE-DUCE icon in the REDUCE 3.8 group).

- **personal REDUCE, no ftp access**:
    1. copy `patches.red` to the directory `packages\support`,
    2. run the script `util\mkpatch`; this script translates the patch file into Standard LISP and builds a new binary.

When REDUCE is built with a non-compiled version of `patches` some programs may need more execution time; however, in most cases this effect is negligible.

The ftp server mentioned above contains other items that might be useful for your REDUCE installation. Please consult the `readme` file for actual information.

9   Obtaining recent information on REDUCE

Recent information about REDUCE and new or updated REDUCE packages can be obtained from a World Wide Web REDUCE server with URL *http://www.reduce-algebra.com* In addition to general

information about REDUCE, this server has pointers to the module library, the demonstration versions, examples of REDUCE programming.

For distribution of REDUCE news and for discussing REDUCE topics of general interest there is an electronic mail forum. Every user of REDUCE is invited to participate. To register for this forum, or for further information, please send email to `reduce@rand.org`.

10   Program Registration

After installing REDUCE, please register the product. ONLINE Registration through the Web page `http://www.reduce-algebra.com` is preferred. Otherwise, please fill out the accompanying registration form and send to:

<div align="center">

Dr. Anthony C. Hearn

RAND

1700 Main Street

Santa Monica, CA 90407-2138

Telephone (310) 393-0411

Facsimile (310) 393-4818

Email: reduce@rand.org

</div>

This should be done so that you can be advised direct of any changes which are made to the system. Furthermore, the copyright statement on the REDUCE documents requires such registration as a requirement for their local distribution. The test time requested on the registration form is the time printed by the final call of `showtime` in the output from the test described in the section "Testing REDUCE".

11   Inquiries and Reporting of Errors

We would appreciate hearing about bugs you encounter or questions you may have regarding the assembly or the operation of the system. Suspected errors should be accompanied by the relevant output and a copy of the input source. Corrections for documented problems or other improvements to the system are also welcomed.

REDUCE 3.8 Registration Form

After installing REDUCE, please fill out this form and send to:

> Anthony C. Hearn
> RAND
> 1700 Main Street
> P.O. Box 2138
> Santa Monica CA 90407-2138 U.S.A.
> Electronic Mail: reduce@rand.org

This should be done so that you can be advised of any changes made to the system. Furthermore, returning the registration form is a requirement for local reproduction of the REDUCE documentation.

Date: _____

Contact Person: _____

Organization: _____

Address: _____

_____

_____

Telephone: _____

Network Address: _____
(Indicate network: Internet, BITNET, EARN, UUCP, etc)

REDUCE Supplier: **Konrad-Zuse-Zentrum Berlin**

Computer Description:

Vendor: _____ Model: _____ Operating System: _____

Please indicate the test time as printed by the final call of `showtime` in the output from the test described in the section "Testing REDUCE" of the REDUCE Installation Guide.
Also give the memory size used (real or virtual) if known (called Region below), and the total amount of (real) memory available on the machine, if you know.

Time: _____ Region: _____ Machine Memory: _____

Please also write on the back of this form any comments you may have about the installation procedure, and system documentation and performance.

If you would like to be listed in a published registry of REDUCE system holders, please check here.
☐