

XpkMaster

COLLABORATORS

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REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

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Chapter 1

XpkMaster

1.1 Welcome to the XPK distribution

Welcome to the eXternal PacKer (XPK) library system for easier ↔
handling
of crunching and decrunching.

About

About this distribution

Archive Contents

Contents of distributed archives

Version Info

What changes are made

GNU - License

License for some of added libs/programs

Philosophy

Some background information

Version 4 news

Preferences

Preferences system

XFD Support

Alien cruncher support

SubLibs

Documentation for supplied sublibraries

C-Utills

Documentation of the included programs

XPK programs

XPK supporting/using programs

Contacts

Addresses of people related to XPK

Try WWW addresses

<http://www.amigaworld.com/support/xpkmaster/>

or <http://rcswww.urz.tu-dresden.de/~stoecker/xpkmaster.html>

Here all files are accessible (also the xpk_Crypt.lha archive).

On this page is also a list of a lot of XPK sub libraries and XPK programs.

1.2 The contents of the distribution

```

                xpk_User.lha (util/pack)
C/           Various
              programs
              using XPK.
catalogs/    Catalog files for use with locale.library.
EnvArc       Preferences file example.
Libs/xpkmaster.library The heart of the XPK system.
Libs/compressors/  Compression
                  sublibraries
                .
Libs_1.3/     xpkmaster.library for OS 1.3.
Libs_68020+/  68020+ versions of some
                  sublibraries
                .
Prefs/       Preferences program.
Install      Installer script for complete distribution.
XpkMaster.guide This documentation.

xpk_Crypt.lha (not distributed in USA, in Germany util/crypt)
  libs/compressors/  Encryption
                    sublibraries
                  .
  source/           Source files of encryption libs.
This archive can be accessed only on German Aminet servers or by calling
my WWW page (See below).

xpk_Develop.lha (util/pack)
  Autodocs/        Programmer documentations of libraries.
  HotHelp/         HotHelp documentation.
  Include/         Includes for programmers.

xpk_Source.lha (util/pack)
  Sources to libraries and utility programs.

```

1.3 xpk programs

XFH: (1.40)

XFH-Handler is a DOS handler which uses xpkmaster.library to provide

transparent access to compressed files in a given directory or partition. All compression/decompression is done automatically by the handler when files are read or written. Compression is optional and may be switched at any time, allowing for fine control over storage of data. The compression method may be changed at will. Decompression is always automatic, you do not have to care about which compressor was used to create the files.

Author:

Matthias Scheler
Where to find: in Aminet as util/pack/XFH.lha

XPk-KNIGHT: (1.05)

XPk-KNIGHT is a free configurable, easy graphic user interface for comfortable usage of most of the important functions within the xpkmaster.library and its correspondending XPK packers.

Author: Alexander Grossberger <nobody@betei.franken.de>
Where to find: in Aminet as util/pack/xpk-Knight_???.lha

XpkArchive System: (2.0)

As stated in

Philosophy
above the xpkmaster.library there exists also the xpkarchive.library, which handles archive creation like LhA or Zoo. Please have a look at this package too!

Author:

Matthias Meixner
Where to find: in Aminet as util/arc/XpkArchivePackage???.lha

XPKatana: (1.2)

Full-featured GUI for XPK, allows (un)packing, features a complete ARexx port, supports batch jobs, etc... Also supports FileID.library for filetype identification, and xfdmaster.library for alien packer decrunching, making it possible to repack most alien packing formats into a regular XPK format.

Author: Eric Sauvageau <sauvae00@libertel.montreal.qc.ca>
Where to find: in Aminet as util/pack/xpkatana???.lha

XpkCybPrefs: (1.2)

XpkCybPrefs is an alternative to XpkMasterPrefs. It provides a transparent "intelligent" packing, according to the filetype (by simply setting "USER" as XPK packer and configuring once for all, you get everything working). Some features: Size conditions, "Multipacking" (trying multiple packers on data, keeping the best or fastest-decrunching etc... one!!), report-window with full info, user-choice requester ETC ETC... (100% user-configurable)

Author: Alexis Nasr <nasr@hol.fr>
Where to find: in Aminet as util/pack/XpkCybPrefs.lha

1.4 about

This distribution was first created by
Dirk Stöcker
in October 1996.

The concept, the most stuff and documentations of version 2.x distribution were made by

Bryan Ford
and
Urban Dominik Müller
. A lot of bug fixes made

Christian von Roques
. I continue XPK development now, because the above mentioned persons have no time to do further support.

To the authors of programs supporting XPK:

Please send me a short description (10 lines maximum) of your program. I compile a list of XPK supporting programs from this information. Please include information, where to find your program (e.g. in Aminet util/pack).

About this documentation:

I created this documentation starting from a lot of single files. To cut the size a little bit down I had to omit much useless or double information. If I deleted something I should not, please tell me and I will reincorporate it. Error reports and newer docs or corrected contact addresses are welcome too. Some of them are probably outdated.

If you have newer versions of included sub libraries or other enhancements please contact me as well.

If someone feels, like translating the Installer script or the catalog files for xpkmaster.library and XpkMaster preferences program, send it, and I will include the stuff in next release.

1.5 history

When the version number has a character attached, the xpkmaster library did not change, but only the distribution was updated.

4.29: Sorry, sorry, but 4.27 did not really fix the bug. Now it is fixed! xpkmaster is now 100% C code (also startup), which results in 100 byte longer executable, but it should be portable a lot easier now.

4.27: Fixed serious bug added in last version, with files larger than 65535 bytes. Thanks to Thomasz Kepa for reporting it. Added missing catalog texts.

4.26: Added xfdmaster.library support and cleaned up the code a lot. XPK can decrunch StoneCracker, RNC, CrunchMania and Imploder files now.

The internal PowerPacker support has been removed, as xfdmaster.library does this now. So powerpacker.library is no longer required.

Thanks a lot to Georg Hörmann for making this possible.

Changed a lot in design of XpkPassRequest. It uses gadtools library and is a lot nicer now (has a window title, shows stars, timeout uses timer.device, ...).

4.16: Changed A2 contents of preferences RecogFunc to TagList (I hope nobody did use it till now.). This causes problems with XpkCybPrefs version 1.0. Use newer versions only!

4.14a: fixed Installer script, rewrote xDir, added more language files

4.14: fixed low-mem-bug in NUKE and DUKE, little changes in master lib, fixed IDEA bug (thanks to Alexis Nasr for finding a solution), fixed bug in XpkMasterPrefs, added some parts to the docs, added length check and OR specifier to file pattern check, added pattern matching for xBench

4.13: fixed Installer script, added xBench ALL and SAVE option, removed error in Expunge code of library, fixed xQuery

4.12: added automatic password request and preferences system, cleared the code a bit and removed obsolete code, removed xDrop from distribution, wrote new xBench utility.

4.0: added 5 new functions, fixed some little bugs, added first stage of preferences system (XpkMaster and XpkMasterPrefs programs), library is now OS2.0+ only

3.12: special OS1.3 only version, removed locale and utility library stuff

3.11: recompiled the library with SAS 6.57, cleaned up the complete package, removed XFH

3.10: I reworked the source and added locale.library support, a better library header and another way of debugging.

NOTE: The include files moved to xpk directory. Before it was libraries.

1.6 Preferences system overview

The preferences system allows packing of files depending on their file type, their size or name. It is useful especially for programs handling a lot of different files like backup tools. With type depending packing you get a faster and shorter backup. It is useful for stacker tools like XFH also. But the system may be useful for lots of other situations.

It consists of 2 parts:

1) Program for preferences settings in "Prefs" directory:

XpkMaster

This program also allows setting global xpkmaster defines

2) Shell utility to handle preferences files on run-time:

XpkMasterPrefs

* Programmers should read the autodoc file xpkpreferences.doc. ←

There is

* told how preferences are handled and how you can replace the preferences system with you own one. There already exists another system called * XpkCybPrefs.

For the user it is really easy to use: You only need to select the sub library 'USER' in the programs which use xpk for packing. This USER library is no real library, but a dummy (it does not exist in LIBS:compressors). Programs accessing the xpk libraries direct, or scanning LIBS:compressors themself are thus not able to use the new preferences!

When preferences are not activated and you select USER you get an error.

To get the preferences active you either need to create a preferences file with

XpkMaster

and to run

XpkMasterPrefs

or to install any other system

like XpkCybPrefs.

The global preferences are used all time when needed (and installed), but may be disabled by certain programs.

xpkmaster.library does not access any of the files itself, but only accesses the preferences semaphore. xpkmaster.library thus never causes any DOS-Requests (except when using file access as source or destination and loading sub libraries). That's why it can be used in multitasking unfriendly environments like for certain games.

1.7 preferences - xpkmaster

It is a normal preferences program like Serial, Printer, Locale, ←

...

This program is used to set global xpkmaster defines (TimeOut, use of xex libraries, ...) and to define file types and corresponding packing methods.

The screen is divided into left and right part. On left side there is a list of all filetypes. 4 gadgets allow manipulation of the entries: move up and down type, delete type and add new type. First entry always exists and cannot be deleted/moved. This is default entry. It's name can be changed, but after reloading saved data the default name applies again. When adding a new type, the data from default type is copied into new type.

The right side allows manipulation of the filetype:

Name Pattern:

Specify a standard AmigaDOS pattern describing the filetype. Using field File Pattern is better, because some programs do not submit file names or use dummy names. It is always better to find a File Pattern description, than a Name Pattern.

File Pattern:

This allows to describe a file type by comparing the file contents with a defined pattern. See

filepatterns
for pattern description and examples.

Library Name:

Four letter ID of library you want use for packing.

Mode:

Mode used for packing. This is a decimal number from 0 to 100.

ChunkSize:

ChunkSize used for packing. See autodoc files for better description. Most time it should be 0.

PackMode:

Define if you want to pack the file, return an error or do not pack the file. When selected 'return error', the caller program gets told, that packing was not possible. When selecting 'do not pack', the file is passed through without changes. If these two type are selected, Library name, Mode and ChunkSize fields are disabled.

Modus 'do not pack' may produce errors on decrunching with certain backup programs. Try using 'return error' for these instead. If this does not work, you cannot use any of these two (for example in Diavolo backup), but only normal type selection. You may choose packer "NONE" for the previous NoPack/ReturnError entries.

For the last part, see

global defines
. These defines are not file type

specific, but xpkmaster global.

The last three gadgets (Save, Use, Cancel) and the menus are equal to standard prefs files and easy understandable.

The patterns: When both pattern types are specified, both must be true, to specify a filetype.

Example: GIF files

1) filepattern and no namepattern is specified:

XpkMaster recognizes all GIF files

2) filepattern and name pattern (#?.gif) is specified:

XpkMaster recognizes all GIF files, ending with .gif

3) on name pattern is specified:

XpkMaster recognizes all files ending with #?.gif (also if these files are not GIF files!)

A correct file pattern should most times be enough and better as a name pattern. So example 1 is nearly in all cases the best way!

1.8 preferences - global

These settings allow to define some global xpkmaster.library ↔
behaviour. All

different preferences systems should support these defines.

Use XFD:

Should xpkmaster use xfdmaster.library for decrunching custom file types, ←

or not? Not all xfdmaster file types are supported. XPK can decrunch only types, which support calculation of uncrunched file size before uncrunching. This is turned off by default, but I suggest to turn it on.

Use XEX:

Should xpkmaster install list, where the scan routines of xex libraries are hold. This is necessary to recognize custom filetypes on decrunching. It is not imlemented at the moment.

Auto Password:

Should xpkmaster use automatic password requester, when password is needed, but not supplied? Password requester quits after a definable time value.

Timeout:

Define the time password request stays open with no user interaction. After that time the requester automatically quits, when no user-action happend. Default is 120 seconds.

1.9 preferences - xpkmasterprefs

This program is like IPrefs. It loads the file ENV:xpkmaster.prefs and makes it possible for xpkmaster.library to access the data. How this is done is explained in the autodoc file xpkpreferences.doc. Everytime you change the file ENV:xpkmaster.prefs by selecting USE or SAVE in XpkMaster preferences program, the data is updated automatically. So after selecting USE, xpkmaster.library uses the new settings.

NOTE: The filetypes are scanned in same order, as you entered them in XpkMaster preferences program. There is only one exception: The default type (displayed first always) is not scanned, but used when no other type matches (which means it is the last always!).

How to install:

Copy it to C: directory and start the program before you use xpkmaster library first. The best place is S:User-StartUp (or S:StartUp-Sequence in some cases). There you may add the line

```
Run >NIL: XpkMasterPrefs
```

The rest will be done automatically by the program. To kill the program call it with "XpkMasterPrefs QUIT" or send it a CTRL-C break signal.

You can start it from WorkBench (or from drawer WBStartUp) as well. You only need to add a icon and set the tooltype "DONOTWAIT". But quitting the program from WorkBench is impossible. You need to enter shell for that and use above command line.

1.10 filepatterns

The file pattern consists of a mode describing lower case character (l, h, m, v, r, g, s) and corresponding hexadecimal data. It helps to describes file type specific parts.

You may specify different types in one string by seperating the types by '|'. So text1|text2 means that the file has to match either text1 or text2.

Control Characters:

For these control characters the data consists of a \$/hex value with upto 8 digits (ULONG) [option m allows only 4 digits (UWORD)].

l - filesize must be shorter (LOWER) than specified value

h - filesize must be larger (HIGHER) than specified value

When using these options, be sure you do not forget any size. When specifying a type l100 and one type h100, the size 100 is missing!

m - Move to position in the file. The first byte has position 0.

Note: The real maximum move-size depends on the buffer value set in XpkMasterPrefs program. Currently this match part are the first 2048 bytes.

The following numbers/strings are specified using \$/hex values and must be given as bytes (2 digits). You may repeat data behind these without adding the command each time (f.e. v40v41 is equal to v4041).

v - Match specified BYTES at the current position in the buffer.

r - Exclude ranges - these ranges cannot be within the match part of the file. You can once again specify numerous ranges, all will be compared against the first 2048 bytes. For example, to figure out an plain text file you might try r001F7F9F, so any file with chars within 00-1F and 7F-9F is passed through to the next preference entry.

You need to specify always 2 bytes (4 digits).

g - Range which may exists at the current position - means same as v but gives a valid range instead. For example, g3039 will match any numeral digit at the current position.

You need to specify always 2 bytes (4 digits).

s - Describes a string which has to be within the match part of the file, but at any given position therein. For example, you could detect post-script files using s25215053 ("%!PS").

examples:

v464F524D describes an IFF file - matching FORM at the start

v464F524Dm8v494C424D describes an IFF ILBM file - matching FORM at the start and ILBM at position 8

r00405BFF matches any file having only UPPER characters A-Z

g415A617A describes a file having an UPPER character at first and a lower character at second position

v000003F316401 Executable file with size up to 25KB

v000003F3h6400119001 Executable file with size between 25KB and 100KB

v000003F3h19000 Executable file with size greater than 100KB

v50503230|v50583230 PowerPacker files: Header is PP20 or PX20

Example File Types:

Files marked with NoPack are already crunched.

Type	NoPack	File Pattern
DMS Archive	(DMS)	* v444D5321
Executable	(EXE)	v000003F3
GIF Picture	(GIF)	* v474946
HotHelpHeader	(HHH)	m6v486F7448656C70486561646572
HotHelpText	(HHT)	* m6v486F7448656C7054657874
Icon File	(INFO)	vE3100001
ILBM Picture	(IFF ILBM)	v464F524Dm8v494C424D
Intellifont	(IOF)	v00440001m10v0014FFFF
JPEG Picture	(JFIF)	* vFFD8
MED Module	(MMD)	v4D4D44g3039
LhA Archive	(-lh?-)	* m2v2D6C68m6v2D
LZX Archive	(LZX)	* v4C5A58
PNG Picture	(PNG)	* v89504E470D0A1A0A
PT 32 Module	(PT MOD 32)	m438v4D2E4B2E
PT Packed Song	(PT SONG)	* v5041434B
Sound File	(IFF 8SVX)	v464F524Dm8v38535658
Startrek. Mod.	(ST MOD)	m438v464C54g3039
WordWorth Text	(IFF WOWO)	v464F524Dm8v574F574F
XPk file	(XPkF)	* v58504B46
Zip Archive	(PK)	* v504B0304
Other IFF	(IFF)	v464F524D

1.11 xfd support

Starting with version 4.19 of `xpkmaster.library`, it is possible to `↔` decrunch files, which are not in XPkF file format (not crunched with XPk).

XPk uses the shared `xfdmaster.library` to decrunch these files. This library can be found in Aminet (`util/pack/xfd???.lha`). You need at least version V38 of this library.

To enable that feature you need a program, which allows this by default or you use

```
preferences
system to turn it on. By default the XFD support is
turned off.
```

Not all `xfdmaster` file types are supported. XPk can decrunch only types, which support calculation of uncrunched file size before uncrunching.

Version 38.2 of XFD allows to decrunch ProPack (RNC), StoneCracker, CrunchMania, Imploder and PowerPacker data.

1.12 XPk - A STANDARD FOR DATA COMPRESSION

MOTIVATION

- * Many programs that should offer data compression (e.g. HD backup utilities) do not.
- * Many programs that offer data compression use old, slow, inefficient or inappropriate algorithm.
- * All programs that offer data compression offer just one algorithm, you are stuck with that one.
- * Many good packers are not used by any application program and have no good user interface.
- * The installation of most packers requires AmigaShell knowledge (f.e. putting LhA in the path so that other programs can find it)
- * The decompression of all files packed with existing packers requires knowledge about the packer used for compression.
- * Many compression programs can not deal with files that are larger than available memory.
- * The existing compression programs are either slow or have a low compression factor.
- * There is no way to support upcoming hardware compression cards in already existing applications yet.
- * For none of the current compression programs exists a real decompressing file handler that uses no dirty tricks to decompress files on the fly.

The solution to all these problems is XPK.

OVERVIEW

The XPK standard is to data compression what xpr is to file transmission.

It consists of three layers:

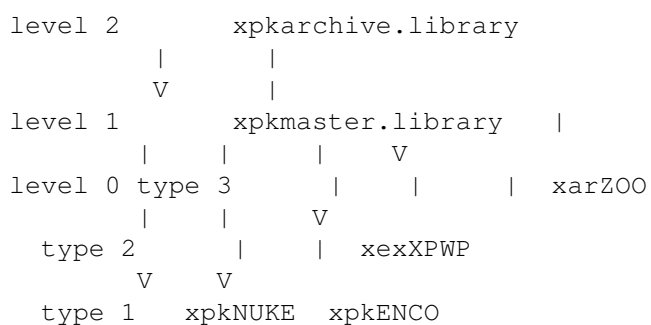
Level 2: The application/XPK interface for archives

Level 1: The application/XPK interface for files

Level 0: The XPK/packer interface

In addition, there is an optional standard XPK file format.

All parts of the XPK standard are implemented in shared libraries. There is one master library for archive level access, one master library for file level access, and one library for each compression algorithm.



LEVEL 0 LIBRARIES

All level 0 libraries offer the same functions. They are very small. Typical calls are: "Tell me what you can", "Compress this chunk of memory to another chunk of memory", and "Decompress this chunk of memory to another chunk of memory". These libs are very limited, their functionality is expanded by xpkmaster.library. No one would want to talk to a sub library directly.

THE LEVEL 1 LIBRARY

 Offers functions like "Compress this file to that chunk of memory using that algorithm". All combinations permitted: Mem to mem, file to file, mem to file, decompression and compression. Asynchronous packing possible. Very convenient tag based caller interface. Determines automatically out which sub library to use for decompression. Returns detailed error messages.

THE LEVEL 2 LIBRARY

Offers archiving functions like "add this file to that archive" or "show me the contents of that archive".

OVERRIDING

It is planned, that libraries of a lower level can offer higher level functions. They should be able to override the automatic functionality expansion by the higher level library. `xpkmaster.library`, for example, enforces the use of the XPK standard file format. It should be possible to override this by a sub library. Therefore an new library interface will be created, the `xex` libraries.

XPK also supports to decrunch alien data cruncher formats by use of the

`xfdmaster.library`

. But not all of `xfdmaster`'s file types are supported.

XPK can decrunch only types, which support calculation of uncrunched file size before uncrunching.

THE XPK FILE FORMAT

Offers checksums, chunks (important when `Seek()`s on a compressed file become necessary) and automatic handling by the `xpkmaster.library`. This means that any new packer that can only pack mem to mem has its own file format immediately. And most important: The name of the packer library is contained in the file. Therefore, copying a new sub library to `LIBS:` is all you have to do to install a new packer (easily done in installation scripts); `xpkmaster.library` recognizes the new file type immediately. No changes to `xpkmaster.library` or the application programs necessary. In case the XPK file format is not used, the introduction of a new packer requires a change the `xpkmaster.library`.

TYPICAL APPLICATIONS

A few examples for applications that could use XPK:

- * A GadTools based archiver interface that can deal with all archivers
 - * A CLI based file compressor/decompressor [`xPack`, `xPK`, `xUp`]
 - * A hard disk backup utility that stores compressed data [`Diavolo` and others]
 - * A tool to write compressed images of devices to files [`PackDev`]
 - * A 'more' program with automatic decompression [`Most`, `MuchMore`]
 - * A DTP program that stores its fonts in compressed format
 - * A network protocol with built in data compression for slow connections
 - * A hypertext utility that allows all data to be compressed
 - * A file handler that overlays an existing filesystem and uncompresses any file while loading [`XFH`, `PackDisk`, `Diskexpander (EPU)`]
- ...plus many more we do not even need to think about yet.
-

CONCLUSION

XPK would increase the usefulness and flexibility of both application and compression programs while improving their user friendliness at the same time. The best way to establish this standard would have been to distribute it on the workbench disk that came with every Amiga.

1.13 gnu-license

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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) 19yy <name of author>
```

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19yy name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type
'show w'. This is free software, and you are welcome to redistribute it
under certain conditions; type 'show c' for details.
```

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than 'show w' and 'show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
'Gnomovision' (which makes passes at compilers) written by James Hacker.
```

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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1.14 Documentation of the included sub libraries

CBRO
Yet another CmpByteRun0 algorithm compressor

DLTA
A trivial delta preprocessor

DUKE
A
NUKE
variant tuned for sampled sound

FAST
A fast LZRW based compression algorithm

FEAL
A Fast Encryprion ALgorithm

HFMN
A fast packing & unpacking dynamic huffman

HUFF
A dynamic huffman cruncher/decruncher

IDEA
ABPs IDEA implementation for XPK

IMPL
A LZ77 variant supporting various compression modes

MASH
Another LZRW based compression algorithm

NONE
A dummy packer doing no compression

NUKE
A LZ77 variant with fast decompression

RAKE
A cruncher of the LZ77 family

SHRI

LZARI variant

SMPL

A dynamic huffman with delta precoding

SQSH

A LZ based cruncher with special algorithms for 8 bit sample data ←

Use

xBench

for comparission between packers.

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.

1.15 cbr0

Copyright 1992 Bilbo the first of Hypenosis

xpkCBR0.library is a standard XPK sublibrary implementing the very simple cmp byte run 0 compression algorithm. The same algorithm is used on compressed IFF-ILBM files. It is well known that this algorithm is only efficient on data containing repeating equal bytes. This means that ASCII files or (not compressed) picture files will be compressed well, but executable files, sound data files, encrypted files (or other white noise data) will be compressed only approx. 3%.

xpkCBR0.library is of course:

- written 100% in 68000 assembler using DevPac V3.02,
- reentrant,
- pc-relative (except for resident structure used by system for injection),
- some bytes shorter than
U.D.Müller's
RLEN,
- 2.9 times faster on compression, 3.6 times faster on decompression compared to RLEN both used on file AmigaVision
- written by Bilbo the first of Hypenosis (this fact should convince you)

Version History

1.0 First public release.

No known bugs.

1.16 dlta

FEATURES

-good when crunching modules/sounds in combination with a cruncher
-written in fast optimized assembly (joh mei)

DOCUMENTATION

The DELTA enciphering routines of xpkDLTA were developed to help XPK-crunchers crunching SOUNDS and MODULES.

In this version xpkDLTA supports BYTE-Delta encoding. This is the most efficient encoding algorithm in combination with samples. WORD-Delta and LONG-Delta may follow if the first 16-BIT (32-BIT!?) samples pass my way or if you ask me kindly.

Example:

8SVX-Sample, Music mixed with talking

Uncrunched: 1016484 byte 8SVX-Sample

Imploded: 789824 byte (77.7% left) IMPL.100ed 8SVX

Deltaed+Imploded: 628076 byte (61.7% left) DELTA+IMPL.100ed 8SVX

HOW IT WORKS

xpkDLTA takes a byte and looks what the difference is between this byte and its successor. It stores these differences. That is all!

Example:

```
|DATA |DELTA
|-----+-----
|6  |+6 (6-0) ;Start-Value => predecessor=NULL
|7  |+1 (7-6)
|3  |-4 (3-7)
|4  |+1 (4-3)
|10 |+6 (10-4)
```

FUNCTIONS: xpkDLTA supports all standard XPK sublibrary functions.

CONTACT

If you want an update, enclose enough DM (Deutsche Mark) for disk, stamps, envelope etc.

Never forget to mention

-what of my programs you are using
-which version
-where you got it from

Fanpost, donations, suggestions, ideas, flames & comments are welcome.

Get the authors address (Stephan Fuhrmann).

1.17 duke

```
DUKE is a hacked version of
NUKE
  combining the effects of
DLTA
  and
NUKE
.
```

Its compression performance and ratio probably is not good enough, we still need a good lossless sound and/or module packer.

1.18 fast

xpkFAST is an XPK compression sublibrary whose main purpose is to be ↔

fast. The most interesting part of FAST is its speedy compressor, which makes it predestined for applications which compress about as often as they decompress. Good examples are: backup systems which make use of XPK to support compressed backups or compressing filesystems.

FAST consists of three parts, two compressors and a common decompressor. You can choose between the two compressors by using FAST.0 up to FAST.79 for the ``speedy`` compressor and FAST.80 up to FAST.100 for the ``crawling`` compressor, which is still faster than

```
NUKE
. The default mode
```

is FAST.50 which selects the ``speedy`` compressor.

Algorithm

FAST is a member of the LZ77 family of datacompressors. Other popular members of the LZ77 family are: xpkNUKE, PowerPacker, Imploder (xpkIMPL) and some parts of lha, gzip, zip, zoo, freeze, arj, uc2, ha, ain, ...

The common thing about all LZ77 compressors is that they store the data as sequences of <copy>- and <quote>-items. FAST uses one 'control-bit' to distinguish between a <copy>- and a <quote>-item. A <quote>-item simply consists of one byte which has to be placed into the outputstream uninterpreted. Each <copy>-item consists of 12 bit <distance>- and 4 bit <length>-information. <distance> encodes where to copy *_from_*. The 4095 useful possibilities are 1..4095(*) bytes back in the outputstream. <length> encodes *_how_many_* bytes to copy. Possible <length>s range from 3 to 18, which are encoded as 18-<length>.

The input: aaaaadadada compresses to: Q(a) C(1,4) Q(d) C(2,5). Where Q(char) is a <quote>-item and means write a single character 'char' to the output and the <copy>-item C(dist,len) means copy 'len' bytes, which can be found 'dist' bytes back in the output, to the output.

FAST uses two datastreams. That is, the compressed data consists of two parts, the wordstream and the bytestream. The first compressor which used this technique was xpkNUKE. The bytestream starts at the beginning of the compressed data and the wordstream is stored in reverse order beginning at the end of the compressed data. Thus the compressed data does look like this: literalsSSDDRR00WW where small characters denote literal bytes and two capital characters are a word from the wordstream.

If you want to discover more of the internal workings of xpkFAST just: ``Use the force! Read the source!`` The best place to start your tour through the source is the decompressor in decompress.s since the decompressor is much simpler than the compressor.

(*) I could have been using distances of 1..4096, but doing so would have added one instruction to the short and thus fast decompressor.

History:

In April 1991, Ross Williams published his LZRW1 algorithm by presenting it at the data compression conference.

The LZRW1-A algorithm is a direct descendant of the LZRW1 algorithm, improving it a little in both speed and compression.

FAST started as a ``port`` of Ross Williams' LZRW1-A C-Implementation and his 68000-version of the decompressor to the Amiga as XPK sublibrary. While porting I made some small changes improving the decompression speed. I removed the feature of handling the case of noncompressible input, because the xpkmaster.library takes care of that. After that, I found some cute changes which dramatically improved the speed of the decompressor. These were in detail:

- * split the compressed data into a word- and a bytestream, removing many double byte accesses with a shift in between.
- * changed the copy loop from a move-dbra loop to 18 moves in a row.
- * changed the used range from 1..4096 to 0..4095 eliminating one instruction in the decompression loop.
- * removed all bra.s from the inner decompression loop.
- * totally rewrote the compressor in 68000 assembler.
 - + changed the hashfunction to NOT use mul or div.
 - + produces the ``new`` format needed by the new decompressor.
 - + removed nearly all of the loop control tests by having a fast and a safe loop.
 - + small code fits into the instructioncache of a 68030.

Urban Dominik Müller

helped me to improve the speed of the compressor
even further, contributing several ideas and some code. For details refer to the source.

V1.00: release date: 29-Aug-1993

V1.01: unreleased. [testversion with four different compressors.]

V1.02: release date: 12-Sep-1993

- * quadrupled the HASHSIZE for FAST.80 .. FAST.100 which allowed the removal of 2 now unneeded COMPARE_BYTES to speed up compress_slow.

V1.03: release date: 17-Oct-1993
* major code juggling in compress2.s to squeeze some cycles.
* removed the need for a ctrlCtr in compress2.s in favour of doing
addx.w ctrl,ctrl bcs.s ctrlFull and ctrl initialized to #1
instead of rol.w #1,ctrl dbra ctrlCnt,notFull and ctrl initialized
to #\$0000FFFF

V1.04: release date: 06-Feb-1994
* fixed a buglette reported by Detlef Riekenberg <eule@netgate.fido.de>

V1.05: release date: 01-May-1994
* removed MEMF_CLEAR from call to AllocMem() of the hashtable which
is initialised anyway. reported by Simone Avogadro
* cosmetic changes to compress2.s

V1.06: release date: 28-Jul-1994
* tuned the copying of the wordstream in compress.s and compress2.s
* rewrote bitreading in the decompressor

"Thank you"s must go to:

Jörg Bublath <bublath@forwiss.uni-passau.de>
for never getting tired of assembling and testing new versions.

Urban Dominik Müller

for providing ideas and code to improve FAST, XPK itself
and doing various xBenchmarks on his A4000 and A3000.

Ralph Schmidt <laire@uni-paderborn.de>
for providing BAsm and BDebug [In my opinion the best
development environment for assembler programs on the Amiga.]
and doing some batch-xBenchmarks on his A4000.

Michael van Elst <mlelstv@specklec.mpifr-bonn.mpg.de>
for being so couraged to run one of the first alpha versions
of the crawling mode on his A3000 during a large filetransfer
--- and crash.

Markus Illenseer <markus@TechFak.Uni-Bielefeld.DE>
for enabling me the remote-use [and once -guru] of his A2000+68030
and temporarily ripping all the 16Bit FAST RAM out for the sake
of accurate xBenchmarks.

Tobias Walter <walter@jazz.hall.sub.org>
for letting me use his A1000 to test 11 totaly different and
incompatible versions of FAST in one evening.

Matthias Meixner

for doing some xBenchmarks when Jörg was 'unavailable'.

Markus Armbruster <armbru@pond.sub.org>
for assisting me in the two weeks search for the
nonexistent timing-indeterministency-bug.

Contact Addresses:

Ross Williams (ross@spam.ua.oz.au)

Christian von Roques

Urban Dominik Müller

1.19 feal

FEAL is an XPK encryption sublibrary which implements the FEAL-N \leftrightarrow data encryption algorithm in CBC1 mode. FEAL-N has been developed at the NTT Communications and Information Processing Labs. in 1988.

FEAL-N is a blockchifre, which encryptes a datablock of 64Bit to a 64Bit codeblock using a 64Bit external key. FEAL mainly consists of a loop which is taken N times. The loopbody encodes half of the data using a 16Bit internal key and swaps the encoded half with the other one. The 64Bit external key is expanded to $N * 16\text{Bit}$ internal keys.

FEAL was designed to be a replacement of DES. DES can be easy made fast using special purpose hardware, but is a pain to be implemented in software using conventional hardware. Since FEAL only uses 8Bit add, rol and eor operations, it is designed to be implemented in software.

Btw.: FEAL is one of the few algorithms which is easier to implement using the 80x86 processorarchitecture than the 680x0 because of the 80x86s splitable registers.

Safety

Rounds Safety (? ; -)

4 unsafe, broken (Murphy 1990)

8 unbreakable for ``normal`` people

16 good Cryptoanalysts can decypher this with less (default) then testing all possible keys. But it can be valued as ``safe`` anyway.

32 There is no known better method of breaking this than testing all 2^{64} possible keys.

64 Only paranoids will use this.
(But real paranoiac do not use FEAL)

History of FEAL

1985 first proposal to ISO (FEAL-1, FEAL-1', FEAL-2)

1987 FEAL-4 presented on Eurocrypt.

1987 attack on FEAL-4 by B. den Boer. (Crypto 1987)

=> doubled the number of rounds: FEAL-8

1988 FEAL-N proposed (N even ≥ 4)

1988 FEAL-NX proposed (N even ≥ 4)

different method to calculate partial keys

=> 128Bit key instead of 64Bit

published attacks

- o B. den Boer (1987: FEAL-4; 100-10000 chosen plaintexts)
- o Murphy (1990: FEAL-4; 4 chosen plaintext)
- o Gilbert Chasse (1990: FEAL-8; statistically)
- o Bilham, Shamir (1990: FEAL-4, FEAL-8, FEAL-N, FEAL-NX)
 - differential Cryptoanalysis:
 - => for up to 31 rounds better than testing all keys.
- o Gilbert (1991: FEAL-4, FEAL-6; 20000 known plaintexts)

published versions of FEAL

name	rounds	key	internal key
----	-----	---	-----
FEAL-1	4	64	4*16+2*32
FEAL-2	6	128	6*16+2*32
FEAL-1'			
FEAL-1.00	4	64	4*16+2*64
FEAL-4			
FEAL-2.00			
FEAL-8	8	64	8*16+2*64
FEAL-N	N	64	N*16+2*64
FEAL-NX	N	128	N*16+2*64

Version History of xpkFEAL

1.0 First public release.

1.02 Fixed a stupid typo, which did not prevent the user from encrypting with an uneven number of rounds.

1.03 Previous versions filled the last block with junk, now the last encrypted byte is length&7.
Minor speedups in the assembler part.

Future Plans

Support the other 3 standard modes. (ECB, CFB and OFB)
Improve the speed.

Contact Address

Christian von Roques

+-----+

| Questions regarding FEAL-N can be referred to: |
| Mr. Shoji Miyaguchi |

```
|   Communications and Information Processing Labs., NTT   |
|   1-2356, Take, Yokosuka-shi, 238-03, JAPAN           |
+-----+
```

1.20 hfmn

This XPK sub library basically uses the same algorithm (dynamic ↔ huffman or classic huffman) as found in the xpkHUFF.library. For more detailed information about the huffman algorithm, take a look into HUFF.doc from M.Zimmermann -- and skip the part that huffman compression & decompression is pretty slow! In difference to HUFF, HFMN is FAST on compression and decompression and produces a slightly better output. Although the basic algorithm is the same, it is entirely different implemented, therefore HFMN will not depack HUFF and HUFF not HFMN!

HFMN needs for private buffers (no xpkmaster.library buffers)

- 7.5 Kbyte packing memory
- 5 KByte unpacking memory

How does it work?

- First, I use heapsort to create the huffman tree, which is most responsible for packing speed. (heapsort is the second-best sort algorithm and is based upon binary trees)
- Second, (for decompression) I generate an (almost) optimal unpack code from the huffman tree.
- Third, I save the huffman tree recursively. That is why I need max. 320 byte to save a complete huffman tree.

020+ Version

I have experimented with 020+ code and rewrote the most used routines. My huffman-code-translation-routine :) is reduced from 50 to 16 instructions, and achieves a noticable speedup. (hmm, I like bitfield instructions.:-)

```
.next move.b (a0)+,d2 ;incoming characters ( $00-$ff )
move.l (a2,d2.w*4),d3 ;huffman code
move.b 3(a3,d2.w*4),d4 ;huffman codesize
bfins d3,(a1){d5:d4} ;store huffman code
add.l d4,d5 ;bitoffset + last codesize
dbra d7,.next
```

For decompression, the 020+ code produces no improvements. But there were still some small optimizations possible, so decompression speed is improved too.

Version History

- V 1.16 - first public version.
- V 1.18 - 2 ways of decompression.

- V 1.19 - bugfix: uncompressable data returns now XPKERR_EXPANSION instead of XPKERR_SMALLOUTBUF.
- V 1.20 - V 1.27 - some experimental versions with 020+ code.
- V 1.28 - extra library with 020+ code for compression.
- improved 000+ decompression code.
- V 1.29 - V 1.33 - some experimental version for the 1.34 bugfix.
- V 1.34 - fixed a bug that i had added somewhere before 1.16.
it should have caused problems only under bad circumstances,
when the byte statistic was fibonacci like.
(in fact, the decompression routine could not handle
huffman codes longer than 16 bits, ups...)
Thanks to Nicolas Pomarede for his superdetailed bugreport.
(He analysed the code and told me exactly when and where it
goes wrong :-))
- V 1.35 - fixed a bug in the 020+ compression routine.
(16 Bit overflow for number of bytes written to xsp_OutBuf
was not handled correctly)
Thanks to David Balazic for reporting this one.
- V 1.36 - 1.35 bugfix was not 100% ok.

Contact Address

Martin Hauner

1.21 huff

The idea of a huffman crunch is as follows: often used bytes (ie 8 bit codes) get a shorter code than 8 bits, fi 5 bits. So everytime one of these bytes occurs in the source file I save (in this example) 3 bits in the dest file. To find out the optimum codes for each byte there is a simple method: A tree is to be constructed so that the path from the root to each leaf reflects the optimum (ie huffman) code. Unfortunately most computers (the Amiga, too) are byte-oriented, which means a rather complex handling of codes that are not a multiple of 8 bits. This results in pretty slow compression & decompression. So this means that the xpkHUFF.library probably will not be used for normal circumstances, but, as Dominik stated, it may serve well as an example library.

There are three different huffman crunch algorithms known:

- static compression/decompression
- dynamic compression/decompression
- adaptive compression/decompression

What are the differences?

The static huffman uses a fix table to represent each byte of the source. This, of course, makes sense only, if the structure of the data to be crunched is known. In this case (for instance crunching an english text) a

fix table of codes is embedded in the code. Crunching other data than what the table was generated for will probably result in worse compression or even expansion.

This is what a dynamic huffman is avoiding: it first creates a statistics table reflecting the frequency every byte occurs with and generates a special tree/table for this case, so the dynamic huffman does a good compression for this special data.

But there is something that can be improved, anyway: imagine, there is a data block which contains many 'a's in its first part and many 'z's in the last part.... The dynamic huffman would represent the 'a's and 'z's with short codes, of course. But it probably would be even better if the crunch/decrunch tree would reflect the *current* data being processed instead of the whole block, thus in resulting shorter codes for 'a' and 'z', depending of the position in the data block. This is what an adaptive huffman deals with: it creates the tree while crunching, without doing any statistics or tree creation before crunching. It permanently updates its internal huffman tree. Therefore it does not have to include the information about the decrunch tree in the crunched data.

Final words about huffmans:

A stand-alone huffman will never achieve crunch results as fine as those reached with most other crunchers, for these will not only regard the number of occurrences for each byte (as huffman does), but sequels of byte, too. This means: If you create all permutations of a datablock, the huffman crunched will always have the same length. Others will not, as they are depending on the order of the crunched data, too.

Description

The library 'xpkHUFF.library' implements a dynamic huffman crunch algorithm, even though the adaptive might result in slightly better crunch results. However, this is more complex to implement and I am using a maximum buffer size of 64K, so this is a little bit like an adaptive huffman for large files.

If I should have lots of spare time I will probably implement an adaptive huffman crunch algorithm. This new library will be called xpkHUFF, too, and new xpkHUFF libraries will always handle output generated by earlier versions.

The xpkHUFF.library supports a totally unsafe (but a little bit better than simple eor :-) encryption. Please note that crunch/decrunch speeds decrease when encryption is used.

Implementation

If you should see an error message saying output buffer too small while crunching *and* encrypting, this means you tried to crunch and encrypt a file that would be crunched and encrypted to be larger than the original file. This should occur only with very small files (for I have a minimum file size due to tables) or with files that have been crunched already and therefore would expand during crunch.

A technical note: this could also happen, if the last chunk of a file to be crunched/encrypted would be dimensioned too small by xpkmaster.library.

However, in this case you cannot encrypt the file. I know this could be annoying and will think about a solution for this problem, but remember: this encryption would not be safe, better if you used FEAL or IDEA for secure encryption.

Last words ...

I tried hard to debug this library with range checking while writing bytes on crunching, and so on, but as in every code larger than, say 10 lines :-), there will be bugs. I do not know any bugs in this version, but if you should meet one, please let me know via email. As usually, reproducible bugs are preferred. Please add your configuration, programs running (best if you try without startup-sequence!), and, most important of all, add the file you tried to crunch! Thank you.

Version History

```
; V 0.1 - 12-Jul-1992 : first version
; V x.yy - 18-Jul-1992 : first OK version
; V x.yy - 19-Jul-1992 : sped up decrunching
; V x.yy - 21-Jul-1992 : bug fixed in word/long decrunching: min pack
; chunk size now 3/5
; V x.yy - 21-Jul-1992 : replaced many subq/bxx with dbf (ie sped up
; crunching a little bit), bug fixed: there was
; a dbf counter wrong (one of my favorite 0/1
; problem bugs)
; V 0.50 - 29-Jul-1992 : added 68030+ cache optimized decrunch code
; V 0.51 - 01-Aug-1992 : byte decrunch improved, first code added,
; indicator byte for crunchmethod used added,
; 68030+ chache optimized code does not make
; sense any more, since byte decrunch fits to
; cache completely, now
; V 0.52 - 01-Aug-1992 : unsafe encryption supported
; V 0.53 - 03-Aug-1992 : slight improvements made to crunch code
; (+ 6K/s)
; V 0.54 - 03-Aug-1992 : inconsistence in expansion handling fixed
; V 0.55 - 03-Aug-1992 : bug fixed: expansion handling now considers
; table creation, too
; V 0.56 - 03-Aug-1992 : bug fixed: HUFF now can crunch files
; consisting of always the same byte (shame
; on me, termination criterium was wrong)
; V 0.57 - 03-Aug-1992 : Tree creation code partially rewritten
; V 0.58 - 05-Aug-1992 : bug fixed: wrong termination criterium for
; expansion check (my favorite 0/1 problem)
; V 0.59 - 06-Aug-1992 : now decrypting in a special buffer, not using
; InBuf (this is read only, I was told) any more
; V 0.60 - 07-Aug-1992 : added extra memory required during
; packing/unpacking
; V 0.61 - 08-Aug-1992 : expansion check changed, renamed from
; xpkDHUF.library to xpkHUFF.library thus
; corresponding to the possibility of handling
; adaptive huffman codes later without having
```

```
;      an inconsistence in the name
; V 0.62 - 10-Aug-1992 :  Flag XPKIF_MODES removed (I do not have modes
;      yet (but I have a mapping code :-=))
```

Contact Address:

Marc Zimmermann

1.22 idea

Patent

IDEA is registered as the international patent WO 91/18459
"Device for Converting a Digital Block and the Use thereof".
For commercial use of IDEA, one should contact

ASCOT TECH AG
Freiburgstrasse 370
CH-3018 Bern, Switzerland

Description

IDEA is an XPK packer sublibrary which implements a highly optimized form of the IDEA encryption algorithm.

IDEA (International Data Encryption Algorithm) is a block cipher developed by Xuejia Lai and Prof. Dr. J. L. Massey at the Swiss Federal Institute of Technology. See patent for information on any commercial use of this algorithm. Especially, this library is not only claimed by the copyright of the author and the copyright of the author of the used IDEA kernel routine, but by the copyright of the IDEA originators and their patent, too.

This implementation of the algorithm was done by André Beck, Dept. of Computer Science, Technical University of Dresden, Germany.

xpkIDEA.library gives a chunk based access to the most common encryption methods, using the IDEA cipher as the encryption function. The IDEA cipher is known to be somewhat slow. It performs 34 multiplications modulo $2^{16}+1$ for every 64 bit data packet, so it must have limited performance on a plain 68000 processor. This library uses the heavily hand optimized, permuted, macroitized and partially unrolled 68000 assembler implementation of IDEA by Colin Plumb. Therefore, the kernel IDEA routine and its macros are copyright by Colin Plumb.

In difference to the most wide spread compressors distributed with XPK, one should know something about IDEA before using it. First, IDEA is completely no compressor, it only encrypts or decrypts data. A password must be specified with first calls to "pack" or "unpack" a chunk. Furthermore, the password given on encryption MUST restore the original chunk contents, otherwise the password will be treated as incorrect. This is a tribute to the XPK architecture and its safety, but has the disadvantage of preventing you from doing things like a triple crypt, what means to first encrypt a chunk with password 1, then decrypting it with password 2 and last encrypting it with password 3, all three passwords different.

Encryption Methods

IDEA is a cipher used for encryption in this library, what means it is a function taking one data block and an encryption key as input and producing one data block as output. The purpose of this function is to generate a very random result from normally highly redundant input, in other words to make White Noise of bits from a regular, low entropic bit stream. The IDEA data blocks are sized 64 bits, where the key has 128 bits in its unexpanded form (DES has a key of 56 bits). One now may use this function in different ways. The simplest encryption is to take the input chunk block by block, driving it through the IDEA function, and building the output chunk from the result. This mode is called Electronic Code Book (ECB). But an Code Book based encryption is not the state of the art, because it is somewhat easy to crack (even ECB using IDEA is not easy to crack, only a bit easier than the following modes). One can imagine, that including the chunks contents (which is to be crypted) itself into the encryption will be much safer. Consider a simple ECB to encrypt text, generated by the function

```
out_character = (in_character + 1) MODULO num_of_characters.
```

This is nothing other than incrementing every character, f.i. making A to B, F to G and Z back to A. So the word FOOBAR will be crypted to GPPCBS, and nobody will see what it is on the first visit. But there are also people called Cryptologists, and cracking such codes is their job. Simple methods of cracking are especially based on the probability of characters in different languages. They know e is a very often found letter in indo european languages, and if they find one character very often in the crypted text, this one may be an e. If it is sure that it is an e, one can insert it in the complete crypted text where the cracked character was.

The method to prevent such simple cracks is based on chaining the produced output back into the crypt function with some delay.
Consider

```
out_character = ((in_character + last_out_char)+1) MODULO num_characters
```

with an initial last out character of 'C'.

FOOBAR gets JAQTVL using this code and nobody can see that an double O was in the input. So it is more complicated to crack messages crypted with this code, because one MUST start at the beginning of the text. It is also possible to increase the number of ,,states of remember'' we are using, for instance by not using the last_out_char but the seventh_last_out_char and using 7 different initial values for them.

The method used above is very similar to a common encryption method called Cipher Block Chaining (CBC) with one state of remember (CBC 1).

The difference to ECB in schematic view:

ECB electronic code book mode

```
y[i] = IDEA(z, x[i])
x[i] = IIDEA(z, y[i])
```

CBC cipher block chaining mode

$$y[i] = \text{IDEA}(z, x[i] \wedge y[i-N])$$

$$x[i] = \text{IIDEA}(z, y[i]) \wedge y[i-N]$$

with

$x[i]$ is the input block number i
 $y[i]$ is the output block number i
 z is the encryption key
 N is the number of states of remember (at least one)
 IDEA is the encryption function using the IDEA cipher
 IIDEA is the corresponding decryption function
 \wedge means the XOR of the operands (Bitwise Exclusive Or)

There are two additional modes often used with encryption. See the following schematics:

CFB ciphertext feedback mode

$$y[i] = x[i] \wedge \text{IDEA}(z, y[i-N])$$

$$x[i] = y[i] \wedge \text{IDEA}(z, y[i-N])$$

OFB output feedback mode

$$h[i] = \text{IDEA}(z, h[i-N])$$

$$y[i] = x[i] \wedge h[i]$$

$$x[i] = y[i] \wedge h[i]$$

As you see, all the chaining modes have additional parameters determining the result of the crypt. Not only the key determines the resulting chunk for a special input chunk, but also the number of states of remember used by the mode and the values used to initialize the states (in CBC 1 coding block #0, you need block #[i-1], but you have no block #-1, so you have to give some initial value for it). For CBC 8 you have to give 8 initializers, and so on.

The xpkIDEA implementation uses the following XPK modes for different encryption methods:

0.. 25 ECB
 26.. 50 CFB
 51.. 75 OFB
 76..100 CBC

As you see, the modes were ordered to somehow match the scheme given by the most XPK packers, with 0..100 mapped to increasing efficiency and decreasing speed. There are neither big differences in speed nor in efficiency of the used modes, and the mapping used is easy to remember. Especially one gets very simple from the mode used to the encr. method and state number by subsequent subtractions of 25 from the mode:

IDEA.79 -> 79 - (3*25) = 4 , so mode 3 (CBC) with 4 states applies.

The default method used when no mode is explicitly given is CBC1, i.e. the mode IDEA.76

The presented speed (in KByte/second) is not very exact. This is mainly caused by the varying cycle count of the 68000's mul instruction. The encryption will be faster with the all-zero-key and slower with the all-ones-key. Try around with key values

Technical Info

This lib is completely written in assembler using a68k and the 1.3 includes. It was developed within around 10 hours of work distributed over more than 14 days (better to say nights).

The author could only test it on an 1 Meg chip no fast 7.14MHz 68000 A500 under Kickstart 1.3. The source is now around 30000 bytes and may contain some bogus. If you find any bugs report them to me via the email address given below.

Make sure the output buffer is at least the size of the input buffer plus XPK_MARGIN, even if this is on decompression more then the original chunk size. This library relies on this behavior, which is correctly done by xpkmaster.

As already stated in the section Disclaimer, the author gives no warranties for the proper function of this software. Additional, he cannot give any guarantee that IDEA itself is a useful encryption standard. It SEEMS to be very strong, but it is still under analyzation by some organizations like the NSA and similars. If you are interested in the theoretics of this algorithm, ask me for some hints.

Contact Address:

See section Patent for information on how to reach the authors of the IDEA cipher.

If you want to get in contact with the author of the fast idea routine used within this library, contact Mr. Colin Plumb at: colin@eecg.toronto.edu

1.23 impl

This XPK sub-library uses basically the same algorithm as found in \leftrightarrow the

Imploder, but without the specifics needed for compressing self-contained executables.

A quote from the Imploder 4.0 technical manual says it all :-)

IMPL does LZ77 like compression with a, per mode, static Huffman like coding step on the various parts of the skip, offset and length tuples. Due to the efficient encoding, a tuple can require less than 12 bits, and thus strings of 2 bytes length and up are encodable with a decent gain (given small Huffman patterns corresponding to likely circumstances).

The default compression mode is 100 which means that the actual compression mode used depends on the chunksize. The default chunksize is 64K. In general, this mode produces the best compression ratio, although the mode range 76..98 (1.00*max) will sometimes produce better results.

The current version of xpkIMPL.library will, by default, react to a BREAK signal (CTRL-C) while compressing. Compressing a chunk (especially on unaccelerated Amiga's) can take quite a bit time, so allowing the user to break-off compression is useful. For now, it is not possible to turn this feature off!

Version History:

0.01 Well known Imploder compression algorithm now included in a XPK sublibrary.
 0.19 Improved robustness.
 1.00 Much needed documentation added.

Contact Address:

Peter Struijk

1.24 mash

xpkMASH is an XPK compression sublibrary whose main purpose is to decrunch fast and have an excellent crunch factor. The sublib is using LZ77 compression and a special method to write matches... MASH now normally uses 256KB for its tables, but reduces the size of the hashtable if memory is scarce. (it could crunch even with 64KB+4KB) Compressing with a small hashtable naturally is very very slow. Default chunk size is 64KB. The compressor uses lazy match evaluation which slowed it down quite a bit.

This sublibrary has several modes:

Mode	Strings to be searched
-----	-----
0-09	1 ;high speed - but low CF
10-19	2
20-29	4
30-39	8 ;good for most executables
40-49	16
50-59	32
60-69	64
70-79	128 ;this should be used for text files
80-89	256
90-99	512
100	1024 ;the best, the slowest

The second column is showing, how many matches should be compared - the more searched strings - the better results you will get. formula is simple $2^{(MODE/10)}$.

MODE 70 is now running as fast as NUKE on my A1200 and if you want to use some higher modes - you will get result better for only a few bytes, but slowdown will be very noticeable. (But for crunching I am always using the best mode anyway :-))

!!! The source for this version is not released !!!
 if you want to see it anyway, drop me an e-mail and I will send you it.

I still want to do some improvements. Probably even change format of stored data to reach better decrunch speed and possibly use some more MC68020 instructions in this case. You do not have to worry, this library will also decrunch old format. Send me an e-mail what you would like to see in newer version of this library. But this newer format will always need 256KB of memory so it could be a problem for some people. If you think this library is worth some money, you could send them It will speed up development :-)

"Thank you"s must go to:

Urban Dominik Müller

for XPK standart. (Try to respond to my e-mails sometimes :-))

Christian von Roques

for correcting some parts of this document file,
and also for releasing his source, so I could use some parts
of it in my library (XPK interface).

Karsten Dageförde

for making benchmarks and other cooperation

more people should be in this list - authors of Zip, Lha, Arj, ...
but I would have to make some deep research for them.

History

- 0.5 Many errors, the biggest problem was bad writing of bits string.
- 0.7 Most errors have been debuged
- 0.8 Last byte has not been saved
- 0.9 On the first look, normaly working version of the sublibrary with fixed hash table - size 64KB
- 1.0 The big improvement in memory allocating;
memory is allocated before each chunk compression and deallocated after this chunk is compressed (usefull if you have installed statram.device)
- 1.01 Hash size was increased from 64KB to 128KB (16 bits)
- 1.05 Hash is allocated dynamicaly - when is large memory free - large hash is used. Starting with 128KB, 64KB, 32KB, ,512 bytes
- 1.15 Seems to work perfectly for me

First public release:

- 1.16 I suppose last bug has been removed - value of register D4 was not saved on return. Also most long word instruction have been rewritten to word oriented instructions (useful for MC68000)
- 1.26 Several speed up improvements - decompression goes about 50 kB faster

Unreleased

- 1.30 New crunch mode - uses 256KB of memory for its buffers
- 1.40 Removed checking of two bytes in match
it is not needed when two-byte hash is used
- 1.53 Removed zero length write when chunk is uncrunchable
Diavolo is a little bit odd and uses this value for DIVS even when its not valid -> caused GURU
- 1.61 Removed bsr call from scanning routine.

Released

- 1.77 Prepared for release - there are still many things to improve, but it already has a very good speed. So I am releasing this version.
- 1.98 Well many new checks have been added to prevent a to deep scan when better match cannot be found. Even a little bit better alghorithm was used for lazy_eval -> better CF.

Contact Address:

Zdenek Kabelac

1.25 none

NONE is only a dummy packer, which was an programming example in the first distribution. It only copies the data to the resulting file. (With 52 or more bytes header)

It may be useful with `xpkarchive.library`, because it gives the option of no crunching like in LhA.

1.26 nuke

NUKE is an XPK packer sublibrary which implements a highly optimized form of the popular LZ77 compression algorithm. This is essentially the same algorithm used in PowerPacker, Imploder and (among other algorithms) in the LZH/LHA packers.

Most applications of packers mean packing once and unpacking many times. One example is a PD program that gets distributed around the world, or a compressed program on the hard disk the needs to be decompressed when loaded. NUKE tries to be fast at decompression, thus restricts itself from applying fancy algorithms (Huffman, Ari-coding). In order to achieve reasonable compression factors anyway, it scans a very long range (more than 24K) for identical byte sequences and if it finds any, it outputs offset and length instead of the bytes themselves.

Of course scanning such a long range for duplicates is quite a CPU intensive process. I have tried to make it as fast as possible, and with around 35K/sec (A3000) I would say I have come close to the best that can be done with this approach. There is a drawback, though. The compression must use large hashing tables to reach this speed. I have made sure that NUKE is still usable on a plain 512K Amiga, but you will not be able to run many things besides NUKE while you are packing. There is, by the way, no increase in mem needs with increasing file size.

Version History:

- 1.0 First public release.
- 1.2 Does compress slower, but a bit better.
Decompression is faster than V1.0.
- 1.3 Fixed excessively long 2 byte matches [there were files, on which NUKE was not bijective!]
- 1.4 added new startup header
- 1.5 recompiled to fix error with DiskExpander
- 1.6 better library start header
- 1.7 fixed low-mem error

Contact Addresses:

Urban Dominik Müller

,
Christian von Roques

1.27 rake

RAKE is an XPK packer sublibrary which implements a highly optimized form of the popular LZ77 compression algorithm. It uses static huffman coding for the 'len' and a three-step coding for the 'offset' information. The major feature of this packer is the highly optimized algorithm for tracking down redundant data.

RAKE supports four modes at compression (see below).

- Scanner & Coder together fit in 68020 instruction cache
- Hashbuffer-size will be reduced downto 0.5Kb, if memory is short

History

Sep-9-94 V1.0 First public release (68000,68020)
[...]
Jul-1-95 V1.6 - Scanning algorithm improved.
Sep-6-95 V1.7 - 68020 version now checks if there is an appropriate processor (68020 or better)

Contact Addresses:

Karsten Dageförde

1.28 shri

SHRI is an XPK packer sublibrary which implements a compressor, highly optimized for compression rate. It uses offset/len encoding with adaptive arithmetic aftercoding for best compression results. Its compression rate is better than that of most other packers, e.g. lha, zoo or powerpacker.

It supports 7 modes, which differ in the size of the dictionary:

Modes	Dictionarysize
-----	-----
0- 14	1k
15- 28	2k
29- 42	4k
43- 56	8k
57- 70	16k
71- 84	32k
85-100	64k

A larger dictionarysize gives a higher compression rate and faster decompression, but slows down compression.

This library is not meant to be used for online-compression as it is used in e.g. XFH. It is meant to be used for achieving highest compression-rates. These can be useful, when transferring files via modem, for a backup to a slow medium (floppy disks) when you have a fast computer or for creating archives with the xpkarchive.library.

The decompressionspeed of this version is about 82% higher than that of version 1.0. The compression is about 5% faster.

History

- V0.2 First public Release
- V0.3 XpksPackChunk returned XPKERR_CORRUPT instead of XPKERR_EXPANSION
- Bug fixed in V0.3
- V0.4 SHRI could not decompress files, which where partly compressable
- Bug fixed in V0.4
- V1.0 New Version with improved compression- and decompressionspeed
- V2.1 Improved decompressionspeed, all relevant parts of the decompressor are now written in assembler.
- V2.2 Removed important bug in the decompression-part, that produced errors with chunksizes above 32767 bytes

Contact Address:

Matthias Meixner

1.29 smpl

SMPL is a XPK sublibrary implementing dynamic huffman coding over variations of datastream. If that sound too complicated, I suggest you read docs for

DLTA
and
HUFF

, in that order. In fact, DLTA was made to be used as preprocessor for other XPK packers.

Then why did I code SMPL? Think this: how many music programs you know that support XPK? Yes, I know I can always use XFH so I can pack all my data, but if I have first fed data thru DLTA and then another compressor, then XFH only decompresses the latter. So I still need XPK supporting program to pack my samples efficiently.

SMPL overcomes this by including

DLTA

coding into same library. I chose

to use huffman coding for actual packing as it seemed to give best average compression. I snatched the huffman code from

xpkHUFF.library
and

tweaked it a bit for faster (de)compression.

Some samples were packed better with simple

HUFF

without delta precoding.

If I find a way to determine output size from frequency table (ie. without

building huffman tree) I will add non-delta packing to SMPL.

I tested

```
DLTA
+SMPL mainly to see if there would be any use for recursive
delta, but less than 100K of all data packed marginally better when fed
thru double delta.
```

Three percent difference between SMPL and

```
DLTA
+
HUFF
comes from two
```

things:

- 1) xpkmaster.library adds some bytes to DLTA coded files
- 2) I store huffman tree in more compact way

Version History: 1.00 First public release.

Contact Address:

Jorma Oksanen

1.30 sqsh

SQSH is an XPK packer sublibrary which implements an optimized LZ ↔
based
algorithm combined with a 8 bit delta compression algorithm.

This packer was especially made for packing 8 bit Samples and ProTracker style modules. It is NOT a lossy compression library, so NO quality-loss will occur when packing Samples with this library.

SQSH is pretty fast at decompression (300K/s on A3000) so is very well suited to compress Modules and Samples since these will typically be packed once and unpacked many times. It is slow at compression (25K/s on A3000) mainly because every part of the file has to be checked twice to see what the better compression method would be.

In order to achieve reasonable compression of other types of files (Executables, Textfiles) this packer will scan a long range (about 20K) for identical byte sequences and if it finds any, it outputs offset and length instead of the bytes themselves. Scanning such a long range for duplicates is a CPU-intensive process. I have tried to make it as fast as possible (about 25K/s on A3000) but

```
NUKE
proves it can be done faster :-)
```

In the archive also is included a 68000 version of this library. Sorry all you 68000 users for the long delay, but I only received one message asking me for a 68000 version. It was Edmund Vermeulen who eventually

Contact Address:

John Hendrikx

1.31 c-utils

xBench
benchmark tool for XPK sub libraries

xDir
directory lister

xLoadSeg
LoadSeg function patch

xPack
XPK packer and unpacker for OS2.0

xPK
XPK packer and unpacker for OS1.3

xQuery
XPK sub library information

xScan
scanner command for XFH

xType
XPK type command

xUp
XPK unpacker

XpkMasterPrefs
Preferences control

Program histories are in source code.

1.32 xbench

SYNOPSIS

xBench FILENAME/A,PASSWORD/K,METHOD/M,TEST/S,ALL/S,SAVE/K

FILENAME Is needed always. This is the name of the test file(s).

You can specify names containing normal dos patterns.

PASSWORD When given, xBench tries all crunching methods with and without password (when possible).

METHOD Here you may specify crunchers (multiple when needed). The format is <packername>[.<mode>] When no METHOD keyword is used, all packer libraries are scanned.

Examples: NUKE, MASH.20, RAKE.100, MASH NUKE SHRI.100

TEST When you give this option, the decrunched buffer is checked against the source file, errors are reported.

ALL This option scans all modes, when no special one is passed.

>>>> Use this with care, as there are 101 modes! <<<<

SAVE Here you may specify a directory, where all packed data is

saved to. When nothing is specified, the data will not be saved. When a buffer error is reported, the saved data of following modes may be false, as some crazy sub libraries destroy source buffer.

When no METHOD keyword is passed, all possible types are used.

NOTE: When no password is given, all libraries needing passwords are skipped. When password is given all libraries are called with and without password. The real output depends on the fact, if the library allows, needs or does not support password.

When no mode information is passed for METHOD keyword (f.e. NUKE) or with no METHOD keyword, all modes are scanned. For every type only the highest mode number is used. In case you specify ALL keyword, all modes from 0 to 100 are used.

DESCRIPTION

With xBench you can create benchmarks for XPK sub libraries. The benchmarks created will be relative to the system (hardware and possibly software) it is run on and to the file used as data. To generate standard XPK benchmarks shown in information data of the sub libraries you will have to run xBench on a A3000/25 with SCRAM, using the AmigaVision executable as data.

xBench uses timer.device for as accurate measurements as possible, but the given time results can differ from call to call.

NOTE: Benchmarks are different for different file-types, so you may produce benchmarks for text, exe-files, sounds, ...

NOTES

Best method to use is : xBench <filename> TEST PASSWORD TestPwd

If error messages "FileSize false ..." or "Decrunched buffer ..." occur, the library producing these errors should be deleted and the library author should be informed of the error.

When the program crashes, this is most time a problem of a sub library. You can find the bad library when looking into LIBS:compressors. The bad library is most time the one after the library that produced last output (when files are sorted alphabetically).

Reboot your system and retest the library with xBench's METHOD option. If it crashes again, delete it!

WARNING

For accurate measurements xBench have to Forbid() task rescheduling while packing and unpacking. This means that multitasking will be disabled while xBench is running. Note that doing a Forbid() for a long time is potentially dangerous.

THE OUTPUT

The output data shows as following:

<filename>

Type	Num	Version	P	CSize	CTime	CSpd	USize	UTime	USpd	Rate
BLZW:	100	3.2		19312	1.13	22162	25044	0.51	49105	22.9

Type: the library type
Num: the crunch mode which was used
Version: version and revision of the library
P: when password was used a "*" is shown here
CSize: file size after crunching
CTime: time used to compress the file (seconds)
CSpd: compression speed (bytes/sec)
USize: file size before crunching
UTime: time used to uncompress the file (seconds)
USpd: uncompression speed (bytes/sec)
Rate: crunch factor

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AUTHOR

Dirk Stöcker

1.33 xdir

SYNOPSIS

xDir
xDir [filenames]
xDir [directories]

DESCRIPTION

xDir shows a listing of all files in the current directory (first form), or of a number of files or directories. Wild cards are not recognized. Files are sorted alphabetically.

xDir sums up the uncompressed and compressed total sizes of all files shown.

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AUTHOR

Dirk Stöcker

1.34 xloadseg

OVERVIEW

xLoadSeg wedges into LoadSeg() and NewLoadSeg (if available) and allows to directly run programs that were compressed using the XPK standard. They are decompressed while being loaded. xLoadSeg uses less than 700 bytes when installed. Should not really bother you.

HOW TO USE

Just start 'xLoadSeg' from your startup-sequence. No need to 'run' it. If you want to remove it, use 'xLoadSeg -q'. The 700 bytes will be lost. Do not try to start from Workbench.

HISTORY

- 1.0 First release, based on PPLoadSeg by Nico François
- 1.1 Complete rewrite: Now able to remove patch
Symbol and Debug Hunks are now skipped, Overlaid Files gracefully fail instead of crashing the machine.

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AUTHOR

Christian Schneider

1.35 xpack

SYNOPSIS

xPack FILE/M/A, METHOD/K, MINSIZE/N/K, SUFFIX/K, PASSWORD/K,
ALL/S, FORCE/S, PROGRAM/S, XSCAN/S, LOSSY/S, QUIET/S

DESCRIPTION

xPack is a command line interface to the XPK compression library. It was made to enable you to pack (or unpack) many files quickly and comfortably, especially for use with the XFH-Handler. xPack needs OS 2.04 or newer.

Main features:

- supports patterns
- can scan complete directory trees
- protection flags, file note and date of the files are NOT changed
- packed files will not be repacked by default

For more details about XPK read the documentation supplied.

ARGUMENTS

FILE You can supply as many files, directories or patterns as you want.

METHOD the compression algorithm to be used

MINSIZE All files which are smaller than this value (in bytes) will not be crunched (default 512 bytes).

SUFFIX add/remove supplied suffix if packing/unpacking

PASSWORD optional Password for encryption (or decryption)

ALL scan through directory trees

FORCE Files will be packed even if they are already XPK packed and/or their size increases.

PROGRAM pack only executables (e.g. for
xLoadSeg

```

    )
XSCAN  create filenotes for fast directory access with XFH
      (like
          xScan
      )
LOSSY  permit lossy packing
QUIET  No progress report is printed while packing.

```

Examples:

```

xPack SYS:MetaFont METHOD
      NUKE
      ALL

```

or

```

xPack Docs/#?.doc METHOD
      IMPL
      .40 SUFFIX .xpk MINSIZE 1024

```

or

```

xPack Secret.txt METHOD ENCO PASSWORD Joshua

```

or (Decrunch)

```

xPack Archive/#?.xpk Archive/#?.pp QUIET

```

HISTORY

```

1.0 (XPKSmart) first internal Release
1.0 (xSmart)
  program renamed on a request by
    Urban 'XPK' Müller
    progress display fits better in the CLI window now
  check for increase of size by packing with XPK implemented
1.0 program renamed again on a request by
  Urban 'XPK' Müller
    "FORCE", "PASSWORD" and "SUFFIX" argument implemented
  file handling changed, slower but more secure
  removed Enforcer hit
1.1 no problems with WShell anymore
  if xPack is started with OS 1.3 a message is printed
  instead of displaying a recoverable Alert
1.2 added "PROGRAM" parameter
  suffixes may be removed while unpacking
1.3 wasted my time with a special function for ILBM-files
  added "QUIET" parameter
  "FORCE" is on automatically if a password is supplied.
1.4 changed "FILE/M" to "FILE/M/A" in template
  added "XSCAN" and "LOSSY" parameter
1.5 "LOSSY" always active in 1.4

```

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required.

AUTHOR

Matthias Scheler

1.36 xpk

SYNOPSIS

xPK [-frsux] [-p password] [-m method] files

-m = packing method
-f = force repack
-s = do not remove original
-r = recursively (un)pack
-u = unpack (extract)
-p = encrypt/decrypt
-x = pack executables only

DESCRIPTION

xPK is a command line interface to the XPK compression library. It compresses a file using the method given by -m. After the process is complete, the original file is removed and replaced by its compressed version under the same name.

The xPK executable can be renamed to a packer name which will then be considered as given by -m.

OPTIONS

-m = method. After -m you can indicate the name of the packer to use, plus a mode number if the packer supports that.
-f = force. Will enforce packing of already XPK-packed files.
-s = suffix. Add a .XPK suffix to the compressed version and do not remove the original.
-r = recur. If any directories are encountered, they are packed recursively.
-u = unpack. Will unpack the indicated files. (same as -e).
-p = password. Will be used for encryption or decryption.
-x = executables. Will refuse to pack files that are not executable or are overlaid. For use with xLoadSeg.

EXAMPLES

```
xPK -rm NUKE dh1:modules
xPK -m IMPL.50 df0:OVERVIEW
xPK -xm NUKE dh4:
xPK -r -p topsecret -m FEAL.32 dh1:private_docs
```

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AUTHOR

Urban Dominik Müller

1.37 xquery

SYNOPSIS

```
xQuery
xQuery [packer]
```

DESCRIPTION

xQuery shows important parameters about a packer, or if none indicated, all packers.

EXAMPLE

```
xQuery FEAL
```

```
Packer : FEAL
Name   : Fast Encryption ALgorithm 1.0
Descr. : FEAL-N with CBC1. Password protects data with selectable safety.
DefMode: 16
Mode   :  0..4      5..8      9..16     17..32    33..100
Descr. :  fastest   fast      safe      safer     safest
PkSpeed: 238 K/s  171 K/s  109 K/s   63 K/s   34 K/s
UpSpeed: 244 K/s  174 K/s  109 K/s   63 K/s   34 K/s
Ratio  :   0 %     0 %      0 %      0 %     0 %
```

The meaning of the fields:

```
Packer : The 4-letter name of the packer
Name   : The full packer name
Descr. : The packer description
DefMode: The default mode
Mode   : Below information is valid for this range of modes
Descr. : Mode description
PkSpeed: Packing speed for this mode range
UpSpeed: Unpacking speed for this mode range
Ratio  : Compression factor (higher=better)
```

All timings were measured on an A3000. Divide by 5 to get timings for 68000.

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AUTHOR

Urban Dominik Müller

1.38 xtype

SYNOPSIS

```
xType filenames
```

DESCRIPTION

Prints the given files to standard output, decompressing them if they are compressed.

EXAMPLE

```
xType intuition.doc.nuke
```

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AUTHOR

Urban Dominik Müller

1.39 xup

SYNOPSIS

```
xUp [-s] [-S] [-p password] filenames
```

DESCRIPTION

xUp unpacks the given files, replacing the original by the uncompressed version. Wild cards are not supported, and file attributes are not yet preserved. When the decrunching fails, the source file is preserved.

OPTIONS

-s = suffix. Keeps compressed version (when suffix is added), stores uncompressed version under the same name minus .xpk suffix.
-S = Same as -s, but removes any .#? suffix and not only .xpk one.
-p = password. Uses given password for decompression

EXAMPLE

```
xUp -p secret mytext
```

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AUTHOR

Dirk Stöcker

1.40 xscan

SYNOPSIS

```
xScan FILE/M/A,ALL/S,REMOVE/S
```

DESCRIPTION

xScan is a small CLI command which scans through XFH partition and modifies them. After those modifications XFH (V1.34 or newer) will be able to read directories MUCH faster. In fact you will no more notice a speed difference between XFH and the normal FileSystem.

VERY IMPORTANT:

xScan will NOT work if you use it directly on a XFH partition, it will just do nothing. Instead of that you must use it on the

PHYSICAL directory of the XFH partition. E.g. if your XFH partition is called "XH0:" and the rootdir of is "DH0:Archive", DO NOT use "xScan XH0: ALL" but "xScan DH0:Archive ALL".

THEORY

How does "xScan" work ?

If XFH scans through a directory it opens EVERY file to check if it is packed or not. That's why it is so slow. xScan scan once through the directories for files. If it finds one with an UNUSED filenote it adds a special one (filenote) to the file. This filenote contains an ID string, some check values and the length of the unpacked file(*).

If the new XFH scans through the directories it checks for such filenotes and after finding one with still valid check values it will take the unpacked length from the filenote without opening the file. That's why the new version is faster. Of course these special filenotes will be hidden.

(*) I do not want to explain the format exactly, because people should not use these informations.

ARGUMENTS

FILE: You can supply as many files, directories or patterns as you want.

ALL: scan through directory trees

REMOVE: remove filenotes instead of creating them

Examples:

```
xScan SYS:Archive/MetaFont ALL
```

or

```
xScan Docs/#?.doc REMOVE
```

HISTORY

1.0 initial release for XFH 1.34
1.1 adds special filenotes to unpacked files, too
1.2 does NOT follow softlinks any more

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AUTHOR

Matthias Scheler

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