Pegase

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	TITLE : Pegase		
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REVISION HISTORY			
NUMBER	DATE	DESCRIPTION	NAME

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Chapter 1

Pegase

1.1 Pegase

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                           Pegase : mPEG Audio Stream Encoder
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                     (c) 1998-1999, Didier Levet
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As my native language is french, and not english, this documentation might be unreadable for most of you because of some mistakes. Do forgive me for that.

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DISCLAIMER

NO WARRANTY, IMPLICIT OR EXPLICIT, WILL BE DUE BECAUSE OF THE USE OF THIS PROGRAMM. ANY DAMAGES, DIRECT OR INDIRECT, CAUSED BY THE INSTALLATION OR USE OF THIS PROGRAM WILL NOT BE IMPUTABLE TO THE AUTHOR. YOU, WHEN INSTALLING THIS SOFTWARE, ASSUME THE LIABILITY OF ALL RISKS TIED TO THE INSTALLATION OR USE OF THIS PROGRAM.

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Pegase is an MPEG audio encoder, optimized for 68000 familly processors and floating point co-processor (FPU). It needs OS 2.0 or above to run.
An experimental PPC version is also provided, but you will need WarpOS to use it.

Pegase is far to be finished. This version should be considered as an early version because a lot of things are missing. As for now, Pegase can't encode using layer 3 algorithm. However, the layer 2 algorithm gives really good results in a short time, making Pegase usefull for anyone. At least, I hope so.

Presentation

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                    Thanks
                        Pegase is EMail-ware. This feed back from the users will make ←
                             me happy
and could ensure that there will be a future for this software.

1.2 Presentation

                              PRESENTATION

   Although it is based upon the original version of Musicin (ISO/MPEG),
only the principle on which things work is identical. The whole source code
has been rewritten, with the Amiga spirit in mind, in order to provide a
fast encoder without sacrifying the quality.

   The first motivation comes from a simple finding : Musicin PPC appears to
be slow compared to the CPU power, so slow that I was convinced that it was
a quick port which misuse this processor.
   Then, I wanted to show what a foolish 68060 is able to do, demonstrating
that a PPC might be useless when it is not used as it should be. I must
admit that the result goes far away than what I expected.

   MPEG files produced with Pegase are as good as the ones created with the
Amiga version of Musicin (at least the first versions, as the latest ones
seem to be not as good). But Pegase is a lot faster : Encoding of a stereo
AIFF file, 44.1 KHz, 128 kbits/s, requires roughly two times the sound
duration (68060/50). A 68040/40 is able to encode the same file at twelve
times the sound duration.

   Pegase is able to encode IFF-AIFF, IFF-MAUD and RIFF-WAV files. These
files can be mono or stereo. RAW format, and CDDA (CD Audio) are also
supported. The samples must be 16 bits wide, and the sample frequency must
be close to 32 KHz, 44.1 KHz or 48 KHz.

   You can create MPEG files using the Layer I or the Layer II algorithms.
Stereo songs can be encoded using the joint-stereo mode.

1.3 Distribution

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                            DISTRIBUTION
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Pegase can be freely redistributed as long as the following conditions apply

- The package must come from Aminet (Internet or CD) and nowhere else. An
  archive obtains elsewhere must not be spread again. This ensure that every
  user can get easily any new update.

- The package must not have been modified in any way. It must be strictly
  the same as the one present on Aminet.

- There must not be any financial charge, direct or indirect, bind to the
  distribution of this package. This forbid, for instance, sells of freeware
  stuff, and BBS (unless their access is free of charge).
  This doesn't concern Aminet which gain the right to distribute Pegase on
  any CD. This doesn't apply either to magazines that are exclusively
  related to the Amiga, but only when this package is available with the
  magazine itself. All other situations require a prior authorization.

These rules were work out in order to restrict the sources of distribution.
This will make my life easier when it will be support time.

1.4 Installation

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                            INSTALLATION
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   There is no need for an Installer script, and installation by hand is not
that difficult. Simply copy Pegase where you want, that's all.

   The default language is english (or something similar to :-)). When a
translation is available for your country, you can also copy the catalog
file to your LOCALE: directory, as usual.

1.5 How to use

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                            HOW TO USE
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   Pegase could be run from Shell as well as from Workbench. In both cases,
it examines its icon in order to alter the default settings. Then, CLI
parameters are taken into account and override these settings.

   You can stop Pegase by pressing "CTRL-C" or "CTRL-D". The former only
stops the file being processed. If there are some files waiting in the
queue, Pegase starts to encode the next one. The latter, on the other side,
stops the whole process. Remaining files are ignored, and partial encoded
files are never deleted.

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Starting from a Shell :
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    Pegase sticks to the standard rules of Shell commands. Options are given
on the command line.

    As usual, "Pegase ?" causes the Shell to display the command line
pattern.  If you answer this pattern with another question mark, then Pegase
shows its extended help :

    Usage :


                FROM
                Input sound files or directories to encode.


                TO
                Output file name, or destination directory.


                LAYER
                Layer number (1 or 2). Default = 2.


                FREQ
                Sampling frequency (Hz). Default = 44100.


                BITRATE
                Total bitrate (kbits/s). Default = 160.


                MONO
                Mono encoding.


                JSTEREO
                Joint stereo encoding.


                COPYRIGHT
                Mark as copyright.


                ORIGINAL
                Mark as original.


                CRC
                Add error protection.


                PRIORITY
                Change Pegase's priority.


                VERBOSE
                Verbose output.



    Don't bother about the stack size. Pegase will be happy with a standard 4
kb stack.


Starting from Workbench :
-------------------------
```

The default settings, as said above, can be changed using the icon's tool types :

> TO
> Output file name, or destination directory.
>
> PATTERN
> File requester's pattern.
>
> LAYER
> Layer number.
>
> FREQ
> Sample frequency.
>
> BITRATE
> Total bitrate.
>
> MONO
> Mono encoding.
>
> JSTEREO
> Joint stereo encoding.
>
> COPYRIGHT
> Mark as copyright.
>
> ORIGINAL
> Mark as original.
>
> PRIORITY
> Change Pegase's priority.
>
> CRC
> Add error protection.

The console settings can be changed with an environment variable named "PEGASE_WBCONSOLE". Use the "SetEnv" command to create it, and don't forget to copy it to "ENVARC:" to make it permanent when you are done.

1.6 FROM

FROM : Source(s).

Specify one or more file and/or directory names. When no source is specified, Pegase open a file requester where you can pick up several files at once (multi-selection).

When one entry, at least, is a directory, Pegase analyzes all files inside this directory, and selects the ones that can be assumed to be audio files. This automatic selection is helpful, but it is too simple to be very accurate. For instance, any unknown file might be assumed to be a RAW audio

file. Don't expect anything useful if you encode such a file ! ;-)

   By now, Pegase only handles these file formats :

- AIFF : Mono/stereo, 16 bits, uncompressed.
- MAUD : Mono/stereo, 16 bits, uncompressed.
- WAV : Mono/stereo, 16 bits, uncompressed.
- CDDA : Always stereo, 16 bits, 44.1 KHz. The byte order (Intel/Motorola)
          is determined automatically by some magic.
- RAW : Mono, 16 bits (might be the default format for any unknown file
          type). Motorola byte order is expected for the samples.

    The sampling frequency used by the coder comes from the audio file
header's if it is available there (AIFF, MAUD and WAV). CDDA files always
use 44.1 KHz sampling rate.

   Note that only 16 bits sample files are supported. Sample frequency must
be close to those allowed by the encoder algorithm (32 KHz, 44.1 KHz or 48
KHz, +/- 4%).

1.7 TO

TO : Destination.

   This define the output file name, or the directory where to save output
files. When no destination is given, ouput files are saved along with the
input files.

   You are not allowed to define an explicit output file name when there are
multiple sources. Otherwise, Pegase will go back to its default setting and
save output files in the source's directory.

   When the destination is a directory, Pegase saves all output files there,
after having append an extension to the original file name. This extension
depends on the layer number (".mp1" for layer 1, or ".mp2" for layer 2).

NOTE :

   By now, Pegase doesn't check if it can write the output file before
starting the encoding. Also, an already existing destination file is
overwritten, without any warning.

1.8 LAYER

LAYER : Layer number.

   By now, Pegase only supports layer level 1 and 2. Layer 2 gives the best
results, and it is slightly faster than layer 1.

   The default setting is layer 2.

1.9 FREQ

FREQ : Sample frequency.

   Pegase use the sample frequency specified in the input file header's
(AIFF, MAUD or WAV), or select 44.1 KHz in case of a CDDA file encoding.

   Then, you only need to define this frequency for RAW format audio files.

   In all cases, the sample frequency must be close to 32 KHz, 44.1 KHz or
48 KHz (+/− 4%).

1.10 BITRATE

BITRATE : Output bit rate (kbits/s).

   This value determines the size (and quality) of the MPEG file. Several
values are allowed, for each layer.

   Even though the default bitrate is set to 160 kbits/s, this is not
sufficient in most cases. The minimum value for stereo datas should be 192.

   You don't need to learn each of these values as the encoder selects one
that is lowest when the specified value is not allowed. Thus, giving 200 as
bitrate causes Pegase to select 192 kbits/s.

   Known bitrates are (layer 1/layer 2) :

32, 64, 96, 128, 160, 192, 224, 256, 288, 320, 352, 384, 416 and 448.
32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 and 384.

   Having the sample frequency and the number of channels, you can compute
the MPEG file size. In example, for a 35 Mb CDDA file, using 160 kbits/s
output bitrate, we have :

Source :
44100 x   16   x   2   = 1411200 bits/s
(freq)   (bits per sample)   (channel)

1411200 / 160000 = 8.82 (ratio)
         (bitrate)

35 x 1024^2 / 8.82 = 3.97 Mb = Output file size.

   The bitrate has no noticeable effect on the encoding speed. Slower
bitrates give a slightly extra speed, but that's all.

1.11 MONO

MONO : RAW file format.

   As RAW files are assumed to be mono files, this option do nothing for
now.

   In the near future, it should be used to specify that a RAW file has only
one channel (the default setting will become 2). It should also be used to
mix stereo samples to mono.

1.12 JSTEREO

JSTEREO : Use Joint-Stereo mode.

   Input file(s) must be stereo. This option gives some liberty to the
encoder, which can progressively mix samples to mono on a subband basis.
Thus, the coder gets more bits to encode the samples, which improve the
quality when you use a low bitrate.

   This mix is done dynamically, for each frame, whenever it is necessary.
The number of mixed subbands varied also from frame to frame.

1.13 COPYRIGHT

COPYRIGHT : Mark as copyright.

   This is an information telling that the audio stream is copyrighted.

1.14 ORIGINAL

ORIGINAL : Mark as original.

   This is an information telling that the audio stream is original.

1.15 CRC

CRC : Add error protection.

   Compute a checksum of each MPEG headers.

1.16 PRIORITY

PRIORITY : Change Pegase's priority.

   Priority values must be in the range [-128; 5].

1.17 VERBOSE

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VERBOSE : Verbose output.

    Display global settings.
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1.18 PATTERN

```
PATTERN : File requester pattern.

    Define the pattern used to display files in the file requester.

    Default setting : ~(#?.info)
```

1.19 Problems

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                              PROBLEMS
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 - Output files overwrite silently existing files.
 - Pegase doesn't check if it can write to the destination file or directory.
   Thus,  encoding something from a CD requires that you define  explicitly a
   destination ("TO" option or Tooltype).
 - Pegase doesn't check if there is enough room on the  destination  disk.  A
   partial MPEG file resulting of this is not erased.

    These long standing problems will not be fixed because Pegase is  nothing
more than a test bed now.
```

1.20 Future

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                              FUTURE
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    Several news have make me  to  change  my  mind  since  the  last  public
release.  First  of  all,  Fraunhofer  and Thomson have claim they hold some
patents that forbid anybody to provide a Layer 3 encoder without  having  to
buy a license.
    By now, the license fee is $25 US per encoder  (upto  1000  units),  plus
$15000 US per year. Needless to say that I can't afford that.


    Beside that, I'm not satisfied with my standalone encoder.  Thus,  Pegase
will become "pegase.library" which should be more usefull.
    From now on, I'll use Pegase as a test bed to experiment new  techniques,
so don't expect new updates soon. The real thing will be the shared library,
and I'll do  my  best  to  improve  the  quality  and  the  encoding  speed,
especially for the PPC version.
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Last but not least, I only got nearly 170 e-mails. This is not enough to
motivate myself to continue such a hudge project like the one I was thinking
of.

1.21 Support

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                            SUPPORT
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    Support is available by sending an EMail to :

                         kakace@pacwan.fr

    Please, don't forget to prepend the subject with "[PEGASE]". This will
help me to setup an automatic sort for these mails.

    I reply to everybody, so don't think that this support is useless.

    Pegase homepage is up. It provides a FAQ, some benchmarks, a  file  area,
and some other nice things.

                    http://perso.pacwan.fr/kakace/pegase/
```


1.22 History

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                            HISTORY
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V1.0, Pegase 37.712 (18.8.98) :

    First public release.

V1.1, Pegase 37.756 (5.9.98) :

 - Bug fix. The encoder might output random bits in some circumstances.
 - Enhance high tones quality.
 - Display local file settings.
 - Display an error when the source file doesn't exist.

V1.2, Pegase 37.759 (6.9.98) :

 - Bug fix. Conversion from Intel byte order  to  Motorola  byte  order  was
completely broken. WAV files should be usable now.

V1.3, Pegase 37.762 (7.9.98) :
 - Removed enhancement done on high tones in V1.1. According to some reports
   it produces "crispy" high tones or some sort of echo.
 - As I'm sometimes stupid, I forgot to link Pegase with  my  ASM  optimized
   routines. This release has them, for sure. Looks like I need a break...

V1.4, Pegase 37.827 (27.9.98) :
```

  – Removed a random bug that might disturb the sound quality.
  – Removed a bug in the progress indicator, that couldn't reach 100% when
    encoding big files (longer than 8 minutes).
  – Restore the change removed in V1.3. It didn't work because of the random
    bug fixed in this release.
  – Added the PRIORITY argument, and the corresponding ToolType.
  – Misc enhancements concerning displayed informations.
  – Speedup (about 10% on 68060/50).
  – Removed a FPU emulated instruction in the 68040 version.

 V1.5, Pegase 1.45 (6.6.99) :
  – Some little changes and bug fixes.
  – Important speedup.
  – Experimental PPC version.

1.23 Thanks

                                    THANKS

    I'd like to thank all those who make this experience become so good :

 Motorola, who give 68k user's manual.
 Haage & Partner, for their StormC C++ compiler.
 Dietmar Eilert, because I can't live without GoldEd :-)
 HiSoft, who made Devpac.

    I don't forgot those who encouraged me, or tested this "thing" :

 Thierry Sillis
 Johann Girard-Cheron
 Eric Giguère
 "Rafo"
 Georges Goncalves

    I also thank the translators for the catalog files, MORB (CdBS) who has
 compiled the PPC version, and all those who have sent me an e-mail.

    Finally, many thanks to Thierry "Pumpkin" Schmitt who drew this beautiful
 icon for me, and to Patrick Beerhorst for his help on Pegase homepage.