Pegase

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COLLABORATORS			
	TITLE : Pegase		
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REVISION HISTORY			
NUMBER	DATE	DESCRIPTION	NAME

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Pegase

1.1 Pegase

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                              Pegase : mPEG Audio Stream Encoder
               ===================================

                         (c) 1998, Didier Levet
```

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
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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.

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.

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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 (Fraunhofer
Institute), 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 three times the sound
duration (68060/50). A 68040/40 is able to encode the same file at six times
the sound duration.
Paradoxically, according to some benchmarks, the 68030 version doesn't give
a significant speedup. But I believe that these benchmarks were not really
accurate.

    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 :-)). As for
now, only the french catalog exists. Since Pegase should be enhance a lot, I
think that other catalog files are needless (I might have to change a lot of
things in this area, so these files may become useless from release to
release). After all, if someone want to spend some time on them, I can make
the catalog descriptors available to him.

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.

Starting from a Shell :

    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 = 128.

                MONO
                Mono encoding.

                JSTEREO
                Joint stereo encoding.

                COPYRIGHT
                Mark as copyright.

                ORIGINAL
                Mark as original.

                CRC
                Add error protection.

                VERBOSE
                Verbose output.

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

Starting from Workbench :

Since the graphic user interface is not ready (and will only be in the
latest stages of the development), Pegase merely opens a console window to
clone a Shell.

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.

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.

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.

   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, improving the quality.

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.

Set a single bit a in the MPEG file header's. I don't know what it is used for.

1.14 ORIGINAL

ORIGINAL : Mark as original.

Set a single bit a in the MPEG file header's. I don't know what it is used for.

1.15 CRC

CRC : Add error protection.

Compute a checksum of each MPEG headers.

1.16 VERBOSE

VERBOSE : Verbose output.

Display global settings, and, for each file, its local settings.

1.17 PATTERN

PATTERN : File requester pattern.

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

   Default setting : ~(#?.info)

1.18 Problems

                              PROBLEMS

   Pegase is far to be finished, thus some things need to be fixed :

- 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.

   Despite these small problems, Pegase seems to work fine. But Murphy's Law
could make me lie ! :-)

   For any problem or deficiency or bug repport, see
             Support

1.19 Future

                           FUTURE

   I have to say right now that there will be a future if I get enough feed
back from you.

   If Pegase is not interresting as it is now, I can't see how it could be
interresting later. I do know that most of you are waiting for layer 3
support. But if you want it, you'll have to support me. That's the rules.

   By the way, layer 2 gives really good results, close to layer 3 quality.
You need a 16 bits sound card to hear the difference between them, unless
you have some special ears ;-)

   Then, if there is a future for Pegase, you can expect (without any
particular order) :

- Some clean-up where things don't go right (files overwritten, attempts to
  write to a read-only volume, and so on).
- New options that allow to only encode a part of an audio file, skip blanks
  at the begining and at end, or create a fade-in/fade-out.

- Further optimizations (yes ! This is possible :-))
- Psycho acoustic analyser #1.
- Layer level #3.
- Decoder (for all layers)
- Player (Paula, AHI, and Concierto/Toccata sound card).
- Graphic user interface(s) (probably using a plug-in system, that allows
  multiple GUI setups like Gadtools, MUI, custom, and so on).

    For sure, I have a lot of work to do :-)

    But I plan no special version for machines without FPU. The encoder is
slow enough as it is. A PPC version might be done later, but it has the
lowest priority because :
- Musicin PPC is fast enough to make it usable. 68k users can't say the same
  thing, so I'll have to finish the 68k version first.
- I have no PPC card, and no C++ compiler for it.
- I don't wish to give my sources to someone to compile a PPC version
  (Musicin sources are publicly available, but my optimizations are not).

1.20 Support

                                SUPPORT

    Support is available by sending an EMail to :

                        kakace@aix.pacwan.net

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

    French-speaking peoples could find me on IRC (10PM to 12PM, GMT+1/+2).
Others could try too, but I'm not sure I'll be able to understand them ;-)

                        kakace #Artbas (IRCNet)

    I have no WEB page yet, I have no time to make it ;-)

    In case of problems with Pegase, please check first for an external
cause. Whatever could be the symptoms, the real culprit could be anything.

    If you can't find the cause yourself, or when it is sure that Pegase is
the culprit, send me a detailed report by EMail. Feel free to tell me about
anything that could have any connection with the problem. In example, I got
this report in an early beta stage :

Beta-tester : Pegase do encode, but the MPEG file remains empty. It doesn't
              display any error.

I couldn't reproduce this problem. Without further informations, I guessed
that it came from the write routine. But this routine worked flawlessly.

Whether I ask for more informations, or I forget it. That's all.

Then, I decided to contact the tester again, and he told me that he uses the
AFS filesystem. And AFS was the real culprit :-/
So I reworked my write routine to solve this AFS incompatibility. Trust me,
the culprit is not always the one that you're thinking of. Any detail could
be important.

1.21 History

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                            HISTORY
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V1.0, Pegase 37.712 (18.8.98) :

    First public release.
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1.22 Thanks

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                            THANKS
                            ------

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

Fraunhofer Institute, who make Musicin sources available for free.
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" what_is_your_real_name ? :-)
Georges Goncalves

    Finally, many thanks to Thierry "Pumpkin" Schmitt who drew this beautiful
icon for me.
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