

PhxLnk

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Contents

1	PhxLnk	1
1.1	PhxLnk V4.00 (13-Dec-94)	1
1.2	Introduction	1
1.3	History since V3.00	1
1.4	Usage	3
1.5	System Requirements	3
1.6	Starting PhxLnk	3
1.7	Description of command line parameters	4
1.8	Linker Symbols	5
1.9	Small Data	6
1.10	Known Bugs	6

Chapter 1

PhxLnk

1.1 PhxLnk V4.00 (13-Dec-94)

P h x L n k V4.00

AMIGA-DOS Module Linker

Contents

Introduction

History since V3

Usage

Bugs

1.2 Introduction

PhxLnk was written in pure assembler-code, assembled with PhxAss and linked with BLink (first version) and PhxLnk itself. It supports all features of a standard Amiga-DOS linker (like BLink), except of overlay hunks and automatic link vectors (ALV).

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1.3 History since V3.00

V4.00 (18-Nov-94) PhxLnk V4.00 requires OS2.04 as a minimum. ↔
As a
 result it offers the standard ReadArgs()-Command
 Line parsing and is much shorter.

DEBUG Hunk blocks are treated the same way as with SAS/C's BLink, which gives the possibility to generate load files for a Source Level Debugger. The latest version of the PowerVisor Debugger, V1.42, unfortunately has still some problems with BLinked programs, consisting of several source files, so there is a compatibility switch, called

PVCOMPAT

.

The new argument DEFINE (see CLI Parameters)

gives the possibility to define an absolute Linker-Symbol (quite similar to the small data symbols supplied by PhxLnk).

By utilizing the new switch

BLINKCOMPAT

PhxLnk

will treat small data modules the same way like SAS/C's BLink does.

Data and Bss sections, which were named "__MERGED", will be coalesced into a small data section (without having to specify the SMALLDATA switch).

Zero bytes at the end of a Code or Bss section will be ignored, which shortens the resulting load file. Because that doesn't work under Kickstart 1.x, there is a compatibility switch called

KICK1

.

- V3.10 (04-Aug-94) Fixed a bug with catastrophic proportions, which sometimes appeared when linking with libraries. To be honest: I don't think, that one of the pre-V3.10 versions are safe enough to link libraries ;-). PhxLnk was completely localized. Until now, german and polish catalogs are available. Documentation was converted into Amiga-Guide format.
- V3.05 (31-Jul-94) Fixed a linker-library bug: Sometimes sections of a library, though not included, appeared in HUNK_HEADER with random length. HUNK_RELOC and HUNK_SYMBOL of zero length will no longer be included.
- V3.01 (22-Jan-94) Because of massive changes in V3.00, there was a little bug with the name of the output file.
- V3.00 (18-Jan-94) Fixed many problems with library linking, which could lead to a FreeMemoryTwice Guru (or even worse). Some linker symbols of Lattice/SAS (__LinkerDB, __BSSBAS, __BSSLEN) and DICE (__RESIDENT, __DATA_BAS, __DATA_LEN, __BSS_LEN) are supported. The special library format of Lattice/SAS, using HUNK_LIB and HUNK_INDEX, is also supported. PhxLnk
-

converts them into standard library format.

1.4 Usage

Requirements

Starting PhxLnk

Parameters

Linker Symbols

Small Data

1.5 System Requirements

Since PhxLnk V4.00 you *must* have OS2.04 (V37) as a minimum. This makes PhxLnk much shorter, faster and easier for me to code. I don't think that this limitation (which is a progress in my eyes) doesn't hurt anybody nowadays, if you use your Amiga for more than just playing :- (even my good old A1000 has OS3.1 installed).

PhxLnk is tested with the following configurations:

A4000 (68040), 2 Chip, 4 Fast, OS3.1

A1000 (68010), 0.5 Chip, 2 Fast, OS3.1

1.6 Starting PhxLnk

PhxLnk can be used from CLI only. You should copy it to "C:" or ↵
set a path
to its directory.

Format: PhxLnk [FROM] {<object module|library module>}
[TO <output file>] [SMALLCODE] [SMALLDATA] [NODEBUG] [CHIP]
[PRESERVE] [PVCOMPAT] [BLINKCOMPAT] [KICK1] [MAXSECTS=<n>]
[DEFINE "<symbol>[=value] [, <symbol>...]"]

Template: FROM/M, TO/K, SC=SMALLCODE/S, SD=SMALLDATA/S, ND=NODEBUG/S, CHIP/S,
PRESERVE/S, PV=PVCOMPAT/S, B=BLINKCOMPAT/S, K1=KICK1/S,
MAXSECTS/K/N, DEF=DEFINE/K

Starting PhxLnk with no argument or with a single '?' will display a short description. For a more precise description, refer to
Parameters
.

There are three types of modules which can be linked:

- o Object modules with extension ".o" or ".obj" which normally consist of one unit. PhxLnk also links object modules with several units.

- o Library modules with extension ".lib" which can consist of any number of units. PhxLnk will only include units, if at least one ext_def-symbol is referenced in an object module unit or in an already included library unit.
- o Lattice/SAS Extended Library modules (also with ".lib" extension). They are translated into the standard library format by PhxLnk (not a very good solution - but it works).

Names with another extension will be rejected.

The module names can appear in any order, provided the first is an object module which contains the startup code.

1.7 Description of command line parameters

FROM/M	All parameters without a keyword specify the names of the object and library modules to link. For valid name extensions refer to Starting PhxLnk .
TO/K	Determines the name of the output file to be produced. If not specified, the output file has the name of the first module without its extension. Example: "PhxLnk prog1.o prog2.o c.lib m.lib" will generate a load file with the name "prog1".
CHIP/S	This switch forces all sections to be loaded to Chip memory.
PRESERVE/S	The normal case is, that PhxLnk removes all section with zero length to save memory. Choose this switch, if you want to preserve empty sections.
B=BLINKCOMPAT/S	PhxLnk will be compatible to BLink, when linking small data modules. That means, that if the small data section is smaller than 32k, PhxLnk will use a small data pointer (_LinkerDB) which points to the beginning of this section instead 32766 bytes into it. As a result all near-offsets will start with 0 instead -32766.
K1=KICK1/S	PhxLnk creates a load file which is compatible to Kick-start 1.x. That will prevent PhxLnk from deleting zero-bytes at the end of a section, for example.
SC=SMALLCODE/S	Normally only the sections with the same type and name will be coalesced. This switch makes PhxLnk to ignore the names of Code sections and to produce one large Code sections. Usually SMALLCODE is chosen, when using the small code model with your assembler or compiler.
SD=SMALLDATA/S	As with SMALLCODE the section names are ignored, but now for all Data and Bss sections. Important: Data and Bss will not be mixed. This large section will contain first all Data and then all Bss sections. Because the Bss part has no definite contents (only zeros),

only the Data part will be stored. The size of Bss is stored together with the Data size in the load file's header.

Since OS2.0 the Bss part will be initialized to zero, when it's loaded (e.g. by LoadSegment()). But beware (!!), this is not the case with Kickstart 1.x!

If you don't want to see your programs crash on some Kick 1.3 dinosaurs, I recommend to clear the Bss part manually by using the special Linker-symbols `_DATA_BAS_`, `_DATA_LEN_` and `_BSS_LEN_` (refer to

Linker Symbols
for more information).

All references to symbols of this

Small Data
section will

be calculated as if the Bss sections were directly behind the Data.

You should use this switch, when compiling/assembling your code with

Small Data
model enabled.

ND=NODEBUG/S	The HUNK_SYMBOL and HUNK_DEBUG blocks, which contain informations for a debugger will not be included in the output file.
PV=PVCOMPAT/S	This switch activates the PowerVisor compatibility mode, which is necessary when using Source Level Debugging informations in your program. Unfortunately the author of PowerVisor, Jorrit Tyberghein, currently does not plan a new release.
MAXSECTS/K/N	Determines the maximum number of sections per unit. The default value ist 16, which should be enough for most cases.
DEF=DEFINE/K	Defines an absolute Linker Symbol. Definition of multiple symbols must be seperated by commas. Don't forget the to embed the whole term, which follows DEFINE, in quotes (because of some problems with ReadArgs()) !

1.8 Linker Symbols

The linker itself creates some `ext_def($01xxxxxx)` and `ext_abs(← $02xxxxxx)` symbols which will be needed by the startup code of a program using the Small Data model.

`_DATA_BAS_` (ext_def) Base address of the small-data section.
`_DATA_LEN_` (ext_abs) Length of the Data-part of the small-data section.
`_BSS_LEN_` (ext_abs) Length of the Bss-part of the small-data section.

For compatibility with Lattice/SAS or DICE you may also use these symbols:

Lattice/SAS:

`__LinkerDB` (ext_def) This symbol can be used to initialize your small data base register. Normally it will point 32766 bytes into the small data section, but when the BLink compatibility switch was selected and the small data area is smaller than 32k, it will point to its beginning.

`__BSSBAS` (ext_def) Base address of the Bss-part of the small-data section.

`__BSSLEN` (ext_abs) Length of the Bss-part in longwords.

DICE:

`__DATA_BAS` (ext_def) Base address of the small-data section.

`__DATA_LEN` (ext_abs) Length of the Data-part of the small-data section in longwords.

`__BSS_LEN` (ext_abs) Length of the Bss-part of the small-data section in longwords.

`__RESIDENT` (ext_abs) Always zero.

1.9 Small Data

Small-data symbols can be accessed in a range of 65534 (\$fffe) bytes. When a symbol is outside of this range, the linker will display an error. The small data model must be initialized by the startup code. When you're using A4 as small data pointer, the initialization would look like this:

```
xref    __DATA_BAS_          ;
        __DATA_BAS_
        is a linker symbol

lea    __DATA_BAS_+32766,a4    ; a4 always points to the mid. of small data
```

1.10 Known Bugs

- o If the output file has more than 1000 sections there could be a stack overflow :-)

If any bugs or questions occur, please write to :

Standard Mail:

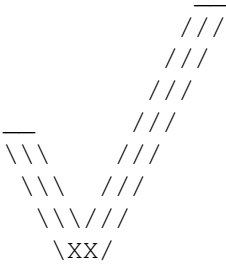
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Germans should prefer my home bbs:

Phoenix@Komet.guru.sub.de (no inter. connection)



A M I G A F O R E V E R !