Tracing Through the Makefile

# Makefile for Blink.c

# Makefile -- Blink program makefile

# Copyright 2000 Free Software Foundation, Inc.

# Written by Stephane Carrez (stcarrez@worldnet.fr)

#

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#

SRCDIR=c:/gel

GEL\_BASEDIR=$(SRCDIR)

# Use the cme11 board configuration files (compilation flags

# and specific includes).

override TARGET\_BOARD=m68hc11-cme11

include $(GEL\_BASEDIR)/config/make.defs

LDFLAGS += -Wl,-defsym,\_io\_ports=0x1000

CSRCS=blink.c

OBJS=$(CSRCS:.c=.o)

PROGS=blink.elf

all:: $(PROGS) blink.s19

blink.elf: $(OBJS)

$(CC) $(LDFLAGS) -o $@ $(OBJS)

install:: $(PROGS)

$(INSTALL) $(PROGS) $(GEL\_INSTALL\_BIN)

# Make.defs

MAKE\_RULES\_DIR?= $(GEL\_BASEDIR)/config

MAKE\_FLAGS\_DIR?= $(GEL\_BASEDIR)/config

MAKE\_VAR\_DIR ?= $(GEL\_BASEDIR)/config

MAKE\_BOARD\_DIR?= $(GEL\_BASEDIR)/config

include $(MAKE\_VAR\_DIR)/var.defs

#

# Gives an idea of the target board memory. This is used to decide

# whether a given example can be compiled or not.

# Define to the following values:

#

# large when ROM >= 32K

# medium ROM >= 16K

# small ROM >= 8K

# tiny ROM >= 2K

# none ROM = 0 (bootstrap only)

#

BOARD\_MEMORY=large

#

# End of configuration

#

# #########################################################################

include $(GEL\_BASEDIR)/config/gel.defs

include $(MAKE\_FLAGS\_DIR)/flags.defs

ifndef TARGET\_BOARD

include $(MAKE\_BOARD\_DIR)/board.def

endif

# Setup according to target board

include $(MAKE\_BOARD\_DIR)/$(TARGET\_BOARD)/make.defs

include $(MAKE\_RULES\_DIR)/rules.defs

all::

clean::

$(RM) \*.o \*.elf \*.s19 \*.b \*.a

dist-clean:: clean

$(RM) m68hc11.ram \*~ #\*

install::

# Var.defs

# var.defs -- Makefile global and generic variables (host specific)

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# Written by Stephane Carrez (stcarrez@nerim.fr)

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#

# Note: The make variables here are dedicated to the host and cross-compile

# environment. They should not depend on the target board.

#

# Host generic commands

RM=rm -f

INSTALL=cp

DEVC\_PREFIX=m6811-elf-

CC=$(DEVC\_PREFIX)gcc

CXX=$(DEVC\_PREFIX)gcc

#CC=$(DEVC\_PREFIX)gcc

AS=$(DEVC\_PREFIX)as

AR=$(DEVC\_PREFIX)ar

SIZE=$(DEVC\_PREFIX)size

OBJCOPY=$(DEVC\_PREFIX)objcopy

GNATBIND=$(DEVC\_PREFIX)gnatbind

INCDIR=

INCLUDES=

DEP\_INCLUDES=

CPPFLAGS=

CFLAGS=

CXXFLAGS=

BOOT\_PROG\_CFLAGS=

INSTALL\_BIN=$(GEL\_BASEDIR)/bin

# Gel.defs

# gel.defs -- Makefile variables specific to GEL (public and private)

# Copyright (C) 1999, 2000, 2001, 2002, 2003, 2004

# Free Software Foundation, Inc.

# Written by Stephane Carrez (stcarrez@nerim.fr)

#

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# Boston, MA 02111-1307, USA.

#

# Note: Makefile variables defined in this file must be prefixed with GEL\_

# to avoid any conflict with user's makefile variables. These definitions

# must not be changed while porting GEL.

#

# GEL version

GEL\_VERSION=1.6.1

# GEL public includes

GEL\_INCDIR=$(GEL\_BASEDIR)/include

GEL\_AINCDIR=$(GEL\_BASEDIR)/ainclude

GEL\_INCLUDES=-I$(GEL\_INCDIR)/asm-$(CPU)/arch-$(BOARD) -I$(GEL\_INCDIR)

GEL\_AINCLUDES=-I$(GEL\_AINCDIR)/asm-$(CPU)/arch-$(BOARD) \

-I$(GEL\_AINCDIR)/asm-$(CPU) -I$(GEL\_AINCDIR) \

-I$(GEL\_AINCDIR)/gnat

# CPP flags necessary to build gel

GEL\_CPPFLAGS=

# GEL libraries

GEL\_LIBGEL=$(GEL\_BASEDIR)/lib/libgel.a

GEL\_LIBBSP=$(GEL\_BASEDIR)/lib/libbsp.a

GEL\_LIBC=$(GEL\_BASEDIR)/lib/libc.a

GEL\_LIBUTIL=$(GEL\_BASEDIR)/lib/libutil.a

GEL\_LIBBOT=$(GEL\_BASEDIR)/lib/libbot.a

GEL\_LIBABSP=$(GEL\_BASEDIR)/lib/libabsp.a

GEL\_LIBGDM=$(GEL\_BASEDIR)/lib/libgdm.a

#

# Libraries (well, only libutil.a for now)

#

GEL\_LIBS=$(GEL\_LIBC) $(GEL\_LIBBSP) $(GEL\_LIBC)

GEL\_ELIBS=$(GEL\_LIBGEL) $(GEL\_LIBC) $(GEL\_LIBGEL) $(GEL\_LIBBSP) $(GEL\_LIBC)

GEL\_INSTALL\_BIN=$(GEL\_BASEDIR)/bin

# Flags.defs

# flags.defs -- Makefile variables to control the compilation, link, ...

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#

# Note: Makefile variables defined in this file must be prefixed with GEL\_

# to avoid any conflict with user's makefile variables.

#

# #########################################################################

#

# Before compiling, you can configure the following make variables:

#

# TARGET\_PROC

# TARGET\_INT

# DEBUG

# OPT

# WARN

#

# You can also do (as an example):

#

# make TARGET\_INT= OPT="-Os -fomit-frame-pointer DEBUG=

#

# to avoid to change this file.

#

# Configure for a 68hc11 with 16-bit int

# Make sure to pass these options when compiling AND linking

#

# Define the target processor:

# 68HC11 -> -m68hc11 [default if no option]

# 68HC12 -> -m68hc12

#

CPU=m68hc11

TARGET\_PROC=-$(CPU)

# Define whether you want 16-bit or 32-bit int

# 16-bits -> -mshort

# 32-bits -> -mnoshort [default if no option]

#

TARGET\_INT=-mshort

# Define whether you want symbolic debug or not (debug with gdb):

# sym-debug -> -g

# no-debug ->

#

DEBUG=-g

# Define the optimization you want:

# Max-speed -> -O3 -fomit-frame-pointer [debug is not possible]

# Good optim -> -Os [debug possible]

# No optim -> [default if no option]

#

OPT=-Os

# Generate full warnings

WARN=-Wall -Wmissing-prototypes

#

# End of configuration

#

# #########################################################################

INCDIR+=$(GEL\_INCDIR)

AINCDIR+=$(GEL\_AINCDIR)

INCLUDES+=-I. $(GEL\_INCLUDES)

AINCLUDES+=-I. $(GEL\_AINCLUDES)

DEP\_INCLUDES+=-I. -I$(GEL\_INCLUDES)

#

# CPP flags passed during a compilation (include paths)

#

CPPFLAGS+=$(INCLUDES) $(GEL\_CPPFLAGS)

#

# C flags used by default to compile a program

#

CFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT)

CXXFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT) -fno-exceptions

ADAFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT)

ADAFLAGS+=$(AINCLUDES)

ASFLAGS=$(TARGET\_PROC) $(TARGET\_INT)

#

# LDFLAGS common to all the examples

#

DEF\_LDFLAGS=$(TARGET\_PROC) $(TARGET\_INT)

DEF\_LDSCRIPT= -Wl,-m,$(CPU)elfb -L$(GEL\_BASEDIR)/config/$(TARGET\_BOARD)

#

# LDFLAGS used by default if not overriden.

# Build a normal program for the target board

#

LDFLAGS=$(DEF\_LDFLAGS) $(DEF\_LDSCRIPT)

#

# Options to creates the .s19 or .b files from the elf

#

OBJCOPY\_FLAGS=--only-section=.text \

--only-section=.rodata \

--only-section=.vectors \

--only-section=.data

# Make.defs

# 68HC11 Axiom Manufacturing CME11E9-EVBU

CPU=m68hc11

BOARD=cme11

# See <include/asm-m68hc11/arch-cme11/arch/gdm.h on how you can

# connect a GDM 128x64 LCD display on the LCD port of Axiom board.

HAVE\_GRAPHIC\_LCD=yes

# Rules.defs

# rules.defs -- Makefile specific rules for GEL (public and private)

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#

#

# .elf is for the simulator and gdb

# .s19 is for some downloader and the simulator

# .b is a binary dump

#

.SUFFIXES: .ads .adb .elf .s19 .b

#

# Rule to create an S19 file from an ELF file.

#

.elf.s19:

$(OBJCOPY) --output-target=srec $(OBJCOPY\_FLAGS) $< $\*.s19

#

# Rule to create an binary dump from an ELF file.

#

.elf.b:

$(OBJCOPY) --output-target=binary --gap-fill=255 \

--only-section=.data $(OBJCOPY\_FLAGS) $< $\*.b

.adb.o:

$(CC) -c $(ADAFLAGS) $<

Looking at the Makefile in sequential order

**Makefile**

SRCDIR=c:/gel

GEL\_BASEDIR=$(SRCDIR)

# Use the cme11 board configuration files (compilation flags

# and specific includes).

override TARGET\_BOARD=m68hc11-cme11

include $(GEL\_BASEDIR)/config/make.defs

**Make.defs**

MAKE\_RULES\_DIR?= $(GEL\_BASEDIR)/config

MAKE\_FLAGS\_DIR?= $(GEL\_BASEDIR)/config

MAKE\_VAR\_DIR ?= $(GEL\_BASEDIR)/config

MAKE\_BOARD\_DIR?= $(GEL\_BASEDIR)/config

include $(MAKE\_VAR\_DIR)/var.defs

**Var.defs**

RM=rm -f

INSTALL=cp

DEVC\_PREFIX=m6811-elf-

CC=$(DEVC\_PREFIX)gcc

CXX=$(DEVC\_PREFIX)gcc

#CC=$(DEVC\_PREFIX)gcc

AS=$(DEVC\_PREFIX)as

AR=$(DEVC\_PREFIX)ar

SIZE=$(DEVC\_PREFIX)size

OBJCOPY=$(DEVC\_PREFIX)objcopy

GNATBIND=$(DEVC\_PREFIX)gnatbind

INCDIR=

INCLUDES=

DEP\_INCLUDES=

CPPFLAGS=

CFLAGS=

CXXFLAGS=

BOOT\_PROG\_CFLAGS=

INSTALL\_BIN=$(GEL\_BASEDIR)/bin

**Make.defs**

BOARD\_MEMORY=large

#

# End of configuration

#

# #########################################################################

include $(GEL\_BASEDIR)/config/gel.defs

**Gel.defs**

GEL\_VERSION=1.6.1

GEL\_INCDIR=$(GEL\_BASEDIR)/include

GEL\_AINCDIR=$(GEL\_BASEDIR)/ainclude

GEL\_INCLUDES=-I$(GEL\_INCDIR)/asm-$(CPU)/arch-$(BOARD) -I$(GEL\_INCDIR)

GEL\_AINCLUDES=-I$(GEL\_AINCDIR)/asm-$(CPU)/arch-$(BOARD) \

-I$(GEL\_AINCDIR)/asm-$(CPU) -I$(GEL\_AINCDIR) \

-I$(GEL\_AINCDIR)/gnat

GEL\_CPPFLAGS=

GEL\_LIBGEL=$(GEL\_BASEDIR)/lib/libgel.a

GEL\_LIBBSP=$(GEL\_BASEDIR)/lib/libbsp.a

GEL\_LIBC=$(GEL\_BASEDIR)/lib/libc.a

GEL\_LIBUTIL=$(GEL\_BASEDIR)/lib/libutil.a

GEL\_LIBBOT=$(GEL\_BASEDIR)/lib/libbot.a

GEL\_LIBABSP=$(GEL\_BASEDIR)/lib/libabsp.a

GEL\_LIBGDM=$(GEL\_BASEDIR)/lib/libgdm.a

GEL\_LIBS=$(GEL\_LIBC) $(GEL\_LIBBSP) $(GEL\_LIBC)

GEL\_ELIBS=$(GEL\_LIBGEL) $(GEL\_LIBC) $(GEL\_LIBGEL) $(GEL\_LIBBSP) $(GEL\_LIBC)

GEL\_INSTALL\_BIN=$(GEL\_BASEDIR)/bin

**Make.defs**

include $(MAKE\_FLAGS\_DIR)/flags.defs

**Flags.defs**

CPU=m68hc11

TARGET\_PROC=-$(CPU)

TARGET\_INT=-mshort

DEBUG=-g

OPT=-Os

WARN=-Wall -Wmissing-prototypes

INCDIR+=$(GEL\_INCDIR)

AINCDIR+=$(GEL\_AINCDIR)

INCLUDES+=-I. $(GEL\_INCLUDES)

AINCLUDES+=-I. $(GEL\_AINCLUDES)

DEP\_INCLUDES+=-I. -I$(GEL\_INCLUDES)

CPPFLAGS+=$(INCLUDES) $(GEL\_CPPFLAGS)

CFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT)

CXXFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT) -fno-exceptions

ADAFLAGS+=$(TARGET\_PROC) $(TARGET\_INT) $(WARN) $(DEBUG) $(OPT)

ADAFLAGS+=$(AINCLUDES)

ASFLAGS=$(TARGET\_PROC) $(TARGET\_INT)

DEF\_LDFLAGS=$(TARGET\_PROC) $(TARGET\_INT)

DEF\_LDSCRIPT= -Wl,-m,$(CPU)elfb -L$(GEL\_BASEDIR)/config/$(TARGET\_BOARD)

LDFLAGS=$(DEF\_LDFLAGS) $(DEF\_LDSCRIPT)

OBJCOPY\_FLAGS=--only-section=.text \

--only-section=.rodata \

--only-section=.vectors \

--only-section=.data

**Make.defs**

ifndef TARGET\_BOARD

include $(MAKE\_BOARD\_DIR)/board.def

endif

include $(MAKE\_BOARD\_DIR)/$(TARGET\_BOARD)/make.defs

**Target Board Make.defs**

CPU=m68hc11

BOARD=cme11

HAVE\_GRAPHIC\_LCD=yes

**Make.defs**

include $(MAKE\_RULES\_DIR)/rules.defs

**Rules.defs**

.SUFFIXES: .ads .adb .elf .s19 .b

.elf.s19:

$(OBJCOPY) --output-target=srec $(OBJCOPY\_FLAGS) $< $\*.s19

.elf.b:

$(OBJCOPY) --output-target=binary --gap-fill=255 \

--only-section=.data $(OBJCOPY\_FLAGS) $< $\*.b

.adb.o:

$(CC) -c $(ADAFLAGS) $<

**Make.defs**

all::

clean::

$(RM) \*.o \*.elf \*.s19 \*.b \*.a

dist-clean:: clean

$(RM) m68hc11.ram \*~ #\*

install::

**Makefile**

LDFLAGS += -Wl,-defsym,\_io\_ports=0x1000

CSRCS=blink.c

OBJS=$(CSRCS:.c=.o)

PROGS=blink.elf

all:: $(PROGS) blink.s19

blink.elf: $(OBJS)

$(CC) $(LDFLAGS) -o $@ $(OBJS)

install:: $(PROGS)

$(INSTALL) $(PROGS) $(GEL\_INSTALL\_BIN)

Now in sequential order with substitutions

~~SRCDIR=c:/gel~~

~~GEL\_BASEDIR=$(SRCDIR)~~

~~override TARGET\_BOARD=m68hc11-cme11~~

~~include c:/gel/config/make.defs~~

~~MAKE\_RULES\_DIR?= c:/gel/config~~

~~MAKE\_FLAGS\_DIR?= c:/gel/config~~

~~MAKE\_VAR\_DIR ?= c:/gel/config~~

~~MAKE\_BOARD\_DIR?= c:/gel/config~~

~~include c:/gel/config/var.defs~~

~~RM=rm -f~~

~~INSTALL=cp~~

~~DEVC\_PREFIX=m6811-elf-~~

~~CC=m6811-elf-gcc~~

~~CXX=m6811-elf-gcc~~

~~#CC=m6811-elf-gcc~~

~~AS=m6811-elf-as~~

~~AR=m6811-elf-ar~~

~~SIZE=m6811-elf-size~~

~~OBJCOPY=m6811-elf-objcopy~~

~~GNATBIND=m6811-elf-gnatbind~~

INCDIR=

INCLUDES=

DEP\_INCLUDES=

CPPFLAGS=

CFLAGS=

CXXFLAGS=

BOOT\_PROG\_CFLAGS=

~~INSTALL\_BIN=c:/gel/bin~~

~~BOARD\_MEMORY=large~~

~~#~~

~~# End of configuration~~

~~#~~

~~# #########################################################################~~

~~include c:/gel/config/gel.defs~~

~~GEL\_VERSION=1.6.1~~

~~GEL\_INCDIR=c:/gel/include~~

~~GEL\_AINCDIR=c:/gel/ainclude~~

~~GEL\_INCLUDES=-Ic:/gel/include/asm-$(CPU)/arch-cme11 -Ic:/gel/include~~

~~GEL\_AINCLUDES=-Ic:/gel/ainclude/asm-$(CPU)/arch-cme11 \~~

~~-Ic:/gel/ainclude/asm-$(CPU) -Ic:/gel/ainclude \~~

~~-Ic:/gel/ainclude/gnat~~

GEL\_CPPFLAGS=

~~GEL\_LIBGEL=c:/gel/lib/libgel.a~~

~~GEL\_LIBBSP=c:/gel/lib/libbsp.a~~

~~GEL\_LIBC=c:/gel/lib/libc.a~~

~~GEL\_LIBUTIL=c:/gel/lib/libutil.a~~

~~GEL\_LIBBOT=c:/gel/lib/libbot.a~~

~~GEL\_LIBABSP=c:/gel/lib/libabsp.a~~

~~GEL\_LIBGDM=c:/gel/lib/libgdm.a~~

~~GEL\_LIBS=c:/gel/lib/libc.a c:/gel/lib/libbsp.a c:/gel/lib/libc.a~~

~~GEL\_ELIBS=c:/gel/lib/libgel.a c:/gel/lib/libc.a c:/gel/lib/libgel.a c:/gel/lib/libbsp.a c:/gel/lib/libc.a~~

~~GEL\_INSTALL\_BIN=c:/gel/bin~~

~~include c:/gel/config/flags.defs~~

~~CPU=m68hc11~~

~~TARGET\_PROC=-m68hc11~~

~~TARGET\_INT=-mshort~~

~~DEBUG=-g~~

~~OPT=-Os~~

~~WARN=-Wall -Wmissing-prototypes~~

~~INCDIR+=c:/gel/include~~

~~AINCDIR+=c:/gel/ainclude~~

~~INCLUDES+=-I. -Ic:/gel/include/asm-m68hc11/arch-cme11 -Ic:/gel/include~~

~~AINCLUDES+=-I. =-Ic:/gel/ainclude/asm-m68hc11/arch-cme11 \~~

~~-Ic:/gel/ainclude/asm-m68hc11 -Ic:/gel/ainclude \~~

~~-Ic:/gel/ainclude/gnat~~

~~DEP\_INCLUDES+=-I. -I-Ic:/gel/include/asm-m68hc11/arch-cme11 -Ic:/gel/include~~

~~CPPFLAGS+=-I. -Ic:/gel/include/asm-m68hc11/arch-cme11 -Ic:/gel/include $(GEL\_CPPFLAGS)~~

~~CFLAGS+=m68hc11 -mshort -Wall -Wmissing-prototypes -g -Os~~

~~CXXFLAGS+=m68hc11 -mshort -Wall -Wmissing-prototypes -g -Os -fno-exceptions~~

~~ADAFLAGS+=m68hc11 -mshort -Wall -Wmissing-prototypes -g -Os~~

~~ADAFLAGS+=-I. =-Ic:/gel/ainclude/asm-m68hc11/arch-cme11 \~~

~~-Ic:/gel/ainclude/asm-m68hc11 -Ic:/gel/ainclude \~~

~~-Ic:/gel/ainclude/gnat~~

~~ASFLAGS=m68hc11 -mshort~~

~~DEF\_LDFLAGS=m68hc11 -mshort~~

~~DEF\_LDSCRIPT= -Wl,-m,m68hc11elfb -Lc:/gel/config/m68hc11-cme11~~

~~LDFLAGS=m68hc11 -mshort -Wl,-m,m68hc11elfb -Lc:/gel/config/m68hc11-cme11~~

~~OBJCOPY\_FLAGS=--only-section=.text \~~

~~--only-section=.rodata \~~

~~--only-section=.vectors \~~

~~--only-section=.data~~

~~ifndef TARGET\_BOARD~~

~~include c:/gel/config/board.def~~

~~endif~~

~~include c:/gel/config/m68hc11-cme11/make.defs~~

~~CPU=m68hc11~~

~~BOARD=cme11~~

HAVE\_GRAPHIC\_LCD=yes

~~include c:/gel/config/rules.defs~~

.SUFFIXES: .ads .adb .elf .s19 .b

.elf.s19:

m6811-elf-objcopy --output-target=srec --only-section=.text \

--only-section=.rodata \

--only-section=.vectors \

--only-section=.data $< $\*.s19

.elf.b:

m6811-elf-objcopy --output-target=binary --gap-fill=255 \

--only-section=.data --only-section=.text \

--only-section=.rodata \

--only-section=.vectors \

--only-section=.data $< $\*.b

.adb.o:

m6811-elf-gcc -c m68hc11 -mshort -Wall -Wmissing-prototypes -g –Os

-I. -Ic:/gel/ainclude/asm-m68hc11/arch-cme11 \

-Ic:/gel/ainclude/asm-m68hc11 -Ic:/gel/ainclude \

-Ic:/gel/ainclude/gnat $<

all::

clean::

rm -f \*.o \*.elf \*.s19 \*.b \*.a

dist-clean:: clean

rm -f m68hc11.ram \*~ #\*

install::

LDFLAGS += -Wl,-defsym,\_io\_ports=0x1000

CSRCS=blink.c

OBJS=$(CSRCS:.c=.o)

PROGS=blink.elf

all:: $(PROGS) blink.s19

blink.elf: $(OBJS)

m6811-elf-gcc m68hc11 -mshort -Wl,-m,m68hc11elfb -Lc:/gel/config/m68hc11-cme11 -o $@ $(OBJS)

install:: $(PROGS)

cp $(PROGS) c:/gel/bin