How to use EGNU and GCC with NE64 TCP/ip stack plus uBUG12

Download and install both EGNU and GCC. Links are:

<u>http://www.geocities.com/englere_geo/</u> <u>http://www.ericengler.com/EmbeddedGNU.aspx</u> <u>http://www.gnu-m68hc11.org/</u>

EGNU IDE download link http://www.ericengler.com/downloads/egnu092.zip

GCC download for Win98, XP and 2K http://stephane.carrez.free.fr/m68hc11_pkg_zip.php http://stephane.carrez.free.fr/EXE/gnu-68hc1x-3.0.exe

Initial Setup:

Locate the *EmbeddedGNU.exe* where it is installed too and double click on the icon.

C:\egnu092									
File Edit Vie	w Favorites Tools Help			20					
🕒 Back + 🕤 - 🏂 🔎 Search 🍋 Folders 崎 📝 🎼 🏂 💼 📔 🗙 🎫 +									
Address 🛅 C:\egnu092 🗾 Go									
Folders X	Name 🔺	Size	Туре	Date Modified					
Deckton	Examples		File Folder	9/27/2004 5:13 PM					
	🔁 help		File Folder	9/27/2004 5:13 PM					
	include 🛛		File Folder	9/27/2004 5:13 PM					
	ib 🔁		File Folder	9/27/2004 5:13 PM					
	profiles		File Folder	9/27/2004 5:13 PM					
	millioad.exe	131 KB	Application	1/25/2004 10:56 AM					
	🗐 changes.txt	4 KB	Text Document	8/15/2004 8:47 PM					
	🗐 Copying.txt	18 KB	Text Document	2/18/2003 5:33 PM					
	SenteddedGNU.exe	1,130 KB	Application	8/15/2004 6:30 PM					
	embeddedgnu.ini	2 KB	Configuration Settings	10/5/2004 5:13 PM					
	errout.exe	48 KB	Application	3/28/2003 1:27 PM					
	🗐 errout.txt	1 KB	Text Document	10/26/1999 6:44 PM					
	🗐 history.txt	21 KB	Text Document	5/31/2004 9:00 PM					
	INSTALL.TXT	2 KB	Text Document	3/27/2003 10:22 PM					
	make.exe	120 KB	Application	11/7/1999 4:04 PM					
	m.exe	64 KB	Application	10/10/2000 12:00 AM					
	SRecCvt.exe	182 KB	Application	8/19/2003 3:11 PM					
	SRecCVT-DeviceInfo.txt	2 KB	Text Document	8/18/2003 6:17 PM					
	SRecCvtRG.pdf	31 KB	Adobe Acrobat Doc	7/18/2003 5:03 PM					

It will prompt for setting up the COM. Select the Yes or No button. It is NOT necessary to setup the COM but if one wants too then the following sequence is how to. Please note that if COM is enabled it will interfere with uBUG12 if there is only one COM port in the PC. If there are 2 serial ports in the PC then this problem will not exist.



If yes is selected then choose a COM port by clicking on the pull down arrow. The environment setup can be change by the Change COM options button.

Environme	nt options					×
Directories	Preferences	Editor	Syntax colors	Associations	COM Port	AutoDownload
	COM Port Opt Select CO COM 1 COM 2 COM 3 COM 4 COM 5 COM 6 COM 7 COM 8	ions M Port	Change COM	Current COM <not set=""> 1 Options</not>	Options:	
	If you check	. this box,	, EmbeddedGNI	J will not try to	use a COM p	ort.
		Γ	Don't use a C	OM port		
✓ 0	к 🗶	<u>C</u> ancel]	4	- <u>R</u> estore De	faults

Here COM 1 is selected then press OK button.

Environme	nt options						×
Directories	Preferences	Editor	Syntax colors	Associations	COM Port	AutoDownle	oad)
	COM Port Opl	ions					
	Select CC)M Port		Current COM (Options:		
	COM 1	-		COM1: 9600,	N,8,1		
	1						
			Change COM	4 Options			
	lf you check	this boy	EmbeddedGNI	Lwill pot tru to r	use a COM r	port	
	ii you check		i Den'ture e C	OM east	use a com p	port.	
		1	Dontuseau	om por			
	1		1				
0	к 🛛 🗡	<u>C</u> ancel		4	• <u>R</u> estore D	efaults	

After the setup note the right window pane is greyed out and left window is blank. As usual with IDEs one is left with a BIG question what to do next. Let us then create a Project.

	Em	bed	ledGNU	0.92														
Fil	e E	Edit	Search	View	Project	Build	Options	Windo	w Help	5								
	0	0	<u> </u>		ø		🖴	ŝ	0	C71	#	۲	-	Ģ	7	<u>+</u>	8::	?
Q.4	ξ C	Compi	er 🛛 😼	Make	log 🔝	Termin	al											
																		4

To create a new Project select File - New Project.



Give a name that makes sense. Here it is called test then press OK

New project	×
ProjectName	
test	
ОК	Cancel

Showing where to save the new project. User should decide whether to create a new folder or save it to an existing folder. Press Save button to Save project.

Create new p	roject		? X
Save in: 🔀	egnu092	- + 🗈 (* 🎟 •
Examples			
i help			
include 📄			
ib 🔁			
Dir profiles			
1			
File name:	test.pri		Save
	1		
Save as type:	Project file (*.prj)	-	Cancel
	·		/

The setup is the Project options. Here one can create a new profile or edit an existing profile.

What is profile? Profile is the type of board and MCU resources that one is working with. If a profile does not exist for one particular board/MCU model then one can create one. One can also edit an existing profile.

The Project Options is VERY important to the setup.

Project options	×						
Make Options							
Hardware Profile							
Create New Profile							
Make with GEL (GNU Embedded Library) No Compiler switches: Note: Don't include processor choice here. That comes from the bardware profile.							
-Os -fno-ident -fno-common -fomit-frame-pointer -mshort -fsigned-char							

Creating a profile for the MCU if it is not yet available. Below are the parameters. In this example we will be using the 9S12NE64 with Technological Arts Adapt9S12NE64. By selecting the Edit profile button one can see the hardware profile as shown.

ardware Profile Profile Settings		>
Profile Name: Adapt951	I2NE64 IPU type 68hc11 C 68hc12 (and 9s12) binload for 9s12C32 Serial Monitor Startup Code Cvt.exe program name below. tput filenames - this is done for you.	
Linker Script Options for	۳۳۳ 32 Memory Map]
Enter Hex numbers h iop eep dat text	here: Origin Length 68hc11e20 orts 0000 0400 Check this box to have brom	
User Defined Entry: (optional)	Cancel	

If the linker is not setup properly there is an error similar to this.



Locate where the GCC is installed and note the version number.



Edit Linker Search Directory to

C:\usr\lib\gcc-lib\m6811-elf\3.3.5-m68hc1x-20050129 then press OK and the error will go away.

TCP/IP Stack:

The above setup was necessary to reach this point. Locate *uIP-HCS12NErelease-1.0.zip* and unzipped to directory *C:\EGNU092\Examples* as shown.

Extraction Wizard	×
Select a Destination Files inside the ZIP choose.	archive will be extracted to the location you
	Select a folder to extract files to. Files will be extracted to this directory: C:\EGNU092\Examples
	Browse
1	Extracting
	(Pack Neut) Cancel
	< Back Next > Cancel

Below is the added directory to C:\EGNU092\Examples

C:\EGNU092\Examples			
File Edit View Favorites Tools Help			1
🕒 Back 🔹 🕥 - 🏂 🔎 Search 🎼 Folders	<u>I</u> • 🗙 🍤 🐰		
Address 🛅 C:\EGNU092\Examples			💌 🔁 Go
Folders ×	0	0	
My Computer M	Blink_using_RTI	Ex2-hc11	
	Ex2-hc12	Ex2-hcs12c32	
Boards Documents and Settings Documents and Settings Documents and Settings Documents	gel-primes	music-hc12	
Examples Bink_using_RTI Ex2-hc11	SCI_test	Scope	
C Ex2-hc12 Ex2-hcs12c32 E gel-primes	UIP-hcs12NE	Vect12-flasher	
GILest Constant	Vect12-serial	Vectors11	
C Vect12-flasher C Vect12-serial C Vectors11			
Ling help 🗾			

Profiles:

Locate the following files **9S12NE64-0.mem**, **9S12NE64-1.mem**, **9S12NE64-2.mem**, **9S12NE64-3.mem** and **9S12NE64-4.mem** in the subdirectory **C:\EGNU092\Examples\uip-hcs12NE**

Copy these files to the profile C:\EGNU092\profiles

Opening Existing Project:

To open an exiting project select on File – Open project or file as shown.



The IDE will open an explorer window to help locate to the file of interest. Locate the directory *uip-hsc12NE* and search for the file called *uip-ne64.prj*

Open file					<u>?</u> ×
Look in:	🚞 uip-hos12NE 🗨	-	۵ (📸 🎹 •	
	🞯 Desktop				_
Ulp-o.	My Documents				
🔝 uip-ne	🙀 My Computer				
	З½ Floppy (А:)				
	🍛 Local Disk (C:)				
	EGNU092				
	🛅 Examples				
	iip-hcs12NE				
	💽 TechArtCDr1 (D:)				
	動 Audio CD (E:)		_		
File name	👮 dev on 'Sarek (Sarek)' (Z:)			Ope	n
Files of tu	🛅 Shared Documents			Cano	
Files of typ	🛅 My Documents				
	ST kit. Klassingly Diagons				111

Click on the *uip-ne64.prj* to select and click on the open button.

Open file				? ×
Look in: 🔀	uip-hcs12NE	•	Þ 🖻 🖻	∱ Ⅲ-
iip-0.9				
	#1#			
I				
File name:	uip-ne64.prj			Open
Files of type:	Project files		•	Cancel



The IDE will open all of the files related to the project.

Click on main.c file and locate the lines of code below.

uip_sethostaddr(uip_ipaddr(**192,168,2,7**)); /*Adapt9S12NE64 or neCore12 */ uip_setnetmask (uip_ipaddr(**255,255,255,0**)); /*Subnet masked */ uip_setdraddr (uip_ipaddr(**192,168,2,20**)); /*Gateway*/

/* open ethernet driver and obtain MAC address */ ethernet_open(**4**, AUTONEG, delay_ms, (MAC_address *)&uip_ethaddr);

Change the values to ones application. Please note the number *4* in *ethernet_open* line. This is related to *9S12NE64-4.mem* memory mapping of the NE64 internal RAM allocation.

Choosing Profile:

Choose the profile as **9S12NE64-4.mem.** Click on Options menu then Project options.

File	Edit Search View Pro	aject Build Options Window Help
) (> 🗅 🖬 🕼	📓 🛃 Project options 👔 🚳 🔶 🗱 🎸 🗾 🖆 🏂 🎼 🍞
uip-nc - d - e - e - m - n - n - n - iti - u - u - u - u - u - u - u - u - u - u	s64 ritical h statypes.h thernet.c thernet.c thernet.stats.c sin.c ucSs12ne_regs.h ucSs12ne_vectors.s etlog.c mer.c mer.c p.h p.arch.c p.arch.h p.arp.h p.parp.h popt.h	<pre>Environment options Test #define BUF ((struct uip_eth_hdr *)&uip_buf[0]) Test #define BUF ((struct uip_eth_hdr *)&uip_buf[0]) Test int main() Test uip_log("NE64 on"); Test timers_open(7, 19531); Test timers_o</pre>
Con	npiler 🔚 Make log 🕅 👧	(Terminal)
	1 - era	Anony and the second
e	Unit	Message

Select **9S12NE64-4** to make sure it matches the intended application. Press OK to continue.

Project option	s	×
Make Options		
Hardware P	rofile	
	9S12NE64-4	
	9S12NE64-4 ▲ Adapt9S12NE64 ▲ CML12S-DP256 Dragon12 evbplus2 ↓ hc11e20 ↓ hc11e3 ▼	
Compiler sw Note: Don	itches: 't include processor choice here. That comes from the hardware profile.	
-Os -fno-io	dent -fno-common -fomit-frame-pointer -mshort -fsigned-char -mauto-incdec	
<u> </u>	Cancel	

Compiling/Build:

We can now compile the project as is and move on to programming the NE64. Click on *Build* menu as shown and select *Make*



Here one can see the feedback output of the build.

Make completed s	uccessfully	
Information:		
Project:		
uip-ne64		
Total errors:	0	
Total warnings:	0	
Size of output file:	23076	butes
	1	-,
	ο ι	

It is always a good idea to check the S-record. One should be aware what is an S-record and what it represent.

Here we can see that *uip-ne64.s19* was generated along with other files related after the build.

🖄 C:\EGNU092\Examples\uip-hcs12NE						
File Edit View Favorites Tools Help					1	
🚱 Back 🔹 🕥 - 👔 🔎 Search	🕞 Folders 🛄 🗙 🍫	Ж				
Address 🛅 C:\EGNU092\Examples\uip-hcs12N	E				▼ 🗦 Go	
Folders X	Name 🔺	Size	Туре	Date Modified		
	9512NE64-2.mem	1 KB	MEM File	7/19/2004 12:14 PM		
🗄 🛄 My Documents 🔝	512NE64-3.mem	1 KB	MEM File	7/19/2004 10:29 AM		
E S My Computer	39512NE64-4.mem	1 KB	MEM File	7/19/2004 10:31 AM	_	
1 (4:)	🗟 critical.h	3 KB	C header file	6/11/2004 11:16 AM		
E Secol Disk (C:)	datatypes.h	3 KB	C header file	6/24/2004 2:26 PM		
🗄 🥅 ACADR13	dethernet.c	11 KB	C source file	7/17/2004 10:39 PM		
🗄 🥅 Asm	dethernet.h	7 KB	C header file	7/19/2004 12:38 PM		
🗄 🧰 Boards	dethernet.o	4 KB	0 File	5/24/2005 11:21 AM		
🗄 🥅 Documents and Settings	dethernet stats.c	12 KB	C source file	7/17/2004 11:50 PM		
🗄 🥅 DownLoad	ethernet_stats.o	1 KB	O File	5/24/2005 11:21 AM		
E GNU092	main.c	7 KB	C source file	7/20/2004 5:45 PM		
E 🛄 Examples	amain.o	4 KB	O File	5/24/2005 11:21 AM		
💭 Blink_using_RTI	mc9s12pe regs.h	42 KB	C header file	7/14/2004 2:36 PM		
🖾 Ex2-hc11	mc9s12ne_vectors.s	5.KB	S File	7/17/2004 9:33 PM		
📛 Ex2-hc12	memory x	1 KB	X File	5/24/2005 11:21 AM		
🖾 Ex2-hcs12c32	Dinetion c	6 KB	C source file	6/11/2004 12:46 AM		
📮 gel-primes	anotogie Detlogie	3 // 8	C beader file	6/11/2004 12:46 AM		
🛅 music-hc12	Detlog o	3 KB	O File	5/24/2005 11:21 AM		
🔁 SCI_test	Timer c	10 KB	C source file	7/15/2004 1:30 AM		
🗄 🚞 Scope	The timer b	S KB	C booder file	7/18/2004 12:18 AM		
🕀 💭 uip-hcs12NE	The timer of	3 KD	O File	5/24/2005 11:21 AM		
🛅 Vect12-flasher	UID part to the UCS12NE such		O File Adaba Acrobat Das	3/24/2003 11:21 AM		
🛅 Vect12-serial			C course file	7/20/2004 5:52 PM		
🗀 Vectors11	i i i i i i i i i i i i i i i i i i i	40 ND	C source file	6/10/2004 1:37 PM		
🛅 help	in up a		C fielder file	6/10/2004 1:30 PM		
🛅 include	in and a		C course file	5/24/2005 11:21 AM		
🗄 🚞 lib	i i i i i i i i i i i i i i i i i i i	D ND	C Source file	6/10/2004 1:44 PM		
🚞 profiles	i in and a	O ND	Cheauernie	6/10/2004 1:45 PM		
🗄 🚞 Examples	i up_arcn.o		C nie C names Gla	5/24/2005 11:21 AM		
🗄 🛅 icc	i up_arp.c	10 KD	C source nie	6/10/2004 1:39 PM		
🗄 🧰 icc11	i up_arp.n	/ KD	C neader file	5/10/2004 1:41 PM		
🗄 🚞 MCUEZ	up_arp.o	5 KB	O File	5/24/2005 11:21 AM		
🗉 🚞 NVIDIA	up-ne64.amp	187 KB	DIMP File	5/24/2005 11:21 AM		
🗉 🛅 old disk	in up-ne64.elf	30 KB	ELF File	5/24/2005 11:21 AM		
🗉 🚞 Orcad	I ulp-ne64.mak	1 KB	MAK FILE	5/24/2005 11:21 AM		
🗄 🛅 pemicro	up-ne64.pr)	1 KB	EmbeddedGNU Proj	5/24/2005 11:21 AM		
🗄 🚞 Program Files 🔤		23 KB	519 File	5/24/2005 11:21 AM		
👝 nacivalian 🗾	🔟 uipopt.h	16 KB	C header tile	7/19/2004 12:33 PM	•	

Use WordPad to open the uip-ne64.s19. Below is the content of the S-record.

.

A few things to point out in the records below that are taken out of the S-record for clarification.

S113 4000 8E4000BD4487CE600718CE21802008A6 CC

S113 FFF0 5DFF5DFF5DFF5DFF5DFF5DFF5DFF 4000 39

Note that the address at \$FFFE contains \$4000 and further note that the start of code is at \$4000. The point being made here is to verify and make sure that the code will start at where the vector address is pointing too.

Also note that the Serial Monitor resides at \$F800 - \$FFFF. Therefore uBUG12 will automatically re-locate the vector addresses at below \$F800.

Programming:

It is time now to program the S-record into the Adapt9S12NE64 or neCore12M64 using uBUG12. Other method can be used to erase and program the MCU but in this case we will use uBUG12. This document assumes that the Serial Monitor is not erased. It further assumes that COM 1 is enabled and is used by EGNU leaving COM 2 for uBUG12.

If no COM is to be used then it is better to start a new Project with the COM disabled.

Switch the Run/Load switch to Load position and apply power to the board.



Run/Load Switch~



Double click on the uBUG12 icon to initiate GUI. Type *con 2* for COM 2 serial port.

💏 uBug12	
File Help	
MonStatus ErrorText ComPort	1.

Connections establish between PC and Adapt9S12NE64 or neCore12M64

2 possible errors can occur:

Connection Error: Unable to open COM2 <- Another application is using the COM port

Connection Error: Read Error: Timeout error <- The MCU not currently in LOAD mode or the cable is disconnected from either PC or Docking Module. Lastly, the cable could be connected at the wrong COM port.

maug12	- D ×
File Help	
>con 2 CONNECTED	
Monitor Active Unknown Error COM 2	1.

Erasing:

To erase flash type *fbulk*

💏 uBug12	
File Help	
>con 2 CONNECTED	
fbulk	
Monitor Active Unknown Error COM 2	1.

Erasing message

📲 uBug12		
File Help		
>con 2 CONNECTED	Message Erasing	
1		
Monitor Active	No Error COM 2	li.

Erase successful

ma uBug12	
File Help	
>con 2 CONNECTED >fbulk	
Monitor Active No Error COM 2	1.

To program S-record. EGNU generates Linear S-record. This is considered to Banked record by uBUG12. The command is *Fload ;b* for banked and *Fload* for non Banked S-record.

maug12	
File Help	
>con 2 CONNECTED >fbulk	
fload ;b	
Monitor Active No Error COM 2	1.

uBUG12 will open an Explorer window to help and locate the S-record as shown. Click on the file *uip-ne64.s19* to select click *Open* button.

Fload Banked						? ×
Look jn:	iip-hcs12NE		•	(† 🖻 🔿	•	
My Recent	Cip-0.9					
Desktop						
My Documents						
My Computer						
S						
My Network Places	File <u>n</u> ame:	uip-ne64.s19		•	L	<u>O</u> pen
	Files of type:	S19, S2, Sx Records		•		Cancel

uBUG12 will immediately program the target.

wBug12	
File Help	
>con 2 CONNECTED >fbulk >fload ;b LOADED OKAY: 0.8906255ec. Tranfer rate was 9.8246Kb/sec	
Monitor Active No Error COM 2	11.

Running the Program:

Switch the Run/Load to Run, press the RESET button and the TCP/ip stack should now be running.





Ethernet Setup:

Locate the Ethernet card connection properties and select Internet Protocol. Click on the Properties button.

🚣 Local Area Connection 3 Properties	<u>?</u> ×	
General Authentication Advanced		
Connect using:		
ASUSTeK/Broadcom 440x 10/100 I Configure		
This connection uses the following items:		
 Client for Microsoft Networks Client for Microsoft Networks Client for Microsoft Networks QoS Packet Scheduler Internet Protocol (TCP/IP) 		
Install Uninstall Properties		
Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.		
 Show icon in notification area when connected Notify me when this connection has limited or no connectivity 		
OK Can	cel	

Check box the **Use the following IP address** as well as change the IP address and Subnet mask to the following numbers. Click OK button to accept changes.

IP Address: 192.168.2.23 Subnet Mask: 255.255.255.0

Internet Protocol (TCP/IP) Propertie	s ? X
General	
You can get IP settings assigned auton this capability. Otherwise, you need to a the appropriate IP settings.	natically if your network supports ask your network administrator for
Obtain an IP address automatical	ly l
• Use the following IP address: —	
IP address:	192.168.2.23
Subnet mask:	255.255.255.0
Default gateway:	· · ·
C Obtain DNS server address autor	natically
Output the following DNS server address of the server address o	dresses:
Preferred DNS server:	· · ·
Alternate DNS server:	· · ·
	Advanced
	OK Cancel

Ethernet Cables:

For using HUBs, the cable is straight thru. Connect the cable from an available HUB port to the Adapt9S12NE64 or neCore12M64.

For direction connection from PC to Adapt9S12NE64 or neCore12M64, the cable must be crossover.

Link LED status:

Reset the Adapt9S12NE64 or neCore12M64 to initiate Link connections to PC. After a few seconds the link LED should come on. If it does not then recheck all connections and verify the cable type are correct for PC or HUB connections.

Ping:

Open a DOS prompt to Ping the target. On the DOS prompt type *ping* 192.168.2.7

ex C:\WINDOWS\system32\cmd.exe	
Microsoft Windows XP [Version 5.1.2600] (C) Copyright 1985-2001 Microsoft Corp.	^
C:\Documents and Settings\Exequiel>ping 192.168.2.7	
Pinging 192.168.2.7 with 32 bytes of data:	
Reply from 192.168.2.7: bytes=32 time<1ms TTL=128 Reply from 192.168.2.7: bytes=32 time<1ms TTL=128 Reply from 192.168.2.7: bytes=32 time<1ms TTL=128 Reply from 192.168.2.7: bytes=32 time<1ms TTL=128	
Ping statistics for 192.168.2.7: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = Oms, Maximum = Oms, Average = Oms	
C:\Documents and Settings\Exequiel>	
	•

Telnet:

Open a DOS prompt to run Telnet application as shown. On the DOS prompt type *telnet 192.168.2.7*



It will ask for password. Enter the password as *hello* then press the CR key.

ex Telnet 192.168.2.7	
Welcome to Technological Arts Demo Board Telnet Interface 	
Server Name : AD9S12NE64 F/W Version : 0.9 MAC Address : 00-00-C0-42-F9-B2 Uptime : 00:00:11	
Please Enter Password: ****	
	-

This concludes the GCC/EGNU with uBUG12. As with all things the challenges are always to better understand how these tools are to be used. This document shows the process of using GCC/EGNU to Flashing the MCU using uBUG12.