**Kernel 2.6.18 compilation for COPPER CPU**

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Since we found that the default kernel (2.6.18) is unstable on COPPER CPU unfortunately, we recommend you to configure and compile the kernel to obtain more stable OS.

**1, Get kernel 2.6.18 source and build modules**

[boot server] % wget https://www.kernel.org/pub/linux/kernel/v2.6/linux-2.6.18.tar.gz

[boot server] # mv linux-2.6.18 /usr/src/kernels/

Before compiling, check if the system time is correct, otherwise the compilation never ends.

% date

If it is not, correct by some commands.

# date --set="2013/09/05 8:46" or ntpdate

Check gcc version. (I failed to boot Copper CPU when compiling kernel w/ gcc 4.7.3 )

% which gcc

% /usr/bin/gcc

% gcc -dumpversion

4.1.2

**2, Get network adapter driver for PCI-E Gigabit network connection**

It is not available in the kernel tar ball.

**2-1, Copy a driver directory**

To compile e1000e driver, it seems that /lib/module/BUILD-KERNEL is needed. So compile modules w/o e1000e first.

Get a configuration file from svn, (use svn **rev. 6535** or later)

<https://belle2.cc.kek.jp/svn/trunk/software/daq/copper/driver/kernel/config-130903>

[boot server] # cp config-130903 /usr/src/kernels/linux-2.6.18/.config

[boot server] # cd /usr/src/kernels/linux-2.6.18

[boot server] # make clean

[boot server] # make modules -j10

“-j10” means use 10 threads for compiling. This option is not necessary.

[boot server] # make modules\_install -j10

**2-2, download and compile driver source**

You can download it from

<https://downloadcenter.intel.com/Detail_Desc.aspx?lang=jpn&DwnldID=15817>

(As of July, 2014, the version of the driver at the site is 3.1.0.2 and I heard from one user that he succeeded to use this version. However, when I used this version, there was a WARNING ”: "skb\_cow\_head" [drivers/net/e1000e/e1000e.ko] undefined!” and when booting a COPPER with the reconstructed kernel, it failed to load the e1000e module. So I currently continue using the older version (e1000e-2.4.14.tar.gz). It was placed in ~yamadas/forDAQusers@kekcc .)

[boot server] % gtar xvf e1000e-2.4.14.tar.gz

[boot server] # cp -r e1000e-2.4.14/src /usr/src/kernels/linux-2.6.18/drivers/net/e1000e

[boot server] # vi /usr/src/kernels/linux-2.6.18/drivers/net/e1000e/Makefile

Read Makefile and add a line that “BUILD\_KERNEL=2.6.18” at a proper position so that it would not be overwritten afterwards.

**2-3, Modify Kconfig and Makefile of kernel directory**

* Add the following lines to /usr/src/kernels/linux-2.6.18/drivers/net/Kconfig

*config E1000E*

*tristate "Intel(R) PRO/1000 PCI-Express Gigabit Ethernet support"*

*depends on PCI*

*---help---*

*This driver supports the PCI-Express Intel(R) PRO/1000 gigabit*

*ethernet family of adapters. For PCI or PCI-X e1000 adapters,*

*use the regular e1000 driver For more information on how to*

*identify your adapter, go to the Adapter & Driver ID Guide at:*

*<http://support.intel.com/support/network/adapter/pro100/21397.htm>*

*For general information and support, go to the Intel support*

*website at:*

*<http://support.intel.com>*

*More specific information on configuring the driver is in*

*<file:Documentation/networking/e1000e.txt>.*

*To compile this driver as a module, choose M here and read*

*<file:Documentation/networking/net-modules.txt>. The module*

*will be called e1000e.*

* Add an e1000e related line to /usr/src/kernels/linux-2.6.18/drivers/net/Makefile

Add “*obj-$(CONFIG\_E1000E) += e1000e/*”

obj-$(CONFIG\_E1000) += e1000/

*obj-$(CONFIG\_E1000E) += e1000e/*

obj-$(CONFIG\_IBM\_EMAC) += ibm\_emac/

**3, compile and install kernel**

[boot server] # cd /usr/src/kernels/linux-2.6.18

[boot server] # sudo make bzImage -j10 or make bzImage –j10

Then you might be asked:

“Intel(R) PRO/1000 PCI-Express Gigabit Ethernet support (E1000E) [N/m/y/?] (NEW) ”

Then type m. (“m” means a module.)

After building, bzImage should be made.

[boot server] # make modules -j10

[boot server] # make modules\_install -j10

[boot server] # make install

Check /etc/grub.conf if this kernel is not the default kernel for booting a PXE boot server, otherwise you may fail to boot the server.

**4, copy the kernel to tftpboot directory**

[boot server] # cp -r /lib/modules/2.6.18 /tftpboot/copper/root/lib/modules/

[boot server] # cp -r /usr/src/kernels/linux-2.6.18 /tftpboot/copper/root/usr/src/kernels

[boot server] # cp /boot/initrd-2.6.18.img /tftpboot/copper/root/boot

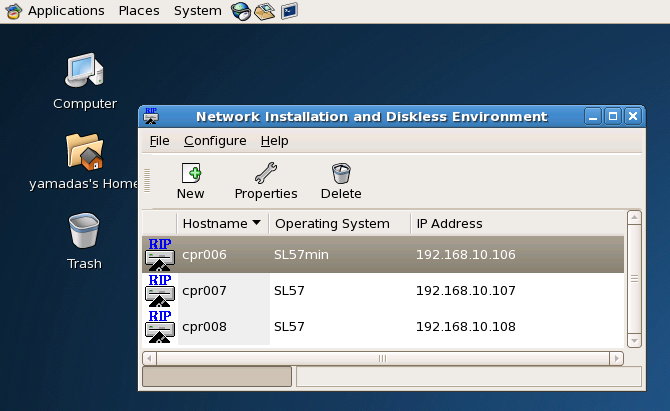
[boot server] # cp /boot/System.map-2.6.18 /tftpboot/copper/root/boot

[boot server] # cp /boot/vmlinuz-2.6.18 /tftpboot/copper/root/boot

**5, Modify diskless client setup on PXE boot server**

System -> administration -> server setting

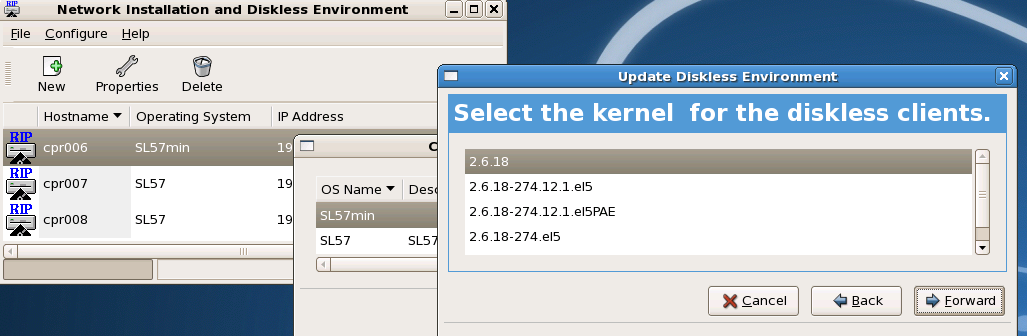
Configure->Diskless-> Add



Proceed in the same way as shown in

https://belle2.cc.kek.jp/svn/trunk/software/daq/copper/doc/SetupPocketDAQ\_1\_PXE\_bootserver.pdf

A new kernel entry should appear on a kernel list.

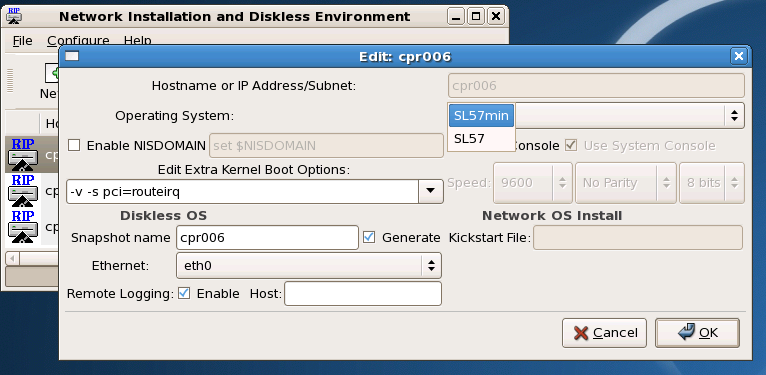


You need to check kernel image is copied to /tftpboot/linux-install/SL57min.

% ls –l /tftpboot/linux-install/SL57min

Notice : When you update /tftpboot/copper/boot/\*, do not forget to make (or replace) a new entry of “Operating System” using this GUI.

After updating diskless environment, each COPPER CPU’s setting also should be modified.



Please check /tftpboot/linux-install/pxelinux.cfg/C0A80A\*\* files so that the modification is correctly applied.

**6, Boot COPPER CPU**

**7, Update copper and cpr\_fngeneric drivers**

You need to recompile COPPER related drivers when you update the kernel, otherwise you may receive an error message below during installation of modules.

"insmod: error inserting 'daq/cprdist-0.1.0/drv/copper.ko': -1 Invalid module format"

Before compiling drivers, please read the following notices;

NOTICE : The version of compiler should be same as the one used for the kernel compilation.

NOTICE : Maybe you will compile COPPER related drivers on a PXE server. In that case, please do not forget to modify KERNEL\_VERSION in drv/Makefile and cprfin\_fngeneric/Makefile like;

#KERNEL\_VERSION = $(shell uname -r)

KERNEL\_VERSION = 2.6.18

Update history

* Sep.3, 2013 : the 1st version?
* July 4, 2014 : Modify the description about adding an e1000e related line to /usr/src/kernels/linux-2.6.18/drivers/net/Makefile
* July 18, 2024 : Correct typos (7:14 -> 7/14, usr/src/linux2.6.18 -> /usr/src/kernels/linux2.6.18)