

## Kernel 2.6.18 compilation for COPPER CPU

July . 18, 2014

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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](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
```

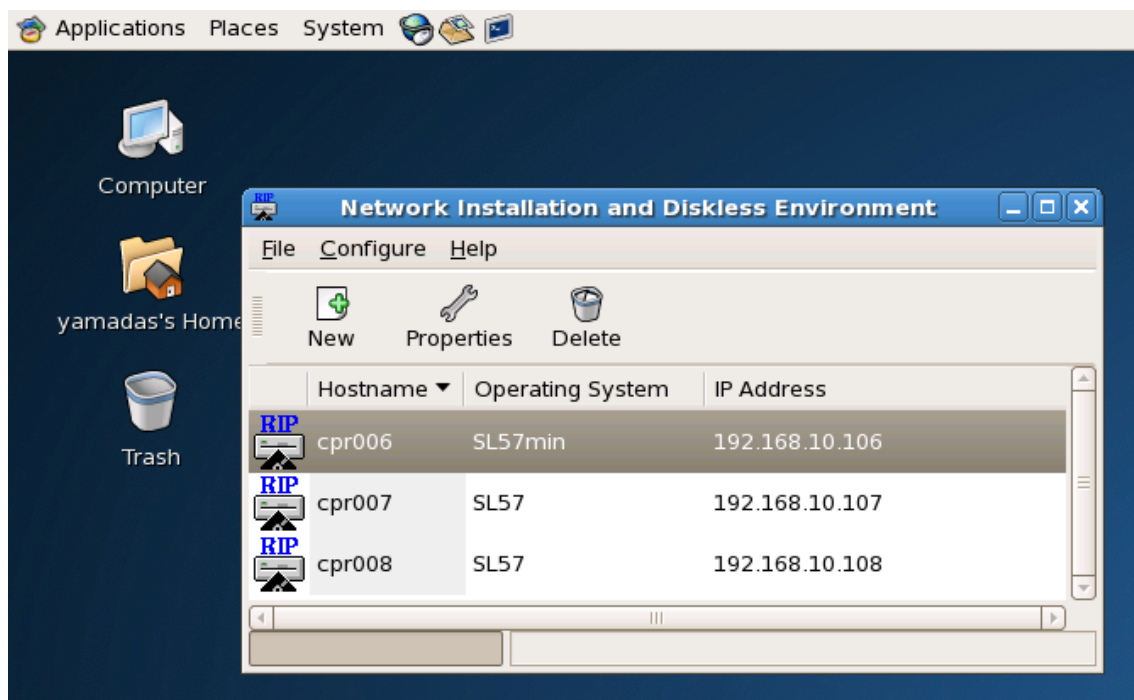
```
[boot server] # cp /boot/System.map-2.6.18 /tftpboot/copper/root/boot
```

```
[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

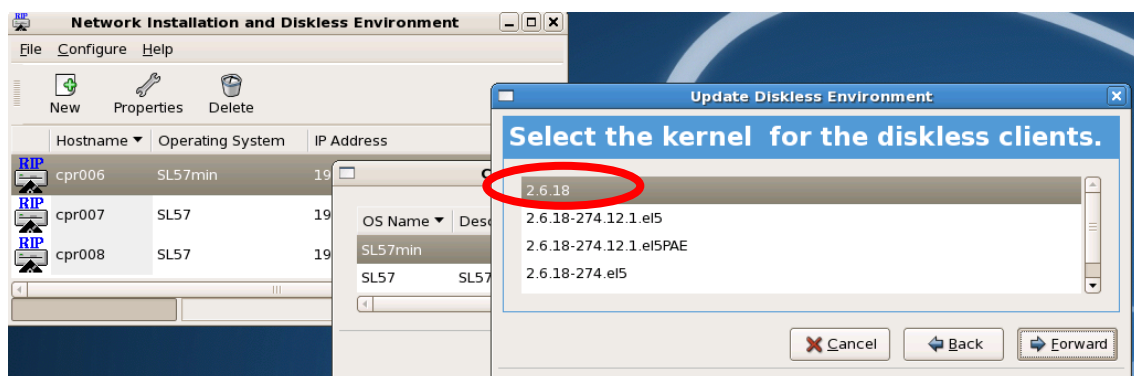
Configure->Diskless-> Add



Proceed in the same way as shown in

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

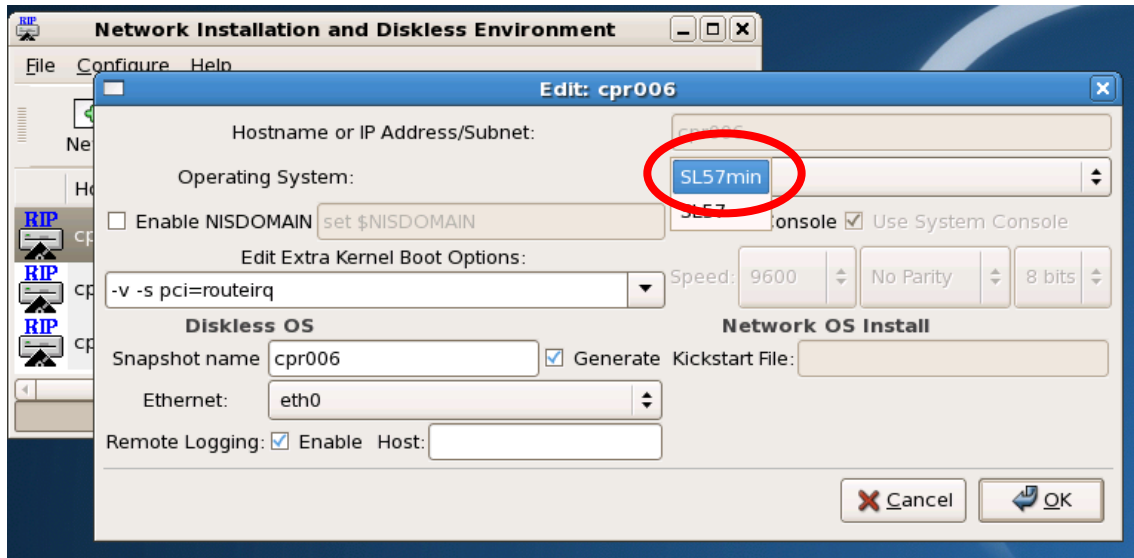


You need to check kernel image is copied to /tftpboot/linux-install/SL57min.

```
% 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 cprfn\_fngeneric/Makefile like;

```
#KERNEL_VERSION=$(shell uname -r)
KERNEL_VERSION=2.6.18
```

#### Update history

- Sep.3, 2013 : the 1<sup>st</sup> 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)