

Manual: Building and running a Simulink model in the external mode with eclib

(in Ubuntu Linux)

<http://cstwiki.wtb.tue.nl/index.php?title=E-box>

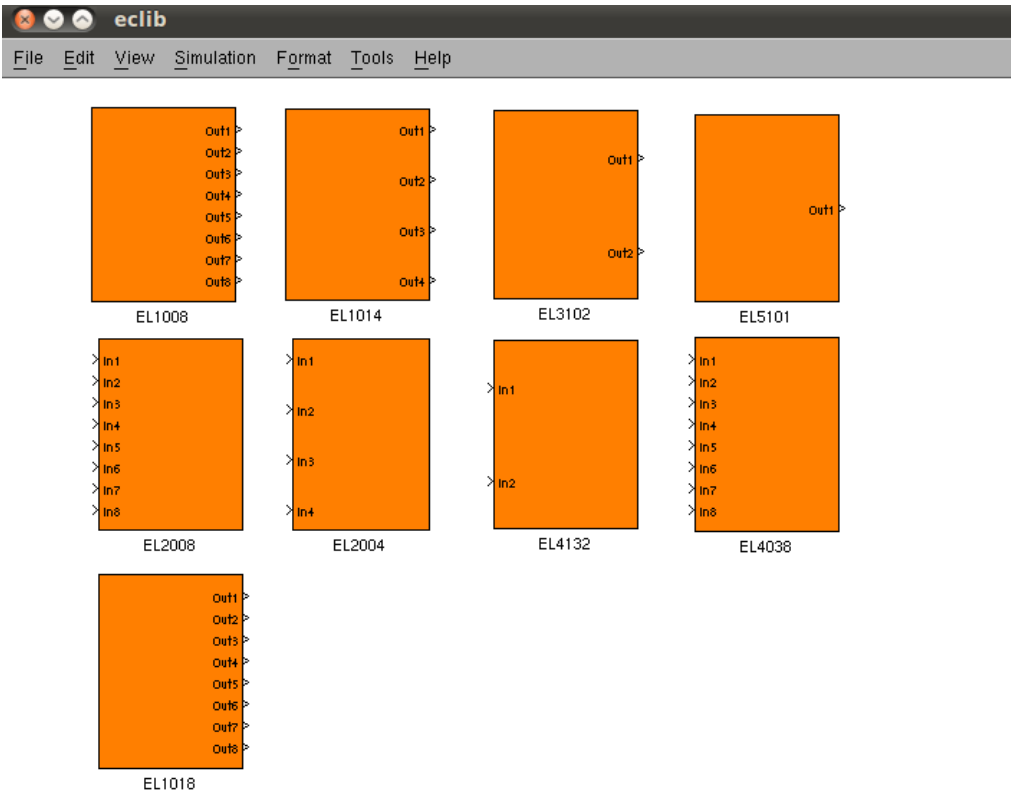
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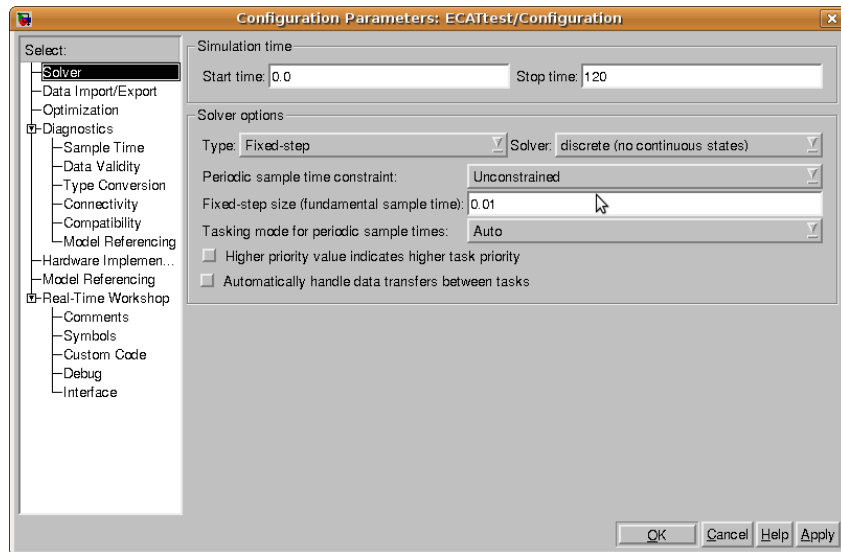
July 1 , 2011

Open or create a Simulink model. The library can be found by typing eclib in the Matlab console. The supported modules while writing this document are:

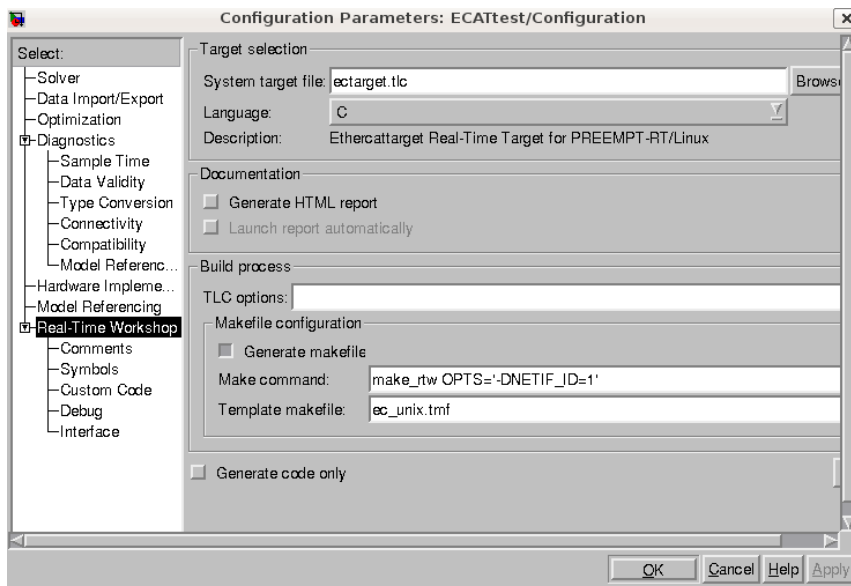
EL3102	2 channel analog input 10V ..10V differential, 16 bit
EL5101	1 channel incremental encoder interface TTL
EL2008	8 channel digital output 24V
EL2004	4 channel digital output 24V
EL4132	2 channel analog output -10 tot 10V 16-bit
EL4038	8 channel analog output -10 tot 10V 12-bit
EL1018	8 channel analog input terminal 24V
EL1008	8 channel digital input terminal 24V
EL1014	4 channel digital input terminal 24V



Check or change te configuration- parameters:



- Fixed step.
- Sample Time e..g. 0.01 sec (100Hz).
 - Minimum Sample Time is 0.1 sec.
 - Maximum Sample Time depends on computation-time and computer .
- Discrete (no continuous states).

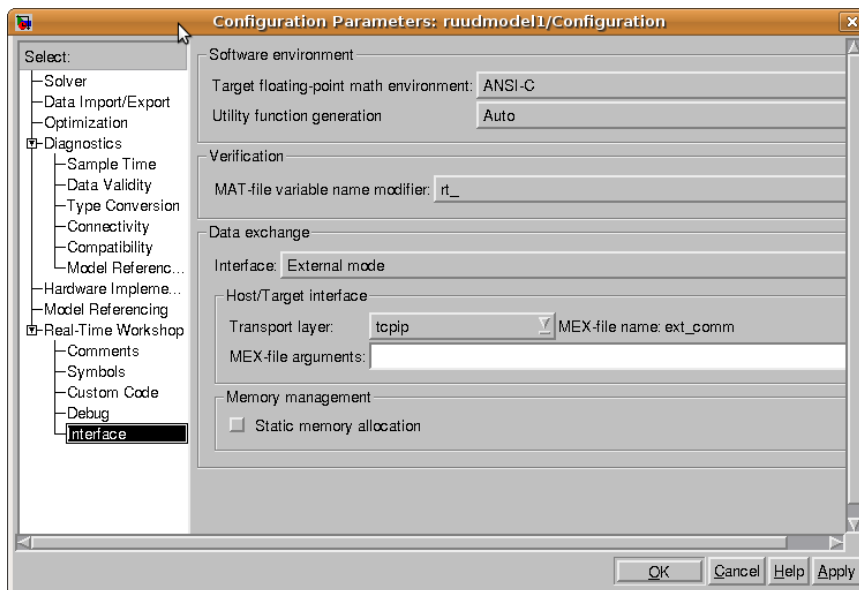


- Select: ectarget.tlc.
- Make command: `make_rtw OPTS='-DNETIF_ID=<X>'` .
- <X> is the ethernetport. eth0 is ethernetport 0 and eth1 is ethernetport 1.

It is possible to check the available network interfaces by typing:

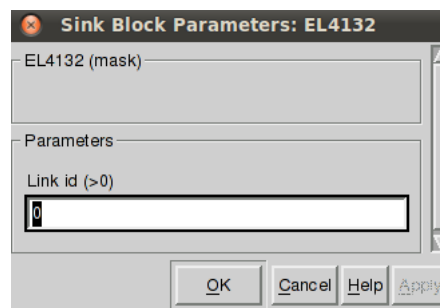
```
sudo ifconfig
```

The "ifconfig" command allows the operating system to setup network interfaces and allow the user to view information about the configured network interfaces.



- External mode.
- Transport layer tcpip. Mex file: ext_com

All S-function blocks have 1 parameter which must be set They are called the **link_id**. The **link_id** is a counter, starting at 0 for each different type of module or device in the EtherCAT stack. Click on the s-function blocks and check the **link id's** starts from zero.

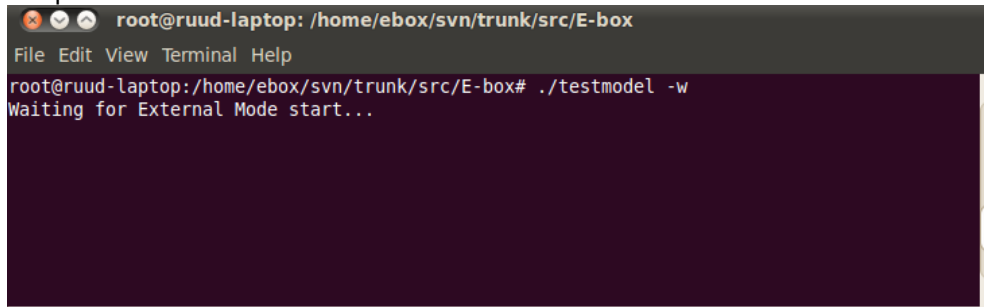


Press "CTRL+B" or type `rtwbuild('Modelnaam')` to build the code. Go to the directory where the model is saved. Run the executable in the external mode by typing:

```
sudo ./modelname -w
```

in a terminal.

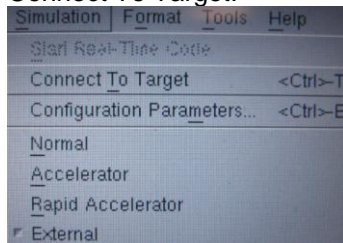
Respons:



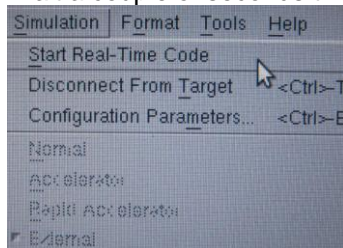
```
root@ruud-laptop: /home/ebox/svn/trunk/src/E-box
File Edit View Terminal Help
root@ruud-laptop: /home/ebox/svn/trunk/src/E-box# ./testmodel -w
Waiting for External Mode start...
```

Return to your Simulink model.

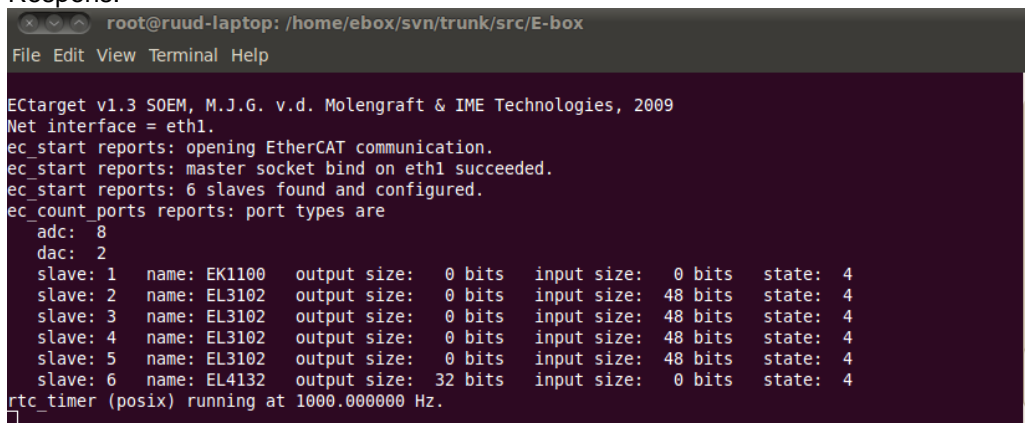
Connect To Target:



Wait a couple of seconds till the text is not longer grayed out and Start Real-Time Code



Respons:



```
root@ruud-laptop: /home/ebox/svn/trunk/src/E-box
File Edit View Terminal Help
Ectarget v1.3 SOEM, M.J.G. v.d. Molengraft & IME Technologies, 2009
Net interface = eth1.
ec_start reports: opening EtherCAT communication.
ec_start reports: master socket bind on eth1 succeeded.
ec_start reports: 6 slaves found and configured.
ec_count_ports reports: port types are
  adc: 8
  dac: 2
  slave: 1 name: EK1100 output size: 0 bits input size: 0 bits state: 4
  slave: 2 name: EL3102 output size: 0 bits input size: 48 bits state: 4
  slave: 3 name: EL3102 output size: 0 bits input size: 48 bits state: 4
  slave: 4 name: EL3102 output size: 0 bits input size: 48 bits state: 4
  slave: 5 name: EL3102 output size: 0 bits input size: 48 bits state: 4
  slave: 6 name: EL4132 output size: 32 bits input size: 0 bits state: 4
rtc_timer (posix) running at 1000.000000 Hz.
```

Sourcecode:

Eclib by M.J.G. van de Molengraft.

Ectarget by M.J.G. van de Molengraft & IME Technologies.

Soem by Arthur Ketels.