

# Co-simulation c-coded processes – ngspice, example Graycode generator

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## Files

user provided	prog1-4.cir	ngspice netlist: digital support, interface with code model, simulation control
	graycode.c, *.c	digital C coded graycode generator, some C coded data handling examples
	compile.sh	Compile script for user-provided c code
within ngspice distribution	d_process.h	d_process interface
	README	Detailed instruction how to compile and run example
	nggtk.tcl	Script for plotting with gtkwave
	digital.cm -> d_process	code model, starting the processes, interfacing with pipes
external install	ngspice	simulator, version 42 and up
	gtkwave	digital data plotting

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### Procedure → two commands only!

Start            Prepare C code for executables \*.c according to structure given in the example

Command        **./compile.sh**

- calls gcc to compile \*.c into independent executables

Command        **ngspice prog1-4.cir**

- Load code model d\_cosim
- Load netlist prog1-4.cir
  - Start compiled executables
- Run simulation (e.g. transient)
- Save and/or plot data

User-provided function

```
static int compute(uint8_t *datain, int insz, uint8_t *dataout, int outsz, double time)
```

Code model example

```
ap0 null clk1 null [q1 q2 q3 q4] proc0  
.model proc0 d_process (process_file="graycode" process_params=["none"])
```

Co-simulation Verilog – ngspice, example graycode gen, simple data handling  
**Links, manual**

Example	<a href="https://sourceforge.net/p/ngspice/ngspice/ci/master/tree/examples/xspice/d_process/">https://sourceforge.net/p/ngspice/ngspice/ci/master/tree/examples/xspice/d_process/</a>
Instructions	<a href="https://sourceforge.net/p/ngspice/ngspice/ci/master/tree/examples/xspice/d_process/README">https://sourceforge.net/p/ngspice/ngspice/ci/master/tree/examples/xspice/d_process/README</a>
Manual	<a href="https://ngspice.sourceforge.io/docs/ngspice-42-manual.pdf">https://ngspice.sourceforge.io/docs/ngspice-42-manual.pdf</a> Chapters <ul style="list-style-type: none"><li>• 12.4.24 D_process</li></ul>
Original web pages, motor control example	<a href="https://www.isotel.eu/mixedsim/embedded/motorforce/index.html">https://www.isotel.eu/mixedsim/embedded/motorforce/index.html</a>