

eCos

Embedded Configurable Operating System

Features

- . Open Source
- . Royalty Free
- . Highly Configurable
- . Very Portable
- . Real Time
- . Small Footprint
- . Standards
- . Networking

History

- Cygnus Solutions
 - 1997 Project started
 - 1998 First release
- Red Hat
 - 1999 Cygnus acquired by Red Hat
 - 2000 RedBoot added
 - 2002 Red Hat lay off eCos team
- eCosCentric
 - 2002 eCos team form eCosCentric

Licensing

- RHEPL
 - Red Hat eCos Public License
 - Allowed proprietary code to be linked with eCos
 - Required all changes to be returned to Red Hat
- GPL + exception
 - Standard GPL
 - Exception allows non-GPL code to be linked with eCos
 - No change requirement
 - No “plain” GPL code allowed in eCos

Configuration

- Packages
 - Separate package for each subsystem
 - Independently selectable
 - Self describing
- Component Description Language
 - Describes features provided by package
 - Describes features required by package
- Inference Engine
 - Automatic resolution of constraints

Configuration Tools

- GUI Configuration Tool
 - wxWindows based
 - Linux and Windows NT/2000/XP
 - Includes build and test systems
 - Large and small scale configuration
- Command line Tool
 - Linux and Windows (Cygwin)
 - Automation
 - Large scale configuration only
 - Small scale configuration by editing save file

ConfigTool

Example Session

untitled* - eCos Configuration Tool

File Edit View Build Tools Help

Configuration

- Global build options
- Redboot HAL option\$
- Intel 82559 ethernet driver current
- PC board ethernet driver current
- PC board RTC Driver current
- Wallclock device driver for Dallas 12887 current
- Hardware wallclock.
- eCos HAL current
- I/O sub-system current
- Serial device drivers current
- Infrastructure current
- eCos kernel** current
- Common error code support current
- Dynamic memory allocation current
- ISO C and POSIX infrastructure current

Property	Value
URL	redirect/ecos-kernel-overview.html
Macro	CYGPKG_KERNEL
File	/hda5/home/nickg/local/ecos/build/
Value	current
Default	current
Doc	redirect/ecos-kernel-overview.html
IncludeDir	cyg/kernel
Compile	common/clock.cxx common/timer.cxx
DefineProc	

This package contains the core functionality of the eCos kernel. It relies on functionality provided by various HAL packages and by the eCos infrastructure. In turn the eCos kernel provides support for other packages such as the device drivers and the uLTRON compatibility layer.

Ready No conflicts

Hardware

i386 PC target

The pc target provides the packages needed to run eCos binaries on a standard i386 PC motherboard.

Packages

posix current

This configuration provides HAL, infrastructure, the kernel and POSIX packages.

OK

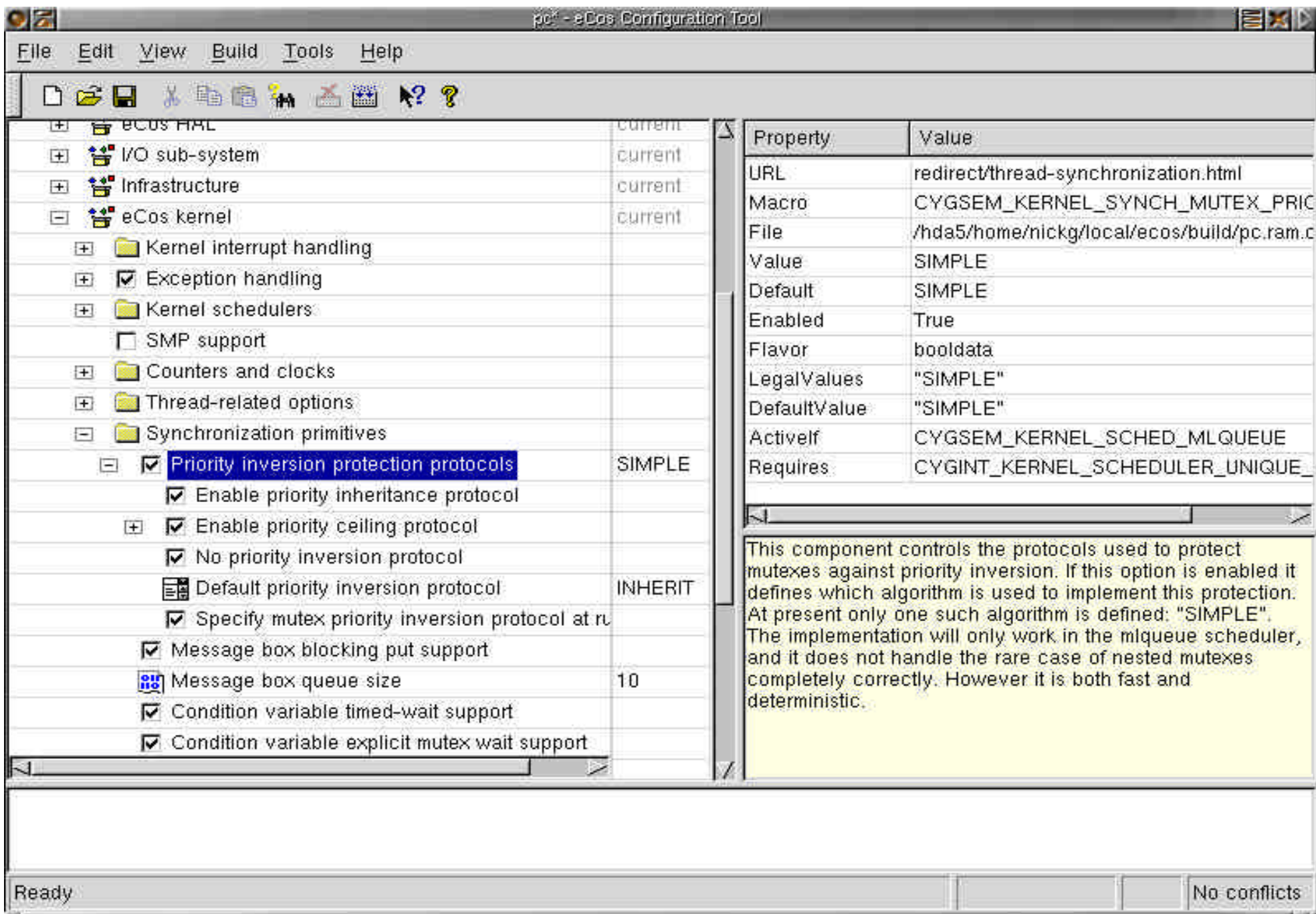
Cancel

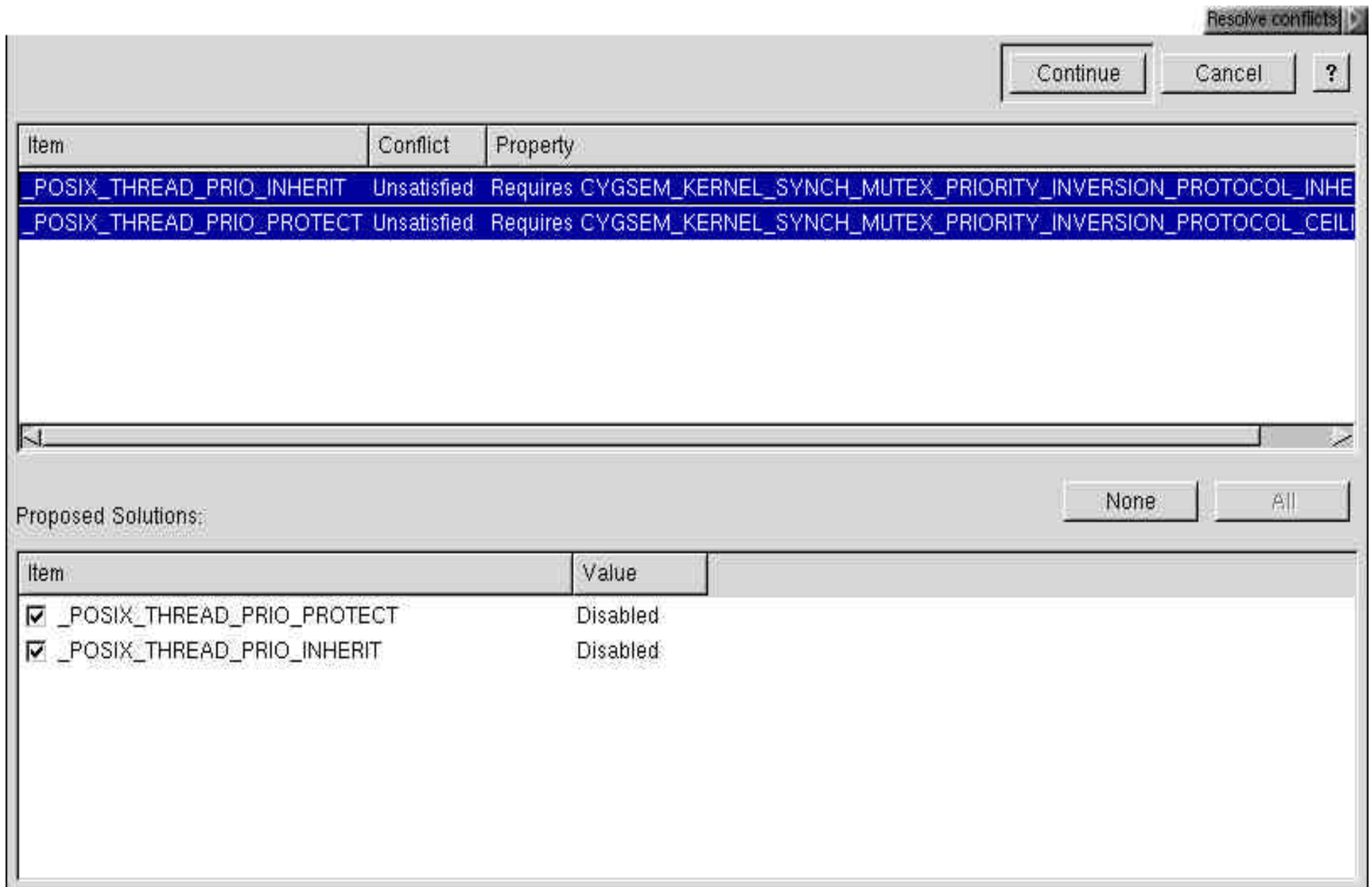
Details <<

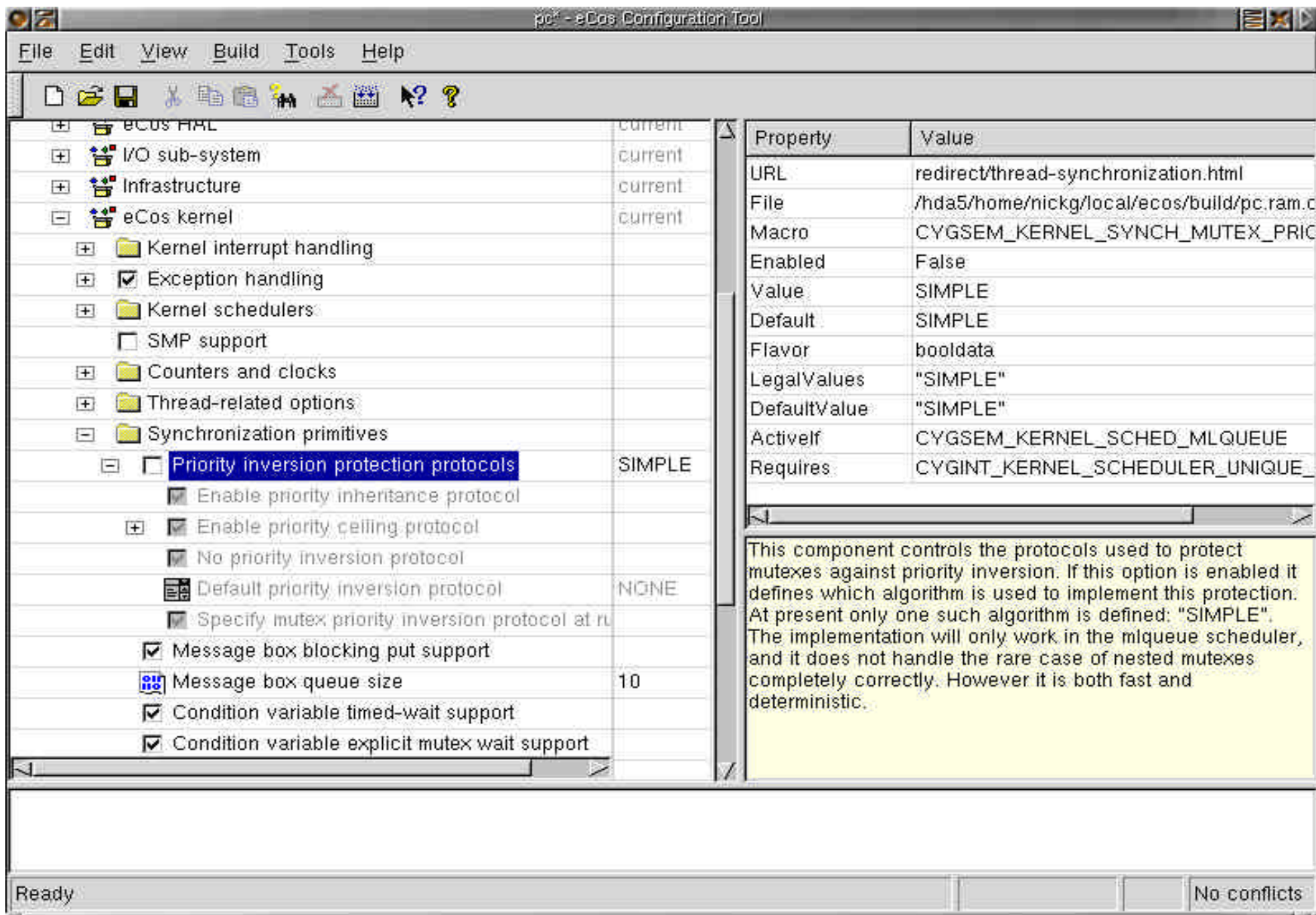
?

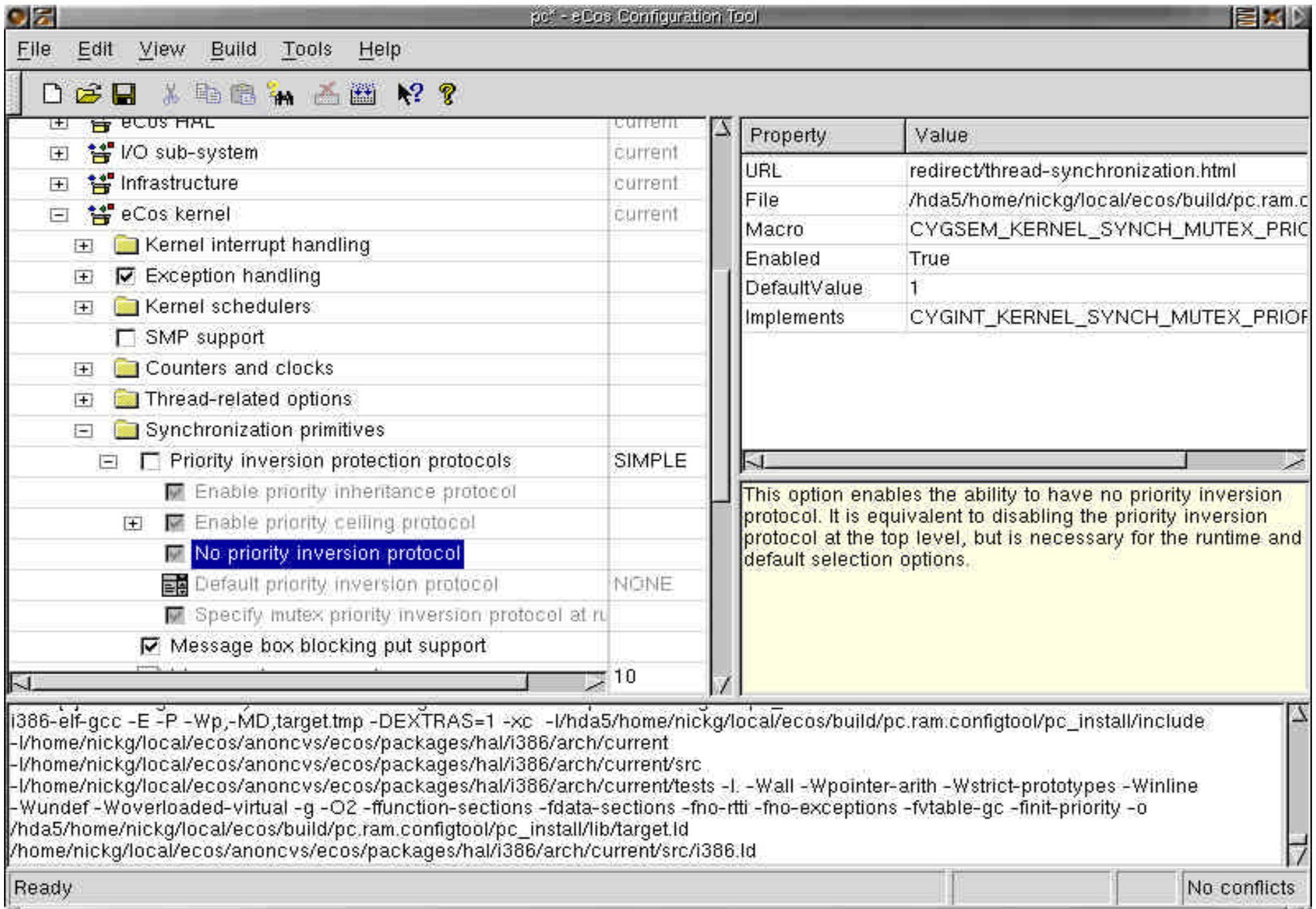
Packages in selected template:

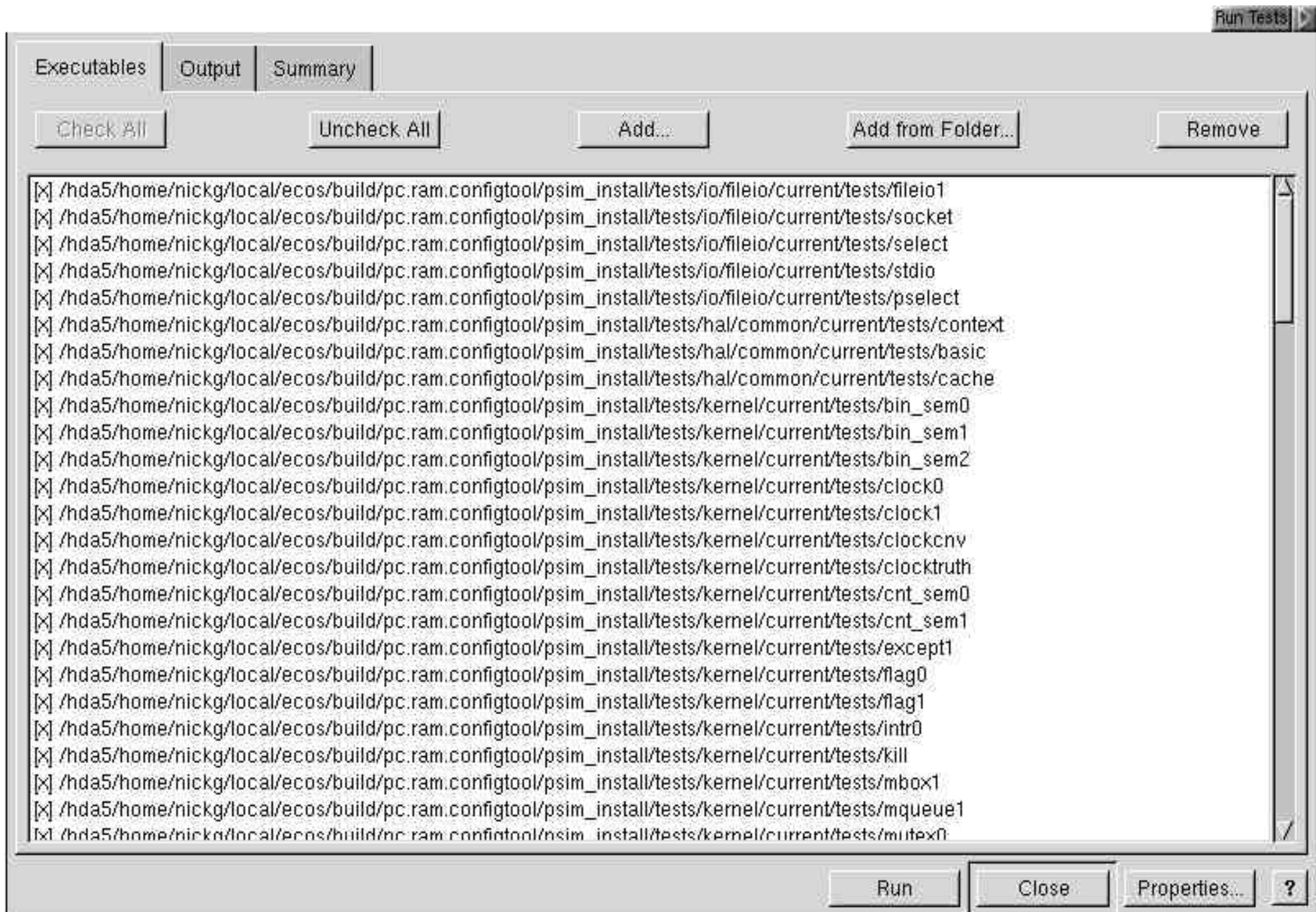
- PC serial device drivers
- PCI configuration library
- POSIX compatibility
- Standard PC RTC device
- Standard PC with EtherPro 10/100 ethernet device
- Wallclock driver for Dallas 12887
- eCos common HAL
- eCos kernel
- i386 PC Motherboard
- i386 PC target
- i386 common HAL
- i386 generic target











Executables

Output

Summary

Time	Host	Platform	Executable	Status	Size	Download	Elapsed	Execution
2003-02-04 16:18:47	balti:0	psim	bin_sem2	Pass	48k/938k	D=0.3/120.0	Total=8.4	E=1.0/900.0
2003-02-04 16:19:47	balti:0	psim	fileio1	Pass	66k/1014k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:19:55	balti:0	psim	socket	Inapplicable	45k/915k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:20:04	balti:0	psim	select	Pass	46k/922k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:20:12	balti:0	psim	stdio	Inapplicable	51k/939k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:20:21	balti:0	psim	pselect	Inapplicable	45k/898k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:20:29	balti:0	psim	context	Pass	46k/901k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:20:37	balti:0	psim	basic	Pass	46k/901k	D=0.3/120.0	Total=7.9	E=0.3/900.0
2003-02-04 16:20:46	balti:0	psim	cache	Pass	47k/902k	D=0.3/120.0	Total=7.6	E=0.4/900.0
2003-02-04 16:20:54	balti:0	psim	bin_sem0	Pass	46k/932k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:21:02	balti:0	psim	bin_sem1	Pass	48k/935k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:21:10	balti:0	psim	bin_sem2	Pass	48k/938k	D=0.3/120.0	Total=7.7	E=0.4/900.0
2003-02-04 16:21:19	balti:0	psim	clock0	Pass	50k/910k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:21:27	balti:0	psim	clock1	Pass	46k/913k	D=0.3/120.0	Total=7.6	E=0.4/900.0
2003-02-04 16:21:35	balti:0	psim	clockcnv	Pass	57k/1014k	D=0.3/120.0	Total=8.2	E=0.4/900.0
2003-02-04 16:21:49	balti:0	psim	clocktruth	Pass	47k/934k	D=0.3/120.0	Total=13.0	E=0.4/900.0
2003-02-04 16:21:57	balti:0	psim	cnt_sem0	Pass	46k/914k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:22:06	balti:0	psim	cnt_sem1	Pass	48k/917k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:22:16	balti:0	psim	except1	Inapplicable	47k/956k	D=0.3/120.0	Total=10.2	E=0.4/900.0
2003-02-04 16:22:25	balti:0	psim	flag0	Pass	46k/914k	D=0.3/120.0	Total=7.9	E=0.3/900.0
2003-02-04 16:22:33	balti:0	psim	flag1	Pass	51k/921k	D=0.3/120.0	Total=7.9	E=0.4/900.0
2003-02-04 16:22:41	balti:0	psim	intr0	Pass	47k/905k	D=0.3/120.0	Total=7.9	E=0.4/900.0

Stop

Close

Properties...

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Platforms

- Twelve Architectures
 - ARM, IA32, MIPS, PowerPC, SPARC, M68k/Coldfire, H8/300H, SuperH, V850, FRV, AM3x, Calmrisc
- Seventy+ Platforms
 - Development boards, target devices etc.
- Simulators
 - ISA simulators for all architectures
 - Platform simulators for some
- Linux Synthetic Target

Hardware Abstraction Layer

- Responsibilities
 - Startup, Interrupts, Exceptions
 - Cache, MEMC, INTC, MMU, Timer, IO access
 - Context switch, Runtime services
- Multiple Packages
 - Architecture
 - Variant
 - Platform
 - Common and extension packages

Kernel

- Schedulers, threads
- Mutexes, semaphores, flags, messages
- Real Time
- Implemented in C++
 - Manage configuration complexity
 - Initialization with static constructors
 - Internal API
- Native C API

Devices

- Serial
 - 16550, 8250, QUICC, SMC, on-chip
- Ethernet
 - AMD, Cirrus Logic, Intel, Motorola, NS, SMSC
- Flash
 - AMD, ATMEL, Intel, Compact Flash
- Interconnects
 - PCI
 - USB slave
 - PCMCIA

Networking

- Four TCP/IP Stacks!
 - OpenBSD, FreeBSD, LwIP, RedBoot
- Ethernet Drivers
 - Shared by all stacks
- Other Protocols
 - SNMP, TFTP, FTP, HTTP, BOOTP, DNS
- Future
 - PPP

Filesystems

- Filesystem Infrastructure
 - POSIX compliant
 - Integrates BSD socket API
- Currently Supported
 - ROM filesystem + tools
 - RAM filesystem
 - JFFS2
- Future
 - VFAT, NFS client

Standard APIs

- POSIX
 - 1003.1-1996 at present
 - 1003.1-2001 moving towards
 - 1003.13 Minimal Realtime System Profile
- μ ITRON
 - Version 3.02 Level S/E
- ANSI C
 - C-89 compatible C and math libraries
 - Some C-99 compatibility

Tools

- GCC
 - Stand-alone ELF tools
 - Constructor priority order
 - Sections and garbage collection
- GDB
 - Command line and Insight
- Simulators
 - GDB
 - SID
 - Bochs

RedBoot

- ROM Monitor
 - Kernel-less eCos application
- Program Loading
 - Serial - SRecords, X/Y modem
 - Ethernet – SRecords, TFTP
 - Flash
 - eCos, stand-alone, Linux (some platforms)
- GDB Remote Protocol
- Flash file system
- Exports services to applications

Debugging

- GDB Remote Protocol
 - Supplied by RedBoot – serial and ethernet
 - Built into program
- Hardware
 - JTAG, BDM, ICE
- Trace Buffer
- Kernel Instrumentation
- `diag_printf()`

Community

- sources.redhat.com/ecos
- Download latest version
- Anonymous CVS
- Snapshots
- Mailing lists

Version 2.0

- Tested Stable Release
- Supported Platforms
 - Concentrate on popular targets: ARM, PowerPC, MIPS, IA32, SuperH.
- Tested tool chains
- Installation and Configuration