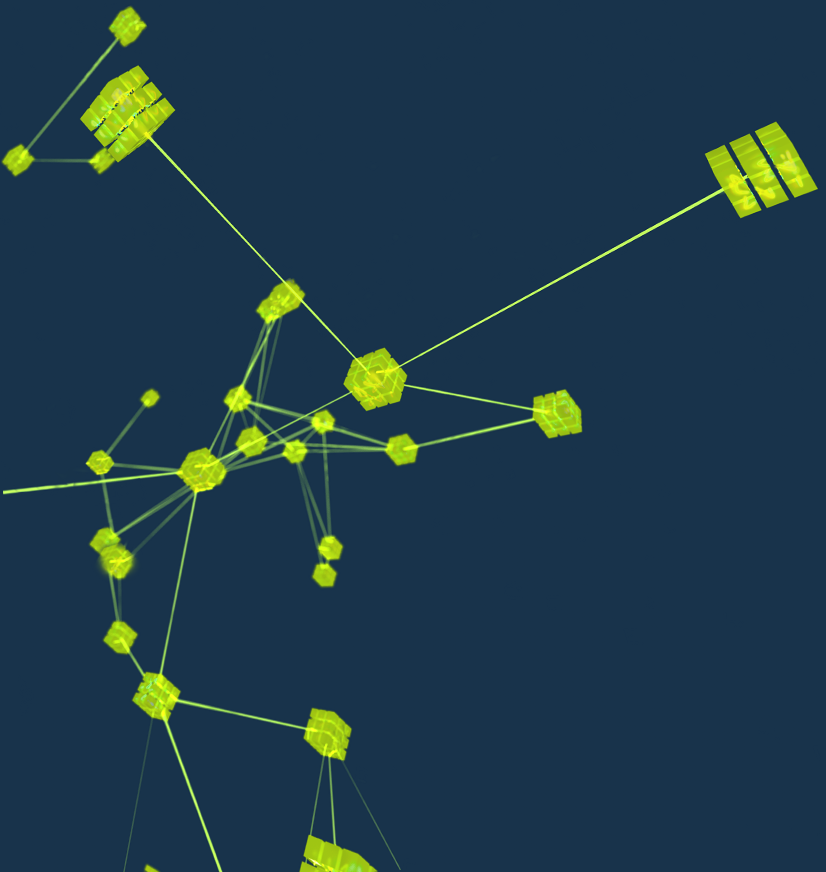


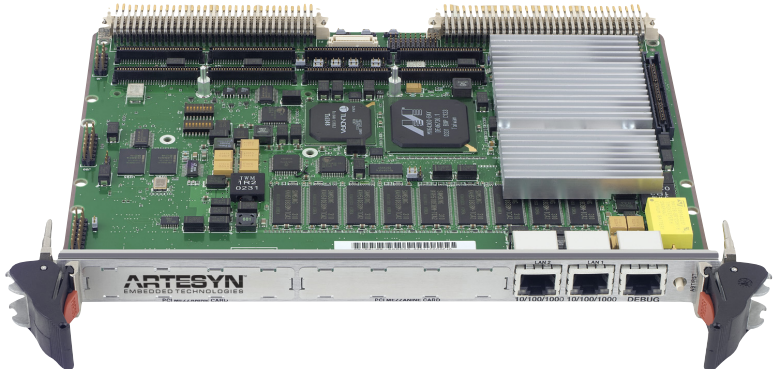
News about EPICS 7 with RTEMS 5

EPICS Satellite Meeting Oct. 2019

OUR STANDARD CPU

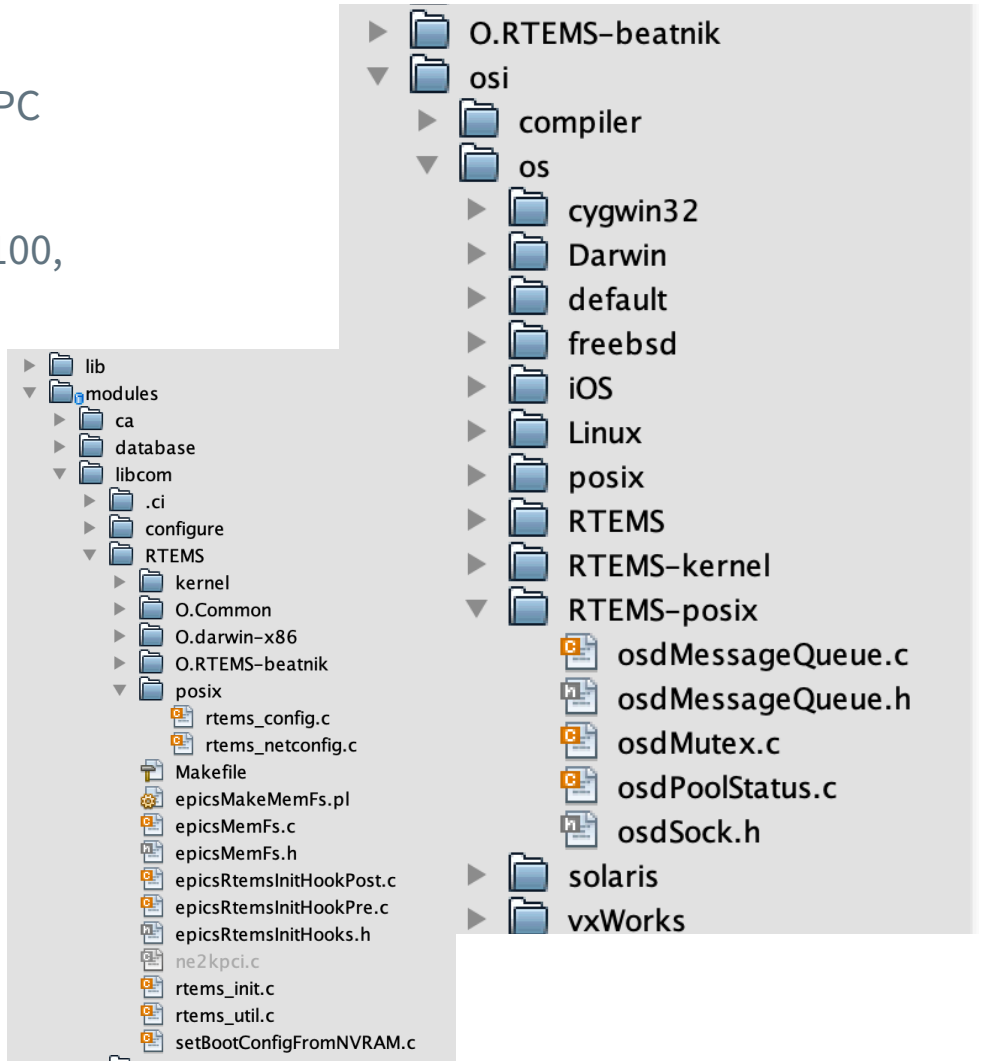
CPU MVME6100 (beatnik)

- 2eSST VMEbus protocol with 320MB/s transfer rate across the VMEbus
- MPC7457 PowerPC® processor running at up to 1.267 GHz
- 128-bit AltiVec coprocessor for parallel processing, ideal for data-intensive applications
- Dual Gigabit Ethernet interfaces for high performance networking



RTEMS 5 DEVELOPMENT

- Still waiting for a release …
- Epics 7 support available, used mainly with PPC (arm is working as well)
- funding of BSP - support (MVME6100, MVME2100, MVME3100 and MVME2500) by FHI
- funding of dynamic linker by HZB
- For lack of time :
  - line editing missing
  - ~~missing test on e.g. telnet support~~ (and other network stuff)
  - missing tests on intel hardware
  - not well tested boot config from NVRAM



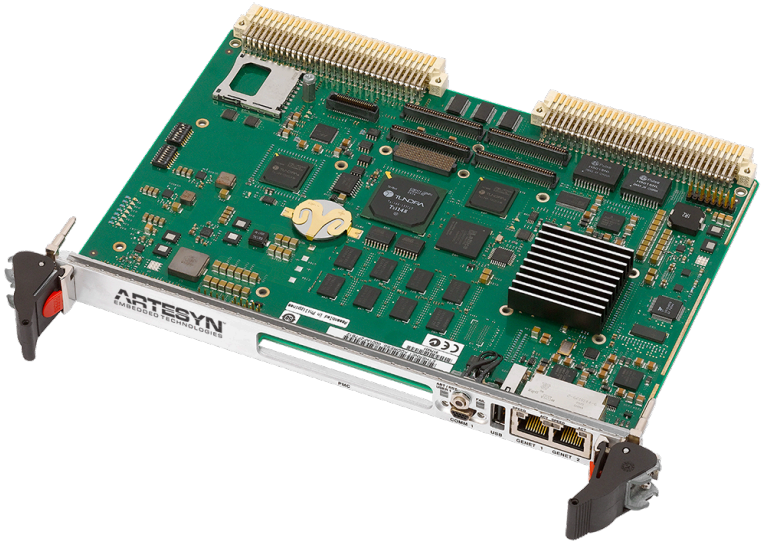
Some improvements (Danke Michael Davidsaver)

```
cry-test> rt help
help: The topics are
  all, help, misc, files, mem, rtems, monitor
cry-test> rt malloc
C Program Heap and RTEMS Workspace are the same.
Number of free blocks:                 141
Largest free block:                 164206288
Total bytes free:                   164941976
Number of used blocks:                 20338
Largest used block:                 20000008
Total bytes used:                   363718176
Size of the allocatable area in bytes:    528660152
Minimum free size ever in bytes:        162844968
Maximum number of free blocks ever:           179
Maximum number of blocks searched ever:        98
…
```

MORE MODERN CPU

CPU MVME2500 (much cheaper than MVME6100)

- 800 MHz, 1.0 GHz or 1.2 GHz NXP QorIQ P2010 and P2020 processors
- 1GB or 2GB DDR3-800, soldered down
- Three on-board Gigabit Ethernet interfaces
- Five serial ports
- One USB 2.0 port
- One or two PCM/XMC site



Uses U-Boot (Universal Boot Loader)

```
…
    DDR:400  MHz (800 MT/s data rate) (Asynchronous), LBC:25   MHz
L1:   D-cache 32 kB enabled
    I-cache 32 kB enabled
Board: MVME2500
    Emerson Network Power, Embedded Computing
    Monitor Version: 2.8
    FPGA Seq.Ver: 2.5
    Is VME system controller
I2C:   ready
SPI:   ready
DRAM:  Initializing....   DDR: 2 GiB (DDR3, 64-bit, CL=6, ECC on)
L2:   512 KB enabled
MMC:  FSL_SDHC: 0
8192 KiB S25FL064P at 0:0 is now current device
EEPROM: Read MAC Address
PCIe1: Root Complex of Slot 2, x1, regs @ 0xffe0a000
…
Enable SPI WP:
8192 KiB S25FL064P at 0:0 is now current device
8192 KiB S25FL064P at 0:1 is now current device
Autoboot in  3 seconds (hit 'h' to stop)
MVME2500=>
```

telnet server on target cpu

```
$ telnet 10.0.0.13
Trying 10.0.0.13...
Connected to 10.0.0.13.
Escape character is '^]'.
syslog: telnetd: accepted connection from 10.0.0.8 on /dev/pty4
tIocSh> help
Type 'help <command>' to see the arguments of <command>.
#               ClockTime_Report        ClockTime_Shutdown
asDumpHash      asInit          asSetFilename   asSetSubstitutions
ascar           asdbdump        asphag          aspmem          asprules
aspuag          astac           asynAutoConnect asynEnable
…
tIocSh> bye
Will end session
syslog: telnetd: releasing connection from 10.0.0.8 on /dev/pty4
Connection closed by foreign host.
```

telnet server on target cpu

```
$ telnet 10.0.0.13
Trying 10.0.0.13...
Connected to 10.0.0.13.
Escape character is '^]'.
syslog: telnetd: accepted connection from 10.0.0.8 on /dev/pty4
tIocSh> rt shutdown
Connection closed by foreign host
```

RTEMS 5 NEWS

telnet server on target cpu

issue:

Can’t catch Ctrl-] -> close

Now we use the libbsd stuff

```
$ git clone git://git.rtems.org/rtems-libbsd.git
$ cd rtems-libbsd
$ git checkout --track origin/5-freebsd-12
$ git submodule init
$ git submodule update rtems_waf
```

RTEMS 5 NEWS

“

RTEMS uses FreeBSD as the source of its TCP/IP and USB stacks. This is a developers guide which captures information on the process of merging code from FreeBSD, building this library, RTEMS specific support files, and general guidelines on what modifications to the FreeBSD source are permitted.

Goals of this effort are:

* Update TCP/IP and provide USB in RTEMS
* Ease updating to future FreeBSD versions
* Ease tracking changes in FreeBSD code
* Minimize manual changes in FreeBSD code
* Define stable kernel/device driver API which is implemented by both RTEMS and FreeBSD. This is the foundation of the port.

We will work to push our changes upstream to the FreeBSD Project and minimize changes required at each update point.

“

RTEMS 5 NEWS

***** Initializing network (dhcp) *****

nexus0: <RTEMS Nexus device>

ofwbus0: <Open Firmware Device Tree> on nexus0

simplebus0: <Flattened device tree simple bus> on ofwbus0

simplebus1: <Flattened device tree simple bus> mem 0xffe05000-0xffe05fff irq 3 on ofwbus0

tsec0: <Enhanced Three-Speed Ethernet Controller> mem 0x24000-0x24fff irq 13,14,18 on simplebus0

miibus0: <MII bus> on tsec0

ukphy0: <Generic IEEE 802.3u media interface> PHY 1 on miibus0

ukphy0: none, 10baseT, 10baseT-FDX, 100baseTX, 100baseTX-FDX, 1000baseT, 1000baseT-master, 1000baseT-FDX, 1000baseT-FDX-master, auto

info: tsec0: Ethernet address: ec:9e:cd:19:3c:61

…

info: lo0: link state changed to UP

info: tsec0: link state changed to DOWN

…

info: tsec0: link state changed to UP

…