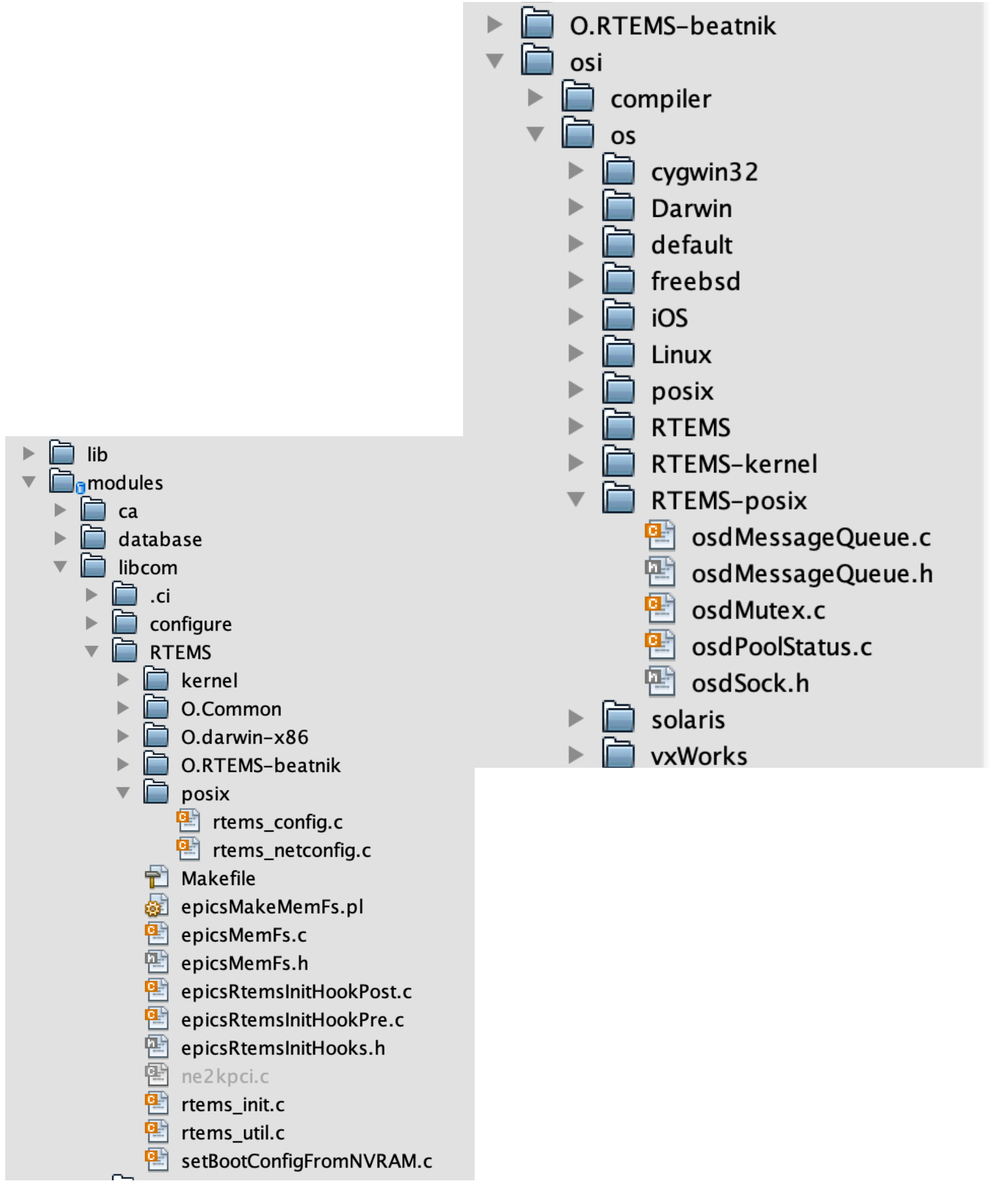
News about EPICS 7 with RTEMS

EPICS Collaboration Meeting ~~Sep. 2022~~ April 2023

RTEMS >4 DEVELOPMENT

- since RTEMS Release 5.1 it is also supported in EPICS 7 (in addition to RTEMS 4.9/10)
- with RTEMS 5.1 the existing libcom-posix implementations are used if possible (RTEMS must be created with ‘- -enable-posix’)
- Use of the 'LEGACY_STACK'. (- - enable-networks)



RTEMS Workshop on Friday 9pm !

RTEMS >4 DEVELOPMENT

- NTP
  - ~~The NTP client support was not brought across to RTEMS-posix in EPICS 7.~~
  - NTP in RTEMS 4.10 and EPICS 3.* uses EPICS code and the legacy stack to work.
  - EPICS is silent about this, so some users (me included :-( ) may not know it is missing.

Chris Johns (RTEMS Developer):
“I have a change to EPICS 7 to return it however it breaks LibBSD builds because it is depends on code in the legacy stack. It also enables the NTP functionality all the time (as it was in EPICS 3). I think the EPICS core developers will need to consider this issue once raised and guide RTEMS on the preferred solution.”

Update 3/23 : Now legacy stack is supported with RTEMS6, including NTP

RTEMS >4 DEVELOPMENT

- RTEMS 6
  - Uses the waf build system. This changes how BSPs are built.
  - The legacy networking stack has been removed from rtems.git and moved to rtems-net-legacy.git. Users will need to build the legacy or libbsd networking option they wish to use.
  - RSB supports deployment. Users who deploy RTEMS using the RSB can simply update their build set configurations to RTEMS 6 and the BSPs should build. ~~The legacy stack is missing from the RSB packages and needs to be added.~~
  - SMP is fully functional. The recent ESA project has improved the quality of RTEMS 6 with formal proof and extended testing such as the addition of the verification tests.

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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. “

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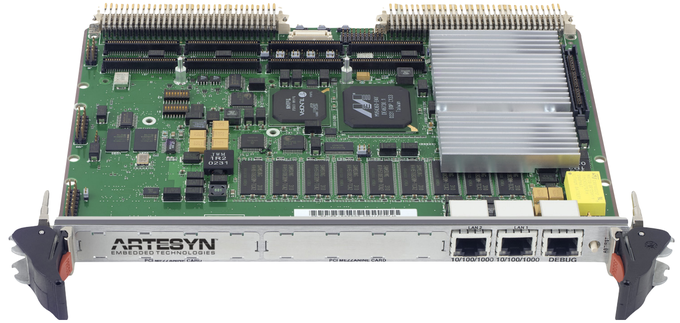
OUR (FHI) STANDARD CPUS

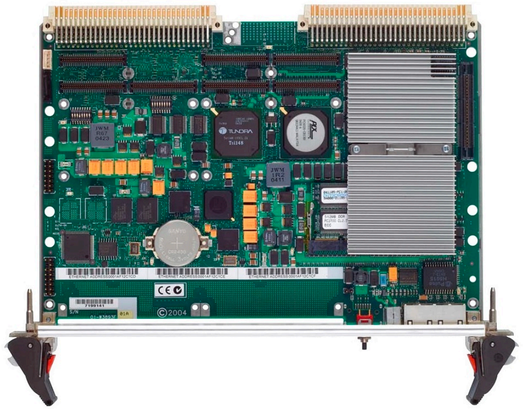
CPU MVME6100 (beatnik)

- ~~Unfortunately, no Nexus network driver (needed for the FreeBSD-stack) was available for this CPU~~.
- At the EPICS codeathon last year (March 2021) Till Straumann created the Nexus driver for the MVME6100.
- Included in RTEMS-FreeBSD branch *6-freebsd-12* since March 2022.



CPU MVME3100

- In production since > 1 year
- with OMS MAXv, Highland v375, Struck SIS3316, …



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RTEMS 6 DEVELOPMENT

- We were able to switch to RTEMS6 and use the new (6-freebsd-12) to :
  - use dhcpcd
  - use telnetd/ftpd etc.
  - ! use NFSv4 !
- Epics 7 support with these extensions, well tested on PPC
  (arm is working as well, xilinx_zynq_a9_qemu in GA - tests)
  see: https://github.com/epics-base/epics-base/wiki (Codeathon @ Diamond)

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RTEMS 6 DEVELOPMENT

Current developments (3/23)

- Legacy-stack for RTEMS6, including ntp
- Support MVME2700
- Better support for PowerPC VMEbus boards (MVME2100, MVME3100, …)
- ptpd (as an alternative to ntp?)
- Trying to get the beatnik BSP to work on the MVME5500 as well

RTEMS Workshop on Friday 9pm !

OUTLOOK

- NTP/NFSv4-Support (Chris Johns, funded by Gemini)
- PCI/VME Support for MVME2500 (Sebastian Huber, funded by FHI)
- Workshop with Vijay Bannerjee (RTEMS) on Friday (Chris Johns online?)

RTEMS Workshop on Friday 9pm !