Porting Guix to modern PowerPC

Guix Day Conference 2020

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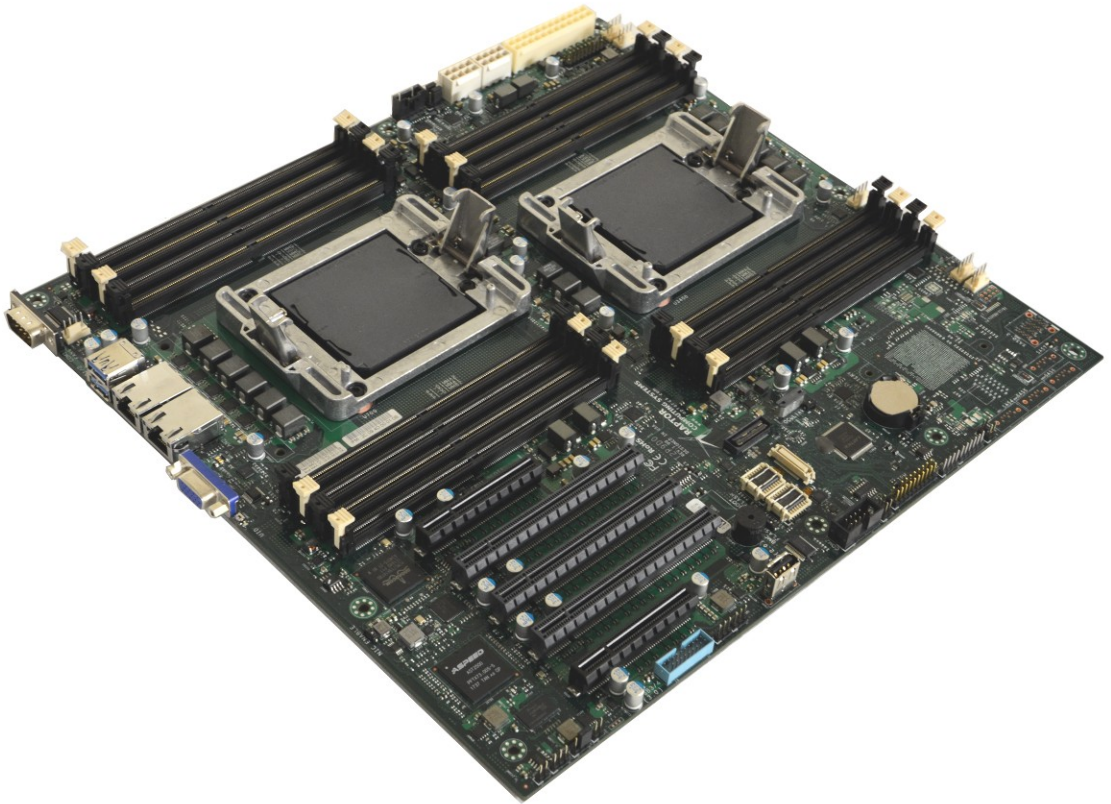
FSF-certified POWER 9 Mainboard

BOSTON, Massachusetts, USA -- Thursday, November 7th, 2019 -- The Free Software Foundation (FSF) today awarded Respects Your Freedom (RYF) certification to the Talos II and Talos II Lite mainboards, from Raptor Computing Systems, LLC. The RYF certification mark means that these products meet the FSF's standards in regard to users' freedom, control over the product, and privacy.

Blackbird also meets the criteria
https://ryf.fsf.org/about/criteria



The PowerPC Architecture

- Apple, IBM, Motorola – iBook G4, ThinkPad, …
- 32 bit subset of IBM Power Architecture
- Bi Endian hardware – boots in Big Endian mode
- Apple switching to Intel in 2005
- IBM released Power ISA Version 3.0 B in 2017

The Existing GUIX PowePC branch

- Runs on PowerMac G4, G5 and NXP Chips
- Big Endian, 32 only / Debian is Litte Endian
- Cross-Compiled GNU Hello runs on voidppc64
- First get 32bit guix running on the POWER9
- Then cross compile for 64bit Little Endian

Cross compile for PPC

- Install lastest binary version of GNU Guix
- Checkout wip-ppc branch
- guix build –target=$PPC bootstrap-tarballs guix
- Should work out of the box for 32bit PPC
- 64bit will need patches → wip-ppc64el branch

Live Demo – 32 bit Guix

ssh into my Talos II

Changes needed for PPC64LE

- GCC Toolchain
- The GNU C Library and other system libs
- Guile-3.0 and Guix
- Bootloader (petitboot, uboot)
- GNU Mes – currently x86 only (32bit)

GCC version and patches

- For PPC64LE a new GCC version is needed
- Configure flags of GCC need to be changed
  - unchanged Guix: glibc will fail
  - everything has to be rebuilt
- Bootstrap gcc may be a different version

Guile and Guix

- Guile on 64bit is untested and may have bugs
- 32bit guix can cross compile for 64bit
- Guix will need more changes for 64bit
- Talos II GPU needs CPU to be in LE mode
- PowerPC notebook will need BE for AltiVec

GNU Mes

- Small Scheme interpreter and C compiler
- C compiler only supports 32 bit x86
- Uses old versions of GCC, not ready for PPC64EL?
- Transperent format: hex assembly
- All Power Instructions are 32 bit, GPRs can be 32 bit
- Add Endian swapping to hex assembler