Hi

David Fry and I are working on designing a board based on the Bruce Culbertson NS32016 design. Bruce posted his design here ftp://ftp.funet.fi/pub/misc/pc532/Culbertson/ buried in amongst the PC532 file set. It is a completely separate design but appears to be more achievable than the PC532.

The current plan is to create a KiCAD schematic and PCB based on Bruce's netlist and partlist files. The original was built with wire-wrap on a prototype board which involves a lot of skills.

At the moment, we have captured a complete schematic in KiCAD and are beginning a PCB layout. Since there was no PCB specified AFAIK we are using a MicroATX (9.6"x9.6") with ATX power supply interface.

The NS32016-BC supports up to 8MB DRAM (original had 2MB installed), dual serial ports, a SCSI interface, and an FDC. It has 64KB of SRAM and 64KB of EPROM (modified to EEPROM to ease development). The design appears to be complete including several JEDEC files for PALs (converted to GALs due to obsolescence). Otherwise the design is intact.

The immediate goal is to get a working board using the ROM image posted on the FTP site. Next I think a porting of the CP/M-68K 'C' sources would serve as a good operating system to stage for further development. DR apparently developed a CP/M-16K although it was never released AFAIK so this would be similar.

We are in the process of reviewing the schematic and initial PCB layout. If you are interested and would like to participate please post in this thread. In particular, we are looking for people with software interest and knowledge of NS32K programming.

Thanks, Andrew Lynch

Hi Andrew

I will be happy to review. I don't know how many GAs are in the design and common signals - if we can reduce down to a CPLD which may ease bring up and debug.

Dave
Hi

There are four PALs in the original design. We are replacing those with GALs due to parts obsolescence. The JEDEC files should transfer over without problem (I think).

Looking at the completed schematic now I can see your point. It practically screams out for a pair of CPLDs to consolidate the PALs and some of the glue logic. I'd make two CPLDs: one for the DRAM circuitry and the other for decoder logic. Neither would be full so it would leave some headroom left for expansion & debugging. Also the design needs some minor expansion so it can have 16MB DRAM using four 4MB 30 pin SIMMs. All it needs is another DRAM address line and some tweaking of the memory decoder (I think). Most, if not all, the pieces are already in place so I suspect the designer was thinking ahead to add the capability later.

For at least the initial design, I'd like to stick as close to the original as possible so it is well understood. Once that's working I think there are great opportunities for a revision two board that incorporates some of these improvements.

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Hi

original Bruce Culbertson archive link does not work anymore. Here is new link


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Hi

Not a lot of interest in the PD32 reproduction although some of the feedback I've gotten is people are turned off by the 8-bit ISA slot and the need for a PC to control the NS32016 processor.

There is an alternative though. Several years ago, I captured the Bruce Culbertson NS32016 processor board. Unfortunately, the original schematics and PCB layout were lost *but* the netlist and parts list were preserved.

That is just enough to resurrect the board although it requires more artform since so much information is missing. However, I was able to capture the schematic and layout a PCB
I think the project is a bit "sportier" than the PD32 but the software may be easier. The NS32016-BC board has its own IO on board (dual serial, floppy drives, and SCSI) so no host PC needed.

Also, the NS32016-BC runs Minix and there are support files included in the archive. At least Minix is open-source and there aren't any IP ownership issues with Minix compared to the less-than-clear rights associated with Unix System V for the PD32.

The downside is the board is larger; approximately 9.6"x9.6" which is standard Micro-ATX size. It does have the mounting holes and ATX power supply interface so you could use a stock PC ATX case and power supply.

Also, since the project started from just a netlist and parts list, I think it likely the build and test will be more involved relative to the PD32 would be.

It is something to consider. Below is an early 3D render to help visualize. Thanks, Andrew Lynch

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Subject: Re: Bruce Culbertson NS32016 project
Posted by lynchaj on Wed, 07 Feb 2024 11:28:03 GMT

Hi

Interesting side note, I've been reviewing and updating the NS32016-BC design to clean up the PCB. Last night I put it in FreeRouting to see if I could get the board to solve as a 2-layer board and it did! I am quite happy about it. However, looking at the size and speed of the board, I think it will have to be a 4-layer PCB minimum so I am going to update it to 4-layer and try trace routing again.

Thanks, Andrew Lynch