
Subject: Any i860 fans here?

Posted by [e2k](#) on Sun, 18 Sep 2022 12:42:00 GMT

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Anybody still plays with intel's idea of a "cray for the poor"?
;-)

Chips are easy to get, and was a funny chip ...

Subject: Re: Any i860 fans here?

Posted by [cheshirenoir](#) on Tue, 20 Sep 2022 02:14:37 GMT

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I mostly remember the i860 being used in a LOT of Postscript printers in the early 90s.

Chesh

Subject: Re: Any i860 fans here?

Posted by [e2k](#) on Tue, 20 Sep 2022 12:05:15 GMT

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I have some graphic cards with i860s, and it was also used on massive parallel computing:
https://en.wikipedia.org/wiki/Intel_Paragon

I would just like to make my own board with one ("1") ;-)

Subject: Re: Any i860 fans here?

Posted by [etchedpixels](#) on Wed, 12 Oct 2022 19:28:50 GMT

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Would love a usable CPU board with one but no idea what it would actually be useful for 8)

Subject: Re: Any i860 fans here?

Posted by [e2k](#) on Wed, 19 Oct 2022 06:25:43 GMT

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etchedpixels wrote on Wed, 12 October 2022 12:28Would love a usable CPU board with one but no idea what it would actually be useful for 8)

If I would ask this question for every item, I have in storage :)

Subject: Re: Any i860 fans here?

Posted by [trianon](#) on Fri, 20 Jan 2023 16:19:21 GMT

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I had no idea that these CPU are easy to find, where can I buy them ?

A very long time ago I designed an i960 processor board, we first had a look at the i860 but this was a little overkill at the time.

Now and then I still have a look in old data books about the full risc family.

Would be nice to get an development board with an i860 and write some code :p

Subject: Re: Any i860 fans here?

Posted by [e2k](#) on Sat, 21 Jan 2023 12:49:37 GMT

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I'm stuck at the moment, in getting any compiler for it to work. If I could be sure, I have SW for it, I would make some boards ...

Subject: Re: Any i860 fans here?

Posted by [etchedpixels](#) on Sat, 28 Jan 2023 21:48:49 GMT

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gcc used to work. You may need to build a couple of progressively older gcc compilers to build a gcc that can build an old enough gcc for i860.

What specific problems do you have and I'll take a look at cooking something up.

Alan

Subject: Re: Any i860 fans here?

Posted by [e2k](#) on Sun, 29 Jan 2023 11:25:11 GMT

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etchedpixels wrote on Sat, 28 January 2023 13:48gcc used to work. You may need to build a couple of progressively older gcc compilers to build a gcc that can build an old enough gcc for i860.

What specific problems do you have and I'll take a look at cooking something up.

Alan

I really tried a lot of combinations, (on ubuntu 22LTS) but sure, I could have missed something ... IIRC, around gcc 4.* the i860 code was slowly removed. (pretty much with the announcement of 4.0, but it was still there)

Not the same combinations of switches worked for both (binutils & gcc). sometime SYSV gave you binutils, sometimes it didn't
(sorry, sitting in the wrong office, can't check what I did)
So the "sweet spot" to have a chance, would be around late 3.* or very early 4.0, but again, couldn't find the right compiler switches ...

Subject: Re: Any i860 fans here?
Posted by [etchedpixels](#) on Sun, 29 Jan 2023 14:22:46 GMT
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Having a dig back in history

```
../binutils-2.26.1/configure --target=i860-stardent-elf --prefix=/opt/i860 --disable-multilib
```

gets you a binutils

```
../gcc-3.4.6/configure --target=i860-sysv4 --prefix=/opt/i860 --disable-multilib --disable-threads  
--enable-languages=c --disable-shared --without-headers --disable-libssp --disable-libmpx  
--disable-libatomic
```

gets you compiler

But the two don't agree. I'll have a further poke later to figure out the rest of the incantations

Subject: Re: Any i860 fans here?
Posted by [etchedpixels](#) on Sun, 29 Jan 2023 16:15:38 GMT
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Ok the following incantations appear to work

```
../binutils-2.14/configure --target=i860-stardent-sysv4 --prefix=/opt/i860 --disable-multilib  
make  
make install
```

(there are probably later ones that still have the right support. I didn't look too hard)

Ensure the resulting i860 directory is on your path

```
edit gcc/config/i860/i860.md  
go to line 1229
```

Comment out the stanza

```
:: AC
::(define_insn ""
:: [(set (match_operand:QI 0 "register_operand" "=r")
::   (match_operand:QI 1 "indexed_operand" "m"))]
:: ""
:: "ld.b %1,%0")
```

which appears to be a bug that never got fixed upstream

```
../gcc-3.4.6/configure --target=i860-stardent-sysv4 --prefix=/opt/i860 --disable-multilib
--disable-threads --enable-languages=c --disable-shared --without-headers --disable-libssp
--disable-libmpx --disable-libatomic
make
make install
```

Subject: Re: Any i860 fans here?
Posted by [e2k](#) on Mon, 30 Jan 2023 12:26:52 GMT
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etchedpixels wrote on Sun, 29 January 2023 08:15Ok the following incantations appear to work
...

Hello again, THANKS for that, you definitely got me on the right track.
On my system (Ubuntu 22LTS, gcc 11) it didn't work completely, but the flags/switches seems to be right.
Tried binutils 2.14, 2.15, 2.16.1, 2.17, 2.18, 2.19.1, 2.20.1 ... Finally, 2.25.1 worked

gcc-3.4.6 worked, after some massaging :)
gcc-4.0.* all failed with internal compiler error
after that, support for the i860 was removed.

THANKS again!

Subject: Re: Any i860 fans here?
Posted by [drogon](#) on Fri, 03 Mar 2023 12:08:32 GMT
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e2k wrote on Sun, 18 September 2022 13:42Anybody still plays with intel's idea of a "cray for the poor"?
;-)

Chips are easy to get, and was a funny chip ...

A bit late to the party, but I've only just remembered about this place ...

I did some work with the i860 back in its day - I worked for a UK Supercomputer computer company and they were a stop-gap from Transputer to Sparc... 40Mhz, capable of 3 instructions per cycle (in-theory) so they seemed like a good thing - and they were - but were a right PITA to code for.

They are a 32-bit RISC CPU with MMU and the Integer side was fairly nice/orthogonal but the floating point side... The chip has a 64-bit data bus and can read 2 instructions at a time. One is for the Integer CPU, the other for the floating point unit. This was called dual-instruction mode - and since one FP operation is a combined multiply and add, this is where it gets the 3 instructions per cycle claim from.

The FP side has to be "hand cranked". So you'd typically use the integer instructions to load a value into the FP pipeline, then 8 cycles later (IIRC) the result would come out, meanwhile you have to use those 7 cycles to continue to load another 7 FP values in the pipeline - so there was a latency for individual operations, but matrix operations would fly and could crank out FFTs and things where multiply and add was a good thing but the code had to be very carefully done by hand - later tools did help though (but that was after my time with them). I've no idea if the last supported GCC could 'vectorise' operations or not.

The biggest headache was taking an interrupt. Then you had to flush and save the state of the FP pipeline, restore the FP pipeline for the interrupt process and carry on. This took several 100 cycles (again, IIRC). So as an embedded system with no interrupts (or simple interrupts that didn't need to touch the FP side) it might be fine, but to use it for e.g. Unix (and I think there was a Unix for it at one point), was somewhat sub-optimal.

Anyway there you go. I load a good few braincells to dual-instruction mode but it was fun at the time. I understand a lot of the internals of it made it into the MMX, etc. instructions in later Pentiums.

-Gordon
