# Re: a dozen cpu's on a chip

***Source:*** http://sci.tech−archive.net/Archive/sci.electronics.design/2008−05/msg01751.html

- *From*: John Larkin <jjlarkin@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
- *Date*: Thu, 15 May 2008 06:50:32 −0700

On Thu, 15 May 2008 09:14:43 +0100, John Devereux
<jdREMOVE@xxxxxxxxxxxxxxxxx> wrote:

> John Larkin <jjlarkin@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx> writes:
>
> > On Wed, 14 May 2008 19:50:42 +0100, John Devereux
> > <jdREMOVE@xxxxxxxxxxxxxxxxx> wrote:
> >
> > > John Larkin
> > > <jjlarkin@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx> writes:
> > >
> > > > On Wed, 14 May 2008 14:37:40 GMT, Jan
> > > > Panteltje
> > > > <pNaonStpealmtje@xxxxxxxxx> wrote:
> > > >
> > > > > On a sunny day (Wed, 14
> > > > > May 2008 07:09:57 −0700)
> > > > > it happened John Larkin
> > > > > <jjlarkin@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
> > > > > wrote in
> > > > > <t8sl24dnv1gga7v38sormu0bvc6dd1eg3d@xxxxxxx>:
> > > > >
> > > > > > Dvorak has
> > > > > > vague
> > > > > > inklings as
> > > > > > to what's
> > > > > > going on:
> > > > > >
> > > > > > http://www.pcmag.com/article2/0,1895,2129596,00.asp
> > > > >
> > > > > Not really, first the 4 TB is
> > > > > full with HD recordings in a

> day or so.
> Look up HD editing
> 'Clean disks?" whats he
> running windows?
> You tube streaming o na
> separate core?
> What a waste of a super fast
> powerful core.
> Webcam? Even less
> bandwidth.
>
> Twittering, blogs, yes you
> _REALLY_ need 10 extra
> cores for that.
> The man is an idiot.
>
> WHOAAAAAA!
> And that Intel guy is a
> salesman.
> Now that they are faster
> then AMD all of the sudden
> speed is important.
>
> I have to admit that I was
> more pessimistic about
> Intel, but hey, maybe I will
> be proven right once they
> have 80 cores with 70 idle..

> So you and Mr Brown agree that computing
> has already reached its
> pinnacle of perfection, and the
> trillion−transistor chips with
> hundreds of CPU's will always run
> Windows, and the individual CPU's
> will always multitask, because that's
> efficient.
>
> Well, since absolutely nothing in technology
> has changed in the last
> 20 years, I suppose it's safe to assume
> nothing will change in the
> next 20 either.

In most systems most tasks are idle − but occasionally you will need
to do something that takes a *lot* of CPU power. E.g. media transcoding, recompiling the linux kernel, FPGA synthesis, video

> > editing, ray tracing.
> >
> > Your "lots of little cores" scheme is not much use in this scenario,
> > since all the near−idle tasks could have been done in a single multitasking core anyway, and the (likely single) heavy duty task runs
> > *really slowly* on one of your little cores.
> >
> > What is actually needed is a single core that is just about as fast as
> > possible. Only when it runs up against practical limits is it then
> > worth going to 2−core, 4−core etc. And you can then rewrite the "heavy
> > duty task" to split itself over multiple cores. But the most efficient
> > scheme would still be to have all the lightweight tasks on one of the
> > cores, and the single heavy duty program spread over the remainder.
> >
> > And this is what we have.
>
> Of course this is what we have. But what will we have 10 or 20 years out?
>
> The GHz race is slowing down to a standstill; everybody is going to more cores to get more mips per chip. The new PR race will be for number of cores, not GHz.
>
> FTTH is coming; soon a good hunk of the population will have gigabits per second pouring into their houses.
>
> Nanometer geometries are happening, but still with UV lithography. So yields are going to suffer, and yields on a single−core CPU with a few billion transistors won't be great.
>
> Heat sinks probably won't get much better.
>
> So, things will stay the same?

No, I agree there will be a move to more cores.

You seemed to be saying that the software complexity / reliability problem could be solved by putting every process on a separate core. I don't see the number of cores as being relevant to this. Current designs already have available mechanisms for isolating processes as much as desired.

"As desired" is the key phrase. Most of the industry seems to think that means "pretty well, usually, it only crashes once a week or so". I want it to mean "absolutely, it can't lock up." Programmers need to be protected against themselves, ans the only real protection is hardware.

And there will always be a need for processes to

> communicate, so the problems of synchronisation, deadlocks and resource contention remain whether or not you have a process−per−core.

So *design* all that into the hardware. There's certainly less resource contention if there's lots of CPUs available, each with some local memory and code cache.

> Essentially, a massively multicore chip will be under−utilised if the software only runs one task per core − unless the cores are so underpowered that they cannot run the few computationally intensive tasks well.

Nanometer transistors are fast and free. Quit worrying about keeping them busy so we can get past using 50−year old concepts in a multitask, gigabit world. The majority of guys here are adamant that things will never change, a pretty radical position for engineers to take. Newsgroups seem to attract that type.

At this moment, my PC is running 389 threads, on one CPU.

John

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