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Hybrid Memory Cube stacks DRAM for 15x the bandwidth of DDR3

By Matthew DeCarlo
On April 2, 2013, 4:42 PM

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After only 17 months in development, a group of the world's largest memory makers has announced a new solution that is expected to greatly improve performance over standard DDR3 and DDR4 DRAM while simultaneously reducing power consumption.

Created by the Hybrid Memory Cube Consortium, whose membership roster includes Samsung and Micron, HMC is designed to address the limitations of conventional DRAM modules, which can hamper performance in highly demanding scenarios.

"The term 'memory wall' has been used to describe this challenge," the consortium's press release reads before noting that busting through the so-called memory wall requires an entirely new architecture, and that's what HMC brings to the table.

The illustration of HMC below will probably seem familiar if you caught Nvidia's recent
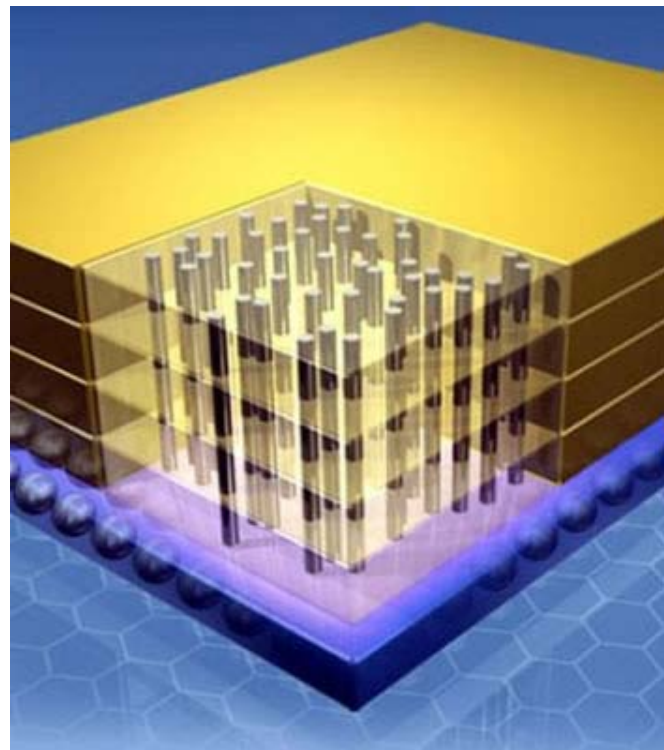
announcement about its next-next-generation (2016ish) Volta graphics cards using a stacked DRAM design that will purportedly offer 1TB/s of bandwidth.

The HMC Consortium's claims aren't quite that lofty, but its products may not be three plus years from market either. Micron plans to start sampling its stacked DRAM products this fall and wants to start production in the first half of next year.

HMC works by stacking DRAM chips with a VIA (Virtical Interconnect Access) technology that lets electrical wiring pass vertically through the silicon wafers. That block of memory dies is seated on a logic chip which sits on the base of the unit.
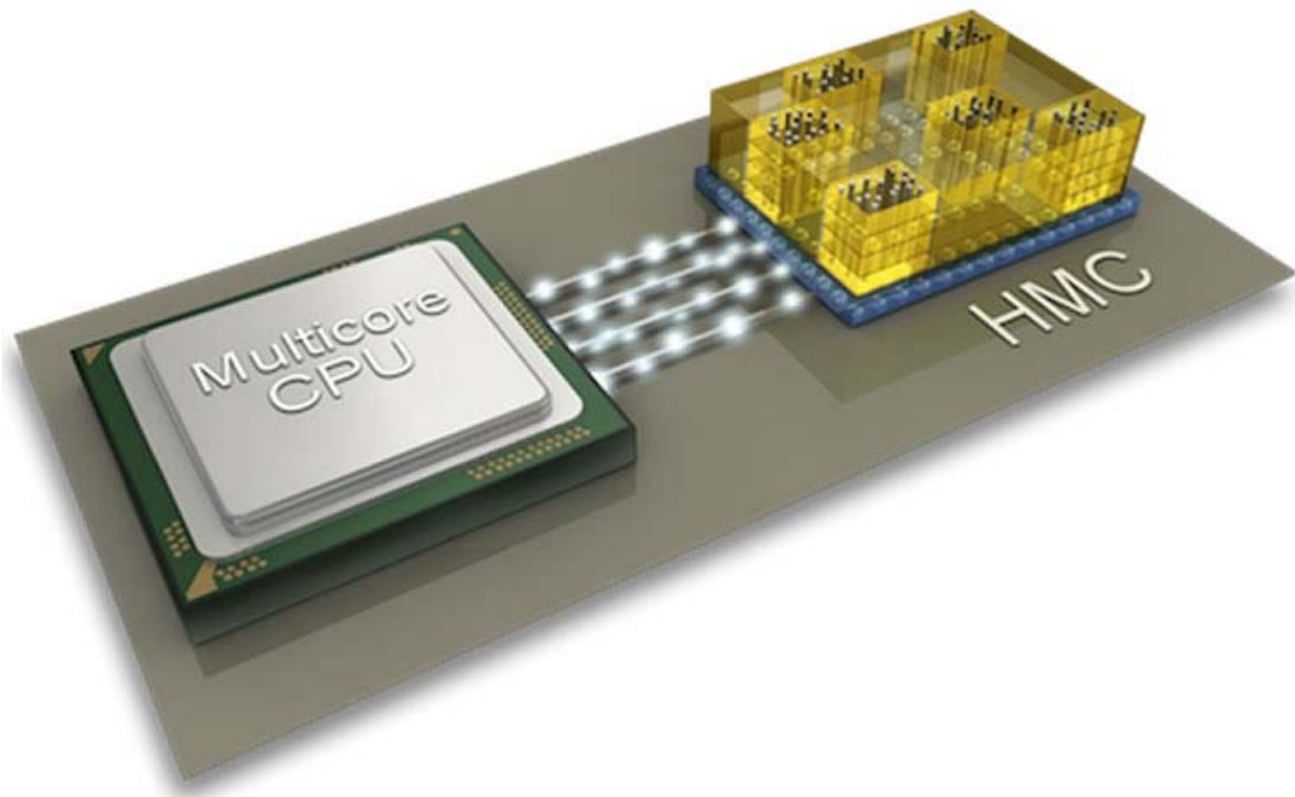
The current prototypes either have 128 or 256 memory banks available to the host system and the first HMC spec will reportedly offer 2GB and 4GB packages that provide bi-directional bandwidth of up to 160GB/s, according to a Micron exec.

By comparison, DDR3 is said to offer 11GB/s and DDR4 only pushes that to between 18GB and 20GB/s. Besides being 15 times faster than standard DRAM, another consortium member noted that HMC reduces power consumption by 70%.

micron, dram, ddr4, memory, ddr3, hybrid memory cube, hmc   **Next Article:** *Registration for Microsoft's B*

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JC713 said: 1 week ago

Great news. Too bad DDR4 is already laid out on paper, it could have adopted this and could have been delayed a few years.

REPLY

Littleczr said: 1 week ago

What they need to improve is Hard drive speeds. As it is hard drives are holding the party even if they are SSD drives.

REPLY

JC713 said: 1 week ago

> What they need to improve is Hard drive speeds. As it is hard drives are holding the party even if they are SSD drives.

The next gen Wester Digital Black HDDs are said to be hybrid. Maybe with SATA 4 we will see improved HDDs. There have been tons of advancements over the past 2 or 3 years in HDD tech like using lasers instead of magnets. You are correct though. They really need to improve HDD speed and reliability (they are reliable already, but they need to be improved on the business level, like for databases and such).

REPLY

VitalyT said: 1 person liked this | 1 week ago

To improve HDD-s? You must be joking... HDD is a history. Today they are only good for massive storage for slow stuff, like movies that do not need fast reads. And SDD-s are getting faster and cheaper very fast. What - 550MB/s isn't fast enough for you? That's just bitching.

And this article is about a real break-through, that may very likely cancel DDR 3/4/5, and good riddance, it's an obsolete architecture, peddled only by the laziness of AMD and Intel to use faster memory, because for that they need to update built-in memory controllers they use in their processors, and they can't be arsed, rather pushing the obsolete memory support into another decade.

REPLY

JC713 said: 1 week ago

... SSDs are pretty unreliable compared to HDDs. Yes they are dated, but they are much more economical. The only potential I see in SSDs isnt really in the SATA category, but more in the PCI-e category (also m-SATA). 90% of the population doesnt need an SSD if they are browsing facebook. Economical is more important than speed for the average consumer I dont wanna turn this into a fla me thread so lets put it to rest. But the point is that HDDs need a final improvement before SSDs take over once they get more reliable.

REPLY

VitalyT said: 1 week ago

Not reliable? How do you figure? - by buying the cheapest SSD from a not credible manufacturer? That doesn't make SSD-s unreliable, that makes a bad choice on your part. I'm working on a desktop that I purchased almost 2.5 years ago, along with two SSD-s Intel X25. They haven't given me a single problem once, and performed superbly, still do.

HDD-s are more economical? In which aspect - the money? Of course they are, because SSD-s are more economical in every other aspect - power consumption, dimension, time wasted for read/write operation. So, I wouldn't repeat such statements about HDD-s being more economical... economy is a sum of factors, that include efficiency, not just money.

SSD-s are not only good for PCI-e? That's nonsense. SSD-s already give more than 10 times

performance on SATA-3 than HDD-s do. And SATA-4 is already on the horizon, just a little more to wait.

"HDD-s need a final improvement " - I wouldn't keep your hopes up. SSD-s are getting cheaper and bigger much faster than HDD-s get improvements.

REPLY

tipstir, **TS Ambassador**, said: 1 week ago

SSD has been tried prior and look at it. HDD can only do what they were designed to do.

First the concept making you have a faster CPU

Second faster Memory

Third Storage Spin Rate RPM

Fourth FSB

Most of all the why the OS functions and how it can't clean-up after memory dumps, crashes and system files that get stored and become junk files. Web Browsers also dump temp files on the system.

So what they need is better PC or System that can detect issues and keep the Operating System running and Top End Performance. We just don't have anything like that today. What we have is pretty much the same process.

When memory fills up the system using part of the hard drive as memory. This process should have been ditched out years ago.

Faster CPU are great but how much applications and games can really run so smoothly after so many hours of running time.

Well if DDR, DDR2, DDR3, DDR4 and etc are no history and new RAM Tech is ready for the market but what about the other issues. Everything should sync up and be at it's top. But again it's not.

REPLY

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> "HDD-s need a final improvement " - I wouldn't keep your hopes up. SSD-s are getting cheaper and bigger much faster than HDD-s get improvements.

[link] . Sandforce controllers have a large failure rate. I have had a bunch of sandforce SSDs (like 10) in the past and 9/10 of them have failed within a year. They were made by Corsair, so a "non-credible" manufacturer is out of the question. Heck, a WD HDD gets 150MB/s read and write while a SSD gets 500. Not everyone needs those types of speeds. Most consumers wont really notice a difference between SSDs and HDDs... the real world factor is reliability. People dont want to lose their years of data after the SSD cycles have ended. You are right in some aspects, but wrong in others. Not many people transfer 20GB movies from drive to drive, so that "time wasted" is not a viable defense. Power consumption? Who cares if you are on a desktop, that is only for laptops, and that is where SSDs shine. Once again... dimensions... who cares. If you have a desktop, it doesnt matter. That only matters in laptops. I am not trying to hate, I am just stating my opinion.

REPLY

dennis777 said: 1 week ago

Great news!

REPLY

VitalyT said: 1 person liked this | 1 week ago

Ha-ha, Sandforce has been a sack of bugs ever since it came to the market! Why do you think Intel stayed away from them for so long? Even when they tried to use a Sandforce controller they modified it completely, to be reliable more or less. It is only nowadays Sandforce became a much better product, but I still would be careful about the manufacturer that uses Sandforce controllers.

So, if you buy an SSD with such faulty controller, I wouldn't discredit SSD-s for this as a technology, it's just businesses trying to take advantage of the hype and producing crappy products. You need to know who to trust and whose products to buy. You are like a car buyer who bought one from Russia and now feels swindled, saying cars are crap, compared to bicycles, for instance.

> Most consumers wont really notice a difference between SSDs and HDDs...

Really? .... I mean, REALLY? ... well, to such a strong argument I bow and step back on all my previous statements.

REPLY

JC713 said: 1 week ago

Most people dont even know what an ssd is...

REPLY

St1ckM4n said: 1 week ago

I thought DDR3 1600 bandwidth was already pretty much faster than the CPU/cache allows. Heck, I'm 80% sure I'm wrong, but I saw this somewhere and now it's taken over. 😕

REPLY

killeriii said: 1 week ago

> "HDD-s need a final improvement " - I wouldn't keep your hopes up. SSD-s are getting
> cheaper and bigger much faster than HDD-s get improvements.

4TB @ $200 is still VERY compelling, no matter the speed.

SSD's are a little ways off it the price department currently. I don't think that will change for a year or two yet. In the meantime, HDD's need a speed improvement.

REPLY

killeriii said: 1 week ago

Oops, forgot like to the $200 deal

[link]

REPLY

Stupido said: 1 week ago

wait...

Can this massive bandwidth from the HMC remove/reduce the need of internal L2/L3 cash? I mean that the size of the CPU can be reduced, or just reuse the die space for some other functionality...

or am I wrong?

REPLY

Guest said: 1 week ago

Yes, exciting news! I wish the HMC consortium the best of luck on their project. This could things alot if it succeeds and has a decent consumer price (assuming this is for consumers)!

REPLY

3DCGMODELER said: 7 days ago

SSD are getting to be slow....

REPLY

VitalyT said: 7 days ago

> SSD are getting to be slow....

...evidently well in tandem with herewith writers' acumen.

REPLY

hahahanoobs said: 7 days ago

> Most people dont even know what an ssd is...

Yet you know they don't need it?

PS, Sandforce is one controller of many controllers in SSD's. OCZ has one, Samsung has one, Corsair has their own now (LAM) and so on. If SSD's you bought with SF controllers died so often, why did you buy 9 (you said 9 out of 10 died on you) more?

confused

REPLY

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> *confused*

I have fixed numerous PCs with SSDs with sandforce controllers. Not all mine. As for OCZ, Indilinx makes their controller, not OCZ themselves. If I am not mistaken, drives like the Corsair Neutron have modified SFs.

REPLY

nestorius said: 1 person liked this | 6 days ago

I don't see where anyone would need a 4 TB drive except as a data drive. I use a 120GB boot drive and a 500 GB data drive. My massive storage I.e. 4 TB(2x2TB) is accessed via a NAS

drive and that's where I keep all my backed up data also. Massive drives as boot drives cause you to spend many hours rebuilding a failed drive.

I have a clone copy of my system, as built and with all of microsofts updates. My data is backed up daily via NAS so a complete system rebuild from a crashed system drive takes less than an hour.....

I find that most people hoard data and keep crap they should have trashed years ago!

REPLY

cliffordcooley, **TechSpot Paladin**, said:

6 days ago

> I don't see where anyone would need a 4 TB drive except as a data drive.

You should be careful making these statements. I can see that you mean present tense but 20 years ago, I didn't see where anyone would need a 1GB drive for an OS or data.

> I find that most people hoard data and keep crap they should have trashed years ago!

So true, I've been cleaning my storage of old crap for a few years. Piece by piece, I think all my old software is finally history.

REPLY

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