Morgan Stanley Technology, Media & Telecom Conference

Company Participants

- Colette Kress, EVP and CFO
- Joe Mayer, Analyst

Other Participants

- Unidentified Participant, Analyst, Unknown

Presentation

Joe Mayer {BIO 1470363 <GO>}

I'm Joe Mayer, Morgan Stanley Research. Very happy to have today Colette Kress from NVIDIA. I wish, Colette, that the meeting we had here last year, I'd just listened to everything you told me and just believed it.

(Laughter)

(inaudible) a lot better. You guys had a great year, obviously. So thank you so much for being here. I know there's a lot of anticipation. Maybe we'll just get right into it.

Maybe start with just the gaming business, because that seems like the focus people have right now -- 59% of your revenues. You had a great year, you grew 44%, 59% sequentially in the Third Quarter, which is -- I've never seen a business of that size kind of have that kind of unexpected growth.

Can you talk about what drove that. And what makes you guys bullish about gaming off that base going forward?

Colette Kress {BIO 18297352 <GO>}

Sure. So gaming -- it is the basis of our company and has been for more than 15, 20 years. We built the Company as one of the key applications for the GPU was gaming. And we have really changed our approach to gaming over the last several years. And last year is one of those key years for us as well.

So last year was about continuing to evolve the overall gaming industry. The gaming industry used to start where it was a one-on-one play. Right? Yourself with the overall computer. And it's really moved to a social platform. It's moved to a social platform

to where you are playing with all of your friends. It's not just about one gamer at a time. They're usually two-by-two or more, because they're all playing with their overall friends. So our approach has been to enable a gaming platform for every type of gamer that will be there.

And we have a lot of different cards. And last year took place in terms of enabling Pascal to come to market. Pascal is an amazing architecture, an architecture that we're using across the Company; but, very importantly, in terms of our launch, in terms of for gaming, that we brought to market probably the most cards that we have ever done over a shorter period of time. Very successful overall launch; very, very strong acceptance of those cards and their performance.

Its performance improvements that are detainable [ph] from the last generation was substantial. But even those that have been on our platform for many years, it was essentially a no-brainer type of thought in terms of the upgrade potential that we could do.

We approach the Pascal architecture as an opportunity for us to enable in the future. If you ever want to play VR, you have that ability in terms of the Pascal.

So through a combination of what we see in terms of an expanding market of gamers -- gamers that are coming onboard for the social experience, gamers that are staying on longer, gamers that are coming onboard where broadband access has never been in the past -- now have those ability to enjoy what they see in terms of sister countries nearby them.

Then, also, what we have is probably the best architecture, the best overall platform, in terms of in the market. And we've been able to continue to both increase those units and increase those overall ASPs for the gamers.

But there's a lot of discussion that says -- well, what now? A very, very strong second half. We're talking about gaming overall results growing more than 60% year over year in those two quarters. The underlying fundamentals of the gaming industry are still there. They are still taking place while things change [ph].

If you were with us last night, also here in San Francisco, at GDC just down the street, we actually announced yet another Pascal card. We announced a 1080 Ti, which is again 35% in performance improvement over our existing 1080 that is in market. We also made room in terms of our overall price points for that 1080 to come in at a $699 price point.

So again, we are enabling all the different types of enthusiastic gamers that are out there to partake in terms of the gaming, with all the different types of price points and great cards that we have.

So we still believe those healthy parts of the market are there for us to capture.

Joe Mayer {BIO 1470363 <GO>}

Then, I guess, how do you parse the product cycle aspect? Because Pascal was obviously a huge cycle. And you talked about the reasons why people are adopting faster. You've rolled out a lot of families quicker, although it's actually pretty exciting, you have new families to talk about. But is that an adoption cycle that you then sort of consolidate your revenue gains at that point? Or do you see that number continuing to grow from that level?

And I think, I guess, it's also encouraging to me that we've seen growth in PC gaming software stronger than we've seen in a long time as well over the last couple quarters. And how much of it is an adoption cycle versus the growth aspects in the population of (inaudible)?

Colette Kress {BIO 18297352 <GO>}

Yes, I think that's a good question. Because with the rollout of all of the different platforms that we had, is all of that upgrade complete? And the answer is absolutely not. The overall cycle for how often they will actually refresh their overall gaming platform may be somewhere between three-and-a-half, four years. It's still too early for us to tell. It takes three-and-a-half, four years to determine if that cycle is still the same.

When we compare and look at how well we're doing against our last architecture in terms of Maxwell, it's still really early, because we're only about two quarters in of selling through our overall Pascal, over a process that should take about three-and-a-half to four years. But so far, we're moving faster, a little bit faster, than when we did at Pascal. So we feel great about that.

But I think you can see that the establishment of more gamers out there is also, overall, driving our ability to sell in in terms of the additional units. And it's not just necessarily just a refresh.

It will take us a little bit more time to see that through. But we'll probably see that continue and that refreshing to occur all the way through the current year that we're into.

Joe Mayer {BIO 1470363 <GO>}

Okay, that's helpful.

And I guess one of the helpful distinctions you guys have made in the last few years is this OEM versus gaming. And OEM has been declining. Gaming has actually been growing at a good clip for quite some time. It's just showing up more now. And it's getting to be a bigger part of the numbers. Can you talk a little bit about how you're parsing that. And why you've seen that shift?

Colette Kress {BIO 18297352 <GO>}

Sure.

So we took that opportunity a couple years ago to really concentrate on our game platforms. We sell GPUs for general-purpose PCs, probably several of the ones that are out here in the audience today. That said, sure, there's a little bit of graphic capability that we want for certain applications that you will be -- but there is a different level to play several of the high-end games.

So we really market and build certain platforms that are exclusively for that gaming market. And we classify those as gaming. Most of the time, it's in the range of probably about a $100 price point or more for those markets, where we feel people, when they are spending that much money, we can actually see them through our GeForce experience -- sign on, download the drivers for games. So we have an ability to actually look to say yes, the intended use of those overall gaming platforms are actually being used for gaming.

So that's essentially how we have split through our overall OEM business. It's a very small part of our business now. It represents probably less than 5% of our business. It's not necessarily growish at this time, because we're still not at the point that overall PC growth is there; or even that a discrete GPU attached is the strong reasons, in terms of something that you would buy in terms of the PC.

We will still be strategically aligned to the OEMs and those PC platforms, in terms of supporting it. But it's different price point at the different ASPs. There can be significant amounts of just volumes, just because of the mass amounts of PCs out there. But again, it's a very small part of our business.

Joe Mayer {BIO 1470363 <GO>}

Okay. That's helpful.

Then, the other divisive point in terms of your gaming business. And where I think investors are all over the map, is how much of the growth is price versus units. And I know you don't go into those distinctions. But maybe qualitatively, some people are of the view that it's all price. It seems to us that it's more units than price and that, actually, like-for-like pricing hasn't changed that much, Maxwell to Pascal. And that you're probably getting some people trading up to the higher-end SKUs. So can you talk a little bit about that?

Colette Kress {BIO 18297352 <GO>}

Yes. The good old discussion about ASPs versus unit growth --

Joe Mayer {BIO 1470363 <GO>}

You can just give it to the top line.

Colette Kress {BIO 18297352 <GO>}

We could, we could go through there.

So we did take an opportunity, about a year, to look at what we have seen historically over the last couple years in terms of our ASPs and our unit growth in gaming. Keep in mind, if you looked from day to day, month to month, given what we launch, sometimes we launch what we know is going to be more of a volume play. Then we launch some that we know is going to be more of a high-end card that's going to be to a certain part of the market, which will essentially drive our ASPs.

So looking at it over a very short period of time, you may have some interesting things that pop out of that. So what we have done is we've looked over a long period of time. Based on what we see as those factors, you are seeing both. You are seeing a growth in terms of units, we are seeing a growth in ASPs.

Over the last five years, the overall gaming business, about a half a year ago, was growing about 30%, 30% growth on the top line. Faster, yes, than the overall gaming market below. And what we talked about was the unit growth is probably about 9%. And the ASP growth was about 11%. Those are a multiplying factor to get to the overall 30%.

As we finish fiscal year 2017 and our growth in terms of being around a little bit higher than 30%, probably in the mid-30s or higher over that same type of CAGR period, those same factors are occurring. Nothing has materially changed, other than a very, very strong part of [ph] 2017 that helped. So I think we're still seeing the same aspects of growth in ASPs as well as growth in terms of units.

You responded of [ph] did we increase our prices with Pascal? And the answer is really not. When you think about the overall price for performance, it is about the same that we've said. Or, another way of saying is, in many times, you're actually getting more performance at a better price that we're doing. And that is our goal. Our goal is not to just overall increase price, it turns out.

But what you are seeing is people continuing to choose a higher-end card to play their games. They truly see the benefits of sometimes playing the exact same game with a better GPU is a better experience. It's like playing a different game. And so we do get those benefits from them just upgrading on their next time of buying a GPU at a higher card. And that is also, therefore, in our overall ASP grip.

Joe Mayer {BIO 1470363 <GO>}

Okay. That's helpful.

Then, the other element that people ask me about is other ways of boosting the dollar per customer, whether it's the Founders Edition card or selling DRAM or those kinds of things. My sense is those things are pretty small. But can you just address that?

Colette Kress {BIO 18297352 <GO>}

Yes. They are pretty small. We get the question of the Founder Edition -- what was our goal? What was the overall excitement about why, in terms of the Founders Edition? It's a small percentage. But if you think about how the launch process works, from last night to when a gamer will actually be able to receive a 1080 Ti, which will be next week. And that's because we have put in a Founder Edition, which allows us to build these boards and be ready as close to launch as possible. That takes that excitement that they have at a launch. And they can feel that excitement in about a week, to when they actually received it. It's still a very small percentage.

The price point of the Founder Edition is also just slightly higher. But keep in mind, there's also different components with that. We felt if we were actually selling it from the Company ourselves, they would expect the high-end components, the rich components that we could put in there. Given that we do not have a volume play in terms of those components, we just have a slightly higher price to keep that.

But really, our overall purpose of that is to just keep the excitement from the launch that they can receive the overall card quite quickly. So that's one piece of it. But you're right, it's not a material part of it.

Joe Mayer {BIO 1470363 <GO>}

Okay. Great.

So overall, it sounds like you're pretty constructive on the growth of this gaming segment. There's, I guess, a view that there's been some discontinuity more recently. And yet, seems like your guidance was for generally seasonal kinds of results. Is that the way you're looking at the current quarter?

Colette Kress {BIO 18297352 <GO>}

Yes. The gaming market does have its seasonality with it. Probably one of the -- one seasonality that we can see versus all of the markets that we are in. And that seasonality is stronger in the second half of the year than the first half of the year. Sometimes, that growth in terms of the second half of the year is largely influenced by the holiday seasons. And I mean seasons, because it's worldwide holidays. It's not just those here in the Western world that influences that. And we've seen that.

And so you're going to likely see the first half to be different than what we've seen in the second half of the year. Given the strength that we had in fiscal year 2017, that seasonality is still there. And given what we can see in terms of Q1, that seasonality will probably continue.

Joe Mayer {BIO 1470363 <GO>}

Okay. Great.

Then, one last question on the gaming topic -- the AMD competition -- this time last year, I feel like people were worried about AMD's Polaris, which turned out to be pretty much entry level. Platform did very well for them but is at an entry level. Now, we're talking about Vega challenging you more in the high end. At least, that's their aspiration. Can you talk about what you're hearing from customers. And just how we should think about market share?

Colette Kress {BIO 18297352 <GO>}

Sure.

We've been competing with AMD since the beginning of time. And as the other discrete market player there. We have a different way we go to market, though. We really have a different way that we actually approach that gamer. We look at it as, how do we surround the ecosystem around the gamer with GeForce Experience, additional features that you can enable for certain games, working with the overall software developers? We don't approach it as an OEM sale. We have a delightful partner channel that we work with to reach all of those different gamers.

So although AMD will continue down that same path on how they've gone to market, which just [ph] says let's talk about the performance, we've still also continued to out-beat performance. And I think that's what our gamers demand after us. They demand the best-of-breed. And that brand loyalty, I think, is there.

So we know how to compete against them. We have been competing them. We have heard that they might come out with Vega. They've been talking about it for a while. But I think we're well prepared. I think our 1080 Ti, being significantly better than even our 1080, which I had seen some comparisons of comparing Vega to 1080 -- I'm not sure we're following the same type of game, if they always know that we'll always having something better to come out with.

Joe Mayer {BIO 1470363 <GO>}

Okay.

Colette Kress {BIO 18297352 <GO>}

But I think the 1080 Ti, even already, is a great piece for us to launch with.

Joe Mayer {BIO 1470363 <GO>}

Okay. That's helpful.

And before I leave the graphics business, I did want to touch on the enterprise, the Pro Visualization business. You guys have talked about that as a GDP growth type of business. And yet it grew double digits last year. Can you talk about what drove that? And is there any possibility of optimization?

Colette Kress {BIO 18297352 <GO>}

Sure.

So Pro Visualization -- the same importance of using graphics in the enterprise is very key to many different types of businesses. And the importance of the mobility for them is very key for collaboration and for them to overall do their work.

So what we have seen is the mobile workforce, in terms of wanting that high-performance GPU in a thin-and light. And moving to form factors that allow them to take their work and do their work everywhere. So we have continued to move to higher-end GPUs in about as thin of a workstation that we can overall get. And that is coming through.

Secondly, you see the ability to render on the spot, the ability for them to render quickly, to smooth out that process and the timing with the high-end GPUs and leveraging the GPU to use the rendering. So they are taking advantage, again, of some of our highest-end GPUs. And that is becoming very successful in terms of the growth rate.

We're very, very pleased with the growth rate of Proviz -- a very mature, very well-established leadership position that we have. But we were able to grow at 11% this last year.

We'll continue to focus on the mobility. We'll continue to focus on enabling better and better rendering as we move forward. So those are going to be our options.

Joe Mayer {BIO 1470363 <GO>}

Okay. Great.

So shifting gears, I mean, the other, obviously exciting part of the story -- less divisive, I think -- it's one we're all excited about it -- is your datacenter-oriented business. You grew 144% last year. And it's up to 14% of sales amount [ph]. So it's starting to really move the needle. Can you give us an overview of that business. And maybe talk about how that splits out between the high-performance compute, the traditional part, the deep learning in businesses like GRID?

Colette Kress {BIO 18297352 <GO>}

Yes.

So the success in our datacenter business, we couldn't be more pleased. I know a lot of other folks in the datacenter business really talk about their growth rates. But when you leave Q4 with tripling, it's doing pretty good on that part. But it does enable many different businesses underneath it. So I think it would be good for us to understand all of those different pieces.

Yes, our high-performance computing business is in there. Our high-performance computing business has been with us for eight to 10 years. That is when we are solving mathematical computations using accelerated computing, areas where, sure, we can derive the overall formulas, we can move that to working in a parallel function and breaking that apart. But we know the answer. And using accelerated computing such as a GPU is very successful. That business is still growing quite nicely and is the core part and the starting point of our datacenter business.

But over the last couple of years, we've seen the evolution and the beginnings of AI. And primarily the use of deep learning training. That had started in one of our second businesses, which is deep learning with our overall hyperscales, where they are using deep learning training for applications and workloads that you and I use every day. Search commands, voice search commands, image detection, natural language processing, video encoding are some of those things that you see. So that business is definitely thriving and has been a great opportunity for us.

But thirdly, we have also seen the evolution that says -- how do you get to the enterprises? How do you move this AI and deep learning. And the computing capability of accelerated computing, using your GPU, to the enterprises?

In the past, maybe 10 or 15 years ago, your IT departments would go off and build that. What we're seeing is the build-out of cloud instances, cloud instances by our cloud service providers that are enabling GPU instances. And so that is also a key component of our datacenter business now, as many of those cloud service providers that you have seen continue to launch GPU instances.

Now, those GPU instances can be used for many things -- one, definitely for AI and deep learning training that the enterprises can get started, in terms of it's already set up. And things that they wouldn't do on-premise now that they can do in the cloud. Number two, you also have the ability to do virtualization in the cloud. You have the ability to put workstations, applications or PCs in your cloud and have that available in a virtualized scenario as well. Then, number three, just doing overall compute. If you want to do high-performance computing in the cloud, you also have that overall capability. So that's an area of our third business that was growing.

That then takes us to our overall GRID business. Our GRID business outside of just the cloud is also enterprises installing it in their on-premise businesses as well, in order to expand their overall workforce for collaboration and not be just tied to their overall workstation; be able to show that across the world.

Then, lastly, our DGX supercomputing AI -- we also have that as an ability for the enterprises for quick-start. We're talking about a fully contained AI supercomputer with eight GPUs, with an overall computing development platform, inclusive of all of the different frameworks that are out there for deep learning; and the abilities for enterprises to just plug it in and get started with what you see right now is the big excitement around AI.

So all of those five different businesses are in there. AI [ph] is probably the fastest-growing piece of that, definitely, in terms of our datacenter business.

Joe Mayer {BIO 1470363 <GO>}

Thank you for that. The deep learning piece in particular, I think, is pretty exciting, given the priority that the cloud companies are putting on deep learning, the things that it's enabling in terms of particularly visual data -- entirely new functions.

But I guess it's a hard business to size. And I know you've sort of resisted the temptation to put a cap on how big it can get. But how do you think about it? Are there multiple years of runway here? And should we think of it in terms of attach rates for traditional CPUs, or should we think of it as its own thing, supporting its own workloads?

Colette Kress {BIO 18297352 <GO>}

Yes. It's a good question. I think the challenge is not what I would refer to as a hesitation [ph]. I think it's more of a -- I think it's very difficult in the first couple years to take a dot and extrapolate it to a line. That's a hard problem to do, to say, when you're in the first couple innings, what we're seeing in terms of an AI market.

I think we truly believe that what we see in datacenter, what we see AI, is a new computing model that will be with us for decades as we move forward. And we are still just in the early stages. So it's hard.

Your second part of that question, though, says, where do you start? Do you do it as an attach rate to a CPU? Or is there another way that you could do in terms of a bottoms-up from a workload? And the answer is both. But there is some flaws in terms of both ways.

If you come from a tops-down approach and, say, a percentage of that will be -- if you're off a single digit, it can be half a billion dollars here and there. So it's not necessarily overly accurate at the stage that we're seeing. Again, as we get a little bit farther, I think that would be a little bit easier.

But I think it's important to look at the types of workloads that are very interested. And/or the types of industries that are very interested. Probably one of the key things that is surrounding anything that we're doing is data, following the data. Where is there a significant amount of data that is either structured and/or is

unstructured, that could be leveraged to be more powerful and useful to the end user, if you could apply the ability of deep learning training, which essentially just says let the computer write the program to understand that overall information?

Those areas that we're seeing in rise [ph] from all of the different applications that we talked about at the hyperscales. But you can also see other industries where a large amount of data -- finance, automotive -- you can see it also in high-end retailers that are trying to process the amount of information, whether that be inventory or the buying patterns to use that in terms of an AI manner.

So I think we're just going to see continuation of workloads expand and industries expand. It's just too far to determine how fast or which ones will move forward.

But our focus has been endorsing and working with all of the different types of frameworks for deep learning that are out there, knowing which ones are the most popular, knowing which ones are being trended towards certain workloads. And making sure that we can empower that with additional code, additional libraries, self-starting capabilities; so that we can get AI everywhere. And that's our approach.

Joe Mayer {BIO 1470363 <GO>}

Great.

And thinking about this from the standpoint of kind of training, building the neural network versus inference; deploying and using that in more of a real-time environment -- it seems very clear that you guys are dominating at least the early stages of training, both through instruction set, the CUDA instruction set is sort of a de facto way of solving these problems. You also have the best graphics engine, which certainly helps.

As you think about inference, do those natural advantages in training work their way into the inference market? And what's the status of kind of going up to specialty? Today, I think all that inference is happening on a CPU. Even Intel is saying there's going to be a lot of specialty silicon used for inference applications. What's the GPU prospects in that space?

Colette Kress {BIO 18297352 <GO>}

Yes. It's a really good question. Inference is not new, something that's been out there for a while. And you're right, it's been dominated by CPU or could be anything from a custom ASIC. But given the complexity of what that inference could be, you're right, there's definitely an opportunity for GPU, with its work that it's done for training, to also be definitely capable in terms of the inference phase [ph].

Our GPU today essentially is a really, really large, capable custom ASIC in that case, that can do a lot of different jobs at the same time in one complete architecture together. We've built it for that purpose, because that is our core competency --

pushing out high-end very capable custom ASIC is something that we're very good at and will continue to do.

As we move forward, we'll move to where the high-end inference is going to be necessary for GPU. Things that need voice command, things that need that voice processing, is a prime example where a GPU may be very, very well suited for the inference.

So it's a vast and wide market. And there's going to be many different types of inferencing solutions in terms of there. But a single-function low-end microprocessor is probably not where we're going to be focusing on. We'll focus in terms of where the high end is necessary.

Joe Mayer {BIO 1470363 <GO>}

Okay. Great.

So I have one more datacenter question. And then I'll open to the audience. Then, if we don't have questions, I'll move into autos and financial stuff.

You talked about DGX getting into a corporate environment. We've actually heard our IT department working on GPU-related training projects. So it's happened kind of faster than I would've thought, that you're sort of at least getting awareness in the enterprise environment. Can you talk a little bit about that? And what are the things you have to do differently when you're selling to an enterprise versus selling to hyperscale?

Colette Kress {BIO 18297352 <GO>}

Yes. I think it's a good question.

Yes. The finance industry is very, very excited about the ability to work with DGXs and get started quite quickly. Very sophisticated IT department. But it's a fast-starting capability. Because it's essentially a containerized ability to start overall AI.

Moving faster than we expected? No. We just actually believed this is the way that the enterprises would likely go to market and get excited about AI.

So what we had to do to prepare for that is our knowledge, our deep learning, our knowledge of deep learning training and those frameworks. And put that into a box that was essentially agnostic to whatever framework you wanted to do, is where we concentrated on. And we're continuing to evolve that and even make it better and better. But it allows them that quick start, by us taking on that part of that middleware that they don't have to worry about. They can now worry about the application letter (inaudible) they can worry about the data. And bring that in, too. Because we've already started a significant amount of that work.

But it also took us enabling working with those enterprises. Yes. We have relationships from the high-performance computing. But there's a different type of market and different types of users.

You've seen us in terms of our expansion of our sales force, our sales enabling. And working with all of those different enterprises. You've seen them, quite globally, reaching out and spreading that word.

Additionally, we have many different programs to continue to train enterprises on how to do deep learning. We call it Deep Learning Institute. And the amount of training hours, where people are like -- I just want to learn, how does deep learning work -- and us using those training hours to teach enterprises how to do it.

Additionally, sure, the enterprises have the means to go off and purchase these high-end systems. But we are also working with startups. There are many, many different AI startups, with what we're doing with an inception program, that allows them a fresh start, with both helping on the cache side or on the hardware side, for them to go get started in terms of those businesses.

So these are some of the things that we have done to continue to spread. It's not just about building a piece of hardware. There's a significant amount of software, there's a significant amount of socialization and training that we continue to do at the enterprises.

Joe Mayer {BIO 1470363 <GO>}

Yes, I took your CUDA for Dummies class at the Developers Conference in Amsterdam. It was actually surprisingly easy to pick up. So I'd say --

Colette Kress {BIO 18297352 <GO>}

It was probably one of the biggest sold-out parts, other than the drink line (multiple speakers).

Joe Mayer {BIO 1470363 <GO>}

So let me stop there and see if we have questions from the audience.

Unidentified Participant

Maybe you could just comment on inventory a little bit. I know there's elevated levels on your balance sheet. Can you also comment how inventory sits at your gaming partners. So the AIB [ph] guys like MSI, Gigabyte, Colorful, Pallet [ph]? How does that compare to last year? And how happy were you with that inventory level?

Colette Kress {BIO 18297352 <GO>}

Sure.

So our inventory levels take part of all of our different architectures across all of our different businesses. Keep in mind most of our gaming inventory is related to our Pascal architecture. And probably something about what we just launched in terms of last night, in terms of our overall inventory getting ready, in terms of for that launch and those pieces.

Keep in mind, in most of our gaming businesses, we are working on supplying the overall chip to our adding card partners. But we also do a significant amount of kitting, where we actually kit the overall memory together with that. And that's part of our practice. But a good part of our overall inventory is associated with a lot of our high-end platforms as well.

What is unique and different about our other markets outside of gaming is, in the case of our Quadro workstations, as well as in our datacenter, we are selling multiple years of our architecture. We are selling couplers. We are selling Maxwells. And we are selling Pascals. So that is unique to the enterprise versus what you see normally on the gaming.

So we are always keeping all of those different things. Because we have to assure that they have the capabilities to lock into an infrastructure that they have done and continue to add onto those.

So our overall inventory really represents what we see in terms of our future sales, as well as what we think we need in terms of supporting all of those different architectures.

Questions And Answers

Q - Unidentified Participant

And in terms of the inventory at your customers? Seems to be a recurring fear that there's too much?

A - Colette Kress {BIO 18297352 <GO>}

Our customers would be our gamers. So I think (multiple speakers) but if we talked about in terms of the channel colors, we have a good ability to see that worldwide. We have very good market share. And we have a very, very healthy channel relationship with it individually in those partners.

It is consistent with both the timing of the year, the timing around the different holidays that we had. And the timing in terms of what we had in terms of new architectures. So we're comfortable with the overall channel levels that we have.

A - Joe Mayer {BIO 1470363 <GO>}

Any other questions from the audience?

Q - Unidentified Participant

Thank you.

Some of the large datacenter companies, companies that have datacenters -- like Google, Facebook, Microsoft -- are rumored to be working on their own deep learning chips, particularly Google. When that happens, how will that have effects on your own business?

A - Colette Kress {BIO 18297352 <GO>}

Yes. So it wouldn't surprise anybody that one would look to say, is this something that we want to purchase, is this something that we could actually build ourselves?

There are always going to be pros and cons in terms of that. And there's not all the same types of solutions out there. A lot of them have approach that says -- do I want to build a custom ASIC for some of my pieces of inference or pieces of machine learning? Now, that's a different statement than -- do I want to build a complete custom ASIC for deep learning training? Because that's a much, much harder, bigger challenge to go off and do.

Keep in mind, the Company is very agile, such that we're generally coming out and launching something quite often. And we're going to keep you quite on your toes in terms of our capability to move that quite fast. So sometimes, the same time that they may process overnight, that they think they want to come out with something custom, we may be in market the next day with something. And that's got to be something that they overall balance.

There's a lot of different ways to solve some of those inference problems, solve some of the machine learnings or some of the more simpler types of data problems, versus the capability in the performance that you have with the GPU is really, really hard to substitute that. Because you do destroy a significant amount of that value in the gain that you got in terms of time and TCO, by leveraging an overall GPU.

So it won't surprise us. But it's not going to necessarily change what we believe is a very vast market and a very large market that a GPU will be here. And there may also be instances where a custom ASIC may be there as well.

Q - Unidentified Participant

Can you sort of compare and contrast what you see from hyperscale relative to traditional enterprise? Is this something that is particular relevant for hyperscale customers but maybe not so much relevant for the traditional enterprise? So what are you seeing there?

A - Colette Kress {BIO 18297352 <GO>}

Yes. I mean, it's a good question that says -- would an enterprise look at building something their own? That's going to be challenging, because you're looking for that talent to actually build that. It's actually not a short process. Keep in mind, when you think about NVIDIA and what we have, we have thousands and thousands of developers whose only focus is a GPU. That's all they do for a living. That's all they've done their entire careers. So we probably have the largest workforce associated with building out that design than anything else in the world.

So I don't think we see that as being a large thing of what enterprises would do. Because we're already seeing right now that fulfilling it with a DGX, which is a container type approach. And/or leveraging the cloud, is meeting a significant amount of the current demand and where they want to go. It's not necessarily where the AIs have approached their overall IT. It's still early to say where that will be. But I think you're correct that if you have the means, if you can get that talent, if you can justify the overall time to market, your ability to outperform something that would be commercially available from us, that might be something that you might look at. But it still may not meet the exact needs of what the high-end GPUs are doing right now.

A - Joe Mayer {BIO 1470363 <GO>}

Time for one more quick one.

Q - Unidentified Participant

Quick question on -- so basically, is it the barrier to further increase processing power is the bandwidth to memory? So can you talk about, is there something that NVIDIA looking to do in the next couple of years to further improve that? And also, can you comment quickly on the longer term, like three; or five-year outlook, on both gaming and datacenter demand for GPUs? Thanks.

A - Colette Kress {BIO 18297352 <GO>}

(multiple speakers). The last half -- I'm sorry -- of your question was on the gaming and datacenter --

Q - Unidentified Participant

And datacenter demand for GPU, that CAGR and [ph] mix through five-year. Anything --

A - Colette Kress {BIO 18297352 <GO>}

So long-term growth rate?

Q - Unidentified Participant

Long-term growth rate.

A - Colette Kress {BIO 18297352 <GO>}

Sure. We could just go [ph], just hit long terms of that one.

Let me take the first part of your question first in terms of memory. It's essentially a question about scale out or scale up. And depending on your workload, both of those are going to matter, in terms of do I put together more, or do I just want to get the overall scale to go consistently on the memory. There's always continued work that we are doing in terms of the architecture, both with the overall bus and express between the memory and the overall GPU, as well as more of what we can do in terms of just the core architecture of the hardware chip.

Right now, it has not been a challenge in terms of the memory. But we'll continue to work on that. In many workloads, it's not even close an issue, because of where they see the overall needs.

So the long term, in terms of gaming and datacenter -- if I had my little crystal ball, it would be a lovely piece. But it's hard to say. Again, these businesses are very healthy. The drivers that influenced us last year are still here. They didn't go away when we changed the clock and moved to 2017. What that overall growth rate and the speed of that growth is just really hard for us to say.

A - Joe Mayer {BIO 1470363 <GO>}

Colette, thank you very much, it's very helpful.