

# Deutsche Bank Technology, Media & Telecom Conference

## Company Participants

- Jason Zander, Executive Vice President, Microsoft Azure

## Other Participants

- Karl Keirstead, Analyst, Deutsche Bank

## Presentation

### Karl Keirstead {BIO 1542979 <GO>}

Okay, good morning, everybody. Thanks for attending DB's Annual Tech Conference. Great seeing a lot of people that I know well here, so thanks for coming. I hope you guys have a fantastic two days. One of the highlights for me is, I think, we've got a pretty amazing keynote line-up. So, it starts now with Jason Zander, the head of -- the EVP of Microsoft who heads up Azure, a pretty special keynote to have. But in addition to Jason, we've got the CEO of VMware. We've got the head of Salesforce's service cloud, just a fantastic line-up.

Let's start it now with Microsoft, and maybe Jason, do you want to give a quick minute on your history at Microsoft? I think you've been at the firm for a couple years, right?

### Jason Zander {BIO 20468487 <GO>}

Just a couple, yeah. Thank you for having me. I'm pleased to be here. Jason Zander, EVP for Azure. I run all of our product work that we've got. Obviously, Azure, I think you're very familiar with that, is our public cloud offering. We build it of course worldwide. We support our own products, Office 365, Xbox Live, et cetera, and of course make it available to customers. Great growth on that.

I've actually been with Microsoft since 1992. When I joined, we were still selling DOS 4, and Windows 3 was new, if you remember that. So, it's been a little while. With the team along the way, I was one of the engineers that created the .NET framework. I ran the flagship Visual Studio developer tool products, and stuff like that, and I moved over to the Azure team in 2012 to go work for Satya Nadella, who was the EVP of the division at the time.

And at this point, my team does everything from datacenters to all the software involved, plus silicon all the way out to crazy stuff like quantum computing. So, it's kind of a dream job for a systems engineer in the middle of a big inflection point, so lots of fun.

**Karl Keirstead** {BIO 1542979 <GO>}

We -- I know, you can't comment on the size of Azure, but we've put it at about \$13 billion, and you do disclose the growth rate, 68% in constant currency. So, that is seriously almost unheard of to have a business at that scale growing at 68%. You must have the funnest job out there.

**Jason Zander** {BIO 20468487 <GO>}

It's huge fun. So as you mentioned, 68% growth on constant currency, and it's just really exciting. I mean, the fun thing for me, of course, is we're working with a lot of companies on their digital transformation. We have industries that are shifting as we speak. They're looking for trusted tech provider, so just an awesome opportunity both to build that technology base but be a trusted partner. So, the innovation agenda, some of the really cool stuff in industry, it's a significant amount of fun.

**Karl Keirstead** {BIO 1542979 <GO>}

Yeah, well, I'm having fun watching your progress. So, I think everybody here in the audience has been on this theme probably for about four years. We have. It feels like that was about when Azure was starting to get its sea legs. And in 2015 was when AWS first -- or Amazon first reported AWS numbers, and that was kind of a shock to the street to start paying attention to this theme.

So, I think over the span of four years, everybody's been monitoring it pretty carefully, but we don't have the degree of visibility you do to sort of some of the underlying trends. So maybe I'll start by asking if you were to look at the last, boy, six months or so, what couple of shifts are occurring. What changes are occurring in the cloud infrastructure market that are most significant to you that you'd flag for the Group here today?

**Jason Zander** {BIO 20468487 <GO>}

Yeah, I think we definitely continue to benefit from IT spending. We're definitely continuing to see that, as companies want to accomplish two things, really. One of them is to become much more agile in delivery to the business, and that's just important, especially as entire industries start to shift and their expectations change. And of course, they're doing that on a tighter budget, as well, so they do need to save money.

And so, obviously the value that we have in the cloud is this kind of hyperscale capabilities that we've got, allows you to run those workloads. I can run them at a far cheaper benefit. I can actually start having the cloud do task that I'm otherwise paying my own personnel to do. That actually frees them up and that budget, you can apply it towards the innovation agenda. So, we're definitely benefiting from that continued growth that comes through with that.

I think you're also seeing us land quite a number of very large kind of mega deals. You've seen us do the announcements, Fortune -- top Fortune 50 companies that, again, are looking at Microsoft as their trusted partner to be able to carry forward their innovation agenda, as well. And so, those things are driving obviously a lot of that growth that you're seeing, and that's on a worldwide basis.

**Karl Keirstead** {BIO 1542979 <GO>}

Satya said, I think in response to a question on a recent call, that after that big AT&T deal, just on the subject of these chunky deals, that he's got sort of line of sight to more of them. So, I think the ones that Microsoft has talked about is you're public with AT&T. I think Chevron, Walmart, Walgreens are couple of the other big ones.

But do you want to just address that, because it feels like that's a big change, where in the last six months to nine months, we're seeing not \$50 million, \$100 million deals drop, but we're seeing like \$0.5 billion to \$1 billion multi-deals drop? And you know, is there any unique catalyst for those big deals starting to happen, because it's a clear shift in the last quarter or two?

**Jason Zander** {BIO 20468487 <GO>}

Absolutely. I think you're starting to see us deployed for this type of technology, increasingly in Tier 1 workloads, the things that are the most core to a business. Obviously, we do do a significant amount of work when it comes to like the back office, you know, IT and other work like that, as well. But if you look at these kind of Tier 1 workloads, they run the business itself.

So generally, when you see those very large deals, you're seeing us also integrate and supply technology and partner very deeply with that. You mentioned a few that are great, AT&T, Walmart, Chevron are great examples of that. Now, for those cases, what you can look at is the technology that we're bringing to bear, like I said. It's more than just what we would traditionally have done, which would have been an operating system, like Windows Server, SQL Server, Exchange, things like that.

Those are for, again, running your back office. And of course, we have all of that. That's actually an exciting growth area, as well. But when you start seeing the much larger deals, you're seeing a more strategic integration of our technology capabilities and skill sets going along with these partners, which they're world-class in their space, as well. And if you put those two things together, that's super important.

And I think if you look at the transition in a lot of industries, it is interesting such that the hiring for software engineers has continued to grow rapidly, and it's not just ISPs like us. It's automotive companies, it's Fin sector, it's basically healthcare. All these folks are hiring more and more engineers as the technology becomes more and more a core part of their business. So again, I think you need that kind of structural advantage of the cloud and the edge. And then, frankly, in some cases, you might

actually wind up competing against the cloud vendor, in which case having a hyperscale cloud vendor like us to partner with, it's a necessity.

**Karl Keirstead** {BIO 1542979 <GO>}

Yeah. Jason, you talked a little bit about these big deals beginning a trend where you're hosting Tier 1 workloads. So this notion of workload type on Azure is a hard one for us on the outside to see. We can sit down with your customers and ask them what kind of workloads you're running on Azure, but the aggregate picture is tough to get at.

So maybe I can ask you for a little bit of color from a few other ways, maybe sort of traditional or raw computer storage-type of workload versus let's say premium. What portion of Azure might be a migration of existing or legacy workloads versus net new? Is there any other cut that you can give us to help us figure out what kind of workloads are running in Azure today?

**Jason Zander** {BIO 20468487 <GO>}

Yes. And if you look at the customer journeys around this, there are some interesting things. We do have some born-in-the-cloud companies. I think one of the best ones early on that we had is Jet.com, which of course was acquired by Walmart, who eventually also became a partner with us. So, we have some born-in-the-cloud startups that just go straight to that.

However, if you look at the bulk of our business, it is highly focused around a lot of the work we do with enterprises. And those circumstances, as you mention, they've got existing workloads. They have been running them in their own datacenters or leased datacenters for a long time. They want to have a better position on their CapEx, and again, they want the agility associated with that. So, it's very frequent that we'll start off by doing some level of migration. How do I take the existing workloads, get them into the cloud? But I get more efficiency. I can run it more cheaply. I can, again, get the agility in there.

And then, we move into the innovation. I actually think that Chevron is a top Fortune 50 company, fantastic partner, very forward-leaning company, and we started the same way. We did essentially kind of your enterprise control plane, the software agility so that their engineers could move quicker, but -- and to start off, just a few workloads. And then, all of a sudden, three became hundreds, and just the hockey stick just kicked in.

And then, once we got there, we started doing more innovation, to the point where we're doing IoT for upstream oil and gas expiration, looking at seismic and other things, as well. So again, moving beyond kind of like your SAP portfolio and a bunch of those things, which were the first round, into this kind of innovation side. So, that's an awesome journey, and the cool thing is we actually did it together along the way. So, the teams and the companies both came along for that ride.

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**Karl Keirstead** {BIO 1542979 <GO>}

Yeah. And Jason, I'm sure this happens, but when we talked to some large Fortune 100 customers, we do pick up anecdotes of friction as they're attempting to migrate existing workloads into Azure, or AWS, or Google Cloud. So can you comment on that migration pace? Does it feel like it's happening as fast as you expected, slower because of friction points? And what kind of things can Microsoft do to the extent that customers are quote stuck to get them unstuck?

**Jason Zander** {BIO 20468487 <GO>}

Right. And this is another one where, oftentimes, it really depend upon where the company is. And what I mean by that, for example, is if they are a leveraging partner, so I have, for example, in SI motion. I've got a partner who's doing most of the work. We've been training the partners for years. They really do know how to make the workloads go. They can get the migration done quickly. They know how to run it. So if that's your mode, you can actually move very quickly.

But what I am finding is that a lot of companies are using this move as an inflection point. So in some cases, I want to do a little bit of clean up. Maybe my portfolio is made up of a bunch of M&A activity. Maybe I've been waiting for a while to figure out how to do some work. So I'm actually factoring that into the process, which isn't really about migration, but it is around how do I actually get the right kind of trajectory.

And then, the other one that's actually interesting is, and this was the case with Chevron, there's a lot of companies that also want to work on the skilling for their own personnel. And so, like, you could come in and have a partner or Microsoft help you move stuff very quickly, but if the personnel that you have, have not yet come up to speed on how cloud operates, they can't take full advantage of it. And so, in some cases, you actually want to work with them along the way, such that they become cloud-skilled and they know how to move fast. And now, I can actually move very quickly.

And so, what I think I'm seeing is a lot of companies that are usually on one of those kind of playbooks. And so the speed can vary, but it's not always because of the technology or the friction, or things around that, but it's around what are the goals for the firm, what am I trying to do with my people, what am I trying to do with my overall portfolio.

But once -- I can tell you, once you start opening the gates on this stuff, man, it's a hockey stick. The floodgates just open. When the first few workloads go, and you've got people that are trained and they know how to do it, all of a sudden, they're kind of like, why isn't the rest of the stuff running here? And we see the usages start to spike.

**Karl Keirstead** {BIO 1542979 <GO>}

So maybe just a little bit further on this migration pace because everybody, and this was affecting talks certainly yesterday, and the last few weeks, they're worried about things like slowing economic growth, or recession, et cetera. Azure has never been through a period of slow economic growth because you really started to scale more recently, it wasn't a material business back on '08 or on '09. So it's hard for us from the outside to judge how recession-proof Azure would be.

On the one hand, it's a source of cost savings and agility. You would think that if companies were entering a tougher economic time, it could accelerate.

On the other hand, to the extent that there are costs associated with re-engineering workloads that could hold companies back, it's hard for you to pontificate because you don't have a case study of Azure going through this. But maybe you can be helpful because maybe some industries or companies that Azure serves have stumbled. And I'm curious how their reaction has been in terms of their migration activity? Any stories to tell that might help us with this question?

**Jason Zander** {BIO 20468487 <GO>}

Well, one of the things, I would look at is, of course, as you point out, every industry has cycles and they're not always around the macro kind of recession sort of environment. When you have downturns in particular areas, we can take oil and gas, we can take all sorts of segments that have this. Those industries, when they hit that, oftentimes, it really does come back to that cost saving thing which you're looking at, because oftentimes, now you're starting to evaluate your CapEx. You're starting to figure out, gosh, do I really need to -- like, I have to renew a lease that's coming up. Do I really want to go? And those are very, very expensive. Do I want to do that, or do I want to actually reposition us to go save money? And so, being able to change how your balance sheet gets laid out when those things occur is actually important.

And then, it really comes down to the partnership like, what's our role? What's our partner ecosystem's role on how to be able to help make sure that someone can realize that? At the end of the day, if you're going to be more agile, and if I'm going to save money on the run rate, then what I've seen, by and large, is companies are actually quite interested in still making those moves. You have to be in a really bad spot otherwise. That actually helps. And of course, we have also been doing services for over a decade. Office 365, originally back to the first version of BPOS that we had way back, and it's like 15 years ago. And so, we have actually run services in this kind of business model for actually quite a while.

**Karl Keirstead** {BIO 1542979 <GO>}

That's true. Some of the other things that Microsoft can do, I guess, to accelerate migration activity, you're doing in terms of partnerships with vendors that other vendors that are important parts of their stacks. So to the extent that firms are sort of wedded to VMware technology. You've signed a partnership with VMware to make it easier to port. You've introduced Azure Stack to create a similar environment on-premise.

What the kinds of things Microsoft can do like that to accelerate growth? I suppose what you're also doing is making it easier and potentially cheaper to migrate existing SQL Server, Windows Server on-prem workloads into Azure. That's probably an important one. Do you want to highlight a couple of those things that you're doing?

**Jason Zander** {BIO 20468487 <GO>}

Yes, absolutely, and you mention a bunch of good ones. And let me split two apart, just to make sure I frame it correctly. I think Pat might be your next guest, which we've been partnering with very well. So, let's take VMware first, if that's okay, we'll come back to some of the others. In that particular case, our goal with VMware is more of a hybrid operating environment with us and VMware also as a first class. So, it isn't about migration. So for example, it's not like can we take VMware and just migrate instances off. That is not our goal.

Our goal instead is to partner with VMware and say, hey, your existing your stay, you've got all these people, personnel, assets that are trained up on VMware, and let's go partner together, because the benefits to our mutual customers are greater for both of us by the time we're there. So, it's a first-class VMware solution that's there, a huge kind of response that we've got from that, which is amazing, which means you can use the benefits of VMware and the access to the technology and relationship with VMware, as well as with Azure, and you get the better together kind of solution there. Now, I can't enable this hybrid solution.

There are other cases where it really is people wanting to migrate workloads. SAP is a fantastic one. We've got an amazing relationship with SAP and really great momentum. I mean, we've done really, really well with that. When we logged onto SAPPHIRE and it's showing off all the cool things over there, lots of case studies -- Coca-Cola, and a bunch of others like Fortune 50s that are out there.

Now, that's an example where the software you may have been running it on-premises and being able to run it, we've seen people get over 100% ROI on it. They've been able to reduce their cycle times by 40%. I mean, you just, like, the cloud just lends itself incredibly well to that. So that's the case where migrating the workload fully makes a ton of sense. And then, we'll have the hybrid scenarios where they integrate together.

**Karl Keirstead** {BIO 1542979 <GO>}

What about the version 2008 cycle? So, one interesting thing that everybody's aware of is that those -- just went end-of-life or about to go end-of-life. So, if you're a large enterprise and you're facing a decision about whether to upgrade your SQL Server database or Windows Server instance, you can either keep it on-prem and upgrade it to the latest version, or maybe -- and this is the spirit of the question -- this is a catalyst, actually, to get you thinking about Azure instead of a version upgrade. So can you talk a little bit about what you're seeing on those kinds of upgrade decisions, and sort of, I don't know, you probably can't give us an exact number, but what portion of them results in customers just saying, let's go to Azure?

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**Jason Zander** {BIO 20468487 <GO>}

Yeah. There's a huge interest in this. As you point out, so end of service, the 2008 R2, and the first thing I would tell you, I actually own SQL Server. I own Windows Server. They are actually part of my team, part of product portfolio that we've got. And guess what? I run the Azure cloud on top of that same technology. We are the best place to run that Microsoft IT. So, Azure's an awesome place to go. So if you're going to consider the cloud, it makes a lot of sense.

From a decision making perspective from IT, it's a couple different things. One, I know I need to make the move because, right, end of service, and it's been a while. I need to upgrade my workloads. And the question that I often get is like how do I get to a point where I'm not having to do this every couple of years, because if I don't move too far ahead, then I'm going to be once again coming back. And I'm having to do the upgrades and having to apply my own personnel in order to actually do the work. How do I get to a better state?

And so, the cool thing about the way we have set this up is with our hybrid benefits. First of all, moving to Azure is about five times cheaper than actually running these same two workloads, Windows Server, SQL Server, on top of AWS. It's much more financially viable to be able to do that. So licensing is great. You don't have to repurchase your IT. I get that kind of flexibility that's there. That's what the hybrid use benefits are for.

At the same time, I can also move to an evergreen state, which basically says, hey, the difference in the cloud is that, with these managed instances, we can actually keep you up to date on the latest version of the database. And by the way, a lot of things that you're having to hire people to do, like your backup and your maintenance, and stuff like that, the service in the cloud just does that for you.

So, you're going to get cheaper economics for the cloud move. You're going to get a more efficient system that keeps you there. And this evergreen state, all of a sudden, I'm not having to worry about this, and I can take the savings that I get and I've never seen an IT department that didn't have work that they had to punt and push out on the backlog. You can apply those resources onto that. Now, I can actually move forward.

So, those are the benefits and this is playing out very, very hard right now. And I think Microsoft and the fact that it is our IP, we've built a cloud around it and on top of it, it's an awesome place to go. It's financially viable, and I think it's actually great from a run rate and the maintenance perspective for the teams. I mean, that's what's most appealing.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay. Can we talk a little bit about the competitive environment, Jason?



**Jason Zander** {BIO 20468487 <GO>}

Certainly.

**Karl Keirstead** {BIO 1542979 <GO>}

Because my imagine is -- I imagine that it's very rare that, on these big Chevron, AT&T, Walmart deals, that many of them are sole sourced. They probably have AWS or Google at the table, if anything, keeping you honest. Can you talk a little bit about what you're seeing around the competitive environment versus Amazon and Google, and if it does seem to be swinging your way, why that is?

**Jason Zander** {BIO 20468487 <GO>}

Yeah. And again, if I go back and look at our growth, 68% growth on constant currency -- basically constant currency for Q4, and again, these big deals. So, we're seeing that growth when we get into these competitive environments.

Two different dimensions on this one. One, there is the product work. We have excellent differentiation. The hybrid work that we talked about, the work we've done at the edge. Azure IoT, awesome example. We're doing 6 trillion message a day on IoT, over 70 industrial customers that are out there. It's amazing. Data and analytics, we've got Spark. We are the only ones with a first party Azure database solution. These guys invented Spark. So all of that kind of tech, those are things you can only get on Azure, which means that we have this product differentiation.

If you then look again more broadly, we're able to do one other thing, which is we have decades worth of DNA, especially for enterprises and how to go run all these businesses. You're probably already one of our customers, which means we can help you with that journey. And by the way, you're quite likely to be using Office 365, as well. You probably have your identity systems in Active Directory, which means you have all these just nice network effects of how the system lines up even better. So even outside of Azure, there's the broader Microsoft Cloud with O365, Dynamics 365. All these things help you propel.

One last thing on the competitive environment. In a lot of these cases, we're also seeing a lot more interest because I'm not in your business. To me, it's weird that you would, on one hand, go pay a vendor to go help you with the cloud; and on the other hand, they would turn around and compete with you. And that is generating a lot of questions. You talk about multiple people at the table. In some cases, it's like we might be talking to multiple people, but there's one that's not going to be here, right?

And it's going to have to be that case because why would I go pump my money, it's a weird boardroom conversation. Yeah, I spent hundreds of millions of dollars on this vendor, and yeah, they are number one competitor, going forward, like we're just not going to do that, in which case there is this kind of opportunity for us to come in, again, as a trusted vendor that you probably have been working with for, again,

probably 20 years or more, with all the technology, with all the investments. We spent all the CapEx. And if you want at some point to be able to compete with another stack that has all the same investments, and more, you're going to need to have those same assets, which means we can partner very deeply.

**Karl Keirstead** {BIO 1542979 <GO>}

So that vertical focus, you think, is net favorable to Microsoft? In other words, you're probably going to do relatively well on the retail environment?

**Jason Zander** {BIO 20468487 <GO>}

Very well in the retail environment.

For obvious reasons, but on the other hand, (Multiple Speakers) a lot of tech companies that are rivals to Microsoft might favor AWS. So, you think the net of those is favorable to Microsoft, by the sounds of it.

I think, from a net perspective, yes. Especially as you start seeing the appetite for cloud companies start to expand into other industries, right? And so, you mention one, which is obvious, but there are others, and it's kind of like at some point, you have to start doing the calculus and asking yourself, where does this end, and who am I competing with, maybe not this year, but maybe in five years. And it's kind of amazing to see what that looks like. You need to have someone that can actually help you with that. And I think that's where we come in, and we're seeing that great momentum is one of the examples for that.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay. I'm sure, on these chunky deals, the degree of price competition can be severe. One thing that we've all worried about for four years is that, when you get three vendors duking it out for deals that, once they land on your infrastructure, might be there for a while. The incentives to price discount is huge. What are your observations about the degree of price discounting out there? Maybe you could offer a comment as to whether you're seeing a little bit more aggressive behavior from Amazon or Google.

**Jason Zander** {BIO 20468487 <GO>}

Sure. Yeah, and what I've seen in this case, of course, some of the early conversations since I've been on Azure since 2012, a lot of the earlier ones were, like, I don't think you guys can run this cloud that cheap, I don't think you can do, whatever, whatever, whatever. And it's really shifted significantly. As you point out, over the last four years as we've seen the growth, it's generally not a question of, if cloud, it's really like when and how should I approach it. That's been more the way that it's worked.

And I mention that because, in a lot of ways, that cost conversation went away reasonably early on because, A, when you're making these decisions, you're actually

landing in the cloud where it's already a lot cheaper to go run in your environment. And so, the first comparison to start off with is not even how are the cloud vendors duking it out, but also like, well, what's the cost between what I'm already doing and what I need to be doing. So I'm already going to wind up saving money.

And then, in your particular case, as you look at this, as you mentioned, like you've got now big, hyperscale vendors, really competing and going at it. Well, one of the things we're also betting on is that we're investing very heavily in our innovation around how do I continue to work on margin, how do I continue to work on my costs, how do I get more and more efficiency. We're very relentless at doing that work.

And so, in this space, I also think in infrastructure, but there's absolutely opportunity in the strong business that's there. And so, when you buy millions of things at a time, you can afford to make that in a good kind of positive business structured way. And then, over time, there's also the move with mix shift. You're going to see a little bit more of the premium services. So we're just, right now, talking about compute, networking and storage, which are the basic intrinsics.

But if you start thinking about it, our data and analytics stack, also very differentiated. The AI and machine learning pieces that come along on top of that. Then, you start getting up into, like, the Power application, Power Platform, et cetera, where I start doing business automation, et cetera. Those are cases where you're going to see some of that premium mix shift continue to kick in, and that also contributes to the overall numbers that we've got.

And if you look at, broadly, our business, we had 24% growth on constant currency for the overall commercial cloud of business, which is a more broad, beyond just the Azure growth of 68%. That just demonstrates like the overall business is there, and again, keep in mind, from a hybrid perspective on both cloud and I'm on-premises, we've got both products, we allow you to handle both. It's a little bit of why we report the way we do.

**Karl Keirstead** {BIO 1542979 <GO>}

Got it. So it does feel like a three-horse race, and there were some vendors, IBM, Cisco, HP, who tried, and IBM's still there, obviously, but some have backed off. But there is a fourth. Oracle's knocking on the door and wants to be part of the party. When you're bidding for these large deals, Jason, how often are you seeing Oracle at the table considered as an alternative?

**Jason Zander** {BIO 20468487 <GO>}

Generally, what I've seen is when you go to the hyperscale cloud, there's a significant amount of infrastructure work that you need. And so, typically our competition is often a Seattle competition. It's a northwest cloudy city kind of competition, often.

From an Oracle perspective, we did announce our partnership with Oracle, which we're happy with. We've got additional things coming up, so you see that great

combination. Obviously, a lot of Fortune 100 firms heavily bet on Oracle. They've got great solutions there that they're trying to go run on top of, and of course, that's why we want that partnership with Oracle to make that go.

When I think of the worldwide footprint, and a lot of the companies we deal with, they want to be everywhere. I just announced another region in Switzerland last week. We did a new region in Germany. That brings up to 56 regions worldwide, so that kind of global coverage, that kind of completeness of that portfolio, that's where I see people most interested in what that future looks like. And then, again, we have our agreement with Oracle and I think we've got a lot of interest in the partnership there, as well.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay. Jason, in response to my question around the pricing environment, one thing you mentioned is the Microsoft confined internal datacenter efficiencies that could offset any unit pricing decline. So can we hit on that a little bit, because that's a hot subject for this group, many of which are invested in some of your suppliers.

And so, Microsoft is in a very unique position these days that you weren't in five years ago where a lot of the buying activity for the whole datacenter supply chain is now aggregated, and a couple of companies in cloudy Northwest parts of the country. So, you've got amazing purchasing power. And so, everybody watches your CapEx now, like they weren't five years ago.

So can we talk a little bit about that, because it was just recently a quarter or two ago when several of your suppliers, Intel being one, but there were many, were seeing some demand pressure and they were claiming that the quote hyperscales -- hyperscaler buyers were holding back on investments, and that led to some consternation where we had to figure out, if that's true, is that because you're anticipating slower Azure growth, or is it because you're finding replacement technology? Are you finding efficiency improvements? Now that I've got you on stage and I can ask you, can you explain why some of your suppliers were pointing at the big cloud vendors, suggesting that you were slowing purchasing? Why would that have happened?

**Jason Zander** {BIO 20468487 <GO>}

Yeah. Well, I mean -- and I would start off, again, just by framing growth. I mean, so I think the growth speaks for itself. So we're (Multiple Speakers) obviously feel like it was a growth. So from my perspective, yeah, I'm still spending CapEx. And it's like we've guided that we're going to continue to spend CapEx.

**Karl Keirstead** {BIO 1542979 <GO>}

Over \$5 billion this coming quarter.

**Jason Zander** {BIO 20468487 <GO>}

Yes. Exactly. So, I mean, and Amy's kind of discussed and disclosed all that. So, that money's out there. We're doing things like the datacenter expansions. I mention two that were there as well. And so a lot of the CapEx is going towards that additional expansion so we can get off into more markets and continue doing things like that. Obviously, the components that we buy and the server and the fleet that we continue to expand is a core part of that.

As you mentioned, one of the things that we do is we are pushing relentlessly for efficiencies because this is a high scale game, which means I have to be doing a really excellent job on every dollar that I spend. And I do product planning on a six-month semester boundary. Every time we do that, it's a combination of what innovation are we bringing to market, the new things, and where is the future going. But there is always commitments that I have from my teams on efficiency.

And so, a few things that we've done in particular, we've tuned our supply chain. Our lead times are starting to shrink, so we can get more into kind of adjusting time, or when I need it, when can I deliver it, making sure that we're meeting all the demands that we have while not having to carry a lot of excess capacity. So, there's a lot of improvements we continue to make there.

**Karl Keirstead** {BIO 1542979 <GO>}

So, it's not like you're buying supplies, storing them on the top shelf for six or nine months, and then bleeding them down.

**Jason Zander** {BIO 20468487 <GO>}

That's correct.

**Karl Keirstead** {BIO 1542979 <GO>}

It's way more just in time now.

**Jason Zander** {BIO 20468487 <GO>}

Yeah, and I talk to Amy once a month when I ask for money, and she will always remind me, I'm not there yet, just to be clear. Maybe you've met Amy. She's going to keep me honest on that one, but we are improving, and we're just constantly working on that. And so, if you think about that, the efficiencies we get out for the money that we spend, we're continuing to make that better and better every single quarter.

In addition to that, we've made a lot of software improvements that we've done. And so, we can do better jobs on densities. I can host more workloads on the existing kit that I've already bought that gives us even more efficiency there, as well. And we can essentially do that, plus, we do a lot of innovation across a lot of different parts of the work. And so, I think, you've seen we are spending CapEx and continue to chase the TAM. The TAM is huge. So, we're continuing to grow. You've seen our growth come

through. And then, we're working very hard on the efficiencies part of the house, and I feel pretty good about it.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay. Not to press you too much, I don't want you to give away your Azure trade secrets in a public forum, but the group is and I am very curious as to exactly what these efficiency gains are. Like when I do field checks with folks, engineers in Silicon Valley, they tell me anecdotes about how Azure has been able to squeeze like 3x more out of a server rack today versus 18 months ago. And I asked them how on earth Azure's been able to do that, and I get vague answers.

**Jason Zander** {BIO 20468487 <GO>}

Good.

**Karl Keirstead** {BIO 1542979 <GO>}

Can you give us anything more specific as to how you're driving these efficiency gains? I think everybody will be super curious.

**Jason Zander** {BIO 20468487 <GO>}

Yeah. So, I can tell you the elements that we're working on, right? So, it is a combination of silicon design work that we do. And we work very closely with our components, partners and things like that. If you think about storage, if you think about the work we've done with the chip manufacturers, all the components that go into as part of this cost, we have -- you know, I have a whole silicon team. Like I mentioned, we do everything from Azure Sphere to the optics for HoloLens, all the way up to quantum computing.

And so, we partner with a lot of the OEMs that you're talking about, the component manufacturers. We also do a lot of specialization that's designed for the cloud in partnership with them, and that actually helps us do a good job getting even more efficiency. In addition to that, a lot of the additional work that we do, it's things like SKU mix, and that's also, you know, like how much RAM should I have, how much Flash drive should I have. Well, it turns out that running in SAP, that server looks like something. Running a gaming server, that's actually more CPU, less disk.

And so, we've been able to over time look at the workloads that people are running, how to get the right mix between them -- this is a little bit of the secret sauce, so that I can start actually tuning the fleet. So, the fleet isn't 100% uniform SKUs where every single node that you pull out looks exactly the same. We wind up with the right kind of balance, and at the end of the day, our job is to really improve the silicon and then the utilization and then figure out how to get great adjacencies across workloads so that we can actually share those resources in a very efficient manner.

I mean, this is part of what it means to be hyper scale and it's one of the things that's a big difference between, well, I've got a colo someplace that I lease and, you know, that server over there, that's my server. I called it Fred, it runs SAP. Well, in the cloud, you don't do that, right? I mean, there's literally millions of servers out there and you have to be able to manage this at massive scale. So, that's a little bit of a trade secret side of the house but you get the idea.

**Karl Keirstead** {BIO 1542979 <GO>}

Got it. Okay, thank you. Can we talk security for a quick sec?

**Jason Zander** {BIO 20468487 <GO>}

Yes.

**Karl Keirstead** {BIO 1542979 <GO>}

So, maybe two parts. One is the Cap One AWS breach was very high profile. And I'm just wondering, as you've interacted with customers since that, have you noticed any change in behavior? Are they sort of pulling back and wanting to double click on Azure security infrastructure in a way that could in any way elongate sales cycles? So, that's the first question. And actually, why don't I stop there and let you go on that and then I'll ask a follow up.

**Jason Zander** {BIO 20468487 <GO>}

Yeah, and I would say that especially the large even fin sector and other folks, you know, healthcare, places where the compliance has been high, I would say that they've always been very, very deep into the security vetting and validation and then the work that's there. So, I see that continue. They, of course, have had questions around specific things that they've seen and how are we doing that. In some cases, we're doing things slightly differently and stuff like that and they can see that.

But what I would tell you is the big thing that we've done with security, because again we've been running cloud services for 15 years. If you go back to Office 365, even Xbox Live, it turns out the biggest hacking period that I get every single year is December 24th in the evening. And it's basically as people are unwrapping a new Xbox and you get these guys that are like, I want to claim the fame that I actually took down the network, and people, for whatever reason, your kid couldn't play your Xbox, your 35-year old couldn't play his Xbox, I mean whatever it happens to look like, that's when the hacks come in.

So, we've been doing this for a long time, and we spend \$1 billion on op-ex every single year just on security. There's over 3,500 people that work on that. We've done a significant amount of work to protect Office, protect the documents that are in there. And we take all of this thing, like a trillion signals go through the system, and we apply it not only to that but to Windows, we apply it into the Office ecosystem, and then we actually make it available for our third parties as well.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay.

**Jason Zander** {BIO 20468487 <GO>}

And so, there's always a lot of scrutiny, and there should be on security. It's especially true as more and more of the Tier 1 workloads start to shift into the cloud, and so we get that extra scrutiny that is there and welcome it and we've got the broadest compliance portfolio out there for hyper-scale clouds, it helps.

**Karl Keirstead** {BIO 1542979 <GO>}

My follow-up on security, and I don't mean to be unfair to Amazon, they're an amazing organization and they're larger than Azure is, so by nature they're going to have more breaches in the newspaper, but when we do a search of all the breaches, it feels like there's a lot of AWS sort of open S3 bucket problems, like there might have been with Cap One.

When we search for high profile Azure breaches, there aren't that many. And again maybe it's just workload mix, I'm not sure, market share, but it feels like there's a disproportionately low number of at least high-profile hacks on Azure. So, I just wanted to ask you why that might be and if Azure in your judgement is doing anything different than AWS is to secure data and customer applications.

**Jason Zander** {BIO 20468487 <GO>}

Yeah, and again here what I would say is from a shared security perspective I actually think as cloud vendors, we're all vested in making sure everyone is safe and secure on the cloud. And to be honest, if you get to the point where people worry that the cloud in general is not a good place to go, then whether it's one vendor or another, that could be problematic for the overall business, and I think we're all dedicated to that. Even when we've had major attacks that have occurred, that impacts all of us.

And we actually have a hotline to Google, we have a hotline to Amazon. Our security folks will talk to each other and figure it out. So, we think that's kind of the greater good. That should really trump some of the competition around things like that.

Now, when it comes to the specifics around Azure, though, I will tell you just what we're doing, not to try and compare and contrast per se but to basically say, as I mentioned, all the security work that we've done to run Office 365 for 15 years is built into Azure. And we get to leverage the same tech and we've built even more on top of it. We have put in the best practice analyzers and the sort of things that frankly we've had for Windows Server and SQL Server for 20 years.

And just to be objective, I mean, Microsoft, we have faced our own security crises in the past, a long time ago. That was kind of a trial by fire and we had to change a lot



of the practices in the work that we did in order to be able to protect our ecosystem. And I think we've learned a lot from that and we have accrued all of it forward into our cloud and our cloud properties and our technology. That's more the approach that we're taking on this side.

And then from that point, then this also has to be a partnership with the customer who's running the workload, because I can secure the environments and I can help them with tools and make it much, much easier, but at the end of the day, they also have to apply those security best practices to their workload to make sure that they remain secure.

And also, what we're trying to do is we call it the pit of success, like I'm trying to design the products, you fall into the pit of success, you don't make the inadvertent non-malicious but accidental sort of problems. That's kind of part of the product design ethos that's there as well, but it's got to be a good partnership.

**Karl Keirstead** {BIO 1542979 <GO>}

Got it. We might have time for me to sneak in two more, so we'll go quick. On gaming, how excited are you about gaming being a new Azure workload and is there anything about the Azure infrastructure that looks, feels different than Google or Amazon that might make Microsoft have a slightly better chance on the game streaming cloud front?

**Jason Zander** {BIO 20468487 <GO>}

Yeah. Well, and the cool thing is gaming is actually an old/new cloud workload, because we've actually been running Xbox Live on top of Azure for a long time.

**Karl Keirstead** {BIO 1542979 <GO>}

Fair point.

**Jason Zander** {BIO 20468487 <GO>}

We're one of the first gaming services that are out there. It's a massive gaming service. But if you look at the going forward part, which I think is really the crux of what you're asking. Game streaming is an awesome opportunity for us. I think especially when you start to immerse this in with 5G and edge compute starting to become more prevalent. I mean, there's an awesome opportunity. Because we've already been doing multiplayer games that run online, that run in our Azure datacenters. They go out through our pops in our network to get out to the homes. Imagine what happens when we get more and more edge compute and protocols and devices that can go handle that.

You've seen the line-up that we announced at E3, all the cool streaming that's coming even on your phone but mounted on controllers. That one's pretty freaking awesome. If I look at things we're doing with all of the online streaming, the gaming

community, I think you're seeing more of that as well. So, there's a lot of content, a lot of video, a lot of sharing and social. So, it's all starting to evolve. But it's actually built on top of this awesome base, it's actually a decade's worth of awesome innovation.

That's the cool thing about Microsoft, because remember, not only do we have the cloud and the streaming, but we've been doing the consoles for a long time, we've been doing PC gaming back to I think the first one that I played was Flight Sim. Anybody used Flight Sim? Remember Microsoft Golf, anybody play that? These are back in the DOS era. Like, I'm too damn old. But that goes all the way back and then up into the modern stuff. And so, it's actually really cool.

**Karl Keirstead** {BIO 1542979 <GO>}

Okay. Last one. You've got to put your forecasting hat on. IR's cringing right now, I know, but Jason, if today hypothetically the on-prem public cloud mix looks something like 95/5 or 90/10, I don't know what numbers you guys use internally, if you were to look out 10 years, what's that on-prem cloud mix going to look like?

**Jason Zander** {BIO 20468487 <GO>}

I think we're going to continue to see the growth in the hyper-scale, we see people doing that move as well, and it's actually a lot of net accretive new workloads. I will tell you one really cool thing, though. We have been doing hybrid since day one. And so, even in this mode where there's a mixture between the two, we were doing - we made hybrid a standard solution when our competitors were just paying it lip service.

It's been something we've been doing since day one. Azure Stack, our Data Box Edge work that we've done, even again these new announcements we've made, partnership with VMware and other work that we're doing, we think that's a first-class state for companies to land in. You're going to see more and more of some of these workloads running cloud native and running in the cloud where I'm going to be able to leverage my existing systems. And honestly, the fact that we've invested in that since the day one of Azure is amazing, because it lines us up incredibly well. And we've been doing on-prem for two decades, which basically means that as your usage and stuff kind of moves between the environments, we're actually in a great structural shape to be able to handle those and take advantage of it.

**Karl Keirstead** {BIO 1542979 <GO>}

Thank you, Jason, for coming. We're honored that you were able to fly down and join us and meet our clients and help them think through Azure and this cloud business, and what a fun ride you've had. Keep it up.

**Jason Zander** {BIO 20468487 <GO>}

Perfect. Thank you so much.

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**Karl Keirstead** {BIO 1542979 <GO>}

Thank you.

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