SAN versus Local Storage in VDI Environments

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Speakers: Brian Madden and Gabe Knuth

Brian Madden: Hello from San Francisco, my name is Brian Madden.

Gabe Knuth: And in Omaha, Nebraska, I am Gabe Knuth and today we have a webcast about "SAN Versus Local Storage" and this is a pretty hot topic right, I mean we have been talking about this ever since we really started talking about VDI and there are definitely two camps here that are diametrically opposed to each other.

Brian Madden: Yeah and this is the thing, this is conversation today by the way. It is specifically "SAN versus local storage" in the context of VDI and desktop virtualization, and you know we talk about devices I mean oh I don't know what was it two years ago, I wrote a blog post I don't know if you can see the text of this video, it basically says, I am paraphrasing "Screw the SAN" forget, 'F' means "forget". 'F' the SAN as in "Forget the SAN" you know VDI storage should be local and…

Gabe Knuth: This thing generated 30 or 40 comments I think right and it was pretty rough, what half of them agree with you and we are like "Oh yeah Brian" and the other half thought you were crazy which is about right.

Brian Madden: Typical half thinking crazy, but one of the people by the way who thought I was crazy was a guy named Ron Oglesby who has been in the industry for ten years and you know goes way back with Gabe and I, and he was writing that "No man if you are doing VDI, it should…", he said I was wrong I mean so you know I am saying I was saying "Hey screw the SAN, all your storage should be local for VDI" and Ron was kind of saying "No man you want the SAN for VDI because that gives you a lot of things". So all these gory details by the way of this conversation, this is exactly what our webcast today is about.

Gabe Knuth: Yeah and Ron's argument was about the features and stuff that will get into here, but its pretty obvious so there is a big gap in the feature set from local to SAN, and so yeah part of that discussion today is going to be about what of these do we actually need when we are talking about desktops.

Brian Madden: Yeah and I think the best way to kind of frame this conversation before we can kind of get into the battle if you will of SAN versus local, I think to level said a

little bit to kind of talk about you know some sort of technology issues like hat you have to take into consideration when you are thinking about storage and VDI and so you know we need to have that conversation first and then we can kind of get into these details, but you know the first thing we will always ever end up talking about is this thing called IOPS.

Gabe Knuth: And that's our whole conversation here, the whole local versus SAN for VDI conversation revolves around this in that IOPS are, IOPS are more or less the currency of VDI storage right. We are trying to get as many IOPS as we can without spending lot of money, and so we are talking about I… I can get this many IOPS, but then I have got to get rid of maybe these features or with this solution I can support this many IOPS and I get all these wicked features that go with it, but IOPS are what drive the conversation for VDI storage, at least in the beginning.

Brian Madden: And do we have to talk about like IOPS you know IOPS is input/output operation per second, input/output both fall under I, so input/output operations per second is basically how many sort of what do you want to call it Gabe like disk based transactions, a specific sort of storage system can handle and….

Gabe Knuth: Yeah right the I is I/O input/output.

Brian Madden: Yeah.

Gabe Knuth: And then operations per second.

Brian Madden: Yeah.

Gabe Knuth: Right so it reads, it writes, it's everything that Windows is doing to your disk that constitute an IOP, one-way or the other.

Brian Madden: Yeah, yeah and so that's, that is you say I like that Gabe and I like that characterization of IOPS being sort of like the currency of storage in general, and you will see, we will be talking about IOPS quite a bit throughout this presentation. The other thing that we would like to do kind of for level setting people when we are having this conversation is we want to talk about that. So we are talking on storage for VDI right that's like virtual desktops in your data center, and a lot of people I think one of the challenges in this industry is that lot of people think of virtualization, they think of server virtualization and then you hear about all of these vendors with all these products that are geared towards you know server virtualization, virtual storage systems and all these kinds of stuff.

Gabe Knuth: This is called virtualization.

Brian Madden: Yeah exact you are right, exactly. The word virtualization to most people means servers.

Gabe Knuth: It's a trap.

Brian Madden: It's a trap, nice. You know the thing is though I mean the way that servers use storage and the way that desktops use storage are very different and forget virtualization for a moment, just I mean in general the way servers acts as a storage system and the way desktops acts as a storage system, these are two very different things. So before we also go too far into the details of like what you need to understand for how you pick a storage for VDI, we should plan out in general and this by the way is not even a virtual conversation, it's like in general desktop storage and server storage these are two very different things.

Gabe Knuth: Right yeah and what we look at specifically just the usage patterns the way that we use desktops as it pertains to storage and the way we use desktop servers, with servers yeah it makes sense to put both of these out. Servers tend to be mostly read and there is a lot of people that would probably dispute that and say "My server writes you know all the time" and there is definitely situations where that's true but I guess its more important that servers are one way or the other, whereas desktops are 50-50 split usually between reads and writes and the key there is that that's effectively making them completely random.

They are hard to predict because you don't know when those are coming, they are just always happening and so that's a big consideration that we have to make when we are looking at the difference in how Windows and how these virtual machines interact with the storage system and so with servers too we look at, we look at, we are more focused on things like capacity right, because servers are moving massive amounts of data around and it doesn't I mean its going to happen, its going to happen fine in the right amount of time like we size it for that.

With desktops because we have got this complete randomness going on, we really need to make sure that we focus on performance so that we can get all of these transactions handled quickly, so that one crazy user or several crazy users don't affect all the other users that are also using the storage system.

Brian Madden: Yeah and I think that's kind of a take away from this is that these desktops, there is so many more writes and so much more random, and there is just very much more I/O intensive of desktop workloads versus the servers the storage way for server workloads.

Gabe Knuth: We should say too that writes are significantly harder to handle than reads are because reads if the same block is read a few times, reads can be cached relatively easily we have seen blockers in a file….

Brian Madden: Right.

Gabe Knuth: Depending upon how you do it.

Brian Madden: Yeah.

Gabe Knuth: Whereas writes, writes are coming from the other side and so there is only a few ways to handle writes and it's much more taxing on a system than reads are.

Brian Madden: Now you can't cache a write you know if you drive if your file system you know send something down to blocks of data to write to that disk, and your system goes back and says yeah that's been written, you can't lose power and have it go away because that's going to maybe invalidate your file system especially if you are doing links I mean its crazy, so and of course as you say also you know with reads, its easier to cache through because the readings so you can start to read ahead and hey I see you are accessing all these blogs and going to go ahead and pre fetch these blogs, but you can't like pre fetch a write because you, hasn't been written yet you don't know what's going to be, what's going to happen.

Gabe Knuth: The clairvoyant storage system, that's the future man.

Brian Madden: So that's so this whole storage you know this whole desktop storage versus server storage that's one part of this conversation. The other part of this conversation that people need to look at before we can get into details of what one's best is that you know when you are talking about storage for desktops so we fundamentally storage these disks right. In VDI environments, we have disk images and there is a big conversation in the industry about what is the best kind of VDI disk image. Do you want to have a single image that are shared amongst many users, or do you want to have like one image per user, and there is a lot of different names for this. Some people call it like one-to-one versus shared some people call it you know persistent versus non persistent.

There are all sorts of different words but when I kind of get into quite so much details on like VDI theory in which ones is best for you, but what we do want to mention is that whether you use shared images or one-to-one images that's really going to affect how your VDI system uses the storage. So what we will get into here is kind of talking about okay so from the perspective of the storage system what's the difference between these one-to-one images and these shared images.

Gabe Knuth: So you know this is I guess this isn't one of the more fundamental differences right, the one-to-one images persistent that means that we sign up our machine, we shut it down, we log back into get the exact same machine again and again and again whereas VDI, shared images are thrown away after each boot and so you log off or shut the machine down, you log back on, you get all of the changes that you made that aren't you know sanctioned or blown away you get a fresh new PC or VM every single time and then on top of that you have your user personalization things like that. So in everything that is inconsequential is thrown away in between the boots.

Brian Madden: Yeah and it's interesting here because there is a quick sign out, which one uses better.

Gabe Knuth: I don't know you tell me.

Brian Madden: Well yeah because…

Gabe Knuth: This is how we have job as bloggers.

Brian Madden: Well he is saying you are the viewer I mean the thing is, so some people are like oh my gosh one-to-one is amazing because its just like the old way of doing everything and anything that user install does is retained between you know reboots and that's perfect, that's awesome.

Gabe Knuth: And then we get all these other VDI features so right, right.

Brian Madden: Yeah for half the room is saying that and only half of them will say "Wait a minute, you knew its shared, the user can do whatever they want and no matter how messed up the user makes it when I reboot it, it throws away instructions from scratch, that's amazing that's my dream." So literally there is used cases where shared make sense, there is used cases where one-to-one makes sense, again we are not digging into all of that kind of stuff here in this, that's not really the point of what we are doing today.

Gabe Knuth: It's a whole other webcast.

Brian Madden: Yeah that's a different webcast, but the point is that when you design the storage for your system, it's a big deal about whether you are going to share it a one-to-one and I guess one of the big deals that we see with people doing this is the shared tends to be more complex to implement and its funny because that sounds backwards right look those sound like the shared scene here.

Gabe Knuth: Yeah it sounds easy oh we are just giving this and throw it away after they boot.

Brian Madden: Yeah, yeah.

Gabe Knuth: Problem solved.

Brian Madden: But the problem is you know if you want to have one disk image, the multiple users are sharing you know Windows doesn't work that way. You can't take one disk file and literally mount that to like 20 different virtual machines. You have to do some kind of whether its like a flex cloning or some kind of snapshotting or like delta, differentiating like with you know some kind of system that the gold master locked and then users log on to get their own little slivers I mean it's a lot of complexities that go into sharing an image whereas the old one-to-one its, you got 20 users you have 20 VMDK or 20 VHD files and that's pretty much it, so…

Gabe Knuth: And obviously there is implications on storage for each of those you know if we have shared storage that's, its more complex but its all based off of one image, then the argument is that one image takes up less space and will cost less and storage perspective and then…

Brian Madden: Yeah and…

Gabe Knuth: If its 20 VMDK files then you have got, you have got 20 times the amount of storage necessary and I mean yeah it's crazy hey look at that.

Brian Madden: Yeah, yeah exactly and that's the thing. So its again you know this is not the time to get into the pros and cons of the one-to-one versus shared, but in terms of the storage standpoint, you know whatever I mean maybe a lot be watching this are not even VDI people but maybe you are the storage people from your company and you know like those crazies that want to do VDI telling you "Hey we got to do VDI, so now you have to figure out how to make the storage work". So you ask them what they are doing, are they going with a one-to-one route where every user owns his or her own unique disk image or are they going that shared route where you got one master image that is shared by multiple users. It doesn't matter what the answer is, about fine answers but you got to find it out and then you can move on to designing your storage solution.

Gabe Knuth: Right.

Brian Madden: Hey look at that.

Gabe Knuth: And we can move on to…

Brian Madden: Design your storage solution, so like we kind of break this up into couple of different, what do want to call this Gabe, like categories strategies, techniques, technologies I am not sure exactly.

Gabe Knuth: I suppose yeah I would just say methods.

Brian Madden: Yeah.

Gabe Knuth: Solutions I guess is why it's on the slide there. So yeah I mean so we have local office that we taking about and in this situation local specifically means using disks that's installed locally on a server, and so there are some other solutions out there that use combinations of things and we will get to that in a second but in this context of this conversation local is drives and start on the server, that could be SSD, that could be fusion I/O, they could be physical you know 15k RPM SAS disks that kind of a thing but these are actually installed in the physical device or in the server.

Brian Madden: Another option we have is to use a SAN and…

Gabe Knuth: You go in.

Brian Madden: And yeah like SANs are very popular obviously lot of people have SANs in the data center, should you use that existing SAN for your desktop, should you have a SAN for your desktop, do you now need the SAN, we will get into that but you know if local is one option obviously shared, central storage is the second option and when it comes to desktops, I think there is a third option too.

Gabe Knuth: Yeah and so streaming something you know and this OS streaming, not application streaming like may not be familiar with but OS streaming exists that takes images that are stored centrally, but not necessarily on a SAN and streams them to the local device so that they execute locally and so this is kind of more flexible way of adding some features, but its also more complex than local is.

Brian Madden: Yeah and we will get into each of these well now. So the type of storage that we will take a look at is local and of course local storage as Gabe said a few minutes ago was, I mean literally like the most basic right you have a server, its got hard drives in it or SSDs.

Gabe Knuth: And result of that is that it's significantly cheaper.

Brian Madden: Yeah, yeah and so that's we, we love it, that's kind of our storing points. The thing is that's sort of more challenging about this is that you know we talked about like how important IOPS are with desktop virtualization, and its hard to come up with an exact number of like you need x-number of IOPS per so many desktops, because even if your desktop you know averages 20 IOPS you can give Windows only 20 IOPS ever because when you are loading stuff is more and so you know its like very busty and everything.

Gabe Knuth: And the fact that you know say a log on drives significantly higher IOPS most people you know people log in and roughly the same time everyday.

Brian Madden: Yeah.

Gabe Knuth: You know that can create an issue if you size it just for 20 hours per Window is done out of the door we are good to go and if you see those numbers, you have the internal benchmarks.

Brian Madden: Yeah but we can't say this so. If you take a regular server like it doesn't matter whose it is, DELL, HP, you know you get a server and stuff it full with as many drives as you can even with like eight SAS drives in there, if they are magnetic drives there is not enough I/O throughput to that whole storage sub system even if its striping it across all these drives, there is just flat out not enough I/O to support maxing that box out on desktop virtualization.

Gabe Knuth: Oh yeah for sure. Now you can still host you know a number of machines but if you could host 50 if desktops weren't an issue or number of storage wasn't an issue you are never going to get that.

Brian Madden: Yeah because it might be like all those things where right its just storage will be a bottleneck maybe that's the way to say it.

Gabe Knuth: Yeah.

Brian Madden: If you just have like good old fashion magnetic drives, now that doesn't mean that we should use local its just means if you want to use local we are going to need a little bit of, a little bit of help to kind of help this performance of the local storage system.

Gabe Knuth: Yeah and before I mentioned fusion I/O which Brian if you can explain this better, but I will take a stab I mean its basically a car that goes in and manages it adds these caching capabilities and these right serialized rights to local devices right.

Brian Madden: It's a go fast card for local storage.

Gabe Knuth: Yeah.

Brian Madden: Yeah.

Gabe Knuth: And then of course SSD is crazy now the number of IOPS for an SSD drive of the same size as a physical magnetic driver, a real magnetic drive is astounding the difference in there. So you know they cost quite a bit more money oh yeah.

Brian Madden: The price is also astounding.

Gabe Knuth: But you know certainly if you add up all the places in these things so even if we just talk about kind of I want your sprinkles into it, if you add up the place of these things though they are still they are around the ball park probably in the case of SSD quite a bit more but they are still if you would use SAN you would still have to use a fiber channel HPA you know so there is already an added cost when it comes to the SAN side too. So it's not like this is a cost we are just moving the money around and paying for something else.

Brian Madden: Yeah, yeah well yeah that's really a good point and…

Gabe Knuth: It's out to SAN to buy in the background.

Brian Madden: Yeah, and that's kind of point here like local storage can work fine, but you should make it fast up, its just that you are not buying that $3000 Dell with like four hard drives in it.

Gabe Knuth: Right.

Brian Madden: And pack up full of SSDs, probably packing up for desktops. So for the concept of using local storage we can make it fast stuff. That said you know we talked of this like two kinds of models for desktops like the one-to-one persistent model and the shared model where lot of users share this in disk image and if you are using local storage, you know that really works best if you have multiple users that are sharing the same disk image.

Gabe Knuth: And that just means that well there is a few reasons, one is that you know you can just store that shared image on each one of the local machines, but then also you don't have to worry about users being routed to the same box every single time and maybe one user or one box has several power users on it and so they are performing such compared to the other box that has several light weight users on it and you know none of this is automatic at this point then the users are automatically connected to their old session but we can't move things around to different boxes on the fly.

Brian Madden: Yeah and I guess that's the kind gets into what's on our cons are, does that make sense with Gabe's SAN like I want to underscore that because like if we are talking about local storage, with persistent images you know like where every some user kind of owns his or her own VHD or VMDK file. Imagine that if you have like a user BobSmith.vmdk on server one and yeah Bob Smith can log on to server one that's fine but if you have five servers that Bob Smith do on VMDK files literally only lives on one server, so Bob has to be connected back to that server to run his desktop and even if that one server is like really like busy and you have a different one sitting right next to it is like empty and free and that Bob disk drive is on server one.

Gabe Knuth: Right.

Brian Madden: That stings which is why I guess we mentioned that as a downside of local storage. There is a lot of functionality that we miss out on, because we don't have a SAN right. So there is always great things that people use SANs for you know like you can move users from machine to machine live, if they are using shared storage you know people can fail over, there is lot of advantages you have of using a SAN which of course they are better because they cost more right.

Gabe Knuth: Yeah it seems that SAN storage its centralized storage any host can access any virtual disk.

Brian Madden: Yeah and so and I guess and that kind of goes towards our last con of local storage is that you just don't want the flexibility. If you are using local, yeah I can use SSD and fusion I will make it work fast, faster, fastest but also look for there, so that's tough.

Gabe Knuth: Right, so and then the so the load bouncing effect shared and one-to-one whereas all these features and stuff. That's why its shared works better is because we don't necessarily need all these features when we are talking about shared image VDI.

Brian Madden: Yeah, yeah and so that's the, that's it for local I guess you know so that's our, you know everything, our quick version local.

Gabe Knuth: Right.

Brian Madden: Let's now move on to the SAN okay and so like just like we deal with local let's look at the sort of pros and cons of when you are using a SAN and we got to start off like SAN is pretty awesome.

Gabe Knuth: Yeah I mean literally they are the best and nobody will tell you otherwise that a SAN isn't the most appropriate solution or the best overall solution in any situation.

Brian Madden: Yeah and it's like what everything I like they cost a lot I guess we will get into that but yeah they are damp expensive. So I mean when compared to local of course there is also such different price ranges for SAN and everything but…

Gabe Knuth: Right.

Brian Madden: But there are some, so and because of that you know you get all these flexibility, so SAN you can have a shared image and used on a SAN of course but you can also if you got one-to-one, so again that example from you, I got BobSmith.VMDK, if that user's disk image file lives on a SAN now Mr. Bob Smith can log on to your load balance or directed to any VDI host that we as admins want to and they can just mount that image and off they go. So I mean that's you know we got the flexibility I guess all these features I mean frankly all these features, there were disadvantages of local now become available with this.

Gabe Knuth: Right we have all of those with SAN and this was actually the argument that Ron made for the most part when we have the devices light up, we had your article said 'F' the SAN and Ron said "No you are wrong", this is his argument was that "Man like these features they are, some of these are critical".

Brian Madden: Yeah.

Gabe Knuth: And so but and so we will make the argument later but you know if you need these features then yeah I mean you have to get it, that's when it becomes critical but if you don't…

Brian Madden: You know that's actually a good point because and I know like let's hit this now real quick because its so critical is that man you get to look and see if these features make sense in your own environment.

Gabe Knuth: Right.

Brian Madden: And I am so much used, I always use car analogies like there is high end cars and low end cars there is two door and four doors and utility vehicles and they all have different cases and there is ones that have like backup cameras and some people say like backup cameras are worthless and a stupid feature that no one needs and other people have like lots of kids are playing and drive would love to have backup cameras and none of them is more right or wrong, its just that everyone's use case is different.

Gabe Knuth: Right.

Brian Madden: So maybe your view is these are just desktops and it doesn't matter and you don't need these things and fine don't spend the money on a SAN, maybe you think these things are critical, then of course you should do that.

Gabe Knuth: That's a new car analogy for me.

Brian Madden: Ha yeah I read it today, the day of recording this, in the U.S they are going to make backup camera standard equipment on all cars in 2014.

Gabe Knuth: Wow.

Brian Madden: So and people complained, oh my gosh its going to make cars too expensive, that's the auto industry is true saying, but of course the ultimate airbags laws, and stability control laws and if they break those laws and the car industry didn't explode, so I guess we are okay.

Gabe Knuth: Guess so.

Brian Madden: Turns out its Wall Street that bank of cars and I will save the features. Now when it comes to cons you might be expecting us to talk about the cost of SAN and we will get there but from our standpoint probably the biggest negative to SANs with the user VDI is I mean I am sure all of you watching this right now you already have one more SANs in your environment. You got like multiple refrigerator size boxes in your data center, you paid hundreds of thousands to millions of dollars for it.

Gabe Knuth: Sure.

Brian Madden: And my fear is so many people are like "Oh SAN we already have one perfect let's just use that" and you remember we opened this webcast by saying you know desktops and servers were not the same thing. Desktop virtualization and server virtualization are not the same thing and the weighted desktops use storage, its not the same way that servers use storage and I feel pretty strongly saying that if you take that existing SAN, way to design for your servers and your data center or your virtual servers and your data center like very heavily read optimized, and if you try and put desktops on that existing SAN you will drop it to its knees. It will just flat out not going to work for

your desktop because is not designed for random writes and all the different ways that desktops interact with storage, so…

Gabe Knuth: Yeah and it won't take long you know you can probably put you know a few desktops out there. You can get well enough into your project that it will come as a surprise but eventually yeah I mean it won't take much to bring it down to its knees.

Brian Madden: And here is the way we can test this, here is the test. If I ask you to describe your SAN the first thing you are probably going to say is the vendor. The second thing you are probably going to say is how big it is, the capacity.

Gabe Knuth: Right.

Brian Madden: And if the next thing you say is capacity ah, you have failed because when it comes to desktops, man we don't care about capacity we care about the performance and the IOPS that we can get in that environment. So if you tell a bout your current SAN the first word on your mouth isn't like 200,000 IOPS not liking it, it is not working so well.

Gabe Knuth: Yeah exactly.

Brian Madden: Anyway okay so next, next take us through this the same bits accessed by everyone is a downside on the SAN.

Gabe Knuth: Sure and that's again just because we are not, when we are talking about shared image VDI, we are talking about users all building their machines. When a user accesses a machine it's all built from the same basic image. So in a shared storage situation not even a SAN necessarily but in a shared storage situation, all of the users are hidden in the exact same place on the SAN every single time. They are on the centralized storage in general and this is more just thinking back to the way that the local storage works where the shared image is distributed to each one of the hosts. So in that situation it's a lot more efficient we are not taxing the storage that's the only location where that image is living and…

Brian Madden: And you know the sort of thing is some SANs can catch things automatically but a lot of them can't and again because you probably didn't need that like when you build that SAN three four years ago for your servers, you weren't like oh I might have one block that I want you know hundred different servers to access at the same time like a lot of SANs they don't just do that and that's what we need them to do when it comes to desktop virtualization.

Gabe Knuth: Right.

Brian Madden: Now of course we still have room for one more con on our slides here about SANs and we just can't walk away from SAN without talking about the cost.

Gabe Knuth: Yeah absolutely and so and that's why you know we say it's the best technical solution but if it was the, if it was the best overall solution, then everybody would do SANs but really they are so expensive that it costs, it prices lot of people lot of it.

Brian Madden: Yeah absolutely. So okay moving on to our sort of third mechanism, we can use delivery desktops in our data center which I guess hope that desktops are storage. There is that streaming option where we actually have, I guess we kind of touched on this before but the ideas maybe the user's disk images live in some central location, but not a super fast central location like a SAN it could be like a regular like a file server.

Gabe Knuth: Yeah NAS.

Brian Madden: And then when the machines boot up and the VDIs boot up, that disk image that VM boot up, it sort of mounts, grabs that file system across the wire and like block by block that file system is put down on to this specific host that booted it up, and then when you shut down again, it goes away and because it wasn't really ever living like on the VDI host right.

Gabe Knuth: Right.

Brian Madden: Still lives centrally so then you boot up from different host and it skims it down again. So this is kind of cool flexible solution I guess.

Gabe Knuth: Yeah and we should add to it you know this is just talking about the OS image, the applications and the data and the user personality and things like that. Those all come from other locations and in most of these scenarios even one-to-one scenarios, we can still had applications coming from application virtualization and things like that but in the context of shared especially nothing, we don't have to worry about the fact that it gets thrown away at the end. It doesn't have to stream anything back it just streams the OS down and then everything else falls in on top of that and then it's all de-compiled, once we are done.

Brian Madden: Yeah and that's what talk about it sort of benefit you get these, the benefits are centralized storage but also some of them maybe the performance of local disk images, so and by the way and this will work well with one-to-one or shared.

Gabe Knuth: And so just to caveat this that this has nothing to do with the amount of local IOPS that you need on the actual server side, because you still need to be able to support all of the I/O activity going on in the server. So while this does add element of centralized storage disk, we still need to have all the same capacity on the local side to support this.

Brian Madden: So you got your regular server you buy from whomever you can just load it with magnetic disks, you have to put in some SSD or you know like when its

hardware acceleration cards or something like that because you still its fundamental with this, with streaming and you still locally its just that sort of your initial inventory is stored back on a file server.

Gabe Knuth: I mean you can load it with magnetic disks if you want but that's $6000 server you then have to buy a whole lot more of them.

Brian Madden: Yeah.

Gabe Knuth: So you might as well take that extra money and spend that on SSDs or fusion I/O cards and things like that.

Brian Madden: Yeah and your back end and again with the streaming it's nice as it doesn't require full on SAN like the difference of the SAN, the SAN is actually the virtual machines are mounting that image, they are sort of connecting to that back end SAN and that's being connected via iSCSI fiber channel or something like that. With the streaming its more like a regular file share sort of, so that the disks that the VMs are interacting with are actually local down on the virtual machine to host whether users are running their VMs its just that the master storage copy is back and some files are with somewhere. So block-by-block those bits come down and they sort of live on the local host just for the time those users are using them.

Gabe Knuth: And that's critical to the block by block park, we are not copying the VM from a NAS to local for streaming, we are literally sending the bits that it needs to boot ahead of time or on the fly and then filling in the back stuff later as we have time.

Brian Madden: Yeah so it's cool I mean there is lot of advantages to this streaming technology, but I guess there is some disadvantages and if it sounds like this is little bit confusing, well….

Gabe Knuth: Yeah of course it is.

Brian Madden: We are going to put that as a sort of number one con here is that there is like, there is a lot more moving parts even than a SAN in this case.

Gabe Knuth: Yeah and so now you have, you have got your front end you know the local stuff, you still have all the same considerations you do had for local storage and then you have also got all these moving parts in the middle and then you have also got the centralized storage location that's got to be you know up all the time and able to source out those, those disk images.

Brian Madden: Yeah and like since this is not a SAN you don't get you know while each virtual machine is running, its running with the local image, so that local image was long term stored in some location but you don't get the live migration, live fail over kind of stuff that you do with a SAN. Now you get the flexibility with local or with the streaming for example to go back to that auto analogy we used where any user can now

log into any machine because every user's disk images are stored centrally and you can just put the disk image, stream it down to whichever host they happen to hit. So you have some of that flexibility but you don't have as much flexibility of the SAN which is live migrations and fail over and that kind of stuff.

Gabe Knuth: Yeah we should definitely have load management on the pros side there.

Brian Madden: Yeah I believe yeah.

Gabe Knuth: Yeah that's key.

Brian Madden: And then finally I guess because its you know there is little bit more complexity there so its local like you have to do with streaming you have to build up your local host exactly as Gabe was saying like you still need SSDs and all that stuff or fusion I/O or something to make your local work fast enough, but then you also need the back end like software and this file host and that kind of thing. So it's kind of in between cost wise, cheaper than SAN but more expensive than local.

Gabe Knuth: Yeah.

Brian Madden: But I guess though it fits in like more features are local.

Gabe Knuth: Yeah it bridges that it's right in the middle for sure.

Brian Madden: Yeah and it gives you features in SAN but more features than local. So in this case we can say it really does makes sense actually that like local is cheapest, these features its streamed its like next cost up, build few more features and SAN is the ultimate, but also the most defensive.

Gabe Knuth: Yeah.

Brian Madden: So these are the three different kinds of technology, any questions? I know one, which one is best, how do we, how do you decide which one you should use?

Gabe Knuth: You know I guess we need to say used case right, used case, used case, used case.

Brian Madden: Yeah.

Gabe Knuth: And really it all comes down to your goals like what are you trying to achieve with your VDI right, what kind of features did you bring in VDI for in the first place and so these here this is a good list as far as some of the thing that we try to use to qualify which storage solution we use.

Brian Madden: Yeah and again like there is just no right, it doesn't like whatever answers are here it doesn't matter like its not people use VDI for so many different

reasons. It does not matter why you chose VDI, it does not matter what your answers are to these things but look at the answers to all of these things and then from there you can sort of figure out what you are trying to do and sort of work out the solution. So let's kind of look back through all these I mean if you want, I mean we say you know sort of to do it all you know then this is something that's I mean they are…

Gabe Knuth: Then SAN is your option.

Brian Madden: Yeah, yeah and when we look at these traditional like when we look at SANs, all these traditional SAN vendors you know you have got I mean these are all the names of course would come to mind as we are thinking about the SANs. By the way we were talking earlier about how don't use your existing SAN from your existing storage or your existing servers….

Gabe Knuth: Right.

Brian Madden: For desktops you can use the same SAN vendor if you want but like…

Gabe Knuth: Oh sure.

Brian Madden: The NetApp that you bought for your servers is not going to be the same model or same specifications or build configurations that you are using for your desktops. So there is nothing wrong with these vendors, there is something wrong with though taking the exact same product you already have and trying to use that for your desktop because that's what is going to fail.

Gabe Knuth: But…

Brian Madden: I am sorry…

Gabe Knuth: Oh no, I was going to bring it down to the next one.

Brian Madden: Yeah so we have got in addition to this is like kind of tradition like hardware SAN vendors, there is newer kind of like software based SAN type solutions that are stored into, you know into the world.

Gabe Knuth: Yeah they take storage down and use it instead of buying these big refrigerator size boxes and just racks and racks and racks of drives, these guys are actually taking commodity servers loaded with spindles and just many, many, many of them and spreading the storage across them, and so I am certain that you know the big iron guys are going to say that ah those little kids they just play nicely you know they are just trying to play nice, but the fact of matter is there is a lot of value especially for smaller environments or environments that aren't as complex for things like Datacore and StarWind and what's the other one, HP left…

Brian Madden: Left hand.

Gabe Knuth: That's left hand yeah.

Brian Madden: Yep like all these companies are that's the thing yeah, like it then uses the same technology, its just that when you buy software and put out whatever hardware you want, you are buying the software and hardware together again we don't care.

Gabe Knuth: Right.

Brian Madden: For us to go to back to features in IOPS and dollars and you do whatever you have to do to make all that work.

Gabe Knuth: Yeah you are just in a situation with these guys where you know in order to get the number of spindles to get the performance that you need you just have to, you need more, you need more hosts.

Brian Madden: Yeah.

Gabe Knuth: Basically.

Brian Madden: Now and then there is also like gosh there is so many, I mean first of all I am sure we are going to piss up a lot of people because we are not mentioning every, there are so many storage vendors out there and there is a lot of, we call it kind of like newer alternatives to the traditional SANs and the traditional kind of software, these are sort of like hybrid software, I don't where it disappeared, oh, here it is.

Gabe Knuth: Yeah.

Brian Madden: So there is, but these are kind of like hardware, like hardware and software bundled together, so XIO, Tagile, I think they pronounce it, Xtreme I/O who as of this recording has announced what they are doing but not yet actually like not for sale.

Gabe Knuth: That's the question mark.

Brian Madden: Yeah.

Gabe Knuth: But none of these lists are all inclusive, there are, I mean there are dozens of software solutions, there is dozen of these newer kind of niche kind of solutions I don't want to call niche really but some more specialized I guess directed towards desktop virtualization and these guys regard and we have left EqualLogics offer traditional Oracles get their own I mean there is, this is not an inclusive slide.

Brian Madden: Yeah, yeah but there is lot of options even if, so even if you decide SAN is it traditional hardware SAN, is it all software with whatever hardware you have, to go towards newer kind of hardware things that again that's a whole different webcast

so like how if we quit SAN use, but these are all forms of SAN they all have you know the same pros and cons of different SANs.

Gabe Knuth: Yeah exactly.

Brian Madden: Okay so that SAN is like the ultimate but the most expensive. So we are down to step, advance features better than like what you go just local but not as expensive as a SAN. Now we go into these, these different streaming products and I think that two biggest ones I think are WideStreaming manager and Citrix's provisioning server.

Gabe Knuth: Yeah it's a much smaller space and I was racking by brain trying to think of other solutions out there and I just can't go up with any. I am not saying they are not out there but they are definitely not on the top of my mind and not easy to Google for.

Brian Madden: Yeah like Double-Take had something called Flex.

Gabe Knuth: Yeah.

Brian Madden: They bought M-boot I think they were coming was called they are sort of like shut down that.

Gabe Knuth: Yeah.

Brian Madden: Division I know Lenovo has disk management options that people can use and for VDI also, but I don't actually know if that's their own or they license that I am not really sure.

Gabe Knuth: So if you are watching this and you have a disk streaming solution much like WideStream Manager and Citrix provisioning server you shall let us know.

Brian Madden: Please and you know these are the ones again as we mentioned they have, they give a lot of flexibility to users coming in. You can use them for one-to-one or shared but they don't, you require to actually buy a SAN because fundamentally they are just delivering on demand disk images to actually VDI host and then everything is locally happening within your VDI. So that is, that's this option, and then the final one that we were looking at before was local. So local course, lowest cost and the biggest down side they are doing things completely local is that you tying those users to the one specific server I think that's the biggest down side.

Gabe Knuth: Yeah absolutely what you will hear like we talked about you will hear people say that you don't get the performance but what we tried to show is that you can't get the performance out of this. You just have to pay for it, its not like you can just install drives in your server and call it good.

Brian Madden: Yeah and so like if you have got Citrix and sell it cache like Nexenta you know VMware has their VSA and Pivot3, Nutanix we will talk about them a little bit, V3, there is a lot of these companies that what's nice about these is, so we talked about how if you are going to do something with local, you can't just take magnetic disks that are cheap, you have to go more expensive and buy like fusion I/O or NSSD or something like that. Well all these kind of software based local solutions actually do change the way that the hypervisor and the VDI interacts with the local storage system and so a lot of these allow you to get the performance of like SSD or fusion I/O without having to buy any extra hardware. So you can now start to take like your ranking file like regular you know ranking….

Gabe Knuth: I won't say they put you in that direction too, I wouldn't, I wouldn't say that SSD performance out of your magnetic disks, but you can optimize your magnetic disk.

Brian Madden: Well I mean, it depends on how they work though because if you think about it I mean so it depends always right but I mean like think of it as that some of these solutions will cached off in RAM and so you can look at like especially for you to share disk image, so that's we talked about never before we are mentioning the local as best if you have a shared disk image, because if you have one-to-one its kind of confusing but if you have got a shared, if you have you know 1000 users and they are all sharing one master, you know you can pre copy that one single master image to every single VDI host you have and then these solutions for example might allow you to cache that in RAM and then all the reads from that shared master are coming out of memory are like four kind of wire speed as opposed to come up from of magnetic disk.

Gabe Knuth: Yeah that's what actually Quest hypercache should be on this list because it works that same way.

Brian Madden: Yeah and you know these, that because it writes, the desktops write to the magnetic disk but if you always reads that come out of a cache, then maybe you have got enough extra disk capacity in terms of I/O capacity to have all the writes on that disk, so…

Gabe Knuth: Well there is different ways of dealing with the writes too. There is you know things serialized writes for instance just takes all of, it just with serialized writes we just assume that all the reads are completely random. So we just drop the writes down as we get them, as they are queued up in the controller, they are just dropped write down to the driver whoever they are, so rather than trying to put them back where they belong or we will put them here one block here, one block here, one block there it just drops them all down in a row and the write or the reads are completely random anyway so this makes the writes relatively fast and less what IOPS intensive.

Brian Madden: Yeah, yeah so that's the family, so all these products are all software products say like Nutanix is we shall actually we should talk about Nutanix in this sort of other category.

Gabe Knuth: Sure.

Brian Madden: Because there are a lot of vendors who are creating sort of new products that don't really, new storage products that don't really fit into easy categorization like they aren't specifically….

Gabe Knuth: SAN local or streaming solution.

Brian Madden: Yeah exactly and so you know Nutanix for example is using local storage but they create like a grid of local storage. So we have got some like rack amount of servers that have processors and storage memory and everything and they all sort of using local but special software kind of move everything around and we, yeah I don't know who else we will put in that sort of…

Gabe Knuth: I put Atlantis in there for sure.

Brian Madden: Yeah, yeah.

Gabe Knuth: And Virtuoso too because I think that they are similar I mean they are probably both shoot me for saying that technologies are similar but the idea is that there is now something there is an in between solution that caches the data and optimizes the data as it comes from the storage system in between, between the storage system and the actual where its being executed.

Brian Madden: So what we end up with is that we now don't have, I mean its crazy we are like okay you got a SAN or a hybrid or local and now there is other, so I mean in fact storage is so, its changing so fast, but I guess lot of these parameters are kind of the same. Okay so now we looked at sort of like different examples from all of these things how we put this all together and actually you know like how do you take this away, and like come up the strategy for what we need to do here.

Gabe Knuth: Well I think we are to look back at it I mean but ultimately it just depends on what your actual goals are in the organization. So you know we have got, we know what the pros and cons of locals are.

Brian Madden: Right.

Gabe Knuth: We know that in certain situations we can use that and then there are certain things that can help us out with it.

Brian Madden: We know I guess the same thing, we know the pros and cons of SANs and we know kind of you know like players that are there and we know the pros and cons of streaming and sort of players who are there, but I think that I guess, Gabe you said it the best, so it comes back to you know figure out what your goals are.

Gabe Knuth: Right and these, this is the most important thing in my mind just because if you need all these crazy features then yeah like sorry guys you then have to go to SAN, but if because we are doing desktops and because maybe you know cost and load management are top two and maybe racker provisioning are top concerns then maybe we can ignore the other stuff and we don't actually have to worry about load migration, we don't have to worry about fail over and DR and things like that and that way within, you know we can tailor our solution to something maybe that isn't quite as expensive and maybe performs better than the SAN.

Brian Madden: Yeah and I mean I really think you hit it, you nailed it with what you said just there is that you know don't take this one way if you are desktop professional but these are just desktops okay. A lot of people you know the goals of server virtualization kind of virtualization in general are all about this high availability and up time.

Gabe Knuth: Mission critical yeah.

Brian Madden: Mission live fail over like nine, five nines all those kind of stuff.

Gabe Knuth: Right.

Brian Madden: And when you look at the goals for desktop virtualization like sure there probably are people who have that as goals and if that is you by all means spend the bucks on a SAN, make it happen but a lot of people they just need like the central backup or the flexibility of client device if there is other reasons why they go to VDI and you know if you look at your existing desktop before VDI, and you had the mission critical there is no redundancy in desktops I mean.

Gabe Knuth: Yeah that thing is down for two days just gave him new one said live with it.

Brian Madden: Yeah with desktop I mean heck we had consumer quality hard drive, consumer grade memory like laptops mail a plastic, these people putting their breezy humbugger fingers all over, shoving their bag and dropping the subway and like spilling coffee on like…

Gabe Knuth: Yeah.

Brian Madden: Nothing redundant like desktops and the reason we go to desktop virtualization is many different reasons for doing it but lot of people do it just because they need that, that flexibility or they, you know want to be able to deliver like Windows desktop to MAC users or something like that you know like do you, when you go to VDI and that do you really, really have to have five nines on your desktops, do you really have to make it so that like one side goes down and in an instant you can fail over 10,000 user to know our sites. If you do, okay you buy a SAN and you are paying a lot of money but lot of people man they just want a simple way to manage things. They just want easier

way to sort of bring everyone in-house and you don't need all those super expensive SAN you know just for desktop users.

Gabe Knuth: Yeah exactly, well said.

Brian Madden: Well that said I may, I guess that kind of wraps it up you know I mean storage…

Gabe Knuth: It does for now though I am sure there would be people that are still, still think they were fans of one over the other when its all about all about the goals in the used case but…

Brian Madden: Yeah and…

Gabe Knuth: We will save the discussion for another day I guess.

Brian Madden: Yeah I mean look this playing people go using SANs that they paid it for it and for the desktops and the people would be happy with it.

Gabe Knuth: Sure.

Brian Madden: And those playing people who are using SANs and they pay up the wazoo and that's a gigantic mistake because now they have like negative ROI on their desktop virtualization VDI environment.

Gabe Knuth: Its easy, you caught up on that hype I mean if you just have a look at this, you would say, I mean you know if you went to VM world and came out of it thinking oh yeah I am going to do VDI, you are probably going to be thinking about doing a SAN just because of all the vendors and all the marketing and things like that, but so the point here is that there is local is good, there is all sorts of solutions for local just like there are all sorts of solutions for SAN just like there are all sorts of solutions for streaming and the combination of all or all of those things you know you have to evaluate how that works or fits in with all of your goals.

Brian Madden: Yeah but that's we are leaving on that man, goals, goals, goals and goals by the way are not called my goals I want a SAN. My goal is what are your users trying to do what you want them to do, what level of service do you need to deliver and then based on that you bought the cheapest solution that meets your goals. So on that, hey thank you so much for watching. Our Twitter handles are here Brian Madden and Gabe Knuth, so I guess till next time, good luck virtualizing those desktops and picking up storage and we will see you out there on Twitter.

Gabe Knuth: Thanks.