The Reality of the Cloud and the Future of the Data center: Debra Chrapaty

Debra Chrapaty, Corporate Vice President, Global Foundation Services, spoke on the Microsoft data center, and the scale and reach of Microsoft. She reminded participants that this was their session and welcomed their feedback and comments throughout.

Debra Chrapaty: Our team runs the data center structure for the company. Globalization, localization. Foundational element anyone in organization can depend on. Today, the work we’re doing and scaling out infrastructure. Challenges broad. Two companies I know of that are building at our size. Regardless, challenges are the same.

S+S. We want to connect the world to our services via the Internet, the cloud. The cloud isn’t this white, puffy thing. This is the real cloud. Data centers, infrastructure … all the things that runs the company. MIS. Our perception has changed 360 degrees. Differentiation in business. When you get right, scale and drive efficiency, saving hundreds of millions of dollars. If not right, huge ineffectiveness, lack of company growth. Components and how Microsoft looks at and addresses.

This is your session. Feel free to interrupt.

Applications and platforms. Going down the stack. Our organization supports over 200 clients in Microsoft. When I came to company, we had 40 clients. Centralized function has big implications so we consolidated 200 internal customers. All the applications, ones you recognize and know, as well as lesser known. Tens of thousands of servers to a hundred servers. We serve them all. Application layer and platform components. Silverlight, our potential platform. Virtual Search. Variety of applications and platforms. Goal ubiquitous structure that scales for company.

Planning. Many of you struggle with capacity planning. It’s tough to nail that planning. If you do properly, can save lots of money for company. We’re building a lot of data centers. Now we plan around kilowatts, or in our world, megawatts. How much to accommodate server and space? Drives our planning. Need to nail close. We are an internal service provider for Microsoft. Data center floor space to networks to security to tier one support. A business inside the business model. People buy what they consume. Our clients can get in, model, price, adjust. Engagement with our clients. Based against consumption. Power and lever in their hands. Before this model was in place, someone from Hotmail came to me. Needed help with price and cost. Budget too high. I told him to just consume less. Responsibility on him, not on my function where we were the cog, the problem. Proper planning, products with less bugs, less tiered support, less bandwidth, etc. Planning important from consumption perspective.

We’re looking at planning for delivery. I never want to be a bottleneck for Microsoft. Products enormously successful. From planning perspective, conservative and need much more than they planned for. Planning, mindful of agility is on my radar. Don’t ever want to not have a place to scale for power. Capacity from power perspective, 20MW houses the data center about $400 million and more. Big decisions.

**Participant: At EDS we’re facing same kind of issues.**

Debra Chrapaty: We hired someone recently. He doesn’t understand our scale. Everything he talked about, I added a zero to.

We’re architecting one of the worlds largest networks. Scale and reach. Always available, always on. Regardless of if in U.S. or Antarctica, must be there. We look at agility. Launched a product that we thought would scale gradually. Huge success overnight. We build potential needs like this into the environment, making sure global network that’s stable and simple, but hierarchical, optical to reach numbers, modularity to add quickly. Basics in our network design. Special twists and turns in our optical design to accommodate growth. Network technology in general. Changes in advances. We’re pushed by high density stuff. Video and photo applications. Taking advantage of obvious and less obvious things. Caching. Partnership with Limelight. We’re building Edge network. Speed, performance, business intelligence. Important part of our world. People thinking costs in servers or data centers. Architecting network properly can save enormous amounts of money. Things we look at as we build.

Software services and trust. AD, DNS. Basics. Virtualization. Spending a lot of time here in tandem with utilization of environment.

**Participant: …**

Debra Chrapaty: We’re looking at both, mainly at software level. We’re looking at partnerships to take advantage of both physical and logical. Highly virtualized in hardware and software. Utilization. Keeps people up at night. Want to get most out of. No company can claim over 20 percent across their environment. We have luxury of being Microsoft. I get to work with guys building the solutions. Looking at how to use and build into our infrastructure. Just kicking that off.

Trust. Huge issue for us. Goes up and down stack. Personal information, we’re careful of. SOA big part of our world. Compliance. Vast array of applications we run; our services with 200 clients. Must apply across the board. We announced a new customer-related solution, and I think PCI. Needs to be baked in to ensure compliant and secure. Robust lifecycle for all applications. If you don’t have, need to formalize. Applications create opportunities for security threats. We bake in so it scales. We have risk assessment framework for business. Security. Throughout organization. We pay a lot of heed to. Need to get right so no one notices. At end of day, we’re a target. It’s thought of as fun to create a virus to bring down Hotmail or Messenger. We have a 24/7 team focusing on this.

**Participant: Secure applications. Two ways. Assign code and ensure correct. Then infrastructure should have more to do with enforcing security. Enforce. Which way are you?**

Debra Chrapaty: We’re both. From infrastructure, we have gating factors. We also enforce secure development lifecycle (SDL). Engage with product groups. They have a SDL to follow. I have a team that audits applications. Developers with coding expertise, to ensure applications follow secure lifecycle. Once in production, we enforce at infrastructure level as well. We weren’t always this mature. We ferreted through to find right way.

**Participant: Abstract security and build service.**

Debra Chrapaty: Perhaps. Now, we do it deeply. Successful in that not much in breaches.

Server infrastructure. We’re buying so much. Huge investment. Real focal point. Idea of server has changed. Capacity, storage, compute, etc. In past couple years, model has changed. Measure at rack level. Not the density or capacity of machine, but density or capacity of rack. About a year ago, talking about data center. Becoming measurement. Containment based data center. The way we looked at server is how we look at rack today. Industry changing rapidly. Rate of change I haven’t seen anywhere else. Working hard to address. In past, we’d just buy servers. Now we’re involved with OEM in architecture of servers and design of motherboard, to the chip level. Key partners excited about doing. Power management, performance, optimization, efficiency, scale. Manageability. Can’t stress standardization enough.

**Participant: EDS. Yes, have standards. In same breath, not enforced or followed to the extent we would like. Our challenge is by time we reach consensus, technology changes. Overall idea to reduce total cost. Standardization helps. If we put new environment in place, we follow standard, but … refresh.**

Debra Chrapaty: Minute standards enforced, technology changes. Good thing, but we also face. New chip. New design. Standardization for us is important. Manageability. When environment gets very large, tooling is part. When you’re running 1M servers, huge challenge. People cost. Number of servers per server engineer. How many can one person manage? Couple years ago, when we went heavy on Search, built a Google. Infrastructure, server disk, thousands of servers. Large environment. Search team came back with huge headcount numbers. Head of our division said no. Asked them to go automated to bring down. They did. That’s working in many areas of our company now. 200 servers per engineer versus 3,000 per engineer. Infrastructure had huge software component.

**Participant: Within rack, are you dealing with … sockets ….**

Debra Chrapaty: Are we still dealing at utility level? Yes we are. Total cost of ownership. Last year at rack level. Now at … level. Significant numbers. How we scale up. People felt happy with 150W/sf. I heard a competitor say 600, which I don’t believe. Healthy number 300 to 400W/sf. What is server? A rack? Data center? Container? Containers offering 1,500W/sf. Changes model. Is power limiting factor?

**Participant: Data center in New Jersey …**

Debra Chrapaty: Questions to think about as you’re building, expanding infrastructure. How am I architecting my rack? What manageability do I want in place? Food for thought. Essential questions as you grow. Should be big on your radar screen. Storage down about 80 percent. Driving down storage costs. Working at being not only larges infrastructure, but most efficient infrastructure.

Data centers. Forbes quoted me as saying they were sexy. Challenge is they haven’t changed much. 15 years later, pretty much the same. Big, raised floors, freezing. External chillers, air coolers. Racks. New configuration of racks that cool bottom to top. Pretty much the same. My challenge to my team is building something different. What does difference look like and how do we hit the mark? Anyone walk a data center? If you haven’t, ask someone to take you on a data center tour. Mind boggling to people when they do a walk through. New data center in Quincy, 275,000sf. 13.5MW of pure hydroelectric, clean power. They don’t get as excited as I do. Power right off the Columbia Gorge. We’re only company completely hydro, completely clean. Others claim, but don’t have. Think data center, lots of metrics. 1.5M pounds of battery. Three miles of chilled water pipe. Ten miles of electric conduit and 600 miles of wire. 1M square feet of drywall. 1.2 million pounds of copper, over two man years to build. Huge investments. Takes a lot of planning. When we plan, do big heat map of world. Realized need to invest. Why is FedEx successful? Best airplane? Cool logo? Arrows? No. They bought strategic landing fields near hubs. Same thing true in data center. Limited space and power. Limitations. We took 20 criteria and weighted them. Bandwidth, power costs. Quincy published number is 9.1 cents per kWh. Washington state is about 6 cents, California 7 cents. Cost of power a huge deal. Clean power is on our radar. Available HR. We maxed out, went into a bit room and heat mapped. Then we looked at different colors. Late at night, saw one dot in Washington. Where IS that? Bright red. Because of the Gorge. Mapped out worldwide since. Planning is essential for this. HR is huge factor people don’t realize. Electricians, construction guys, etc. When we built in Quincy, we were flying out as Google was flying in. Nailing down resources and contracts huge. Resource component important. Cost of steel. Price goes up, off budget. Considerations when you’re building data center. Components with six month wait. We’re getting smarter. All parts critical.

Power. One thing, more than nay other, is power. We measure everything against power. Right way to look at efficiency. How we look at infrastructure. Sustainability and ecology as well.

Dublin, Ireland. Clean power. Some hype, some real. If you can find and build where clean power is available, do it. Turbine power, not as easy to fuel.

**Participant: Heat …**

Debra Chrapaty: We’re looking at, haven’t done. Are we doing anything with heat emitted from servers in data center? Heavy building? Driving other power needs? Yes, absolutely. On our radar. Practicality is that 40 percent of power in data center is to cool. One thing you can do is look at alternate ways to cool. Ambient air coolers. Channel air through data center to cool. Ireland perfect place for data center because of ambient air. Reflective paints can make different to the heat emitted in data center. Overall, use less power. We’re architecting conservatively. Part server, part OS. How do we pair so we only build box for what we need, and OS that only uses what it needs to.

**Participant: Planning. Do you have implications from planning perspective on refresh? Power chips cost. If power not a consideration, refresh.**

Debra Chrapaty: If I can buy a server 50 percent more efficient …

**Participant: … if smaller, can have …**

Debra Chrapaty: In general, it should be as we are architecting a single standard SKU now. Trying to accommodate all of them. Working towards one SKU. Depreciation. Power cost is more valuable than cost of refreshing server. Microsoft more comprehensive approach. Worth it to you. Numbers big depending on number of sources. We’re a company thinking green. My clients all get carbon footprint statement, as well as emission numbers. Creating awareness in company of clean energy. Healthy to be aware of and look at. Architecture to be more efficient. Huge issues for every company. Important thing we need to do. I’m on the board of the Nature Conservancy.

**Participant: Organizational point. Have you identified roles or put organizations or teams together, responsible purely for power conservation?**

Debra Chrapaty: Yes. Group is in our legal function. Global citizenship. Corporate perspective. We have someone in our corporate function focusing broadly across Microsoft. How we want to represent Microsoft across entire company. Energy, energy efficiency, green. I’m a sub group below it. One person in my server group is all about energy. He looks at only green data centers. He has team. Then groups more carbon statement awareness group. Pairing awareness and evangelism.

**Participant: Do you see Microsoft … Chief Energy Officer in future.**

Debra Chrapaty: Given importance, I can see most companies with a Chief Energy Officer.

**Participant: … manufacturing carbon costs … energy impacts remanufacturing server hardware.**

Debra Chrapaty: I’m not going to replace servers to replace more energy efficient SKUs. We will architect and as things appreciate, roll up. My intent isn’t to accelerate, but to migrate.

**Participant: Remanufacturing cost. How to benefit another year.**

Debra Chrapaty: Have I modeled remanufacturing costs? No. I haven’t. Not that granular. If I remanufacture, amount …

**Participant: Dialogue with manufacturing, how to minimize …**

Debra Chrapaty: Good point. His point is working with larger OEM partners, can we highlight and minimize to take advantage of … I haven’t had this dialogue.

**Participant: Do you use AC or DC? What temperature do you run data centers at? A U.K. business, with kit, runs 50 degree Celsius. Ambient cooling. No real reason to run.**

Debra Chrapaty: We started doing AC to DC. At rack level. Can’t tell you savings. But that’s been our move. I can get numbers if you want. I don’t know temperature of data centers. Have heard similar conversations, that could run a bit higher, letting ambient air minimize.

**Participant: Reality behind.**

Debra Chrapaty: Industry trend. I don’t have exact numbers. Ambient air to cool. Have we kept data centers too cool? Can we use more ambient air? I’ve heard a lot in industry.

**Participant: Would it lower reliability?**

Debra Chrapaty: I have heard that with reliability, can run at higher temperature than we are. A team member is checking on this.

**Participant: You talked heat map leading to Quincy decision. Did you consider other factors? We look at catastrophe, risk, etc.**

Debra Chrapaty: We have 20 criteria. Power and bandwidth aren’t the only criteria. We took 20 criteria. Global citizenship, local resources, all rated. We have a California data center. Just had an earthquake, but I had the phone call.

New data center in Dublin. 500,000 SF facility. Why Ireland? Why not. Microsoft has a 23 year relationship with Ireland. Quite thoughtful in their power pricing. Not green. Amsterdam point of presence. Tax advantages. Just announced data center in Chicago. Good power pricing, near power plant. Will be largest data center in world. Innovations there. My original statement on why they all look or feel the same. Balancing. Continuity planning. Security and risk management, keeping everything up and running worldwide. We’re building more redundancy into software so we can have less redundancy in facilities. Huge amount of infrastructure for a raised floor. Predictable in redundancy. Are containers real? At scale? What does it look like from build? Lots of things we’re looking at. Creating less redundant data center? More of the grid power. Dublin and Chicago both impressive. Large opportunities for us. Reinventing infrastructure for the industry. Want to pass on learning’s to our customers.

**Participant: … possibility of data lost and possibility of system …**

Debra Chrapaty: What’s the possibility of data loss in application failure? Myriad of applications across Microsoft. Vary in design. In general, has to do with application design. Hotmail is built to run in multiple locations. Dependent on Passport . Built for multiple locations. As you build services, thing about dependencies and scale. Pretty much we’re scaled. Never lost a facility, never had data lost. No data corruption. Architected that way. Infrastructure enables the application. Now that we’re ten years into this arena, more people are savvy about services, globally scalable. Need to consider multiple locations as you move

**Participant: …**

Debra Chrapaty: How do we see virtualization? We’re not through growth inflection curve. I’m looking at doing more with less. More with the infrastructure. Some very heavy on storage, others IO intensive. Plenty of available IO for computing, but we don’t. Single applications running on single server. Being thoughtful on availability. Getting more out of servers. Always on applications. Don’t want to compromise search if its on same box. Scale up and use more. Getting more out of the environment we have. Network virtualization in data center. Virtualization within data center. Both. For utilization purposes. mission not to scale down, but up efficiently.

**Participant: Big futuristic data centers. What about small and medium businesses?**

Debra Chrapaty: I believe these things are big and expensive to build. Small, medium businesses, I wouldn’t expect to do it. I would expect Microsoft to build and someday let smaller companies leverage so you don’t have to build. Microsoft is a trusted brand. We have money and talent to do this. Let me be the person woken up in middle of night, not you. It’s what I love to do.

**Participant: You mentioned building at scale, developmental work. How much are you passing back into core mother ship?**

Debra Chrapaty: At server point, we use tools and add-on. Microsoft builds beautifully and is targeted for Enterprise. We sit weekly with tools group. Mass scale tool development. I don’t want to rebuild, but dog food. Value extended to smaller Enterprise. De-partnership. Goodness will be coming out that you can leverage.

**Participant: … structure … do you have?**

Debra Chrapaty: How should you design for cloud storage? Infrastructure or data? Software in the cloud? You want data design for a service in the cloud? What kinds of applications? Search? Communications service? Social network? Designs vary.

**Participant: … sub cycle …systems … financial … for those … what type of system design is better?**

Debra Chrapaty: Let’s talk after and I can share some of the designs.

**Participant: Commercial rates… data center**

Debra Chrapaty: Do I pay commercial rates for our server? No. I utilize software and dog food some of it. Total cost of ownership baked into server cost? As we model, potential is question I can’t answer. If we commercialize, I don’t know what we do with cost. I don’t have that model. If we were going to sell our environment back to Enterprise, would include server rate to run the servers? We don’t have that model. I’m sure we’ll make total offering attractive. Sales question. Compliancy question.

Thank you.