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AIMES Grid Services: Cutting-edge future technologies look for rejuvenated power and cooling design to match

The AIMES Centre (Advanced Internet Methods and Emergent Systems), part of the University of Liverpool, is a pioneer in the application of 'Grid' technologies for regional business development. The Technology Transfer Centre was established four years ago and funded by the North West Development Agency and the Single Regeneration Budget. AIMES's principal objective is to revolutionise e-commerce and other business processes by harnessing 'Grid' technology, and thereby boost the regional economy by helping local companies to reap the commercial and financial rewards. The Grid has been described as the next generation of the Internet as it provides users with seamless access to network and computing resources without having to worry about their own individual processor power, memory or storage capacity.

Developing the technological capabilities to fulfill their brief required some innovative thinking and AIMES decided the way forward was to develop their own facility for hosting applications in order to capitalise on the University's strength in the E-business sector. This led to the AIMES Grid Services project. Dr Jim Mooney, Head of Technology, AIMES Grid Services, explains further:

"We started developing applications that businesses could access over the Internet and we needed to be able to host these applications. We were conscious of cost, being publicly funded we didn't want to waste money on commercial hosting; we needed our own internal hosting. It's not traditional web hosting that we offer - it's more a niche, a bespoke managed service. In our region there are a growing number of IT companies developing on-demand applications".

As the demand for AIMES' services and its client list increased, so the need to establish appropriate data capabilities grew also. The premises occupied in Duke Street were not suited to housing appropriate datacentre facilities so a new site at the former Marconi site, now called Liverpool Digital, was selected. At the design stage of the Liverpool Digital facilities, it was clear, according to Dr Jim Mooney that the need to power and cool high availability and high density IT was the critical issue:

"We needed to host some high availability 24-7 applications and also some high performance computing applications which require lots of processing power. With that processing power and the associated densities comes a lot of heat so we have always had a problem around cooling. So we had lengthy deliberations about how much heat we could get in the cabinets and what the cooling would look like. It became increasingly clear that the main design problem was not one of IT but of thermodynamics".

The design that AIMES were in the process of signing off before APC's involvement was based on an original specification of a maximum power density of 12kW/rack and 'traditional' cooling methodologies of raised floor, floor grilles and air movement based on four large perimeter coolers located at one corner of the datacentre. Once introduced to the APC design methodology and with the benefit of hindsight, Dr Jim Mooney suggests:

"We knew we were doing it the wrong way but we didn't think there was a better way". ***(Ctd Pg.2)***

For over 25 years, **on365** has been driving down costs, improving power and cooling efficiencies and managing risk as a specialist in the design, planning, installation, maintenance and optimisation of critical physical IT infrastructure and utility services. Whether it's a small server room or a complete datacentre build we have the necessary expertise to meet the IT power and cooling challenge, delivering support at the very foundation of your IT technology.

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Almost at the conclusion of the design stage, Dr Jim Mooney opportunely received an invitation to attend an APC seminar in Manchester. The title of the seminar – 'How hot is your hot aisle?' caught his eye as an accurate summary of the issue his team had been dealing with for a considerable time. Previous experience and knowledge of APC was limited to smaller, rack-mounted Smart-UPS devices, nevertheless the chance to get a fresh perspective on the cooling problem proved too important to pass up:

"I booked myself on it because we had spent weeks labouring over the design of our hot aisle. So we went along to see what APC had to say about this. They told us about the problems that we knew about, about heat and high densities. Then they presented their InfraStruXure® solution. At first we were thinking 'that's not right, you don't do that' but when they explained the detail of their approach we became convinced that they were right".

The methodology presented was that of the In-Row™ cooling with Hot Aisle containment. Dr Jim Mooney's initial doubts were based on the use of water close to the IT equipment and on the principle of heat containment rather than release:

"My first doubt was that they were using water cooling. I've heard a lot of horror stories and had some bad experience of water cooling. You think that the last thing you want to put anywhere near electricity is water. And if you're putting your water in line with your computers it's even closer. The other solution which seemed counter-intuitive was that you contain heat. Your first reaction is you don't want to do that – it'll be even hotter".

However, the presentation and seminar allowed AIMES to discuss and accept fully the design principles behind In-Row™ cooling with Hot Aisle containment. There were a number of factors instrumental in convincing AIMES to invite APC to submit the design methodology for Liverpool Digital. Most important were the relevance of the design methodology to the power and cooling problems faced by Liverpool Digital, the clear understanding of those problems demonstrated by APC and APC Gold Partner, on365 and the ability to use the proposed solution to cool loads of up to 18 kW/rack, 50% greater than achievable under previously proposed solutions:

"APC effectively presented us with all the problems we had met in real life. Then they said that the density we could get would easily be 18 kW per rack and that's what we needed. We knew we were doing it the wrong way but we didn't think there was a better way. We looked at each other in the presentation and said 'these guys have got it right!'".

There were, however, first some logistical problems. Sign off on the datacentre was only a few days after the presentation so APC and on365 needed to move fast to ensure Liverpool Digital got the cooling solution it required. The team delivered on this tight timeline:

"At the end of the seminar we went up to the APC reps and said we were signing off our datacentre design at the end of the week, what you presented to us makes perfect sense but you're going to have to be damn quick if you want to change our minds and change the design we've got. All credit to APC and on365 - they pulled out all the stops, they came back to us with a design that met the budget we were working to".

The importance of getting the cooling right is that AIMES Grid Services offer a contract-led commercial service to local enterprises. Under the terms of the contracts, downtime means lost revenue:

"We have service-level agreements with the people we host and we agree a certain amount of downtime with them and after that it's an agreed penalty, it's a discounting on the hosting revenue. So if we're down too much then we simply don't make any money. There's the damage to our reputation as well."

The solution was installed by on365 and comprised of a Hot Aisle Containment System (HACS) initially with a 20kW UPS, complete with bypass and distribution panel to N+1 configuration, eleven 42U 600mm Server racks, six IRRC, a controlled distribution unit (on a raised floor with piping under-floor) and a NetBotz® 500 Wall Appliance with Extended Storage System (60GB). The build included also a Start-Up service for Symmetra PX/Network Air CW and an InfraStruXure® on-site next business day response Service Package with semi-annual preventative maintenance (7x24) for the Network Air CW site coordination service.

The APC cooling solution is scalable and able to cope with the burgeoning IT requirements of AIMES Grid Service's continued growth and it offers the operator the confidence of a cooling system built into the racking architecture. The build process also demonstrated the commitment of APC and on365 to ensure tight deadlines were met:

"on365 pulled out all the stops. We gave them a tight schedule – we wanted the whole project finished in 8 weeks. The engineers they had on-site coordinated all the various trades and installation work, they just got on with it and did it. Their attitude and performance was fantastic".

The future looks increasingly busy for AIMES as regional authorities and stakeholders recognise the importance of increasing the technological capabilities of the region. This means AIMES are embarking on a programme of building and integrating further datacentres:

"You don't want to give people a laptop or a desktop and an operating system and programmes, what you need to give them is a managed service. You don't want to build one huge great datacentre, you actually want to put it into the area it's going to serve. So we're starting another datacentre, it has picked up a lot of pace and it's in the pilot stage now. We'll be building lots more of these centres and once we've got them, they'll be interconnected for additional resilience".

APC InfraStruXure® with In-Row™ cooling methodologies will be very much a part of AIMES's future growth as the most appropriate solution for the demands of their modern IT requirements:

"It's the design thought that has gone into it. It's a brand new design for modern computing requirements, for high density computing and power and heat. It just gives it the edge. You're not using a traditional approach that worked a few years ago. You've got a new design and approach for something that's a growing problem".

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