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Editorial

Technology is often full of buzzwords – everyone talks about them, but few suspect what's actually behind them and how to really use them. For this issue of AIMagazine, we've chosen topics that may sound like buzzwords, but experience says they aren't.

The first of these is the ***cloud****. Most of us have begun using it, without suspecting what it means. Over time it has grown from just storage into a new direction for both consumer and industrial IT. Inside this issue, you'll learn of the applications that cloud computing can have for industry. We've also grilled Aimtec's new cloud services director Jan Stočes on what cloud solution development entails. You'll find this interview on page 14.*

Augmented reality *is another popular technology. While it's currently more the domain of game developers and advertisers, here as well, real possibilities for its use in industrial practice are inevitably emerging. So don't miss the articles on pages 8–11 with examples of how to use augmented reality in manufacturing, thereby saving time and money.*

And since no systems can exist without physical tools, we've prepared a review of the ***new Zebra terminal*** *that's just reaching the market. Turn to page 20 to find out where it beats its predecessors. But in these pages you'll also find much more. Here's wishing you pleasant reading.*

Zdeňka Linková

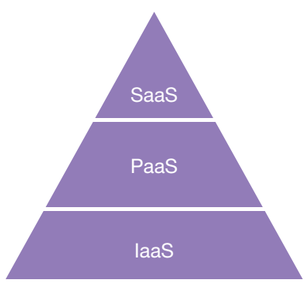
The cloud is more than just photo storage

Do you think of the cloud as a new advancement? Well, did you know that you started using it far earlier than you might think? If you remember the first email address you founded – if it was, say, Google or Hotmail – that's precisely when you first became a user of cloud services. But since those days, the possibilities for what can be run in the cloud have expanded significantly. In short, the cloud isn't just about external storage.

It seems that the cloud has gained the most mindspace as a place for sharing docs and photos. Many companies also have it to thank for their rocketing growth. But it would be ill-considered to ignore the cloud's advancement and only use it as a replacement for your own hardware (your servers). The cloud can advance your manufacturing and logistics to the next level at a fraction of the price of typical software tools.

What the cloud really is

The cloud is a general term for providing services over the internet. Two of its frequently mentioned, yet easy to fix, drawbacks lie in the speed and reliability of a customer's internet connection. The types of cloud services that can be subscribed to can be divided among three models:



Software as a Service (SaaS)

Just like storm clouds, SaaS clouds can be touched – if you know how. Perhaps the best known cloud model is Cloud Computing. No matter whether we're talking about the above-mentioned shared storage or email services, it's all SaaS. That also includes e.g. Office 365 and Spotify.

Platform as a Service (PaaS)

Meanwhile, PaaS tends to be hidden from ordinary users and is mainly used by developers and application managers. A platform as a service is a software environment in which the actual development and operation for SaaS applications takes place.

Infrastructure as a Service (IaaS)

Put simply, IaaS is a virtual server room. If you need to store or process a large amount of data for your purposes or if you're dealing with ensuring high flexibility or high accessibility for your systems from everywhere, but you don't want to buy or manage your own hardware, IaaS is the solution for you. In this model, all your IT infrastructure is located at data centres.

The cloud's benefits

- Scalability and flexibility
- Security
- Minimal starting investment
- Accessibility for all your data from everywhere
- Fast deployment
- High uptime
- Pay as you go

Scalability and **flexibility** are unambiguous benefits of using cloud services. You only choose those modules (services) that you actually need, and the price reflects this. You don't have to pay for expensive robust solutions whose functionality you'll never utilise in full; instead, you're always putting together your own bespoke solution for your specific situation.

Costs are a second indisputable advantage. When you're using cloud services, you don't have to invest into infrastructure and its administration. With SaaS, you also don't have to invest into complex software. All the worries about arranging and maintaining server hardware cross over to the service provider. With SaaS, you hardly have to worry about anything at all. You only pay monthly service usage fees based on the specific modules that you're using.

Thanks to how SaaS keeps you from having to acquire infrastructure and install an overall system, **startup** for an SaaS solution is far **faster** than it tends to be for on-premise solutions. That speeds up both your corporate processes and problem-solving and the deployment of new services.

Security and **service level** guarantees are equally important. These are guaranteed by both the provider of the SaaS itself and the data centre operator. The operators of large data centres have far better possibilities for protecting servers against physical threats; they can distribute data among multiple data centres, thus ensuring high service availability. Meanwhile they have dedicated teams scattered around the world that are constantly addressing potential security threats and working nonstop to ensure no unauthorised parties can access data or force the service offline. Through both of these efforts, they **increase uptime**.

The cloud's drawbacks

Any objective discussion of cloud services must also mention their drawbacks. Perhaps the most commonly mentioned one is the **(in)stability of the end user's internet connection**, a key issue for SaaS. This is not an unsolvable issue today; companies try to ensure stable internet coverage to meet other needs as well. But it's good to have your provider verify that you won't have any internet connection troubles when using cloud services.

Rules set forth by human beings are another sticking point. In industry, suppliers often face strict customer audits, which can even forbid the use of the cloud for a customer's project. In that situation you have to go on-premise. But customers are seeing technology advance as well, and so their thinking is changing, and more and more enterprise processes are successfully moving to the cloud.

Marek Šabatka

Is the cloud safe?

Security is likely the most important factor for every kind of IT service, whether internal or external. For the cloud, security issues are perhaps seen even more critically than usual, because data is stored on external servers. But are you sure that keeping your data in-house is the best you can do for it?

Research by Gartner shows that users, not cloud service providers (CSPs), are the largest threat here. How well end users will be able to comply with security rules is decisive for absolutely every IT system – and that applies for the cloud too. **So the question isn't: "Is the cloud secure?" The question is: "Can you use it securely?"**

When storing data on internal servers, its security becomes one more responsibility for your IT department. And that's not to mention managing the data from the GDPR standpoint, as well as fighting leaks and hacking attempts and server room issues. After all, even server overheating can be viewed as a security risk. But to go back to cloud services: for these the CSP, and not your IT, handles security. And its size brings strength.

For some fields **certification** is very important. Large providers of data centres or IaaS/PaaS that have both "ordinary" ISO certifications and various levels of special regulatory requirements such as SOX compliance in the USA, and in some cases exotic certifications that are practically unavailable in your company's home country, are the real winners here.

So when choosing a SaaS supplier, you need to always verify what infrastructure supplier they work with, i.e. what data centres they use. Service availability depends on this, and so does the above-mentioned security. At Aimtec, we've chosen Amazon Web Services (AWS) as our partner, because they care greatly about security, just like we do.

Amazon Web Services

You'll find Amazon Web Services data centres in twenty regions worldwide, and they recently announced an expansion to add four more. They have at least three data centres in every region. That ensures high uptime – when an outage occurs at one centre, services are provided from another, so the user never notices a problem. AWS has a 99.99% service level agreement (SLA), and for example for their S3 Storage Service the availability level is 99.999999999%. In practice this means that if you have 10,000 objects stored in AWS, you can expect the loss of one object per ten thousand years. And that's a likelihood that no on-premise solution can offer you.

Data centres are top targets, but also tough targets

When cyberattacks happen, data centres are very often targeted first. That's why AWS has specialised teams worldwide that work nonstop to address any security threats. They are also superb at sharing information, and thus security gains, with the whole network. So if a threat appears e.g. in China, defensive measures are deployed in the rest of the world practically instantly. That's one of the benefits of cloud services – **you're getting the whole back office**: infrastructure, uptime, support and above all security.

Jan Stočes

Your digital ecosytem for manufacturing and logistics

In April, we enriched the cloud platform market with our new aimtec.cloud. Through this, we're expanding our portfolio of products that are available in both on-premise and – new – cloud versions. Our wish in doing so is to respond to the latest IT trends that are breaking through into manufacturing, while also offering our customers more flexible manufacturing and logistics systems than ever.

Aimtec is no newcomer to the cloud; we have been offering a cloud EDI solution in the form of SaaS (Software as a Service) for several years now. But this year we're adding more comprehensive solutions alongside it, such as a Manufacturing Execution System (MES), a Warehouse Management System (WMS) and a Yard Management System (YMS). We're doing this because progress in cloud services has begun to make it possible to reap the benefits of SaaS in manufacturing and logistics as well.

aimtec.cloud

Our **Chairman of the Board Roman Žák** explains our reasons for introducing this new platform: "Originally the only service that we offered in the cloud was EDI. But we gradually introduced more and more sectional solutions that came to reach beyond just electronic data interchange. We thus decided to move these services to a new platform and add comprehensive solutions for manufacturing and warehouse management – MES and WMS. We would like, through this service, to offer customers one single system for all the key areas of their business. In just one click, they can apply our verified best-practices processes for specific manufacturing areas. They can then focus on manufacturing rather than IT concerns. We're planning to move our complete product portfolio to aimtec.cloud over the next few years".

One benefit of aimtec.cloud lies in its **scalability**. You can easily choose whether you'll use only selected functions alongside your established systems, or choose a complete cloud solution instead. Besides our existing EDI customers, we already have our first clients out there making use of our more comprehensive solutions. The outsourcer Skladon is among them. **Skladon's CEO Konstantin Margaretis** has this to say about why they chose aimtec.cloud: "Since we provide logistics outsourcing for the e-commerce segment, system speed and stability are key for us. Our field is growing dynamically, and with aimtec.cloud, we're prepared for quick, flexible growth. It makes capacity scaling, server stability, data security and system administration far easier and more efficient than they would be with ordinary solutions."

Aimtec's cloud services are in the expert hands of **Jan Stočes**, who's been working here since 2016. As Cloud Services Director, he's responsible for the entire Aimtec cloud portfolio and its development. "Six years ago, when we first started with cloud EDI, there were very few specialised cloud services out there. Today customers are seeking practically all of their solutions "As a Service" – from EDI to WMS and even ERP. Fuelled by our experts' enormous know-how, aimtec.cloud enables us to offer time-tested solutions in the form of cloud services, with all of the advantages that these bring. And the whole package is backed by the first-class infrastructure at Amazon Web Services."

To learn more about what it means to develop software that also works in the cloud, and just what things Jan has to do the planning for in his job, turn to pages 14–15.

Zdeňka Linková

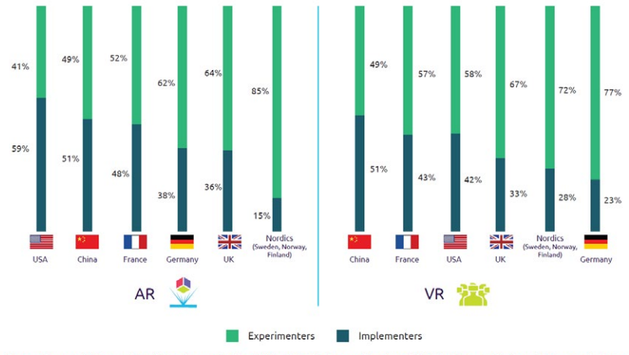
Augmented reality – from ice cream to the production line

According to a study by the University of Washington, a full 65% of children have one or more imaginary friends[1]. But that's nothing compared to all the people out there chasing imaginary animals down real streets, or waiting with some help from their phone to give their ice cream just the right consistency. Augmented Reality (AR) is no longer just a figment of our imagination. And although it's still currently most often used by game makers and advertisers, it's now time to stop playing around and teach AR to work. Because we're entering the age of virtual co-workers who are constantly there to provide advice and aid while never complaining about anyone… including us.

The first words in the story of augmented reality were written in the late 1960s, but only today has reality enriched with computer-created elements become prominent. Just like with other technological inventions, the world had to wait for the arrival of affordable technologies that could support the original concept. Today, ordinary smartphones and tablets are ready to handle augmented reality.

The USA and China lead the way in implementation

According to research performed by Capgemini[2] in 2018 among over 700 companies, more than half of the companies out there will be working to implement augmented reality during the next three years. In automotive, some say that it should become an absolute standard. The worldwide leaders in AR implementation are the USA, followed by China, France and Germany.



Source: Capgemini Research Institute, Augmented and Virtual Reality Survey; May-June 2018, N=603 organizations that are exploring and implementing Augmented Reality and Virtual Reality. Implementers: companies with small or large-scale implementations; Experimenters: companies with proof of concepts or pilots.

Boeing has made use of augmented reality in aircraft cabling assembly and, by providing instructions and blueprints to its technicians in AR, it has shortened manufacturing time by 25%, increased productivity by 40% and cut down on errors[3]. Similar benefits can be achieved in other fields of industry as well. In automotive and in manufacturing overall, AR can help to increase efficiency and productivity and save significant time. Where? For example during quality control and at assembly centres.

Assembly using augmented reality

During assembly, augmented reality can make operators' jobs easier and save time that would otherwise be wasted on reworking. AR makes it possible to show instructions step by step – and to inform operators of mistakes in real time as well. In the Czech Republic, this approach is being used by ŠKODA AUTO, who use video mapping to aid the process of packing pallets destined for export. Throughout every step, the projection shows an image of the required part and its placement on the pallet, and it highlights any misplaced parts in red.

A multitude of similar cases can be found throughout industry. We are ourselves engaged in augmented reality at present, and we see primarily the following benefits for its deployment at assembly centres:

- faster manufacturing times,
- fewer errors,
- better final product quality,
- step-by-step displaying of instructions,
- faster worker onboarding.

Quality control in augmented reality

The best manufacturing products for putting AR to work here are those that are standardised in their shape, dimensions and other parameters, while also having a number of variants. In some products, the differences among individual configurations are furthermore indistinguishable to the human eye, and this is a space for the application of technologies that can uncover even tiny differences.

We can cite as a practical example the pilot project that Aimtec has implemented for a major supplier of door panels for passenger automobiles. Our goal was to provide them with a tool that would make it possible to assess situations quickly, simply and in the same way every time. Augmented reality automatically informs them of any deviations from the required state and enables them to not only detect these deviations, but also comprehensively register them for traceability. It thus replaces a long checklist that inspectors must otherwise run through for every part.

AR's benefits for quality control:

- processes become digitalised and automated,
- traceability data is recorded automatically,
- errors are reduced.

So – does it pay to invest in AR?

More and more often, it does. Even though the use of augmented reality is still in its beginnings, we see a large future for it. Today's technologies already enable satisfactory results using even widely available hardware, with software playing the key role. A specialised team of developers is engaged in future development within our AimtecLab R&D platform. Our implementations make use of both the latest technologies from market leaders and time-tested, still-unchallenged standards. Aimtec's main advantage here lies in its ability to successfully integrate all of these technologies into a single functional unit and thus harness an information system's true potential. In our labs, we are testing and preparing for the industrial deployment of e.g. video mapping systems, special hand scanners and advanced software AR tools such as Vuforia.

Petr Stejskal

[1] https://www.washington.edu/news/2004/12/09/imaginary-friends-most-kids-have-one-or-more/
[2] Capgemini Reserach Institute: Augmented and Virtual Reality in Operations, available at https://www.capgemini.com/us-en/research-old/augmented-and-virtual-reality-in-operations/
[3] Capgemini Reserach Institute: Augmented and Virtual Reality in Operations, available at https://www.capgemini.com/us-en/research-old/augmented-and-virtual-reality-in-operations/

The Czech Republic's biggest logistics innovations of 2018

Every year, the renowned media house Economia organises Zóna logistika, a conference at which it presents awards for the best logistics innovations. This year robots, augmented reality and a fish processing centre fought for the top spots in this competition. Aimtec came home with the award named Impuls Logistika Top Logistics Product – Software. The winners in the other categories were ŠKODA AUTO, HOPI and MiR.

Logistika magazine and their publisher, the media house Economia, founded Impuls logistika so as to provide media support for the arrival of innovative projects and products in logistics. This competition has four categories: Top Logistics Project, Service, Hardware Product, and Software Product. In each assessment, the jury – made up of academics, trade-press journalists, and field experts – primarily considers an idea's innovativeness, its use of new approaches or devices in practice and its overall benefit for the company using it. This year, **ŠKODA AUTO** received an award for their deployment of autonomous part conveyance at their Vrchlabí plant, as did **Mobile Industrial Robots** for their autonomous MIR500 mobile robot, able to bear loads of up to 500 kilograms. Meanwhile the **HOPI** concern's centre for ocean fish and seafood processing and logistics was recognised as providing the top logistics service. In the software section, the jury was captivated by **Aimtec AR Quality Check (ARQ)**, an application for performing augmented-reality quality control on standardised products.

Tablet-assisted quality control

This application for performing quality control with support from augmented reality (AR) was born as a pilot project for a major supplier of door panels in passenger automobiles. The best manufacturing products for putting AR to work in quality control are those that are standardised in their shape, dimensions and other parameters, while also having a number of variants. Even though products are typically checked on receipt by trained and experienced operators, they too are only human. Our goal was to provide them with a tool that enables them to evaluate situations quickly, simply, and the same way every time.

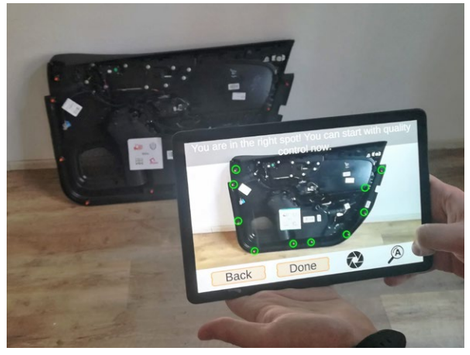
The process for AR-assisted quality control

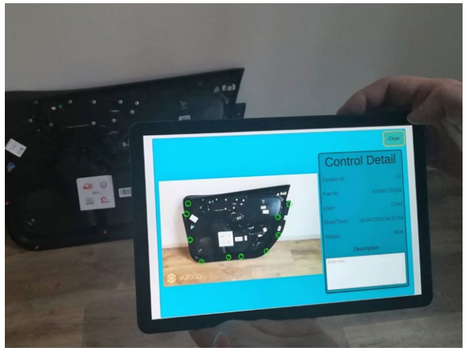
During each output inspection, the quality-control worker first uses their tablet to check the barcode of the part they're inspecting, and then aims its camera so that the whole part fits onto its screen. The system automatically monitors the product's inspection points and assesses whether the part is complete. It then lets the worker photograph the product and record the output inspection value. The data paired with the specific product is sent off to the MES, where it is stored for later use and traceability. AR thus helps to automate the whole quality control process, and above all to unify the outputs from all of the control stations.

The benefits were the motivation

The first version of the ARQ application was developed within the AimtecLab R&D platform. A specialised team of developers seeking practical applications for new technologies is now working to transform it into a commercial product. During the development of this AR-based quality control tool, a large role was played by its benefits – the reduction to the time needed per inspection; the elimination of errors; easy process training; the increase in information quality thanks to precise and unambiguous records; and the digitalisation of the process – including the elimination of written records' paper consumption.

Zdeňka Linková





Fiori – a facelift to SAP

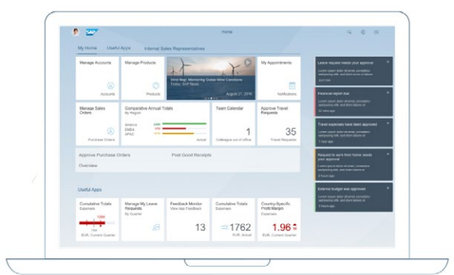
As one of the top players in ERP systems, SAP is well aware that an intuitive interface is an integral part of every modern software tool and helps to maximise work efficiency. Several years ago its developers decided to give its interface a facelift; the company then went on to publish SAP Fiori. Even though this application has been around since 2013, it has only begun to receive increased attention recently, with the entry of SAP S/4HANA, where Fiori is the only interface supported.

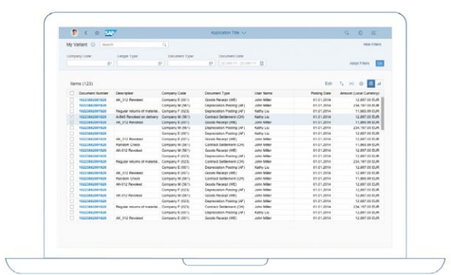
SAP Fiori is the front end for all of the modules within SAP ERP, i.e. the rules for how individual applications should look. Thus for the very first time in its history, SAP is issuing recommendations to developers on how they should write their add-ons and other applications from the standpoint of a unified user interface. Thanks to this, the SAP work environment is unified, more convenient for users, and easier to use. To name two examples: toolbar locations (e.g. how to confirm a transaction and how to return to the previous screen) have been unified, and the environment now offers more complex elements – graphs and maps – within applications.

SAP Fiori is distinctive for its simple, minimalist look and its use of tiles, which are clearer for users. Every SAP Fiori user can also set their own views – an option they are accustomed to from other software. Another major advantage for Fiori lies in the option of filtering applications based on user functions. After logging in over the web interface, you only see the modules that you are authorised to use, and you also don't have to go looking for them. We are thus seeing a gradual end to the days when by far the most efficient approach for users was to remember their top 20 transaction abbreviations. Things are also simplified by the fact that standard transactions' screens can themselves be simplified, by hiding selected fields or renaming them, to maximize convenience of use.

S4/HANA mobile

The Fiori client lets users access SAP applications via their mobile devices without the need for special versions of these applications. This brings with it not only reduced development costs, but also enormous flexibility for users. Managers can now monitor overviews or approve requests from practically anywhere. Yet the use of mobile versions is also attractive for e.g. workers in the maintenance or quality departments, who can perform their measurements conveniently on a tablet with full support from the on-line SAP system. This too is one reason why SAP ERP's new S4/HANA generation is another step forward in digitalisation and in making many companies' work easier.





Fiori's application types

Fiori differentiates three basic types of applications: transactional, analytical and fact sheets. As the name implies, a **transactional** application is the equivalent of transactions as you know them from traditional SAP – e.g. receipt of materials, invoice creation, handling purchase orders, etc. **Analytical** applications, meanwhile, visualise various overviews and provide source documents for analysis and reporting. Most importantly, they perform these steps in real time thanks to the strength of the S/4 concept in tandem with the HANA database. **Fact sheets**, meanwhile, are a combination of the previous methods, and they offer a comprehensive overview of related processes and enable deeper analysis and prediction, primarily for financial indicators.

Support for custom KPIs

The possibility of modelling and monitoring custom KPIs is invaluable for the daily work of everyone in finance, manufacturing and purchasing. SAP Fiori makes it easier to create the needed models and offers every user the opportunity to monitor custom indicators such as production volumes, defect rates, supply volumes and overdue invoices.

When the user is setting up new KPIs, the interface leads them through all of the needed steps, and it even provides multiple assessment options, including display via graphs, timelines and percentages of completion.

Monika Kolesar

We have a lot more responsibility now

This April, we officially launched aimtec.cloud, a single platform incorporating all of Aimtec's cloud solutions. What led us to do it, where do we see cloud services' future, and how can manufacturing and logistics firms profit from SaaS? Aimtec's Cloud Services Director Jan Stočes has the answers.

Jan, you started out as the manager of Aimtec's ClouEDI product. So you were involved in cloud services right away. Is that true?

Yes. ClouEDI was the first cloud solution we offered. Six years ago, we successfully completed our first project providing EDI communication as a service. Because our main focus is on the automotive sector, special features specifically from this field were gradually added in: the Customer Portal and the Supplier Portal, ASN checks and more. But the cloud and SaaS are trending across all sectors, and the growing number of our customers from other sectors, such as chemical manufacturing and logistics, just confirms this.

What was your reason for introducing cloud services?

We saw an opportunity for offering a simple, quick and high-quality solution. When we were starting out with ClouEDI, specialised services in the cloud were few and far between. Today companies are seeking practically all of their solutions "As a Service" – from EDI to WMS and even ERP. And that was one reason why we decided to introduce aimtec.cloud.

As we went about developing ClouEDI and new features, we found ourselves using the cloud for solutions addressing more than just EDI. Besides developing the portals you mentioned, we also, for example, developed scanner integration, a Yard Management System and more. So introducing MES and WMS as services was just a logical step and another stage in our products' development.

How long did it take until aimtec.cloud could be launched?

Starting from the final decision to jump into cloud WMS and MES as well, it was about half a year – but we definitely haven't reached the end. A team of people in all of our divisions is working on development, but it's possible in the future we'll dedicate these people to the cloud alone.

What are the pitfalls of providing SaaS?

Even though it might at first seem that a cloud service is only a copy of an on-premise solution, that's not the case. We had to change how we think and how we work. With SaaS, we're responsible for everything involved in application operations, updates and security. With an on-premise solution, the customer's IT department handles a large part of this. Also, it's just as easy for a customer to turn off a service as it is to turn it on. So client satisfaction plays a large role, as does the SLA, which tends to be stricter than for most "physical" solutions. Even though our partner Amazon Web Services – one of the largest IaaS providers – has our back, first contact is something we carry on our shoulders. And so the entire responsibility for the solutions' functionality is on us. As is the criticism when anything goes wrong. But the benefit of AWS is that it's a robust solution, minimising our risk of downtimes.

What, meanwhile, are the pitfalls for the customer?

Practically none. A few conservative firms might keep their distance from cloud services, but those are somewhat exceptions. With the cloud, manufacturers can acquire the solutions they're used to from on-premise, and also do it faster and without a large initial investment. They can also choose and assemble features however they need.

So the benefits win out?

Definitely. All it takes to start up a cloud service is an internet connection. Companies no longer have to worry about infrastructure, installation, licences, updates etc. Likewise the initial investment is very small compared to on-premise solutions. In combination with the reliability and security that can be achieved today, SaaS is clearly the future, and not just a trendy term.

In what direction will cloud services for industry develop in the future?

I think the era of giant multifunctional monoliths is behind us. While the cloud is a real trend of course – as you can see, by the way, from SAP's planned transition to a cloud version exclusively – various microservices and modules that companies are acquiring for their ERP are a trend as well. More and more often, customers are reaching for the chance to assemble their own solutions from individual smaller systems, which they each purchase as a service, and then turn off when it's no longer needed. So we'll need to know how to integrate not only cloud solutions with on-premise systems, but also individual SaaS solutions among each other. The IoT, and processing data from it, will be another big topic, of course; the cloud is a major advantage there.

Zdeňka Linková

Jan Stočes
Cloud Services Director

Jan has focused on IT in manufacturing from the very start of his career; he has also worked as a consultant at CSC (named DXC Technology today). In 2016 he arrived at Aimtec to begin developing their first cloud service. Now that aimtec.cloud has entered the market, he's in charge of the strategic development of Aimtec's entire cloud portfolio. His free time is devoted to sports and his family. He'll gladly speak with you in English or German.

Making the yard work like clockwork

Limited gates. Delays caused by traffic accidents. Unknown trucks in the yard. These are just a few of the problems faced by manufacturers and logistics companies. How can you keep trucks from having to wait unnecessarily in your yard, wandering and seeking the right loading ramp? How do you respond flexibly when traffic and other circumstances have kept loading and unloading from happening on time? Logistics has taken a liking to three-letter abbreviations, and the solution here is among these – it's a YMS.

It's true that some ERP systems can cover a certain portion of the planning for loading and unloading as well. But a system that large can't always respond flexibly to all the specifics, and what's more, information is often needed by up to three parties – the customer, the supplier and the shipper. And if they don't have that information in one shared place, there might as well not be a plan. So it pays to acquire a Yard Management System (YMS) that's integrated with the other software you need, while also letting shippers access the planning table and directly reserve specific loading and unloading times. If you also decide for YMS in the cloud, you can start using the system very quickly without any sort of large initial investment. And meanwhile, if you're no longer using it, you can turn off the service and not pay for it.

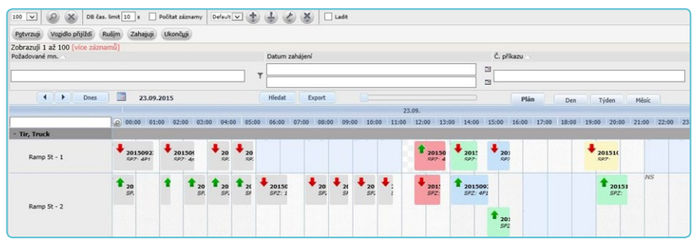
Automatic information sharing

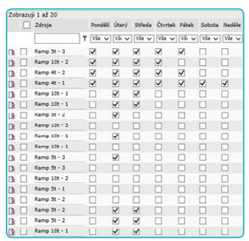
A yard management system lets shippers and their customers share shipping requests and inform each other of unexpected situations and changes automatically. The shipping customer can then respond flexibly and relocate their handling crew and equipment to another loading or unloading job. Another advantage of a YMS is that it can be integrated with, for example, the yard's boom gate, and – with help from truck license plate recognition – shippers can be let in without large delays. The company that's renting the yard can thus rest assured it contains only people who need to be there, increasing security. Suppliers' reliability can also be evaluated based on how well they abide by planned arrival times and loading/unloading lengths. Integrating a YMS with a WMS also makes the process of receiving materials at the warehouse faster and more precise.

The benefits of a YMS:

- optimum planning of capacities and handling equipment,
- savings on overhead costs for the planning of loading and unloading,
- assessment of carrier reliability,
- monitoring of operator performance levels,
- automatic information on unexpected changes,
- visualisation of the plan vs. reality right at the ramp.

Jan Stočes





Silicon Valley in a railway station

Is Silicon Valley still the only mover and shaker, or are creative ideas born in other places too? Are million-dollar labs a must, or is an old former railway building enough? This year's #AimtecHackathon in Pilsen's Moving Station was proof positive that progress can be born anywhere – and it changed our thinking too. This March, fans of new technologies from among students, academics and professionals came together in Pilsen for the fourth time.

Hackathons are a format that is popular worldwide. And with good reason, because they connect technologies with creative people who can find new uses for them. These two sides of the equation might never come together otherwise, because not everyone has access to their own robot, IoT cloud platform, or latest-generation VR hardware. We do have that access. And because we're well aware of the power of thinking outside of the box, we offer opportunities to others as well.

This year's #AimtecHackathon had a single spirit: "the technologies have matured". In previous years, we often found ourselves trying a technology for the first time. We didn't know anything about it, and there really wasn't anyone in the world who could advise us. It was trial and error, in a sense. We usually had major enthusiasm at the start, and at the end sometimes a little disappointment too. But the technologies that reigned in this year's hackathon already have those wild years behind them. "This year AimtecHackathon

was a three-day event, which was very exhausting for the organisers, but at the same time, the entire event filled us with energy, and I'm confident that besides the new ideas, it has led to a number of new friendships", says #AimtecHackathon's main organiser **Jiří Dobrý**. **Markéta Jedličková** from the winning team praises the atmosphere as well: "AimtecHackathon is great because of how you feel at home. There's a great team of people here organising it, and they put a lot of energy into it".

The most interesting technologies

IoT and the cloud attracted the most attention. Today it's nearly certain that the age of smart refrigerators is just around the corner. Within the Hackathon, participants could try out all three of the IoT networks in the latest generation, while also receiving a chance to prove that smart devices can be built for just pennies using commonly available components. The Big-Clown platform, for example, saw use as the foundation for a sensor that monitored parcel shipment (it monitored a parcel's temperature, humidity, position and acceleration), while commonly available sensors were used for a system that monitored the air quality in a house or apartment, and an outdoor version that monitored urban spaces. As well as one of those smart refrigerators we mentioned – it could monitor its own contents via barcode scanning, and could even talk to its owner.

Just about every IoT project today has to use **cloud services** it seems, and here we were pleased to offer the teams a number of services from the market leader, Amazon AWS. Likewise nearly every team worked with the RDS database service for data stoage, and we tested the mettle of AWS Rekognition as well, for face recognition and other services.

Mixed Reality was another popular area. The team named ARigami presented one option for harnessing augmented reality as an interactive guide; they applied it to the problem of origami folding. Using the OpenCV framework, it performed image analysis, and then it recommended the next step in real time.

Virtual reality was there in the form of not only the HTC Vive headsets that are so widespread today, but also the top-of-the-line and professional-ready XTAL headset from vrgineers. The **real-world use of a hand-motion sensor, Leap Motion**, was a small exception to the "no new technologies" theme. It lets users manipulate the environment of an augmented or virtual reality without any kind of controller, thus bringing us closer to mass utilisation of these technologies. Without any kind of training, using natural motions, users can play the piano, control VR strategy games and more. This sensor proved itself fully up to par for use in gaming.

We saw the greatest leap this year by the technology that's been with us the longest. We've all known the word **robot** for a hundred years, and robots assemble most cars today, but recently we've seen a change in their availability. Today they're not just a tool for the elite costing hundreds of thousands of Euros. You want to build your own android? Today you can do it for even just €500.

The influence of robotics on our future will be enormous: once-expensive goods will become an everyday commodity open to everyone. The Czech open-source robot project **Matylda** is a nice example. It gained a bit of national fame for its hitch-hiking travels back and forth through our country. But it really deserves international fame, as a great example of a new generation of robots that everyone can build themselves. Its body can be printed on a 3D printer, and countless e-shops out there can sell you its electronics. A RaspberryPi or an Arduino can be used as its brain.

A team at this year's Hackathon managed to not only assemble an entire Matylda robot, but also teach it a number of things. Thanks to cloud services, it was able to communicate in natural language – the team used IBM Watson for its speech recognition and SpeechTech TTS for its speech synthesis. It also used a dialogue system for managing communication, thanks to which this Matylda could react to simple commands in natural language. The icing on top was live video streaming using Amazon Kinesis straight into the cloud for analysis. Here the Rekognition system processed the video and could recognise human faces and their characteristics – such as age, gender and mood.

Collaborative robots were another quite interesting area. Until now, for safety reasons, every robot has had to be enclosed in a cage, with no humans allowed inside. However, global manufacturers are beginning to become aware that human-robot co-operation is also an important part of solutions, and so today nearly every one of them offers "collaborative robots". A robot of this type differs from its older brothers and sisters mainly in its set of sensors that detect whether it has collided with anything or encountered any kind of resistance during its motion. It is entirely safe in conjunction with humans, who can behave entirely unpredictably around it without a risk of injuries.

An international team presented a possible use for collaborative robots at AimtecHackathon via a simple game of noughts and crosses. The robot was fitted with a camera that monitored the scene, and its images were processed using the OpenCV framework. Through segmentation, each real-world image was transformed into a digital description of the current situation that the gameplay algorithm could use. This example of playing a very simple game vividly illustrated a much broader concept in which a robot could co-operate with a human in performing a certain task while also reacting in real time to the current situation. The Fanuc collaborative robot to which the hackathon's participants had access had no predefined motions (since the human it was playing against chose moves randomly), and yet it was always able to react to the token just placed on the playing field and to choose a new move using artificial intelligence.

AimtecHackathon has expanded our boundaries once again. It has shown us IoT solutions that no longer require years of waiting. It has pushed the possibilities of virtual and augmented reality forward with help from natural hand control. And meanwhile it has confirmed that robots are indeed here for everyone. They don't need to be enclosed in cages, they don't have to cost millions and any one of us can build one at home. Now let's all go out and find ways for these technologies to help us as much as they can.

About #AimtecHackaton

#AimtecHackathon is organised by Aimtec to support tech education and IT awareness among the public. Our first Hackathon was held in 2016, and over time these events' programming marathons have been joined by presentations and children's programmes. The event is traditionally held in Pilsen in March. The Faculty of Applied Sciences at UWB and nvias – a youth tech education centre – are its main partners. For more information on this project, visit www.aimtechackathon.cz.

#AimtecHackathon 2019 Partners: Alpha Industries, Amazon Web Services, Arduino-shop.cz, BigClown, Campo Arduino, The City of Pilsen Robotics Centre, Cisco Systems (Czech Republic), DataScript, Desseq, eMan, Fanuc, The Faculty of Applied Sciences at UWB, The Faculty of Health Care Studies at UWB, iNFINITE production, juicymo, nvias, OpenTechLab Jablonec nad Nisou, RVTECH, SentiSquare, SpeechTech, TrendMicro and VOŠ a SPŠE Plzeň. Media partners: ABC magazine, AIMagazine and ComputerWorld.

Petr Stejskal

The king is dead, long live the king!

The MC9000 mobile terminals have long been among the best-selling products in their category. Since their entry onto the market in 2003, 2.8 million terminals from this line have been sold. And it's no wonder, because this is one of the most robust solutions among mobile terminals – one that holds up long-term during demanding operations in manufacturing halls and warehouses.

The last available generation of the MC9000 line, named the MC92, has its best years behind it. So we've been waiting impatiently for a successor, and now the wait is over. Zebra has just brought the new MC93 model, with many new features, onto the market.

Let's start with what's evident at first sight (or first touch). The **ergonomics** and craftsmanship of the "93" will catch your interest as soon as it's in your hands. You'll feel like you're holding a gun to shoot down all the challenges of picking. Although the terminal is a little heavier than its predecessor, that doesn't matter thanks to its good balance.

Its 4.3" capacitive display is surely eye-catching; it provides more room for viewing information. Its LCD is also protected with a full two layers of **Gorilla Glass**. I also consider the positioning of the scanning module to be an advantage. It's more deeply recessed into the device's body, which will definitely protect it better against damage.

When you look at the battery, an unpleasant surprise is waiting at first. All of the previous generations used the same battery model, and thus the same charging accessories too. The new generation has brought with it an entirely new battery, and that can be a problem in terms of compatibility with older chargers. But you just need a special adapter to be able to use today's chargers with the MC93 as well. And the new battery does have a number of benefits. The battery now has a capacity of **7,000 mAh**, and this in itself ensures nearly **twice the staying power** per charge. Also, using the new charging stations with the quick-charging feature, you can reach 90% capacity in just 3.5 hours.

Computing power is provided by an eight-core Snapdragon 660 2.2GHz **processor** and 4 GB of **RAM**. This platform is in all of the terminals that Zebra has released recently, as well as those just being released. So for the first time, we're seeing a **unification of their portfolio**. This brings positives in the form of better support, updates, and the use of software across all Zebra products.

Talking of software, Zebra Mobility DNA software is likely the device's largest competitive advantage. **The future belongs to Android**, and so with the MC93, what we see is strictly and solely the Enterprise Android 8.1 OS with pre-installed utilities such as Device Tracker for determining equipment locations, Push to Talk, ALL Touch TE or Velocity Telnet Emulator, StageNow for easy and fast configuration of multiple devices at once, and Enterprise Home Screen Pro. The **Power Precision Console** is an interesting new feature with which you can remotely monitor the state of each individual battery without worrying about which device it's currently inside of.

Thanks to the LifeGuard programme, we can all count on the MC93 having support and security updates that last for ten years. In light of what we've seen with the preceding generations – which in many cases ran without problems even for longer than ten years – and considering that the MC93 is right at the beginning of its life cycle, it's definitely an attractive investment within your future projects.

On the one hand, we've all had to wait for some time for the MC93. But after our first impressions, we have to state that the waiting has paid off.

Antonín Steinberger

Current generation: MC9300

- Perfect balance
- 2 layers of Gorilla Glass
- 4 GB RAM
- Android
- 4.3" display
- Charged to 90% in 3.5 hours
- 7,000 mAh battery: 2× MC92's staying power
- 10 years of support

A safe motorway to the cloud

A snapshot from a typical hall: the beeps of readers and buzzes of printers resound throughout the warehouse. Operators are scanning barcodes and printing stickers that they will then be placing on packages of materials or finished products. Data is flowing between each reader/printer and the server swiftly, safely and with no need for user intervention. At least in the case of an on-premise solution. But how is it with connecting these devices to the cloud?

Currently the vast majority of IS communication runs through a company's own computer network. So data rarely peeps out over a hall's walls into the unsafe world of the internet; it flows along the company's safe internal wires only. Thanks to this feeling of safety, old, insecure communication protocols such as Telnet for text or traditional HTTP for web browsers are used in even the most modern on-premise information systems. In a cloud-based world, all of this will have to change completely.

The risks of unsecured communication

Once cloud services are in play within an information system, it no longer lies on "home" ground in a company's own server room; instead, it is accessed via the insecure, open internet and faces a number of potential risk factors. **Data theft** and **manipulation** are the main risks that arise when insecure communication is used between the client (the mobile reader or printer – or your PC) and the information system on the server. Enterprise data is an ever more valuable commodity, and if you're sending information over an insecure protocol, you might as well ask your bank to send your PIN on a postcard.

The second main risk is potentially **exposing your information system** to practically everyone on the internet. Back when it was on your server, no outside parties could reach it. But cloud tools and systems are available to everyone. This situation demands that you secure your solution.

Securing cloud solutions

IT developers are well aware of the risks, and countermeasures exist for every one of them. The risk of data theft or manipulation is mainly addressed by **encrypting your communication**. Encryption is a process wherein a sender's sensitive information is turned into something that looks like nonsense, but is readable using the decryption key held by the receiver. Ordinary users never notice the encryption; it takes place between software programs only.

HTTP is one of the most popular communication protocols on computer networks today. Even though it was originally developed for displaying web pages only, it has become the de facto transfer medium for other applications as well. Its secure variant **HTTPS** is the right solution for tools in the cloud. Not only does HTTPS ensure the encryption of the transferred data, as well as its continuous integrity (confirmation that no-one has manipulated it along the way), it also verifies the other party's identity. So if for example you send an EDI message or a transaction for a WMS system over HTTPS, you have the certainty of knowing precisely who you're communicating with, and simultaneously knowing that nobody has changed or read the data in the transaction or message.

How information is secured in aimtec.cloud

Within aimtec.cloud, we use the HTTPS protocol to connect to not only mobile terminals, but also end-user PCs, as well as any touch panels. Mobile terminals, meanwhile, use HTTPS within the native DCIx Touch Client Android app – a product developed by Aimtec itself. Computer users can stick to their usual web browser, but instead of "http", aimtec.cloud web addresses will begin with "https" – as has become the standard for the majority of web pages today. The same applies for touch panels; these panels are typically located in the spaces that are used for collecting manufacturing data.

In certain cases, HTTPS can also be put to use for sending print jobs to printers. Normally, a server located in a cloud data centre should not have any access at all to the printer on the desk next to you; these printers should be connected to your local enterprise network only. However, the modern **IPP** printing protocol can optionally be used for printing labels or customer documents from aimtec.cloud; IPP makes use of HTTPS and thus of its security features as well.

All the same, the ideal solution is to define a secure tunnel over a **VPN**. This represents a secure route for data even over the public internet, and it gives both sides full control over the rules for data flow. Ideally, the VPN connection is set up between the data centre and the customer's network in one direction only (from the cloud to the customer) and for a precisely defined set of endpoints (printers). This eliminates the risk of printers potentially being exposed to the internet.

A second fundamental security problem, **reliable authentication**, is primarily addressed through a well-designed password policy and password management. Within aimtec.cloud, passwords are treated as extremely sensitive data – they are encrypted, and the password policy enforces a certain minimum length, non-reuse or limited validity for passwords, and the blocking of accounts after a certain number of failed logins. In connection with the function used, Microsoft Active Directory integration can also be applied, thus retaining centralised user administration.

Security is one of our main priorities guiding the development of aimtec.cloud. Securing communication between the client and the server is one area in which we apply the latest approaches to our overall system design, but it's far from the only one. This approach makes the entire platform highly modular and fully secure, yet still fully open to communication with the rest of the world.

Petr Stejskal

When a problem is solved before you know it

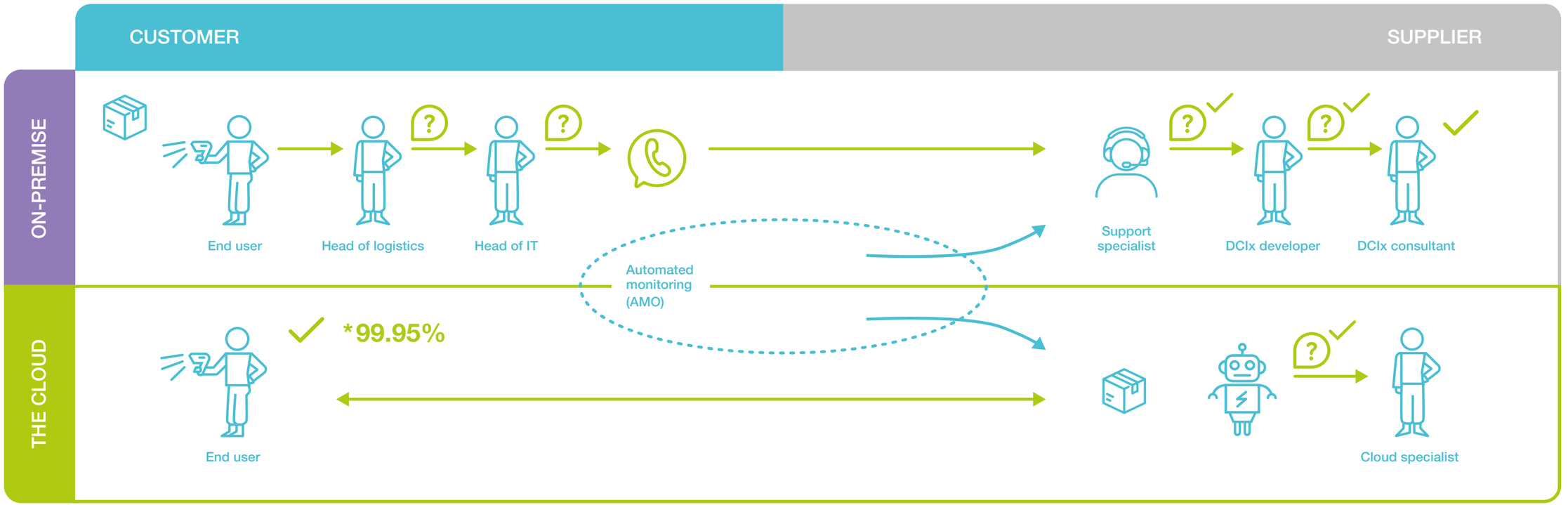
Cloud services don't just mean moving a server off-site. Using them also gives you many services in the background that would otherwise burden your internal team. You don't just save money – in many cases you won't even have to know there was a hiccup.

Traditional **IT infrastructure operations** are one example. With cloud services, you leave all backup, archival, configuration and hardware maintenance processes to their supplier (or the data centre operator).

The second area that the cloud simplifies for you is **resolving incidents**, for example the inability to scan a code. With an on-premise solution, the warehouse worker must escalate to their superiors. This escalation may continue on through up to five people at the customer and the software supplier. This takes a lot of time, causing unpleasant delays.

With cloud solutions, including aimtec.cloud, it's precisely the opposite. The end users often **needn't even know** that the system was improved. Thanks to automatic monitoring and preventive maintenance, the service's operator knows in advance where a problem can occur and proactively resolves it even before it occurs. Thus with guaranteed 99.95% uptime, you gain a reliable system in which you often won't even have to know of an incident, because it's all resolved before you learn of it.

Marek Šabatka



Logistics start-up Skladon has entered a new era

It's said that the Czech Republic is a land of e-shops. But e-shops require high-quality logistics, and the founders of Ostrava-based Skladon know this well. Four years ago, they took advantage of a hole in the market and – after winning a startup competition – started their own company. Now they've opened a new fulfilment centre that provides infrastructure for their future growth. But you won't find a WMS server room there…

This distribution centre's gala opening on May 22nd was bursting with startup enthusiasm, which gradually carried over to the representatives of this young company's suppliers, investors and other supporters. Energy and faith in Skladon's business plan were palpable in the speeches by its founders and by the deputy regional governor of the Moravian-Silesian Region, Jakub Unucka, who stated: "I'm glad to see such an ambitious company founded in none other than the Moravian-Silesian region." The founders Konstantin Margaretis, Matrik Babinec and Miloš Halecký all declared that the strategic partnerships they've successfully forged, both investor-side and on the sides of suppliers and of the solution-development team now tirelessly building their MySkladon application, have been essential. MySkladon helps e-shop owners to navigate and manage orders, refunds and replacement claims. Konstantin Margaretis laid out Skladon's future direction: "We want to work on automation and digitalisation and expand into the world. It won't be simple, and it will require finances, partnerships and hard work by everyone at Skladon." We at Aimtec feel compelled to cross our fingers for their future. We look forward to seeing the cloud version of our WMS growing alongside Skladon – who were also its first deployment.

Zdeňka Linková

In Brief

A New Innovation Partnership

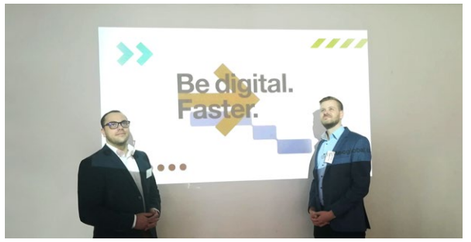
At the end of 2018, we began partnering with Bavaria's Cluster Automotive. We see this partnership as a chance to share our experience with Bavaria's universities and industry networks and to present our digitalisation projects to a broader audience.

There for EASTLOG – this year like every year

The EASTLOG conference is a shining star among Czech logistics conferences, and like every year, we were there in 2019. At a panel discussion, our Roman Žák offered a look at the ever blurrier borders between production and logistics.

Coffee with a robot

As a part of the traditional job fair organised by the University of West Bohemia, we presented post-graduation employment opportunities to their students, and this year we also brought in a Matylda robot with which they could chat and enjoy a cup of coffee.



The cloud in Ostrava

This time around, we took our seminar on harnessing cloud services in industry to Ostrava. But that wasn't all – its participants, all automotive manufacturers, also had a chance to try out virtual and augmented reality.

Aimtec Open Race

Over 500 bikers rode out on 18 May into Pilsen's countryside for the Aimtec Open Race cycling marathon. On the longer 68-kilometre route, Lukáš Pitel from the Big Shock team was fastest.

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