DEMATIC

Dematic cuts warehouse design time from weeks to a day with Azure HPC and Azure Kubernetes Service

March 16, 2023

Customer
Dematic

Products and Services
Azure
Azure Batch
Azure Blob Storage
Azure Container Registry
Azure HPC + AI
Azure Kubernetes Service
Azure Resource Manager
FastTrack for Azure

Industry
Professional Services

Organization Size
Large (1,000 - 9,999 employees)

Country
United States

We live in a world where at any given time, consumers can be one click away from whatever products their hearts desire. With some retailers permanently closing the doors to their brick-and-mortar locations and other internet-native brands going viral and reaching millions of customers seemingly overnight, it's no surprise that the world has experienced ever-increasing demand for high-performance, always-on e-commerce and warehouse technology. That's why US-based intralogistics innovator Dematic has built a strong reputation for helping thousands of brands set up, run, and improve their manufacturing and distribution operations using automated warehouse solutions.

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With the support of IT consultancy PRODYNA, Dematic's system design tools team manages a robust analytical platform known as the Dematic Concepting Engine (DCE), which the company's sales force uses to run calculation jobs and issue proposals much faster than in the past. Initially built on virtual machines (VMs) in Microsoft Azure (https://azure.microsoft.com/), the system design tools team decided to modernize the application design and move toward a microservice-based architecture running on Azure Kubernetes Service (AKS) (https://azure.microsoft.com/products/kubernetes-service). Facing an urgent need to scale up the capacity of its sales workforce and support more customers, the updated design makes it possible to provide dedicated AKS node pools to each DCE user—and more of them—by tapping into the almost unlimited capacity of the Azure cloud platform for the exact period needed. It also allows Dematic to outsource complex calculation jobs to Azure Batch (https://azure.microsoft.com/products/batch), creating a cost-effective solution with on-demand compute power that wasn't possible on-premises.

> "Using Azure Batch has already helped us streamline parallel workloads and reduce simulation time from 11 hours to 24 minutes."

—Bjorn Madsen: Head of System Design Tools
Dematic

Making the most of multimillion-dollar investments

As a member of the KION Group, a leading supplier of industrial trucks and supply chain solutions, Dematic plays a key role in improving the flow of material and information within factories and distribution centers. For many local and global brands, warehouses are multimillion-dollar investments that are absolutely critical for business continuity. So, Dematic strives to offer tailored solutions in a fast and flexible way, reducing the potential risk to customers if they face delays with managing peaks in orders and shipments.

Learn More

Azure Batch

Azure high performance computing (HPC)

Azure Kubernetes Service

FastTrack for Azure

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To generate those personalized results, Dematic's system design tools team runs complex calculations to help its customers assess and select the best warehouse footprint to achieve their individual goals and sustain growth. The team then analyzes several months of raw product, order, and supply data from each customer and creates a granular sales forecast extended to the lifetime of the facility to anticipate future capacity needs. If a customer wants to reformat or change part of its warehouse equipment, such as swapping out an automated storage and retrieval system for the company's multishuttle system, the team needs to support the customer by making space adjustments or reevaluating how many conveyors and buffers are needed to feed different components and throughputs.

Traditionally, the calculations involved to make such adjustments would take eight weeks to complete given perfect information—not to mention that the associated workloads are extremely volatile. "If a customer updates fundamental assumptions, it can trigger a complete recalculation of the warehouse design and set the project back by weeks," explains Bjorn Madsen, Head of System Design Tools at Dematic. "If customers can't get answers from us quickly, the dialogue stalls and the entire process can grind to a halt, and we wanted to change that."

This led Dematic to develop the first generation of its DCE and enable a broader team of warehouse design engineers and consultants to draft and simulate warehouse designs for more customers much faster and more reliably than before—and at a higher level of quality. As Madsen notes, "The most important outcome for our solution design engineers is how much time it takes from a customer asking a question to when we can confidently provide a computationally proven answer."

Further optimizing an already game-changing solution

The original DCE ran on a set of Azure VMs that were shared among the application's entire user base. Dematic wanted to further improve the performance and scale of the DCE by making

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dedicated workers available to every user, and it was confident that the right application of technology would resolve any constraints. Using familiar Microsoft products and services, the system design tools team rearchitected and innovated the entire DCE platform in Azure using a “rent, use, and return” approach to make the required computing resources flexible and available on demand.

In the new design, less than one percent of the DCE components are reserved—the rest scale out and back in as required. This wouldn’t have been possible without the high availability of Azure resources, including Azure HPC and containerized, autoscaling AKS, which made it economically viable to eliminate the need for engineers and consultants to share compute resources or wait for their own compute time. Madsen elaborates, “Whether they’re rendering a customer demonstration movie or computing the solution to an optimization problem, users can choose and select an instance of the provided Azure VM product that fits their current needs, launch the application, do what they need to do, and then drop the instance back to the cloud when they’re done.” Idle services scale to zero and take up mere megabytes in storage.

Dematic’s success as a business not only relies on precise calculations and detailed proposals, but the speed at which its engineers and consultants can deliver actionable plans and advice to customers. That all starts with the initial requests for quotes (RFQs) and a 10- to 12-week process of replying to a typical RFQ, and the business has only one attempt to get the design right. “With the first generation of the DCE, we’ve managed to build the tools so that the timeline first dropped to one week, and now with the current generation, it can be done same day,” says Madsen. This time savings leaves plenty of room for adjustments, experiments, and perhaps most importantly, additional RFQs, which enables the business to grow its sales using the same resources.

Future-proofing the DCE with help from Microsoft and PRODYNA

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After launching the next-generation DCE, the system design tools team quickly started tapping into value-added capabilities in Azure with support from a team of FastTrack for Azure (https://www.microsoft.com/azure/partners/fasttrack-for-azure) specialists and cloud solution architects. Dematic was backed by PRODYNA, a member of the Microsoft Cloud Partner Program (MCPP) and Microsoft Solution Partner for Azure Digital & App Innovation, Azure Data & AI and Azure Infrastructure. Microsoft and PRODYNA experts brought their best practices and experiences to the table, which accelerated Dematic's innovation rate as it found the right solutions for its specific challenges. For example, notes Florian Assmus, Chief Architect at PRODYNA, "The main issue we noticed with Dematic's existing solution was that it was static, and the actual workloads are highly dynamic." The consultancy helped Dematic write custom software, deploy infrastructure, and containerize the DCE into a more future-proof, microservice-based architecture on AKS.

A significant part of supply chain logistics is determining the best sequence to pack boxes. Dematic and its team of experts identified Azure Batch for this use case because a dataset from a customer containing 90 days of deliveries to 170 stores could equate to more than 1 million pallets needing to be packaged and transported. The company can now use Azure Batch to outsource high-performance computing (HPC) (https://azure.microsoft.com/solutions/high-performance-computing) batch jobs and seamlessly transfer the results back in-house. "Because we know about how much memory we need on each calculation, we can make a tradeoff between how big we want a cluster—2,000 or 20,000 cores—and then just distribute the workload," says Madsen. "Using Azure Batch has already helped us streamline parallel workloads and reduce simulation time from 11 hours to 24 minutes."

As for storing customer data, Dematic appreciates not having to worry about the availability or scalability of Azure Blob Storage (https://azure.microsoft.com/products/storage/blobs) and has gained significant performance improvements using Azure Premium SSD (https://learn.microsoft.com/azure/virtual-machines/disks-types). "By having

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dedicated workers for the end-user on demand, we see an average speed increase of around 2,000 times using Azure Premium SSD relative to our previous shared worker model," says Madsen.

Recognizing that the cloud is an evolving marketplace, Dematic is continuing to make strategic design decisions to optimize IT management, including offering self-service options to its broad user base. The system design tools team is using Azure Resource Manager (https://azure.microsoft.com/get-started/azure-portal/resource-manager) to help automate the selection of the latest products available to users without requiring administrator involvement. "We anticipate that the Azure Resource Manager API will deprecate aging products and add new versions, and the only dependency we'll have is calling the API and selecting the next best VM with the most CPU power that we can get," says Madsen. The result: no wait times, hurdles, or internal dependencies—just more work done faster, smoother, and easier than previously possible.

The system design tools team has automated its continuous integration and continuous delivery pipeline to include Terraform and Helm scripts to such a high degree that building new services only requires a developer to create a new project from a template and add the application code, leaving the pipelines to do the rest. The team's record turnaround from receiving a new specification to deploying it is 90 minutes. Although the team's high innovation rate leads to many releases, no configuration management tools are required. This is because the services are containerized, and the containers exist in the Azure Container Registry (https://azure.microsoft.com/products/container-registry) so that any version of the service can be launched at any time. The AKS control plane monitors the workload and adjusts the number of instances to match demand.

Reducing time to solution while enhancing the user and customer experience

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Since choosing to evolve its DCE on Azure and turning to a modern, microservice-based architecture in AKS, Dematic has significantly improved the ability of its engineers and consultants to support highly complex warehouses with many moving parts, while also bringing on more engineers and consultants to help more customers. The sheer scale of its fully on-demand compute power is now a key differentiator for the business, empowering it to meet growing e-commerce market demands and help reshape the future of the industry.

"With the new release of the Dematic Concepting Engine not only running on Azure but also benefitting from the capabilities of the entire Azure platform, we've dramatically reduced the time to solution—from having customer data to running designs and calculations and ultimately giving out a warehouse proposal—from eight weeks down to one day," shares Madsen. This productivity increase translates to an increase in the capacity of the workforce to answer RFQs and engage with new and existing customers.

Dematic says it plans to continue scaling the warehouse design application throughout the organization with the hope of soon opening it to the public. As Madsen reflects, "Through our collaboration with Microsoft and PRODYNA, we're defining innovation. Not only are we at the forefront of what can be done in the industry, but we're now capable of doing exactly what we wanted, and that's a great place to be."

Find out more about Dematic (https://www.dematic.com/) on Twitter (https://twitter.com/dematicglobal), Facebook (https://www.facebook.com/DematicGlobal), and LinkedIn (https://www.linkedin.com/company/dematic).

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