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CASE STUDY

HP Site Flow's architecture relies on containerization to quickly scale up and down as demand dictates. Mako™ was key to this approach, offering a small memory and resource footprint, without compromising PDF processing performance.

THE CHALLENGE

When HP Inc began developing HP Site Flow, an end-to-end workflow & production automation, they soon encountered several challenges:

The personalized market was growing

Knowing the standard file format in the industry is PDF, HP based its original solution on open source software. But it quickly outgrew this as new customer requirements were identified, for example to extract metadata, add a barcode or create a thumbnail; HP needed a more reliable, fully featured solution from a dependable source to manipulate PDFs. They tried a proprietary solution, which was satisfactory at first, but they found that it didn't meet their growing needs. Support issues that required a code fix could take months to appear in a release, potentially delaying the project. Support for Linux was also not as lightweight as it needed to be for containerization, impacting scalability.

KEY FACTS

- HP Site Flow is an end-to-end workflow & production automation, available through PrintOS, HP's cloud-based platform, which is fully integrated with HP Indigo presses and HP PWI digital presses.
- HP Site Flow makes it easy for print service providers to manage large volumes of orders; it accepts orders, groups them into production batches for printing, then unbatches them so they can be sent off to different addresses, integrating with delivery carriers.
- HP Site Flow is focused on the personalized market, where users can handle hundreds of thousands of orders a day. It offers integrated ordering, billing and shipping features, as well as the ability to set up customer accounts and create reports. It manages high volumes of short-run and personalized jobs end to-end, from submission to shipment.

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Not all PDFs are equal

Personalization also leads to a wide variation in the quality of files entering the system, as consumers use many different tools to create PDFs. HP Site Flow therefore needed to "normalize" the incoming PDFs prior to printing, which was slowing down the production process.

Printing large PDF files at speed

With high-volume printing a focus, and the need to print large files, where each file is different, HP Site Flow had to be capable of processing huge PDF files; large documents sent to the printer in PDF format can take a long time to print due to their size and complexity. This can lead to a bottleneck and slow down the printer when all the printer memory is being used trying to render the PDF document in real time.

The ability to scale quickly

The system would need to automatically scale quickly; there may be 100, 10,000 or 100,000 orders to process each day and print jobs must be processed in an efficient and timely way.

"I see Mako as a fantastic tool in our toolbox that we can very quickly implement. For example, we've recently been looking at PDF complexity - we know we can grab Mako and look at how complex a particular PDF file is. Mako tells us how such complexity will impact our system and what the resulting requirements will be for us to go ahead with that process and we can start to map that. We couldn't do that without Mako."

Nir Gilon, cloud engineering manager at HP

THE SOLUTION

HP chose Mako™, an SDK from Global Graphics Software that offers pre-flighting options and streamlines PDFs. Using Mako, HP Site Flow manages the process of taking the PDF and making it suitable for printing. It analyzes the document, working out the consumables required, such as how much toner, paper stock etc.

Nir Gilon, cloud engineering manager at HP comments: "Mako runs on Linux and it allowed us to get it up and running in a short time. Working with Global Graphics, we could develop smaller, more efficient deployable containers to execute a scalable PDF renderer."

Nir continues: "One of the things Global Graphics did for us early on was to assist with running the system on a small, simple and secure Linux. This was a big thing for us because we build everything on containers and we are running containers on Amazon elastic Kubernetes service. That allowed HP to reduce container start-up time and run many more of them on a single host, increasing scalability."

Realizing Mako's potential, HP commissioned the team at Global Graphics Software to implement several new features:

Scalability

HP Site Flow runs on a platform called Workforce, a dynamically scaling microservice orchestration software platform that deals with rapidly changing volumes of orders. Workforce was initially built as a data-driven processing platform to perform custom file processing operations at scale. Workforce continuously monitors the backlog and Workers (a discrete service dedicated to performing a single task type) rapidly scale up and down based on demand to ensure the backlog is completed within an acceptable timescale.

Improved memory usage and CPU performance

David Stevenson, product manager for Mako comments: "One of the things that HP needed us to do was focus relentlessly on performance. For example, by employing innovative caching strategies to improve content reuse and reduce runtime memory usage, we have been able to reduce hours of processing time to just minutes in some cases. This has also made possible processing of huge jobs – tens of thousands of complex pages – that would have previously exhausted available memory."

Enhanced Productivity Mode

Together HP and the Mako team also implemented a new feature to automatically evaluate jobs for their suitability for printing using Enhanced Productivity Mode (EPM). EPM is defined as printing color (CMYK) jobs using only three colors (CMY) and generating the Black separation by overlapping the three colors CMY. To determine whether a PDF is a candidate for EPM, Mako applies the same unique color management used for EPM by the RIP, allowing for in-depth examination of the PDF, carefully analyzing different separations, color usage and densities.

Nir continues: "EPM saves hugely on consumable costs and enhances productivity by 33% for colorful jobs. Knowing before a job hits the RIP allows EPM jobs to be managed and charged for correctly. This was a very exciting project and couldn't have happened without Mako. The collaboration between our companies made that possible."

Mako in Live Production using Workers

Workers tend to be small messaged-based microservices that underpin the "heavy lifting" of Workforce. Using Mako we developed Graphic Imposer worker which is intended to add elements to pages in a PDF file. In terms of volume it's main use is the addition of barcodes to artworks.

Finally, it's not just about Mako

Nir adds: "It's not just been about Mako, but about the team. The best thing about this project has been working with Global Graphics Software. We could send a message and say we wanted to try and do this thing and very quickly we would get the right people on that call and they would investigate it - and that has been a huge benefit for us. What we've done over the years wouldn't have been possible without that team behind it."

" Mako proved its capability and adaptability by rising to HP Site Flow's development challenges, resulting in increased productivity and profitability for its users."

Nir Gilon, cloud engineering manager at HP

THE RESULT

HP Site Flow is a full-featured, end-to-end workflow and production automation with high functionality that has resulted in increased productivity and profitability for its users.

Mako now handles 90% of PDF files in the HP Site Flow workflow. Mako analyzes the file, accurately predicting the achievable line speed for every PDF job, optimizing the job for the printer.

Mako's PDF file optimization process has increased the proportion of jobs that can be RIPped at full engine speed – enabling print service providers to print more jobs, fast, enhancing their productivity.

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ABOUT HP

The HP Graphics Solutions Portfolio offers a suite of tools to brands and print service providers. At the core resides Brand Centre and Site Flow. Site Flow is a manufacturing execution system for Print Service Providers which enables large-scale print production automation and control from job capture to ship. Brand Centre provides publishers, content owners, and PSPs alike a web portal enabling easy order ingest and tracking for customers.

On top of these services there is one more service called AutoFlow. Autoflow provides a simple UI to automate complex or tedious file preparations and reduce the labor, cost, and time associated with them.

From order management through to printing and shipping, the HP Graphics Solutions portfolio provides the means to optimize and profit through every step of the print manufacturing process.

www.globalgraphics.com

Global Graphics Software Inc.
6601 S Tamiami Trail
Suite 176
Sarasota, FL34231
United States of America
Tel: +1(941)925-1303

Global Graphics Software Ltd
Building 2030
Cambourne Business Park
Cambourne, Cambridge
CB23 6DW UK
Tel: +44 (0)1954 283100

Global Graphics KK
613 AIOS Nagatacho Bldg.
2-17-17 Nagatacho, Chiyoda-ku,
Tokyo 100-0014
Japan
Tel: +81-3-6273-3198

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