Walmart Strives to Be an Online Retail Leader with Node.js

Walmart needed to improve its business.

That's not normally said about an international mega-corporation that made $482 billion in revenue last fiscal year, but Walmart has set its sights on becoming the world's largest online retailer.

Walmart.com currently offers 23 million items for sale, and is rapidly expanding. Earlier this year, the company announced it is inviting retail partners and smaller vendors to sell on its site.

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Keeping Content Fresh with Node.js

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At any one time, there are as many as 30 concurrent business users adding new site content via Walmart's internal CMS system across the web and native app experiences. This data is sent to an orchestration layer built on Node.js, which leverages asynchronous I/O to delegate calls to multiple APIs reducing network overhead in retrieving backend data. Node.js helps improve the ease of being able to write asynchronous APIs to enable more parallel calls to downstream services.

"If you looked at our application layer when it was on Java, you would see a lot of code generating thread pools and calling downstream services in parallel, then joining those to generate one response," Najim said. "If you looked at the same code running on Node.js, it is a lot simpler to understand because Node.js is asynchronous when it comes to I/O calls."

Node.js Keeps Walmart Top of Mind

Second, Node.js also helps Walmart.com keep its content in front of the eyes of Google and other search indexing robots.

When Walmart.com decided to beef up its website, it searched for a front-end framework that would allow it to create beautiful interfaces for crucial components like its shopping cart and checkout process, on various display elements on product pages and the home page, and anywhere else customers could have an easy and delightful experience.

Alex Grigoryan, director of application platform, said Walmart chose React.js, an open source front-end framework that renders data as HTML, to change and update the site as users interact with the interface and enter new searches or data about their preferences. React.js also allows for modular code reuse, which cuts development time for new sites or new features.

Once Walmart selected React.js, Node.js was the obvious choice for one simple reason: React.js renders in the web browser client, but SEO robots from Google, Microsoft and other search engines read data that's rendered on the server and delivered in the browser. If Walmart wanted its dynamic, new website to be easy to find by shoppers searching online, it needed server-side JavaScript, and that means Node.js.

"The unique requirement of Walmart, and I think most ecommerce-based applications, is that we have to be search-engine savvy," said Grigoryan. "What that fundamentally means is that our server has to render HTML internally and send it down the wire to Google and to other bots so when we get indexed it's at the most efficient capacity."

Node.js is a server-side JavaScript that allows Walmart's developers to write what is referred to as "universal" JavaScript. The identical code is shared between the client and the server, the server sends the React-rendered HTML to the browser, and that's where the search bots happily read it.

Using Available Talent as Full Stack Developers

Claude Jones, director of engineering for the experience tools team, said Walmart's need for universal JavaScript highlights another reason why it's using Node.js more and more: By moving to Node.js from Java, it created the opportunity for the company to use a much larger portion of its staff as full-stack developers.

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Node.js allows us to take advantage of the JavaScript on server/side which allows a front-end developer with a JavaScript skill set to now do server-side programming and orchestration. This is very enticing from a developer productivity and scalability standpoint.

Turning a Supertanker into a Speedboat

Walmart will get a big boost from their new Node.js-based technology stack: making developers more productive, modular code, and vast scalability will each help migrate Walmart.com to its new form quickly. Grigoryan said the team started building frameworks for the new Walmart.com last January, with deployment beginning to roll out in that same month. Right now they have about 70 percent of the website running on React.js and Node.js—including Shopping Cart and Checkout—and Grigoryan hopes to have between 90-95% of the site migrated after the holidays.

For a site the size of Walmart.com—with more than 80 million monthly users—that's very, very fast.

Grigoryan has set his sights on moving SamsClub.com, another property owned by Walmart, to the same tech stack as soon as possible.

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"Node.js has also proven out its reliability and its stability, and it's matured over the past two years. This played a significant role. We don't have to worry about how Node.js is going to scale, or if it is going to be reliable. The Node.js ecosystem has grown; a lot of modules and things that we wanted to build were already available," Grigoryan said.

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"Third, it's maturing in its performance and those things together really enabled us to make the decision to chose Node.js and move forward quickly. We knew that if we wanted to move, we needed to do it quickly so that we can really compete as a business."

With Node.js as its core supercharging development in the organization, Walmart is building an ecommerce site to continue its massive growth and mission to become the world's number one online retailer.