Comcast Business Strategy Hinges on DevOps

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They say enterprise IT organizations can't be as agile as web startups.

All the legacy applications and systems in place create too much organizational resistance to change. As one of the largest providers of media and internet services with a history going back to 1963, Comcast would beg to differ.

Comcast has aggressively embraced advanced DevOps processes to not only dramatically speed the rate new code is deployed in production environments, but also to improve how application development and deployment is managed. There's no Comcast requirement for shipping a certain amount of code in a specific amount of time. On average, Comcast puts new code into its production environment twice a week, says Sharmila Ravi, vice president of product development for xFi, CVR and Automation at Comcast Cable. Developers working within a line of business (LOB) unit at Comcast ultimately decide when to add a capability or deploy a new application.

"Releases are not set in stone," says Ravi.

Development teams also can pick their own tools, as long as they are able to be productive. At the core of the Comcast DevOps strategy is a commitment to scripting—everything within the Comcast IT environment is scripted. There's no opportunity to manually make changes, which too often leads to mistakes caused by something as simple as a typo. When something does break, Ravi says, the metric is not whether something didn't work but rather how quickly the DevOps team was able to recover. In fact, pushing that responsibility for attaining specific metrics to individual engineering teams is one of Comcast's key differentiators, she notes.



Comcast's Decision to Embrace DevOps

DevOps at Comcast is a top-down initiative, starting with a tenor fomented by the company's most senior IT executive leadership including Tony Werner, president of technology and product for Comcast Cable.

In fact, Ravi notes, the DevOps success Comcast has enjoyed is directly attributable to culture change within the IT organization led by the IT management team, not any specific process implemented or tool adopted.

Comcast's decision to aggressively embrace DevOps was driven by the recognition that, as a provider of internet and media services, the conglomerate now competes with almost every other technology company in business.

"DevOps is borne out of a need," says Ravi. "You tailor it to your needs."

Comcast's need was driven in part by its transition to internet services at a time when traditional broadcast revenue growth was on the decline. In its first quarter of 2018, Comcast added 379,000 high-speed internet subscribers, yet lost 96,000 video customers. Comcast's high-speed internet revenue hit a high of \$4.2 billion Q1 2018, compared to \$5.7 billion attributed to video revenue.

In addition to providing internet services in 40 states and the District of Columbia, Comcast owns television networks NBC Universal and Telemundo as well as several theme parks. Comcast is also bidding against 21st Century Fox and Disney to acquire UK-based broadcaster Sky for \$31 billion.

Overall, Comcast revenues in Q1 2018 reached \$22.8 billion, a 10 percent increase driven mainly by the 2018 Winter Olympics and the Super Bowl. Net income was \$3.1 billion, a 21 percent increase.

To help foster innovation, Comcast gives developers three weeks a year during regular working hours to work on their own projects, which are then presented to line-of-business managers at a science fair of sorts. Ravi notes that not every developer Comcast brings on is schooled in DevOps, so the company is willing to invest in developer training as long there is a willingness to learn.



DevOps at Comcast – The Details

John McCann, vice president of software development and engineering for Comcast Cable, says one of the most important things any organization should do in the digital age is define and optimize an IT architecture that ensures high levels of availability for microservices. Once that's achieved, it becomes much easier to group microservices around specific lines of business.

Most of the code Comcast deploys runs on either a private or public cloud service provided by Amazon Web Services (AWS). But there are instances when code is deployed in an on-premises environment. And for all that has been achieved using microservices, there are times when it still makes sense for Comcast to continue to rely on monolithic applications.

McCann notes that tools such as Ansible and HashiCorp have improved substantially over the years, so the amount of time required to train developers on how to programmatically manage IT infrastructure has been reduced dramatically.

Comcast has aggressively embraced microservices, most of which are based on containers running on everything from virtual machines to an instance of the open source Cloud Foundry platform-as-aservice (PaaS) environment.

Comcast's best-known instantiation of a microservice is its addition of voice support to Xfinity Home and the Xfinity X1 cloud-based entertainment platform, which was developed with a traditional graphical user interface to enable customers to navigate programming. By employing a microservice, Comcast developers were able to add support for bilingual voice-based search capabilities to more than 18 million customers. The service has processed more than 1 billion voice commands per quarter, ranging from general searches for programs on a specific topic to searches for all viewing options for a particular program, including on-demand and DVR.

Xfinity X1 also features integrations with Netflix, YouTube, Pandora and iHeartRadio applications, as well as onscreen, sports companion application that keeps track of scores, stats and fantasy leagues. Streaming web video is also provided via services including Buzzfeed, GoPro, Machinima and Vox.



The service last year won an Emmy Award for Technology and Engineering from The National Academy of Television Arts & Sciences. But it wasn't the first Emmy the Xfinity team has garnered: In 2014, the X1 team won the award for "Outstanding Achievement in Interactive Media Program: User Experience and Visual Design," and an award for "Personalized Recommendation Engines for Video Discovery for MVPDs." And, in 2016, Werner won a lifetime achievement Emmy for his distinguished career as a technologist, innovator and leader. These accolades have enabled Comcast to improve its overall Net Promoter scores among end customers by a double-digit percentage over the last three years—albeit from an initial low score, typical of most cable service providers.

Adoption of the X1 Voice Remote is widespread. Today, there are more than 20 million of the devices in customers' homes.

Comcast's goal is to turn Xfinity Home, the company's home security offering, into a centrally managed internet of things (IoT) hub for the home using the company's xFi high-speed WiFi network as a hub. xFi can be controlled via a mobile app for iOS and Android, website or television connected to the X1 Voice Remote. As part of that vision, Comcast recently aligned with Tile, creator of a location dongle to help users quickly find, for example, their keys, to integrate Tiles with the X1 Voice Remote. In addition, Comcast's machineQ business unit has launched an IoT service based on LoRaWAN (long-range wide area network) for enterprise companies in 15 markets including Chicago, Philadelphia and San Francisco. In addition, Comcast's machineQ business unit has launched an IoT service based on LoRaWAN (long-range wide area network) for enterprise companies in the San Francisco Bay Area.

The natural language query capability built into X1 Voice Remote is also being used to provide access to a new generation of customer service applications, dubbed aiQ, that are being built using machine learning algorithms. The initial wave of aiQ applications were designed to reduce the amount of time customers spend waiting to talk to an agent. For example, instead of waiting in a queue, customers can simply say "internet" to inform Comcast they are having an issue with internet access. That microservices-based application runs on a distribution of Cloud Foundry provided by Pivotal Software. Comcast plans to apply that same set of AI capabilities to the applications its technicians employ.

Simultaneous to those efforts, Comcast is also signing up customers for a 4G LTE mobile wireless service, available via a smartphone. Comcast added 196,000 new subscribers to its Xfinity Mobile service during the first quarter of 2018, bringing its total customer base to 577,000. That number may pale in comparison to rival mobile service providers, but Comcast is betting its combination of internet, video, wireless and connected home/home security will prove irresistible to developers, which in turn will help increase demand for its bundled services. To further that aim, Comcast has formed a partnership with Charter Communications to create a mobile operating platform that will be used to provide back-end services for both Xfinity Mobile and Charter's forthcoming Spectrum Mobile service.



The Overall Benefits of DevOps at Comcast

Comcast allows developers to pick the tools they are most comfortable with as long as they can be effectively applied within the architecture defined by the company, Ravi says. But new hires are assigned a "DevOps Champion" who schools them in the specific processes Comcast has developed.

Comcast wants to ensure its developers know how to not only write code, but also programmatically manage and secure the overall IT environment. Developers don't need to have those skills when they are hired, but the DevOps teams work to get developers up to speed quickly. Today, all Comcast developers are certified Six Sigma green belts, with 35 percent of them having attained a yellow belt certification.

Comcast is also starting to apply DevOps principles in its cybersecurity efforts. As part of the rise of DevSecOps, developers are now accountable for the security of the applications they manage, says Larry Maccherone, a senior director at Comcast who is leading the DevSecOps transformation. Otherwise, he says, there's a tendency to simply check compliance boxes rather than take actual responsibility for cybersecurity. "They need to be less of a gatekeeper."

Specifically, Maccherone says, teams need to ensure they are addressing cybersecurity issues without slowing down application release cycles. They also need to understand what fixes should be prioritized over others.



Conclusion

Embracing DevOps and microservices is providing Comcast with the flexibility and agility needed to compete globally. Comcast is no longer simply a provider of television programming and internet bandwidth; it's a software company that understands how the quality of the software it delivers impacts its customer experience.

Much of that customer experience is not driven simply by the amount of network bandwidth Comcast can access, but also the quality of the code it develops and how well it is integrated with third-party applications. Comcast now competes with almost every technology category there is—for example, it's IoT ambition clearly squares it against Google and Amazon in the home. At the same time, Comcast is partnering with companies it competes with in one or more segments of its business—for example, many Comcast customers access Netflix over their mobile devices rather than via a television, yet Comcast is moving to allow customers to pay their monthly Netflix access on their Comcast bill.

At the center of Comcast's efforts is DevOps, which is enabling Comcast to dynamically adjust its technology platforms to whatever changing business conditions may warrant both now and well into the future.

