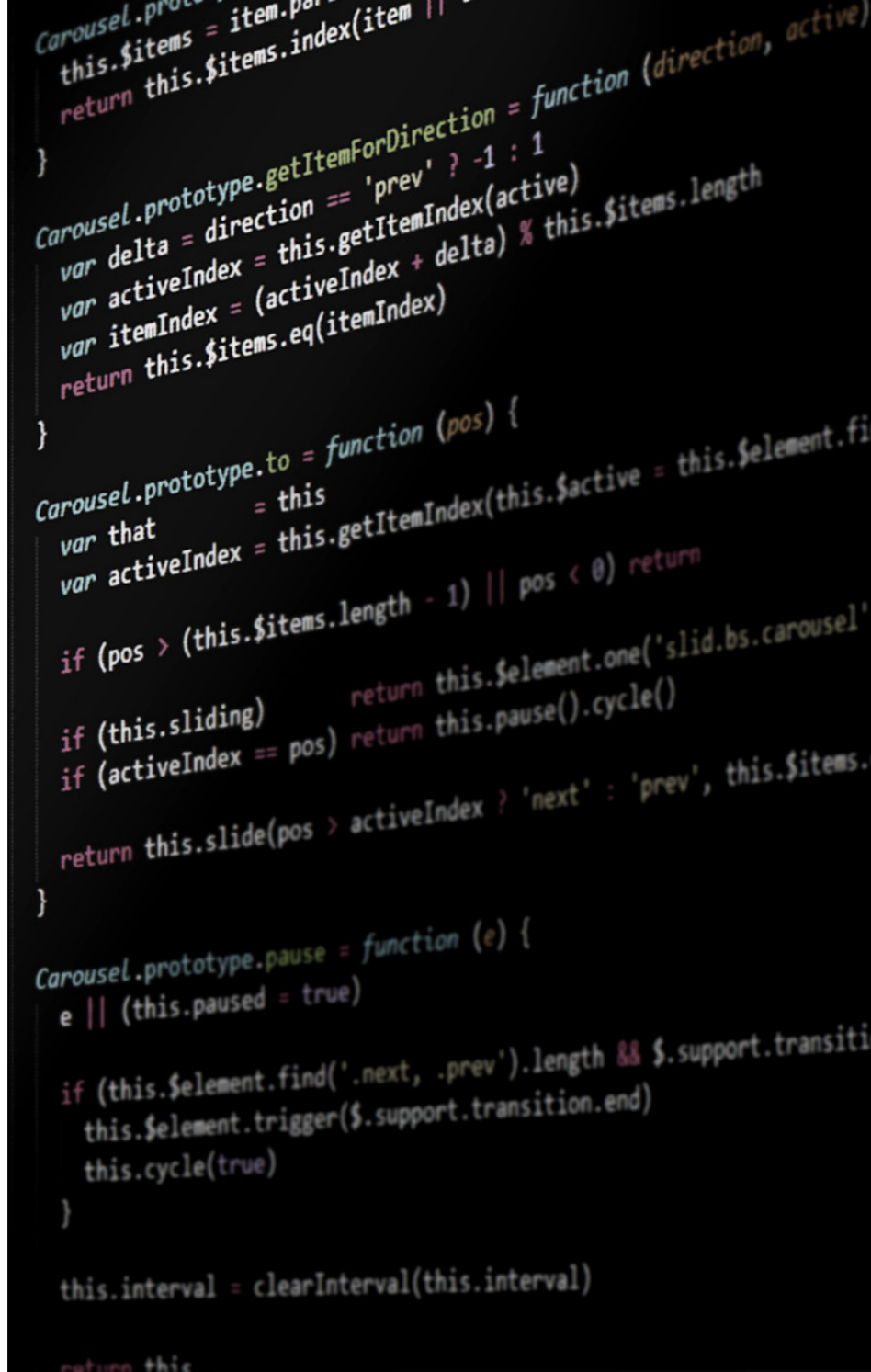
# AUTOMATING DNS WITHIN OPENSTACK

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# INTRODUCTION

Over the past six years, OpenStack® has become a commonly used platform for enterprise private clouds. Although OpenStack is an increasingly popular alternative to other cloud implementations, there's no question that it is complex. That's one of the reasons why Rackspace offers it as a managed service — to remove the complexity while delivering all of the benefits.

As we onboard customers, it's not uncommon for us to encounter novel issues that need to be resolved. We recently on-boarded a new customer who delivers business intelligence (BI) services on bare metal and AWS using Hadoop®. This customer decided to migrate to Rackspace OpenStack Private Cloud to add self-service capabilities and reduce costs. They spin up new or custom builds of their support platform, execute a series of automated tests and then tear them down — hundreds of times a day.

OpenStack mainly identifies instances by IP address. For many customers, spinning up instances that were only addressable by IP wouldn't be a problem. But this customer required some kind of outside orchestration and automation to spin up new or custom builds of their platform hundreds of times a day. They had a collection of hand-scripted fixes that often broke, and wanted a more stable solution that didn't require as much handholding.

A decades-old technology called DNS was developed to reduce this type of management overhead. Traditionally, you assign a DNS name to your target device and address it with that name, rather than with the IP address directly. This allows the operator to change the IP addresses associated with that DNS name without affecting the way applications or users interact with that service.

# EXPLORING THE CHALLENGES

OpenStack provided sufficient agility for this customer, spinning up many instances very quickly to improve development, testing and production goals. However, OpenStack's normal default installations don't provide DNS automation, leaving organizations to manage instances with IP addresses. That can quickly become a huge headache, as instances jump in and out of existence.

For this customer, OpenStack's limited support for DNS was a significant obstacle. DNS can be very useful for a number of applications, although it is required for only a few. One of the applications that require DNS is Hadoop, as it makes heavy use of DNS A and PTR records. The A records resolve hostnames to IP addresses, while the PTR records do the opposite. This means that if you know the IP address or the DNS name, you're able to get the accompanying piece of information.

Until recently, there hadn't been a way to automate DNS within OpenStack itself. OpenStack now has a new DNS-as-a-Service (DNSaaS) project named Designate that allows creation and deletion of DNS records through a RESTful API. As Hadoop heavily relies on DNS, Designate offered a potential way forward for our customer. Designate offers the possibility of automating DNS record creation and deletion, but it doesn't directly resolve the issue of adding a DNS record when an instance is created. The OpenStack Mitaka release sought to add this capability — a new option, "external_dns_driver," was added to Neutron. The idea behind this driver is that upon port creation (whether directly through Neutron or indirectly through Nova when launching an instance), it sends a message to the DNS service to create the appropriate records. Unfortunately, problems with that driver in the Mitaka branch prevented it from being fully functional.

# RACKSPACE'S ANSWER

To make the driver functional, we updated Designate in OpenStack Ansible to ensure that it was working properly. Then we set up a pair of BIND DNS servers, because Designate requires DNS servers that sit outside the Designate service. Our customer then pointed their corporate DNS to this pair of BIND DNS servers. When Designate received a request, it validated it and then communicated with the BIND servers.

Unfortunately, even with this fix, the external_dns_driver (as of the OpenStack Newton release) does not support Keystone v3, a requirement for Rackspace environments. Additionally, a bug prevented the driver from working when the network had only a single subnet. Rackspace responded to this shortcoming by putting together a script to watch created instances and create and delete appropriate DNS records (including A and PTR records). The script, running as a daemon, works by watching for changes to VMs and ports on the OpenStack cluster. When a change is detected, whether from adding a VM or removing one, we can update Designate with this information. In turn, Designate informs the DNS servers of this change. The whole process completes before the instance has booted. These changes enabled the DNS servers to remain current with the customer's OpenStack private cloud. Our efforts completely resolved the customer's problem.

# CONCLUSION

By using this tool, we enabled one of our customers to go beyond a feature in OpenStack that, even as of Newton, didn't fit the full requirements of their cloud. Our customer could leverage OpenStack to process big data with Hadoop without manually managing DNS entries every time the cluster changed. We've had these fixes in place and running smoothly for several months, and other OpenStack users can leverage our work. The script is on GitHub, and the Designate fixes are available to any Rackspace customer. Through a professional services agreement, our customers use this fix, and similar fixes, to customize their OpenStack private cloud environments.

Fixes like this are one of the reasons Rackspace is the #1 managed cloud company. We've helped virtually every kind of company successfully move to leading cloud platforms, including OpenStack. As thought leaders and trusted advisors, we're here to help you understand how to move forward. Our portfolio of cloud capabilities helps make IT more relevant and independent while delivering the agility and cost savings that organizations need. We've helped thousands of companies successfully move to the cloud, including a



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top-10 North American bank that moved to an OpenStack private cloud platform. The bank increased its speed to market and lowered its cost per virtual machine by up to 40%.

To learn more about how Rackspace can help you with cloud technology, sign up for our free cloud strategy session at http://go.rackspace.com/OpenStackExperts.

# ABOUT RACKSPACE

Rackspace, the #1 managed cloud company, helps businesses tap the power of cloud computing without the complexity and cost of managing it on their own. Rackspace engineers deliver specialized expertise, easy-to-use tools, and Fanatical Support® for leading technologies developed by AWS, Google, Microsoft, OpenStack, VMware and others. The company serves customers in 120 countries, including more than half of the FORTUNE 100. Rackspace was named a leader in the 2015 Gartner Magic Quadrant for Cloud-Enabled Managed Hosting, and has been honored by Fortune, Forbes, and others as one of the best companies to work for.

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FEBRUARY 16, 2017