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Joyent Cloud Downed by Administrator

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Joyent is a high-performance cloud provider aimed at real-time and mobile applications. On Tuesday, May 27, 2014, one of Joyent's data centers was taken totally offline by an operator error.

Joyent uses open-source software developed by Sun Microsystems, including the SmartOS operating system and the ZFS file system ("Z" initially stood for Zettabyte, but only the acronym is now used).

Joyent maintains data centers in San Francisco, Las Vegas, Northern Virginia, and Amsterdam. Joyent touts itself as *the high-performance cloud infrastructure and big data analytics company* that serves an eclectic mix of companies. Though primarily aimed at the highly volatile online social network game market, Joyent once hosted Twitter in its early days.

Joyent promises high availability with a 99.9999% uptime record in every service region as well as a 100% SLA. On its web site, Joyent positions itself against Amazon Web Services (AWS) as a cloud with higher performance and greater availability. It describes its architecture as follows:

> "A failing component only affects the infrastructure that is directly dependent upon it. For example, if a disk fails, ZFS automatically begins resilvering – with minimal disruptions and no downtime to the compute node. If an entire compute node fails, only the virtual machines provisioned on that node fail; other nodes are unaffected. And in the unlikely event of broader failure the affected components stop, but the failure does not spread."

The Joyent Cloud Goes Down

Well, not quite. In the early afternoon of Tuesday, May 27, 2014, Joyent's US-East-1 data center located in Ashburn, Virginia, began to report "transient availability issues."

After a quick investigation, Joyent administrators discovered the source. An operator had erroneously entered a command to reboot all of the servers in the data center. The operator was performing capacity upgrades to some of the compute nodes in the data center using tools that allowed for remote updating of software. When he had completed the upgrades, he issued a command to reboot those servers.

Unfortunately, he mistyped the command. Instead of rebooting just the servers that he had upgraded, he rebooted every server in the data center. There was no validation in the reboot command tools to ensure the operator was "really sure" that he/she wanted the reboot to be performed against *all* systems. All of the servers in the data center stopped functioning during the reboot process, and the entire US-East-1 data center was down.

Joyent was refreshingly transparent with rapid blog communications to its customers. In an early post, it said:

> "Due to an operator error, all compute nodes in us-east-1 were simultaneously rebooted. Some compute nodes are already back up, but due to very high load on the control plane, this is taking some time. We are dedicating all operational and engineering resources to getting this issue resolved and will be providing a full postmortem on this failure once every compute node and customer VM is online and operational.
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> "While the immediate cause was operator error, there are broader systemic issues that allowed a fat finger to take down a datacenter. As soon as we reasonably can, we will be providing a full postmortem of this: how this was architecturally possible, what exactly happened, how the system recovered, and what improvements we are/will be making to both the software and to operational procedures to assure that this doesn't happen in the future.
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> "The operator that made the error is mortified, there is nothing we could do or say for that operator that is going to make it any worse, frankly."

80% of Joyent's customers were returned to service within an hour. However, a known transient bug in a network card driver on Joyent's legacy hardware platforms extended recovery times for some customers to 2 ½ hours

The Postmortem

The cause of the outage was that an admin was using a tool to remotely update the software on some new servers in Joyent's data center and, when trying to reboot them, accidentally rebooted all of the servers in the facility. In its postmortem, Joyent explained:

> "The command to reboot the select set of new systems that needed to be updated was mistyped and instead specified all servers in the datacenter. Unfortunately, the tool in question does not have enough input validation to prevent this from happening without extra steps/confirmation, and went ahead and issued a reboot command to every server in us-east-1 availability zone without delay.
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> "First, we will be dramatically improving the tooling that humans (and systems) interact with such that input validation is much more strict and will not allow for all servers and control plane servers to be rebooted simultaneously. We want to reiterate our apology for the magnitude of this issue and the impact it caused our customers and their customers. We will be working as diligently as we can, and as expediently as we can, to prevent an issue like this from happening again."

Summary

The recent Ponemon 2013 Study in Data Center Outages lists the current top three causes of data center outages. They are:

1. UPS failures.
2. Human errors.
3. DDoS attacks.

It is said that 70% of all outages are caused by or are aggravated by humans. Humans need redundancy too when critical actions are to be taken. If the Joyent operator had someone else

looking over his shoulder and verifying his actions before he hit the Enter key, this outage likely would not have happened.

Acknowledgements

Information for this article was taken from the following sources:

Fat-fingered admin downs entire Joyent Data Center, *The Register*; May 28, 2014.
Cloud Provider Humiliated by Data Center Outage: Top Causes and Prevention Strategies, *Datacenters*; May 28, 2014.
Admin Error Brings Down Joyent's Ashburn Data Center, *Datacenter Knowledge*; May 28, 2014.
It Only Takes One Bozo To Kill Your Cloud Data, *Gizmodo*; May 29, 2014.
How to Take Down the Cloud with a Single Finger, *Windows IT Pro*; May 30, 2014.
Server Reboot Crashes Joyent Cloud, *Virtualization Review*; undated.
A Single User Error Causes Cloud-Wide Failure at Joyent, *Evolven*; undated.
Fat Finger Flub Takes Down Cloud Computing Datacenter, *IEEE Spectrum*; June 2, 2014.