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# AMAZON'S CLOUD SERVICE OUTAGE AND DATA LOSS

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## YES IT CAN HAPPEN BUT IT SHOULD BE AVOIDED...

The outage (and eventual data loss) of Amazon's storage services in April 2011 show once more that infrastructure clouds have the same requirements as conventional deployments in terms of redundancy and fault tolerance. The cloud is a change in business model, not an architectural shortcut.

In the cloud, reliability and availability are implemented through horizontal scaling. Zimory's technology stack with its distributed architecture through zimory®manage and zimory®connect gives users all the tools they need to deploy industrial strength solutions in the cloud.

## WHAT HAPPENED?

First let's have a short look at the Amazon outage. The outage was caused by an administrative mistake that occurred during an upgrade of the EBS facilities of a single Amazon Region. EBS is the block storage environment of Amazon, used to store data and the basis for many applications running on Amazon's EC2. –Literature on EBS can be found here: <http://aws.amazon.com/ebs/>

What happened, although dramatic and with severe consequences to some users, was a "normal" failure within the service level agreements that Amazon provides. This is not surprising: EBS is meant to have the availability of a very advanced RAID system. If you want tolerance to site failures (what happened) you need to replicate across sites (across Availability Zones in Amazon vocabulary). To be fair, Amazon provides this option and their manual explicitly indicate that tolerance to failures within one availability zone (hence the name) can be achieved by replicating and deploying across availability zones. Looking at the explanation that Amazon provided it became clear that if customers had not copied their data into another Availability Zone, then they were out of luck. It is the same situation as when a PC disc crashes: if there is no back-up or security copy, the data is gone. Amazon recommends their customers that they should deploy across Availability Zones to prevent such problems (but then customers tend not to do this because it is cheaper to ignore the advice). Beside the image problem for Amazon, what happened is a problem for the administrators of the companies that were affected, since they did not have a reliable deployment. However, there are ways both parties could have avoided the black out.

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## LESSONS LEARNED

There are several important lessons to be learned from this incident. Firstly, the incident was caused through an administrative error during an upgrade and made worse by the lack of failover mechanisms on the EBS storage management system. Mechanisms designed to make the system work better turned out to completely misbehave as a result of the failed upgrade. It is important for Zimory customers to know that our solution is independent of specific storage solutions and can operate across storage environments of different vendors. With this, Zimory products provide the technical basis for implementing highly fault tolerant solutions across regions and across vendors.

Secondly, many existing cloud deployments need to be redesigned. They assume cloud computing provides properties that it does not. Cloud elasticity is assumed to provide the necessary redundancy and horizontal scalability. This is true only within one availability zone, as the Amazon outage made painfully clear. Application architects and operation managers must understand the limitations of their deployments in the cloud and they need to have the right tools to overcome these limitations.

Thirdly, the outage emphasizes the requirement in any cloud solution to support reliable horizontal scaling of the application. This requires users to have the proper tools and platforms. zimory@connect, thanks to its inherently distributed architecture, has been designed to support high availability deployments through its ability to seamlessly link multiple sites. . With zimory@connect, a cloud provider can implement automated solutions to the high availability problem through deployments across regions and even offer customers safe links to their own infrastructure as a backup option.

In addition, a multi – vendor strategy for hardware reduces the single points of failures. If multiple storage vendors are used, no bug in a single storage system can cause a complete system failure. Finally, enabling horizontal scaling of applications is a prerequisite for allowing customers to operate applications in a distributed manner. Cloud service providers running an update to their systems should use this functionality to move a copy of the system to another site before updating the device – an important system administration functionality that Zimory's product provide.

## CONCLUSION

A failure of a single storage system like the EBS can happen but there are tools and methods to avoid application outages. Cloud service providers should secure the capability to distribute an application and supporting multi-side fault tolerance set ups - a Zimory standard feature. Architects and operators should configure their deployments and use this feature to operate their applications in a safe manner and with the option to seamlessly migrate them across regions in case of an emergency.

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