

Downtime statistics of current cloud solutions

(June 2013 Update)

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I. INTRODUCTION

In recent years, cloud computing has received considerable attention from global businesses and government agencies in economies. Regarding the potential and impact of cloud computing in the world, providing reliable services to meet the requirements of mission critical systems becomes more and more important. Meanwhile, the lack of reliability of cloud services is not commonly known by industry. In order to monitor and analyze cloud computing resiliency, IWGCR¹ presents its short report aggregates information from press releases and provides a brief summary of availability of major cloud providers.

II. PRESS RELEASES

We gather information from cloud provider status dashboard and press releases. Main press sources are:

- BBC,
- BGR.com,
- Bloomberg.com,
- CIO.com,
- CloudPro.co.uk,
- Computing.co.uk,
- Datacenterknowledge.com,
- DSLreports,
- FastCompany,
- gigaom,
- Huffingtonpost.com,
- Informationweek,
- Silicon.com,
- Zdnet.com.

III. SERVICE DOWNTIME

Table I shows all cloud services downtime we have grabbed from press releases and cloud computing providers. Below are some examples of stories of cloud service failure, their causes and consequences. All the failures we have noted are available on the IWGCR website².

¹IWGCR: The International Working Group on Cloud Computing Resiliency

²<http://iwgcr.org/>

A. Year 2007

- 165, 000 website hosted by NaviSite suddenly went offline and were offline during 1 full week.
- Hostway migrated several thousand servers from Miami to Tampa. This relocation resulted thousands of sites offline during 3 days.
- ServerBeach datacenters were affected by a power outage. The downtime lasted 4 hours.

B. Year 2008

- Twitter had often been down on and off for hours.

C. Year 2009

- OVH was down for 1 full week because of ZFS failure.
- Amazon and Microsoft datacenters downed by lightning in Dublin. Some sites that rely on one of its storage services took between 24 to 48 hours to recover.
- The Gmail service was not available during 4 hours.
- Paypal was down for 5 hours. Performance problem was detected and the outage affects ebay transactions.

D. Year 2010

- Amadeus got two failures in 3 months. This outage forced some airlines to check in manually in 1 hour.

E. Year 2011

- A 3 days blackout interrupted email and Internet services for tens of millions of users of BlackBerry.
- Microsoft Azure was offline for 7 hours.
- Yahoo! mail went down for 6 hours. More than 1 million users were affected.
- Users were unable to access Google Docs List in 1 hour.

F. Year 2012

- Routers failed during 2 hours in OVH.
- Major Facebook outage disrupted users worldwide during 3 hours.
- FirstServer has suffered an outage for 30 minutes by trying to update some servers against security vulnerability. More than 5.000 enterprises have lost data.

	2007(Hour)	2008(Hour)	2009(Hour)	2010(Hour)	2011(Hour)	2012(Hour)	Total(Hour)
1. FirstServer						0.5	0.5
2. Tumblr						2	2
3. Cisco	3						3
4. Facebook						3	3
5. Zoho						3	3
6. ServerBeach	4						4
7. Cerner						5	5
8. Paypal			5				5
9. GoDaddy						6	6
10. Yahoo					6		6
11. VMware Cloud Foundry					10		10
12. GitHub						12	12
13. Twitter		7	2			4	13
14. MailChimp						14	14
15. Netflix						20	20
16. Amadeus Check-in				1		21	22
17. Google Apps			4		1	23.93	28.93
18. Apple iCloud mail						30	30
19. Microsoft			24		7		31
20. Salesforce						34.36	34.36
21. Microsoft Xbox Live						61	61
22. Hostway	72						72
23. RIM					72		72
24. Microsoft Windows Azure						111.5	111.5
25. Microsoft T-Mobile Sidekick			168				168
26. Navisite	168						168
27. OVH			168			2	170
28. Amazon Web Service			24		144	56.7	224.7

TABLE I

A SUMMARY OF DOWNTIME (IN HOUR) STATISTICS OF EACH CLOUD SERVICE PROVIDER FROM 2007 TO 2012. THE TOTAL DOWNTIME IS 1299.99 HOURS

- Amazon datacenter in Virginia suffered an electric failure for 2 hours.
- MailChimp has experienced some hardware issues on a datacenter for 14 hours. User data that was created in a slot of two hours were lost.
- Twitter blamed a double-whammy on Olympics and a cascading bug as root cause of its downtime for 3 hours.
- Cerner Corp. datacenter was down for 3 hours. Dozens of hospitals temporarily lost access to patient records.
- iCloud mail was unavailable for 30 hours. Impacted users was about 1,650,000 people.
- Github has suffered 14.5 hours of downtime in two days.
- GoDaddy has suffered an issue for 6 hours that had impacted on hundreds of thousands of websites.
- Google App has suffer an outage due to a cascading failure on traffic routers for almost 11 hours.
- Amazon ESB of US-EAST-1 Region experienced elevated API failures and delays launching, updating and deleting. This issues has impacted many major services, such as Reddit, Foursquare, Minecraft, Heroku, GitHub, imgur, Pocket, HipChat, Coursera, FastCompany, Flipboard, Payment and many others.
- Hurricane Sandy have affected several datacenter in the New York region. US Cloud Computing have resisted, thanks to the warnings were issued 72 hours before the events.
- Google mail suffer 6 hours of downtime almost spread on consecutive days.
- Netflix has suffered a 20 hours outage at Christmas Eve resulting of an outage at an Amazon Web Services cloud computing center in Virginia.
- Windows Azure Storage at South Central US goes down for 77 hours.
- Vodaphone lost all data retention (legal obligation) in a fire in December.

IV. CONCLUSION

Preliminary results (Table II) of cloud service availability show an average of 7.738 hours unavailable per year or 99.91% availability. As a comparison, the service average unavailability for electricity in a modern capital is less than 15 minutes per year. [3] The cost of these failures amounts for almost 285 millions USDs based on hourly costs accepted in industry [2] [1].

Due to imperfect methodology, such figures are most likely underestimated, since many events are not published in the press releases and the current procedure to collect events by IWGCR leaves a lot of room for missed outages. Future work of IWGCR will focus on improving the observation of cloud service availability and better measure the economic impact.

Readers should note that the 22.78 hours of unavailability, or 99.74% of availability, recorded in 2012 has almost multiplied by 3 compared to previous years (Table I). This is due to the addition to our sources reports from some providers themselves in addition to the data from the press. IWGCR members highlight that the highest downtime of providers outlined in Table I for 2012 do not show any lesser quality than non reported providers, or those who have less downtime. It is a direct consequence of their transparency policy on their own failures which we encourage because more transparency from providers themselves can only lead to more confidence from their customers.

	Total(Hour)	Average(Hour)	Availability	Cost/Hour(USD)	Cost(USD)
1. FirstServer	0.5	0.083	99.994	336,000 [1] (or 180,000 [2])	168,000 (or 90,000)
2. Tumblr	2	0.333	99.977	100,000	200,000
3. Cisco	3	0.500	99.966	200,000	600,000
4. Facebook	3	0.500	99.966	200,000	600,000
5. Zoho	3	0.500	99.966	200,000	600,000
6. ServerBeach	4	0.667	99.954	100,000	400,000
7. Cerner	5	0.833	99.943	336,000 [1] or 180,000 [2]	1,680,000 (or 900,000)
8. Paypal	5	0.833	99.943	225,000	1,125,000
9. GoDaddy	6	1.000	99.932	336,000	2,016,000
10. Yahoo	6	1.000	99.932	200,000	1,200,000
11. VMware Cloud Foundry	10	1.667	99.886	336,000	3,360,000
12. GitHub	12	2.000	99.863	200,000	2,400,000
13. Twitter	13	2.167	99.852	200,000	2,600,000
14. MailChimp	14	2.333	99.840	200,000	2,800,000
15. Netflix	20	3.333	99.772	200,000	4,000,000
16. Amadeus Check-in	22	3.667	99.749	89,000	1,958,000
17. Google Apps	28.93	4.822	99.670	300,000 [1] (or 200,000 [2])	8,679,000 (or 5,786,000)
18. Apple iCloud mail	30	5.000	99.658	200,000	6,000,000
19. Microsoft	31	5.167	99.646	200,000	6,200,000
20. Salesforce	34.36	5.727	99.608	200,000	6,872,000
21. Microsoft Xbox Live	61	10.167	99.304	200,000	12,200,000
22. Hostway	72	12.000	99.178	336,000 [1] (or 100,000)	24,192,000 (or 7,200,000)
23. RIM	72	12.000	99.178	200,000	14,400,000
24. Microsoft Windows Azure	111.4	18.583	98.727	336,000 [1] (or 180,000) [2]	37,464,000 (or 20,052,000)
25. Microsoft T-Mobile Sidekick	168	28.000	98.082	200,000	33,600,000
26. Navisite	168	28.000	98.082	100,000	16,800,000
27. OVH	170	28.333	98.059	336,000 [1] (or 100,000 [2])	5,712,000 (or 17,000,000)
28. Amazon Web Service	224.7	37.450	97.435	336,000 [1] (or 180,000 [2])	75,499,200 (or 40,446,000)
Total	1299.89	216.665	99.470		273,325,200 (or 211,405,000)

TABLE II

A SUMMARY OF TOTAL AND AVERAGE DOWNTIME FOR EACH CLOUD SERVICE PROVIDER AND THEIR ECONOMIC IMPACT

V. FUTURE WORKS

Here are at least several shortcomings in our approach.

Our procedure to gather informations still far from exhaustive and ranking of availability still not unreliable. In next version, we will improve our tools, like online detectors or probes to monitor mainstream cloud service providers continuously. Setup communication channels to able users to report failures is planned.

Finally, we believe that the messages of the operators should be more transparent and easier to handle automatically.

Second, our data is not based on number of users. However, the social or economic impact of big player failures (Google, Amazon, Salesforce, eBay, etc.) is much wider than the small one's. It is useful to consider this factor to make average estimation more accurate. Some Software as a Service providers indicate the percentage of impacted users about their outage, but never indicate the total number of their users.

Further, we still don't have precise value of economic cost for each failure or average hourly cost for each cloud service provider. This is required to obtain better assess the cloud society.

REFERENCES

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