Problem

- Lightning strikes on grid that powers Google data center, some data compromised

What

- Problem(s)
  - Lost data

When

- Date: August 13, 2015
- Time: 09:19 PDT

Where

- Facility, site: Saint-Ghislain, near Mons in Belgium
- Data center in europe-west1-b zone
- Google Compute Engine data storage

Impact to the Goals

- Customer Service: Some data permanently lost
- Production/ Schedule: Some data temporarily inaccessible
- Property/ Equipment: Datacenter equipment failed
- Labor/ Time: Work required to recover data

Analysis

Basic Level Cause Map

- Customer Service Goal Impacted
  - Some data permanently lost
  - Power grid struck by lightning four times

Basic Cause-and-Effect

- Some data was lost because datacenter equipment failed after the nearby power grid was struck with lightning four times and was damaged. This particular data was stored on a less stable system and wasn’t duplicated in another location.

More Detailed Cause Map

- Power lost to datacenter
  - AND
  - Data center equipment failed
  - Inadequate automatic auxiliary power systems?
  - AND
  - Data center equipment failed
  - Inadequate battery backup?
  - AND
  - Stored on less stable systems
  - Recently written data
  - AND
  - Power grid connecting to datacenter damaged
  - AND
  - Power grid struck by lightning four times
  - AND
  - Electrical storm in area

Solution

- Google Compute Engine data storage

Customer Service Goal Impacted

- Work required to recover data

Effect

- Evidence: Statements released by Google

Cause

- Possible solution: Upgrade data center equipment

3. Solutions

The final step in the Cause Mapping process is to develop solutions to reduce the risk of a problem recurring in the future. For this example, Google has stated that they are upgrading the datacenter equipment so that it is more robust in the event of a similar event in the future. Google also stated that customers should backup essential data so that it is stored in another physical location to improve reliability.

A small amount of data was permanently lost at a Google datacenter after lightning struck the nearby power grid four times on August 13, 2015. About five percent of the disks in Google’s Europe-west1-b cloud zone datacenter were impacted by the lightning strikes, but nearly all of the data was eventually recovered with less than 0.000001% of the stored data not able to be recovered.

“This outage is wholly Google’s responsibility. However, we would like to take this opportunity to highlight an important reminder for our customers: GCE instances and Persistent Disks within a zone exist in a single Google datacenter and are therefore unavoidably vulnerable to datacenter-scale disasters.”

-statement by Google on August 18, 2015

Investigate Problems. Prevent Problems.

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