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What Would We Do Without the Internet?

I cannot imagine myself without access to the Internet. No email. No Google for research.

Fortunately, the Internet is pervasive. There is no central control point that can be disrupted to shut down the Internet. Internet Service Providers (ISPs) are heavily interconnected so that an outage in any one part of the Internet network is quickly repaired by rerouting traffic around it. At least, this is the case in most highly developed nations, such as the U.S. and Western European countries. It would be almost impossible to shut down the Internet in these areas. (Update: See our next issue. The U.S. lost a large portion of its Internet on Friday, October 21.)

However, in many third-world countries, Internet service is provided by just one or two ISPs. Here, there is the ability to shut down the Internet simply by pulling the plug to a couple of facilities. And governments often do so for reasons varying from stifling protests to preventing cheating on exams. In this issue, we look at examples of Internet loss in entire countries.

In addition to writing such articles for the *Digest*, we also write for others. If you have a magazine article or a case study that you would like written but cannot find the time, give us a call. We would be delighted to work with you.

Dr. Bill Highleyman, Managing Editor

Case Studies

High Availability, 1970s Style

In 1972, I started a small payroll services company, MiniData Services, Inc. The intent behind MiniData was to provide payroll services to small companies via the use of inexpensive computers. Our billboards read, "You pay $9, We pay 15." In other words, we would do a fifteen-man payroll for $9 per pay period.

What were inexpensive computers? The choice at the time was the PDP-8 from Digital Equipment Corporation. A basic PDP-8 was a 12-bit machine with 4K of memory (yes, kilo, not mega or giga). We purchased two enhanced machines, each with 8K of memory. We would normally use both systems to process different payrolls. However, if one system failed, we could still get out the payrolls by using the surviving system. This was high availability, 1970s style.

We created our own high-level language, SAIBOL-8, with which to write our payroll applications. The SAIBOL-8 compiler interpreted statements as PDP-8 assembly-language statements, and a SAIBOL-8 program was executed as a standard PDP-8 assembly-language program.

Can you imagine programming a multi-company payroll on a computer with only 8K of memory today? Back then, we didn't know it couldn't be done. So we did it.

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Large Hadron Collider Running Out of Disk

The Large Hadron Collider (LHC) is a massive machine that studies the effects of proton collisions by accelerating protons speeding in opposite directions. The results of collisions are recorded on hard disk for later analysis. The LHC was originally outfitted with enough disk to handle its anticipated data storage needs for years. However, collision rates have been far more than expected, and the LHC is now running out of disk space.

The LHC is located at CERN, the European Organization for Nuclear Research, in Geneva, Switzerland. Constructed between 1983 and 1988, it is a circular superconducting tunnel seventeen miles in circumference straddling the Swiss/French border. It is twelve feet wide, and its depth ranges from 164 feet to 574 feet underground.

The largest machine in the world, it is designed to smash protons together at nearly the speed of light.

The LHC is by far the most expansive machine ever implemented by man. It is arguably one of the most important scientific tools with which humanity has ever come up. It allows us to glimpse what happens at the subatomic level.

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Best Practices

Can a Country Shut Down Its Internet?

Can a country shut down its own Internet? It depends. Probably not in the United States, Britain, or the Western European nations. But countries in Africa and Asia have done so frequently. Reasons range from stifling dissent to preventing cheating on exams.

A government's ability to shut down the Internet depends upon its control of the Internet Service Providers (ISPs). They are typically private-sector companies that offer services for accessing and using the Internet. If the government has the authority or the will to do so, it can force its ISPs to power down routers, change routing tables, or do other damage to the Internet so that it is not usable by its citizens.

How easy it is for a government to take this action depends upon two variables:

- What is the country's Internet infrastructure?
- How many ISPs offer connections within, into, and out of the country?

There are sixty-one countries in which there are only one or two providers connecting to the outside world. They include Libya and Syria; and for them, shutting down the Internet is a trivial task. All it takes is to turn off power to a couple of central facilities.

Availability Topics

Airlines' Aging IT Technology Is Taking Its Toll

First it was Southwest Airlines. In July, 2016, a router failure grounded Southwest for four days. Over a three-day period, Southwest cancelled 2,300 flights.

Next was Delta Air Lines. In August, 2016, a fire in Delta's data center took down all of its computer operations, causing it to cancel 2,100 flights over three days. Delta estimates that the outage cost it $150 million USD.

Then came British Airways. In September, 2016, a power outage at its hub near Heathrow airport caused a worldwide computer failure.

The Delta outage shows how a single IT failure can cost an airline millions of dollars. This is a wake-up call for an airline industry in which outdated information systems can strand thousands of passengers and cost an airline millions of dollars.

What is happening to the airline's IT infrastructure? The short answer is that the airlines have to deal with an aging and complex legacy infrastructure.

Tweets

@availabilitydig – The Twitter Feed of Outages

A challenge every issue for the Availability Digest is to determine which of the many availability topics out there win coveted status as Digest articles. We always regret not focusing our attention on the topics we bypass.

Now with our Twitter presence, we don't have to feel guilty. This article highlights some of the @availabilitydig tweets that made headlines in recent days.

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