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Up in the Clouds Computing

Wisconsin Wastewater Operators Association
47th Annual Conference
October 24, 2013

Eric M. Fisher, P.E.





Outline of Presentation

- What is Cloud Computing?
- History of the Cloud
- Personal Cloud Services
- Business Cloud Services
- SCADA in the Cloud and Cloud Security
- Cloud Applications



Poll Question of the Day

Do you use cloud services?

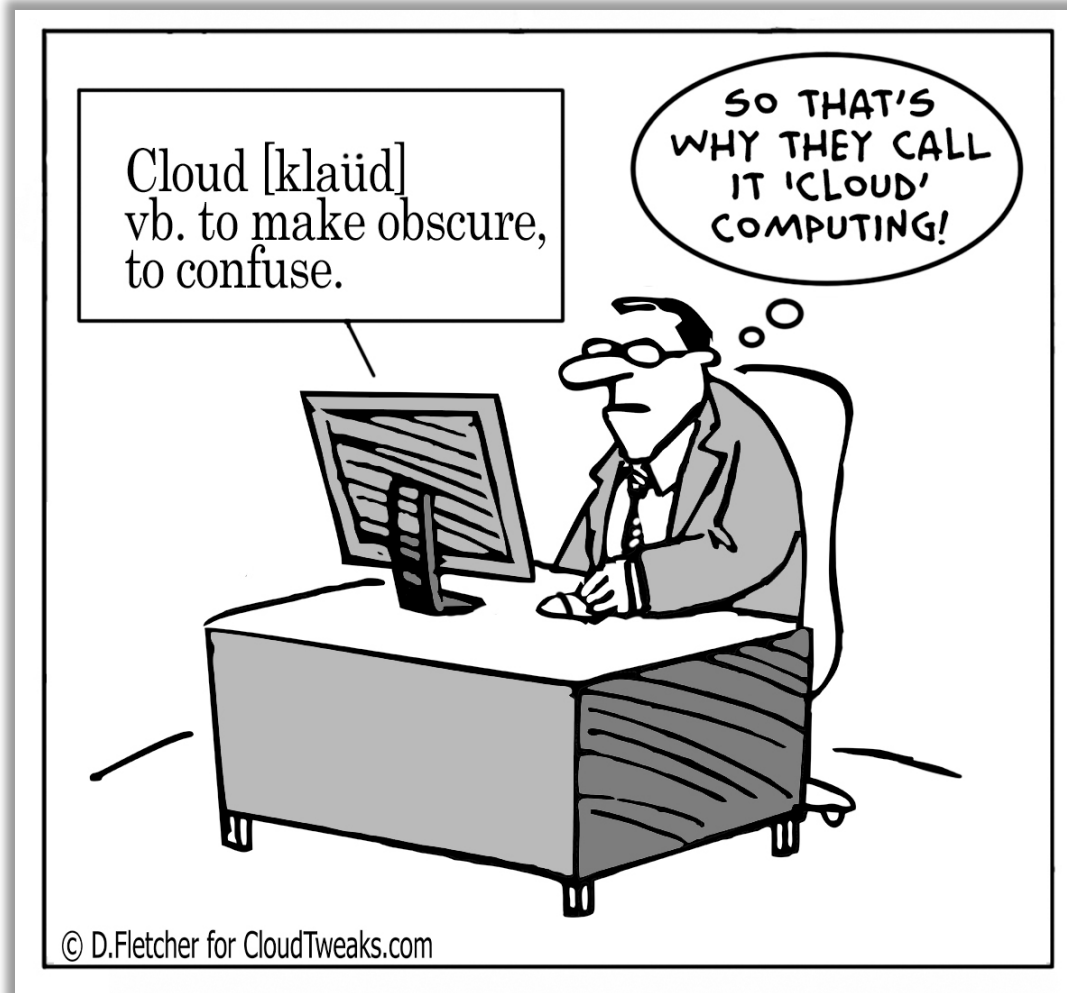
Text answer to 22333

- **Yes** **749004**
- **No** **749005**
- **Not Sure** **749006**

<http://tinyurl.com/wwoa-poll>

What is Cloud Computing?

What is Cloud Computing?



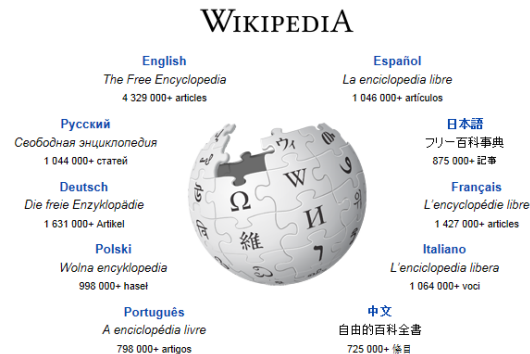
“First to mind when asked what ‘the cloud’ is, a majority respond it’s either an actual cloud, the sky, or something related to weather.”
[Citrix Cloud Survey Guide](#) (August 2012)

What is Cloud Computing?

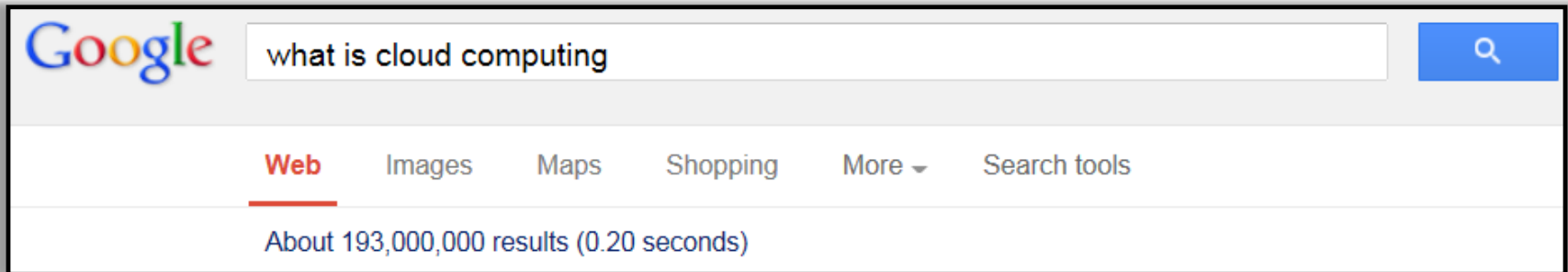
- **Wikipedia - Cloud computing**, or **the cloud**, is a colloquial expression used to describe a variety of different types of computing concepts that involve a large number of computers connected through a real-time communication network such as the Internet.

.....Cloud computing is a term without a commonly accepted unequivocal scientific or technical definition.

.....network-based services which appear to be provided by real server hardware, which in fact are served up by virtual hardware, simulated by software running on one or more real machines.



What is Cloud Computing?



cloud com·put·ing

noun

1. the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

What is Cloud Computing?



Industries & solutions

Services

Products

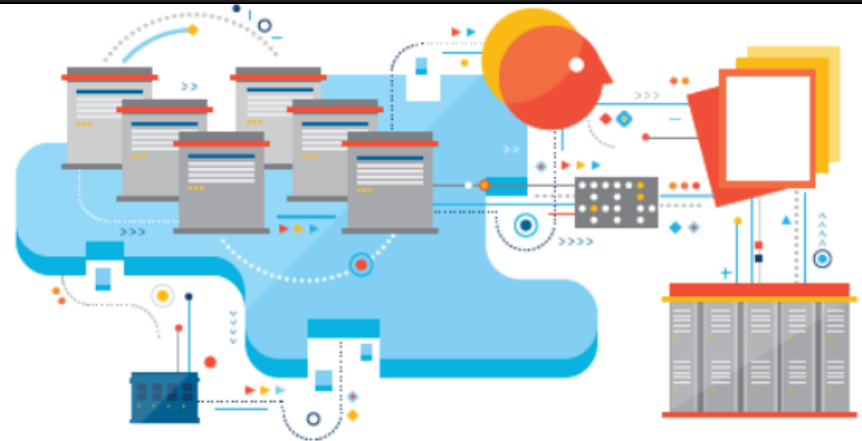
Support & downloads

My IBM

What is cloud?

Computing as a service over the Internet

Cloud computing, often referred to as simply “the cloud,” is the delivery of on-demand computing resources—everything from applications to data centers—over the Internet on a pay-for-use basis.



Elastic resources

Scale up or down quickly and easily to meet demand



Pay for use

Metered service so you only pay for what you use



Self Service

All the IT resources you need with self-service access

What is Cloud Computing?

- **NIST (National Institute of Standard and Technology) -**
"cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

National Institute of
Standards and Technology

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

Opinions on Cloud Computing

“The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do. I can't think of anything that isn't cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women's fashion. Maybe I'm an idiot, but I have no idea what anyone is talking about. What is it? It's complete gibberish. It's insane. When is this idiocy going to stop?”

- Larry Ellison, Founder of Oracle (2008)

Opinions on Cloud Computing

“Just like water from the tap in your kitchen, cloud computing services can be turned on or off quickly as needed. Like at the water company, there is a team of dedicated professionals making sure the service provided is safe, secure and available on a 24/7 basis. When the tap isn't on, not only are you saving water, but you aren't paying for resources you don't currently need.”

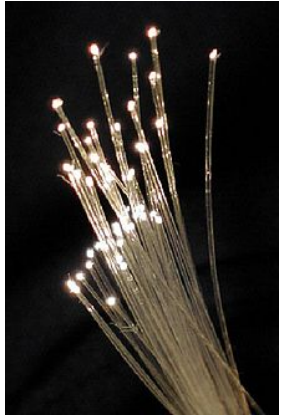
- Vivek Kundra, Former Chief Information Officer of Obama Administration

History of the Cloud



Cloud Concepts Have Been Around for Over Half a Century

- **1961** – Professor John McCarthy said, “Computing may someday be organized as a public utility just as the telephone system is a public utility”
- **Mid-1960s** – J.C.R. Licklider introduces the concept of an “intergalactic computer network”, which would “...allow everyone on the globe to be interconnected and accessing programs and data at any site, from anywhere...”
- **1977** – The first fiber optic telephone cable was installed under downtown Chicago (1.5 miles)
- **1988** – The first transatlantic fiber optic cable is placed into use
- **Mid-1990s** – Widespread internet is in use by the public
- **1996-1997** – Fiber Optic Link Around the Globe (FLAG) is completed



Cloud Concepts Have Been Around for Over Half a Century

- **1997** – The term “cloud computing” is first used by Ramnath Chellappa (I.S. professor)
- **1999** – Salesforce.com launched
 - First major “cloud computing” company
- **2002** – Amazon Web (Cloud) Services launched
 - Storage, computation, human intelligence
- **2006** – Amazon Elastic Computer Cloud (EC2)
- **2009** – Google, others launch web-based enterprise applications
- **2012** – Over 80% of new apps are distribution/deployed on cloud servers



Where are we Headed?

“By 2015, at least 20% of all cloud services will be consumed via internal or external cloud service brokerages, rather than directly, up from less than 5% today.”

-Gartner Research

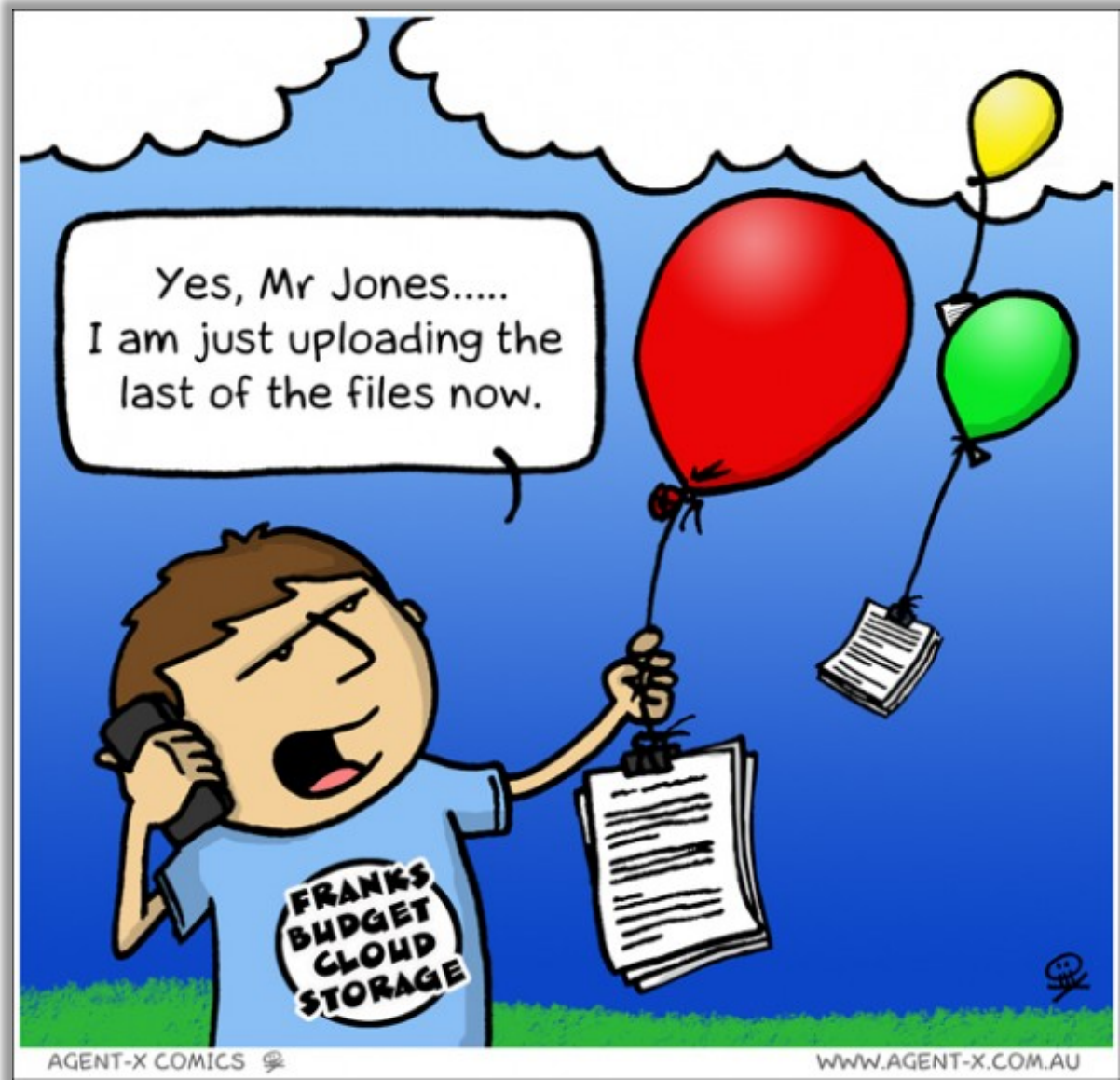


“Global Data Center IP Traffic: Nearly Four-fold increase by 2016.”

Source: Cisco Systems Global Cloud Forecast, 2011-2016

Why the Hype?

- Technology
 - Connectivity
 - Network
 - Virtualization
 - Scalability
 - On Demand
- Money
 - Cost Savings
 - Revenue Generation

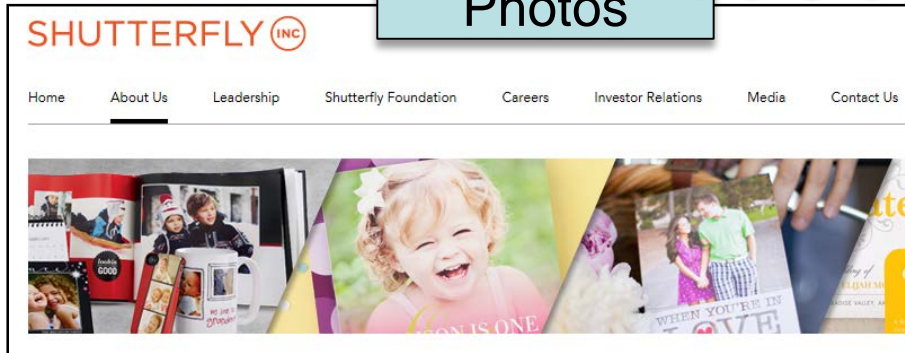


Personal Cloud Services

Most Personal Cloud Services are for Entertainment or Recreation

1999

Photos



Movies

NETFLIX

1999/2007

You Tube

2005

Video



Popular on YouTube



Music



Sports

Social Media

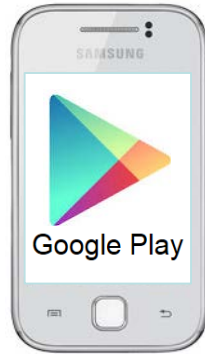


facebook

2005

More Personal Cloud Services

2007



Smartphone/
Tablet Apps

Security

2009



2010

Google Cloud Storage

Data Storage and File Sharing



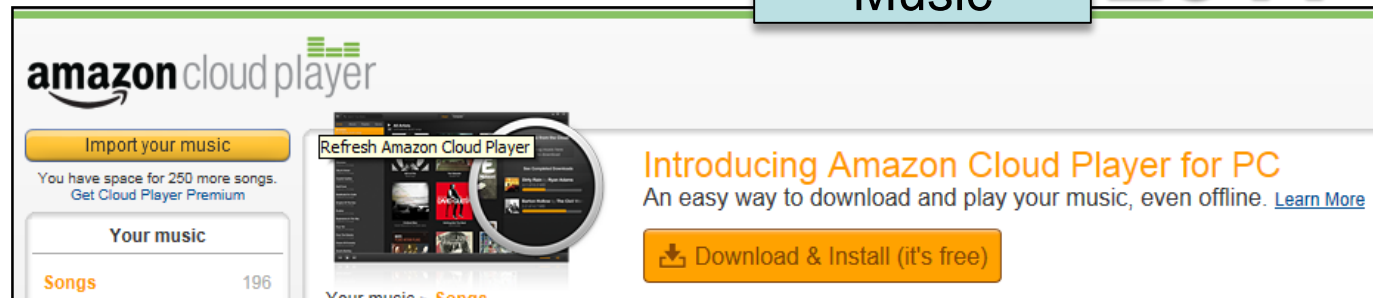
Store your data in Google's Cloud

Google Cloud Storage lets you store and access your data on Google's scalable storage and networking infrastructure.

[LEARN MORE](#)

Music

2011



Are Personal Cloud Services Safe/Secure?

- Online purchasing
 - Identity/account theft
- Social media
 - Personal theft
 - Employers/recruiters
 - Self incrimination
- Most cloud services are secure/protected!
- But, breaches do happen!



“I started to get suspicious when I was playing a game online and my score was the same as my Social Security number.”

What does it Cost?

- Most personal cloud services are Free!
- Free “cloud services”
 - Facebook
 - Shutterfly
 - Youtube
 - Cloud Players
- Minimal Cost for Cloud Storage
 - Google Cloud Drive
 - First 15GB free
 - \$60/yr for 100 GB; \$600/yr for 1000 GB
 - Amazon Cloud Storage
 - First 5GB free; photos and music are unlimited and don't count towards limit.
 - \$10/yr for 20 GB; \$50/year for 100 GB; \$500/yr for 1000 GB

Business Cloud Services

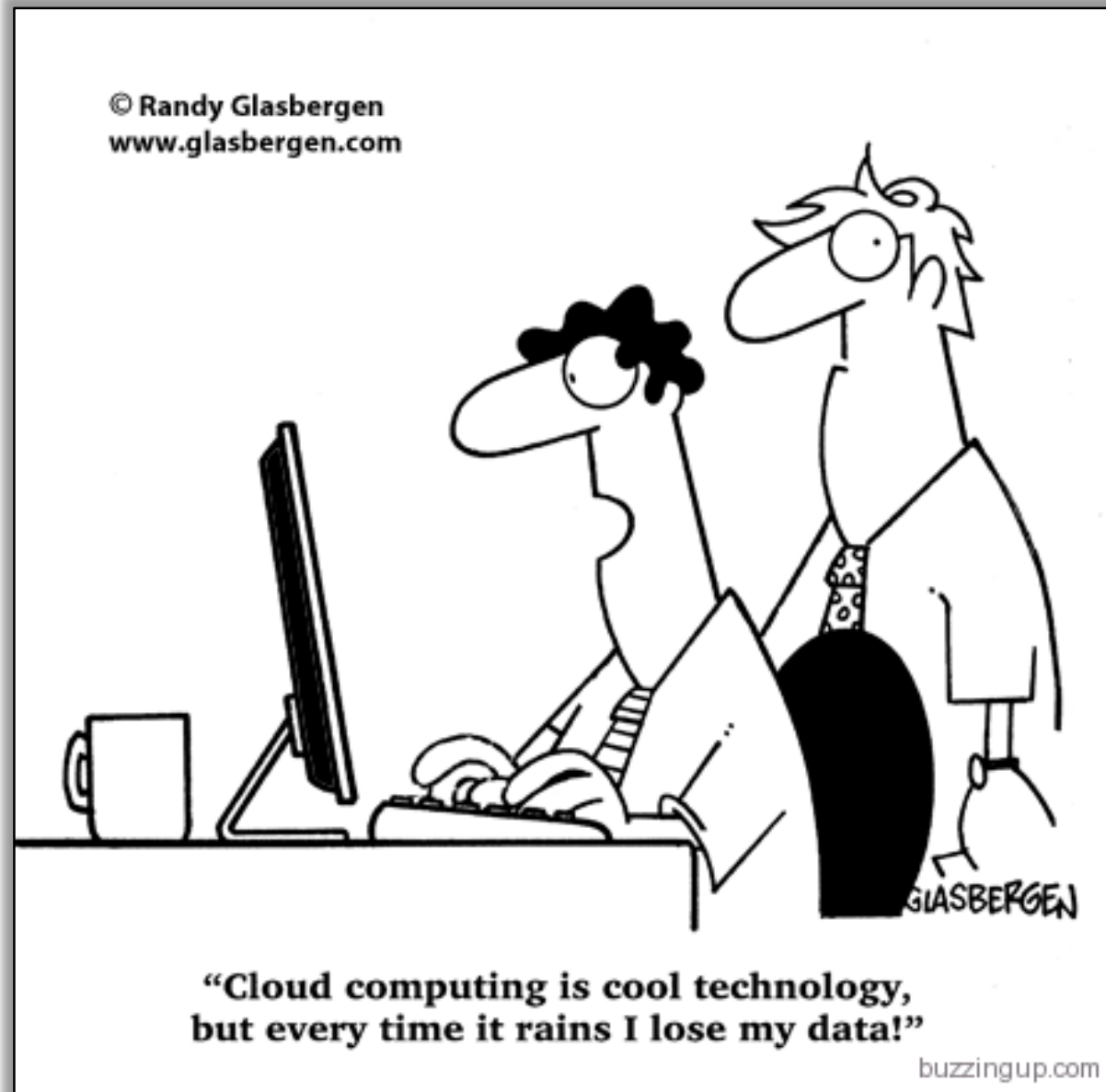


Business Cloud Services...the Sky is the Limit!

- E-mail
- File sharing
 - Dropbox/FTP
- File backup/disaster recovery
- Productivity Software
 - Office
 - Google Apps
 - Project management
- Videoconferencing
- Server/computer hosting
- Accounting
- Sales/customer management
- Security

Benefits of the Cloud

- Quick Deployment
- Disaster Avoidance
- Cost Savings
- Efficiency
- Security



Is the Cloud Right for You?

- Network ready?
- Cost effective?
- Comfortable with provider?
- Comfortable with ISP
- Data Secure?



What does it Cost?

Service Level Agreements

- Microsoft Exchange Online (Office 365)

- 43 minutes to 7 hours outage = 25% credit (99.9%)
- 7 hour to 36 hour outage = 50% credit (99%)
- More than 36 hours = 100% credit (95%)

- Google Apps

- 43 minute to 7 hour outage = 10% credit (99.9%)
- 7 hour to 36 hour outage = 23% credit
- More than 36 hours = 50% credit

- Amazon EC2

- 99.95% uptime based on previous 365 days (4 hours, 23 minutes)
- 10% monthly credit if SLA missed

Exchange Online (Office 365)
\$12.50 - \$20/user/month

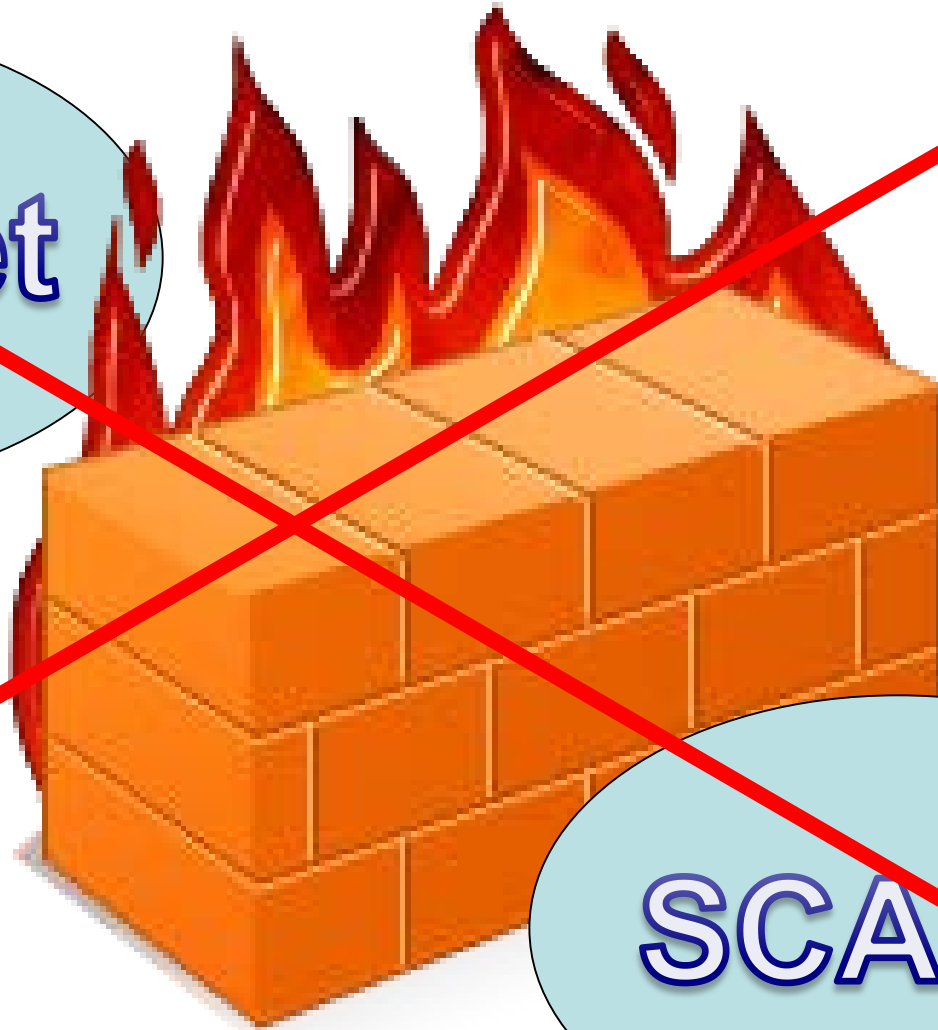
Google Apps
~\$5/user/month



SCADA in the Cloud and Cloud Security

Really?

~~Internet~~



~~SCADA~~

Risk Level and Potential for Exposure may be High

NETWORKWORLD

This story appeared on Network World at
<http://www.networkworld.com/news/2013/031513-scada-honeypot-267740.html>

[News](#)

Honeypot for phony waterworks gets hammered on Internet

Black Hat Europe: Trend Micro's SCADA experiment finds 17 targeted attacks, mainly from China, US, Laos

By [Ellen Messmer](#), Network World
March 15, 2013 11:08 AM ET

Network World - An experiment in which a Trend Micro researcher set up two instances of an Internet-based simulation of an industrial-control system (ICS) for a nonexistent water-pump facility in rural Missouri found the simulated system was targeted 17 times over about four months in ways that would have been catastrophic if it had been a real waterworks operation.

So....what do we do?

Water



Wastewater



On-call



Lab



Streets



Training



Safety

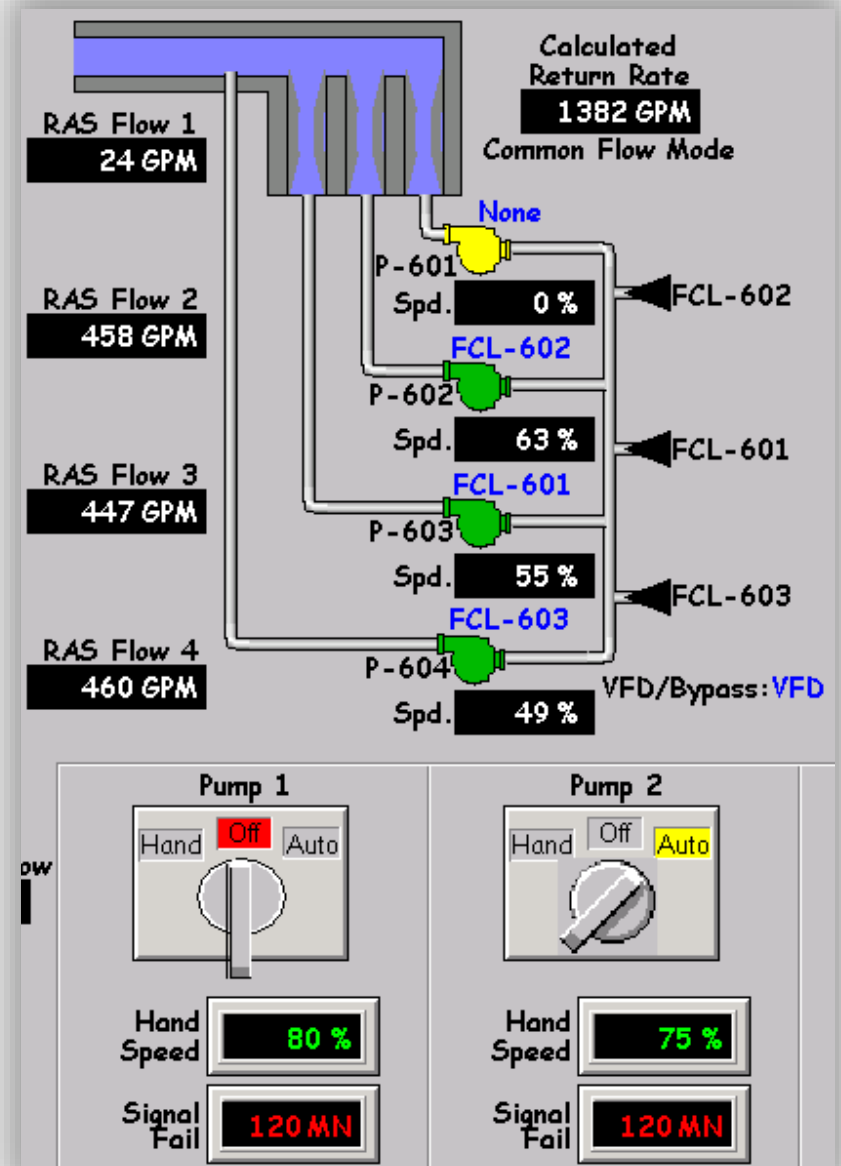


CEUs



First, review the functionality desired

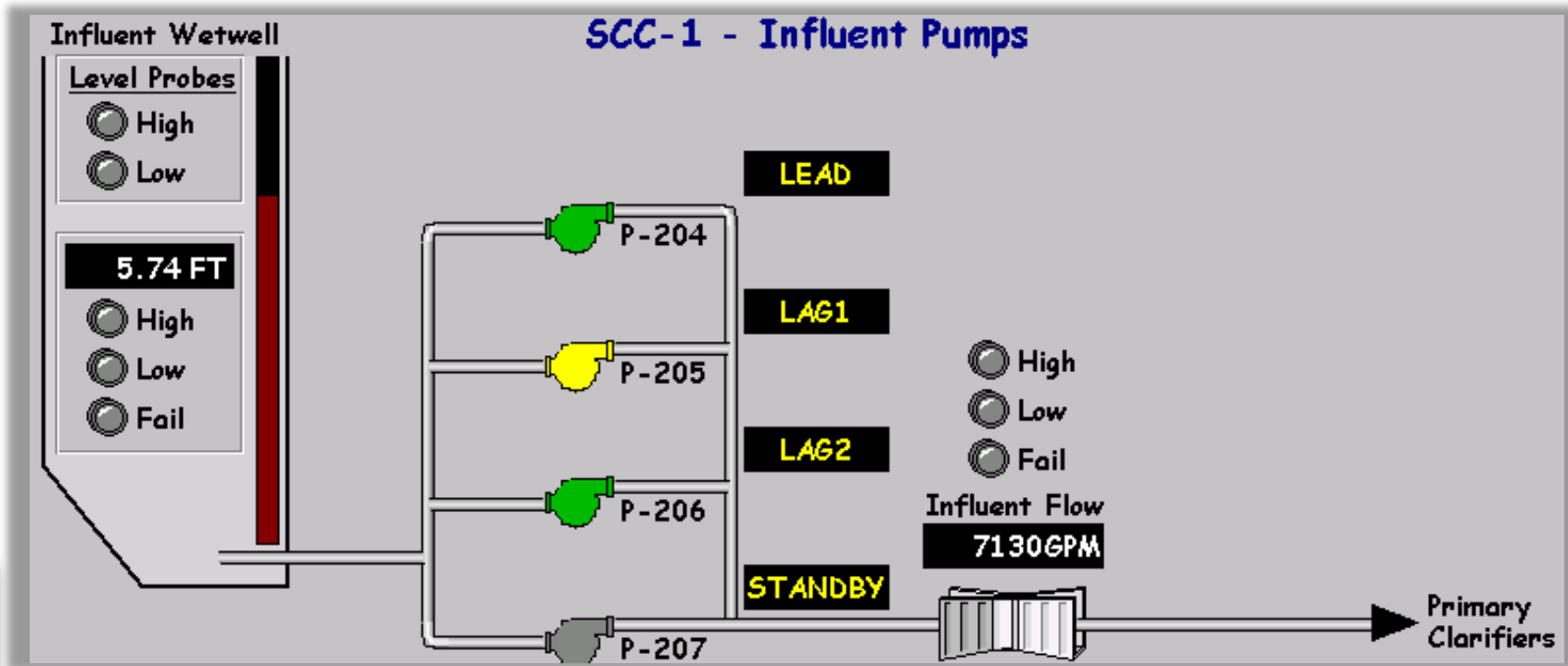
- Monitoring only
- Monitoring and control
- Alarm dial-out, text messaging, email, etc.
- Historical data access
- Reporting



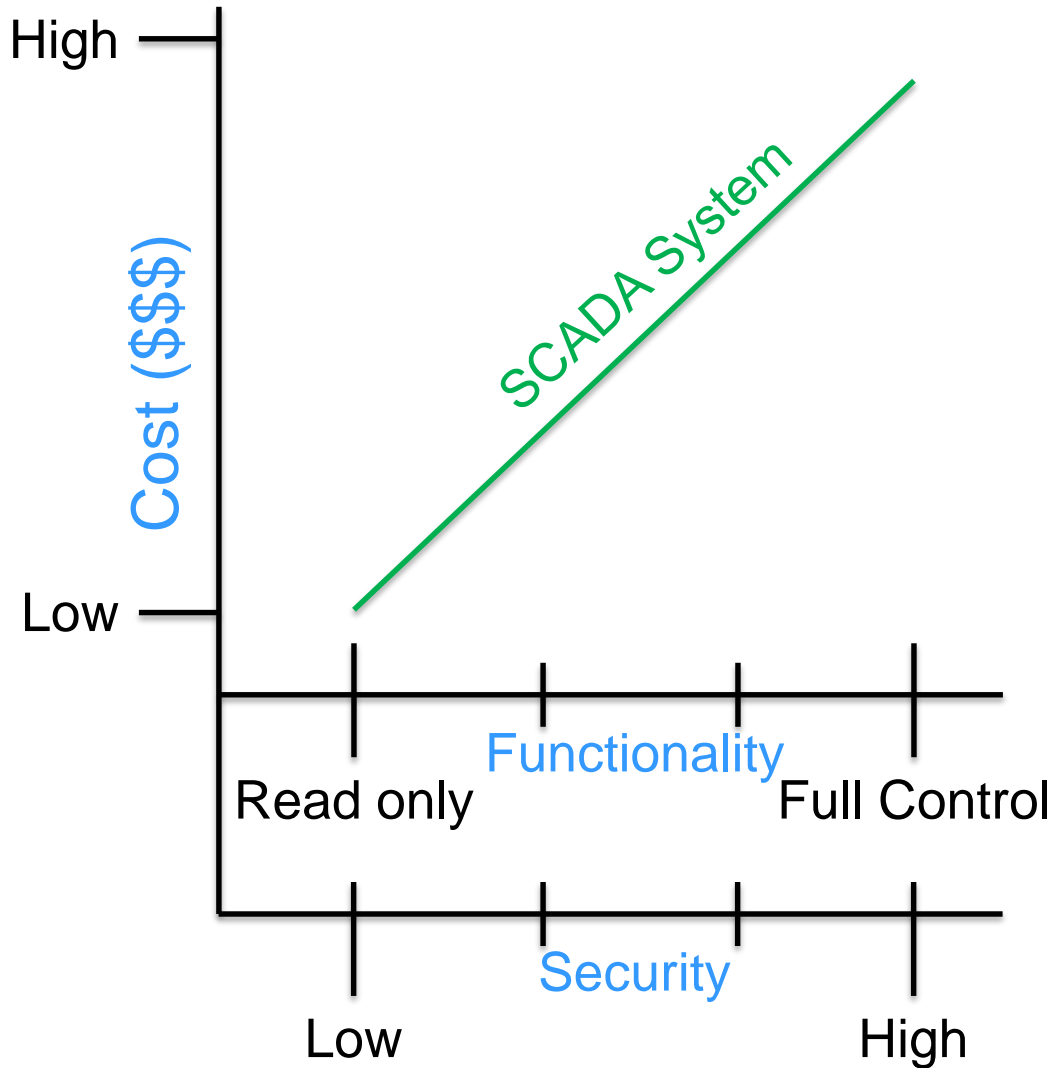
WIN-911[®]

Then review the available technology

- Internal server
- Hosted server
- Cellular
- Satellite
- Hybrid



Then review Cost versus Budget



And Weigh Risk versus Benefit

Security / Cyber-Attackers Breach SCADA Network, Destroy Pump at Water Utility

Cyber-Attackers Breach SCADA Network, Destroy Pump at Water Utility

By Fahmida Y. Rashid | Posted 2011-11-18 [Email](#) [Print](#)

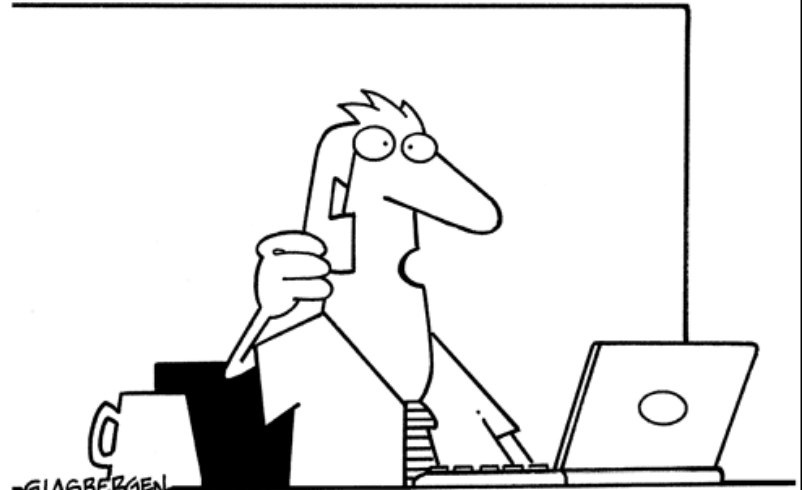
[f Share](#) 0 [T](#) Tweet 0 [G+](#) Google + 0 [in](#) Share 0

Hackers destroyed a pump used by a U.S. water utility after hacking the network of a SCADA vendor and stealing remote access login information.

Hackers breached the network at a water utility in Springfield, Mass., according to a post on the Wired Threat Level blog.

Cyber-attackers gained remote access into the control system of a water utility in Springfield, Ill. on Nov. 8, a security expert told Wired. A water district's SCADA systems used in the facility kept a pump from burning out, according to the report.

© Randy Glasbergen / glasbergen.com

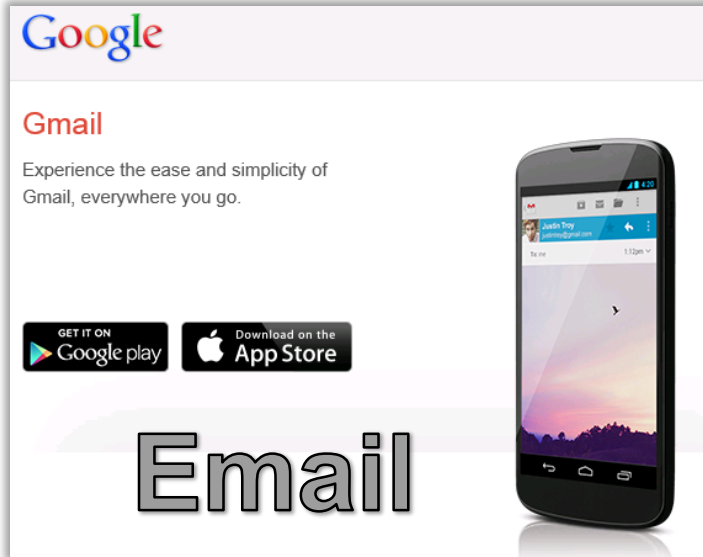


**“Are you sure our data is secure on the cloud?
I just saw my spreadsheet on the weather channel!”**

Cloud Applications



Personal Cloud Applications




Google

Gmail

Experience the ease and simplicity of Gmail, everywhere you go.

GET IT ON Google play | Download on the App Store

Email



Drive Headquarters™ Sales: (800)836-0199

The First Cloud IT Solution Provider

Home Features Software Premium Ser

It cannot be easier!

Drag & drop, virtual hard drive, it's that easy.

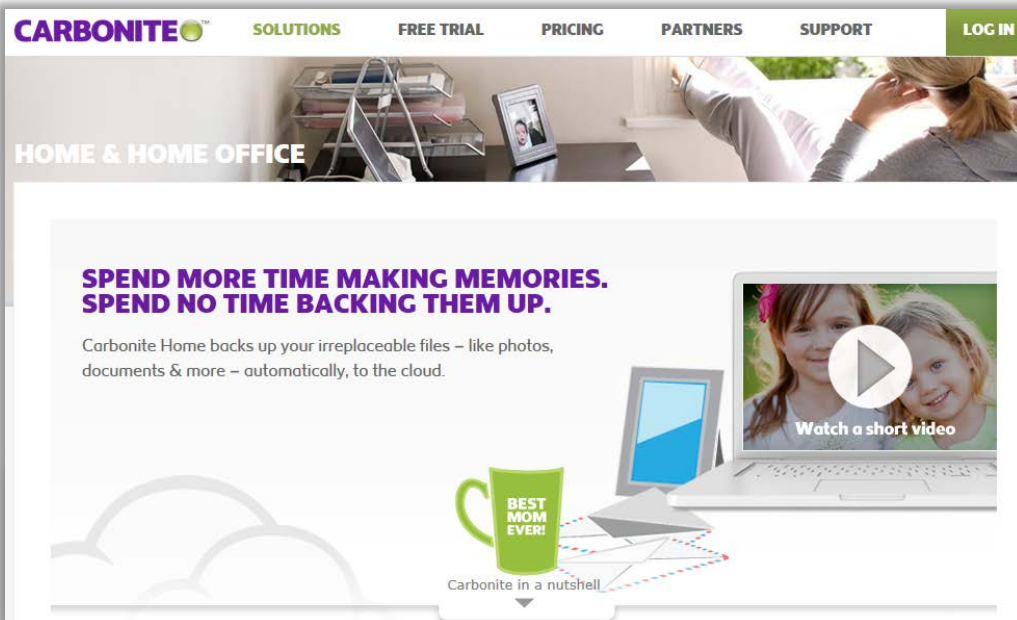
▶ Watch quick intro



And we have real customer support!

File sharing

Data backup



CARBONITE™ SOLUTIONS FREE TRIAL PRICING PARTNERS SUPPORT LOG IN

HOME & HOME OFFICE

SPEND MORE TIME MAKING MEMORIES. SPEND NO TIME BACKING THEM UP.

Carbonite Home backs up your irreplaceable files – like photos, documents & more – automatically, to the cloud.

Watch a short video

BEST MOM EVER!

Carbonite in a nutshell

SCADA Cloud Applications

HighTideTechnologies now transmitting on the **iridium** network

CONTACT HIGH TIDE TECHNOLOGIES OR YOUR LOCAL DISTRIBUTOR FOR MORE INFORMATION

The advertisement features a background image of the Earth from space with several Iridium satellites in orbit. The text is overlaid on this image.

Satellite/Cellular

telemetryview
LOGIN

HighTideTechnologies

Username

Password

Remember me

[forgot password?](#)

The interface is a login page with a dark green header. It includes a 'Sign In' button and a 'forgot password?' link.

MISSION

SCADA Made Simple
1-877-993-1911

Username:

Password:

[Forgot username?](#) [Forgot password?](#)

Products | Services | Solutions | Case Studies | About Us

The interface is a navigation bar for a SCADA application. It features the 'MISSION' logo, a phone number, and a navigation menu with dropdown arrows. A red circle highlights the 'MISSION' logo.

Cellular



Closing Thoughts

Follow-up Poll

Do you use cloud services?

Text answer to 22333

- **Yes** **749004**
- **No** **749005**
- **Not Sure** **749006**

<http://tinyurl.com/wwoa-poll>



Closing Thoughts

- Use cloud services where appropriate
- Make sure your network is ready
- Due diligence is critical
- Protect Critical Assets
- Keep up with Changing Technology





Questions and Answers



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Excellence in Engineering Since 1946