Excellence in Engineering Since 1946
Up in the Clouds Computing

Wisconsin Wastewater Operators Association
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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 computing

*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?

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."
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?”

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
More Personal Cloud Services

2007
- Smartphone/Tablet Apps
- Security

Google Play

2009
- Data Storage and File Sharing
- Music

Google Cloud Storage

2010

2011

Amazon Cloud Player

Panda Cloud Antivirus

Introducing Amazon Cloud Player for PC
An easy way to download and play your music, even offline. Learn More
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

“Cloud computing is cool technology, but every time it rains I lose my data!”
Is the Cloud Right for You?

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

I’ve finished studying other companies’ cloud migration strategies, ‘close your eyes and hope for the best’ seems to be the most popular...
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

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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

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
Then review the available technology

- Internal server
- Hosted server
- Hybrid
- Satellite
- Cellular
Then review Cost versus Budget

Cost ($$$)

High

Low

Functionality

Read only

Full Control

Security

Low

High

SCADA System
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, Ill. on Nov. 8, a security expert told Wired. A water district data acquisition (SCADA) systems used in the facility kept the pump to burn out, according to the report.

“Are you sure our data is secure on the cloud? I just saw my spreadsheet on the weather channel!”
Finally, Develop a Secure System with Limited Access

• Follow industry guidelines and recommended architectures

• Keep systems up-to-date

• Monitor incoming and outgoing traffic

• Integrate security into daily operations with all staff

• Disconnect when not in use or not needed
Cloud Applications
Personal Cloud Applications

Google

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

Email

Drive Headquarters
The First Cloud IT Solution Provider

It cannot be easier!
Drag & drop, virtual hard drive, it's that easy.

File sharing

Carbonite

HOME & HOME OFFICE

Spend more time making memories. Spend no time backing them up.

Data backup

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

High Tide Technologies now transmitting on the iridium network
CONTACT HIGH TIDE TECHNOLOGIES OR YOUR LOCAL DISTRIBUTOR FOR MORE INFORMATION

Satellite/Cellular

telemetryview

Username
Password

Remember me
Sign In
forgot password?

High Tide Technologies

Mission

SCADA Made Simple
1-877-993-1911

Username:
Password:

Forgot username? Forgot password?

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SCADA Cloud Applications

**Hybrid**

The **icontrol™** Hosted SCADA System

icontrol's hosted-SCADA solution provides you with fully-functional, true SCADA control by integrating your water or wastewater control devices (PLC's, RTU's, or similar instrumentation) with icontrol SCADA/HMI servers using the most appropriate communications systems.

**Traditional**

Remote Desktop Connection

**Computer:** scada.wwtp.com

**User name:** None specified

You will be asked for credentials when you connect.

[Connect] [Help]
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

Looks like they’ve switched to cloud computing
Questions and Answers