Leak Detection as a Service, Pros and Cons
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Software as a Service (SaaS) is a model for deploying an application using the Internet.[1] Using this deployment method a software provider can license their products in various ways depending on the needs of the user. Typically SaaS applications are used where the user does not have the resources to manage the applications locally or does not wish to incur the large up-front cost of ownership.

Background

Leak detection in one form or another is something every pipeline should consider having. Pipelines have an excellent safety record but accidents still happen. An example of such an accident occurred in Burnaby, B.C. Canada, July 2007[2]. A construction crew was performing a sewer excavation when they hit an oil pipeline. Despite normal precautions in planning at the work site, a mistake was made and an oil pipeline was ruptured. The oil geyser spewed for more than 30 minutes after the initial damage. This is a typical leak scenario where some event ruptures a pipeline causing unexpected economic losses and environmental damage. Having a leak detection system in place allows an operator to know within minutes if there is a leak and take swift appropriate action to minimize the damage.

Currently the only available leak detection systems are purchased applications that are installed on-site. These tend to be very expensive in terms of initial cost, installation and maintenance. But a SaaS leak detection implementation as shown in the diagram would have the SCADA system exchanging data with the remote application. The results are returned to the SCADA system and are also available to other users as needed. A SaaS based leak detection application would be more affordable to a pipeline operator who does not want the initial expense of a traditional system but still desires leak detection.

Implementing a realistic leak detection service is certainly within the limits of the current technology. The question becomes is it something you should consider? Depending on your available connectivity not all Computational Pipeline Monitoring (CPM) methods may work well. Methods that are time sensitive or data intense may not perform well if you have a slow Internet connection. Whereas, simpler methods, such as compensated mass balance, might work just fine for a single pipeline using a dial-up connection.

Without discussing the implementation details, this paper will address some of the primary issues from the user's point of view. Once the

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1 Wikipedia, Software as a Service
2 www.canada.com/vancouversun/story.html?id=31749b61-8662-4f67-9d6c-6506a67d5b88&k=21086

user has a good understanding of what to expect, this information can help them make an informed decision on the type of system they need. Five key areas will be addressed: Cost, Data Security, Communications, Performance, and Support.

Reasons for SaaS

Initial Cost and Personnel Requirements are the primary reasons for using a SaaS application. In addition, Data Integrity, Performance, and Communications provide other supported reasons as explained below:

Cost – SaaS products are normally billed on a monthly basis. As such, the cost is usually treated as an ordinary operating expense. This may be extremely important to an existing pipeline operator when capital budget funds may be scarce. Another advantage is the ability to easily add or delete functions as required to manage costs. With expanding Internet, communication equipment and service options costs should continue to decrease over time.

Data Security –Since SaaS is an off-site application, the data is in a more secure environment.[3] Typically, the SaaS vendor will have redundant servers in multiple geographical locations. Therefore, you increase the chance that your data will survive an incident at your data center. Storing the data in an off-site application eliminates the need for multiple server locations (and the cost to maintain them), protects your data, and provides automatic back up of the same.

Communications - Using SaaS enables you to easily access your data from multiple sites without having to build and manage an in-house approach. This access can be achieved by using the Internet with Virtual Private Network (VPN) connections, leased lines, or web-based access using secure HTTPS. Depending on how you tap into your data stream, using an off-site service may even allow an operator useful data when other systems are down.

Performance – A SaaS application usually has a minimal performance impact on the local system, since the majority of the processing is performed remotely. A small interface program would be required for communication between the local SCADA system and the remote application. The vendor will have the ability to monitor specific data from his site and address any problems that might arise to keep the application running at its peak performance.

Support – With the SaaS application, the vendor should be more responsive in making sure the bill gets paid every month. With a traditional system, while you are spending the $300,000 or more, you have the vendor's key personnel attention. After the system commissioning, these key personnel generally move on to the next client and you are now dealing with a second tier support group. If you have a SaaS system, it is reasonable to expect knowledgeable expertise to help you with issues or changes to you system during the life of the contract. Having this level of expertise available frees you from having to maintain in-house expertise or contract with an expensive 3rd party provider for occasional changes.

3 Taking the risk out of SaaS by Mark Gibbs, Networkworld, March 26, 2008,
        http://www.networkworld.com/newsletters/web/2008/0324web2.html

Reasons against SaaS

Just as there are reasons for using a leak detection service there are reasons against using a SaaS based application. Addressing the same items as before:

Cost – A monthly cost which must be paid or your service is turned off. You do not have this problem with a purchased system. In the event of budget cuts you might drop the annual maintenance but you still have your leak detection system. By having a purchased system and not paying the monthly expense for leak detection you free up funds for other activities such as additional training or more personnel.

Data Security – Security, industrial spying and snoopy reporters are always an issue when dealing with your data.[4] As long as your data remains "inside the fence" your data is under your control. Once the data leaves your facility you no longer have direct control and must rely on your vendor's security measures. Security concerns now include not only your facility but the network connection and the vendor's facility.
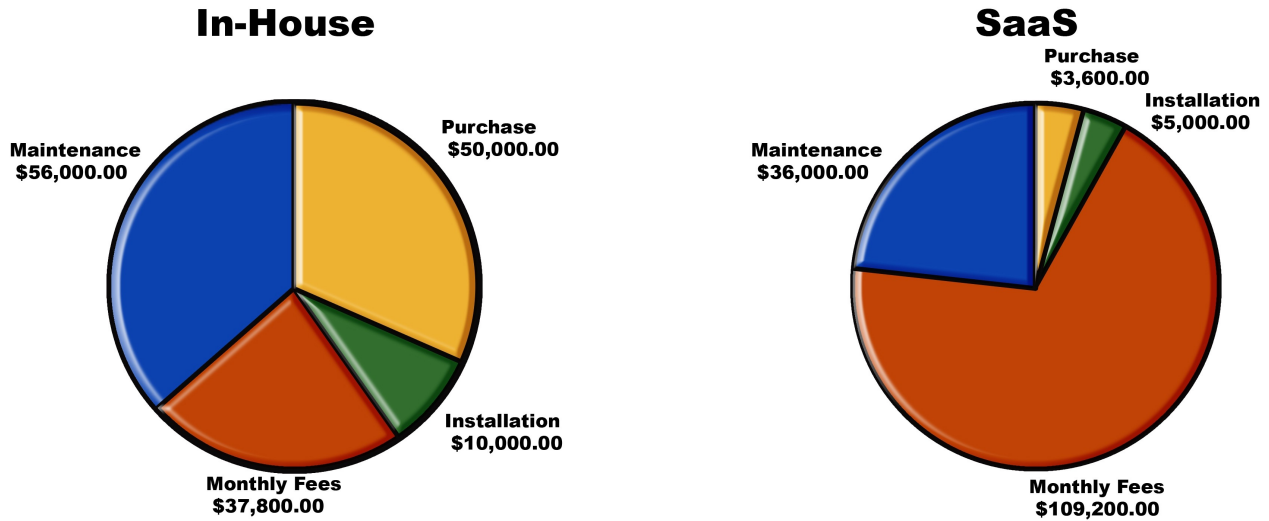
Communications – A reliable data link between your data center and the vendor can be intimidating to setup. Unlike most service applications, leak detection will require 24 hour access to the vendor. A dedicated circuit can be installed but that is expensive and unlikely. The next most likely alternative is a VPN connection. Setting up a VPN connection may require a special router and an experienced IT specialist to correctly configure the connection.

Performance – Under normal conditions transferring data to the vendor's machine is not a problem. When the Internet begins to lag or slow, down the quality of the leak detection may degrade or even fail. The use of dial-up, satellite or cellular data can be used as a backup connection but will require additional complexity at your site.

Support – If you purchase a leak detection package it is yours. If the vendor drops support your leak detection is still operational, unless something breaks. With a SaaS application, if the supplier ceases operation or is bought by another company your service could be canceled or have huge cost increases. If you own the application you get to decide when to install any updates. For a SaaS product, you may not know when updates are installed. You need to be aware of how the vendor handles updates and what happens if an update should fail.

4Hacking SCADA/SAS Systems, 11/2006, http://stuweb.ee.mtu.edu/~ssmoily/NESEC.pdf

A Sample Cost Comparison

Three good reasons for using a leak detection as a service are rapid deployment, minimal personnel training and initial cost. Costs include the initial investment, installation and training. The base price for a single pipeline leak detection application can start at $50,000 plus installation costs. For this comparison a basic system costing $50,000 will be used and evaluated over a seven year period.

In-House

Maintenance
$56,000.00

Purchase
$50,000.00

Installation
$10,000.00

Monthly Fees
$37,800.00

SaaS

Purchase
$3,600.00

Installation
$5,000.00

Maintenance
$36,000.00

Monthly Fees
$109,200.00

Purchase – The purchase price generally includes only the licensing fee, installation costs are extra. For a SaaS system there may be a minimal purchase price.

Installation – Depending on the complexity of a system or special processing needs, the installation costs are subject to change. Generally for a purchased mass balance system, installation involves identifying, configuring and verifying all the data points, hardware and software installation and user training. Finally, operating limits are tuned and some form of acceptance testing performed. With a SaaS system configuration, training and testing are still required but will be generally much less since the vendor is responsible for a majority of the work.

Monthly Costs – A support contract typically is about 10% of the purchase price per year. This would include software updates and some form of telephone support for problem resolution. Some vendors may offer a more expensive premium service for faster response. For SaaS applications, support is generally included in the monthly contract.

Maintenance Costs – Basic costs start with maintaining the equipment with regular cleaning, replacing or repairing broken parts and the cost of a hardware technician to perform the maintenance. A person is also needed who is familiar with the leak detection product who can manage changes and make adjustments as the pipeline changes. This person would need to know how to install updates, configure, run and generally maintain the leak detection package. If using a leak detection service, the vendor typically provides a majority of this support and expertise. Using a service also frees you from equipment maintenance since you will not have any special leak detection hardware.

Total Cost – Over a 7 year period the total cost would be about the same for both methods. The traditional system would have a large up front cost which would be depreciated while the SaaS system would have a higher monthly cost but would be an expense. The total cost for either system would be approximately $153,800.

Conclusion

Leak detection as a service appears to be a low risk and cost effective alternative to the traditional purchase. The low start up cost allows for a low risk venture into leak detection for even the smallest pipeline operators. The monthly costs would be higher but would be an ordinary operating expense verses a major capital expense. A SaaS application would allow a pipeline operator to install a system quicker instead of waiting one or more years for budget approval. In the future if a better alternative becomes available the pipeline operator could easily switch without having to scrap a large investment. Leak detection as a service is a viable alternative to the traditional product, especially for smaller pipeline operators who do not wish to make a major investment.
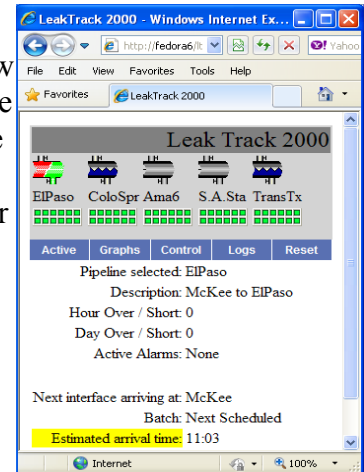
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