



Department of Labor

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# State of Idaho Cloud Computing Pilot

Background on the Idaho Department of Labor Cloud Computing pilot program.

## **What is Cloud Computing?**

National Institute of Standards and Technology defines cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources – networks, servers, storage, applications and services – that can be rapidly provisioned and released with minimal management effort or service provider interaction.

## **Why should the Department/State adopt Cloud Computing?**

Cost Savings: The Department of Labor has a highly seasonal operation with peak workload in the winter. Under the current model the department must build sufficient automated infrastructure to handle the peak winter load. The infrastructure sits idle or with minimal use during the remainder of the year. Other agencies have similar seasonal needs. With Cloud Computing the state would pay only for what it used. The Department of Labor's costs would drop dramatically during the summer. There should also be savings as a result of reduced staff for installation and maintenance of infrastructure. Network costs are likely to increase, but the absence of capital expenditures on infrastructure should more than cover that increase.

Scalability/Rapid Elasticity: Should the department's infrastructure – or the state's infrastructure – needs suddenly expand or contract, Cloud Computing allows the state to rapidly acquire greater infrastructure capacity or rapidly offload excess capacity. The current model does not allow that. Currently, there is no way to recover from a sudden unexpected drop in computing needs, and acquiring additional infrastructure takes extended periods for procurement and installation. Cloud computing allows for almost instant adjustments. With Cloud Computing the state can unilaterally and automatically provide computing capabilities such as server time and network storage as needed without involving each service's provider or procedures such as the state's procurement process.

The Department of Labor is currently the lead state in a four-state consortium designing a new integrated unemployment insurance tax and benefits system. Construction of that system will begin in the fall of 2011. The design will allow one or more states to host the system for other states. If the Idaho Department of Labor were to host the system for other states, the rapid elasticity of Cloud Computing would be critical to its success.

Security: Computer security is complex. Large companies in the private sector spend large sums hiring experts and purchasing sophisticated and costly software and hardware to protect their automated systems. The state of Idaho cannot possibly come close to that level of protection. The state is a relatively small organization with very few true security experts. Using a large Cloud Computing vendor that has highly qualified security personnel and extensive security infrastructure greatly reduces the state's risk exposure. It's a huge improvement over what we are able to do alone.

Disaster Recovery/Business Continuity: Much of the state's automation has little or no capacity for disaster recovery or business continuity. That has happened because under the current

information technology model employed by the state, disaster recover/business continuity is very expensive. The Department of Labor has devoted substantial sums building this capacity but has only partially met the need. Using a large Cloud Computing vendor such as Microsoft or Google automatically solves the problem. Microsoft has a half dozen data centers in North America and would house the state's data in more than one center. If one center fails, another takes over. Cloud Computing represents a near perfect solution to a problem we have been working on for decades. The taxpayers will be much better served under Cloud Computing should we suffer some unfortunate event that would disrupt our automation.

*Mission Focus:* The department and the state of Idaho as a whole devote a lot of personnel time to infrastructure installation and maintenance – patching operating systems, patching software, replacing broken equipment to name just a few of the tasks at hand. Using Cloud Computing will offload that effort to the cloud vendor, allowing the state to refocus that infrastructure effort towards activities more directly related to the mission of state government. In the department's case, the infrastructure effort would be redirected towards enhancing automated systems that serve unemployment insurance claimants, job applicants and other clients.

*Skills shortage:* Many of the skills required for infrastructure installation and maintenance as well as infrastructure security are not in abundant supply. In some areas such as mainframe technical services, there are extreme skill shortages. Using Cloud Computing allows the state to offload that problem to the cloud vendor. The cloud vendor is also in a much better position to compensate properly to attract and retain personnel with skills that are in short supply or to develop programs to help employees acquire those skills. That better position is largely the result of economies of scale and having highly skilled staff benefiting a much larger audience than would be possible for the department or the state individually. Actions that are not economically feasible for the state make perfect sense for the large cloud vendor.

*Software/Hardware Maintenance:* Patching operating systems and software often results in problems with other software. Vendors producing those patches go to great lengths to test them, but they cannot possibly foresee every user hardware/software configuration. The often heard accusation of vendors using their customers to debug their software is an outgrowth of that and of the current infrastructure model employed by the state of Idaho and most other information technology organizations. Cloud Computing minimizes that problem because the software runs in a standardized environment that can only be modified by the vendor. The cloud vendor can test software changes for his cloud environment and minimize subsequent problems as a result of patching.

Also, hardware maintenance is handled more efficiently and less costly by the cloud vendor. Large cloud vendors purchase hardware in much larger quantities than the state of Idaho or a single department can. As a result their hardware costs are greatly reduced. In addition, the cloud vendors have skilled hardware technicians who specialize in specific aspects of their infrastructure as opposed to the state's or department's need to have generalists – people who know something about a number of infrastructure aspects. As a result, cloud vendors can solve

hardware problems much faster than we can. In fact, much of their infrastructure is designed to identify problems before they happen so that corrective measures can be taken before any disruptions occur. The skills required to design and maintain such sophistication are far beyond anything the state of Idaho or a single department can afford.

*State of the Art:* Many information technology organizations are way behind the curve in maintaining current versions of software. This is often the case because upgrading software creates new problems and operational disruptions that most organizations want to avoid. Failing to make those upgrades eventually causes even larger disruptions when the unpatched software is compromised or fails entirely. With Cloud Computing the cloud vendor takes care of upgrading software. The cloud vendor also has the proper incentive to minimize disruptions caused by upgrades. The current infrastructure model places most of the risk for upgrades on the customer.

*Vendor Incentives:* One of the most compelling reasons for moving to Cloud Computing has been mentioned previously. Since most cloud vendors guarantee availability and reliability of their software or platform, they have a strong incentive to fully debug software before deploying it. Problem software costs them directly instead of just being an irritant to customers. Cloud vendor revenues are based on customer use. The customer cannot use anything and thus pays nothing if the software or platform has failed. Problem software also hurts the vendor's competitive position in a new market that is probably going to expand exponentially in the next decade. Customers will quickly abandon an unreliable cloud vendor. Cloud Computing does a superb job of aligning the vendor's incentives with the customers interests.

### **What are the obstacles to adoption of Cloud Computing?**

*Experience:* The state of Idaho has little or no experience with Cloud Computing. The best way to address that is to start a pilot of Cloud Computing. The Enterprise Services Oversight Committee has recommended that the Idaho Department of Labor be allowed to begin such a pilot. The Department of Labor is developing a plan for that pilot and will share everything learned with the oversight committee and the Department of Administration. The state needs to start somewhere, and isolating the impact to a single department while also giving the cloud a rigorous workout seems the wisest course of action. Labor volunteered to do this pilot and is committed to the project. The cloud vendor used in this pilot will be Microsoft. Labor is especially interested in Microsoft's application development platform, Azure.

*Security:* The Department of Labor and the state of Idaho handle a substantial volume of confidential information. The current infrastructure model depends on each agency following good security protocols in order to protect that information. Unfortunately some agencies do not have the personnel with the expertise needed for good security nor have they done the requisite training to ensure that staff are following existing security guidelines. As stated previously, cloud vendors are much better prepared to safeguard automated assets than the state of Idaho. They have more knowledgeable staff and better security software.

Nevertheless, Cloud Computing security will be evaluated in the pilot by the Department of Labor. Widespread use of data encryption will also be evaluated in the pilot.

*Network Capacity:* If Cloud Computing customers cannot access software on the cloud because their network cannot handle the load, then Cloud Computing is basically worthless. As a result, a detailed evaluation of network requirements will be part of the Department of Labor's pilot program. The department is beginning this pilot with the belief that its network is likely to require some upgrades in some locations.

*Customer Infrastructure:* For the last five years or so, the Department of Labor has been experimenting with thin clients where the software runs on a central server and the local device is primarily just a display of that server software's user interface. The local device thus has no hard drive and very little memory. It is inexpensive. In order to use the Microsoft cloud the department will need to revert some staff back to PCs. The client computers located in all of our local offices will remain thin clients for security reasons. We have already identified resources for the new PC's. Fortunately the PC's needed for the MS Cloud are now almost as inexpensive as the thin clients were when we started using them. It represents a burden for the department, but the general cost benefit from Cloud Computing should be much greater.

*Dependence on Vendor:* Many people are concerned that investing heavily in Cloud Computing will leave the state dependent on a single vendor. Obviously such dependency could prove dangerous if the vendor were to go bankrupt or quit Cloud Computing entirely. However, many entities including the National Institute of Standards and Technology, which is part of the U.S. Department of Commerce, are working to develop standards for Cloud Computing. Such standards should ease moving from one vendor to another. In addition, there is a lot of competition among companies eager to get into the Cloud Computing business. It is unlikely that the state would not have a choice of vendors. Fundamentally, the state is already dependent on one vendor since the state's software standard is Microsoft.

*Procurement:* The Department of Administration is unsure whether we can use the existing state contract with Microsoft to purchase cloud computing services. If it is determined that the existing state contract cannot be used, the Department of Labor will immediately begin work on a formal Request for Proposals.

*Internet Fail Over:* The State's communications network does not currently have an automatic failover to a secondary Internet service provider in case of the failure of the primary provider. That capability is currently under construction and should be available by the end of September. The Department of Labor has volunteered to assist financially and otherwise in getting this fail over mechanism in place.

### **What is the pilot program timeframe?**

The Exchange/ SharePoint/Office Live Meeting/Office Communications pilot on Microsoft's cloud will take place over the next 14 months.

The first phase of the pilot will involve software as a service – specifically e-mail. Microsoft’s e-mail cloud offering (MS Exchange) will be functionally complete within three months. It will include archiving and integrated voice messaging – two functions currently used by the Idaho Department of Labor but not available in the state’s central messaging initiative. In order to migrate to the MS Exchange in the cloud, we will need to upgrade our local servers to Exchange 2010. After that upgrade is complete, we can connect our local exchange servers to the MS Exchange cloud servers by implementing Active Directory Federation Services. At that point we will migrate a test group of department e-mail users to the cloud. Once we know the migration works and all problems have been resolved, we will move the entire department to the cloud. We believe that process will be complete in six months. At that point we will begin preparations for migrating to the MS Cloud for Office Communications Services, SharePoint and MS Office.

Within two years Microsoft claims that it will have virtual server capabilities in its cloud where we can use cloud resources such as database servers as if they were local devices. The department believes it can save substantial sums on capital expenditures and can improve performance dramatically as a result.

During that same period the Department of Labor will be exploring Cloud Computing using the Microsoft’s Azure platform to:

- Build a simple pilot application to test availability of department applications from outside our environment. This application will provide a low-risk proof of concept and low-volume real transactions.
- Convert the Job Search Web service to run in the Azure environment. This is under way and should be ready to pilot in August.
- Evaluate actual costs based on transactions from trial applications. Some free service is included with existing MSDN subscriptions.
- Review the activity reports that Azure provides to ensure transparency into system usage and corresponding costs. It is important to evaluate what actual costs are likely to be before we turn on an application such as job search, which will quickly become high volume.
- Research Azure data security and confidentiality to ensure that confidential data could be housed on SQL Azure servers. Broader use of this environment will require that this question is answered unambiguously.
- Research SQL Azure administration strengths and weaknesses. Review backup and restore procedures as well as costs associated with saving and transferring backup files into and out of the cloud.
- Prepare a report evaluating Azure in several key areas including:

- Performance and Scalability;
- Changes required to application architecture;
- Deployment and Application Support and Management;
- Security and Encryption;
- Data confidentiality;
- Administration of SQL servers;
- Limitations.

The Department of Labor is currently a lead state in a four-state consortium whose mission is to develop an integrated, web-based unemployment insurance tax and benefit system. The design phase is currently in process and should be completed by September 2011. In October 2011 the construction phase will begin, and the department intends to build that system on Azure.

### **What is the long-term impact of Cloud Computing on the Department and State?**

Cloud Computing will likely become pervasive in the future. Offloading so many headaches to vendors at what currently appears to be very low cost will be difficult for companies and government agencies to resist. Cloud Computing today is often compared to the advent of electric utilities. Who today would even dream of doing Idaho Power's job for them. Most of us would just as soon let the experts handle electricity generation, leaving us to focus on our real mission—providing services. Cloud Computing will likely follow the same path.

However, someone in state government needs to manage the contractual relationship with the cloud vendor. Currently the Department of Administration manages the relationship between state agencies and Qwest on the IDANet successor network. Following the same strategy with the cloud vendor would seem like a reasonable approach.

The Department will keep a log of project activities during the year and will continue to invite representatives from other agencies to participate in the project. The Department of Labor will create a final report on this pilot project by the end of September, 2011. In order to compare the cloud email with the State's existing central messaging facility, the Enterprise Services Oversight Committee will provide a set of performance metrics that Labor will seek to generate from its cloud-based email operation.

### **What vendors are offering Cloud Computing services?**

Current vendors include Microsoft, Amazon, Google, HP, IBM, EMC, Salesforce, Skytap, AT&T, GoGrid, NetSuite, Platform, Rackspace, Computer Sciences Corp., RightScale, Unisys, Accenture, VMWare, Computer Associates, 3Tera, Eucalytpus and Verizon to name more than a dozen. Numerous other companies are preparing to enter the competition. Obviously all of these vendors are making substantial Cloud Computing investments in order to secure a role for themselves in what they view as the future of information technology.