

G-Cloud : Web Business Evolution

Best practices in Government Cloud Outsourcing

<http://CloudBestPractices.info/G-Cloud>

Executive Summary

Recently Elections Canada published an RFP for their web hosting requirements, providing an ideal scenario to focus on for identifying new solutions and best practices for Government Cloud Computing (G-Cloud).

It typifies the type of solution needed to migrate other Government agencies from a traditional web hosting approach to a new Cloud computing paradigm, describing exactly the technical features required to make such a transition. These features represent the common components that other agencies will also require, and thus define a framework for G-Cloud architectures.

Elections Canada have stipulated requirements for two main transformational journeys:

- The move to a Utility Cloud Computing service model
- Adoption of new software development methods

Requirements Overview

Elections Canada is an ideal product development blueprint because they're atypical of the market as a whole.

They launched their web presence in the mid 90's with simple HTML, and then began enhancing it with custom .net code to add in more interactive functionality. Since then it's grown organically into an estate of over 16Gb of ASP, HTML pages and 6,500 PDF files. As they state the design of this environment has now remained unchanged for almost 10 years, and so a Cloud computing inspired modernization of the entire approach is what they're looking for.

Thousands of other organizations have undergone exactly the same journey and are currently in the same position, so a solution modelled for one is a product development cycle for them all.

As a web site for voter elections, Elections Canada is also the poster child for the core value of a Cloud computing approach. On that one election day their web site receives a spike of traffic that accounts for almost a third of their traffic for the entire year.

Their monthly rate is 200,000 visits but on the polling day this rockets to 700,000 for that one day alone. Out of a total 2.4m hits per annum, almost 30% occur within one day, meaning their web site infrastructure must be large enough able to cater for a traffic ceiling of 700,000 hits, but on every other day experience a demand that is barely 1% of this.

This is a hosted environment of 32 servers, running Windows Advanced Server 2000, HP-UX and Solaris, and 22 HP, Cisco and Nokia devices used for firewalls, load balancing and switching, firewalls and private VPN connections.

That's a lot of equipment to sit idle for 364 days of the year and therefore not an optimum use of taxpayers monies, and so now they're looking to exploit the Cloud trend and address this.

Utility Cloud Computing

The fundamental value of Cloud computing is of course that its “elastic”, so EC can migrate to an environment that can scale to this level but only when needed on these rare occasions. For the remaining time they only pay for what they use at the much lower levels.

EC states requirements for:

"a computing capacity-on-demand operating model"

"develop cloud computing capabilities; which support not only infrastructure capacity improvements but also provides new and emerging opportunities that leverage application level revitalization using a flexible and dynamic provisioning model"

"develop value-added services to support current and future development projects, pilots, proof-of-concepts and other web business initiatives"

How this new approach will impact their current set up is actually nicely demonstrated through their own contract terms listed in the RFP, specifically where they define the need for capacity change-controls (buying more servers, more bandwidth etc.) which they articulate through:

"Provide additional capacity within 10 working days."

Manually re-configuring infrastructure to meet demand, and taking up to 10 days to do so, is a symptom of the traditional web hosting approach, where the move to Cloud will make this requisition possible within seconds, automatically.

Cloud Computing allows applications to leverage the flexibility of leased Virtual Machines to scale organically, where the Cloud environment monitors http response times and other critical performance factors, and automatically provisions and de-provisions new IaaS (Infrastructure as a Service) as traffic dictates.

DevOps architecture: Enabling Web Business Evolution

While this is the core benefit of Cloud Computing, it is not the only benefit that Elections Canada is seeking from this upgrade journey.

They also want to transform the nature of how they engineer software entirely, not just change the hosting model for it. This is a double whammy known as “[DevOps](#)”, referring to the integration of Development (writing software) and Operations (running software), within the context of an overall Quality Management System (QMS) so that the site can be changed quicker while also increasing the safety and uptime.

In this regard Elections Canada struggles with the same challenge most legacy web hosting environments do. Their site operates through a variety of custom software modules written on .net, C# and Javascript, and not only does it cater for the main web site but also a number of specific business processes for how the organization works too.

This includes smaller app functions, like 'Political parties fiscal returns' and 'Candidates contributions and expenses' through to significant business workflows, like the ENR System - Election Night Results, which manages the process of Returning Officers uploading voting results, and the VIS - Voter Information Service, which enables citizens to self-serve their requests for more information on their local activities.

In short most of their mission critical process runs over the web, a process that Elections Canada

describe as "**Web Business Evolution**".

The challenge is that it is currently achieved through a somewhat tangled web of custom code and ad-hoc applications, and so through a DevOps framework that Elections Canada are calling their Application DEF - Delivery Environment Framework, EC wants to transform how efficiently and quickly they can develop, test and deploy new online applications by enhancing the structures of this environment as part of the move to the Cloud.

They cite examples of projects they're working such as the 'FAST' Project - **Field Application Systems Transformation**, where new web applications will be deployed to support new ways of working for the Returning Officers, an **eRegistration Project** where voters can self-service validate their voter registration records, and the big daddy of them all: **iVoting** - online election voting.

Providing the tools and hosting environment that enables EC to deploy these types of new applications quicker, is where the strategic opportunity is for G-Cloud hosting providers.

Elections Canada now sees itself as a "web business", meaning their primary business processes are executed through the context of their web site, and they want a new level of platform to reflect this strategic priority.

G-Cloud

The role of G-Cloud is to provide a common reference architecture and infrastructure to cater for both of these capabilities, the utility computing and DevOps environment, via a single platform.

Elections Canada describe this as an underlying "Multi-Tier System Architecture", where common services for authentication, authorization and auditing are built into the Cloud environment via a Web Services Reference Model.

This will provide the common building block components like Identity Authentication that will underpin these new web applications, and via an 'ADC' - Application Delivery Controller, combine this other key functionality as part of an optimized hardware level capability that also delivers SSL VPN connectivity, L4 load balancing, L7 content switching, XML brokering and an application XML firewall.

These technologies can be configured with G-Cloud specifications, like [FIPS-140-2](#) for encryption, to modify them accordingly for Government compliance, with the right mix enabling the overall system EC is seeking.

In particular "Cloud Aware" applications are key. As the Wikipedia entry about DevOps highlights, one of the key foundations of this methodology is the inherent architecture of the hosting environment itself:

"Giving infrastructure more application-centric understanding"

This would provide the core mechanics for both the utility computing environment, where new IaaS is provisioned on demand, and also software engineering where the ADC facilitates common architecture like Identity single sign-on.

iVoting

Building these capabilities directly into the hosting environment itself is how Elections Canada anticipate they'll be able to realize the compelling vision of their 'Web Business Evolution'.



A strong platform of Identity-centric architecture will be key to the security and features needed to more easily build the future applications they're looking for, like eRegistrations, and the real flagship scenario: iVoting.

iVoting - The ability for citizens to vote online rather than via paper-based ballots, highlights how thorough the security systems must be and also the full scope of the potential that these technology trends represent.

Application Store for Government (ASG)

iVoting is one example of the type of new applications that Governments will want to adopt, and how they do so highlights the role of the 'ASG' – Application Store for Government, a key foundation of the G-Cloud program.

As well as identifying their needs for Cloud hosting, Elections Canada also states their appetite for a much broader suite of services on an ongoing basis that goes well beyond that of web hosting, what would be considered MSP - Managed Service Provider.

They start with a high level statement of interest in:

- "advanced data storage capabilities, new telco services, emerging mobile computing platforms".

and follow with a list of other value add services they would consider buying in the future, ranging through managed email and collaboration, content and document management, office productivity tools, file storage and secure remote access, amongst many others.

The ASG will provide the online “shopping basket” site to browse G-Cloud applications of these different types, with options to deploy them to their preferred G-Cloud provider.

About the author

Neil McEvoy is a Cloud computing entrepreneur, with a track record of new products and businesses across the spectrum of ASPs, SaaS and Cloud computing trends.

He also specializes in Business Transformation, recently working for PwC to help Canadian provincial governments understand how to adopt new technologies like Cloud.

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