Government of Alberta

Cloud Computing Reference Architecture

Version 0.1

Service Modernization
Ministry of Service Alberta

Table of Contents

EXECUTIVE SUMMARY

Cloud Computing is changing the way Information Technology (IT) services are delivered. It is a computing concept where scalable and elastic IT-related capabilities are provided as a service through a communication network such as the Internet.

A recent survey shows that although Cloud Computing adoption is on the rise, a number of organizations have yet to choose a Cloud Computing Architecture. Cloud Computing Architecture refers to the components and subcomponents required for cloud computing, the structure, their relationships to each other and the environment. The principles used develop a vendor-neutral architecture and a solution that does not restrict innovation by defining a prescribed technical solution. The intent of the Cloud Computing Architecture is to determine how an organization can most effectively achieve its current and future business objectives using this technology.

This document recommends that the Government of Alberta (GoA) adopt the National Institute of Standards and Technology (NIST) Cloud Computing Reference Architecture for the GoA Cloud Computing strategy.

1. BACKGROUND

At this time, most IT providers have adopted some Cloud-based services and a new Cloud industry is developing. A number of GoA ministries are independently investigating and planning to solicit Cloud services from outside suppliers.

While Cloud Computing can deliver significant benefits, careful consideration must be given to security, privacy, classification of information, and availability of the services. A sound Cloud Computing strategy will enable the GoA to position itself to be an effective adopter of Cloud Computing, in order to provide more responsive and efficient IT services.

To realize this approach, in April of 2013, the Deputy Minister Information Management/Information Technology (DM IM/IT) Committee convened to discuss the topic of Cloud Computing. The committee recommended that the GoA adopt a “one-enterprise” approach for Cloud Computing to guide IT and government business, and that Service Alberta facilitate the development of a corporate Cloud Computing strategy on behalf of the GoA.

As a key component of the Cloud Computing strategy, Corporate Architecture & Standards branch of Service Modernization, Service Alberta has been tasked to research, analyze, and recommend a Cloud Computing Reference Architecture for the GoA.

2. OBJECTIVES

While Cloud Computing is a complex and rapidly evolving concept, it can help enterprises improve the creation and delivery of IT solutions by allowing them to access services more flexibly and cost-effectively.

Understanding how Cloud Computing is defined and how it will evolve, will help the GoA to better understand when, where, how, and why Cloud Computing services should be implemented.

To reduce confusion and focus government efforts, it is important that the GoA conduct Cloud Computing investigations of the models, architectures, technologies, and best practices, and produce reference architecture to assist the GoA's Cloud Computing strategy development.

3. APPROACH

The Corporate Architecture & Standards team researched and reviewed available Cloud Computing Architectures and Strategies, and recommends the GoA adopt the NIST Cloud Computing Reference Architecture.

NIST developed and published the Cloud Computing Reference Architecture in September 2011. Since then, it has seen widespread adoption and acceptance by industry and government. The NIST Cloud Reference Architecture focuses on what Cloud services provide, with an accompanying taxonomy to describe the service models, deployment models and essential characteristics of Cloud services. It also describes the terms, roles, responsibilities, actors, and architectural components of Cloud services.

4. GOA CLOUD COMPUTING REFERENCE ARCHITECTURE

The Corporate Architecture & Standards team recommends the GoA adopt the NIST Cloud Computing Reference Architecture as GoA's Cloud Computing Reference Architecture with the following supplements described in section 4.1.

4.1 NIST CLOUD REFERENCE ARCHITECTURE FOR GOA

Executive Summary:

- Disregard "USG", replace with "GOA";
- Disregard "Federal", replace with "Provincial"; and
- Reference Executive Summary of this document, GoA Cloud Computing Reference Architecture.

Section 1 Introduction:

Section 1.1 Background

- Reference section 1, Background of this document, GoA Cloud Computing Reference Architecture.

Section 1.2 Objectives

- Disregard “Federal”, replace with “Provincial”;
- Reference section 2, Objectives of this document, GoA Cloud Computing Reference Architecture.

Section 2 Cloud Computing Reference Architecture: An Overview:

Section 2.4 Cloud Auditor

- Disregard “Federal”, replace with “Provincial”.

Section 3 Cloud Computing Reference Architecture: Architecture Components

Section 3.3.3 Portability and Interoperability

- Disregard “US government”, replace with “Government of Alberta”;
- Moving data or applications across multiple Cloud environments, host/copy data objects into or out of a Cloud, must comply with Canada’s Patriot Act.

Section 3.4 Security

- Cloud Computing security should comply with GoA’s security policy and directives.

Section 3.5 Privacy

- Disregard “Federal CIO council”, replace with “FOIP”. Cloud Computing should comply with FOIP Act.

Appendix A: Cloud Taxonomy Terms and Definitions

- Bullet 12: replace with reference to GoA FOIP Act;
- Bullet 19: Disregard “Privacy-Impact Audit”, replace with “Privacy Impact Assessment”.

Appendix C: Acronyms

- Add “FOIP Freedom of Information Protection”;
- Add “GoA Government of Alberta”;

- Remove “USG US government”.

Appendix D: References

- [1] broken link, corrected link: http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf
- [4] broken link, refer http://www.dhs.gov/sites/default/files/publications/digital-strategy/federal-cloud-computing-strategy.pdf
- [5] broken link, remove;
- [7] broken link, corrected link: http://csrc.nist.gov/publications/nistpubs/800-144/SP800-144.pdf
- [12] broken link, refer http://dosen.narotama.ac.id/wp-content/uploads/2012/01/Cloud-Computing-Initiative-Vision-and-Strategy-Document-DRAFT.ppt
- [18] broken link, corrected link: http://csrc.nist.gov/publications/drafts/nistir-7756/Draft-NISTIR-7756_second-public-draft.pdf
- [19] broken link, corrected link: http://csrc.nist.gov/publications/nistpubs/800-61rev2/SP800-61rev2.pdf
- [20] broken link, corrected link: http://www.its.bldrdoc.gov/fs-1037/fs-1037c.htm
- [26] broken link, corrected link: http://www.redbooks.ibm.com/redpapers/pdfs/redp4528.pdf
- [32] broken link, refer http://www.snia.org/cloud/newcontent

4.2 NIST STANDARD ATTACHMENT

NIST Cloud Computing Reference Architecture (NIST SP 500-292)

Please note:
NIST Cloud Computing Reference Architecture may be amended, revised or substituted from time to time. Ministries should check http://www.nist.gov/ for its latest edition.