Cloud Computing Services
Strategy & Roadmap

Produced by Oakland County Information Technology
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Background
Oakland County has been providing technology solutions to its local municipalities for many years. To continue fostering intergovernmental cooperation while containing operating costs for everyone, Oakland County is committed to enabling as much technology sharing as possible. Toward this goal, Oakland County is implementing cloud computing services for use by County Departments and other government agencies. Cloud computing services support technology sharing among governments via the web, providing the opportunity for government agencies to use technology that may not otherwise be within reach. Oakland County’s current cloud computing efforts are focused on providing Software as a Service (SaaS) internally and externally for selected applications.

What is Cloud Computing?
Defined in the broadest sense, cloud computing is the practice of storing regularly used computer data and/or applications on servers that can be accessed through the Internet rather than a local server. Some of the generally accepted components of cloud computing are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

Software as a Service (SaaS) is the practice of hosting applications on a network server rather than installing applications locally on computer workstations or other devices. Common examples include Google Apps and Microsoft Office 365 as well as numerous hosted systems for email, calendar, payroll, accounting, etc.

Platform as a Service (PaaS) is a layer below SaaS in the application delivery structure. PaaS can be seen as roughly equivalent to providing development platform hosting, much as website hosting services provide the ability to host applications written in .Net, Java, PHP, etc. PaaS services provide the infrastructure for an application without particular concern about the underlying operating system.

Infrastructure as a Service (IaaS) works at the lower layers of the application delivery structure, providing virtual servers and storage that can be used to build an application from the operating system up. IaaS reduces the need for upfront capital for servers and storage while providing more flexibility in application platform.

Who Uses Cloud Computing?
Public cloud services are available from a number of major companies and include a full range of services and options. Public cloud vendors include Microsoft, Google, Amazon, AT&T, and others. The prospective customer can choose the type/level of service as well as special security options. The major vendors are also incorporating industry-specific cloud offerings that are targeted toward groups with special requirements, including the government sector. These targeted offerings can incorporate control over the physical location of the contracted cloud services, as well as special audit and security
requirements. In general, public cloud services can offer economies of scale, a level of security, capacity, and resiliency that private cloud implementations may not be able to achieve due to budget, geographic, and/or technical constraints.

In contrast to public cloud services, private cloud services are provided and maintained by the customer solely for the benefit of the customer. While private cloud services are typically provided and operated by the customer at a customer site, cloud services provided and operated by a vendor onsite or at a vendor site may be a private cloud if the supporting infrastructure is dedicated to the sole use and control of the customer. Private cloud services may be necessary for government in cases where data security is a critical need or required by law, such as under HIPAA requirements or for applications and systems involving law enforcement and criminal justice data. In these cases, data is often managed by governments in a secured, private environment or as a private cloud.

**Benefits of Cloud Computing**

Cloud computing provides many economic incentives and benefits to the County and other governments. By evaluating application requirements in terms of costs, performance, security and compliance, the County’s approach to cloud computing and the expansion of G2G (Government to Government) shared services can be evolutionary. Cloud computing resources can be deployed and used where and when it makes sense. Some of the benefits of cloud computing for the County and shared G2G services include:

- Lower costs and capital expenditures for the County and other governments
- The ability to only use and pay for the computing resources that are needed
- Combined economies of scale from shared computing resources, software and licensing, thereby reducing costs
- The pooling of resources in a multi-tenant model allows resources to be dynamically assigned and reassigned according to demand
- Faster provisioning and consuming of technology resources
- Improved scalability, redundancy and resiliency, often not available to governments due to lack of financial or technical resources
- Reduced need for scarce and hard-to-find IT resources required to manage servers, networks, security, etc.

**Risks of Cloud Computing**

Cloud computing is not a panacea and it is not without risks. One fundamental premise for cloud computing is that the Internet is available and that there is adequate bandwidth and redundancy to handle acceptable application performance and any outages in getting to the cloud. There are also unforeseen events that can disrupt cloud services and/or damage data. Acts of nature, loss of electricity, fire, extreme weather and data loss can sometimes be a factor in application availability and recovery. Other risks include denial of service attacks, cyber warfare, poor security and/or security policies, legal issues, licensing, inadequate support and maintenance of data, backups and disaster recovery. It
should be noted that these risks are not just attributable to cloud computing or Oakland County, but to any data center that houses applications or data.

Many of the risks associated with cloud computing can be mitigated through proper governance, risk assessment and planning for unforeseen events. As an example, an effective backup and restore process may include an additional backup copy held at Oakland County or another location, rather than the cloud within the cloud supplier’s system, thereby mitigating the risk of data loss. Overall, the County believes the economies and advantages of moving forward with cloud computing outweigh the potential risks.

As with any new technology, the rush to implement should not prevent the development of a strategic approach. Cloud computing is an evolutionary step forward in the County’s strategic plan for the continued provisioning of applications and data services, both internally and to other governments through G2G Cloud Solutions. Cloud computing services can and should be deployed on an as-needed basis, and only for instances where cloud computing make sense.

**Strategic Approach**

**Introduction and Overview**

In an effort to assess the viability of Cloud Computing and providing SAAS applications to other governments, the County did considerable initial research and collaborated with various government elected officials, CIOs and private sector vendors throughout the country. Some of those discussions were held through collaboration and panel discussions with the Center for Digital Government, the National Association of Counties (NACo), Michigan Digital Summit, various States, Cities, Villages and Townships, Gartner, and the private sector. Discussions about sharing technology to reduce costs, provide better government services, to establish partnerships and to explore innovative ideas and opportunities were all taken into account when formulating this strategy.

Based on our research and collaboration, Oakland County is focusing on SaaS for its initial cloud services. As a government entity, the County has some unique software requirements that are only applicable within the government sector, and in fact may only be applicable to other local governments. This sometimes limits the availability of appropriate applications from vendors, requiring the County to develop its own solutions either internally or by contract. In implementing SaaS, the County is examining the ability to distribute the cost to develop and support its applications by providing selected applications to other government entities. Depending on the applications selected, the County’s implementation of SaaS could have ancillary benefits of reducing costs across the County constituent community as well as increase influence of proposed regulatory, statutory, or administrative requirements.

Cloud computing supports the County’s established “build it once, pay for it once, and everybody benefits” philosophy. The cost reductions that are achieved through shared
services benefit governments as well as taxpayers. Lower costs allow governments to raise the level of services they provide to constituents, even if resources are scarce or knowledge is lacking.

**Request for Information (RFI)**

In implementing SaaS, the County recognizes that the scope of its services will be limited by technical and monetary resources available to the County, particularly with regard to service scalability for large-scale implementation. To address this, the County issued a Request for Information (RFI) to explore potential opportunities for partnering with private sector cloud service providers. The RFI contained three main objectives. First, the RFI sought to confirm the level of interest among vendors in partnering with the County to deliver cloud services to other governments. Second, the RFI served as a gauge of the interest among vendors in hosting and marketing the County’s applications in a vendor-owned cloud. Third, the RFI requested detailed information on cloud services provided by vendors.

The RFI was well received by a variety of vendors. In total, the County received 18 different responses to the RFI and many other vendor inquiries. The variety of services and responses included cloud hosting, specific security solutions, SaaS government applications, testing software, and other services. Based on the RFI and the vendor responses to partnering with the County, the County has multiple innovative options for moving forward from the beginning to the future phases of its cloud computing initiative.

**Readiness Assessments**

In addition to the RFI, the County also began assessing and evaluating some initial applications such as Online Payments and Web Suite to determine the level of cloud readiness, and to identify any outstanding issues that would prevent an application from being included in cloud service offerings. The cloud readiness of each application is evaluated in a number of categories, such as legal/business process, contract/licensing status, branding, financials, infrastructure, cloud service, training and support, and so on. Cloud readiness assessments include notations of any actions needed and the status/timeline of each action. To date, cloud readiness assessments have been completed for Online Payments, Web Suite, and the Health Portal.

Based on the early readiness assessments and ROI, the County elected to move forward with both Online Payments and Web Suite as initial private cloud applications. One of the challenges of these applications is determining the viability of the market and the price point of the services. These two factors will be greatly influenced by the number and success of the public cloud vendors and their drive toward providing services that meet or exceed the security requirements of Federal, State, and Local governments.

Oakland County will be implementing selected PaaS and IaaS functionality in support of SaaS for Online Payments and the Web Suite. This functionality will assist the delivery of some of the key benefits of Cloud services enhance capacity, agility, reliability, scalability, and redundancy. Implementation of this functionality will be selective based
on the cost/benefit to the County. Not all functionality will be delivered in a manner comparable to the public cloud.

In addition to Online Payments and the Web Suite it should be noted that the County has already undertaken some of the first steps toward successfully implementing a private cloud through its virtualization efforts. In undertaking a virtualization and consolidation program, the County has achieved a reduction in server infrastructure costs while acquiring products and technical experience that will allow further evolution toward a Private Cloud infrastructure. To date, the County has virtualized and consolidated about 75 percent of its server environment. The standardization of the infrastructure begun in the virtualization and consolidation project will be critical in the necessary virtualization of storage and network going forward toward a private cloud.

**Request for Proposal (RFP)**

In addition to the RFI and Readiness Assessments, the County also issued a Request for Proposal (RFP) to determine the costs of further implementing a public and/or additional private cloud. The RFP was needed to support the demand by County departments for increased capacity, security, availability and redundancy of many of its applications. The County’s existing network and server infrastructure is as at capacity and significant upgrades are required. Based on the RFP, it was determined that moving some applications to an external cloud infrastructure provides the County with more cost efficient, scalable, secure and reliable solution for both its internal and external needs.

To best leverage the County’s existing technology investments, the County’s movement toward cloud computing should be evolutionary rather than revolutionary. This approach will allow cloud vendors to mature including public cloud providers and vendors of software for building a private cloud. This cloud computing strategy enables the County to expand its internal capabilities in an innovative and evolutionary way while saving considerable capital and other costs.

**G2G Cloud Solutions**

In 2011, Oakland County formed G2G Cloud Solutions to support technology sharing among governments via the web. Through this initiative participating government agencies benefit from the opportunity to use technology that may not otherwise be within reach. The government-managed technology solutions available through G2G Cloud Solutions support reduced operating costs and increased reliability, security, and privacy protection for government data.

G2G Cloud Solutions – with “G2G” meaning “government-to-government” – positions Oakland County’s many advanced technology applications in cyberspace. Through G2G Cloud Solutions, the same advanced technology solutions that Oakland County uses are made available to other governments regardless of size, budget or resources. With G2G Cloud Solutions, governments can work together to reduce the overall cost of government operations, leverage technology for mutual benefit, and create a sustainable model for digital government.
G2G Cloud Solutions also allows governments to seamlessly integrate their existing branding and online identity with cloud services. G2G applications are customizable for each government, and can incorporate each government’s logo, colors and other images as well as the look and feel of an existing web site. Preserving each government’s branding is important for overall application usability, as custom branding helps to clearly identify that cloud services are an official government offering. G2G custom application branding enables governments to maintain a unified web presence, further assuring their customers of the integrity and security of online applications and services.

A critical component of G2G Cloud Solutions is the establishment of the County as a cloud service provider with the proper agreements and licenses to offer cloud services to other governments. The County has addressed the issue of licensing through the development of Inter-Local Agreements (ILA), Exhibits and vendor licensing that can be used to formalize the County’s position as cloud service provider for other government units. A next step in the expansion of G2G Cloud Solutions is the development of the G2G Marketplace. The G2G Marketplace is a catalog and service bureau modeled on the application store concept. It will provide governments with an easy-to-use, cost-effective way to shop for, purchase, and provision cloud computing services under pre-negotiated blanket purchase agreements. The G2G Marketplace will simplify the cloud service purchase and licensing process for government consumers.

**Self-Funded Model**

In challenging economic conditions, governments realize the ever-increasing importance of maximizing every hour and every dollar spent on operational tasks. G2G Cloud Solutions is a self-funding initiative with long-term sustainability that re-invests enhanced access fees to the benefit of participating governments and the people they serve. Oakland County has been actively sharing advanced technology solutions with other government agencies for many years. G2G Cloud Solutions enables Oakland County to bring even more governments on board, to add more applications and services to the menu of cloud offerings, and to establish a self-funding model for cost recovery that makes participation in the program even more beneficial for all participants. Regardless of their size or the budget and resources available to them, G2G Cloud Solutions enables other governments to use the same advanced technology solutions that Oakland County has used with success for many years. G2G Cloud Solutions also enables other governments to share their own applications in the same cloud for the mutual benefit of all participants.

A detailed cost model has been prepared for G2G Cloud Solutions, including a complete return on investment (ROI) analysis. This ROI estimates that positive payback of initial investments will be achieved in year four. An additional ROI Analysis for the cloud computing program further documents development and operational costs as well as any anticipated, quantifiable benefits resulting from the proposed program. The ROI Analysis is an evolving document that will be updated and resubmitted throughout the life of the cloud computing program. Lastly, future expansion of G2G Cloud Solutions and the
cloud computing program will continue to go through an established and rigorous ROI process to establish a business case to justify any further technology initiatives.

**Marketing and Communication**

To effectively promote cloud computing, G2G Cloud Solutions, and the G2G Marketplace, it is critical that the County develop and implement a marketing and communication plan. This plan will raise awareness of the County’s cloud computing services, generate interest in the adoption of cloud computing services by other governments (via G2G Cloud Solutions and the G2G Marketplace), and further the County’s reputation as a national leader in eGovernment. A detailed marketing plan has been developed that outlines the County’s approach to marketing cloud services through G2G Cloud Solutions. Phase one of this plan includes market research and a summary of the education and awareness plans needed to move forward.

G2G Cloud Solutions has been marketed to potential users via the web site www.g2gcloud.com and presentations at various government conferences and meetings, as well as direct contact with government agencies. G2G Cloud Solutions has also been promoted through articles in Government Technology magazine and a video on Oakland County’s web site www.oakgov.com. The G2G Cloud Solutions marketing and communication plan serves the dual purpose of promoting G2G services to potential new participants and marketing current services to drive increased use.

In addition to the marketing and communication plan, the County is also collaborating with the National Association of Counties (NACo) to leverage the shared services model of G2G Cloud Solutions on a national scale via the NACo Application Store. The goal of the NACo Application Store is to create a comprehensive catalog for counties across the country to share information and communicate about applications. The NACo Application Store allows for Counties to add applications they are currently using or search for applications they are looking to use in the future. In addition, the NACo Application Store allows the County to place banner advertisements within the store to promote, educate and create awareness about G2G Cloud Solutions offerings.

**Recommended Roadmap and Projects Moving Forward**

In an effort to align the goals and strategies of the cloud computing strategy with the IT Strategic Plan, the following roadmap outlines by phases the projects in support of this initiative.

**Phase 1: Getting Ready**

1. Program Management
   a. Cloud Computing Program Management: Completed Project IDT61186CP
2. Request for Information (RFI)
   a. Cloud Computing Project ID T60186CC
3. Market Research
   a. G2G Market Research: Completed Project ID T60186CG
4. Readiness Assessments
   b. Cloud Computing – Online Payments Readiness: Completed Project ID T61186GP
   c. Cloud Computing – HHSCP Readiness: Completed Project ID D91182HH
   d. Cloud Computing – Health: Completed Project ID D91182HC

5. Legal Requirements
   a. Cloud Computing – Legal Requirements Assessment: Project ID T61186CL (Note: Includes Interlocal Agreements and Exhibits)

6. Education and Awareness
   a. Cloud Computing – Marketing and Promotion: Project ID T61186MP

7. Infrastructure Expansion – RFP
   a. Infrastructure Expansion: Project ID T62186TI

**Phase 2: Implementation**

1. Program Management
   a. G2G – Program Management: Project ID DE2182GP

2. Participant Development
   a. Cloud Computing – Participant Development: Completed Project ID T61186CD

3. Participant Implementation
   a. Cloud Computing – Participant Implementation Budget: Completed Project ID T61186CI

4. NACo App Store Implementation – Initial Pilot
   a. Cloud Computing – NACo Application Store: Project ID T61186SI

5. Cloud Rollout
   a. Infrastructure Expansion Program: Project ID T63186TI

**Phase 3: Expansion**

1. Program Management
   a. G2G – Program Management: Project ID DE2182GP

2. Participant Development
   a. G2G – Participant Development Budget: Project ID DE2182GD

3. Participant Implementation
   a. G2G – Participant Implementation Budget: Project ID DE2182GI

4. Government Marketplace
   a. G2G – Market Place: Project ID DE2182MP

5. eCommerce
   a. eCommerce Over the Counter Payments: Project ID DE21870C

6. NACo App Store implementation – Full Rollout
   a. Cloud Computing – NACo Application Store: Project ID T61186SI
7. Cloud Rollout  
   a. Infrastructure Expansion Program: Project ID T63186TI
8. Web Site Migration  
   a. Web Site Migration: Project ID DE1187GP

Conclusion

Oakland County has already begun the process of creating cloud computing services through G2G Cloud Solutions. Initial cloud service offerings for a number of clients are managed internally, and the NACo Application Store is in its initial pilot phase. Future development will focus on service refinements, expansion of services, and the launch of the G2G Marketplace as a central app store for governments interested in acquiring cloud services under pre-negotiated purchasing agreements. To support this continued development, the County is engaged in addressing issues associated with licensing, the establishment of contracts and other legal documents, and securing proper authorization for the distribution of expanded cloud computing services to other governments throughout Michigan and the United States.

In addition to further sharing technology resources through G2G Cloud Solutions, the County is at a crossroads where it needs to invest in upgrading its own network, servers and other services due to capacity constraints, availability and redundancy. The cloud computing services strategy enables the County to expand its internal capabilities in an innovative and evolutionary way while saving considerable capital and other costs.