

Texas Cloud Services

GUIDE FOR STATE AGENCIES AND INSTITUTIONS OF HIGHER EDUCATION

Cloud computing delivers managed information technology (IT) services. This approach provides convenient, on-demand delivery of information, as well as IT flexibility, efficiency, and cost savings for government. Texas agencies and institutions of higher education (agencies) are authorized and encouraged to consider cloud services for information resource projects. The 83rd Legislature, through the passage of House Bill 2422 (Gonzalez), authorized state agencies to consider cloud services for major information resource projects.

Although cloud services are relatively new in the public sector, the model has been tested and is sufficiently mature to be adopted by Texas agencies (see [Lessons Learned: Pilot Texas Cloud Offering – PDF](#)). The Texas Department of Information Resources (DIR) has included cloud services as one of the top technology priorities for Texas state government in the 2014–2016 State Strategic Plan for Information Resources Management. DIR has developed tools and resources for agencies to evaluate cloud solutions and determine benefits and appropriateness of such solutions.

Cloud services can be highly beneficial when properly implemented in appropriate circumstances, but they are not the answer to every IT need. Cloud services can pose their own special risks, as can any powerful and innovative service delivery model. Agencies should always examine all the issues relevant to their data and circumstances before determining whether and how to implement any cloud solution.

Purpose

The purpose of this guide is to direct agencies to the necessary resources and tools to use when considering cloud services.

DIR encourages agencies not included in the Data Center Services program to consider shifting to cloud services when a secure, reliable, cost-effective cloud option exists. The variety of services and pricing models associated with cloud computing makes it challenging to develop a uniform approach for all agencies. Each agency should consider recommendations and best practices defined herein when evaluating and procuring cloud services. Agencies should also determine when cloud services are appropriate for their business needs and identify the precise services to be utilized, then create plans for implementing cloud services based on their specific requirements.

Scope

This guide was developed to inform state agency business and IT leadership by deepening their knowledge and understanding of cloud services and resources.

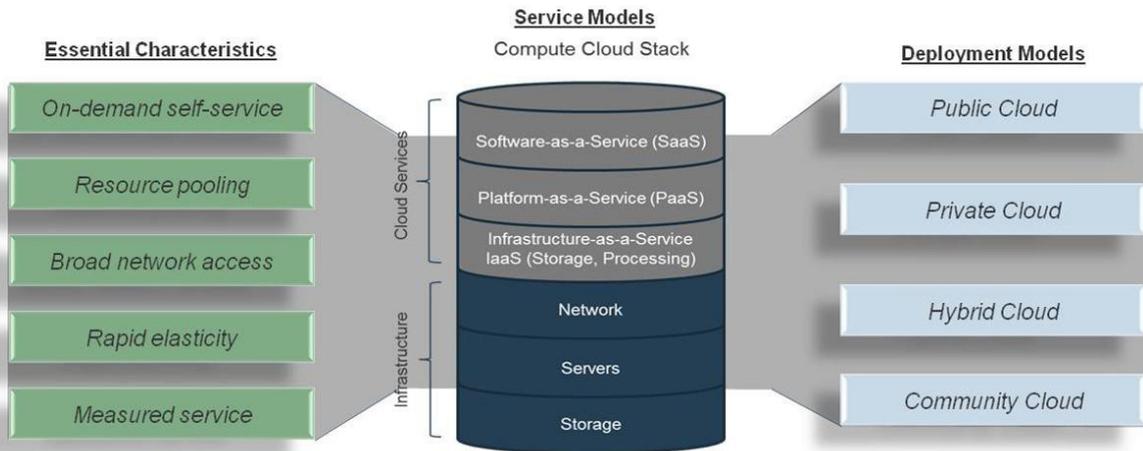
Note: Data Center Services Agencies

Consult directly with your DCS representative for information about DCS cloud services.
Visit the DCS Web Portal at <https://www.dcs.state.tx.us>.

Cloud Basics

The cloud model is composed of five essential characteristics, three types of service models that can be accessed, and four deployment methods, as shown in the graphic below:

Cloud Computing Characteristics, Service Models, and Deployment Models



Source: Info-Tech Research Group. Definitions and essential characteristics derived from National Institute of Standards and Technology.

Characteristics of Cloud Services

Five characteristics of cloud services allow for the immediate delivery of computing services needed:

- **On-demand self-service.** Agencies can unilaterally provision computing capabilities automatically as needed.
- **Resource pooling.** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- **Broad network access.** Capabilities are available over a network and accessed through standard mechanisms that can be used by a variety of devices (e.g., mobile phones, tablets, laptops, and workstations).
- **Rapid elasticity and scalability.** Capabilities can be provisioned and released automatically to scale rapidly with demand. For agencies, the capabilities available for provisioning may be appropriated in the requested quantity at any time.
- **Measured service.** Cloud systems automatically control and optimize resource use by leveraging a metering capability in resource units appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Cloud Services Models

There are three basic cloud service models that are useful for different agency needs.

- **Software as a Service (SaaS)** delivers applications, such as email, customer relationship management, and collaboration software.
- **Platform as a Service (PaaS)** delivers an application framework that supports design and development, testing, deployment, and hosting.
- **Infrastructure as a Service (IaaS)** delivers computing hardware, storage, networking, and backup.

Cloud Deployment Models

Generally, there are four common cloud deployment models, each with different terms of access to information and resources.

Deployment Model	Private Cloud	Community Cloud	Public Cloud
Provisioned for	exclusive use by a single organization comprising multiple consumers	exclusive use by a specific community of consumers from organizations that have shared concerns (e.g. data center services agencies)	open use by the general public
Owned, managed, operated by	the organization, a third party, or some combination of them	one or more of the organizations in the community, a third party, or some combination of them	a business, academic, or government organization, or some combination of them
Location	on or off premises of the cloud provider	on or off premises of the cloud provider	on the premises of the cloud provider

Hybrid Cloud

a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by technology that enables data and application portability and interoperability.

Considerations for Use of Cloud Services

- **Research cloud deployment models.** Knowing the options for deploying cloud services will maximize the capabilities of the solution. There are currently four different deployment models for cloud: *public* cloud, *private* cloud, *hybrid* cloud, and *community* cloud. For example, a private cloud deployment model may be ideal for highly sensitive and mission-critical applications and services, but is also more costly than a public cloud model.
- **Research the types of service models available through the cloud, including cloud broker and cloud assessment services.** Services provided through the cloud include Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

Cloud broker and **cloud assessment** services may help an agency select the appropriate level of cloud deployment and are available through a DIR contract.

- A **cloud broker** manages the use, performance, and delivery of cloud services, and negotiates relationships between cloud providers and cloud consumers. A cloud broker acts as the intermediary between consumer and provider and will help consumers navigate the complexity of cloud service offerings.
- A **cloud assessment** assists an organization in establishing a strategy and roadmap for determining if cloud solutions are viable for the organization. The assessment will further enable the customer to identify candidates for cloud services and identify risks and benefits based on a set of criteria such as operational readiness, security, application characteristics, complexity, and cost.

- **Complete a cost benefit analysis and risk assessment.** A cost benefit analysis and risk analysis help determine if cloud services are appropriate for the organization. Completing a cost-benefit analysis and risk assessment comparing on-premise IT resources (email, databases, servers, storage, application software, desktop services) to one or more cloud options can help determine appropriate choices.

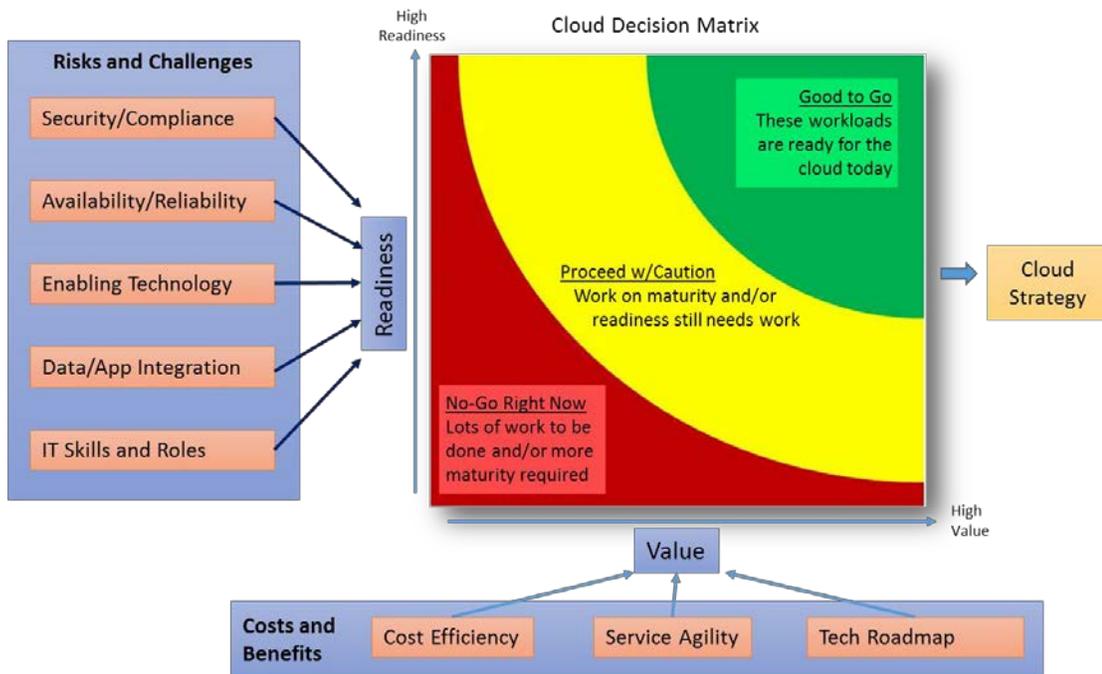
In general, cloud services are expected to reduce cost and increase efficiency. Due to situational dependencies, this might not be true for all organizations. Organizations that do not have in-house resources available to complete an assessment can use DIR Cooperative Contracts for cloud assessment. Customers may use the [Texas Project Delivery Framework Business Case Workbook](#) to assist with calculating a cost benefit analysis.

- **Determine which applications are appropriate for the cloud.** Cloud services may be a good fit for some applications within the organization, but may not be appropriate for others. In general, cloud services should be considered for applications that
 - require rapid deployment,
 - are approaching a technology refresh and/or the end of contractual obligations to a legacy environment,
 - have variable storage needs,

- need bursting capability that allows cloud services to exceed planned or allocated thresholds when capacity is maximized,
 - use virtual services rather than physical servers, and/or
 - are based on federal funding with “cloud first” recommendations.
- **Identify first movers.** High priority and those services that are most ready should be positioned for cloud migration first. An agency should identify which IT applications to move to cloud services and determine a timeline for migration. Depending on agency needs, high priority for cloud migration should be given to services that have high per-user costs and low utilization rates, are expensive to maintain, require long lead times to upgrade, or that would benefit the most from innovation. The Cloud Decision Matrix can be used to determine what and when to move to the cloud.

Cloud Decision Matrix

The decision of what and when to move to the cloud is contingent upon balancing value creation and risk mitigation



Source: InfoTech Research Group

- **Research cloud business pricing models.** Cloud model comparison can be challenging due to the broad range of product and pricing offerings. Some providers offer full IT solutions, (hardware and software infrastructure, middleware platforms, and application system components) while others only provide an option for pricing each additional add-on service. Various pricing models include on-demand, subscription, and reserved capacity:

- **On-demand or pay-as-you-go** pricing models that provide hourly-based pricing for virtual resources based on various combinations of CPU, memory, storage, and network capacity. The resources are billed after they have been provisioned and allocated for a designated time.
 - **Subscription pricing models** (also known as *monthly package pricing* or *reserved instance pricing*) involve a pre-payment for some fixed capacity. This could be a monthly or yearly subscription for the fixed capacity whether it is used or not. The advantage is lower per-hour or per-capacity pricing than the on-demand model since it is pre-paid.
 - **Reserved capacity** pricing models (also known as *virtual private dedicated capacity* or *utilized capacity*) define a specific total amount of CPU, memory, storage, and network capacity that is dedicated and always available to the customer. The advantage is providing consistent pricing on a month-to-month basis.
- **Consider specific application requirements or compliance regulations.** Identify any and all application or agency compliance requirements, such as security, privacy or accessibility. Compliance requirements may exist depending on the type of data being stored:
 - personally identifiable information (PII) will require much more stringent security controls,
 - credit card payment information has associated Payment Card Industry (PCI) compliance requirements,
 - criminal justice information has state and federal regulations that need to be addressed,
 - health related data may have HIPAA or other security requirements.
 - **Identify security requirements.** Agencies should consider security needs for all aspects of the cloud deployment: data storage, network, web service communications, as well as data uploads and downloads for deployment of applications and databases. Once the agency identifies application and agency security requirements, the agency can choose a deployment model that best suits its needs.
 - **Involve all stakeholders.** As agencies pursue various solutions, they should involve the business unit owners and executive management team. In addition, agencies should include other key stakeholders in determining cloud needs that will be impacted such as the IT, legal, contract, and financial teams.
 - **Obtain an executive sponsor for the project.** An executive sponsor will promote and provide support for the project. This will ensure that the project aligns with the agency's strategic goals and objectives. An executive sponsor might include an executive director, business unit director, or IT director.
 - **Obtain references from previous and current customers.** References will help the agency make a more informed decision regarding the best provider and successful solutions deployed. In soliciting a cloud service provider through a Statement of Work (SOW), organizations should ask for current and previous customer references.

DIR Cloud Contracts and Services

Through the DIR cooperative contracts program, multiple cloud contracts are offered for cloud assessment services, cloud broker services, platform as a service, and infrastructure as a service. See the latest list of DIR cloud service contracts and providers on the DIR website.

- **Use DIR Cloud Services contracts and obtain a minimum of three bids for services.** Using Cooperative Contracts eliminates the Request for Offering bidding process and allows for purchasing economies of scale. All DIR Cooperative Contracts are competitively bid and negotiated.
- **Review terms and conditions.** Each cloud service provider has specific terms and conditions that may or may not accommodate specific agency rules and regulations.
- **Develop service level agreements (SLAs) and reporting requirements with vendor.** Cloud service levels will vary between all providers, and the agency should agree to the service levels prior to contract execution. Examples of SLA components include security, quality, availability, performance, incident notification response, and business continuity. Reporting requirements should also be established prior to contract execution. Sample report deliverables that vendors may provide include SLA reports, Help Desk/Trouble Ticket reports, Service Orders and Sales, Service Utilization and Invoicing/Billing. Consider attaching appropriate, specific remedies for failures to meet specific service levels.
- **Include general and technical cloud computing requirements in Statement of Work.** DIR Cloud Service contracts include a sample SOW that agencies can customize to meet their needs. It is important to note that the agency retains ownership of any user created/loaded data and application(s) hosted on vendor's infrastructure, and maintains the right to request full copies of these at any time. Agencies are encouraged to use these sample SOWs as templates to ensure vendors provide a solution that aligns to general and technical cloud computing requirements:
 - [Sample Statement of Work for Cloud Services](#) (DOC 124KB)
 - [Sample Statement of Work for Cloud Assessment Services](#) (DOC 131KB)

More on Cloud from DIR

Find more information related to cloud services on the DIR website at www.dir.texas.gov:

- **Biennial Performance Report** (PDF, 6.1 MB), *State Priorities, Assessment of Cloud Services*, November 2014
- **2014–2018 State Strategic Plan**, *Top 10 Technology Priorities*, November 2013
- **Texas Project Delivery Framework Business Case Workbook**, August 2013 – Tool to assist with calculating a cost/benefit analysis
- **Lessons Learned: DIR Pilot Texas Cloud Offering** (PDF, 267KB), August 2012 – DIR used the experience gained from the pilot to release an RFO for infrastructure as service, platform as a service and cloud broker services
- **Technology Brief: Cloud Computing**, March 2012

For more information about cloud services,
please contact Endi Ollis at endi.ollis@dir.texas.gov or 512-475-4700.