Project Document

Country: Saudi Arabia

Expected Outcome(s)/Indicator (s):
Public institutions at the national and regional level more capable to respond to citizens needs in quality and effectiveness of services

Expected Output(s)/Annual Targets:
Established of Cloud Computing Center

Implementing Partner:
King Abdulaziz City for Science and Technology

The main goal of this project is to establish a cloud computing center at KACST in collaboration with the top companies and institutes in this field to provide the required cloud services to enhance the technical competence and internal capabilities of ICT sectors to migrate to cloud computing. The center will provide many critical services to the government and private sectors such as; standardization,consultation, assessment, industry initiatives, and international cooperation.

Programme Period: 2013-2016

Project Title: Cloud Computing Center

Project

Project Duration: 3 Years

Management Arrangement: NIM

Agreed by KACST:

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Dr. Turki bin Saud bin Mohammed Al-Saud,
Vice President for Research Institutes, KACST

Agreed by UNDP:

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Dr. Riyad Musa Al-Ahmad
UN Resident Coordinator & UNDP Resident Representative

Government of the Kingdom of Saudi Arabia

King Abdulaziz City for Science and Technology (KACST)

United Nations Development Programme (UNDP)

Project Document

Cloud Computing Center

Situation Analysis

Despite of the IT spending in the Kingdom of Saudi Arabia, the total spending of cloud services and technology is 0.3% ($13.82 million) of the total IT spending. In 2011, total spending on cloud services in KSA is $13.82 million which is 0.3% of total IT spending. This is a clear indicator that cloud computing market is still in the early stages and facing many inhibitors and obstacles that need to considered and resolved.

Cloud computing have different deployment models such private cloud, public cloud, virtual private cloud, and hybrid cloud. Among these models, private cloud is more common and has a bigger share of market (53%) than other types of cloud models (public cloud=43.7%, virtual private cloud=3.3%) in 2011 to reflect the market concerns about cloud computing.

Since the cloud market is in the early stages, more cloud services provide focus on IaaS (56.2%) compare to other services such as SaaS (36.2%) and PaaS (7.6%) to utilize their own existing infrastructure and shorten their ROI time. However, SaaS is expected to grow more than other type of services as a result of the market being more mature.

Cloud computing market is expected to increase by 34.8% in 2012, and to continue its increase up to 49.7% compound annual growth rate over the five year (2012-2016) to reach $103.88 million by 2016. This is a clear indicator that cloud computing market will attract more customers, service provider to meet increase in the demand. Organizations will invest in consulting services such as cloud assessments, cloud readiness, and cloud roadmaps. Spending on systems integration will also be impacted. Being relatively new, more training business will be needed to build the skills of existing human resources and fresh graduate students to reduce the gap between existing skill sets and the level of skills required to provide and utilize cloud services.

The cloud computing in Saudi Arabia is driven by several factors. The first driver is operational efficiency which is reflection to what the majority of CIO believes in that the IT should be a business enabler and help the business to run its daily operations more efficiently. The second is cost reduction which help IT manager to cope with budget reduction that might be caused by the economic downturn. The third driver is differentiated customer experience which cloud computing addresses in different ways so that customers with different sizes, locations, and experience will be benefit from the cutting-edge technology. The fourth driver is recognizing international attention and migration to the cloud, which encourage local market to move forward and adopt cloud computing. The last driver is mobility, which is one of the main advantage of using cloud that help companies to reach out to their customers more effectively.

On the other hand, cloud computing in Saudi Arabia is facing several inhibitors that

slow down cloud adoption and migration. Information security is on the main concerns that most IT managers bring to the table. In fact, security argument in many cases is a scare tactic to deter management from investing in cloud models which is due to the threat often perceived related to loss of jobs and control. Another inhibitor is the lack of awareness about cloud computing, models and benefits. Being not exposed direct or indirect to the cloud computing technology justifies the fear that some organizations have. The third inhibitor is the fear of change and losing control since most Saudi organizations have a strong culture of keeping IT infrastructure and solutions in house. The fourth inhibitor is the bandwidth concern despite of the recent improvement in the bandwidth. Cloud solutions require high bandwidth in order to deliver the solution in an efficient and reliable way. The last inhibitor is the lack of clarity on ROI for using cloud, which the required justification for any company or agencies to adopt cloud.

Strategy

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [1]. With the cloud model, computing resources are kept on providers' servers, rather than on users' systems, which enables end users on various types of devices (e.g., PCs, laptops, and smart phones) to remotely use applications running on a cloud infrastructure, run consumer-created/-acquired applications, or deploy and run an operating system over the Internet, via services offered by cloud-computing providers. This makes cloud-computing services commoditized and delivered in a way similar to traditional utilities such as telephony and electricity. Cloud computing provides several advantages for consumers including: (i) flexibility and scalability in instantly meeting business needs on demand; (ii) reduction in IT cost and energy consumption; and (iii) resource management efficiency.

With the dynamic fast growing IT sector in the Kingdom of Saudi Arabia, cloud computing provides an opportunity for supporting both the business and government agencies with state-of-the-art, affordable, easy-to-manage and scalable computing services. In this project, we build a cloud architecture with a converged cloud strategy in mind, offering both private and public clouds. Our cloud solution will provide IT cloud-services serving both KACST and other governmental agencies. Two types of services will be provided by our cloud solution: (i) software-as-a-service (SaaS) products that gives the consumer the capability to run software applications from different client devices through a thin client interface (e.g., a web browser); and (ii) infrastructure-as-a-service (IaaS) products that deliver a full computer infrastructure via the Internet (e.g., running and managing the entire operating system).

One of the crucial challenges in adopting cloud-based services is the migration process of applications to the cloud. A major goal of this project is to provide the necessary consultations and hands-on for governmental agencies to migrate their IT related services to the cloud. Furthermore, another important role of this project is to lead the research efforts in the area of cloud computing in the Kingdom.

To build strong cloud computing capabilities that address various customers segments, the project has an evolving path of four phases: (1) designing and building the appropriate data centre infrastructure for the cloud; (2) designing the cloud; (3) configuring and integrating the cloud; and (4) managing the data centre and the cloud. The project will first focus on offering full-fledged IaaS services, leveraging the data centre infrastructure. Our cloud infrastructure will also offer designing and operating dedicated private cloud solutions with an end-to-end service management. The cloud will be then extended to: (i) SaaS by aggregating partners' applications; and (ii) PaaS by opening the platform to developers. This plan helps in individually evaluating each phase of the project and to accurately measure the project success. Finally, the cloud will leverage the existence of an HPC architecture with the powerful supercomputer SANAM as a solution that offers additional computing capacity and flexibility.

Moreover, our cloud system aims to first serve KACST by offering KACST IT services (e.g., KACST satellite services) over the cloud, the cloud will also offer IT services to government agencies using a private cloud architecture that is operated and managed solely for each organization, offering customized and dedicated resources accessed through a secure connection. It is important to note that one of the important goals of this project is to help governmental agencies to migrate their IT services to the cloud, by providing all the necessary consultations and best practices guidelines. Furthermore, the project aims to help researchers in this area and to spur further exploration of challenges and new advances in cloud computing.

The project strategy has been customized to suit the local conditions and situation in KSA that have an impact on Saudi cloud computing ecosystem.

Aims and Objectives:

The following are the aims and objectives of the cloud computing center:

- Building the cloud infrastructure;
- Migrating KACST services to the cloud;
- Migrating 3-4 government agencies;
- Leading the kingdom's orientation toward implementing cloud services;
- Leading the establishment of Saudi Arabia cloud regulations and guidelines;
- Helping small businesses through Badir incubators by providing them with cloud-based IT infrastructure and know-how;
- Building a business case for cloud computing for Taqnia company;
- Establishing a network of partnerships and alliances in cloud computing;

- Enhancing the awareness of cloud computing;
- Providing professional services in cloud computing;
- Supporting an expanding and innovative ICT industry in Saudi Arabia;
- Achieving a strong global market presence;
- Enhancing IT capabilities to meet critical needs in the Kingdom in the short term, and the regional and international needs in the long term;
- Enhancing technical competence and internal capabilities of ICT sector;
- Conducting applied research in cloud computing to meet the local industry needs;
- Provide advanced training in cloud computing that help local human resource in the IT sector;
- Collaborating with Saudi universities to provide the right research and training in cloud computing;

Supporting the development of the cloud computing industry in Saudi Arabia

Human Resource Needs (based on Vmware Document)

Role	Number of employees	Employer	
		KACST	UNDP
Principle Investigator	1	1	
Researcher	2	2	
PMO	1	1	
Program Manager	1		1
Administrator	4	3	1
Developer	13	10	3

Principle Investigator

- Responsible for overall leadership of Cloud Infrastructure Operations Center of Excellence (COE)
- Has a direct line of communication to the Executive Sponsor
- Is responsible for executing the cloud strategy as defined by the Executive Sponsor
- Provides leadership and guidance to Cloud Infrastructure Operations COE members
- Responsible for overall services offered by Cloud Infrastructure Operations COE Works with Cloud Tenant Operations regarding the planned cloud-based service offering portfolio as well as any portfolio changes
- Actively promotes awareness of the impact the cloud infrastructure has on service offering and service level support and delivery
- Responsible for overall cloud infrastructure Is responsible and accountable for making sure that the cloud infrastructure can support and continue to support the cloud-based service offerings and service levels
- Coordinates and assists with planning cloud infrastructure initiatives
- Facilitates development and maintenance of cloud infrastructure capacity forecasts
- Manages the acquisition and installation of cloud infrastructure components
- Responsible for overall communications with other groups Facilitates

integration of the cloud infrastructure into existing, traditional IT operations management processes as needed, for example change management

- Provides guidance to change management for changes related to the cloud infrastructure; may authorize low risk, low impact changes to the cloud infrastructure; lobbies on behalf of the Cloud Infrastructure Operations COE for pre-approved changes
- Maintains management level relationships with the Cloud Infrastructure Operations COE ecosystem teams
- Is involved in managing vendor relationships for cloud infrastructure components
- Is involved in managing provider relationships with external cloud providers

Researcher

- Develop research plan
- Collaborate with the PI to realize projects' objective
- Perform studies related to cloud computing
- Conduct surveys to explore market needs and expectations
- Conduct literature reviews
- Test, analyze and document research data
- Develop and maintain research database
- Prepare research papers and presentations

Program/Project Management Office (PMO)

- Establish project methodology
  - Develop project charter
  - Develop work plan
  - Develop Governance plan
  - Develop work breakdown structure
  - Develop Forms and templates
- Project Tracing
  - Collecting Program Status Information
  - Consolidating and analyzing of the data collected from program status information
  - Implementing Corrective Action, if required,
- Project Support

Administrator

- Responsible for overall cloud infrastructure
- Determines maintenance windows for the cloud infrastructure consistent with Operating Level Agreements (OLA) requirements

- Provides Tier 3 support of the cloud infrastructure
- Responsible for working with developers and other teams to implement any required cloud integration with external systems
  - Deploys and configures cloud infrastructure components
- Executes the validation plan when deploying new infrastructure components
- Works with Cloud Center of Excellence ecosystem team members to configure cloud infrastructure components
- Creates, configures, and administers cloud provider-related components and cloud-specific operational management tools
  - Configuration and Compliance
- Responsible for auditing cloud infrastructure component configuration consistency.
- Tests and installs cloud infrastructure patches
  - Security
- Develops and maintains cloud infrastructure user access roles
- Works with the IT Security team to implement cloud-related security and compliance policies
  - Event, Incident, and Problem
- Confirms that the cloud infrastructure is correctly instrumented for monitoring and logging purposes
- Works with developers to implement the cloud infrastructure-impacting workflows
- Works with the Network Operations Center (NOC) to develop cloud-specific remediation activities

Developer(s)

- Works with Cloud Infrastructure Operations COE ecosystem teams to implement any required cloud integration with other applications
- Develops, tests, and deploys cloud-impacting automation workflow
- Mentors Cloud Infrastructure Operations COE ecosystem teams about cloud integration and automation
- Develops and maintains cloud integration and automation workflow documentation and standards
- Works with Cloud Infrastructure Operations COE member and ecosystem team to establish integration and automation monitoring
- Works with Cloud Infrastructure Operations COE members and ecosystem team to establish automated event or incident remediation wherever possible and appropriate

Provides tier 3 cloud integration and automation workflow support

Results and Resources Framework

Intended Outcome as stated in the Country/Regional/Global Programme Results and Resource Framework: public institutions at the national and regional level more capable to respond to citizens needs in quality and effectiveness of services				
Outcome indicators as stated in the Country/Regional/Global Programme Results and Resource Framework, including baseline and targets. **Quality and Indicators:** number of Recommendations produced. **Baseline:** New and emerging institutions adapting to expanding mandates **Target:** Recommendations for 4 pilot institutions				
Partnership Strategy: King Abdulaziz City for Science and Technology (KACST), Government and Private Sector				
Project title and ID (ATLAS Award ID): SAUxxxxxxx – Cloud Computing Center				
Intended Outputs	**Output Target for (Years)**	**Indicative Activities**	**Responsible Parties**	**Inputs $**
Cloud Computing Center Established and Operated	Cloud Computing Center established in KACST	Recruitment of the PMO Research Staff Developers and Administrator and program manager	KACST/UNDP	
Research and Development Unit Established and functioned	Measured and rating maturity of cloud products and applications Establish Academic cloud: a small private cloud for academic sector to teach cloud concept and programming as well as conduct cloud research Develop new cloud	Set up a tesing facility and established a research team Test and evaluate cloud product and applications Set up a private cloud for academic sector and install the right software and tools to help the students and researchers Develop new cloud applications and services for KACST and help others	KACST	

	applications and services Localization of cloud applications Security aspect of cloud	outside to develop their own To conduct study on security aspect of cloud		
Advocacy awareness, networking and consultation role	3 awareness raising event 3 stakeholders workshops Status Assessment Established of consultation unit	Recruitment of advocacy expert Workshop and conferences To undertake questionnaire to assess the status	KACST	
Cloud computing policy and strategic direction	Policy and strategic direction document	Conduct extensive research for the available guidelines, policy and strategy for cloud computing Provide recommendation for public and private sector	KACST	
Cloud Implementation Projects			KACST/ UNDP/ Government/ Private Sector	
Capacity Development			KACST/ UNDP	

AWP Budget Sheet(s)

Annual Work Plan Budget Sheet 2013-2014

Expected Outputs	Planned Activities	Time-frame		Responsible Party	Planned Budget		
		Q3	Q4		Source of Funds	Budget Des.	Amount

Management Arrangements

The project will be executed by King Abdulaziz City for Science and Technology (KACST). KACST assumes ultimate responsibility on behalf of the Government for the overall management of project activities, reporting, accounting, monitoring and evaluation of the project and audit of the use of Government cost sharing contribution to the project.

Due to the magnitudes of the project size and its diversified technical aspects and responsibilities requirements for the project management arrangements include the following roles;

Project board: Consists of the project coordinator, representative from UNDP, representative from KACST. The main role of the board will be making management decisions for the project when guidance is required by the project manager, including recommendation for UNDP/KACST approval of project revisions. In order to ensure UNDP's ultimate accountability, final decision making rests with UNDP accordance with its applicable regulations, rules, policies and procedure. Project reviews by the group board are made at designated decision points during the running of the project, or as necessary when raised by the Project Manager. The group is consulted by the project manager for decisions when PM tolerances (normally in term of times and budget) have been exceeded.

Project Assurance: The project assurance role supports the project board by carrying out objectives and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. (A UNDP representative holds the project assurance role.The project manager and project assurance roles should never be held by the same individual for the same project.)

Project Director: whose responsibilities will be associated with the coordination of the different activities with UNDP and main counterparts representing the executing agency.

Project Manager/CTA: has the authority to run the project on a day-to-day basis on behalf of the project board within the constraints laid down by the project board. The project manager is responsible for day-to-day management and decision-making for the project. The project manager's prime responsibility is to ensure that the project produces the results specified in the project documents, to the required standard of quality and within the specified constraints of time and cost. The project manager is appointed by the implementing partner.

Administrative and Financial Assistance: whose responsibilities focus on carrying out the administrative and financial support to the project activities including audit, with UNDP and concerned government and NGO's.

UNDP will render its support and assistance normally provided to all technical cooperation projects. In addition, UNDP country office in Saudi Arabia will provide further support to KACST required for the execution, monitoring, reporting, evaluation, and auditing of the project as well as management of the project's financial resources suitable to the needs and requirements of the project's expenditures. Throughout the project implementation, UNDP will also support building the technical and administrative capabilities of KACST as an executing institution.

The project's diversify activities and outputs towards reaching the desirable outcomes imply collaboration with the specialized government institutions, the private sector and NGO's as deemed necessary. The overall management will be coordinated through KACST.

The amount estimated in the budget (US$ xxxxxxx) will be deposited with UNDP as per agreed Activities and schedule of payment. Thereafter, payment for items identified in the matrix (budget) of each of the component project will be UNDP after receiving disbursement instructions for the project director. A financial report will be submitted to KACST on quarterly bases and at the end of the project for the purpose of review and endorsement. In the event that both parties decided to close this project and certain fund remained unutilized, UNDP will return unutilied balance, after clearing all contractual commitments, to KACST or transfer to a successor phases of this project depending on the preference of KACST.

The budgets are subject to review as needs arise and there is enough flexibility to transfer among project budget activities.

Monitoring and Evaluation, including AWP Monitoring Tool

In addition to the periodical monitoring visits by the UNDP office, the project will be subjected to all required monitoring and evaluation processes and procedures set by UNDP organization. These will include an annual tripartite review (TPR) from the date of the initial project's operations. The TPR will bring representatives from KACST, UNDP and the Ministry of Foreign Affairs to review and discuss the operations

and performance of the project. The TPR will be preceded by an annual project report (APR), prepared by the project manager/CTA, which should present the project’s performance towards achieving its objectives and producing the intended outputs and outcomes as well as outlining the milestones and any shortcomings that could adversely impact the operation of the project. The APR will be the basis of the discussions of the TPR which will yield a set of recommendations for further improvement and fine turning of the project's performance.

Also based on UNDP guideline of project management, a Project Quarterly Progress Report (PQR) has to be prepared and submitted to UNDP office. The PQR is a monitoring progress report to be submitted by the project management to measure scope, schedule, costs, benefits and quality (e.g., evidence of progress towards expected results, according to schedule, within budget, and quality outputs and approach accepted by beneficiaries. A Quarterly Progress Report should be prepared toward the end of each quarter to document the performance of the project. This report would actually make it much easier to produce the Annual Progress Report that you submit every year, as all the information would've been entered on a regular basis.

As deemed necessary, mid-term review and/or in-depth evaluation could take place by an independent party to further assess the projects activities and set measures and mechanisms for improvement. Prior to the completion of the project, a terminal report will be required and possibly a terminal review could be needed to assess the sustainability of the intended outcomes and determine the essential mechanisms and modalities for this purpose.