Khyber Pakhtunkhwa Cloud First Policy

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Definitions

Cloud Computing

Cloud computing is the on-demand delivery of Information Technology resources such as compute, storage, databases, software, networking over the internet, often referred to as the "cloud". Typically, enterprises only pay for cloud services they use, helping them lower operating costs, run infrastructure more efficiently, and scale as their business needs change.

Cloud Service Provider (CSP)

A Cloud Service Provider (CSP) is a third-party company that offers components of cloud computing such as infrastructure, software, storage, application, etc. security and compliance in a cloud environment is a shared responsibility between the CSP and its customers. The share of responsibility depends on the cloud service model in use.

Public Sector Entities (PSE)

The Government of Pakistan (GOP) including all its Ministries, Department, Agencies, Dependencies, and Institutions at the Federal and Provincial levels; and corporations fully or partially owned by the Federal or Provincial Government of Pakistan.

Government Data

Data collected, generated, processed and/or managed by Public Sector Entities.

Service Level Agreement (SLA)

An agreement between a customer and a service provider that lists the services required and the expected level /quality/grade of service.

New ICT Investment

Procurement of new ICT hardware and software as well as renewal of hardware and renewal of software licenses.

Open Data

Publicly available data structured in a way that the data is fully discoverable and usable by end users is called ‘open data’. The implementation of open data principles in the public sector makes the government open and accountable and increases citizen participation in government. The PSE classifying any data as Open Data must share the criteria with Cloud Office.

Interoperability

The ability of computer systems, platforms, software, database or different computerized products or systems or their components to exchange and use information seamlessly between each other.

Abbreviations

PCFP	Pakistan Cloud First Policy
CAO	Cloud Acquisition Office
CSP	Cloud Service Provider
GOKP	Government of Khyber Pakhtunkhwa
ICT	Information and Communication Technology
IT	Information Technology
PSE	Public Sector Entities
KPPRA	Khyber Pakhtunkhwa Public Procurement Regulatory Authority
MoITT	Ministry of Information Technology and Telecommunication
SDG	Sustainable Development Goals
IaaS	Infrastructure As a Service
SaaS	Software As a Service
PaaS	Platform As a Service
SLA	Service Level Agreement
IDS	Intrusion Detection System
IPS	Intrusion Prevention System

1. Introduction

Cloud computing presents a myriad of opportunities and benefits, including cost reduction, improved citizen services, enhanced transparency, environmental advantages, efficient resource management, and optimized public service delivery. It fundamentally reshapes how organizations leverage Information and Communications Technologies (ICT) to operate more efficiently. Recognizing these immense advantages, the Federal Ministry of Information Technology and Telecommunication (MOITT) has embraced the potential use of cloud technology as a means to provide better access to public services and streamline governance, as evident in the Pakistan Cloud First Policy (PCFP) 2022.

In alignment with the PCFP 2022 and recognizing the transformative potential of cloud technologies, the Khyber Pakhtunkhwa Cloud First Policy is established to drive the strategic adoption of cloud-based technologies and services within the provincial government of Khyber Pakhtunkhwa. This policy aims to harness the power of cloud computing to enhance efficiency, scalability, cost-effectiveness, and overall digital transformation while upholding the highest standards of data security and privacy.

The Khyber Pakhtunkhwa Cloud First Policy 2023 draws inspiration from the successful cloud-based adoptions for Digital Transformation and Governance, which aligns with the Federal Government's cloud-first initiative. This collaborative approach between the federal and provincial levels ensures a unified strategy for cloud adoption while respecting the unique requirements and characteristics of each province.

2. Background

There are a number of benefits of cloud adoption in the public sector and governments around the world are moving towards cloud computing. The government of Pakistan approved its first Pakistan Cloud First Policy (PCFP) in February 2022. The policy outlines the scope and implementation of cloud computing in the public sector of Pakistan. The policy serves as a useful guidance to provinces of Pakistan to implement cloud first policy in their jurisdictions.

The true benefits of cloud computing can only be realized when there is an aggregate demand for cloud services throughout the country. ICT infrastructure is currently available in clusters across Pakistan. The absence of a cloud first policy in the past has resulted in public sector organizations working in silos for their ICT needs. These small clusters are highly inefficient in their resource utilization and do not offer the level of security that public sector data requires. Moreover, the reliance on on-premise hardware presents an impediment in the delivery of citizen centric services and internal operations of the PSE. In contrast, cloud computing provides an agile approach to procurement, development, deployment, and operations. A close liaison between the provinces and the federation is

utmost necessary to achieve efficiency and optimization and for the generation of an aggregate demand by the public sector in Pakistan. This will also be beneficial in reducing the cost of ICT spending by the government of Pakistan.

Cloud first approach is also recognized by the provinces in their digital strategies. Punjab's IT policy 2018 includes the implementation of Cloud First adoption as the preferred option for delivering IT services as one of the objectives. Similarly, Khyber Pakhtunkhwa's Digital Policy 2018 has listed prioritization of cloud-based services and hosting as one of the objectives to be achieved within five years. Baluchistan Digital Policy 2021 states the objective to utilize cloud computing to curtail the IT infrastructure and maintenance costs. This shows that the provinces and the federation are already aligned in their goal to utilize cloud computing in order to attain the potential and benefits of cloud computing in public sector.

Considering the numerous advantages brought about by cloud first strategy in public sector, the province of Khyber Pakhtunkhwa issues this cloud first policy. This policy is a continuation of approved Pakistan Cloud First Policy by the federal government and focuses on the implementation mechanism of cloud first in the province.

3. Scope and Adoption

This Cloud First policy is published in continuation of PCFP approved by the federal cabinet in February 2022 and applies to all Public Sector Entities (PSE) under the provincial government intending to make new ICT investment(s) which have a cloud based alternative available. The policy will also serve as useful guidance to regulated sectors and private sector organizations as they continue to undertake digital transformation.

4. Coherent Cloud First Approach

A coherent approach to Cloud First between the provinces and the federation is necessary to achieve the true potential of cloud computing in public sector of Pakistan. Some of the salient benefits are as following:

4.1. Efficient (cost of) Governance

Efficient technology resources can be procured on a "pay as you use" basis and is cost-efficient. Resources of a cloud data center are shared among many organizations and provide flexibility and capacity management without any requirement of hardware procurement and related lengthy tendering process. Organization can increase and decrease the required resources as per their changing requirement seamlessly. Therefore, fewer servers, storage, network equipment and power & cooling equipment are utilized. Furthermore, the frequent purchase of ICT equipment to replace obsoleted equipment every few years is also replaced with paying for only the services utilized. This will result is cost efficiently for organizations and will reduce the overall import bill of Pakistan.

Lastly organization can focus on their related/ targets/ objectives without taking on the burden of IT resource management with respect of ICT Infrastructure maintenance.

4.2. Economies of scale

With the aggregate demand for cloud computing throughout Pakistan, CSP will be able to achieve economies of scale. This will bring down the cost of ICT expenditure and attract investment.

4.3. Collaboration between provinces

A coherent approach to cloud computing throughout the public sector of Pakistan will provide increased opportunities for collaboration among provinces on their ICT initiatives. Extension of already developed solutions deployed on cloud can easily be replicated for other provinces.

4.4. Standardization

The development of a cloud ecosystem with inherent interoperability capabilities will result in adoption of standardized mechanisms for the development of citizen centric solutions.

4.5. Adoption of latest tools and technologies

Cloud adoption across the country will facilitate the adoption of latest tools and technologies for implementation of ICT initiatives. The traditional approach to software development will be replaced by the latest cloud native methodologies. This will also result in the development of a cloud enabled workforce throughout Pakistan.

4.6. Enhanced Data Security and Privacy

A unified approach ensures consistent standards and practices for data security and privacy. This is crucial in safeguarding sensitive citizen information and maintaining trust in government services.

4.7. Improved Disaster Recovery and Business Continuity

A coordinated Cloud First strategy allows for shared resources and expertise in disaster recovery and business continuity planning. In the event of an unforeseen incident, the provinces can collaborate for faster recovery and minimal service disruptions.

4.8. Greater Access to Specialized Services

Through collaboration, provinces can collectively access and benefit from specialized cloud services that might be challenging for individual entities to procure. This fosters a culture of shared resources and expertise.

4.9. Accelerated Innovation

Collaboration in cloud initiatives encourages the exchange of ideas and best practices. This environment of shared knowledge accelerates innovation in the public sector, leading to the development and implementation of cutting-edge solutions.

4.10. Capacity Building and Skill Enhancement

A unified cloud strategy allows for joint capacity-building programs and skill enhancement initiatives. This ensures that the workforce across provinces is equipped with the necessary skills to manage and utilize cloud technologies effectively.

5. Policy Objectives

a. Implement a system for pre-accreditation of Cloud Service Providers (CSPs) to reduce the time required for procurement and launch of ICT initiatives.

b. Optimize ICT infrastructure costs by adopting a pay-as-you-go model, ensuring payment only for utilized services.

c. Create an environment conducive to cloud service investment, both from local and international CSPs, contributing to the technological advancement of Khyber Pakhtunkhwa.

d. Facilitate CSPs to achieve economies of scale, fostering cost-efficiency and resource optimization.

e. Prioritize the implementation of cloud offerings to enhance information security for end-users across government services.

f. Utilize digital government solutions hosted on the cloud to provide transparency to citizens in the delivery of public services.

g. Encourage the transition from local hosting to cloud hosting, increasing the utilization of cloud solutions for government operations.

h. Develop and maintain readily available cloud services to foster a digital entrepreneurship ecosystem within the province.

i. Attain optimization through the aggregation of ICT resources, ensuring efficient utilization across government departments.

j. Implement initiatives to develop a workforce well-versed in cloud technologies, ensuring the province has the necessary skills for effective cloud adoption.

k. Obtain environmental benefits through the optimization of resources, aligning with sustainable practices in cloud computing.

6. Current State of Cloud Computing in Khyber Pakhtunkhwa

E-Government initiative is an integral part of Government of Khyber Pakhtunkhwa list of priorities to make the province more digitally enabled. Previously distributed small-scale server rooms dispersed across various Government offices faced the challenge of maintaining round-the-clock power supply, cooling, as well as upkeep of servers and

services. In the same way the departments were also required to maintain reserves of fuel and run generators during power outages and employ extra technical staff in shifts for 24/7 operations. Despite these measures, services often faced frequent downtimes. To resolve these problems, the Government of Khyber Pakhtunkhwa established a Tier-III Data Centre in 2014 at Home Department for consolidation of IT services deployed across provincial government departments. Presently, Science and Technology & Information Technology Department is the custodian of KP Data Center Technical and Operational management. There is a huge cost and energy savings by transformation from a distributed DC model to a centralized data center. This is leading to rapid deployment of applications and IT services by the government.

KP Data center is equipped with the latest technology infrastructure for powerful computing and meets critical cost controls with lower operational expenses through its converged infrastructure technology while delivering reliability and uptime using redundant infrastructure. Currently major services provided by KP Data Center Include

- Government Websites Hosting
- Applications / ERPs / MIS Hosting
- Internet over LAN
- Intranet based solutions (Fiber optic Network throughout civil secretariat)
- Secure IP Telephony
- Wireless Hotspots
- Co-Location
- 24/7 Support through support portal (support.kpdata.gov.pk)

Since the establishment of KP Data Center, approximately 150+ KP Government websites and more than 250+ applications have been hosted in it. Hosting of Government websites and applications has resulted in significant cost savings for the KP Government.

Keeping in view the criticality of government applications/websites hosted at KP Data Center, data security and integrity have been ensured by deploying a next generation firewall which includes VPN Connectivity and Intrusion Detection System (IDS) / Intrusion Prevention System (IPS). Similarly, HVAC systems and uninterrupted power solutions are specially designed for efficient and uninterrupted service delivery. The center guarantees 24/7 availability and the uptime of services to 99.998%.

7. Policy Deliverables

7.1. Nomination of a representative for National Cloud Board

This policy is published in line with the principles outlined in PCFP 2022 by the federal government. With the approval of this policy, the provincial government will nominate a representative for the National Cloud Board as outlined in PCFP. The Cloud Board is

headed by Secretary Ministry of IT & Telecom and Chief Secretaries of all provinces or their representatives along with two industry experts will be the members of the board. The province's representative will not only represent the province on the federal cloud board but will also be helpful in staying abreast of the cloud adoption across Pakistan.

7.2. Provincial Cloud Acquisition Office

A Cloud Acquisition Office (CAO) will be established to support PSEs in their transition to cloud. CAO will facilitate PSEs in designing, architecting, procuring, building, migrating, and managing their workloads and applications on the cloud.

Only a CSP accredited by the National Cloud Office will be eligible to take part in the competition. The CSP with the most advantageous offering will be selected. An SLA will be signed between the CSP and PSE accordingly. Any breach of the SLA between PSE and CSP will be reported to CAO by the PSE. CAO will report continued serious non-compliance of SLA by CSP to the National Cloud Office. An offering of CSP will be considered if the Government Cloud/Data Center is not able to support the workload or application for any reason.

The CAO will have a close liaison with the federal Cloud Office to communicate the cloud needs of federal PSE. To reduce operational overhead, coherence of policies and to benefit from the advantages of aggregate demand, only CSP accredited by the National Cloud Office will be considered for the needs of PSE. The CAO will work together with the provincial procurement regulator to develop and adopt a procurement methodology that best fits the cloud ecosystem. Organizational hierarchy of CAO for Khyber Pakhtunkhwa is given in Figure 1.

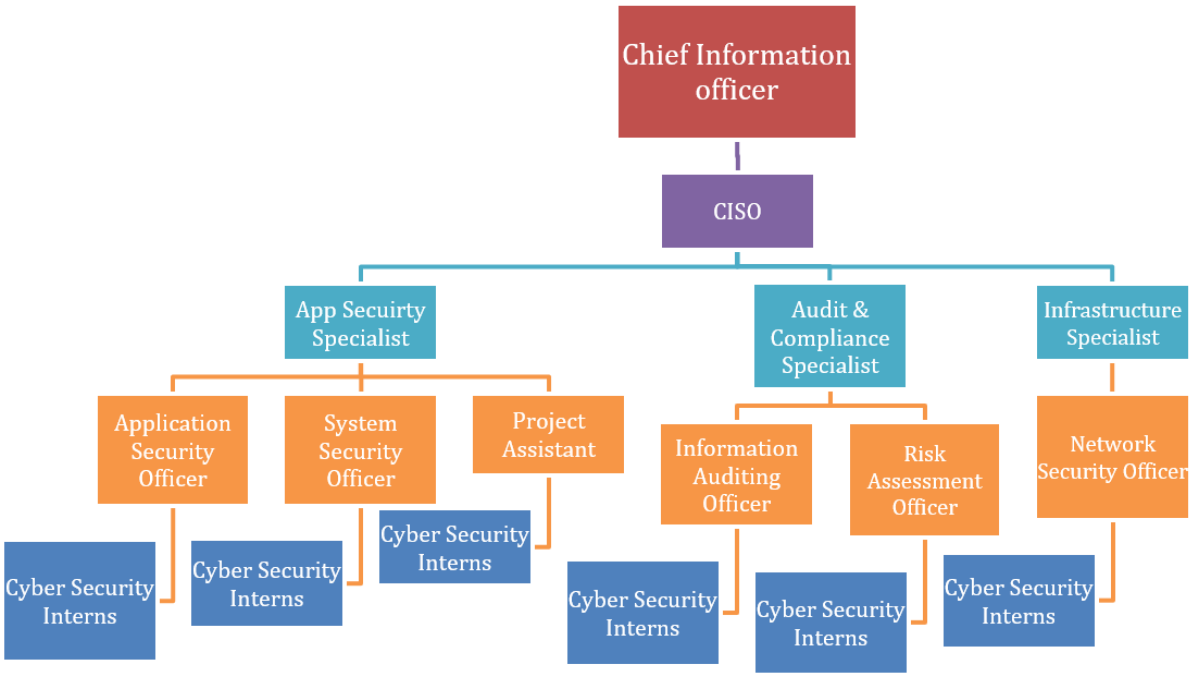

Figure 1: Cloud Acquisition Office Hierarchy for Khyber Pakhtunkhwa

7.3. Restrictions on Investment in Fragmented ICT Infrastructure

With the approval of this policy the government of Khyber Pakhtunkhwa will require all PSEs to review any projects which involve setting up a data center/ICT infrastructure/Server Room for which a cloud-based alternative exists, and will prioritize cloud-based solutions for any future ICT investments where Infrastructure As a Service (IaaS), Software As a Service (SaaS), Platform As a Service (PaaS) or any such cloud applications are better and viable options. Same provisions will apply on any projects in the public sector implemented via a third-party or donor agency. The Science and Technology & Information Technology Department in the province will work together with Planning/Development and Procurement Regulators to ensure no proposed project with requirement for fragmented ICT infrastructure is approved unless approved. After the approval of this policy, all new ICT investments should adhere to the directions of the Cloud Board and CAO where applicable.

8. Procurement

Government procurement is an important component of cloud adoption. PSE must consider cloud services for all of their new ICT procurement decisions wherein cloud adoption is a viable alternative. Any new ICT procurement decision to select services except cloud must have approval by the CAO. Moreover, PSE will also seek approval from Cloud Board to host data on private cloud and will have to demonstrate the need for hosting on private cloud. Similarly, an organization intending to establish its own Private Cloud must have approval of the CAO.

Upon the approval of this policy, the selection of cloud-based ICT will be prioritized in new ICT procurement. This will apply to infrastructure, hardware, software, information security, licensing, storage, and provision of data, as well as services like security, development, virtualization, databases, or any kind of technology where a cloud-based offer is essentially equivalent to or better than other kinds of technological solutions. Any decision to not use cloud solutions first must be substantiated by a business case and clear evidence of the value of such a decision. In this regard, the PSE must establish that the non-cloud-based ICT deployment strategy has a lower Total Cost of Ownership (TCO) with at least the same level of security that a cloud deployment offers or it meets special requirements of the PSE that are not offered by a cloud deployment.

The selection of the appropriate cloud deployment and service model will be based on an assessment of each application, incorporating cost-benefit analysis and achieving value for money over the life of the investment. Procurement practices should reflect purchasing practices and contract terms that allow cloud platforms to be scalable, cost-effective, and innovative. CAO will facilitate PSE in their selection of the appropriate cloud service and deployment model, architecting, procuring, building, migrating, and managing their workloads and applications on the cloud. CAO will also hold competitions for the selection of accredited CSP.

The following aspects will be considered when procuring cloud services:

a. Value for money-to fulfil the intended purpose of the service;
b. Transitioning from capital budgets to operational expenditure;
c. short, medium, and long terms impact on finances, governance, technology, relevance, suitability;
d. The suitability of Service Level Agreements (SLAs) in relation to PSE needs; and
e. Information on data security guidelines and compliance with national legislation and international standards on data privacy and cybersecurity;

In general, cloud services are provisioned on a “pay as you use” basis. The organizations requiring ICT services do not have to purchase equipment to obtain services. This is a shift

from the traditional way of procuring ICT in public sector in Pakistan which is based on purchasing equipment and incurring a capital expenditure. In order to achieve the goals, set out in this policy, a new perspective for purchasing and operating ICT will be considered. The "Pay As You Use" and "Self Service" approaches permit scaling of services and is useful as the data and compute needs of an agency fluctuate.

After the approval of this policy, Khyber Pakhtunkhwa Information Technology Board (KPITB) together with the provincial procurement regulator and other relevant authorities, shall devise mechanisms to move away from the conservative theme of Capital Expenditure to Operational Expenditure, which is more relevant for cloud service provisioning. Furthermore, guidance will be provided to PSE on the aforementioned aspects concerning procurement of cloud services.

The true benefits of cloud computing can be realized with a centralized entity providing facilitation to PSE for their cloud procurement needs. This provides convenience, efficiency, reduced costs and a simplified ordering process. Aggregate demand for common cloud technologies by PSE results in the best possible offerings from CSP. It also aligns different PSE over a common set of terms and conditions rather than different ones for each organization. CAO will be the centralized office for applicable ICT procurements of all PSE. CAO will have the visibility of the aggregate demand of PSE which will result in better cost and service offerings by CSP.

9. Date of Application and Validity

This policy becomes effective by the date it is provided approval by the Government of Khyber Pakhtunkhwa. The policy is subject to holistic review as and when required by the government.