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Practical Oracle Cloud for Governments

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Abstract
Major IT businesses advocate for the development model of cloud governance (G-Cloud) through private sector investment, hence enhancing public sector consumers' access to next-generation IT services. The G-Cloud private operators manage governmental cloud infrastructure by incorporating specific SaaS (Software as a Service) functionalities. This model, proposed by major corporations, assists public institutions in cost optimization and enhances operational efficiency, yielding tangible benefits for citizens and society at large. These improvements are realized by transferring the initial investment to the private sector via a subscription model, hence minimizing reliance on human elements (technical) and offering a reduced cost.

Keywords: Cloud Infrastructure (IaaS), Public Sector Cloud Solutions, Data Security and Compliance, Government Digital Transformation, Cloud Application (SaaS0, Hybrid Cloud, Smart City Solutions, Artificial Intelligence(AI), Oracle Autonomous Database, Blockchain for Government, Analytics and Data Visualization, Cloud-based Workforce Management, Government Regulatory Compliance.

Introduction

The Government Cloud is a concept previously implemented in other European nations, such as Great Britain (referred to as G-Cloud), which offers high-quality public services that are more readily available to residents. Prominent IT corporations provide technology and knowledge to the Romanian market, delivering new solutions for the public cloud industry [1].

The establishment of a cohesive government cloud market necessitates the introduction of commercial operators to provide access to cloud solutions, functioning within an efficient infrastructure of public institutions. Major IT businesses want to enhance access to and utilization of integrated IT solutions nationally, via the cloud, with little public budget commitment [2].

Cloud Computing within the European Union

A Brief History of Cloud Computing in the EU

In September 2012, the European Commission (EC) implemented a policy to "Unlock the potential of cloud computing in Europe." The policy is to promote the adoption of cloud computing across all sectors of the EU economy and the group of Experts are a crucial component of this approach and the Commission's initiatives to promote the growth of the distinctive digital market [3].

The plan is predicated on previous legislative measures, including the EU reform of data protection [4] and the optional European legislative proposal in the sales sector [5]. The Expert Group assists the Commission in evaluating enhancements to the legislative framework governing cloud

computing contracts for consumers and SMEs, aiming to bolster their trust in utilizing such arrangements. The notion of "cloud computing" refers to the process of storing data (including text files, images, and videos) and utilizing software on remote servers accessed by users via the internet, using any desired device. This approach is swifter, more economical, and more adaptable, and perhaps more secure than local IT solutions. Numerous services, like Facebook, Spotify, and web-based email, utilize cloud computing technology; nevertheless, substantial economic advantages are realized only when these cloud solutions are extensively embraced by corporations and public sector entities [6-11].

EC Strategy in the sphere of cloud computing

The Commission's policy on cloud computing encompasses three primary activities, one of which is to provide secure and equitable contractual arrangements for cloud computing agreements.The presence of standard contractual provisions can enhance the convenience of agreements between service providers and cloud clients or small enterprises. These can also assist the implementation of EU data protection regulations, inasmuch as the pertinent clauses apply to cloud computing contracts. The European Commission's plans for overhauling data protection, which garnered an overwhelming majority of votes in the European Parliament, would also establish a framework that promotes and facilitates the growth of cloud computing services. The swift implementation of data protection reform recommendations would facilitate the emergence of a distinctive digital market, ensuring that both consumers and SMEs fully capitalize on economic growth in digital and cloud computing services. The European Community's proposal for unified European sales legislation has prompted the Commission to initiate enhancements to the legal framework governing cloud computing contracts. Consequently, the unified European law would implement optional sales regulations, applicable across the EU, encompassing equitable and balanced provisions that consumers and SMEs can utilize when purchasing digital items, such as music or software, via cloud downloads. The expert group will undertake special supplementary work to incorporate other contractual concerns pertinent to cloud computing services into the scope of the common European sales regulation, using a similar optional instrument, for subjects unrelated to the legislation.

Cloud Computing Legislation in the EU

The European Commission has convened a panel of experts to formulate secure and equitable conditions for cloud computing agreements at the European level, predicated on an optional instrument. The purpose is to discover optimal practices for consumers and small organizations, which frequently hesitate to get cloud computing services owing to the ambiguity of the associated contracts [12-15].

The establishment of the expert group is integral to the Commission's initiatives aimed at enhancing trust in cloud computing services and optimizing their potential to boost economic productivity in Europe. This measure is a principal initiative executed by the EC under the cloud computing strategy established in 2012 [7, 8].

The committee is also tasked with tackling cloud computing concerns that are beyond the purview of standard European sales regulation, which is now under discussion [5].

The cloud computing expert group comprises members from cloud service providers, consumers, small and medium enterprises (SMEs), academia, and legal experts. The initial group meeting will present its findings by the conclusion of 2014.

The submissions received will serve as the foundation for a policy statement that will initiate an extensive public consultation regarding future actions on cloud computing contracts for consumers and SMEs in Europe. During the European Council, EU leaders emphasized the necessity of initiatives that would facilitate the establishment of a unified market for cloud computing services.

The Commission has previously implemented steps concerning this issue. The complete utilization of cloud computing advantages might create 2.5 million new employment in Europe, and by 2020, the EU's gross domestic product would rise by almost 1% annually. Experts must provide consumers and small to medium organizations with a balanced array of contractual provisions, enabling them to utilize cloud computing services with more assurance. Trust is a benefit; individuals should possess assurance that the services they utilize are equitable and dependable.

Governmental Cloud in Romania

The Romanian proposal is consistent with the instructions of the European Commission, which promotes the adoption of cloud computing the utilization of technology in e-Government initiatives to achieve cost reductions in governmental budgets. The Dedicated Romanian Government Cloud may be established on three fundamental pillars: Online access serves as the nexus between public entities and the recipients of services provided by the Romanian state. Integration involves incorporating specialized services of regional organizations and their standardized processes, ranging from accountancy to infrastructure management. Interoperability - enabling the flow of data and services among public institutions, regardless of the cloud solutions employed. The new function of the G-Cloud private operator is crucial inside the government cloud ecosystem. This would provide the administration of cloud services for people through public institutions and an integrated Service Level Agreement (SLA) for all these services. Implementing this model necessitates collaborative efforts from major IT businesses and Romanian authorities to formulate public laws that define the comprehensive framework for cloud implementation and provide special standards for private G-Cloud operators. To implement this idea in Romania, it is essential to establish a certification process for designated public sector cloud service providers and the corresponding regulatory framework [16-22].

Enhanced Efficiency in Governmental Administration

The establishment of a government cloud market might enhance technological advancement in the public sector, addressing IT requirements at both central and local administration levels, by providing a viable alternative to existing traditional systems. Public administration will evolve into a more transparent entity and an efficient provider of IT services to citizens.

Government cloud solutions do not necessitate public agencies' investment in IT infrastructure. Resource use is contingent upon a monthly subscription, with accountability for the administration and maintenance of the cloud.

The infrastructure is the responsibility of the commercial operator. Consequently, expenses become foreseeable, and issues associated with the scarcity of specialist workers in public institutions are eliminated.

Employed in the public sector, cloud technology enhances citizen engagement by streamlining processes and improving access to solutions that fundamentally improve the public administration experience. Consequently, high-quality services will be promptly given to residents. Government Cloud facilitates effortless access to information for residents, minimizes mistakes in documentation, streamlines interactions between users and public institutions, and frequently results in a significant reduction in travel and time spent at service counters.

Establishing a framework for the integration of private operators into the federal cloud's public services market is imperative in an era dominated by mobile technologies that enhance convenience for individuals.

Streamlined Collaboration Enhanced Efficiency

Sharp has introduced a new solution aimed at the European market: Cloud Portal Office. This enables users to exchange and store data, optimizes workflow, facilitates efficient collaboration among firms, and enhances productivity. Cloud Portal Office grants access to information across an extensive hardware platform, encompassing both stationary and mobile devices. It is an ideal choice for organizations with an extensive network of offices and branches or those employing several field operators.

The portal was established to streamline information sharing, allowing for the access, upload, download, management, and secure printing of files, the creation of new folders, and the collaboration and sharing of data across any computer, mobile device, multifunctional device, or interactive Big Pad whiteboard. It streamlines the workflow, enabling team members to securely access necessary information promptly and from any location. This service is highly beneficial for firms in their regular operations and project implementations, particularly those involving personnel from several departments' offices or various nations. Cloud Portal Office exhibits remarkable flexibility, enabling rapid and effortless configuration of various units and the addition of access rights to a shared cloud area.

The portal allows the employer to augment or diminish employee engagement, hence decreasing the company's operational expenses. Cost savings can also be achieved by granting rapid access to cloud-based firm resources, eliminating the necessity for expensive expenditures in IT infrastructure. In this manner, document access may be broadened without necessitating secure access to an FTP server or a VPN connection.

Cloud Portal Office provides storage options from highly reputable partners. The data is only kept on secure servers managed by Amazon Web Services and Fujitsu Cloud Services. These are safeguarded by access control, screen safeguards, and the most advanced encryption techniques. Moreover, all resources are retained within the European Union.

The Cloud Portal Office is accessible to individuals connecting to the portal, with access to resources regulated by the company's IT personnel. The Chief Product Officer (CPO) enables the

user to adjust access privileges, add or delete individual access, and augment data storage capacity as required, all facilitated through a secure website.

Romanian Cloud Proposal for Public bodies

The National Institute for Research in Informatics (ICI) has introduced, at a public event, a proposal to serve as a cloud computing services provider for governmental bodies, businesses, and people. The proposal is founded on the project "Cloud Infrastructure for Public Institutions" - ICIPRO, which pertains to the development of the ICI data center for this objective.

The Data Center represents a collaborative investment over 77 million lei. Approximately 13 million of this total represents the Institute's contribution from its own resources, while the remainder is sourced from the European Union under the Structural Funds POSCCE.

The ICI data center is characterized by a uniquely built structure with a specific project focus constructed space exceeding 300 square meters, situated within the institute's facilities.Upon completion, likely in 2015, the project will be accessible to public bodies seeking to utilize cloud computing services. Initially, this data center will also be utilized by ICI, which will transition to the cloud domain domenii.ro and the IT programs public library now administered within the institute. This initiative signifies Romania's transition to the "early adopter" phase of cloud computing. According to analysts, the primary benefactors of this scheme will be county councils and local public authorities.

The project is now at the stage of completed data center construction, pending clearance for connection to the public power supply network. No public information is available on the IT infrastructure to be implemented in the data center.

CloudSME - Simulation in Cloud Small and Medium Enterprises

The formulation of innovative business concepts or the investment in novel technology and methodologies is a significant challenge for enterprises. Simulating a process, system, or model using simulation software entails pretesting the behavior to align with the actual system. Simulation will prevent unimaginative expenditures, allowing organizations to identify vulnerabilities and faults in workflows or goods in advance.

CloudSME is a European initiative aimed at facilitating the integration of small and medium enterprises with cloud computing. The project will provide a cloud-based simulation platform that enables SMEs primarily engaged in engineering and production to utilize simulation technology as a service (SaaS), offering a comprehensive, pay-per-use model. Consequently, businesses will save substantial expenditures on software licensing, associated gear, and maintenance, instead leveraging simulation benefits to enhance productivity.

Simulation software may substantially enhance the standing of these SMEs by decreasing expenses and facilitating more effective development, manufacturing, procurement, logistical, and finance operations. Nevertheless, the adoption of software simulation by SMEs has been limited thus far due to obstacles such as hardware costs, license fees, and the necessity for technical skills.

CloudSME has developed a comprehensive platform, a one-stop shop for cloud-based software simulation, which substantially mitigates these constraints, facilitating broader use of simulation

software among SMEs in engineering and manufacturing. Software providers may utilize simulation as a service platform as Platform-as-a-Service (PaaS), enabling them to rapidly develop bespoke applications in the cloud for their clients—specifically small and medium-sized enterprises (SMEs)—which will operate as Software-as-a-Service (SaaS) in the cloud.

To enhance the efficacy of the CloudSME simulation solution, the project necessitates the involvement of up to ten new SME beneficiaries from an EU Member State or an FP7 affiliated country. The newly designated recipients must be

• A small to medium-sized enterprise (SME) primarily engaged in engineering and production, necessitating simulation software to enhance operational efficiency, and will utilize simulation software facilitated by CloudSME.

A consortium that includes at least one SME software simulation provider and one or more SMEs engaged in engineering and manufacturing utilizing the software simulation provider.

Simulation software manufacturers, as new beneficiaries of CloudSME, must modify their software simulations for compatibility with the CloudSME platform, enabling SMEs to develop simulation applications utilizing their software on this platform.

Concerning the SMEs in engineering and production, as new beneficiaries, they are required to:

• to delineate specifications for business operations that will be facilitated by simulation on the CloudSME platform,

• to assist in the development of simulation programs to facilitate their job,

• to collaborate with technology and simulation software providers platform.

• to use the application in the present endeavor, and

• to offer comments on enhancements.

e-SENS: Commercial Prospects in the Public Sector

A range of e-government services is currently available at the national level. Nonetheless, several impediments persist when accessing government services across borders, encompassing technological, legal, organizational, and semantic challenges.

e-SENS (European Simple Electronic Networked Services) is a project sponsored by the European Union, aimed at developing compatible technology solutions and online public services inside the European Union and its affiliated nations. The project emphasizes essential technological components like e-Identity, e-Signature, e-Delivery, and e-Documents.

Following the inaugural year of the project, the groundwork for the construction of essential ICT architecture was established, and the piloting scenarios to imitate real-life examples were delineated.

The objective of the pilot phase is to illustrate the viability of executing actual ICT services among European nations. The e-SENS prototype applications will illustrate the feasibility of achieving flawless electronic contact with public administration across the European Union. Genuine

interactions between enterprises/citizens and governmental administrations, grounded in fundamental principles, will be accessible throughout a diverse array of activity sectors.

The pilot phase will illustrate that the established technical solutions can be executed throughout Europe, offering a distinctive opportunity for European individuals and enterprises to maximize advantages from a unified digital market.

The project's solutions comply with European norms and laws for cross-border electronic communication. Essential technological modules are available at no cost for the IT sector to facilitate development services. This approach enables the acquisition of a competitive edge in the European market.

Big Data Analytics in Federal Cloud

Despite the extraordinary accumulation of data by economic, scientific, and governmental institutions, accessible business data analysis for each employee remains generally unattainable. Business analysts and IT possess extensive data access, while regular employees continue to face challenges in acquiring and analyzing information promptly.

To enable all users to access the most pertinent data at any time and place, software companies have introduced cloud services that provide a range of analytics tools. These services, along with mobile phone capabilities, facilitate expedited decision-making inside the business by minimizing access constraints for users, providing secure access to extensive information, and enhancing cost effectiveness in the cloud.

These services that enhance the use of critical information rely on data analysis and visualization for users across the enterprise. This technology, grounded in verified Business Intelligence (BI) principles, is optimized for cloud services and enables users to integrate data from various sources, including cloud platforms, organizational headquarters, and third-party applications, facilitating the rapid development of interactive, sophisticated applications and analyses.

The subscription-based nature of cloud offerings enables clients to implement these services instantaneously, whether for small teams, business units, or the full organization, without incurring capital expenditures. Services offer ready-to-use functionalities, enabling users to access and analyze data at any time and from any location without requiring any development work.

IT businesses that provide government cloud solutions may utilize these cloud services to provide sophisticated, tailored apps to their clients, therefore generating new income streams. The proposal further liberates essential IT resources while enabling IT to uphold a security assessment of a company's information architecture. Founded on the infrastructure of industry leaders (e.g., Oracle Database Cloud), the services of "Big Data Analytics" are grounded in substantial functionality and utilized by millions globally.

Opulent and Engaging Experience

"Big Data Analytics" services enable users of varying technical expertise to swiftly and effortlessly develop analytic applications, possessing the following attributes:

• Rapid initialization: The data import framework, facilitated by a wizard, enables users to construct tests or integrate BI apps without necessitating programming expertise or analytical abilities.

• Implementation efficiency: An interactive interface including assistance and integrated lessons enhances productivity and facilitates implementation. Individuals with prior understanding of cloud services or apps can utilize the services instantly without the need for specialist training. Best practices within the cloud sector are also incorporated.

• Mobility: Featuring "on-the-go" analytical capabilities, it encompasses tactile and interactive elements without necessitating further development. Moreover, services are optimized for offline functionality, using enhanced security measures to regulate access and visibility.

• Flexibility: Users can obtain programming interfaces for enhanced customization and improved integration.

Minimize Administrative Burdens While Ensuring Security

Through "Big Data Analytics" services, firms may save expenses and required resources for implementing analytical applications, while ensuring comprehensive database management.

Advantages:

• Scalability: The cloud-based paradigm allows enterprises to incorporate more users and apps.

• Availability: The services provide high availability, while service-producing organizations enhance speed through transfer optimization and examination of intricate mechanisms in the cloud.

• Security: Data and BI apps are integral to the portfolio that adheres to the highest industry security requirements and are entirely owned and maintained by the firm, guaranteeing that no data will be shared to other parties.

• Simplicity: IT firms oversee update cycles and software patching, therefore liberating additional IT resources and ensuring the prompt availability of the latest solutions.

• Elasticity: The service offers the capabilities of a database (e.g., Oracle) and advanced business intelligence expertise to support both current and future business data analysis requirements. Information possesses the potential to revolutionize business, provided it is utilized by the appropriate individuals at the optimal moment. "Big Data Analytics" services, incorporating mobile functionalities, will enhance and expedite decision-making processes within corporations and governmental entities by minimizing data access obstacles for all users through secure and extensive information accessibility, leveraging the simplicity and cost-effectiveness of cloud services.

Snap-on Business Solutions is anticipated to enhance productivity in developing Oracle applications and to expedite deployment in data-intensive environments, leveraging the capabilities of Oracle BI Cloud Service to swiftly format and present visual outcomes through charts, graphs, and reports.

Users must directly engage with databases to attain expedited analytical outcomes. "Big Data Analytics" BI services enhance this process by simplifying the loading and integration of data from various sources. Coupled with integrated mobile functionalities, "Big Data Analytics" services ensure that employees receive analyses "whenever and wherever" required.

Utilization of the Internet of Things in the Public Sector

The Internet of Everything (IoE) is projected to create an economic value of 4.6 trillion dollars for the public sector over the next decade, as shown by a report published by Cisco.

In recent, this substantial sum will be acquired by the effective management of resources, enhancement of staff productivity, generation of additional income (without tax increases), and the advantages for citizens [12].

The Internet of Everything (IoE) refers to the interconnection of individuals, processes, data, and objects, yielding added value from the capability of any entity to connect to the network. The shift towards the Internet of Things, enhanced mobility, the rise of cloud computing, and the growing significance of big data are factors contributing to the advancement of IoE.

For instance, the city of Barcelona [13] presently employs IoE solutions to enhance experiences. Spanish Town is among the first in Europe to develop "virtual services" for its citizens, utilizing video and collaboration technologies to facilitate remote interaction with the City Hall.

It is among the most interconnected and intelligent communities globally, having adopted IoE solutions in water management, smart parking, trash management, and public transit, hence facilitating cost savings and enhancing services for inhabitants. At the municipal level, the Internet of Everything (IoE) has the potential to produce a value of 1.9 trillion dollars over the next decade. Urban areas may capitalize on this by adopting "killer applications": Intelligent buildings have the potential to produce $100 billion by minimizing operating expenses associated with energy use through the integration of heating, ventilation, and air conditioning systems. Monitoring gas use has the potential to yield 69 billion dollars by decreasing expenses and enhancing the precision of metering readings for consumers and utility providers. Smart parking solutions could yield $41 billion by offering real-time visibility of parking availability within urban areas. Citizens can locate and reserve the nearest available spaces, traffic enforcement officials can readily detect violations, and the municipality may implement a demand-based pricing system.

Water management has the potential to produce $39 billion through the integration of water meters throughout the residence on an IP network to furnish data regarding utilization. A traffic charge system might create $18 billion in new income by establishing an automated system in congested urban areas, so enhancing traffic conditions while augmenting profits. As an increasing proportion of the population relocates to urban areas, cities must enhance their adaptability and responsiveness to residents' requirements while maximizing current revenue streams. The Internet of Everything (IoE) revolutionizes the delivery of services to people and their engagement with the administration. Besides the advantages for urban areas, the Internet of Everything (IoE) influences all tiers of administration, as demonstrated by the analysis: State agencies may generate income of $682 billion from IoE solutions utilized in bridge management, prisoner transportation, chronic illness management, education, and fire services.

• Non-Defense Federal Agencies may get 472 billion dollars allocated to IoE solutions for enhancing disaster response, fleet management, cybersecurity, and several other sectors.

Worldwide military forces can enhance mission efficiency by establishing secure information exchange among soldiers, bases, vehicles, and data from conflict zones. Enhanced connectivity

among global defense forces could yield a value of $1.5 trillion and significantly improve soldier safety.

Globally, there are 350 million public employees, and IoE applications that enhance productivity in state, local, and non-defense agencies could yield significant value. For instance, remote working solutions could generate $125 billion by decreasing rental, printing, and other expenses. Furthermore, these solutions enhance employee productivity and retention while creating new employment opportunities.

Public sector executives under immense pressure to fulfill increasing public expectations with dwindling resources. IoE solutions may transform the public sector executives must find possibilities to deploy the Internet of Everything (IoE) within their agencies and envision the potential achievements in a world interconnected by the Internet of Things.

Study [14] supplements a study by Cisco from February 2013, which indicates that private enterprises implementing IoE solutions will realize profits of approximately 14.4 trillion dollars over the next decade. The total value generated by IoE across both sectors is projected to reach 19 trillion dollars within the same timeframe.

Conclusions

In the concluding section of this work, we will examine IT solutions for public institutions in Romania within the European framework and their compatibility with the government cloud. To enhance the ICT infrastructure of public institutions in Romania [15, 16] for the benefit of citizens, we assert that the following aspects must be taken into account: The present status of eGovernment initiatives at the central level includes the Single Point Contact (PUC), Electronic System for Public Acquisitions (SEAP), National System for Electronic Payment of Taxes via Credit Card (SNEP), Electronic Transport Award System (Saeta), Electronic Prescription Information System (SIPE), Integrated Information System (SIUI), among others, as well as the status of projects at the local level; Projects and prospective initiatives to guarantee interoperability, efficiency, and efficacy of current and forthcoming infrastructure; Measures regarding the shift to cloud computing and the establishment of a governmental cloud. Developing the national framework for network security and information systems, applicable to state institutions and critical infrastructures; Implementation of measures to evaluate vulnerability and conduct penetration testing for cloud computing infrastructures and cloud monitoring services. Establishing a nationwide framework for monitoring and countering cyber assaults through the integration of systems from public and private sector agencies. Actions and methods to address infiltration and cyber terrorism, within the framework of current ICT infrastructure and within the framework of the Internet of Things (IoT). These conclusions are intended to facilitate the advancement of the information society in Romania for the benefit of its citizens and to promote Romania's progression to a level comparable to that of EU countries. Concurrently, this work seeks to enhance citizen engagement with the information society, characterized by the integral role of ICT, software, and hardware as essential infrastructure for the functioning and efficacy of all sectors of activity.

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