UNIVERSITY OF NAIROBI

College of Biological and Physical Science

School of Computing and Informatics

CIT 506: CLOUD COMPUTING AND IT OUTSOURCING

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Make a case for outsourcing the Systems that deliver/support services of the University of Nairobi. Indicate whether outsourcing is an option and if so what can be outsourced and the possible outsourcing possibilities and scenarios.

Critically discuss possible outsourcing implementation scenarios (Type of provider [e.g. in-shoring, onshore outsourcing, off-shore outsourcing etc.], Flavor of implementation [i.e. Private organizational Platforms/solutions, Off-shore cloud platforms, hybrids, type of cloud services, etc.])

The University of Nairobi relies on several information systems to carry out its administrative, teaching and learning functions. Most of the applications are on-premise developed by the ICT team while others are outsourced. The following are the cases of Information systems deployed within the university and the cloud service deployed in each of the system.

1. **University Website**

The UON website is a strategic tool through which the university reaches out to all its stakeholders. Through the website, the University posts information on public announcements, achievements, upcoming events, news, job and programme advertisements among others.

Cloud service deployed: Platform as a service (PaaS) is a cloud computing model in which a third-party provider delivers hardware and software tools usually those needed for application development to users over the internet. A PaaS provider hosts the hardware and software on its own infrastructure. This deployment is ideal for informative websites which provides current status of the university to the public. A public cloud is offered by the 3rd party providers over the public internet.

2. **Student Management Information System (SMIS)**

It used to implement core functions of students' educational processes that include:

   i. Admission
   ii. Course registration
   iii. Marks entry
   iv. Issuance of transcripts
   v. Graduation
   vi. Provisional online fees statement and
   vii. Provisional marks on the student portal.

Cloud service deployed: Data center infrastructure is the core physical or hardware-based resources and components which includes all IT infrastructure devices, equipment and technologies. It is modeled and identified in a design plan that includes a complete listing of necessary infrastructure components used to create a data center. An on-premise data center is the ideal implementation of the SMIS. This is due to the sensitivity of the data that is collected, stored

and processed. Virtualization of servers is the current trend in server manager which reduces the size of the data center.

3. Online Room Booking and Allocation System

The system has increased efficiency in online room allocation process. Previous cases of refunds to students due to paid but missed rooms have been eliminated. Reservation and payments is made through mobile payment platforms which necessitate the system to maintain a high level of data integrity.

Cloud service deployed: Data center infrastructure is the core physical or hardware-based resources and components which includes all IT infrastructure devices, equipment and technologies. It is modeled and identified in a design plan that includes a complete listing of necessary infrastructure components used to create a data center. An on-premise data center is the ideal implementation of the system to secure online payment process and assure data integrity on room allocation.

4. Online Leave Application System (OLAPIS)

This system automates the process of leave application. Using a workflow system of online leave application, the process has been streamlined, thus making approval process more manageable. Information is sent to users via email on their leave application status.

Cloud service deployed: Infrastructure as a Service (IaaS), are self-service models for accessing, monitoring, and managing remote datacenter infrastructures, such as compute (virtualized or bare metal), storage, networking, and networking services (e.g. firewalls). IAAS is suitable for OLAPIS where the university outsources its services but wants to maintain control of their own internal data. A hybrid model is used where the infrastructure is provided over a public cloud, but the internal data is provided over a private cloud which is hosted by the sourcing data center.

5. University Health Service Management Information

The system has automated the operations of the University Health Services including treatment and drug stock control. Future modifications to be made include creation of modules in counselling, theatre operations and full integration of audit and finance.

Cloud service deployed: Infrastructure as a Service (IaaS), are self-service models for accessing, monitoring, and managing remote datacenter infrastructures, such as compute (virtualized or bare metal), storage, networking, and networking services (e.g. firewalls). IAAS is suitable for UHS where the university outsources its services but wants to maintain control of their own internal data. A hybrid model is used where the infrastructure is provided over a public cloud, but the internal data is provided over a private cloud which is hosted by the sourcing data center.

6. E-Learning platform

It is a Web based e-learning platform for deployment of online course materials, teaching and collaboration among students and lecturers. Currently, lecturers can post learning materials which can be accessed online by students online. Approximately 334 courses are on the e-learning platforms. In future, E-learning intends to integrate with SMIS and HRMIS to facilitate students and staff access.

Cloud service deployed: Data center infrastructure is the core physical or hardware-based resources and components which includes all IT infrastructure devices, equipment and technologies. It is modeled and identified in a design plan that includes a complete listing of necessary infrastructure components used to create a data center. An on-premise data center is the ideal implementation of the system. Since learning and research are the core activities of the university, an on-premise data center will ensure a smooth accessibility of the system.

7. Joint Admission Board System (JAB)

This system computerizes the admission processes for all Kenya's public universities. Successful applicants can access KUCCPS results through the University of Nairobi Website.

Cloud service deployed: Infrastructure as a Service (IaaS), are self-service models for accessing, monitoring, and managing remote datacenter infrastructures, such as compute (virtualized or bare metal), storage, networking, and networking services (e.g. firewalls). IAAS is suitable for JAB where the university uses the infrastructure of the ministry of higher education to query data of their respective admitted students. A hybrid model is used where the infrastructure is provided over a public cloud, but the internal data is provided over a private cloud which is hosted by the sourcing data center.

8. Financial Management Information System (FIMS)

It computerizes the financial/accounting function of the University. It has several modules including General Ledger, Inventory Control, Accounts Receivable and payable. It has enabled efficient, accurate and timely financial reporting by the University.

Cloud service deployed: Data center infrastructure is the core physical or hardware-based resources and components which includes all IT infrastructure devices, equipment and technologies. It is modeled and identified in a design plan that includes a complete listing of necessary infrastructure components used to create a data center. An on-premise data center is the ideal implementation of FIMS. Monetary which is a critical factor in management of revenue the CIA triad of data should be enforced on the high level.

9. Student Clearance System (SCS)

The turn-around time and effort students take to clear from the University has been reduced, as the process of clearing students who have finalized or wish to suspend their studies has been computerized.

Cloud service deployed: A method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers. Since SCS is not a critical system, SAAS software as a service application that can perform clearance process is ideal and significantly cheap. A public cloud is used where it allows the accessibility of systems and its services to the clients. The security level of organization data depends on the service provider.

10. Q-Pulse

This system was implemented to automate the Quality Management Systems of the University of Nairobi. It includes the following modules: Document Control, Audit/CAPA, Assets, Customers and Suppliers, and Training.

Cloud service deployed: Infrastructure as a Service (IaaS), are self-service models for accessing, monitoring, and managing remote datacenter infrastructures, such as compute (virtualized or bare metal), storage, networking, and networking services (e.g. firewalls). IAAS is suitable for UHS where the university outsources its services but wants to maintain control of their own internal

data. A hybrid model is used where the infrastructure is provided over a public cloud, but the internal data is provided over a private cloud which is hosted by the sourcing data center.

11. Online Job Application System (OJAS)

This system aims at computerizing the process of job application and short-listing at the University. This is intended to streamline the processing of job applications and to reduce turnaround time for processing of job applications.

Cloud service deployed: A method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers. Since there exist a lot of online application within the country, SAAS is ideal, cheap and easily deployed for OJAS since the implementation procedure is well documented and the software well packaged

12. Performance Management Information System (PCMIS)

The system aims at computerizing the process of tracking and analyzing Performance Contracts.

Cloud service deployed: A method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers. Since there exist a lot of online application within the country, SAAS is ideal, cheap and easily deployed for PCMIS since the implementation procedure is well documented and the software well packaged. A public cloud is used where it allows the accessibility of systems and its services to the clients. The security level of organization data depends on the service provider.

13. University Performance Appraisal System (USPAS)

This project aims at computerizing the process of Staff Appraisal within the University and analysis of the data collected to reduce the turn-around time.

Cloud service deployed: A method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers. Since there exist a lot of online application within the country, SAAS is ideal, cheap and easily deployed for USPAS since the implementation procedure is well documented and the software well packaged. A public cloud is used where it allows the accessibility of systems and its services to the clients. The security level of organization data depends on the service provider.

From the outlined cases above on the services the systems offer to the university, various implementation scenarios and decisions are outlined below which include: Onshore Outsourcing, Offshore Outsourcing, Onshore insourcing, Offshore Insourcing

Outsourcing is where organizations, groups or people outside the company are employed to execute part of the business or a service. In order to streamline, optimize quality and / or reduce costs, the organization entrusts the management and operation of its services or processes to an external provider. One of the main advantages of Outsourcing is transferring the risk to a third party that can give guarantees of experience and professionalism in the area. In a sense, this provider becomes part of the company but is not formally incorporated. Outsourcing methodology is part of the management decision-making, it includes all administrative steps of the evaluation process, planning and implementation, help plan and set business expectations and indicates those areas where specialized expertise is needed for different activities of the organization.

Insourcing refers to a project or business initiative that will perform within the company rather than outside the company. The purpose is to maintain control of operations and processes of the company resulting in reduced training costs and time. It also avoids dealing with the cultural differences of employees and allows employees to feel more integrated, loyal, and effective.

Outsourcing and offshoring can be visualized as a decision which firms make regarding their strategy to cross the firm and the country boundaries. This can be represented in a 2x2 matrix.
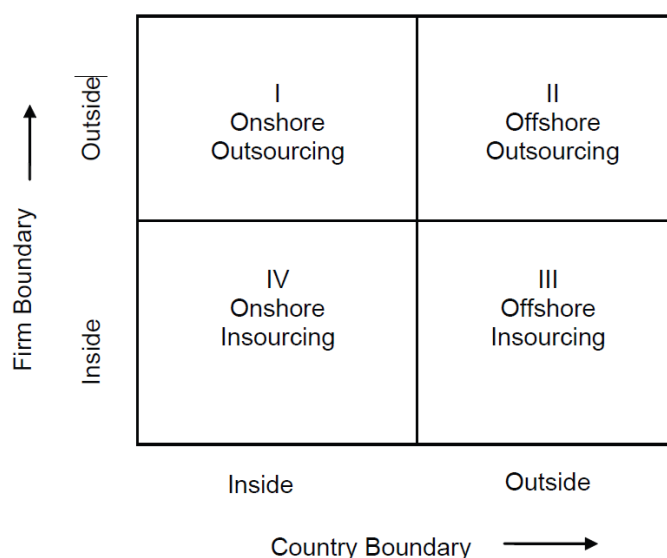
The figure above illustrates that offshoring (quadrants II and III) can be both outsourcing and insourcing, bringing out the fundamental difference between onshore outsourcing and offshoring. Offshoring systems might be outsourced, or alternatively they might be insourced to a subsidiary of the parent company. It makes it possible to extend enterprise boundaries to effectively access skills from distant places without physical movement of labor. This phenomenon of taking jobs to the country of the skilled worker allows firms to tap the services of that segment of labor, which may otherwise be unwilling to move away physically, from their home country. Hence, firms not only have an incentive in terms of cost reduction but can also exercise a wider choice in terms of labor skills.

Another critical difference between onshore IS outsourcing and IS offshoring lies in the modalities for such arrangements. offshoring, it is relatively easier to monitor onshore outsourcing. There are two key reasons for this: the small physical distance, and the fact that both vendor and client are usually in the same time zones. In general, any function that does not require physical monitoring and can be easily digitized for transmission through electronic means is an offshore candidate. Thus, offshoring includes not only the firm's IS functions and processes, but also IS-supported business processes.

When considering outsourcing, (Banerjee and Williams, 2014) recommends evaluating the technical infrastructure and the quality of human resources from the provider, and cultural consistency between the organization and the client. It is also essential to determine whether the service to outsource need very frequent communication, in this case, would be more convenient that there was no excessive distance between customer and supplier, which made it impossible to communicate in real time, due to different time zones. In this case, onshore model provides a clear advantage. (Jain and Khurana, 2015) states that Onshore is a great model because it gives you the ability to work closely with a geographically close team who work in your time zone and who can communicate smoothly and easily with you. The downside is that the cost model that they work within is like the one that your business operates within and therefore you can't take advantage of the potentially lower cost structures of other places.

A decision matrix on UON Information System Support services is represented in four quadrants as shown below.

	Onshore Outsourcing	Offshore Outsourcing
Outside	1. **Joint Admission Board System (JAB)** 2. **Online Job Application System (OJAS)** 3. **Online Leave Application System (OLAPIS)**	1. **Q-Pulse** 2. **University Health Service Management Information** 3. **University Website**
	Onshore Insourcing	**Offshore Insourcing**
Inside	1. **Student Management Information System (SMIS)** 2. **Financial Management Information System (FIMS)** 3. **Online Room Booking and Allocation System** 4. **E-Learning platform**	1. **Performance Management Information System (PCMIS)** 2. **University Performance Appraisal System (USPAS)** 3. **Student Clearance System (SCS)**

Firm Boundary

Inside   Outside

Country Boundary ⟶

Onshore outsourcing (also called domestic **outsourcing**) is the obtaining of services from an expert outside a company but within the same country. This scenario is recommended when skill and talent is not at the core of the major university operations, but the skill is available within the country.

Benefits

i. Ease of Communication.

ii. A Greater Level of Control, Responsiveness, and Reliability.

iii. Fewer Cultural Differences.

iv. Locally Appropriate Skill Sets. ...

Services which are ideal for this scenario in UON include: -

➤ Joint Admission Board System (JAB)
➤ Online Job Application System (OJAS)
➤ Online Leave Application System (OLAPIS)

Offshore outsourcing is a strategic practice in which a business hires a third-party supplier to perform work in a nation other than the one in which the hiring business primarily conducts its operations. This scenario is recommended when skill and talent is not at the core of the major university operations, but the skill is available outside the country.

Benefits

i. Wages and benefits are lower in developing countries which enhances cost savings

ii. Access to better and continually enhanced technology

iii. Better security Ability to benchmark to industry and global standards

Services which are ideal for this scenario in UON include: -

➤ Q-Pulse
➤ University Health Service Management Information
➤ University Website

Offshore insourcing (also referred to as captive supplier) refers to contracting with a wholly-owned subsidiary located in a foreign country to provide business functions which the organization might otherwise have performed in-house. This scenario is recommended when the university intends to incorporate the culture of developing critical systems by involving a different nation.

Benefits

i. Useful for resources required for long periods of time

ii. Global enterprises can get significant cost benefits from centralizing processes in a geographic location

iii. Process control remains in-house

iv. Process knowledge remains with the organization

v. Faster turnaround of processes

Services which are ideal for this scenario in UON include: -

➢ Performance Management Information System (PCMIS)

➢ University Performance Appraisal System (USPAS)

➢ Student Clearance System (SCS)

Onshore Insourcing

Assigning a project to a person or department within the company who resides within the country instead of hiring an outside person or company to do the work. It is a business arrangement which is often designed to control critical production processes and service quality. This scenario is recommended when the university intends to develop critical systems within the organization when they have a pool of skills and talents.

Benefits

i. Insourcing is one of the best solutions for businesses which are concerned with culture, security, legislative compliance or client needs.

ii. Useful for companies that prefer keeping their intellectual property and confidential information

Services which are ideal for this scenario in UON include: -

➢ Student Management Information System (SMIS)

➢ Financial Management Information System (FIMS)

➢ Online Room Booking and Allocation System

➢ E-Learning platform

Recommendation

From the matrix above, onshore insourcing is the most preferable model for sourcing in the university of Nairobi. Most of the critical systems should be on-premise and have a private cloud which is hosted in their data center

Willcocks et al. (2002) provided an evaluation criterion on processes which constitute good candidates for outsourcing. The authors suggest that business activities should be assessed in terms of their contribution to business operations which can be compared with the concept of value-creation as well as in terms of their contribution to competitive positioning (which matches the concept of value-capture of Aron and Singh).

	Commodity	Differentiator
Critical	"Qualifiers" best source	"Order winners" in-house/buy-in
Useful	"Necessary evils" outsource	"Distractions" migrate or eliminate

Contribution to business operations (vertical axis: Critical / Useful)

Contribution to competitive positioning (horizontal axis: Commodity / Differentiator)

Source: Willcocks et al., (2002)

As is illustrated in the table above

"Order winners" are those activities that contribute greatly to the company's business operations as well as to its competitive positioning. These activities constitute the basis of the firm's differentiation relative to its competitors and should be kept in-house.

"Qualifiers" are those activities that are critical for business operations and they do not contribute to the company's competitive positioning in a major way. These activities should best be sourced, which could include the involvement of a third party if it meets the right cost and quality criteria.

"Necessary Evils" are those activities that do not contribute significantly to the company's business or to its competitive positioning.

"Distractions" are failing attempts to differentiate a company from its competitors. The process should be eliminated from the business processes since they add no value.

Using Wilcock's criteria, the following decision was arrived regarding the systems that support services for the University Of Nairobi.

	Qualifiers (best source)	Order winners (in house)
Critical Contribution To business Operation	1. **Joint Admission Board System (JAB)** 2. **UHS Claims System** 3. **Online Job Application System (OJAS)**	1. **Student Management Information System (SMIS)Network Support Service** 2. **Financial Management Information System (FIMS)** 3. **Online Room Booking and Allocation System**
	Necessary evils (Outsource)	Distractions (Migrate)
Useful	4. **Q-Pulse** 5. **University Health Service Management Information** 6. **E-Learning platform**	1. **Performance Management Information System (PCMIS)** 2. **University Performance Appraisal System (USPAS)** 3. **Student Clearance System (SCS)**
	Commodity	Differentiator

Contribution to competitive positioning

Conclusion

The important things the university of Nairobi should understand is their services and the core business processes. From the decision matrix model, the output of different kinds of systems is directly correlated to its sourcing therefore the decision-making process is easy. Using the willcocks evaluation criteria, the role of the system to the university is the major determinant factor. A clear grouping of system in their respective quadrant should be efficient in order to determine the amount of revenue required to purchase, maintain or resources required for on premise systems. The decisions above will guide the management when providing justification on the resources required for various Information system.

References

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