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Analysis of the Need for Information Technology Infrastructure Supporting Main Application Implementation PT. XYZ

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Abstract- *Analysis of IT infrastructure requirements in supporting operations at PT. XYZ which is engaged in social insurance is very much needed as a form of proactive process needed to reduce the risks associated with the reliability of existing IT infrastructure. IT infrastructure needed by companies is hardware devices that are formed into one system. The revamping process is not only done on IT infrastructure, but also on the main applications used for operational processes. In reforming IT infrastructure, needs analysis is needed, while the stages of this analysis are; 1) internal study of needs, 2) analysis of infrastructure alternatives and identification of initial needs, and 3) adjustment of specifications and capacity estimates. In order for this analysis to be measurable and objective, a methodology that can be accounted for is needed, that is, using a SWOT analysis to determine the existing problems and what is really needed to get a solution to the problem. The results of this analysis are, providing technology recommendations in the form of forward architectural design and the need for IT infrastructure specifications at PT. XYZ. The results of the analysis of the ratio of the required database and storage server capacity are 2.3529 with an annual average growth of 13% obtained from the calculation of capacity estimates. There are also non-viable IT infrastructure devices (end of life / end of suppot) of 42 units from 80 units of equipment or 52.5%, from the analysis of PT. XYZ. Based on this analysis, the IT infrastructure of PT. XYZ is currently unable to support the creation of reliable infrastructure, so it is necessary to reform infrastructure that is very critical.*

Keywords- *IT Infrastructure, Main Applications and SWOT analysis.*

I. INTRODUCTION

Analysis of IT infrastructure requirements in supporting operations at PT. XYZ is needed as a form of proactive process needed to reduce the risks associated with the reliability of existing IT infrastructure. Reliability of IT Infrastructure is a very important requirement to achieve company goals and objectives. Based on the 2017-2021 Strategic Plan document owned by PT. XYZ has several assumptions that have been set, namely, up to 2021 the target participants are 80% of the total participants receiving wages in Indonesia. To support this target, an analysis of existing IT infrastructure is carried out, namely whether the current IT infrastructure that is used can still fulfil perfect services without the risk of achieving company / organizational goals and objectives. The analysis of IT infrastructure requirements is limited to devices, database server capacity, storage and service availability with the concept of High Availability

II. RESEARCH METHODS

A. The analysis process is divided into several stages, namely

Fig. 1. Flow of analysis steps

1. Internal studies, to identify analysis needs, a number of supporting data from inside and outside are needed, namely in the form of sofycopy and hardcopy data, and interviews conducted with unstructured interview techniques or free interviews.
2. Analysis of alternative infrastructure and identification of initial needs, this stage performs data analysis techniques obtained for affirmation of the purpose of the analysis and analyzes all existing data then poured in the form of descriptions.
3. Adjustment of specifications and estimated capacity, in this stage is the final specification adjustment is done by considering the analysis of the last requirement.

B. Analysis SWOT

SWOT analysis is a strategic planning method used to evaluate Strengths, Weaknesses, Opportunities), and Threats in a project or a business speculation. The four factors that form the SWOT acronym (strengths, weaknesses, opportunities, and threats). SWOT will be better discussed using tables made in large paper, so that relationships can be analyzed properly from every aspect.

III. RESULT AND ANALYSIS

From the results of data collection at PT. XYZ by the researcher obtained information needed data both softcopy and hardcopy. The data in question, are as follows:

1. Physical topology of database server and storage devices.
2. The architecture of the device currently in use
3. Configuration Management Database (CMDB)
4. Strategic Plan Documents 2017 – 2021
5. List of IT Infrastructure Devices used.

After analyzing according to the research method described above, the results are as follows:

A. Database Server and Storage Capacity

Calculation of the existing capacity of all database servers and calculated processor capacity (VCPU), is obtained as follows:

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TABLE 1. Recap server capacity existing database

No	Name Database	Storage (TB)	Memory (GB)	VCPU
1	Database Care	13,0	512	176
2	Database Core	20,4	672	120
3	Database Echa	3,5	576	128
4	Database OLAP	16,6	800	72
5	Database Invest	0,7	128	32
6	Database LDAP	1,3	64	16
7	Database Repository	2,1	128	16
8	Database MySQL (E-proc)	1,2	188	16
Total capacity for DB Server		58,8	3.068	576

The assumption of the growth in the number of participants based on data obtained from February to December 2017 is as follows:

TABLE 2. Participant VS Capacity Data existing storage

Month	Participants	Used Database Capacity (GB)
February	22,578,157	32,111
March	22,587,046	32,687
April	22,874,509	32,876
May	22,896,170	33,157
June	23,056,355	34,052
July	23,758,859	34,151
August	23,922,756	34,694
September	24,450,843	35,096
October	24,401,995	35,549
November	25,206,134	36,475
December	25,902,028	37,104

Using the table above, it can be calculated that the increase in infrastructure capacity for the needs of 2018 until 2021, where the target of the participants reaches 30 million and 48 million, is quite significant and alarming given the current condition of the infrastructure. The following is the calculation of the estimated infrastructure capacity to anticipate growth that has been assumed for anticipation plans for 2018 and 2021. Determination of linear formulas for future capacity estimates, based on data on the number of participants during 2017.

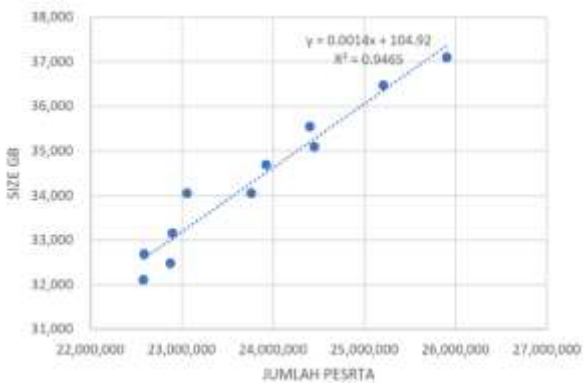

Fig. 2. Capacity of used database (GB) based on the number of participants in 2017.

The analysis results are based on linear formulas obtained to calculate future capacity according to the number of participants' targets. The ratio between the database capacity and storage capacity used is 2.3529, where the actual storage capacity that will be used is 2,3529 times the capacity of the database.

TABLE 3. Estimated storage capacity Database

Year	Target Participants	Size Database (GB)	Estimated Used Storage	Ratio
2018	29.652.831	41.619	97.925	2,3529
2019	34.354.268	42.598	100.229	
2020	40.602.735	56.949	133.995	
2021	48.565.867	68.097	160.226	

From the estimation table above, we can make an average growth per year to anticipate future IT infrastructure needs, can be calculated with the beginning as follows:

GROWTH RATE = ((Estimasi Size/Present Size)1/N Year – 1) *100%

From the formula above, the expected average growth is: 13 percent per year. The results of this capacity estimation calculation are the basis for conducting the best technology analysis that will be recommended for server and other device updates. The following is the estimated increase in the capacity of Storage, Memory and Vpu for database servers until 2021 assuming a growth of 13 percent.

TABLE 4. Estimated capacity growth database storage and server until 2021.

Growth of IT Infrastructure	Year			
	2018	2019	2020	2021
Storage (TB)	58.875	66.529	75.177	84.951
Memory (TB)	3,068	3,467	3,918	4,427
Prosessor (vcpu)	576	651	735	831

With the data above, technology will be sought that can be commensurate with the above requirements, where data storage needs must be able to accommodate 90TB. Memory capacity is thought to be 4.4 TB for the future. The number of virtual processor needs is also likely to reach 831.

The following recommendations are ideal specifications for database servers and storage.

TABLE 5. Database server specifications

Processor Software License	Existing Licenses (Cores)	Existing Capacity (cores) x86	25% License Efficiency (Core)	Desired Processor Ratio	Server Processor Specification
Server Database	52	288	39	7,4	Server processors with normal performance reach 7.4 times that of Intel x86 processors

TABLE 6. Spesifikasi storage

Size	90TB (3 unit)
Workload Management	Hardware Base All Flash Array (AFA)
IOPS Minimum	1.300.000
Lantency Minimum	180 MicroSecond
Tier	0 atau 1
Availlability	99,999%
Disaster Recovery	Active – Active
Recovery Point Objective (RPO)	0 minutes
Recovery Time Objective (RTO)	5 minutes
Data Protection	CDP (Freq=Hours)
	Snapshoot (freq=hours)
Data Archiving	Hot Archive & Retention

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B. Rejuvenation of IT infrastructure devices

Data obtained about the use of IT infrastructure is currently recorded at 80 units, of which there are devices that have exceeded the service life of more than 5 years and have no longer received technical support from vendors or principals. The recapitulation list for these devices is as follows:

TABLE 7. List of device usage IT infrastructure

No	Year of Procurement	Device Unit	%
1	2005	20	25%
2	2008	2	3%
3	2009	11	14%
4	2011	1	1%
5	2012	8	10%
6	2013	2	3%
7	2014	1	1%
8	2015	28	35%
9	2016	2	3%
10	2017	5	6%
Total		80	100%

From the table below, the devices that are not feasible are 42 units of equipment from 80 units of equipment or 52.5% of devices that are not feasible or have no longer received technical support from the vendor or principal (end of life), so that the device needs to be rejuvenated. that, by looking at the priority of the critical device.

C. Availability of services with the concept of High Availability

To reduce the risks associated with the reliability of IT infrastructure and support the implementation of new major applications in fulfilling perfect services without the risk of achieving company goals and objectives, it is necessary to add devices in a state of single point of failure so that the availability of the High Availability concept service is met . In this case what need to be done is the addition of devices, namely internet routers, core switches, load balancers and SAN Switches. This device is used to overcome the condition of single point of failure in the infrastructure of PT. XYZ. As for the recommended device specifications to function as redundancy, the maximum is the same as existing specs.

It is expected that the device architecture conditions suggested for PT. XYZ in order to be able to provide with the concept of Redundancy (High Availability), are as follows:

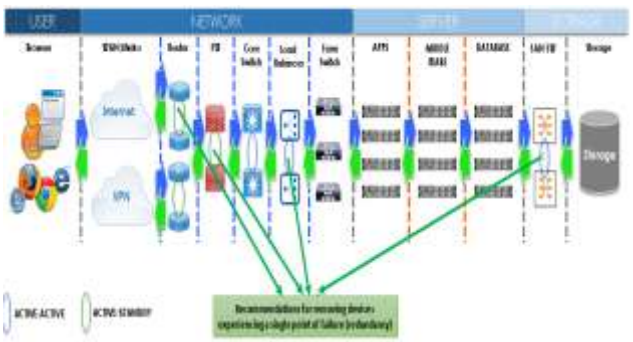

Fig. 2. Recommended device architecture

From Figure 2 above, it can be explained that the internet router devices, core switches, load balancers and SAN switches now have 2 units each, so the concept of redundancy (High Availability) for all IT infrastructure devices is met. This concept will create security and reducing risks related to the reliability of IT infrastructure to the flexibility of the ability of the organization / company to adapt to changes and the IT infrastructure in PT. XYZ.

IV. SWOT ANALYSIS

Before conducting a SWOT analysis, problems were identified by collecting issues and problems in the IT infrastructure environment, and obtained several main issues related to the problem, namely:

1. Many failures occur and slow response from the database to application requests.
2. Lack of IT infrastructure to develop new applications / application development.
3. The high cost of licenses based on the scheme of the number of cores imposed, because of the large number of active processor cores in the physical node server.
4. Infrastructure to support up to 50 million participants for 2021 with an estimated storage requirement of more than 90 TB.
5. IT infrastructure that is owned by a device still has a single point of failure.
6. From the list of problems above, SWOT analysis is conducted to evaluate the strengths, weaknesses, opportunities and threats of this IT infrastructure problem.

TABLE 8. List of IT infrastructure problem.

STRENGTHS	WEAKNESSES
○ Stakeholder support for IT ○ Adequate HR resources ○ The ability to choose the best technology financially ○ Company experience of more than 40 years ○ Is the biggest insurance body	○ Core processors are limited to new VM manufacturing ○ The server device is more than 5 years old ○ Maximum storage capacity ○ Servers are in various and complex machines ○ High server load with old technology ○ Infrastructure is limited to the development of new applications ○ There are still devices experiencing a single point of failure
OPPORTUNITIES	**THREATS**
○ Partnership with the government ○ Development of online / mobile applications with diverse target participants ○ Standardization of National / International Governance ○ Become the largest service center for participants ○ The number of participants is very high above 50 million participants	○ Long time in delivery service ○ A critical server is end of life / support ○ Licenses are less than needed with the core license scheme ○ High operational costs ○ Significant membership targets ○ Community demands for IT application services both online and mobile ○ The rapid development of online transactions demands high security

Of the 4 influencing factors mentioned above, we identified the components of Weakness and Threats to find a way to overcome them, this SWOT analysis is more focused on current infrastructure conditions.

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TABLE 9. List of problems focus Weakness and Threats

Current Weakness	Goal and Plan
○ Core processors are limited to new VM manufacturing ○ The server device is more than 5 years old ○ Maximum storage capacity ○ Servers are in various and complex machines ○ High server load with old technology ○ Infrastructure is limited to the development of new applications ○ There are still devices experiencing a single point of failure.	○ Plan for appropriate Core Processor capacity for the next few years ○ Renewal / rejuvenation with the latest technology ○ Looking for storage technology that fits your upcoming needs ○ Simplifying the server topology that suits your needs ○ Determine the latest server technology with high but effective capabilities ○ Setting up a separate development environment with production ○ Adding devices to overcome single point of failure
Current Threats	**Goal and Plan**
○ Long time in delivery service ○ A critical server is end of life / support ○ Licenses are less than needed with the core license scheme ○ High operational costs ○ Significant membership targets ○ Community demands for IT application services both online and mobile ○ The rapid development of online transactions demands high security	○ Looking for the latest technology so that delivery services are more timely ○ Looking for the best processor technology so that it can reduce the number of core licenses used with the same or more VM loads. ○ Looking for technology with TCO that is the most effective for the next 5 years ○ Calculate the storage capacity according to target needs ○ Building infrastructure that is high availability (HA)

A. Conclusion of SWOT results

The conclusion of the results of the SWOT analysis is the renewal of IT infrastructure that is in accordance with the capacity needs that have been estimated, are as follows:

1. Selection of IT infrastructure technology that can provide faster and more efficient service delivery (SLA), effective TCO, ready to support future technological trends, up to the next 5 years and High Availalbility.
2. Looking for the best processor technology so that it can reduce the number of core licenses used with the same or more virtual machine loads.
3. Separation of environment for application development is either physically or logically separate.

B. Main Needs and Additional Needs

The results of problem identification and needs analysis with SWOT can be concluded that there are two levels of need to overcome the problems of PT. XYZ, namely the main (Mandatory) needs and additional needs.

1. Main needs (mandatory), are:
   a. Processor technology that can replace the load of a high number of cores with a lower number of cores so that the license fee can be reduced.
   b. IT infrastructure with TCO costs that are cost effective for the next five years.
   c. High Availabilities infrastructure both at the processor level and to a broader level, namely the data center level.
   d. The infrastructure topology is more simple both logical and physical.
   e. Large capacity and high speed data storage server with the latest technology.
   f. Has its own environment for application development servers physically or logically.
2. Has its own environment for application development servers physically or logically.
   a. Infrastructure with a high level of security to the level of hardware or processor.
   b. Processors, software and hardware that are compatible with open source applications and technology.
   c. Infrastructure that supports the concept of agility, infrastructure as a service and platform as services.
   d. Infrastructure that has anticipated the need for mobile service applications both from the processor, hardware and software.
   e. Technology that is ready for online transaction applications with blockchain concepts and structure will be needed in the financial and insurance industries for the next 5-10 years.
   f. Infrastructure can meet the needs of Big Data, Hadoop and other applications in terms of hardware and software support
   g. The list of needs mentioned above will be a reference in determining the recommendation criteria for IT Infrastructure.

V. CONCLUSION OF RESULTS

Based on the analysis and discussion conducted by the researcher, conclusions can be drawn as follows:

1. IT infrastructure resources at PT. XYZ for the development of new applications / application development is still very minimal so it is necessary to prepare environment development separately from production. Existing environment development that uses a server with end of life conditions or discontinue and is still in the operational infrastructure environment which can cause the integrity of the application source code is not maintained and can result in the slow process of quality testing of an application.
2. There are 80 units of equipment including the life span of more than 5 years and have not received full support from the principle of the device manufacturer. The devices that did not receive the support were 42 units or 52.5% of the existing devices.
3. The current condition of storage devices is still inadequate, because some of the storage used has end of life or discontinue and existing storage capacity is not sufficient to accommodate the development of data targeted by the company so that it affects the performance of storage availability.
4. The existence of IT infrastructure is experiencing the condition of Single Point of Failure, so the availability of the service concept of redundancy (High Avaibility) cannot be fulfilled. This condition is at high risk which will result in less reliable PT. XYZ in achieving company goals and objectives.

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