



CAPACITY AVAILABILITY ANALYSIS TO HP SERVER PROLIANT DL380P GEN8 AT PT. AERO SYSTEM INDONESIA

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Abstract: There has Servers who used for Keeping some domestic flight data at Soekarno-Hatta airport and its often experience downtime or servers inconnected, because these server capacity exceeds those maximum server limit. This research aims to examine and analyze capacity from HP Proliant DL380P Gen8 server that used for domestic flight data at PT. Aero Systems Indonesia. The population here used 3 servers with research sample is 1 server, HP Proliant DL380P Gen8 server. Data analysis exert time series forecasting used comparison from Moving Average, Single Exponential Smoothing and Weighted Moving Average methods. These results which using Moving Average shows that the use of server capacity exceeds those server capacity limit with highest usage up to 3,568 GB from total available capacity of 2,930 GB, so it needs to change immediately by other server capacity which more balanced with usage at PT. Aero Systems Indonesia.

Keywords: Server capacity, moving average, single exponential smoothing, weighted moving average.

INTRODUCTION

Information technology currently growth rapidly, both in terms of hardware and software or applications, which one has managed large data, such as data centers. The increasingly of digital data processing makes everyone need a data storage media which flexible, large capacity and of course secured. But at this time data storage media used by most people still in form of physical storage media, where those device is vulnerable to damage, loss and very inflexible because we have to carry it wherever we go and it would be stumbled. Those increase in digital data processing also increases number of media for digital data storage. Media (server) for digital data storage has certain capacity limit, so it is necessary to make sure the exact number.

PT. Aero Sytems Indonesia, which current referred to PT. Asyst is a company engaged in information technology. PT Asyst which engaged in providing server, network, email, desktop and VPN services. From these five services, PT. Asyst received customer complaint reports every month, where highest number of customer complaint reports was related to server complaints with 1,262 complaint tickets and from number of customer

complaints PT. Asyst from these three types of servers which indicate that server problems that occur at PT. Asyst mostly found on HP ProLiant DL380p Gen8 server type.

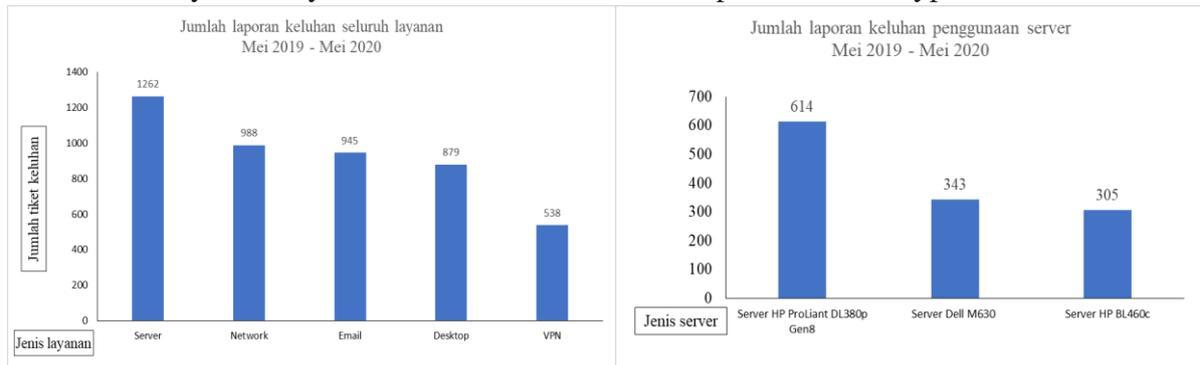


Figure 1. Number of Complaint Tickets and Number of Server Usage Report

Source: PT Asyst Internal Data (2020)

According to results from data reports of high server service complaint tickets with type of HP ProLiant DL380p Gen8 server, so researchers will carry out these research on HP ProLiant DL380p Gen8 server. Regarding these complaint, the use of server which exceeds those capacity will causing the server to die and cannot be used. From these data I get, it appears that within 1 year the use of HP ProLiant DL380p Gen8 server exceeds capacity used.

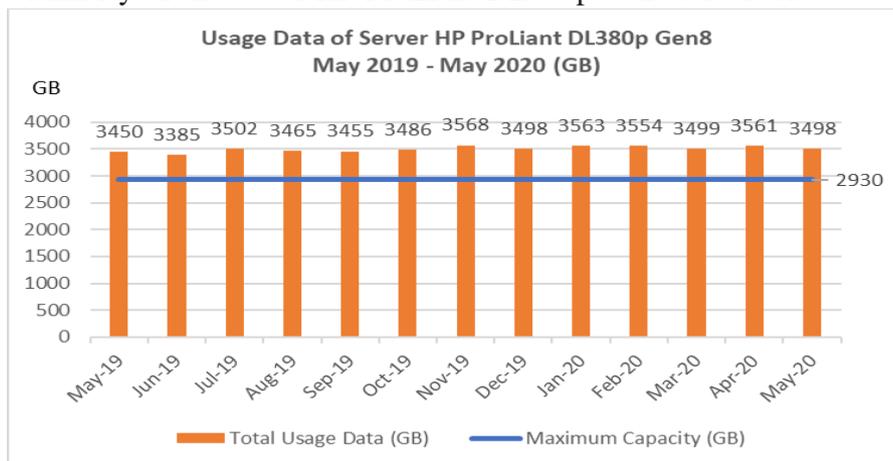


Figure 2. Data from the Use of HP ProLiant DL380p Gen8 Server

Source: PT Asyst Internal Data (2020)

In conducting research on HP ProLiant DL380p Gen8 server, researchers will use forecasting method using to comparison of moving average, single exponential smoothing and weighted moving average methods. Hutagalung (2013) states that forecasting methods could be support production needs according to number of consumer demand. Yuniastari (2014) found that forecasting demand for silver products using simple moving average and exponential smoothing methods that could increase the company's production capacity and meet these total demand for silver products. Furthermore, Rachman (2018) found that machines with excess capacity were able to meet all requests through application of simple moving average and exponential smoothing methods. Based on these background, phenomena, previous research, these authors are interested to performed further research which titles" Capacity Availability Analysis to HP ProLiant DL380p Gen8 Server at PT. Aero Systems Indonesia.

THEORETICAL REVIEW

Inventory Management

Inventory management is an effort to monitor and find out optimal level of material composition in supporting smoothness and effectiveness and efficiency of company activities. Nusraningrum & Truong (2019) found that material management planning used inventory methods which could overcome existing capacity, so all demands could be fulfill.

Capacity

Capacity is optimum level of production capability for facility usually expressed as amount of output in given time period. Capacity planning which related to ability from company to earned products in fulfillment of demands that should be met by company (Harnita, 2013).

Forecasting

According to Heizer and Barry (2015) which states that forecasting is an art and science in predicted future events, with data from sales forecasting that could be used as a basis of production planning.

Web Server

These server could be function as a file server, web server, print server and mail server. File server plays a role in handling files that could be accessed by client server, print server functions as printer controller that could be used by clients, web server functions could handle web pages that can be accessed by browser, while mail server functions could be handle to electronic mail.

RESEARCH METHODS

These research is qualitative research with descriptive approach. This research was focused on server storage capacity variables, which server's ability to store data which, if excessive, it could affect these server's performance. Research population in this research is data with number of passengers on domestic flights that using Garuda Indonesia over past 12 months. Number of Garuda Indonesia passengers on domestic flights over 12 months was 18,912,877 passengers. Besides these data population which used server storage capacity at PT. Asyst for Garuda Indonesia airline domestic flight data. Capacity availability data on servers owned by PT. Asyst is 2,930 GB and currently the use of server capacity data has exceeded these available data capacity, namely highest use of 3,568 GB. Sampling was chosen carefully so it is relevant to these research structure, where those server sampling chosen by researcher is server sample according to characteristics by analyzing these availability of storage capacity on HP ProLiant DL380p Gen8 server in 2019-2020.

To gathered data was carried out by secondary data, which is: 1) gathered specific data about server used. 2) Collect server capacity demand data over past 12 months. 3) Accumulated on process data used server capacity. Data analysis with forecasting time series in this research used as comparison from Moving Average, Single Exponential Smoothing and Weighted Moving Average methods.

RESULTS AND DISCUSSION

Forecasting Error Analysis Results

In this forecasting error test which carried out to find out those selected forecasting method. This error test was performed from three forecasting methods, such as : moving average, single exponential smoothing and weighted moving average. These three forecasting methods compared to smallest error value on mean absolute percent of error (MAPE) and mean absolute of deviation (MAD). Based on these calculations result which have been done, it shows that calculation by moving average method on MAPE gets 0.079 results and on MAD gets 35,885 results. Then the single exponential smoothing method on MAPE gets 0.363 results and MAD gets 165.302 results. Then the weighted moving average method on MAPE gets 0.449 results and on MAD gets 204,385 results. Based on these results from MAPE and MAD these three methods, therefore forecasting method used moving average because it could be seen from these 2 standard error values that moving average method has smallest error value. So this method will be used as a references as demand forecasting during period June 2020 - April 2021.

Table 1. Comparison of Error Values

Method	MAPE	MAD
Moving Average	0.079	35.885
Single Exponential Smoothing	0.363	165.302
Weighted Moving Average	0.449	204.385

Validation Test

Moving range used to compare observed values or actual data with those predicted. On moving range calculation, it takes data from previous month to get these current month, so these moving range calculation will start from month 3. These are Following results from moving range calculation, moving average range, upper line, lower line, center line, region A , region B and region C in July 2019.

- 1) $MR = |(d'_t - d_t) - (d'_{t-1} - d_{t-1})| = 63 \text{ GB}$
- 2) $\overline{MR} = \frac{\sum_{t=1}^N MR}{N-1} = \frac{674.50}{12} = 56.29 \text{ GB}$
- 3) $Upper \ Line = 2.66 (\overline{MR}) = +2.66 (56.29) = 149.73 \text{ GB}$
- 4) $Lower \ Line = -2.66 (\overline{MR}) = -2.66 (56.29) = -149.73 \text{ GB}$
- 5) $CL = Center \ Line = 0$
- 6) $Region \ A = \pm 1.27 (\overline{MR}) = \pm 1.27 (56.29) = 71.49 \text{ GB}$
- 7) $Region \ B = \pm 0.89 (\overline{MR}) = \pm 0.89 (56.29) = 50.10 \text{ GB}$
- 8) $Region \ C = Center \ Line = 0$

These complete moving range from calculation results that presented in Table 2 below.

Table 2. Moving Range Test

No	Bulan	t	Jumlah Pemakalan Data Server (GB) $Y(t)=d$	MA (n=2) $Y(t)' = d'$	Moving Range	Upper Line	Lower Line	Region A	Region A	Region B	Region B	Region C
1	May-19	1	3450									
2	Jun-19	2	3385									
3	Jul-19	3	3502	3417.50								
4	Aug-19	4	3465	3443.50	63	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
5	Sep-19	5	3455	3483.50	50	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
6	Oct-19	6	3486	3460.00	55	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
7	Nov-19	7	3568	3470.50	72	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
8	Dec-19	8	3498	3527.00	127	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
9	Jan-20	9	3563	3533.00	59	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
10	Feb-20	10	3554	3530.50	7	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
11	Mar-20	11	3499	3558.50	83	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
12	Apr-20	12	3561	3526.50	94	149.73	-149.73	71.49	-71.49	50.10	-50.10	0
13	May-20	13	3498	3530.00	67	149.73	-149.73	71.49	-71.49	50.10	-50.10	0

After getting overall moving range calculation results, as for next step is drawn a graph based on that outcome result. According to moving range graph, these out of control condition could be seen as follows:

- 1) There has eight consecutive dots on either side (above or below these center line or Region C line).
- 2) From these three consecutive points, there are two or more points which spread on area A or region A.
- 3) From these five consecutive points, there are four or more points which spread on area B or region B.

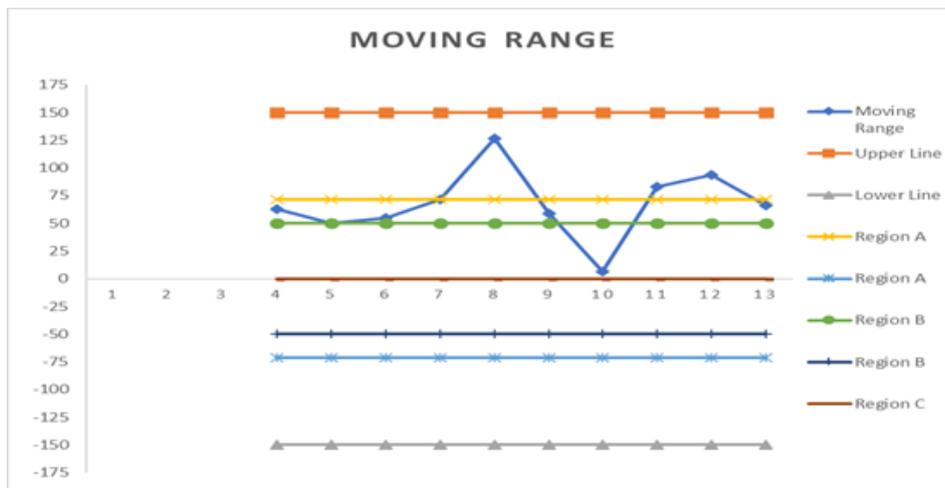


Figure 3. Moving Range Graph

Based on Figure 3 above, it would appears that all error data between these control limits so this forecasting method could be used for further calculations.

Forecasting

After getting those results from moving range chart, then proceed with forecasting during period June 2020 - April 2021 which could be seen from Table 3 below.

Table 3. Forecasting Results during period June 2020 - April 2021

No	Bulan	Jumlah Peramalan Pemakaian Data Server (GB)
1	Jun-20	3417.50
2	Jul-20	3443.50
3	Aug-20	3483.50
4	Sep-20	3460.00
5	Oct-20	3470.50
6	Nov-20	3527.00
7	Dec-20	3533.00
8	Jan-21	3530.50
9	Feb-21	3558.50
10	Mar-21	3526.50
11	Apr-21	3530.00

Based on table 3 related to forecasting results during period June 2020 - April 2021 these results obtained in June 2020 amounted to 3417.50 GB, July 2020 amounted to 3443.50 GB, August 2020 amounted to 3483.50 GB, September 2020 amounted to 3460 GB, October 2020 3470.50 GB, in November 2020 at 3527 GB, in December 2020 at 3533 GB, in January 2021 at 3530.5 330 GB, in February 2021 at 3558.50 GB, in March 2021 at 3526.50 GB, in April 2021 at 3530 GB.

Discussion

In this forecasting capacity availability used secondary data from May 2019 - May 2020. These results are related to previous research Which carried out by (Dhico, 2019; Hutagalung, 2013; Yuniastari, 2014) that Shown calculations using moving average, single exponential smoothing methods and weighted moving average. These calculation results From these three methods are performed using forecasting error test calculations by MAD (mean absolute deviation) and MAPE (mean absolute percentage error). Then calculation Results From smallest error test that will be used for forecasting.

According to estimation results, these moving average method has the smallest error test value compared to error value with single exponential smoothing and weighted moving average method. Then calculation result of moving average method that carried out validation tests using a moving range graph. This carried out to discover whether these data from moving average is valid or not. after obtaining these calculations result on moving average method is valid, then forecasting availability from HP ProLiant DL380p Gen8 server capacity during period June 2020-April 2021.

Based on the calculation result of forecasting server capacity usage for period June 2020-April 2021, it was found that highest increase in server capacity usage in November 2020 was 56.5 GB due to backflow on beginning of November 2020 after long holiday at the end of October 2020. While the decrease in capacity usage that the highest server in March 2021 was 32 GB, this was due to absence of long holiday, so the use of server capacity for domestic flight data would not used too much.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on these research results which discussed, there has several conclusions that could be drawn from this research, such as:

- 1) Those Availability from storage capacity on HP ProLiant DL380p Gen8 server during May 2019-May 2020 period exceeds the storage capacity of HP ProLiant DL380p Gen8 server. The ability of HP ProLiant DL380p Gen8 server to store data is 2930 GB, but average usage from HP ProLiant DL380p Gen8 server is 3498.77 GB.
- 2) These forecasting Estimates Which has been done shows that usage of HP ProLiant DL380p Gen8 server capacity for June 2020 - April 2021 with following details in June 2020 was 3417.50 GB, July 2020 was 3443.50 GB, August 2020 was 3483.50 GB, September 2020 was 3460 GB, October 2020 was 3460 GB, November 2020 was 3527GB, December 2020 was 3533 GB, January 2021 was 3530.5 330 GB, February 2021 was 3558.50 GB, March 2021 was 3526.50 GB April 2021 Was 3530 GB.

Suggestion

According to These research results, there has suggestions that could be useful for server and infrastructure operational management at PT. Aero Systems Indonesia as in belows:

- 1) Researchers has suggest That PT. Aero Systems Indonesia to increase server capacity availability from currently used by 2930 GB to 3600 GB range. This because in order to avoid these back down server problems which often occur Previously at PT. Aero Systems Indonesia.
- 2) Forecasting estimation should be done periodically with span of 2-3 years. This done to get forecasting estimation that could be used as operational use for server capacity availability at PT. Aero Systems Indonesia.

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