



# RESOURCE UTILIZATION ANALYZER IN SERVER FARMS

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# OVERVIEW

- Server Farms are the popular architectures of the coming infrastructures. As server farms becomes complex work load increases. Designing efficient policies to manage the resources in efficient manner is essential to maintain in QoS. There are numerous methods to analyze and manage the resources.



- Among them the method which stores the resource information in the separate server and handling resources of other servers in the farm by analysing it and signalling the manager periodically is implemented.



# IDEOLOGY

- Theoretically the status of all resources of each client is calculated and stored in the database using its IP as the primary key with the help of time stamp. It is then shown to the manager through proper channel and alarmed in the critical conditions. Practically the above project is simulated with a single client attached to the server (Assumed to be generalised for  $n$  clients).



- The resources namely CPU time, Disk, Network, Memory will be considered for the analysis. These resource information will be extracted from the client periodically and analysed and the status will be stored in server accordingly. The admin can know the status information of all the servers from a single terminal and hence the proper measures can be taken.



It mainly contains three actors.

- To fetch resource information from the client.
- To analyse and store the status.
- To provide information of status to the manager.



# TO FETCH RESOURCE INFORMATION FROM THE CLIENT

The resource information of the client can be fetched using the commands

- For CPU – mpstat
- For memory – vmstat - s
- For Disk – vmstat - D
- For network – netstat - s



# DATABASE TABLE INFORMATION

The information is stored in the database with the help of following tables in which timestamp and client id act as joint primary key.

- CPU
- Memory
- Disk
- Network
- Status (To maintain status information and warning messages)





# TABLE STRUCTURES

Table CPU

<b>%usr</b>	<b>%sys</b>	<b>%iowait</b>	<b>%idle</b>
Float	Float	Float	Float

%usr – CPU consumption by user.

%sys – CPU consumption by system.

%iowait – Percentage of processes waiting in io queue

%idle – percent of CPU in idle state



- Table Memory

Total Memory	Used Memory	Active Memory	Inactive Memory	Free Memory	Buffer Memory	Swap Memory
integer	integer	integer	integer	integer	integer	integer



- Table Disk

Disks	reads	partition	writes
integer	integer	integer	integer



## Table Network

totalReceived	forwarded	inDiscarded	inDelivered	outRequests
integer	integer	integer	integer	integer



## ANALYZING THE INFORMATION

- By extracting the information from the table, status of the client can be analyzed.

- CPU RESOURCE

$$\text{cpuutilization} = 1 - \text{cpuidle}$$

$$0 < \text{cpuutilization} < 20 = \text{status is "low"}$$

$$20 \leq \text{cpuutilization} < 80 = \text{status is "normal"}$$

$$80 \leq \text{cpuutilization} < 100 = \text{status is "high"}$$



## ○ Memory Resource

$\text{MemoryUtilization} = (\text{usedMemory} / \text{TotalMemory}) * 100$

$0 < \text{MemoryUtilization} < 20$  = status is “low”

$20 \leq \text{MemoryUtilization} < 80$  = status is “normal”

$80 \leq \text{MemoryUtilization} < 100$  = status is “high”

- If  $\text{activeMemory} / \text{usedMemory} > 0.80$  then,  
Active memory consumption is High
- If  $\text{usedMemory} / \text{TotalMemory} > 0.80$  then,  
Used memory consumption is High
- If  $\text{bufferMemory} / \text{usedMemory} > 0.80$  then,  
Buffered memory consumption is High



## ○ Disk Resource

- $\text{readFactor} = (\text{reads}/\text{disks}) * 100;$
- $\text{writeFactor} = (\text{writes}/\text{disks}) * 100;$
- $\text{readFactor} > 80$  or  $\text{writeFactor} > 80$ , status is “high”
- $20 \leq \text{readFactor}$  and  $\text{writeFactor} < 80$ , status is “normal”
- $0 \leq \text{readFactor}$  and  $\text{writeFactor} < 20$ , status is “low”



- Network Resource

- If  $\text{inputDiscarded} > \text{totalReceived}/2$  or  $\text{inputDelivered} < \text{forwarded}/2$ , then  $\text{status} = \text{"high"}$
- If  $\text{outputRequests} = 0$  then,  $\text{status} = \text{"low"}$
- Otherwise,  
 $\text{status} = \text{"normal"}$ ;





## TO MAINTAIN STATUS INFORMATION

- The status information is maintained in a table called status table
- The structure of table is as follows

CPU Status	Memory Status	Disk Status	Network Status	Warning Msg



# OUTPUT REPRESENTATION

- The programs to insert and extract resource information is run periodically one after other.
- If the stored information in status table shows any resource utilization as high, warning message sent to admin.



# TRIGGERS FOR AUTOMATION

- In client and server side resource data fetch and analyze programs are executed periodically in a synchronized manner.
- In client side crontab is used and in server side windows task scheduler is used to run programs in background.
- Warning messages and resource information are stored in file for the admin to refer.



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Students.



THANK YOU

