ISSN 2250-3153

# A Power Saving Scheme for FTP Applications in Peer To Peer Networks

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***Abstract***- A peer-to-peer (P2P) system is composed of peer computers which are interconnected in overlay networks. Here, each peer computer can play both the roles of server and client. The P2P system is fully distributed and there is no centralized coordinator. The power consumption of each peer will vary accordingly. Here, the calculation of CPU utilization time is addressed. In the existing system, a reducing power consumption of web application is considered. A client peer issues a request to a set of server peers. On the receipt of a request, a server peer performs the request and sends the web pages to the client. An algorithm is developed to calculate the power consumption of each server peer. The minimum power consumed by the server peer is selected by the client. The proposed work is to consider the file transfer protocol (FTP) application. In the existing system, minimum power consumption is identified in the web applications. Here, the power consumption is measured in multi-CPU servers by using an algorithm and by comparing with an existing algorithm.

***Index Terms***- CPU utilization, FTP-File Transfer Protocols, multi-CPU severs, overlay networks.

## I. Introduction

### A. Peer to peer networks

Peer to Peer (P2P) network, in which each computer is capable of functioning as a client and server users on the network can freely share resources on their computers or access shared resources on other computers. P2P networking is a distributed application architecture that partitions tasks or workloads between peers. P2P system is composed of peer computers which are interconnected in overlay networks. Peers are equally privileged, equipotent participants in the application. Peers make a portion of their resources, such as processing power, disk storage or network .

### B P2P Network Overview

A P2P computer network refers to any network that does not have fixed clients and servers, but a number of autonomous peer nodes that function as both clients and servers to the other nodes on the network. This is contrasted with the client-server model. In the P2P model, any node should be able to initiate or complete any supported transaction. Peer nodes may differ in local configuration, processing speed, and network bandwidth and storage quantity. There are two types of applications in P2P networks. They are transaction based and transmission based applications.

## II. RELATED WORK

### A. Web Servers

Elnozahy and Kistler [4] described three policies for reducing the energy consumption of server processors during web serving. The first policy uses a Dynamic Voltage Scaling (DVS), an existing energy saving mechanism, but employs it in a feedback-driven control framework. The second policy is based on request batching, a new mechanism, that groups requests under periods of low work-load intensity and executes them in batches. The third policy leverages both request batching and DVS mechanisms in a policy that saves energy across a wide range of workload intensities.

1.1 Feedback-Driven Control Framework

The feedback driven control framework adjusts policy parameters to increase energy savings when measured response times are lower than the response time goal, or to decrease energy savings when system is not meeting its response time goal. This is done on a best effort basis and the system may not be able to meet the goal under the conditions of extreme goal.

1.2 Dynamic Voltage Scaling Policy

Dynamic Voltage Scaling (DVS) policies have reduced the energy consumption by varying the processor operating point according to the rate at which work must be done. If the system is more responsive than required, the processor frequency is decreased by one step and the voltage is set accordingly.

1.3 Request Batching Policy

Request batching is a mechanism that had developed to conserve energy during periods of low work load intensities. In request batching, the servicing of incoming packets from the network is delayed while the main processor of the web server is kept in a low power state.

1.4 Combined Policy

The combined policy invoked the request batching and voltage scaling mechanisms based on the activity level of the server and reduced energy consumption across a broad range of workload intensities while maintaining system responsiveness at the required level.

### B. Heterogeneous Server Clusters

Taliver and Bruno [7] proposed a concept of efficient servers for heterogeneous clusters. The implementation is dealt to maximize throughput under constrained budget. The web

ISSN 2250-3153

servers need to configure intelligently on heterogeneous clusters for higher energy savings.

Heterogeneity raises the problem of how to distribute the client's request to the different cluster nodes for best performance. It must be considered in cluster reconfiguration for energy conservation, and the additional problem is how to configure the cluster for an appropriate tradeoff between energy conservation and performance.The total amount of power consumed by the cluster is monitored by a multimeter connected to the power strip. The multimeter collects instantaneous power measurements and sends these measurements to another computer, which stores them in a log for later use. The power consumed by different cluster configurations by aligning the log and system's statistics has been obtained.

### *C. Distributed Systems*

Aikebaier and yang [2] introduced a P2P overlay networks where computers are heterogeneous and cannot be turned off by other persons different from the owners. In the P2P overlay networks, each peer has to find the server peer whose energy consumption satisfied the Qos requirements.

Based on the experiments with servers and personal computers, power consumption models for performing a process in a computer are classified into two types.

- Simple model
- Multi-level model

In the simple model, each computer consumes maximally the electric power if at least one process is performed. Otherwise, the computer consumes minimum electric energy, i.e. in idle state. Most of the personal computer with one CPU independently of the number of cores, satisfies the simple model. In the multilevel model, the energy consumption of a computer depends on the number of process that is concurrently performed. A server with multiple CPUs follows the multi-level model.

Fig.1 shows the energy consumption of a computer m where the processes $p_1$, $p_2$ and $p_3$ are performed. First, the process $p_1$ is processed and then the processes $p_2$ and $p_3$ are processed on the computer. The normalized energy consumption rate $e_i$ (t) of the computer is increased if more number of processes is performed.

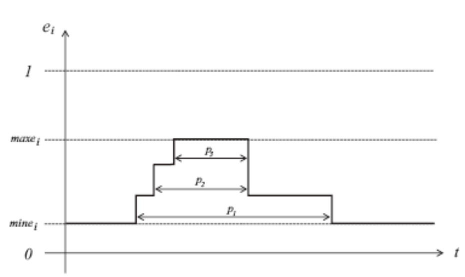


**Fig. 1: Energy Consumption**

The total energy consumption TEi ($t_1$, $t_2$) of a computer $c_i$ from time t1 to time $t_2$ is given as follows in Equation (1):

$$TE(t_1 t_2) = \int_{t1}^{t2} ei(t)dt \quad (1)$$

Where

$TE_i(t_1,t_2)$=Total energy consumption from time $t_1$ to time $t_2$

$e_i(t)$=energy consumption rate.

## III. PROPOSED WORK

The proposed system is designed to reduce the power consumption of File Transfer Applications in peer to peer networks. A client request is issued to the set of server peers, where the peer acts as both server and client. The client requests are received by the server and the response is created in each server peer. The power consumption is calculated using an algorithm and the peer is selected which consumes less energy when compared to other peers.

### *A. Client Query Process in P2P Networks*

In the existing system, web application in P2P network is used. Client peer requests the webpage to the server peers set. Each server peer will create its own response. Two algorithms had been proposed to select the server peer which consumes less energy and time. It is then compared with the basic Round Robin algorithm. Then, the server peer which consumes less electric power is selected as the server peer for the particular process.

A client peer, in Fig 2, first issues a request to perform process $p_s$ to a load balancer K. The load balancer k selects one server peer $c_i$ in the server set for the process and sends a request to the server peer. When the request is received, the process is performed on the server peer and a web page is sent to the client peer $l_k$.

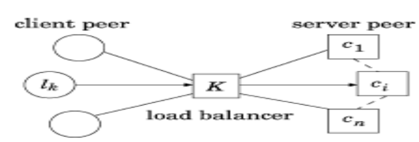


**Fig 2: System Model**

The load balancer k exchanges load information with the load balancers of other peers.

### *B. Power Consumption of Peer Servers*

When the request is received by the set of server peer, the responses of each server will be calculated separately using the algorithms. The algorithms used here are PCLB (Power Computation Laxity Based algorithm) and CLB (Computation Laxity Based algorithm). PCLB algorithm is used to calculate the power in each server peer. CLB algorithm is used to calculate the time of each server peer in the set.

### 3.1 PCLB Algorithm

Power of each server is calculated using PCLB algorithm, when the client peer sends the request. A server peer which consumes the minimum power is selected for a process. The server peer that is selected from the set of server peers will respond to the client for FTP applications. In Equation (2), power of each server peer can be calculated by,

$$le_i(t) = \max e_i . (ET_i(t) - t) \quad (2)$$

Where
$le_i$ (t) = laxity time of a server
$e_i$ = energy consumption rate
$ET_i$ (t) = Estimated Termination Time

### 3.2 CLB Algorithm

The Computation Laxity Based (CLB) algorithm shows how long it takes to perform the process on a server set. The server for a process is selected on the basis of time for FTP applications. In the Equation (3), the processing time taken by each server peer is calculated by,

$$Cl_{is}(t) = ET_{ps}(t) - t \quad (3)$$

Where
$Cl_{is}$ (t) = Computation laxity of time t
ET = Estimation time of a single process
ps = process

In the RR (Round Robin) algorithm, servers are ordered and a request is first issued to the fastest server. Until the server is overloaded, requests are issued to the first server. Thus, requests are issued to the servers in the set.PCLB and CLB algorithms are compared with the RR algorithm.

### *C. Peer Selection*

The algorithms are used to select a server in a set of servers for a process so that the deadline constraint is satisfied and the total power consumption is reduced on the basis of the laxity concept. The power of each server for FTP applications in the server set is calculated using the PCLB algorithm [6] .CLB algorithm shows how much time is taken to complete a process. So, the power and time can be calculated easily. Then it is compared with the basic (RR) algorithm.

## IV. CONCLUSION

The work investigates the power consumption for FTP applications in Peer to Peer (P2P) networks. In the existing system, the web applications in P2P networks are considered. The throughput of each peer is reduced and the latency is increased in heterogeneous server cluster of P2P networks. In proposed system, Power Consumption Laxity Based (PCLB) and Consumption Laxity Based (CLB) algorithm can be used to calculate the power and time of each peer in the system. The total power consumption of PCLB algorithm can be minimized compared to Round Robin (RR). The peer which consumes less power and time is selected for the process. To provide high performance in terms of high throughput and short delay on P2P networks, PCLB algorithm can be extended. Thus the performance is increased in FTP applications.

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