

Study on load balancing of intermittent
energy big data cloud platform

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ABSTRACT

- With the development of construction on smart grid and the reasonable utilization of intermittent energy source, data processing on traditional platform cannot already satisfy the intermittent energy sources.
- According to the superiority of cloud platform of processing data as well as the load balancing of the overall cluster on the cloud platform is integrated with the intermittent energy sources data and load balancing of multi-factor predictive cloud platform.
- Firstly, developing the overall process of the intermittent energy data processing on a new data processing platform, and then running the multi-factor predictive cloud platform load balancing on the processing platform. Finally, simulations and experiments prove that the data processing platform proposed provides better performance and will promote the construction of smart grids.

Existing System

- Big data energy is not only the through application of big data technology in the field of energy, but also the thorough integration of energy production, consumption and related technology revolution with the big data concepts, which will accelerate the development of energy industry and the innovation of business model. However, negative impact of intermittent energy big data on the entire system will be gradually expanded.
- Hence, it will be significant for the cloud computing technology of intermittent big data.

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Disadvantages

- Less feasibility
- Storage management is less
- High computational services

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Proposed System

- Firstly, developing the overall process of the intermittent energy data processing on a new data processing platform, and then running the multi-factor predictive cloud platform load balancing on the processing platform.
- Finally, simulations and experiments prove that the data processing platform proposed provides better performance and will promote the construction of smart grids.

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- This mainly focus on (1) a new model of cloud servers that is based on different operating regimes with various degrees of energy efficiency" (processing power versus energy consumption);
- (2) A novel algorithm that performs load balancing and application scaling to maximize the number of servers operating in the energy-optimal regime; and
- (3) Analysis and comparison of techniques for load balancing and application scaling using three differently-sized clusters and two different average load profiles.

Advantages:

- Good in Storage management
- Energy consumption is less
- It is possible to evaluate energy performance after completing work.
- Automatic scaling function for feasibility.

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Literature Review

1. Energy-aware autonomic resource allocation in multitier virtualized environments

Author - D. Ardagna, B. Panicucci

- This paper focuses on the resource allocation problem in multitier virtualized systems with the goal of maximizing the SLAs revenue while minimizing energy costs.
- The main novelty of our approach is to address-in a unifying framework-service centers resource management by exploiting as actuation mechanisms allocation of virtual machines (VMs) to servers, load balancing, capacity allocation, server power state tuning, and dynamic voltage/frequency scaling.
- To validate its effectiveness, the proposed model is compared to top-performing state-of-the-art techniques.

2. Energy-aware resource allocation heuristics for efficient management of data centers for Cloud computing

Author- A. Beloglazov, J. Abawajy

The proposed energy-aware allocation heuristics provision data center resources to client applications in a way that improves energy efficiency of the data center, while delivering the negotiated Quality of Service (QoS).

In particular, in this paper we conduct a survey of research in energy-efficient computing and propose: (a) architectural principles for energy-efficient management of Clouds;

(b) energy-efficient resource allocation policies and scheduling algorithms considering QoS expectations and power usage characteristics of the devices; and

(c) a number of open research challenges, addressing which can bring substantial benefits to both resource providers and consumers.

3. Energy Efficient Resource Management in Virtualized Cloud Data Centers

Author- A. Beloglazov, R. Buyya

- Rapid growth of the demand for computational power by scientific, business and web-applications has led to the creation of large-scale data centers consuming enormous amounts of electrical power.
- We propose an energy efficient resource management system for virtualized Cloud data centers that reduces operational costs and provides required Quality of Service (QoS).
- Energy savings are achieved by continuous consolidation of VMs according to current utilization of resources, virtual network topologies established between VMs and thermal state of computing nodes.

4. Power-saving in large-scale storage systems with data migration

Author-K. Hasebe, T. Niwa, A. Sugiki

- We present a power-saving method for large-scale distributed storage systems. The key idea is to use virtual nodes and migrate them dynamically so as to skew the workload towards a small number of disks while not overloading them.
- Our proposed method consists of two kinds of algorithms, one for gathering or spreading virtual nodes according to the daily variation of workloads so that the active disks are reduced to a minimum, the other for coping with the changes in the popularity of data over a longer period.
- For this dynamic migration, data stored in virtual nodes are managed by a distributed hash table. Furthermore, to improve the reliability as well as to reduce the migration cost, we also propose an extension of our method by introducing a replication mechanism.

Modules

- Load balancing,
- Idle servers
- Server consolidation.
- Energy proportional systems.

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LOAD BALANCING

- The concept of load balancing" dates back to the time when the first distributed computing systems were implemented.
- It means exactly what the name implies, to evenly distribute the workload to a set of servers to maximize the throughput, minimize the response time, and increase the system resilience to faults by avoiding overloading the systems.

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IDLE SERVERS

- Idle and under-utilized servers contribute significantly to wasted energy.
- A survey reports that idle servers contribute 11 million tons of unnecessary CO2 emissions each year and that the total yearly costs for idle servers is billion.
- An energy-proportional system consumes no energy when idle, very little energy under a light load, and gradually, more energy as the load increases.

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SERVER CONSOLIDATION

- The term server consolidation is used to describe: switching idle and lightly loaded systems to a sleep state.
- Workload migration to prevent overloading of systems any optimization of cloud performance and energy efficiency by redistributing the workload.
- For example, when deciding to migrate some of the VMs running on a server or to switch a server to a sleep state, we can adopt a conservative policy similar to the one advocated by autoscaling to save energy.

Hardware Requirements:-

- Processor - Pentium –III
- Speed - 1.1 Ghz
- RAM - 256 MB(min)
- Hard Disk - 20 GB
- Floppy Drive - 1.44 MB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse

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SYSTEM SPECIFICATION

Software Requirements :

- Operating System : Windows xp/7
- IDE tool : Netbeans 7.1
- Application Server : Tomcat5.0/6.X
- Front End : JAVA

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- Predictive policies, such as the ones discussed in will be used to allow a server to operate in a suboptimal regime when historical data regarding its workload indicates that it is likely to return to the optimal regime in the near future.

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ENERGY PROPORTIONAL SYSTEMS

- In an ideal world, the energy consumed by an idle system should be near zero and grow linearly with the system load.
- In real life, even systems whose energy requirements scale linearly, when idle, use more than half the energy they use at full load.
- Data collected over a long period of time shows that the typical operating regime for data center servers is far from an optimal energy consumption regime.

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Screen short

Home page:

ACH

study on load balancing.avi - VLC media player
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HOME Admin User

Study on Load Balancing of Intermittent Energy Big Data Cloud Platform

WELCOME

```
main(String[] args)  
JButton1: JButton  
JButton2: JButton  
JButton3: JButton  
JLabel1: JLabel  
JLabel2: JLabel  
JLabel3: JLabel
```

Building JavaLibrary1 (run)... JavaLibrary1 (run) 9 | 31 | INS 5:33 PM 8/18/2018

01:19 07:56

Type here to search 12:41 29-Aug-18

User page:

ACH

The screenshot shows a VLC media player window titled "study on load balancing.avi - VLC media player". The main content is a user login page with a green background. The page title is "Study on Load Balancing of Intermittent Energy Big Data Cloud Platform". There is a "BACK" button in the top left. On the left, there is an image of two 3D figures shaking hands. The main section is titled "CLIENT LOGIN" and contains two input fields: "USER NAME" with the text "User" and "PASSWORD" with masked characters. A green "submit" button is below the fields. To the right, there is a blue sidebar with the text "Intermittent Cloud Platform" and an image of three stylized people icons. The Windows taskbar at the bottom shows the time as 5:33 PM on 8/18/2018. A red arrow points to the search bar in the taskbar.

Client page:

CH

The screenshot shows a VLC media player window titled "study on load balancing.avi - VLC media player". The main content is a presentation slide with the following elements:

- Header:** "Load Balancing of Intermittent Energy - Client A"
- Image:** Two 3D figures, one white and one red, shaking hands. The white figure has a briefcase.
- Text:** "Submit Select the File File Path Client File"
- Image:** A group of three stylized human figures in green, blue, and orange.
- Image:** A small inset image showing a network diagram with a "Browse" button.
- Footer:** "Load Balancing of Intermittent Energy - Client A"

The VLC player interface includes a playback progress bar at the bottom, showing a time of 01:45. A tooltip is visible over the play button: "Play If the playlist is empty, open a medium". The system tray at the bottom right shows the date and time: 12:45, 29-Aug-18.

User1 page:

ACH

The screenshot shows a VLC media player window titled "study on load balancing.avi - VLC media player". The main content is a presentation slide with a green background and a purple header. The header text reads "Study on Load Balancing of Intermittent Energy Big Data Cloud Platform". Below the header, there is a "BACK" button and an image of two 3D figures shaking hands. To the right of the image is a "CLIENT LOGIN" section with the following fields:

- USER NAME: User1
- PASSWORD: [masked]
- submit button

The slide is partially obscured by another window on the right, which shows the text "Intermittent Cloud Platform" and an image of three stylized human figures. The bottom of the screenshot shows the Windows taskbar with the search bar, taskbar icons, and system tray.



clinetB:

ACH

The screenshot displays a VLC media player window titled "study on load balancing.avi - VLC media player". The main content is a presentation slide titled "Load Balancing of Intermittent Energy-Client B". The slide includes a 3D illustration of two figures shaking hands, a "Submit" button, a "Browse" button, and a form with labels "Select the File", "File Path", and "Client File". A Windows taskbar is visible at the bottom of the screen.



User2 page:

ACH

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Study on Load Balancing of Intermittent
Energy Big Data Cloud Platform

BACK


CLIENT LOGIN

USER NAME

PASSWORD

submit

Intermittent
Cloud Platform



02:22 07:56
100%

Type here to search

12:49
29-Aug-18

Client C:

ACH

The screenshot shows a VLC media player window titled "study on load balancing.avi - VLC media player". The main content is a presentation slide with the following elements:

- Header:** "Client Home"
- Image:** Two 3D figures, one white and one red, shaking hands. The white figure has a black briefcase, and the red figure has a black briefcase. The background is purple with a butterfly and a network diagram.
- Text:** "Submit Select the File : File Path : Client File"
- Form:** A white rectangular input field with a "Browse" button to its right.
- Image:** An icon representing three people (green, blue, and orange).
- Footer:** "Load Balancing of Intermittent Energy-Client C"

The VLC player interface includes a playback progress bar at the bottom, showing a time of 02:25 out of 07:56. The Windows taskbar is visible at the very bottom, with the search bar and various application icons.



Admin login:

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study on load balancing.avi - VLC media player
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Study on Load Balancing of Intermittent Energy Big Data Cloud Platform

back

ADMIN LOGIN

USERNAME

PASSWORD

SUBMIT

Server2.java - Properties

Name	Server2
Extension	java
All Files	(No Property Editor)
File Size	12450
Modification Time	(No Property Editor)

Server2.java

02:59 07:56

Type here to search

12:50 29-Aug-18

Server page:

ACH

The screenshot displays a Java Swing application window titled "Server" with a dark red background. The main content area features the text "Energy Aware Load Balancing" and "Load Balancing of Intermittent Energy" in red. Below the text is an image of three server racks. Underneath the server image are three white rectangular panels, each labeled "Server A", "Server B", and "Server C" in pink text. The application is running in a Windows environment, as evidenced by the taskbar at the bottom. The taskbar includes a search bar with the text "Type here to search" and a red arrow pointing to it. The system tray shows the time as 12:54 on 29-Aug-18. A red watermark "ACH" is visible in the top right corner of the image.


Files upload:

ACH

study on load balancing.avi - VLC media player
Media Playback Audio Video Subtitle Tools View Help

Server

Energy Aware Load Balancing Load Balancing of Intermittent Energy



Server A Server B Server C

Compromised machines are one of t

```
127.0.0.1,2222,402,Jul 3, 2015 7:38:2
127.0.0.1,2222,402,Jul 3, 2015 7:39:1
127.0.0.1,2222,402,Jul 3, 2015 7:39:2
127.0.0.1,4444,341,13 Jun, 2016 3:23
127.0.0.1,4444,3657,13 Jun, 2016 3:2
127.0.0.1,4444,399,13 Jun, 2016 3:23
127.0.0.1,2222,402,13 Jun, 2016 3:28
127.0.0.1,2222,402,13 Jun, 2016 3:29
```

06:36 07:56

Type here to search

12:56 29-Aug-18

Server2.java - Properties

Name	Server2
Extension	java
All Files	(No Property Editor)
File Size	12450
Modification Time	(No Property Editor)
Classpaths	

Server2.java

Graph:

ACH

study on load balancing.avi - VLC media player
Media Playback Audio Video Subtitle Tools View Help

Energy Aware Load Blancing-Client

Number of Visits per State

Queue State Evolution

Arrival Distribution

Service Length Distribution

Start Stop Reset

Queue State: 4 Last Arrivals: 0

Time: 9.19 Last Departures: 0

Graphical

Server C

HOME.java - Properties

Name	HOME
Extension	java
All Files	(No Property Editor)
File Size	12674
Modification Time	(No Property Editor)

HOME.java

07:54 07:56

Type here to search

12:58 29-Aug-18

Conclusion

- In this paper, we have mainly studied the data processing of intermittent energy and improved an intermittent energy big data cloud platform load balancing processing model. We migrated the intermittent energy big data to a new data processing problem, and then implemented the strategy of multi-factor predictive cloud platform load balancing. The simulation and experiment show that our new data processing platform provide a better performance of data processing.

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References

- [1] MapReduce[j], Jeffrey Dean, sanjay ghemawal Communications of the ACM.2008.
- [2] Above the Clouds: A Berkeley view of cloud computing Armburst M.2009.

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