Study on load balancing of intermittent energy big data cloud platform

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.

Cont..

Disadvantages

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

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.

Cont..

- 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.

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.

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.

IDLE SERVERS

- Idle and under-utilized servers contribute significantly to wasted energy.
- A survey reports that idle servers contribute 11 million tons of unnecessary CO_2 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.

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

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.

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.

Screen short

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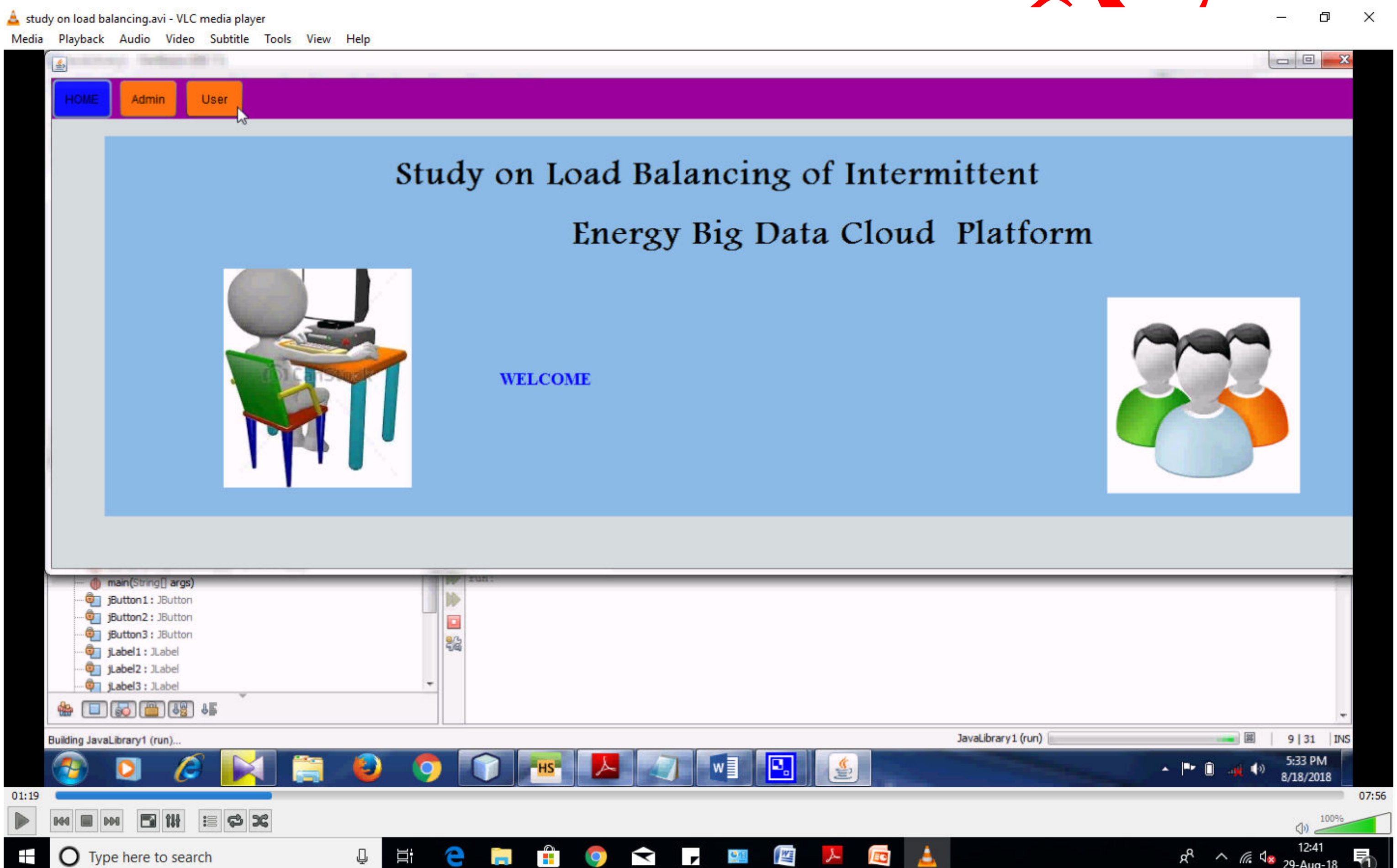

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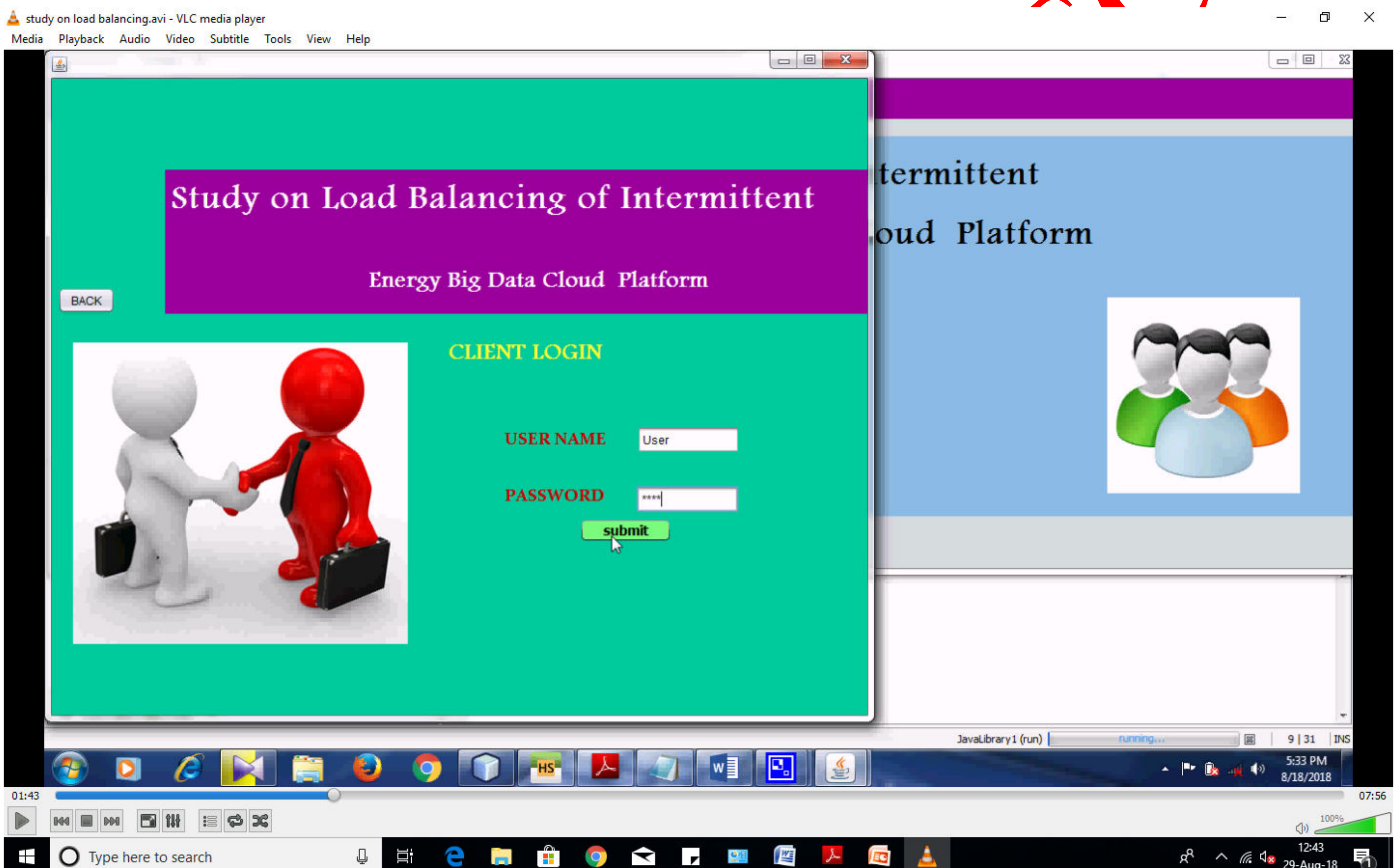

study on load balancing.avi - VLC media player
Media Playback Audio Video Subtitle Tools View Help
Study on Load Balancing of Intermittent
Energy Big Data Cloud Platform
BACK
CLIENT LOGIN
USER NAME
User
PASSWORD
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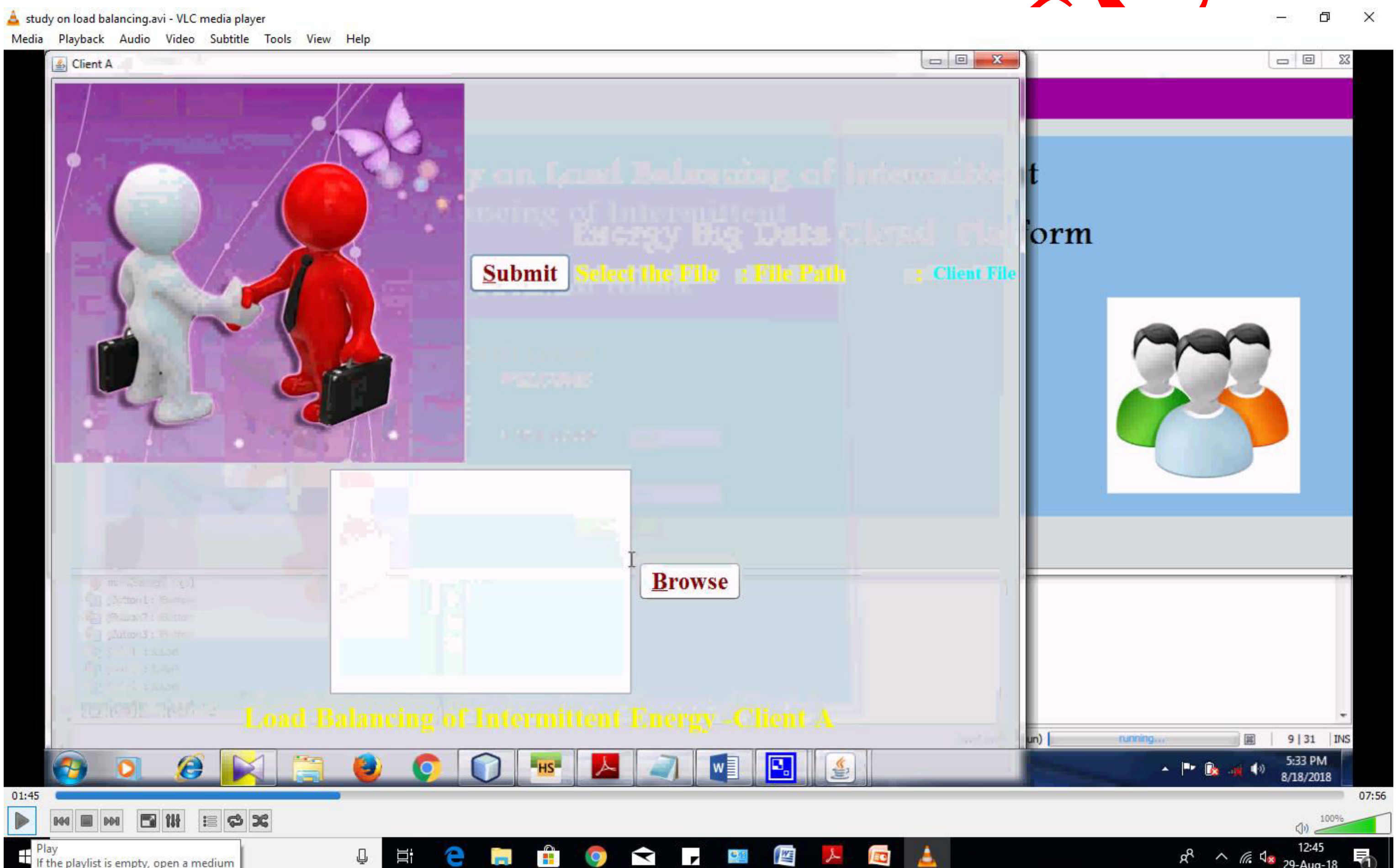
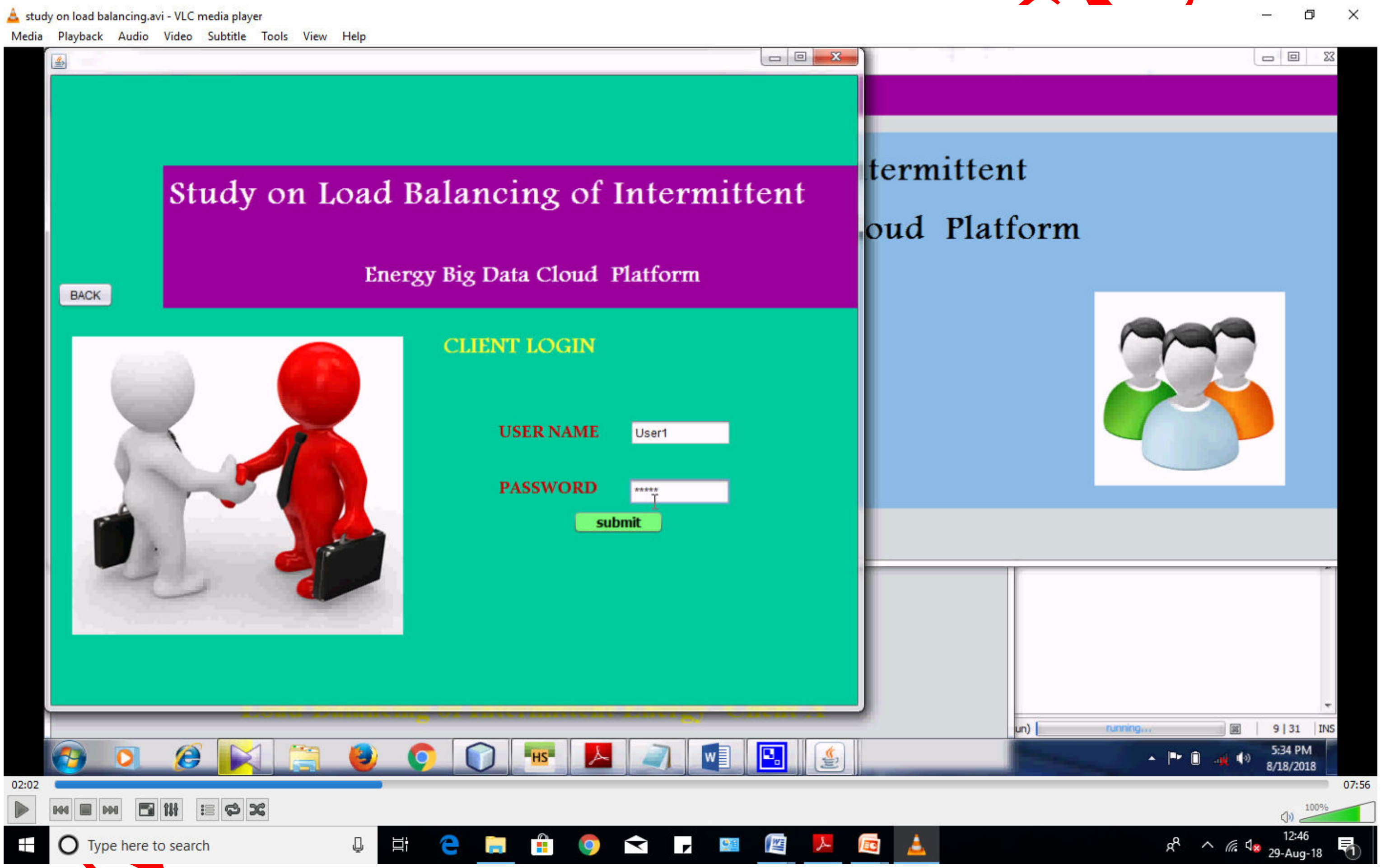
oud Platform
01:43
07:56
Type here to search

Client page:


study on load balancing.avi - VLC media player
Media Playback Audio Video Subtitle Tools View Help
Client A
Submit
Select the File
: File Path
: Client File
Browse
Load Balancing of Intermittent Energy -Client A
01:45
07:56

User1 page: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Subtitle
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Energy Big Data Cloud Platform
BACK
CLIENT LOGIN
USER NAME
User1
PASSWORD
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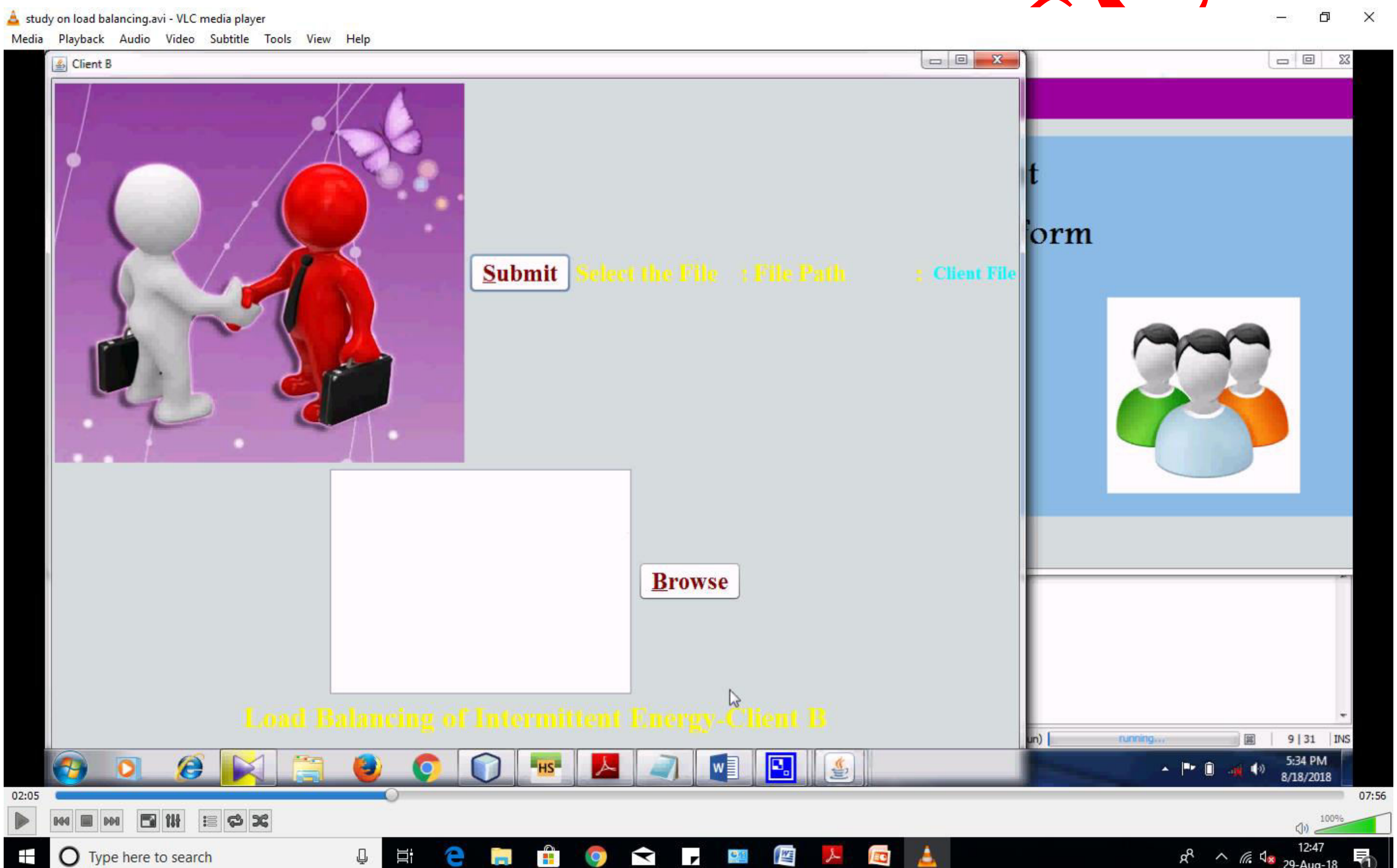
oud Platform
02:02
07:56
Type here to search

clinetB: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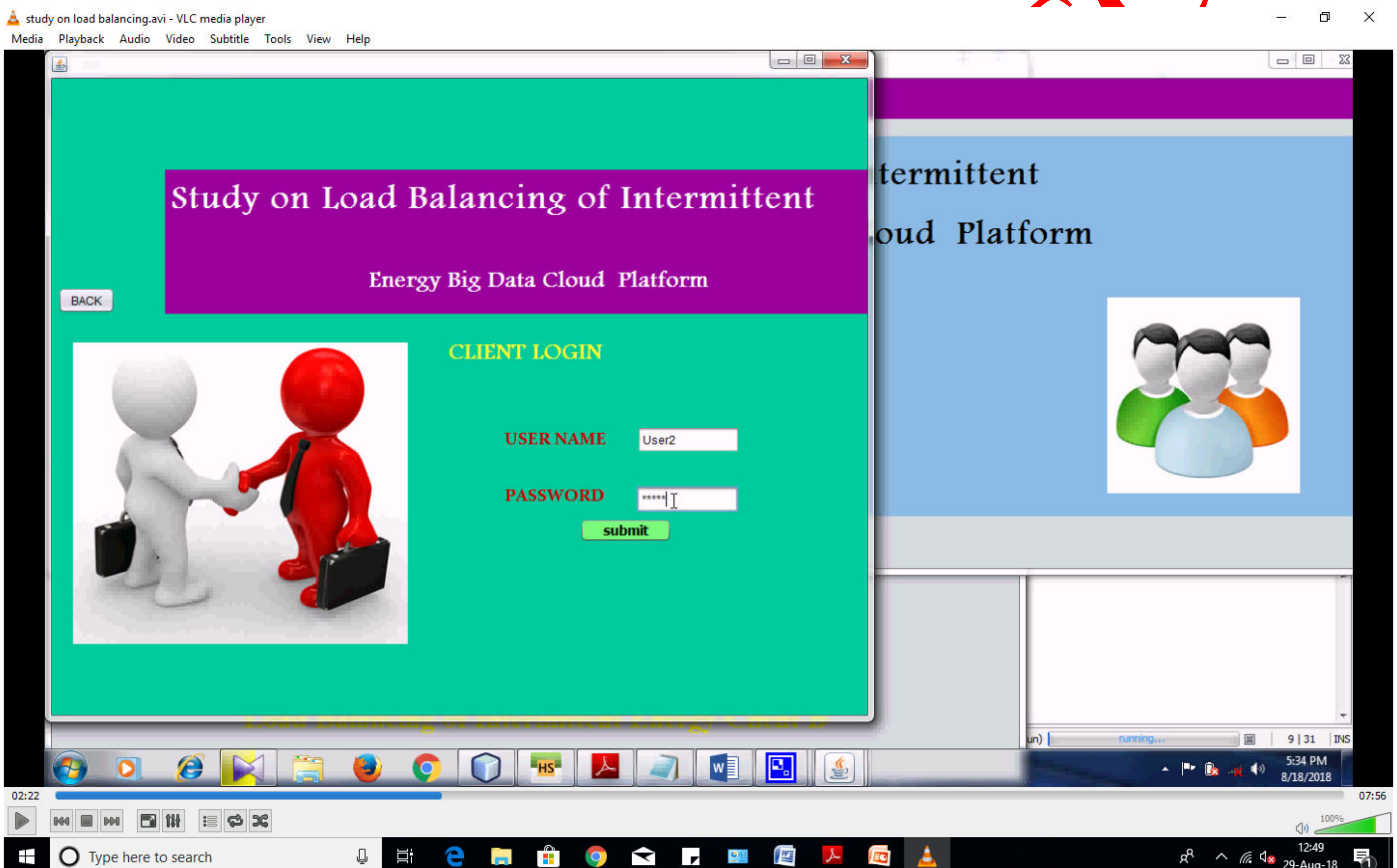
Media Playback Audio Video Subtitle Tools View Help
Client B
Submit
Select the File
: File Path
: Client File
Browse
Load Balancing of Intermittent Energy-Client B
02:05
07:56
Type here to search
12:47
29-Aug-18

User2 page:



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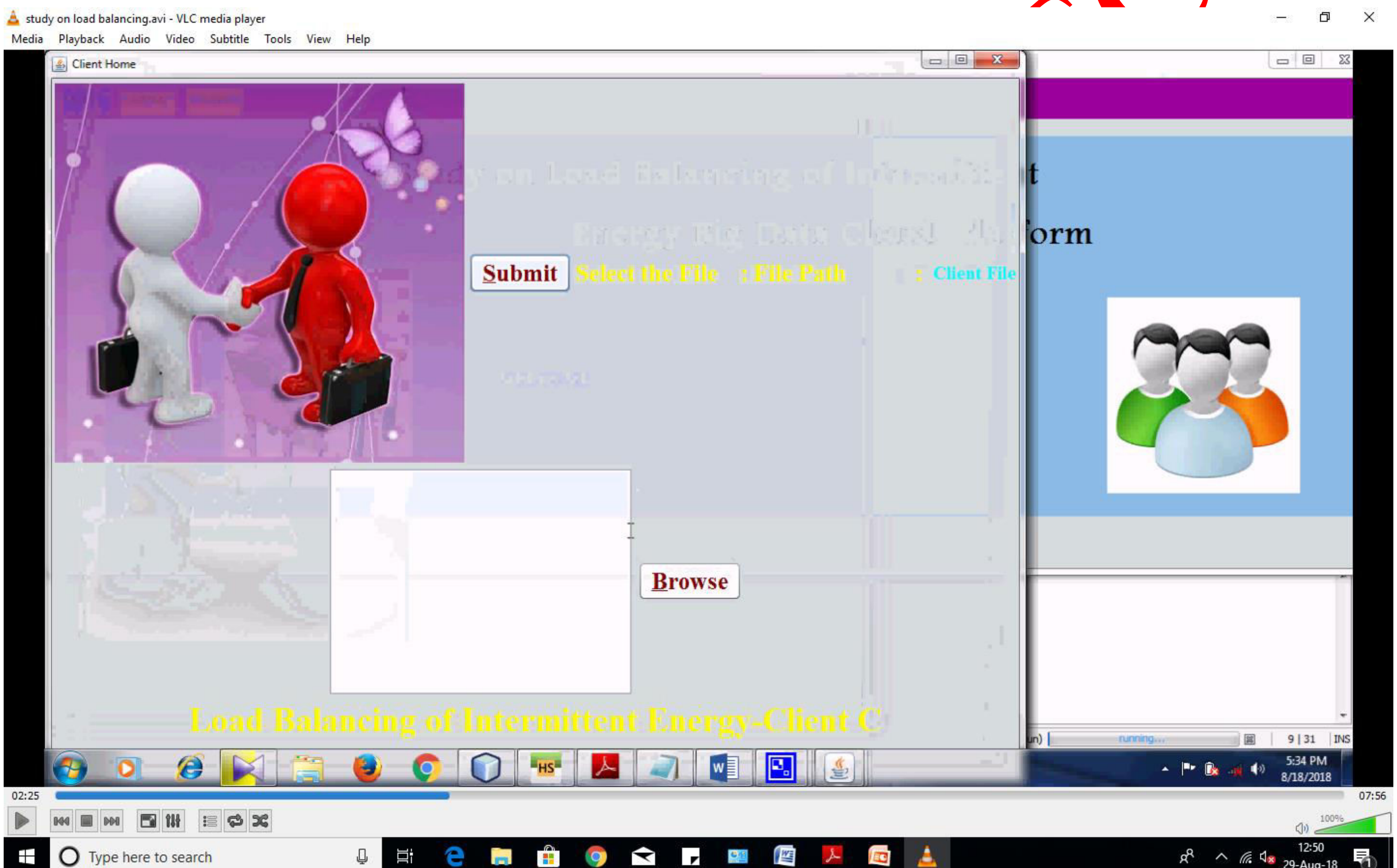
Study on Load Balancing of Intermittent
Energy Big Data Cloud Platform
BACK
CLIENT LOGIN
USER NAME
User2
PASSWORD
submit
02:22
07:56
Type here to search

Client C:



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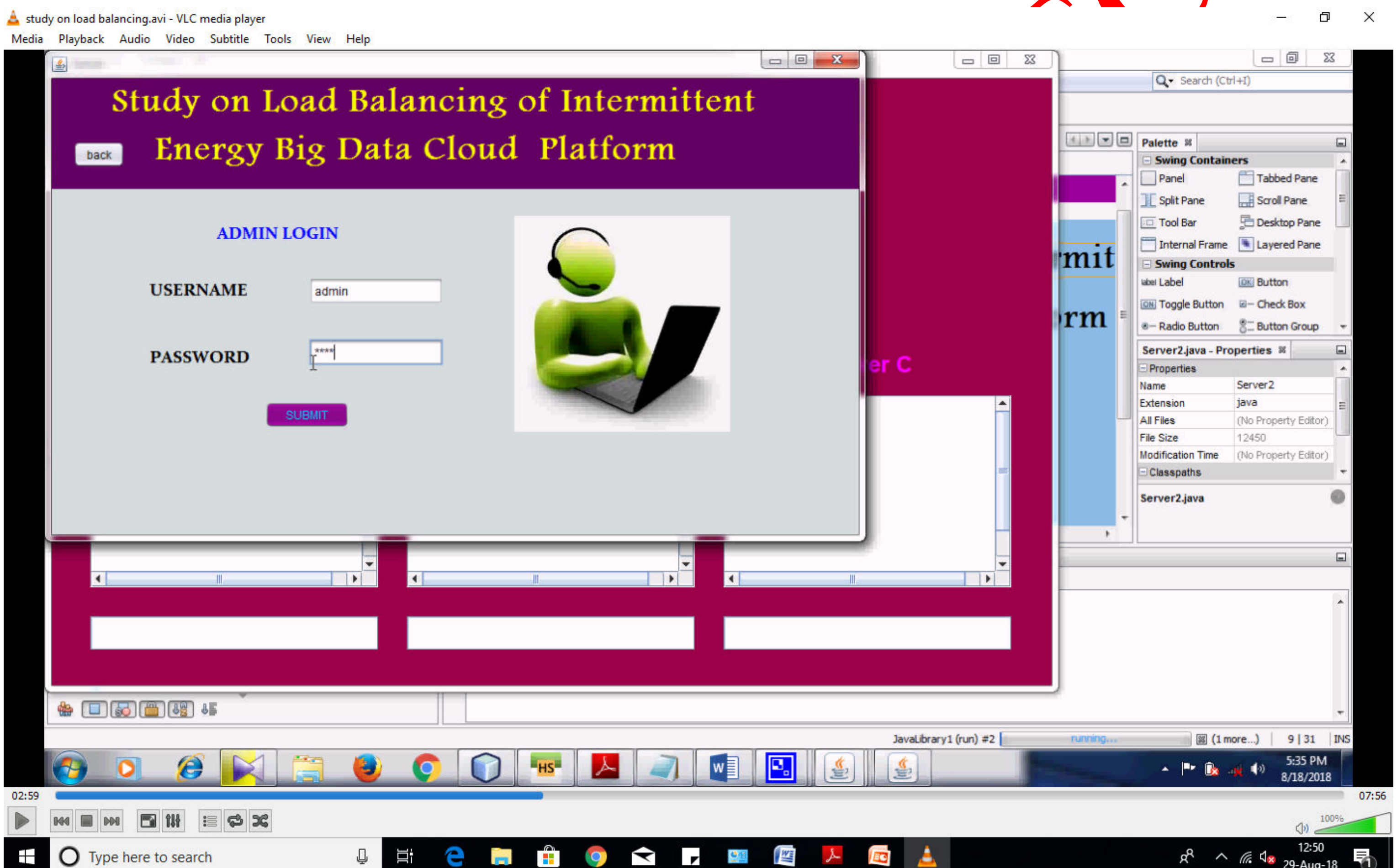
Media Playback Audio Video Subtitle Tools View Help
Client Home
Submit
Select the File
: File Path
: Client File
Browse
Load Balancing of Intermittent Energy-Client C
5:34 PM
8/18/2018
02:25
07:56
Type here to search
12:50
29-Aug-18

Admin login:



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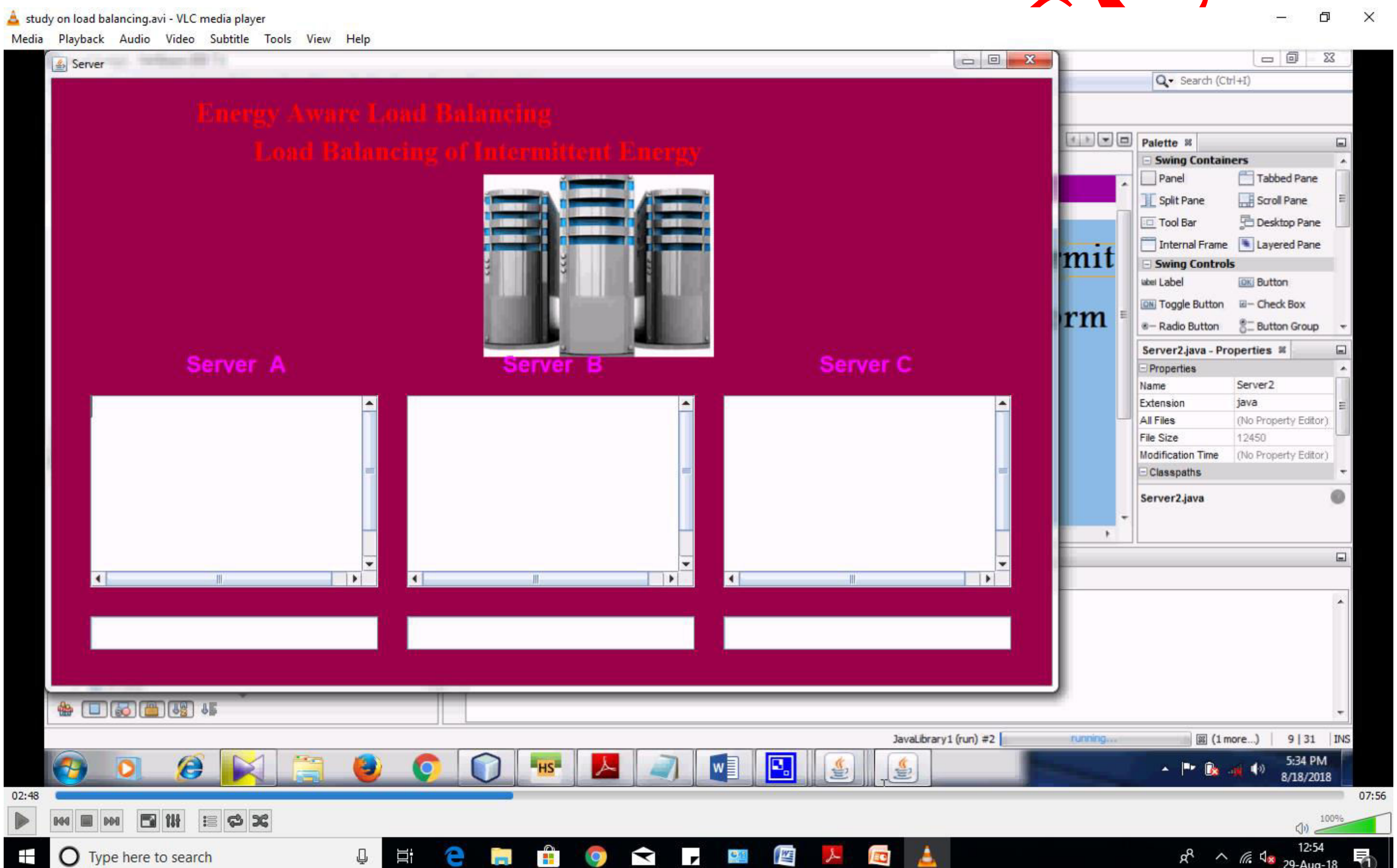
Media Playback Audio Video Subtitle Tools View Help
Study on Load Balancing of Intermittent
Energy Big Data Cloud Platform
back
ADMIN LOGIN
USERNAME
admin
PASSWORD
SUBMIT
Palette
Swing Containers
Swing Controls
Server2.java - Properties
Type here to search
02:59
07:56

Server page: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Media
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Subtitle
Tools
View
Help
Server
Energy Aware Load Balancing
Load Balancing of Intermittent Energy
Server A
Server B
Server C
Palette
Swing Containers
Panel
Tabbed Pane
Split Pane
Scroll Pane
Tool Bar
Desktop Pane
Internal Frame
Layered Pane
Swing Controls
Label
Button
Toggle Button
Check Box
Radio Button
Button Group
Server2.java - Properties
Properties
Name
Server2
Extension
java
All Files
(No Property Editor)
File Size
12450
Modification Time
(No Property Editor)
Classpaths
Server2.java
Search (Ctrl+I)
JavaLibrary1 (run) #2
5:34 PM
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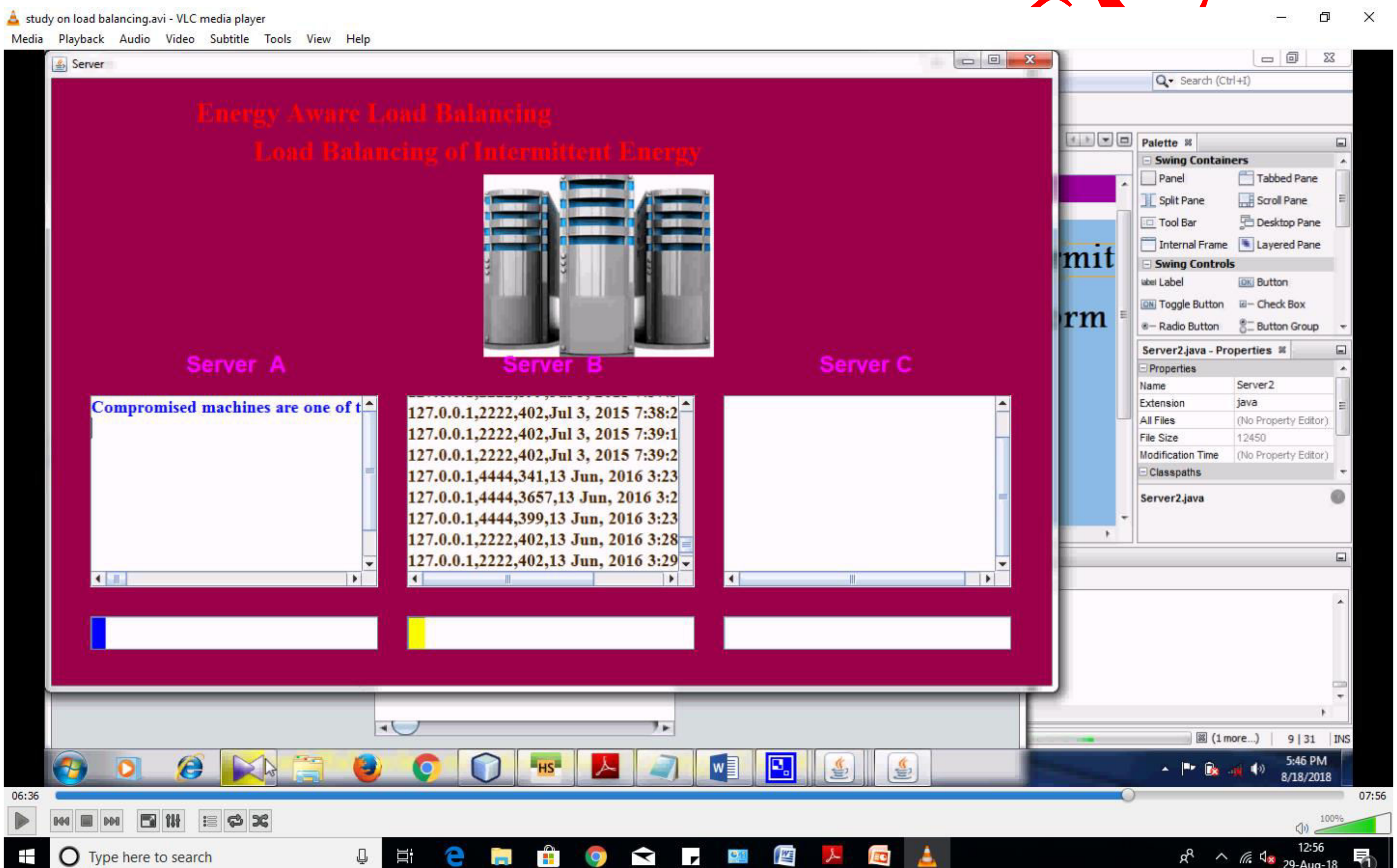
02:48
07:56
Type here to search
12:54
29-Aug-18

Files upload:



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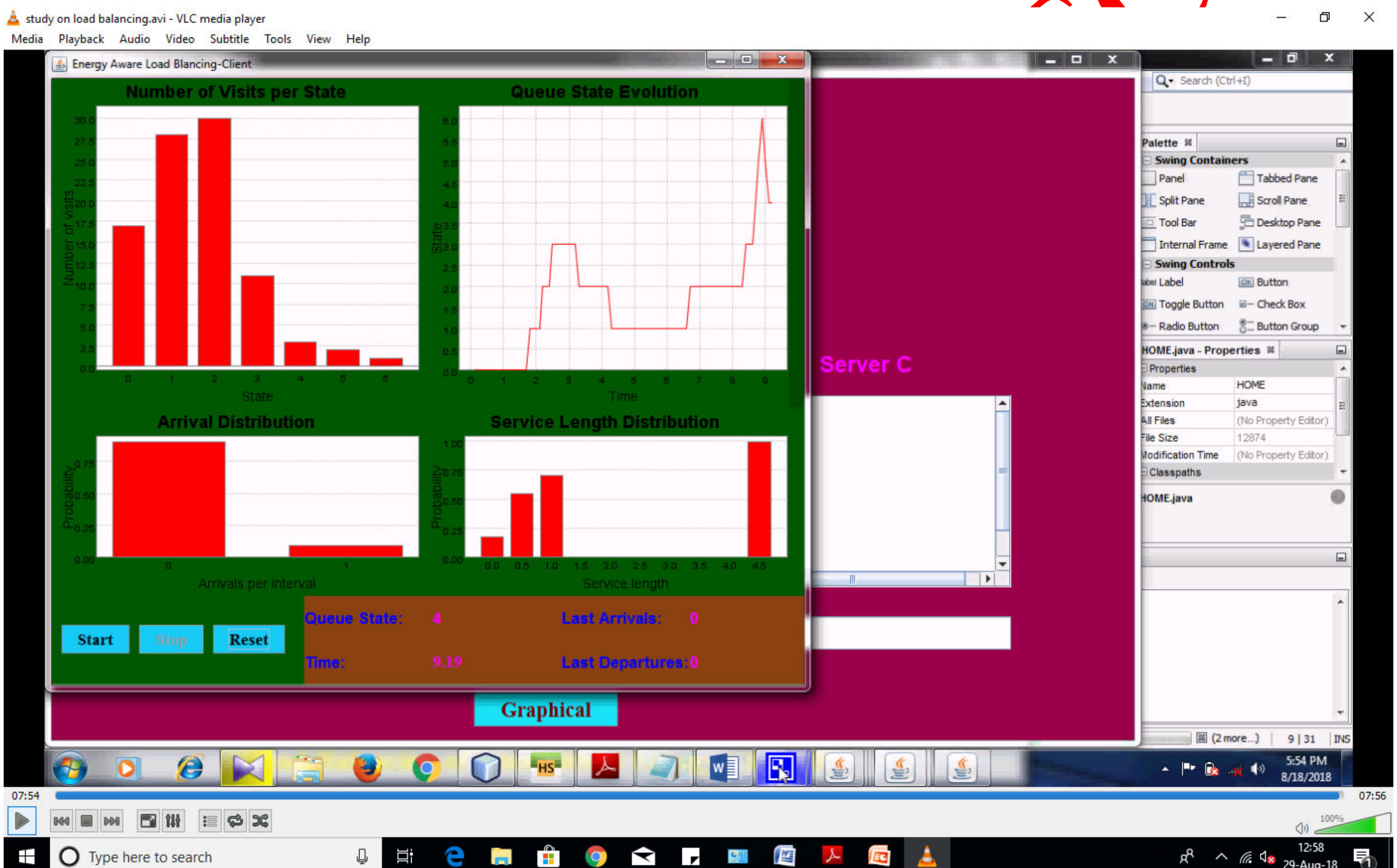
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Energy Aware Load Blancing-Client
Number of Visits per State
Queue State Evolution
Number of visits
State
Time
Arrival Distribution
Service Length Distribution
Probability
Arrivals per interval
Service length
Start
Stop
Reset
Queue State: 4
Last Arrivals: 0
Time: 9.19
Last Departures:0
Server C
Graphical
Palette
Swing Containers
Panel
Tabbed Pane
Split Pane
Scroll Pane
Tool Bar
Desktop Pane
Internal Frame
Layered Pane
Swing Controls
Label
Button
Toggle Button
Check Box
Radio Button
Button Group
HOME.java - Properties
Properties
HOME
java
(No Property Editor)
12874
Classpaths
HOME.java
Search (Ctrl+I)
5:54 PM
8/18/2018
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.

References

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