

# Cloud AppProfiler: Telco Cloud Applications Tracing and Monitoring

**CTPD Project**

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# Outline

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- **Issue**
- **Objectives**
- **Review of Litterature**
- **Proposed Solution**
- **Cloud Applications Tracing Challenges**
- **Results**
- **Future work**
- **Demo**

# Issue

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- Poor performance can be caused by the lack of proper resources:
  - limited bandwidth
  - limited disk space
  - limited memory
  - limited CPU
  - limited network connections
  - limited latency
  
- Performance issues in the system can end a service delivery.



# Issue

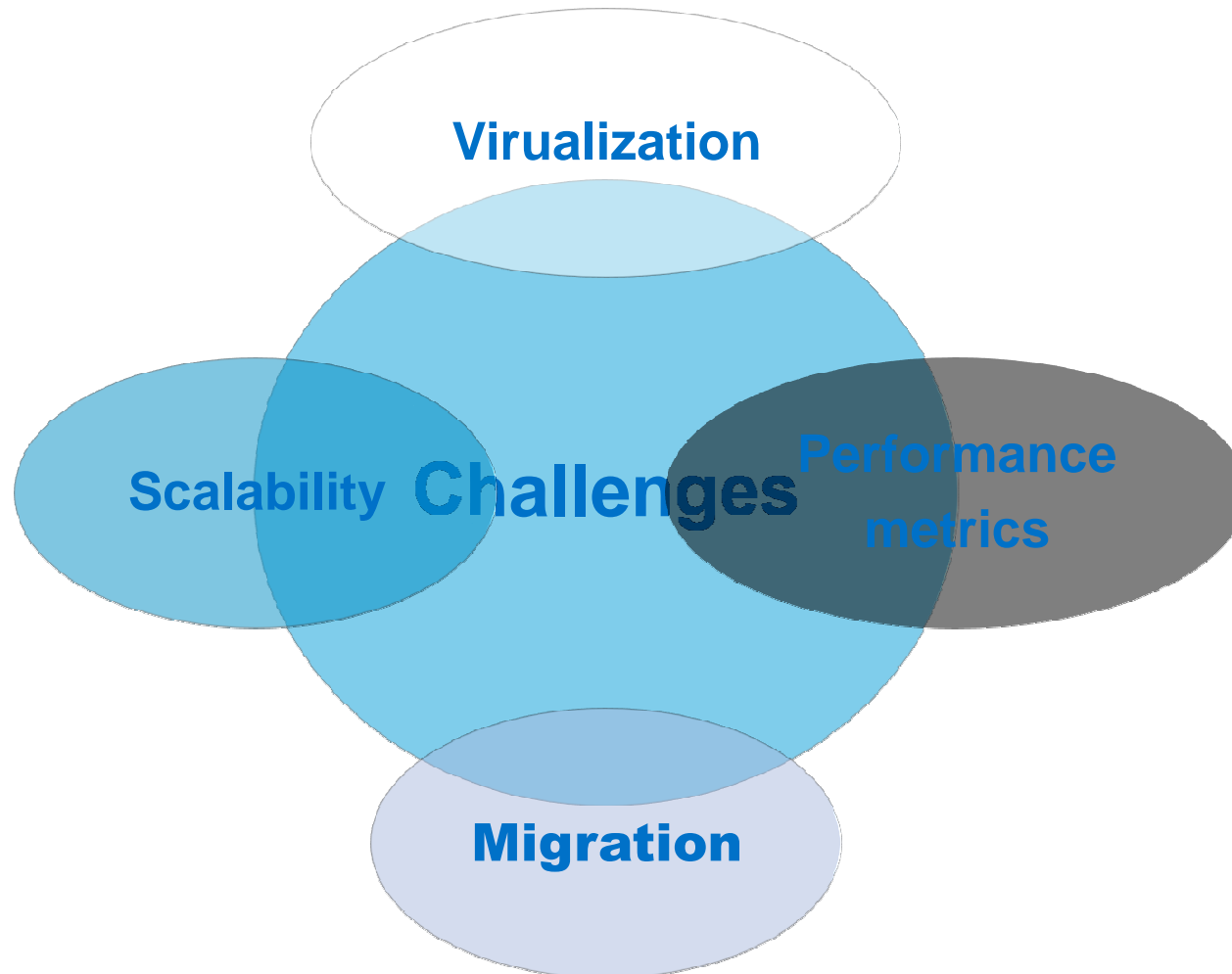
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- Poor performance causes companies to:
  - Lose customers
  - Deal with the service outage
  - Reduce bottom line revenues
  - reduce employee productivity
  - deal with general lost productivity.



# Cloud Applications Tracing Challenges

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# Cloud Applications Tracing Challenges

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- **Virtualization:** monitoring the hypervisor layer isn't something traditional systems managements were easy to manage.
- **End User Response Profiling:** End user response time is difficult to monitor for cloud application for two reasons:
  - cloud applications operate across the open public network
  - the end users are often distributed across the globe.
- **Performance metrics:** Various metrics needed to be calculated
- **Cloud Scalability:** Scalability is very large and it isn't predictable and measurable

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# Cloud Applications Tracing Challenges

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- **Scalability:** to ensure that the monitoring can cope with a large number of probes .
- **Elasticity:** So that the virtual resources created and destroyed by expanding and contracting networks are monitored correctly.
- **Migration:** So that any virtual resource which moves from one physical host to another is monitored correctly.
- **Adaptability:** So that monitoring framework can adapt to varying computational and network loads in order to not be invasive
- **Automatic :** So that the monitoring framework' can keep running without intervention and configuration.

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# objective

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The main objective is to design and develop a new model to trace and monitor applications in the cloud.

We seek through this solution to achieve the following objectives:

- Collecting data from applications running on the cloud using a monitoring agent.
- Storing data and calculating applications performance metrics.
- Visualizing metrics in graphs and charts.
- Analyzing applications performance metrics and displaying warning and alerts in case of problems.

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# State of Art

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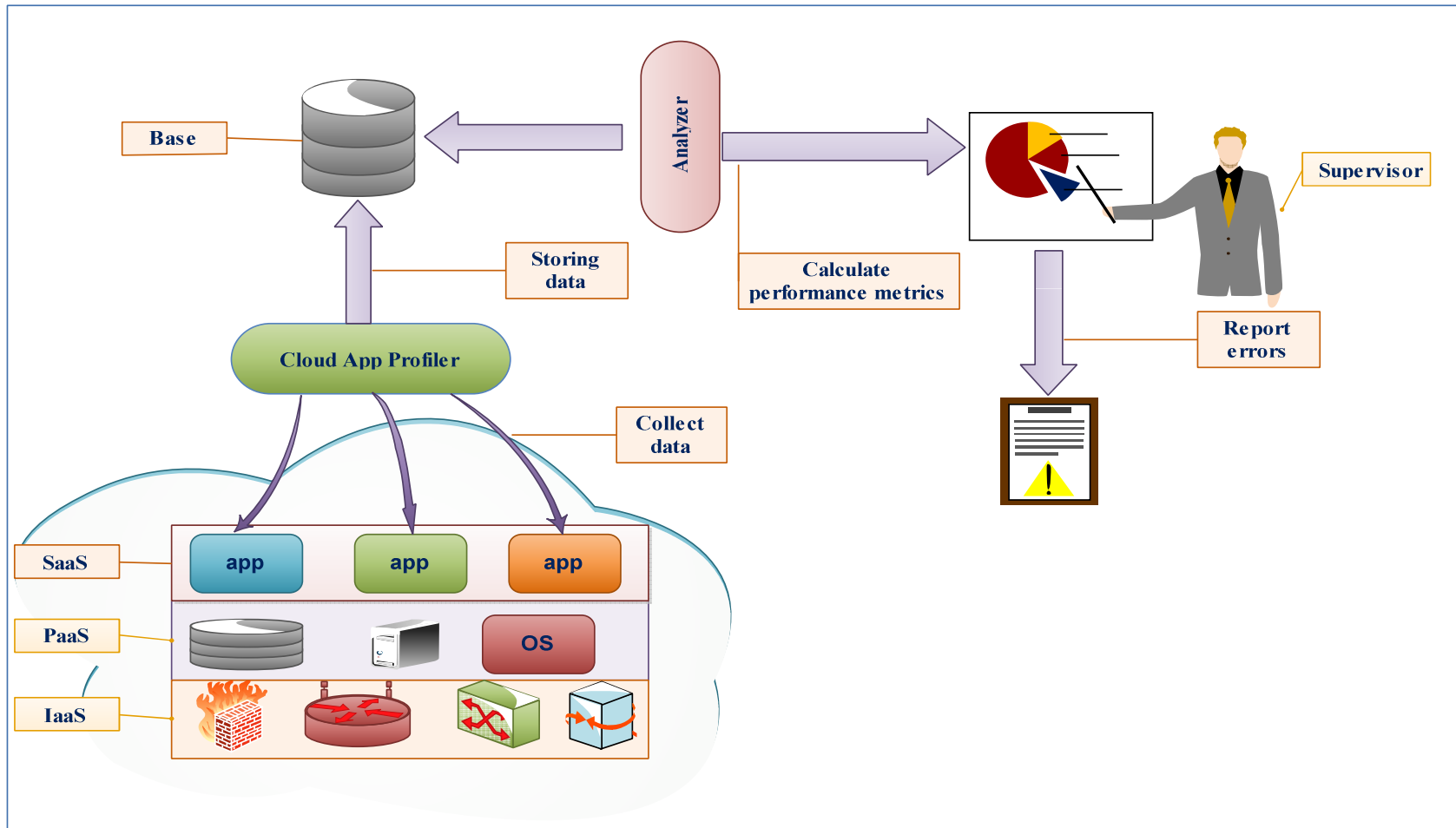
- Paid Solution:
  - AppDynamics
  - Manage Engine Applications Manager.
  
- Free Solution:
  - The Lattice Monitoring Framework[2010]

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# Proposed solution

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## Architecture

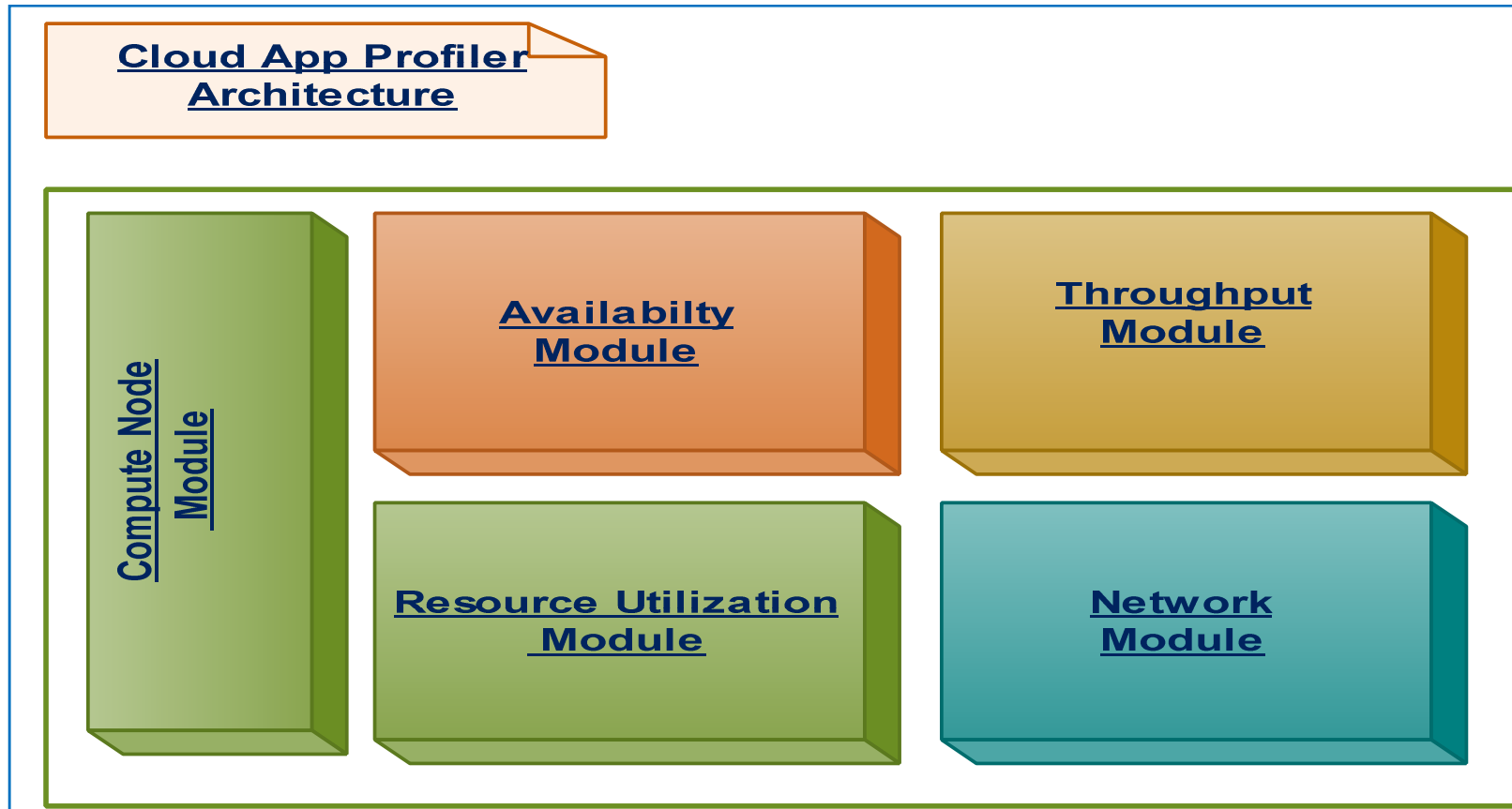


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# Proposed solution

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## Modules Implemented



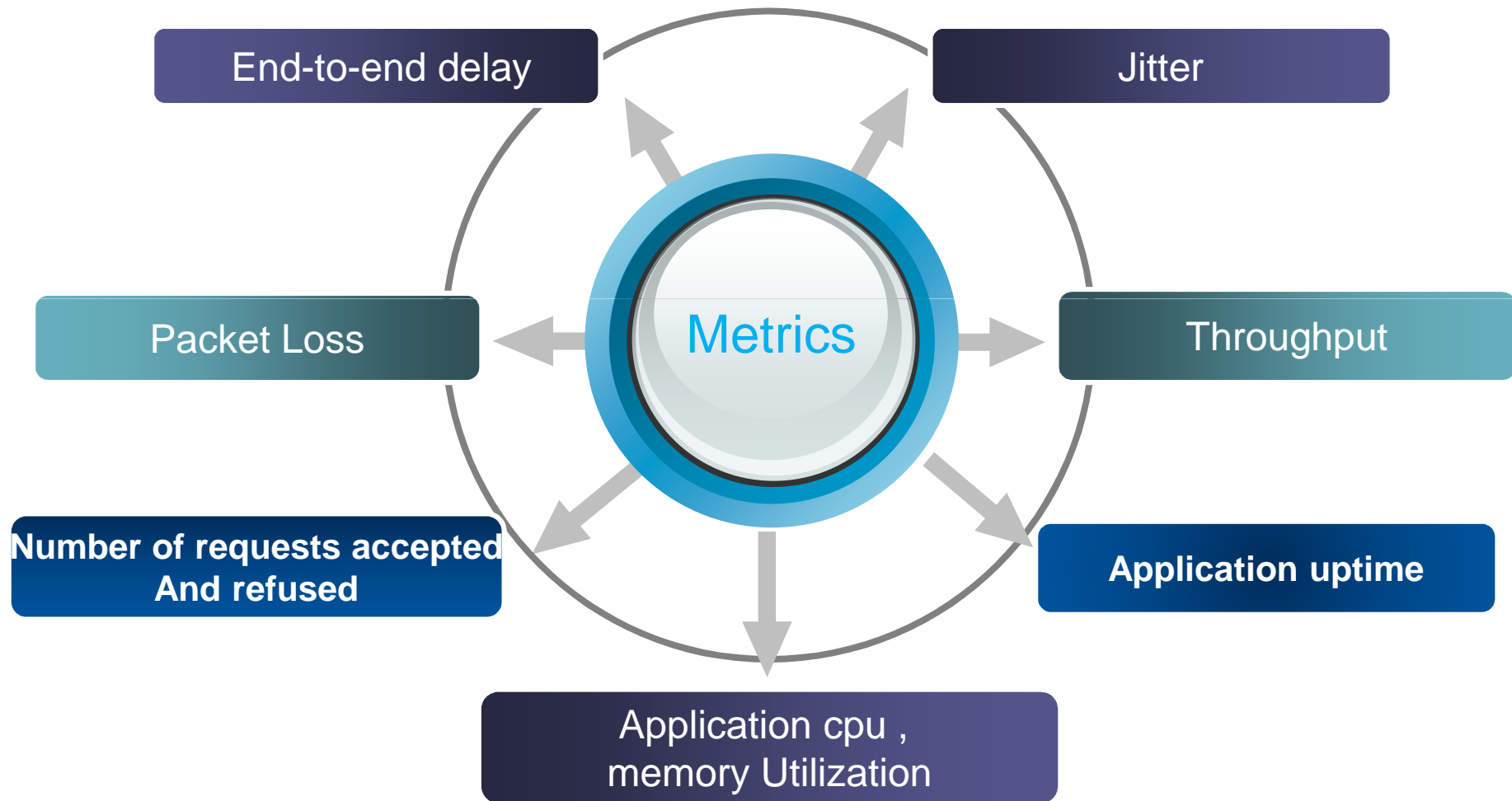
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# Methodology

## Performance Analysis of cloud-based streaming Applications

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### Calculation of the Performance metrics



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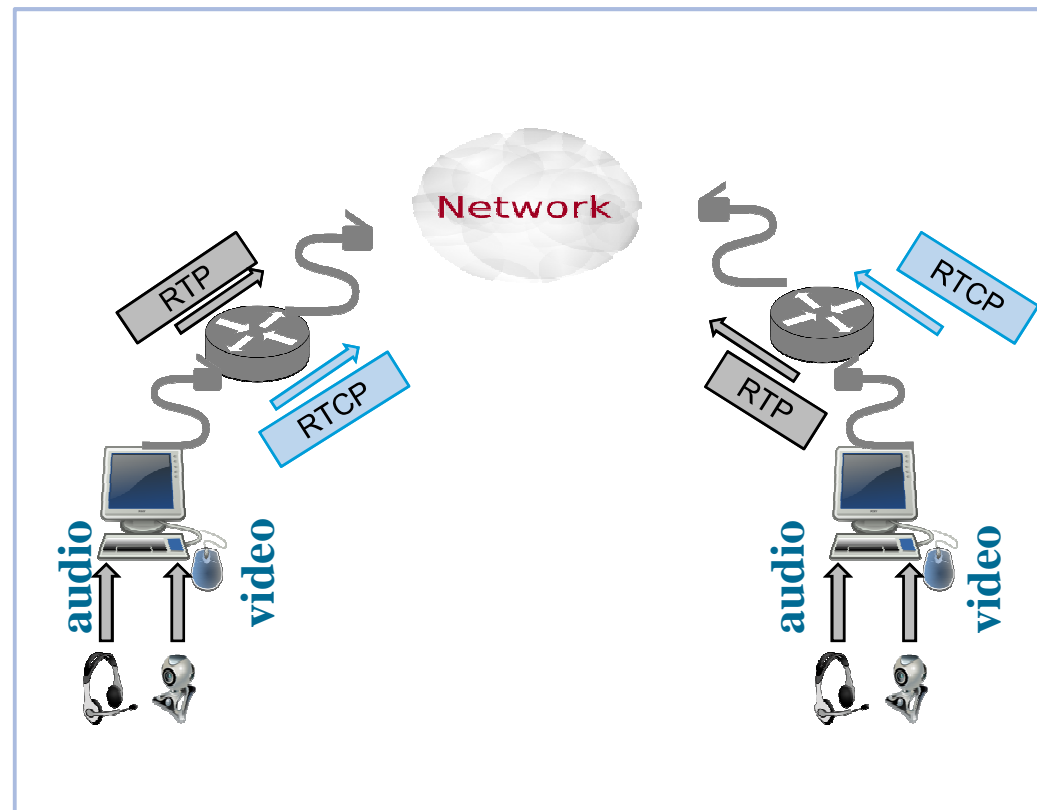
# Methodology

## Performance Analysis of cloud-based streaming Applications

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### Performance Metrics

- End-to-end delay
- Jitter
- Packet loss
- Throughput
- Application Throughput
- Application Availability
- Application Resources utilization

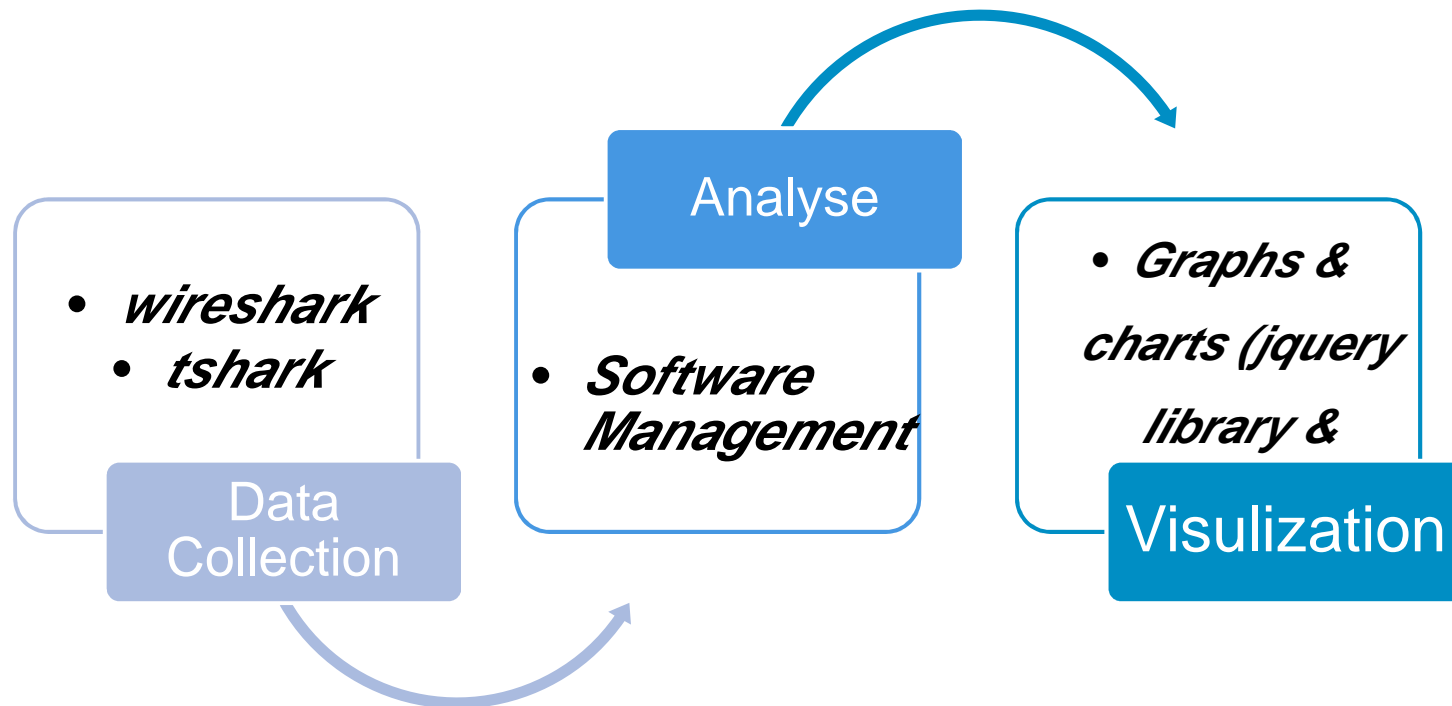


# Methodology

## Performance Analysis of cloud-based streaming Applications

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### Calculation of the Performance metrics



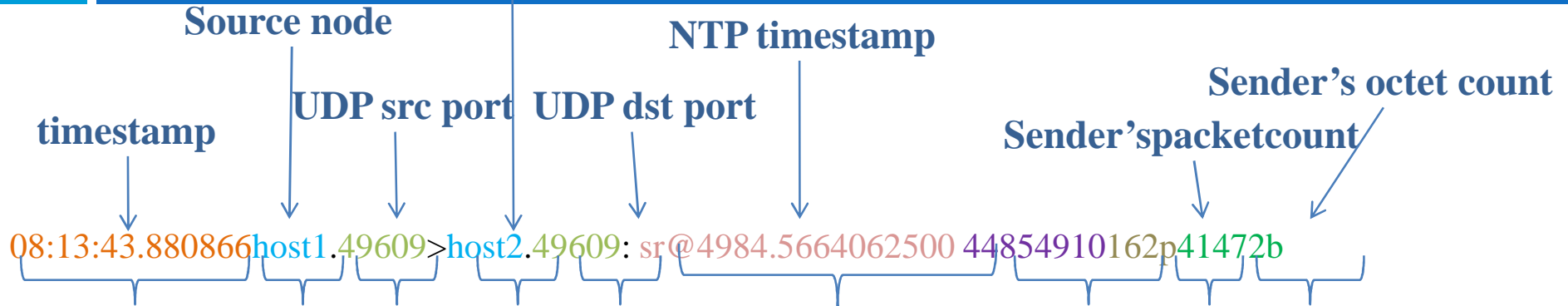
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# Methodology

## Performance Analysis of cloud-based streaming Applications

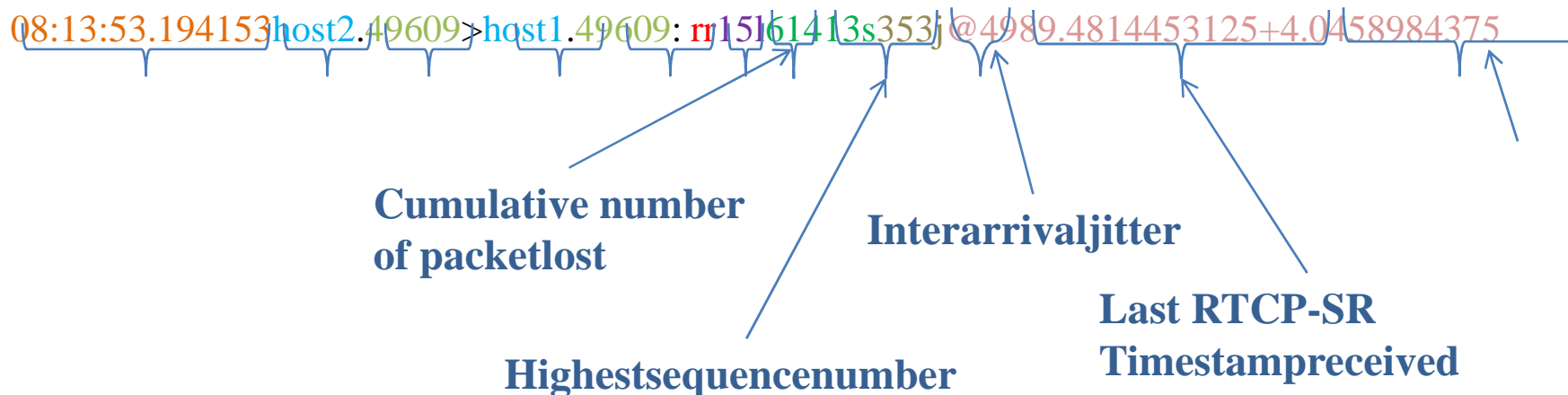
destination node

### 15 Calculation of the Performance metrics



08:13:46.627595 host2.49609 > host1.49609: rr 10l 61209s 227j @4984.5664062500+2.7451171875

08:13:49.145088 host1.49609 > host2.49609: sr @4989.4814453125 44894326 315p 80640b



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# Methodology

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## Calculation of the Performance metrics

- Delay(second) =  $t_2 - (t_1 + \text{DLSR})$
- Jitter(second) = Interarrival Jitter / sampling rate of media codec
- Packet Loss(%) =  $\frac{[(\text{highest sequence number } i - \text{highest sequence number } i - 1)] / (\text{cumulative number of lost packet } i - \text{cumulative number of lost packet } i - 1)] * 100$
- Throughput (kbps) =  $X * Y * 8 / Z$

Or

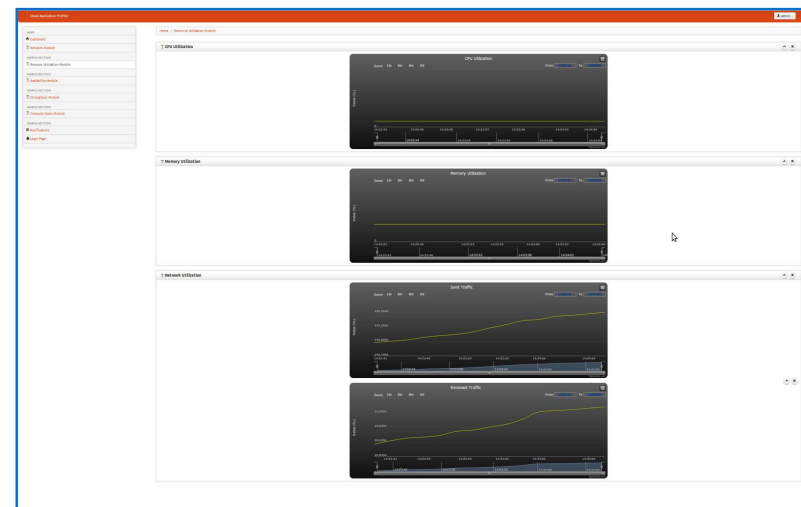
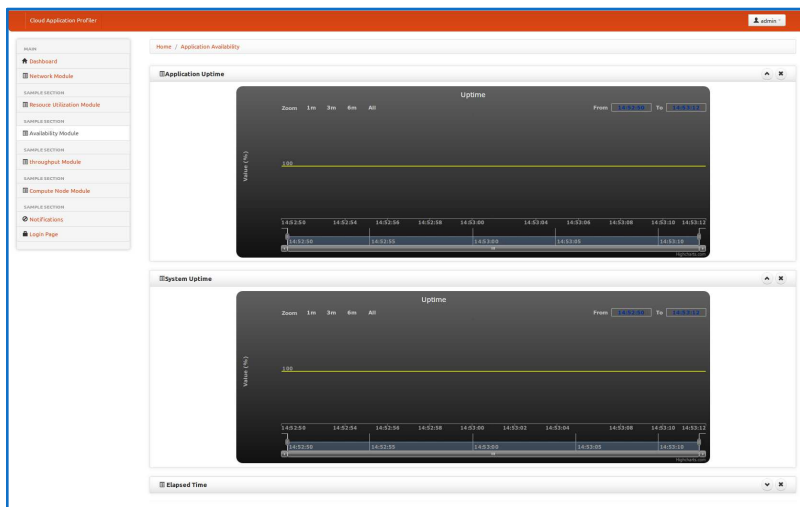
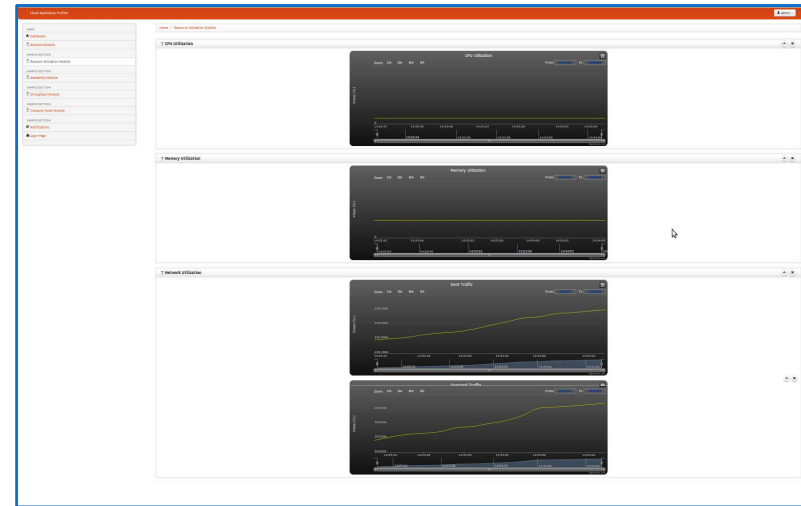
- $X = \text{RTPpayload} + \text{Rtpheader}(12) + \text{UDP}(8) + \text{IP}(20) + \text{Frame Relay}(6)$  (bytes/packet)
- $Y = \text{timestamp } i - \text{timestamp } i - 1$  (seconds)
- $Z = [\text{cumulative number of lost packet } i - \text{cumulative number of lost packet } i - 1] - (\text{cumulative number of lost packet } i - \text{cumulative number of lost packet } i - 1)$

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# Results

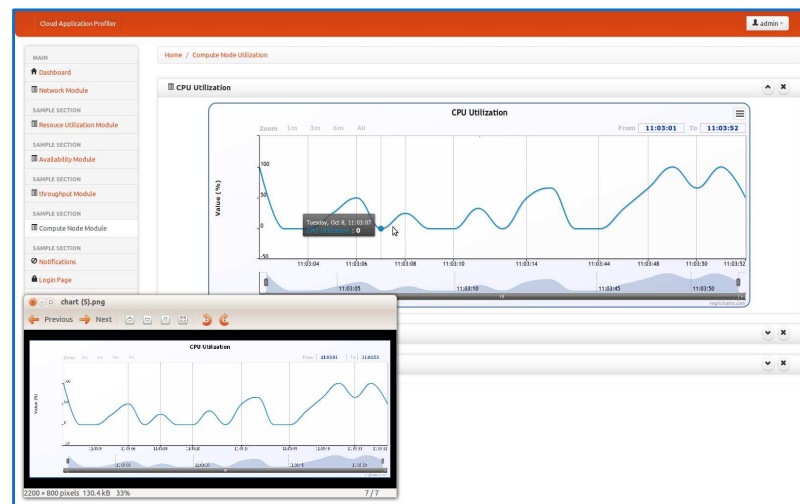
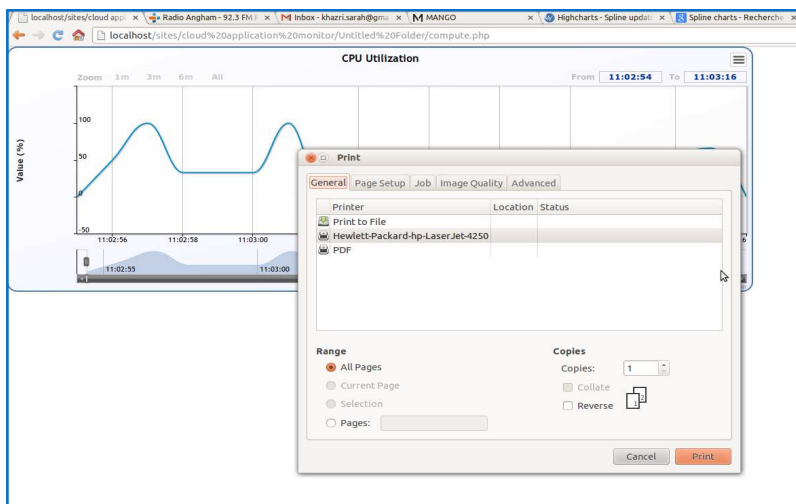
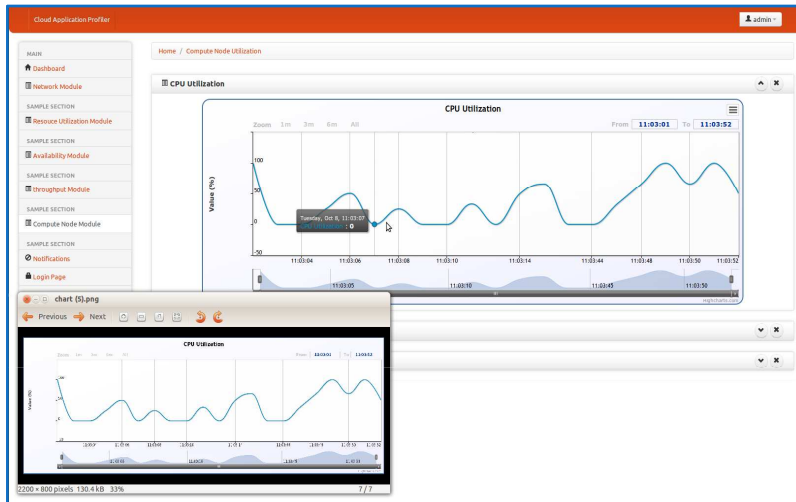
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# Results

## 18 Export Graph

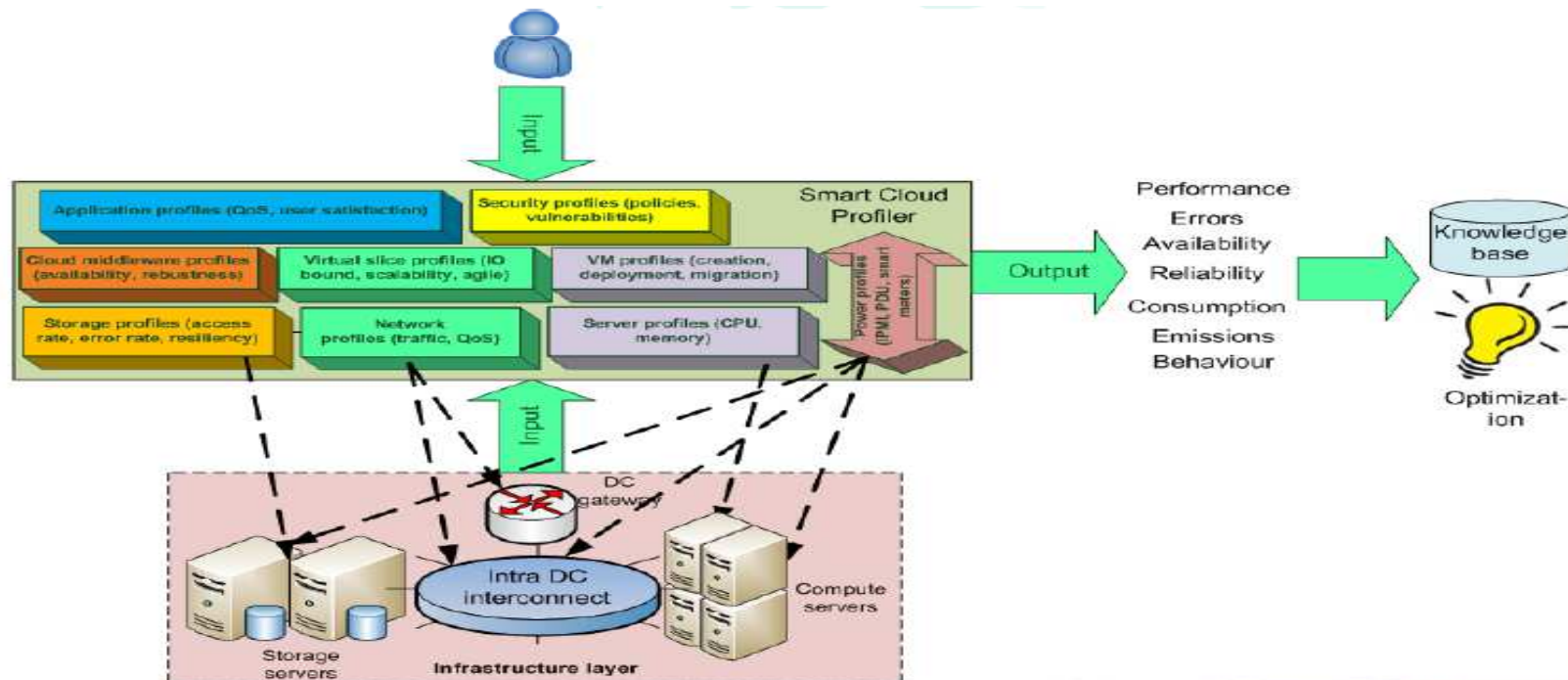


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# Future Works

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- Integration of **Application Profiler in Smart Cloud Profiler** :
  - Contribute to the tracing of telecommunications applications in the ecolotic project : ims apps
  - Have a automatic cloud app tracing system.



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# Demo

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# References

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- Jin Shao; Hao Wei; Qianxiang Wang; Hong Mei, "A Runtime Model Based Monitoring Approach for Cloud," Cloud Computing (CLOUD), 2010 IEEE 3rd International Conference on , vol., no., pp.313,320, 5-10 July 2010
- HaiboMi; Huaimin Wang; HuaCai; Yangfan Zhou; Lyu, M.R.; Zhenbang Chen, "P-Tracer: Path-Based Performance Profiling in Cloud Computing Systems," Computer Software and Applications Conference (COMPSAC), 2012 IEEE 36th Annual , vol., no., pp.509,514, 16-20 July 2012
- HaiboMi; Huaimin Wang; Gang Yin; HuaCai; Qi Zhou; Tingtao Sun, "Performance problems diagnosis in cloud computing systems by mining request trace logs," Network Operations and Management Symposium (NOMS), 2012 IEEE , vol., no., pp.893,899, 16-20 April 2012
- De Chaves, S.A.; Uriarte, R.B.; Westphall, C.B., "Toward an architecture for monitoring private clouds," Communications Magazine, IEEE , vol.49, no.12, pp.130,137, December 2011
- [\[http://www.infosys.com/engineering-services/features-opinions/Documents/cloud-performance-monitoring.pdf\]](http://www.infosys.com/engineering-services/features-opinions/Documents/cloud-performance-monitoring.pdf)
- <http://www.cloudtweaks.com/2012/08/how-performance-issues-impact-cloud-adoption/>
- [http://www.priv.gc.ca/resource/fs-fi/02\\_05\\_d\\_51\\_cc\\_e.pdf](http://www.priv.gc.ca/resource/fs-fi/02_05_d_51_cc_e.pdf)
- <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>
- <http://www.us-cert.gov/sites/default/files/publications/CloudComputingHuthCebula.pdf>
- <http://www.toolsjournal.com/testing-articles/item/803-cloud-application-performance-monitoring-challenges-and-solutions>
- <http://www.unc.edu/courses/2010spring/law/357c/001/cloudcomputing/examples.html>
- Vijayakumar, Smita, Qian Zhu, and GaganAgrawal. "Dynamic resource provisioning for data streaming applications in a cloud environment." Cloud Computing Technology and Science (CloudCom), 2010 IEEE Second International Conference on. IEEE, 2010.

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# Thank You

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