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Fwd: [ACM e-Energy 2017] Paper #6

Zhenhua Liu <zhenhua.liu@stonybrook.edu> Fri, Apr 21, 2017 at 8:08 AM
To: JK Nair <jayakrishnan.nair@ee.iitb.ac.in>
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Thanks, JK!

I looked through the reviewers' comments, and here are some points we should consider:

--The noise model for the real-time prices might explain
why the simulations work so well. In practice, real-time prices are
very volatile and very hard to predict [*]. This might lead to a
different outcome.) [*] see for example A Control Theorist's Perspective on Dynamic
Competitive Equilibria in Electricity Markets by Wang et al.

I have asked Tan to work on why the simple heuristic is working so well. This comment is helpful. Tan, could you please quickly read the reference and let us know your response?

--In the modeling, it assumes that M_i servers in data center i and they are homogeneous, actually servers in a real data centers are more likely heterogeneous in terms of performance, power and energy consumption characteristics. Moreover, such power and energy consumption characteristics change with workload intensities， i.e., the energy proportionality of a server.
For example, many modern servers achieve their peak performance at non-peak power consumption.

This should be easily incorporated. Currently, we use GLB to decide the load for a particular data center, then transform that into number of servers, and finally to power consumption. In the case of power proportionality, we can transfer the load directly into power consumption.

--"In some cases, the prices in the forward markets might be (on average) higher than real-time prices. If so, instead of saving electricity expenditure, the cloud provider can participate in forward markets to reduce cost variations. Our model can be extended to handle either case."

Please clarify how the model is extended to handle such cases (i.e., forward market is more expensive).

This can be simply addressed. When long-term price is even higher, we shouldn't use it.

Actually, we are considering the real-time price and (fixed) long-term contract instead of forward market. We should clarify this. However, incorporating forward market, where prices are uncertain, might be an interesting extension.

--"The importance of delay is estimated according to the fact that 100ms latency costs 1% of Amazon in sales".

This is not always true. On one hand, when the latency is lower than a certain threshold, further performance improvement won't make much difference. On the other hand, when the latency is too high, the cost could increase much faster than linear (i.e., exponentially). Can the model and algorithm be generalized to handle more general cases?

I think our model can be generalized to convex delay cost.

Tan, you can go back and check my original GLB paper, where we started from the most general model, and finally come to the linear delay cost. We should do something similar in our paper to mitigate such comments.

Comments listed below highlight the points we should try to make even more clear:

--The electricity bills should be integral of the energy procurement with time.
The last two equations in Section 2.2 are not correct.
--Assumptions of fixed and known long term electricity price make it hardly usable in real world scenario. It would be interesting to consider both workload and future price when electricity price is also not predictable.

Tan, please start preparing the camera ready and slides accordingly. Meanwhile, it'll be great if you can propose a plan for journal submission. Thanks!

Best,
Zhenhua

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