CLOUD COMPUTING APPLICATIONS

CLOUDONOMICS: PART 1

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Cloudonomics: Part 1

Economics necessitates Cloud computing:

- Part 1: Utility Pricing
- Part 2: Benefits Common Infrastructure

See other details and benefits in

“Cloudonomics: A Rigorous Approach to Cloud Benefit Quantification,” Joe Weinman

https://www.csiac.org/sites/default/files/journal_files/stn14_4.pdf

Value of Utility Pricing

- Cloud services don’t need to be cheaper to be economic!
- Consider a car
  - Buy or lease for $10 per day
  - Rent a car for $45 a day
  - If you need a car for 2 days in a trip, buying would be much more costly than renting
  - **It depends on the demand**

Utility Pricing in Detail

D(t): demand for resources, 0<t<T

P = max(D(t)): Peak Demand; A = Avg (D(t)): Average Demand

B = Baseline (owned) unit cost; B_T = Total Baseline Cost

C = Cloud unit cost; C_T = Total Cloud Cost

U = C / B : Utility Premium (for the rental car example, U = 4.5)

C_T

(because the Baseline should handle Peak Demand)

When is the Cloud cheaper than owning?

Substituting for C_T, B_T :

which implies

i.e., when Utility Premium is less than ratio of Peak Demand to Average Demand

Utility Pricing in Real World

- In practice, demands are often highly spiky
  - News stories, marketing promotions, product launches, Internet flash floods (Slashdot effect), tax season, Christmas shopping, etc.
- Often a hybrid model is the best
  - You own a car for daily commute, and rent a car when traveling or when you need a van to move
  - Key factor is again the ratio of Peak Demand to Average Demand
  - But we should also consider other costs
    - Network cost (both fixed costs and usage costs)
    - Interoperability overhead
    - Consider reliability, accessibility

Summary

- Utility Pricing is good when demand varies over time, as is the case of a start-up or a seasonal business
- When Utility Premium is less than ratio of Peak Demand to Average Demand, Cloud computing is beneficial
- Next, we look at the possible savings that Cloud providers can create using statistical multiplexing