STRATEGIC MANAGEMENT OF SHARED CLOUD SERVICES

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CLOUD MARKETS

- One option - purchase resources from single provider

(As internal service provider)

- Google Cloud
- AWS
- OpenShift
CLOUD MARKETS

Possible Alternative: Open Exchange with Auction Variant

CLOUD ECONOMICS

• INTERPLAY BETWEEN ENGINEERING AND MANAGEMENT DECISIONS

• WANT TO PREVENT USERS FROM GAMING THE MARKETPLACE.

• HOW DO USERS MAKE PURCHASING DECISIONS?
GAME THEORY

• **Players:** Users and/or Providers

• **Strategy:** Best response against other players’ actions

• **Equilibrium:** No player wants to deviate
EQUILIBRIUM CHARACTERIZATION

- Uniqueness and Stability
- Provider’s Revenue
- Social Welfare
KEY INSIGHT

• IT IS POSSIBLE TO INCREASE REVENUE AND/OR SOCIAL WELFARE WITHOUT INVESTING IN ADDITIONAL RESOURCES

• How?
  • JUDICIOUS PRICING
  • JUDICIOUS RESOURCE ALLOCATION AND SCHEDULING
SHARED/BUY-IN COMPUTING

- **Game theoretic analysis of shared/buy-in computing systems**

- **Key Insight:**
  - Heavy users "subsidize" lighter users
  - Possible emergence of "free-riders"

SHARED/BUY-IN COMPUTING

• An example: Shared Computing Cluster at BU

• Social welfare is sub-optimal
FUTURE WORK

• Is auction-based marketplace a more efficient way of sharing?
ADVANCE RESERVATION + PREEMPTION

• Game theoretic analysis of Preemptible (transient) Services

• Key Insight: Advance Reservation + Preemption Maximizes Revenue

ADVANCE RESERVATION + PREEMPTION

- Users have incentive to avoid latency
- Purchasing service priority reduces latency
FUTURE WORK

• IN MARKETPLACE/AUCTION SETTING, HOW DO ADVANCED BIDS IMPACT USER BEHAVIOR?
SUMMARY

- **Through Game Theory**, we can understand trends of user behavior in shared clouds.
- Can identify improvements through policy.
- Future work includes applying our results to other variants in shared cloud types.