FLOCX: First Layer of Open Cloud eXchange

A Marketplace at the bottom of the cloud

Sahil Tikale
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Public Cloud

Cloud Providers

Google

Microsoft

Amazon

AT&T

VMware

Yahoo

Verizon
Public Cloud

Private cloud
Hybrid Cloud

Public Cloud

Private cloud

Cloud Providers: Google, Microsoft, Amazon, AT&T, VMware, Verizon, Yahoo
Hybrid Cloud

Public Cloud

CAN WE DO BETTER THAN THIS?

Private cloud
Hybrid Cloud

Public Cloud

CAN WE DO BETTER THAN THIS?

Private cloud
HPC/HTC Cluster

- Unlimited CPU demand.
- Aggregated CPU usage per month
- Happy to share if monthly CPU usage > HPC owned CPUtime

Common shared pool

Bare Metal Servers
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OpenStack Cluster

- Interactive demand: Short term peaks.
- Let other use than running idle

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Deterministic Experiments

- Need “Exact-same-hardware”
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- Peak demand: paper deadlines
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- Utilization < 1%
- Willing to share if compliant hardware available when required.

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Requirements

How do we satisfy all these divergent needs?

- Access to hardware you own whenever you want.
- Ability to reserve nodes for future use.
- Ability to request and offer specific hardware.
- Strong incentive to give up nodes when
  - You do not need them
  - Or someone else needs them more than you do.

Solution: Marketplace with an underlying economic model
Towards a Simple Marketplace: First-Steps

Assumptions:
● Homogeneous pools of Bare-Metal Servers
● Marketplace Tracks of Tenant Credits and Server Ownership

Incentivization:
● Tenants Accrue Credits when Other Tenants Lease their Servers
● Expend Credits to Lease Servers
● Price High $\Rightarrow$ Release Servers
FLOCX: Marketplace for Bare-Metal Servers

OpenStack  HPC/HTC  HIPAA  Shared Pool
Future Features

- **Bids:** Requesting hardware at desired asking price-range
- **Offers:** Complex time intervals for sharing idle nodes
- **Advanced Reservation System:** Ability to make reservations in future
- **Dynamic Pricing:** Prices reflecting demand and supply fluctuations
Agent-Based Trading

• Initially human bid/offer resources in the FLOCX

• Consequently, develop agents for automated trading
  ○ Exemplary agents for HPC and OpenStack
  ○ HPC Agent: maximize CPUtime
  ○ OpenStack Agent: maximize revenue
Long Term Goals

- Deploy FLOCX at MGHPCC
  - Enabling Trade Between Universities
- Enable Organization to Deploy and Manage Agents
- Agile development model
Conclusion

- Addressed broad set of use-cases
- We believe:
  - building an economic model is the right approach
- Simple prototype microservice built on HIL, BMI and BOLTED.
- Service that offers economic incentives for tenants to release hardware
Questions / Feedback

FLOCX

First Layer of Open Cloud eXchange

A marketplace where sharing (servers) is always good !!

Thank You