TheCloudExchange

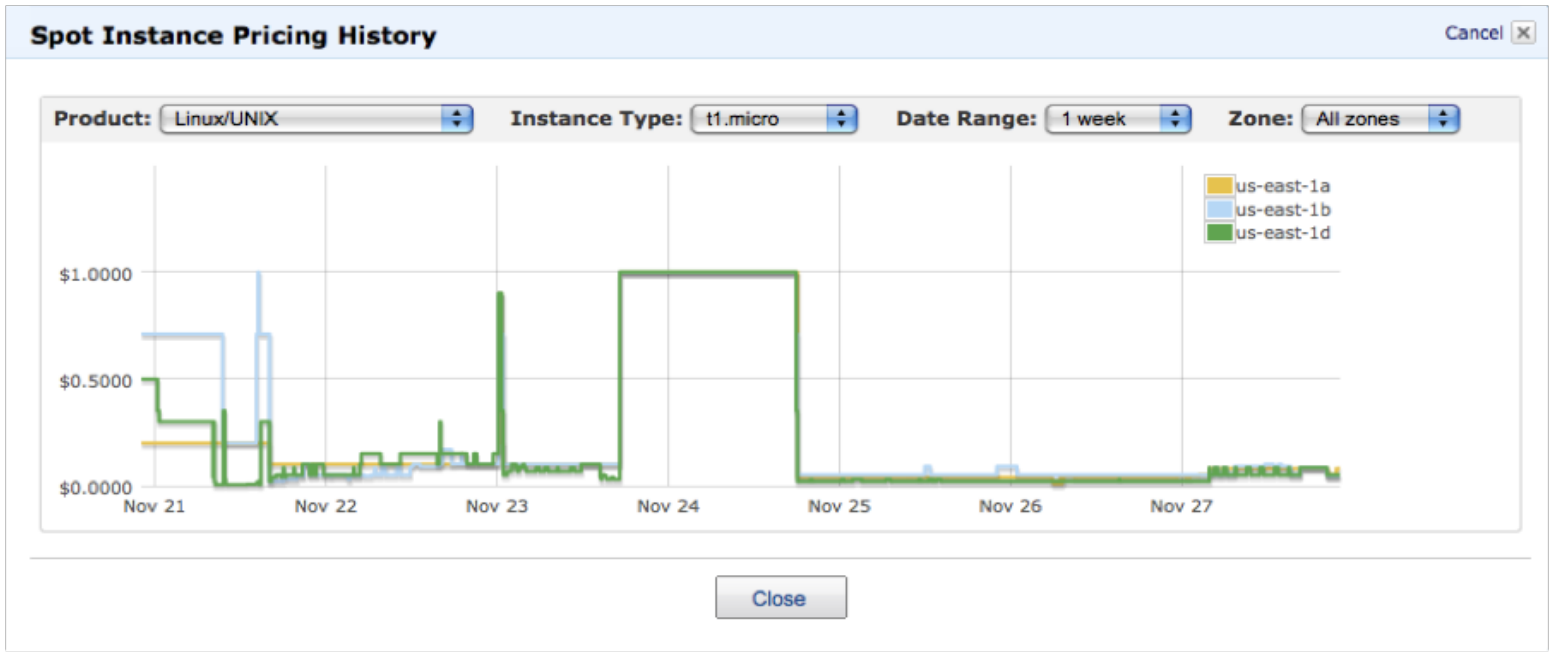
A Futures Market for Spot Instances

Alan Verga akv2001@columbia.edu
Evgeny Fedotov ef2363@columbia.edu
Suhan Canaran sc3055@columbia.edu

Amazon EC2 Spot Instances

- Amazon EC2 offers Spot Instances, in addition to On-Demand and Reserved Instances
- Spot Prices change periodically based on supply and demand, allow customers to bid on unused EC2 capacity, at prices often ~50% lower than On-Demand instances.

- Participants increase risk exposure from price volatility
- Attempt an experiment: a "utility computing market", to allow hedging and even speculation.



TheCloudExchange

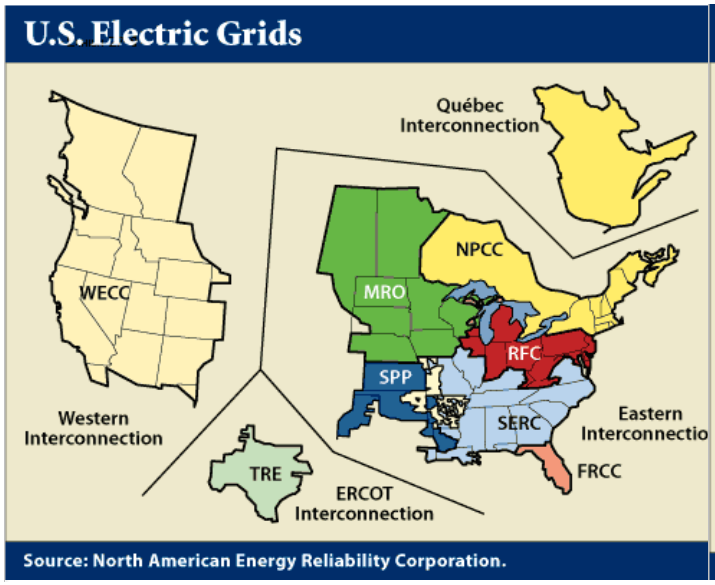
- TheCloudExchange is an automated exchange platform for trading Spot Instances futures

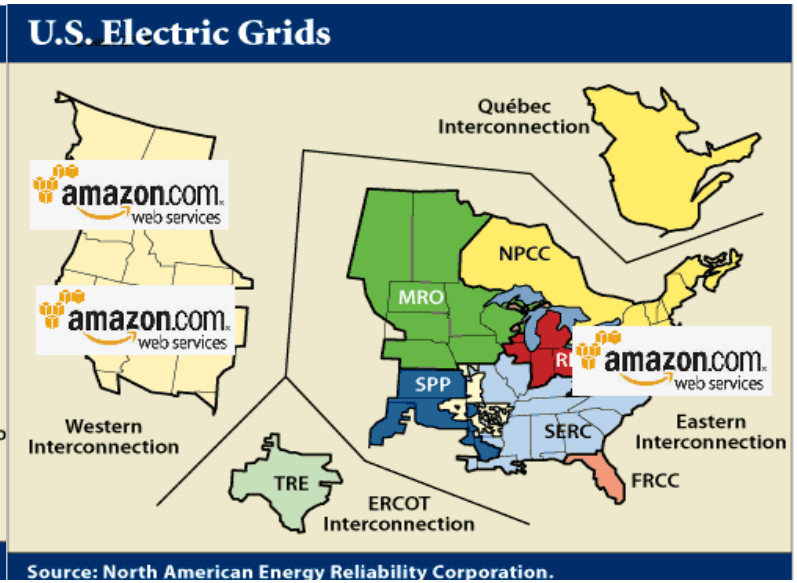
- Futures Contract:
  - Instance Type (Linux, Windows, Suse)
  - Size (micro, small, large)
  - Region/Zone(US East, EU, Asia)
  - Delivery Date & Time (December 30, 2011 2pm)

- Platform: TheCloudExchange will be a Google App Engine application

- Approach:
  - Simulation of a trade between buyer and seller
  - Launching EC2 instances on behalf of the buyer
  - Comparison of computational cost vs. On-Demand Instance
  - An experiment toward true market-based utility computing

Commodities Market Analogy





Geographically Distributed

Variable Zone Pricing

Exxon - Amazon

Difficult to Store

Benefits:

- Provision IT budget for fiscal year
- Hedging against price fluctuation
- Speculation

Computation as the newest trade-able commodity

System Architecture

- TheCloudExchange is online application written in Java and running on the Google App Engine platform

- MVC approach:
  - JSP + jQuery as "view"
  - Servlets as "controller"
  - Google Datastore entities as "model"

- Speed up Datastore requests through Memcache

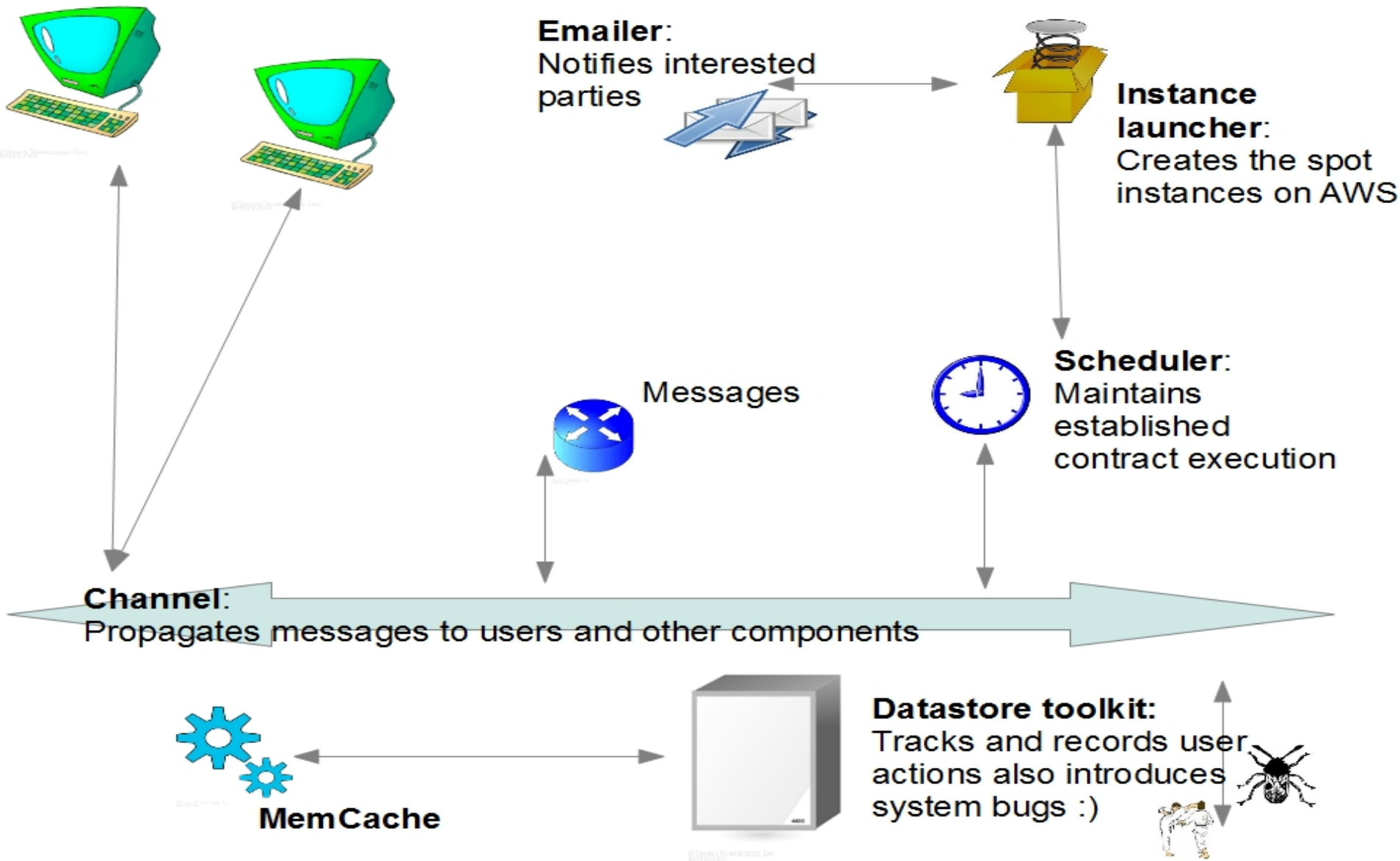
- Real-time notifications through Channel messages

- Check us out at http://thecloudexchange.appspot.com

App Engine Features

- Authentication through Google Accounts API
- Datastore & Memcache for persisting objects
- Blobstore for persisting the AWS credentials file
- Channels for real-time messaging between the clients
- E-Mails for notifying the customers about executed deals and delivered instances
- Task Queues for simultaneous execution of long-running jobs (launching spot instances)
- Job scheduling via Cron service
- Automated AWS instance launching through Google App Engine

Workflow Diagram



Findings, Comments

On Demand			**3 years = 1576800 minutes**
Type	**Hour**	**Per Minute**	**System List Price**
small	0.085	0.0014166667	2233.8
large	0.34	0.0056666667	8935.2
xlarge	0.68	0.0113333333	17870.4
Spot			
Type	**Hour**	**Per Minute**	**System List Price**
small	0.027	0.00045	709.56
large	0.108	0.0018	2838.24
xlarge	0.68	0.0036	5676.48

Conclusions

- We created a workable prototype of a futures exchange
- At the moment, there is too much variation across cloud computing providers to allow for standardized futures contracts
- The concept of trading computational power is promising. Nascent implementations are already in place (eg. SpotCloud)
- Utilized almost all Google App Engine services, however it is not the best platform for trading applications