

# appscale: open-source platform-level cloud computing

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May 2010

# cloud computing

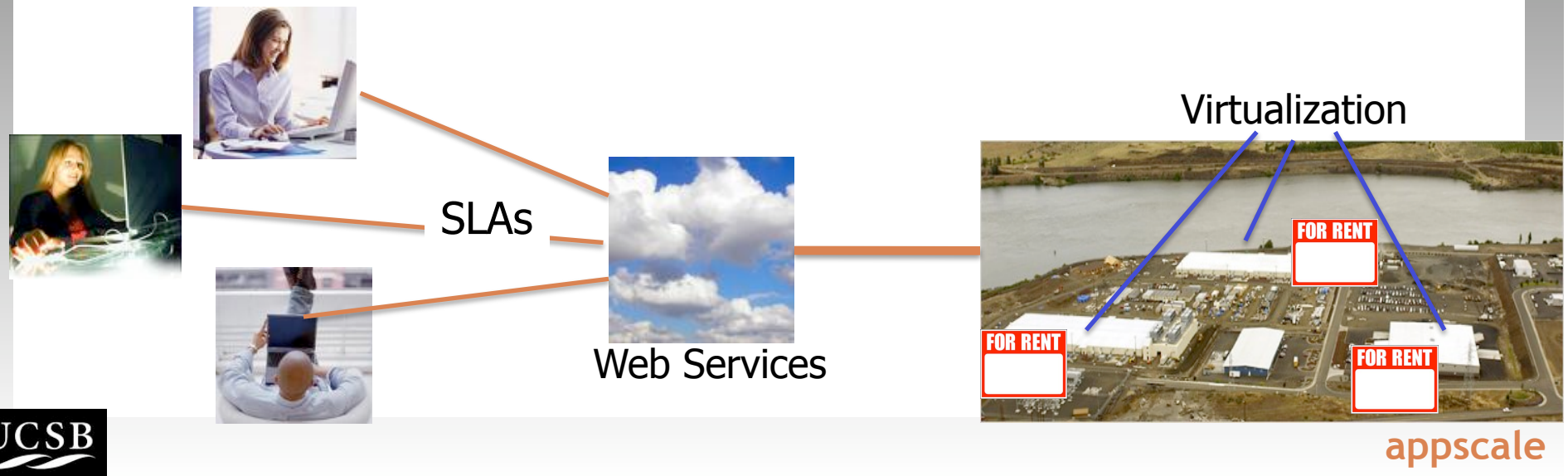
- Software systems for accessing easily and transparently scalable CPU/storage/network resources via a network connection or web interface – “*as-a-service*”
  - Culmination of grid/cluster/utility/elastic computing
  - Advances in processor, virtualization, systems technology

# cloud computing

- Software systems for accessing easily and transparently scalable CPU/storage/network resources via a network connection or web interface – “*as-a-service*”
  - Culmination of grid/cluster/utility/elastic computing
  - Advances in processor, virtualization, systems technology
- Remote access to distributed and shared cluster resources
  - Has experienced a rapid uptake in the commercial sector
    - ▶ Public clouds –your software/apps on others’ systems
    - ▶ Users **rent** a small fraction of vast resource pools
      - ◆ Advertised service-level-agreements (SLAs)
      - ◆ Resources are **opaque** and **isolated**
  - Offer high availability, fault tolerance, and extreme scale

# cloud computing

- Remote access to distributed and shared cluster resources
  - Potentially owned by someone else (e.g. Amazon, Google, ...)
    - ▶ Users **rent** a small fraction of vast resource pools
      - ◆ Advertised service-level-agreements (SLAs)
      - ◆ Resources are **opaque** and **isolated**
    - ▶ Offer high availability, fault tolerance, and extreme scale
  - Relies on OS, network, and storage virtualization/isolation



# cloud computing

- 3 types: as-a-Service (aaS)



- Infrastructure: Amazon Web Services (EC2, S3, EBS)

- ▶ Virtualized, isolated (CPU, Network, Storage) systems on which users execute entire runtime stacks
  - ◆ Fully customer self-service
- ▶ Open APIs (IaaS standard), scalable services

- Platform: Google App Engine, Microsoft Azure



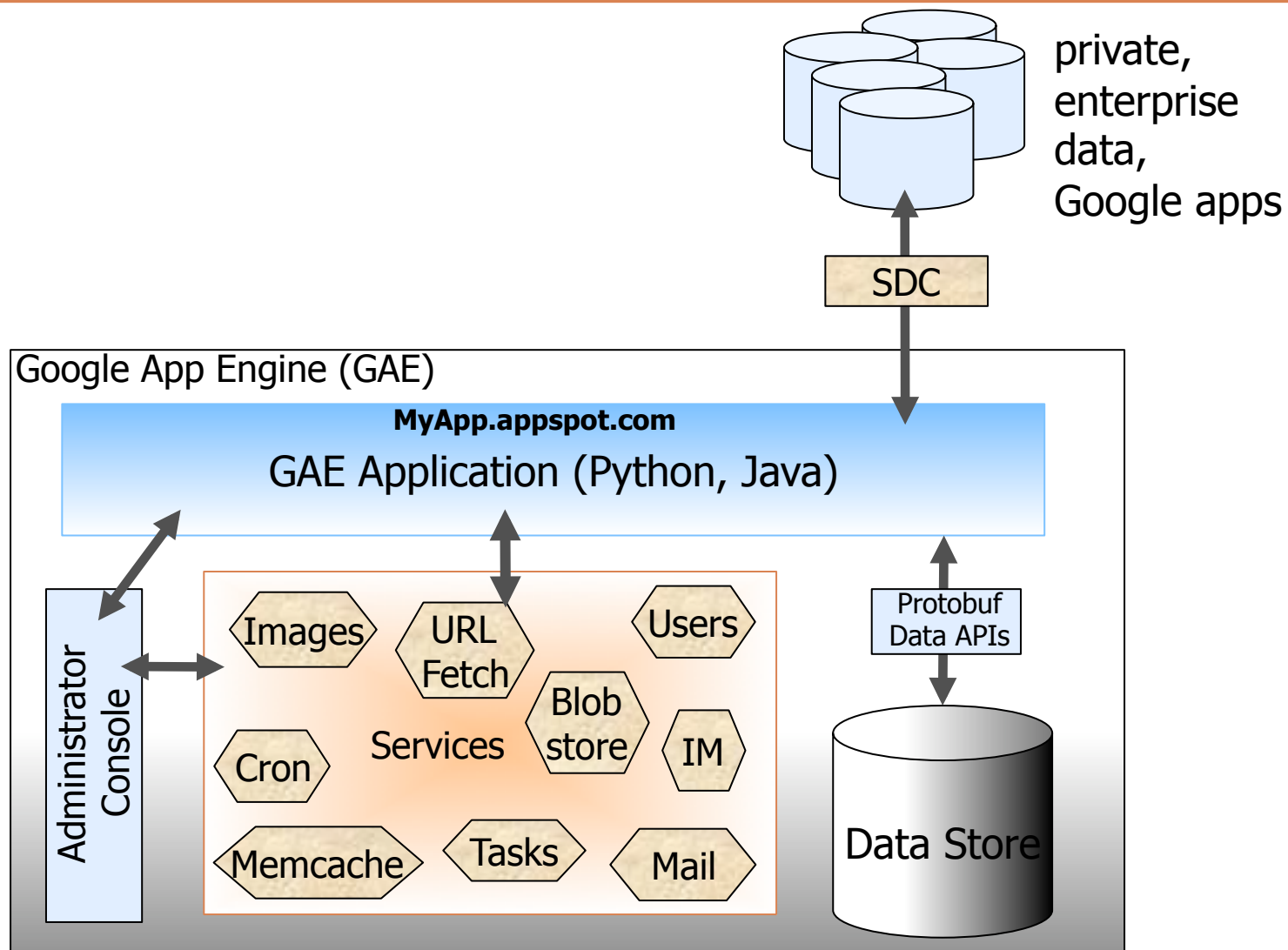
- ▶ Scalable program-level abstractions via well-defined interfaces
- ▶ Enable construction of network-accessible applications
- ▶ Process-level (sandbox) isolation, complete software stack

- Software: Salesforce.com

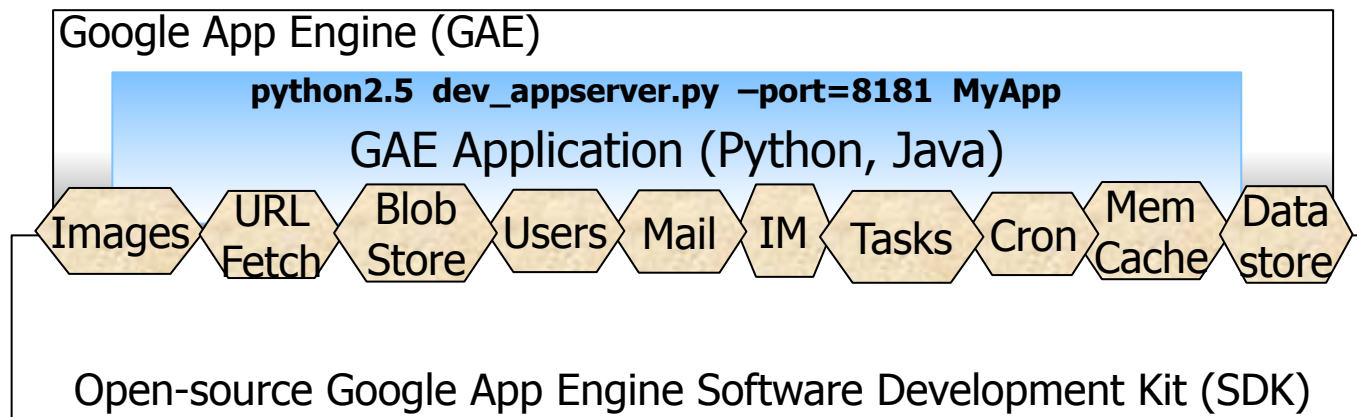


- ▶ Applications provided to thin clients over a network
- ▶ Customizable

# google app engine



# google app engine: the sdk



# from gae to appscale



- GAE SDK extensions

**Data store** Pluggable using open-source distributed database technologies  
HBase, Hypertable, Cassandra, Voldemort, MongoDB, MemcacheDB, MySQL

**Mem Cache** Memcached library (Python and Java)

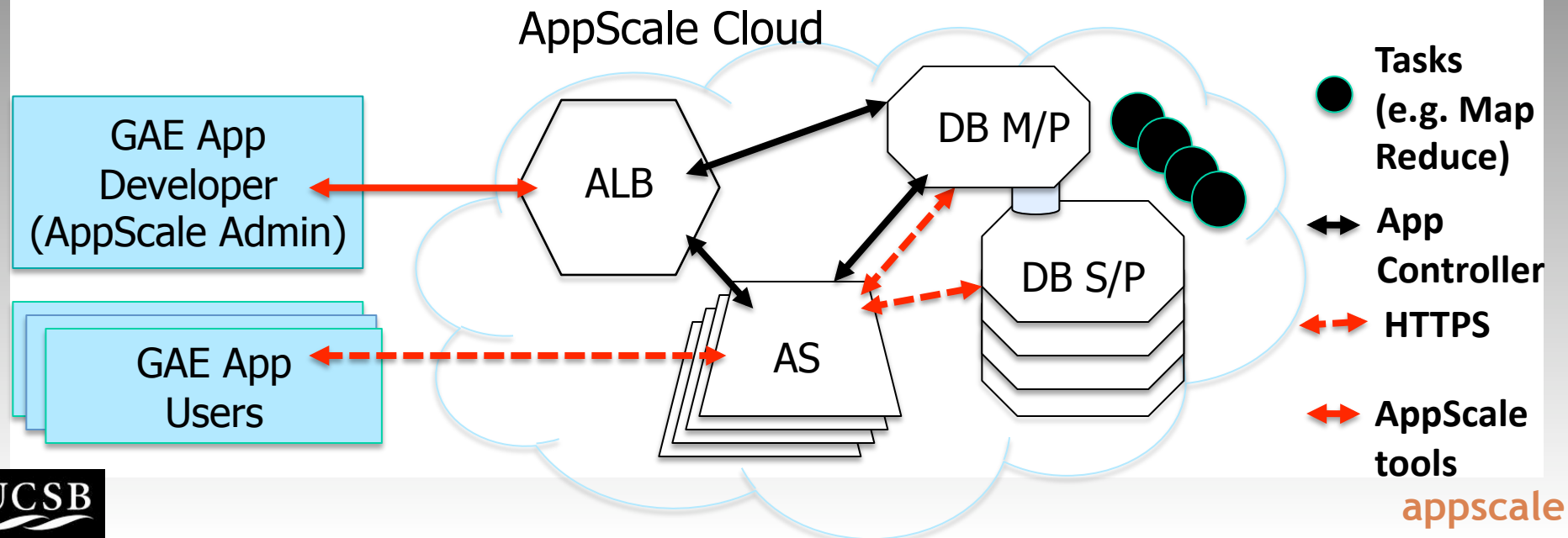
**Tasks** From console or as background thread (automatically)  
▶ Interface to Hadoop (MapReduce)  
◆ Multi-language support: Python, Java, Ruby, Perl, X10

**Cron** Translator to Linux Cron job, similar to Tasks

**Users** Pluggable: built-in cloud-wide authentication via Rails, support for Eucalyptus and EC2 credentials

# appscale

- Distributed system with four key components
  - AppLoadBalancer (ALB)
  - AppServer (AS)
  - Database Master/Peer (DB M/P)
  - Database Slave/Peer (DB S/P)
- Released as a single as a Xen or KVM image
  - Can instantiate as a particular role (ALB, AS, DB)
  - Can change functionality and instantiate itself as another





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  - Can instantiate as a particular role (ALB, AS, DB)
  - Can change functionality and instantiate itself as another
  - Runs automatically and transparently (auto-deployment of all services)
    - ▶ Xen, KVM
    - ▶ Eucalyptus
    - ▶ EC2 (can integrate with SimpleDB)
  - Services can be accessed via REST from any language/framework (Ruby/Rails, Python/Django, ...)

# thanks!

- Students and Visitors!
  - Chris Bunch, Jovan Chohan, Navraj Chohan, Nupur Garg, Matt Hubert, Jonathan Kupferman, Puneet Lakhina, Yiming Li, Nagy Mostafa, Yoshihide Nomura (Fujitsu), Kowshik Prakasam, Raviprakash Ramanujam, Michal Weigel
- Support
  - Google, IBM Research, National Science Foundation

<http://www.cs.ucsb.edu/~racelab>

<http://appscale.cs.ucsb.edu/>