Cloud Computing and Grid Computing 360-Degree Compared

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Outline

- Business model

- Architecture

- Resource management

- Programming model

- Application model
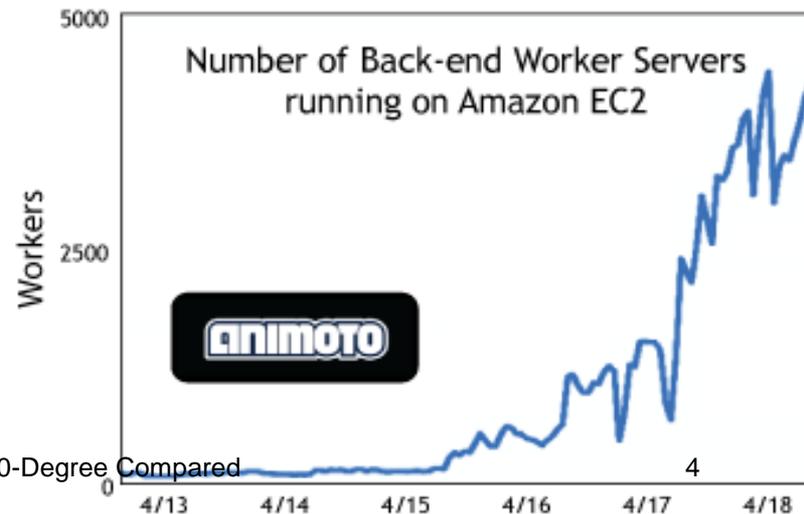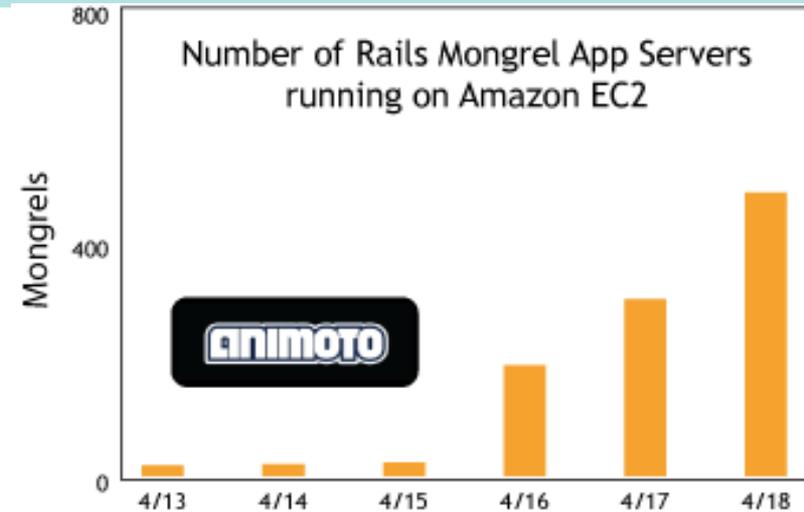
- Security model

Business Model

- Grids:
  - Largest Grids funded by government
  - Largest user-base in academia and government labs to drive scientific computing
  - Project-oriented: service units

- Clouds:
  - Industry (i.e. Amazon) funded the initial Clouds
  - Large user base in common people, small businesses, large businesses, and a bit of openn science research
  - Utility computing: real money

Business Model
Why is it a big deal?

- Why is this a big deal?
  - No owned infrastructure
  - All resources rented on demand
- Critical for startups with risky business plans
- Not possible without Cloud Computing and a credit card
  - Launched in 2007/2008 timeframe

Number of Rails Mongrel App Servers running on Amazon EC2

Number of Back-end Worker Servers running on Amazon EC2

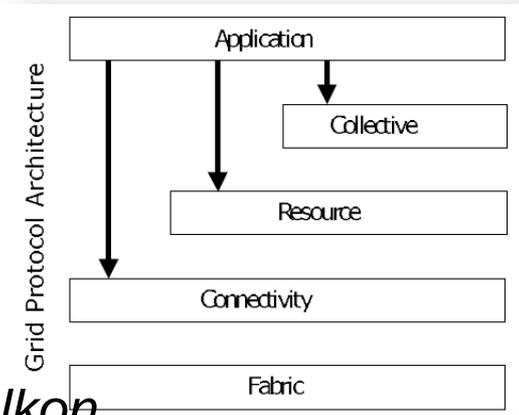# An Example of an Application in the Cloud

- Animoto
 - Makes it r̶̶̶ ... ̶ te videos
    with ...

Architecture

- ## Grids:
  - Application: *Swift, Grid portals (NVO)*
  - Collective layer: *MDS, Condor-G, Nimrod-G*
  - Resource layer: *GRAM, Falkon, GridFTP*
  - Connectivity layer: *Grid Security Infrastructure*
  - Fabric layer: *GRAM, PBS, SGE, LSF, Condor, Falkon*

- ## Clouds:
  - Application Layer: *Software as a Service (SaaS)*
  - Platform Layer: *Platform as a Service (PaaS)*
  - Unified Resource: *Infrastructure as a Service (IaaS)*
  - Fabric: *IaaS*
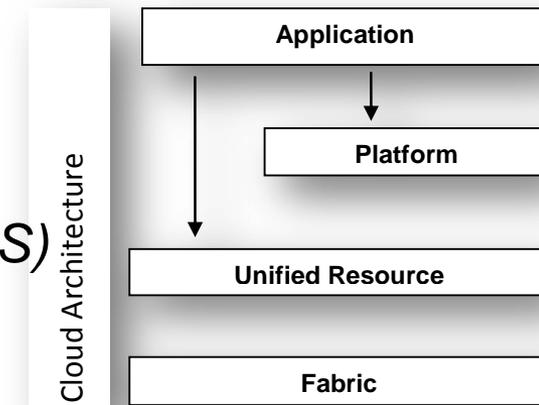
Resource Management

- Compute Model
  - batch-scheduled vs. time-shared
- Data Model
  - Data Locality
  - Combining compute and data management
- Virtualization
  - Slow adoption vs. central component
- Monitoring
- Provenance

Questions

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