Databases In the Cloud

Overcoming the challenges

• Rob Masson – ScaleArc, Manager, Solution Architecture
• Jon Tobin – Percona, Director, Solution Engineering
What’s Coming

• Jon
  • Enabling the Organization
  • Advantages of Leveraging “the cloud”
  • Who are the Big Players?
  • I(nfrastucture)aaS vs P(latform)aaS
  • Starting Small

• Rob
  • Cross Region Failover
  • Hybrid Deployments
  • Best Practices & Lessons Learned
“Cloud” – 5 Characteristics

According to National Institute of Standards & Technology

1. On-demand self-service
2. Broad network access
3. Resource pooling
4. Rapid elasticity
5. Measured service

6. Perimeter contained
“the cloud” – organizational migration

High Value
- Service oriented
  - Deep understanding of ingredients
- Aligned to business need
  - Not component need
- Linked to business outcomes

Low Value
- Quick provisioning
- Reduced management

Source: https://www.gartner.com/doc/3393517/cloud-computing-deployments-begin-service
Compelling Advantages

- Time to provision
  - Months to minutes
- Geographic distribution
  - Resources available “anywhere”
- Operating vs Capital Expenditure
  - Recurring billing
- Standardization
  - Side effect
- Simplicity
Drawbacks

- Noisy neighbor
- Rigidity
  - Netflix Outage Christmas Eve 2012
- Resource location
  - Actually, where is that server?
- Regulatory/Security
- Skillset Atrophy
- Lock-in
- Troubleshooting
- Complacency
What are your options?

• **AWS**
  • Market leader
  • Staggering product mix
  • Solid service offerings

• **Azure**
  • Microsoft’s reach
  • Enterprise focus

• **Google**
  • Developer focused
  • Fewer, focused options
Azure

- Enterprise focused
- Compliance
  - FIPS 140-2, PCI-DSS (L1), HIPAA/HITECH, etc
- Windows & Linux
- 38 regions
  - Almost every continent
- 99.99% uptime SLAs
- DBaaS: SQL (MSSQL based), NoSQL (Doc, KV), Data Factory (ETL)
AWS

- RDS: MySQL, MariaDB, MSSQL, Postgres, Oracle, Aurora
  - Most feature rich DBaaS
  - Auto-backups
  - Auto-failover
  - Large traction amongst Percona’s user base
- Semi-compliant
- AWS Data Migration Service
  - Homo/heterogenous
- AWS Marketplace
  - Thousands of software solutions
Google Cloud Platform

- Developer focused
  - IaaS, SaaS, PaaS
  - CaaS
- Compliant
  - SSAE 16, ISO 27001, PCI DSS, HIPAA
- Database
  - CloudSQL
  - Cloud Bigtable
  - Cloud Datastore
IaaS

**Upside**
- Flexible
- Tunable

**Downside**
- Configuration
- Management @ scale
- Monitoring
- Scaling

AWS Monthly EC2 Reserved Instance Cost
EC2 db.r3large = $76.75
PaaS

Upside
• Easy to use
• Full featured
• Forgettable
• Great for sweet spot

Downside
• Hard to tune
• Rigid
• Tough to scale
• Forgettable
• Premium cost

AWS Monthly RDS Reserved Instance Cost
RDS db.r3large = $138.70*
45% more than EC2
Cloud Success

• Service Synergy
  • IaaS is nice, but not valuable
  • Leverage services whenever possible

• Cloud is not a cost reduction strategy
  • Make sure you identify hidden costs

• Know the limits/tradeoffs
  • Test infrastructure & assumptions

• Monitor/alert to those limits

• Avoid integrating app w/infrastructure
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Active / Active DCs – Cross Geo, Cloud, Hybrid

Global Traffic Manager

Advantages

- Geo Load Balancing
- High Availability
- Resilience to Load Spikes

Challenges

- Resolving Writes
- Stale Reads
- Failover and Failback
Active / Active DCs – Strategy 1: Modify your Apps

1. Apps will need to understand where to send Writes and where to send Reads
2. No inherent Load Balancing
3. No inherent Replication awareness
4. Does not address Failover or Failback

Diagram:

- Global Traffic Manager
- Site A:
  - Web Load Balancer
  - App Servers
  - Database S
  - Database P
- Site B or Cloud:
  - Web Load Balancer
  - App Servers
  - Database P
  - Database S

Replication arrow from S to P and from P to S.
Active / Active DCs – Strategy 2 : PaaS

Apps will need to understand where to send Writes and where to send Reads

No inherent Load Balancing

No inherent Replication awareness

Cannot be used for a Hybrid Implementation
Active / Active DCs – Strategy 3: DB Proxy Layer

1. ScaleArc performs read/write split and geo-load balance database traffic
2. Best performance achieved by Time To First Byte
3. Active replication lag monitoring; avoids sending traffic to lagging nodes
4. Database auto failover is enabled within and across datacenters
Best Practices

- Make your Applications Agnostic to the Implementation Details
- Automate the processes as much as possible!!!
- Spend Time on the Important Stuff (Security, Migration, Ops)
- Be prepared for the Sprawl.....
- Don’t forget to backup everything!!!!!
- Avoid Vendor Lock-In