Amazon S3 + EC2 + Rails = Dream Team?

Thoughts by
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Amazon S3
Simple Storage Service

- Pricing
  - $0.15 per GB-Month
    (10 GB = $1.50 per month)

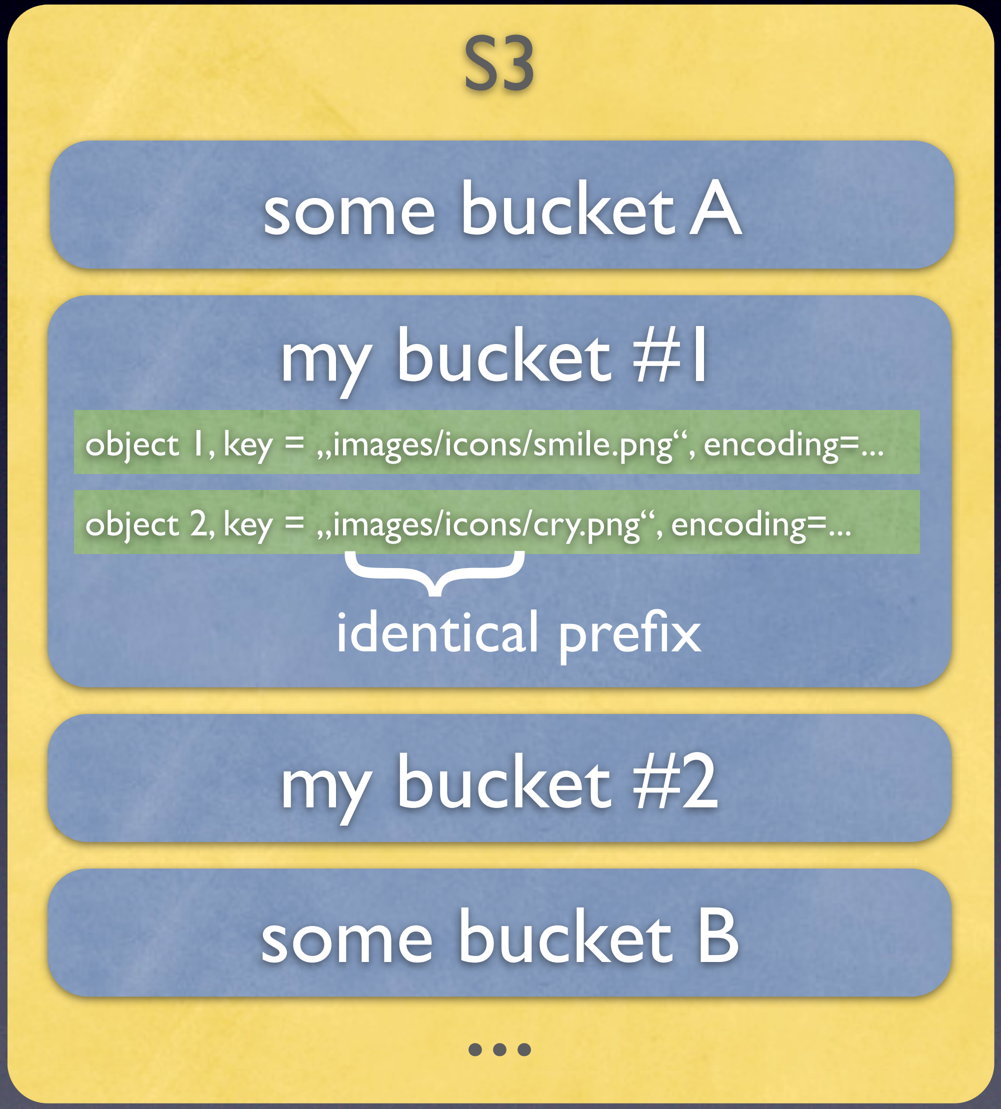
    NO COST DRIVER

  - $0.20 per GB of data transferred
    (100 GB = additional $20 per month)

    BEWARE HIGH TRAFFIC SITES

Amazon S3
Common Terms

- buckets:
  global name space
- objects:
  accessed by key [~ path+name]
  can have metadata
- prefixes:
  searching by prefix emulates directory structure
- ACL:
  everyone, authenticated users, owner / named users



S3

some bucket A

my bucket #1

object 1, key = „images/icons/smile.png“, encoding=...

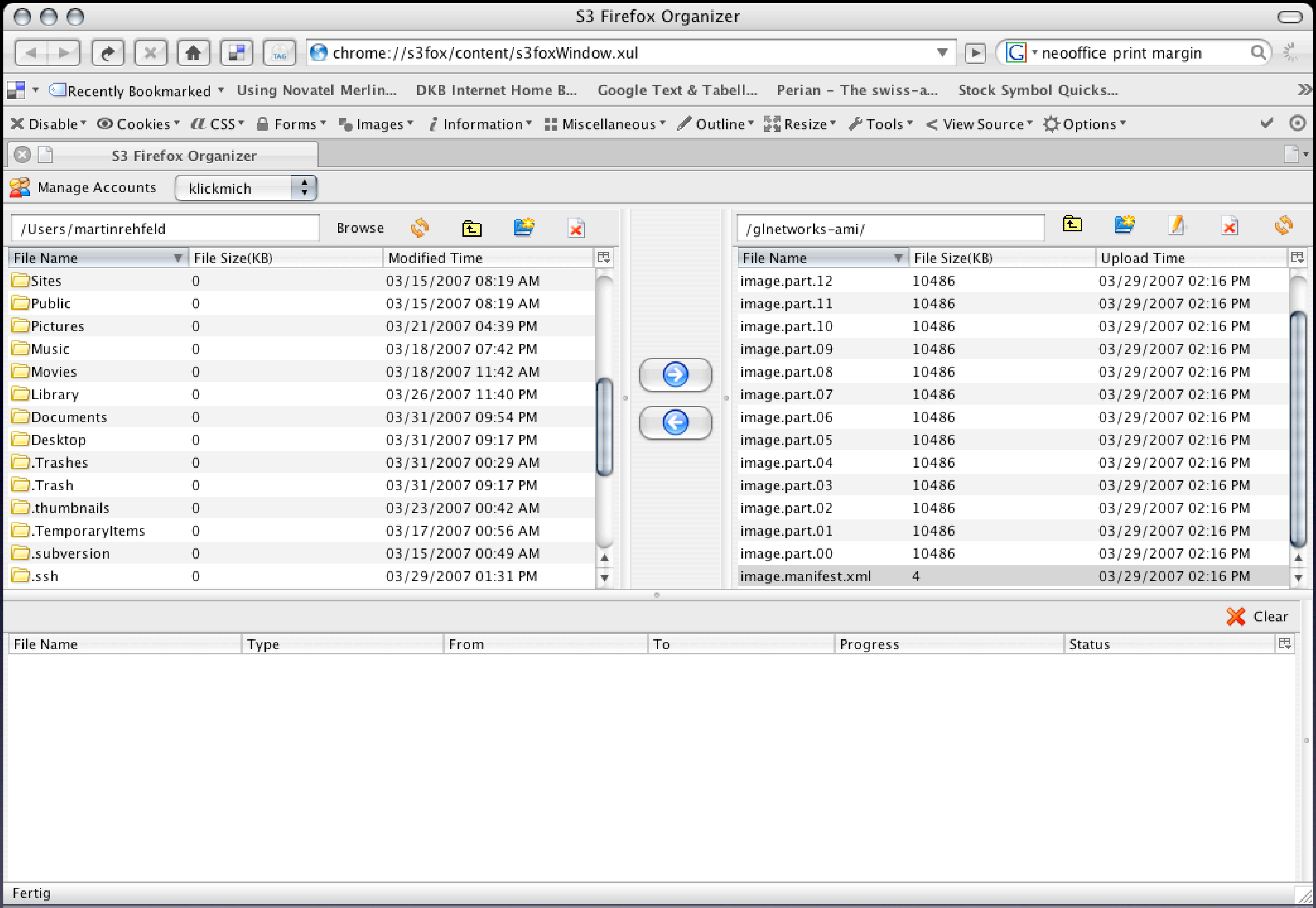
object 2, key = „images/icons/cry.png“, encoding=...

identical prefix

my bucket #2

some bucket B

...



chrome://s3fox/content/s3foxWindow.xul

neooffice print margin

Account: klickmich

/Users/martinrehfeld

File Name	File Size(KB)	Modified Time
Sites	0	03/15/2007 08:19 AM
Public	0	03/15/2007 08:19 AM
Pictures	0	03/21/2007 04:39 PM
Music	0	03/18/2007 07:42 PM
Movies	0	03/18/2007 11:42 AM
Library	0	03/26/2007 11:40 PM
Documents	0	03/31/2007 09:54 PM
Desktop	0	03/31/2007 09:17 PM
.Trashes	0	03/31/2007 00:29 AM
.Trash	0	03/31/2007 09:17 PM
.thumbnails	0	03/23/2007 00:42 AM
.TemporaryItems	0	03/17/2007 00:56 AM
.subversion	0	03/15/2007 00:49 AM
.ssh	0	03/29/2007 01:31 PM

/glnetworks-ami/

File Name	File Size(KB)	Upload Time
image.part.12	10486	03/29/2007 02:16 PM
image.part.11	10486	03/29/2007 02:16 PM
image.part.10	10486	03/29/2007 02:16 PM
image.part.09	10486	03/29/2007 02:16 PM
image.part.08	10486	03/29/2007 02:16 PM
image.part.07	10486	03/29/2007 02:16 PM
image.part.06	10486	03/29/2007 02:16 PM
image.part.05	10486	03/29/2007 02:16 PM
image.part.04	10486	03/29/2007 02:16 PM
image.part.03	10486	03/29/2007 02:16 PM
image.part.02	10486	03/29/2007 02:16 PM
image.part.01	10486	03/29/2007 02:16 PM
image.part.00	10486	03/29/2007 02:16 PM
image.manifest.xml	4	03/29/2007 02:16 PM

File Name	Type	From	To	Progress	Status

S3Fox Extension

Amazon EC2
Elastic Compute Cloud

- Pricing
  - $0.10 per instance-hour consumed (1 month 24x7 ~ $72)

IDEAL FOR STAGING AND SCALING

  - $0.20 per GB of data transferred (just internet traffic; no charge for EC2-S3 traffic)

TRAFFIC WARNING APPLIES

Amazon EC2 Instance Specs

- ~ 1.7 GHz x86 CPU
- 1.75 GB RAM
- 160 GB local disk space
- 250 Mb/s network bandwidth

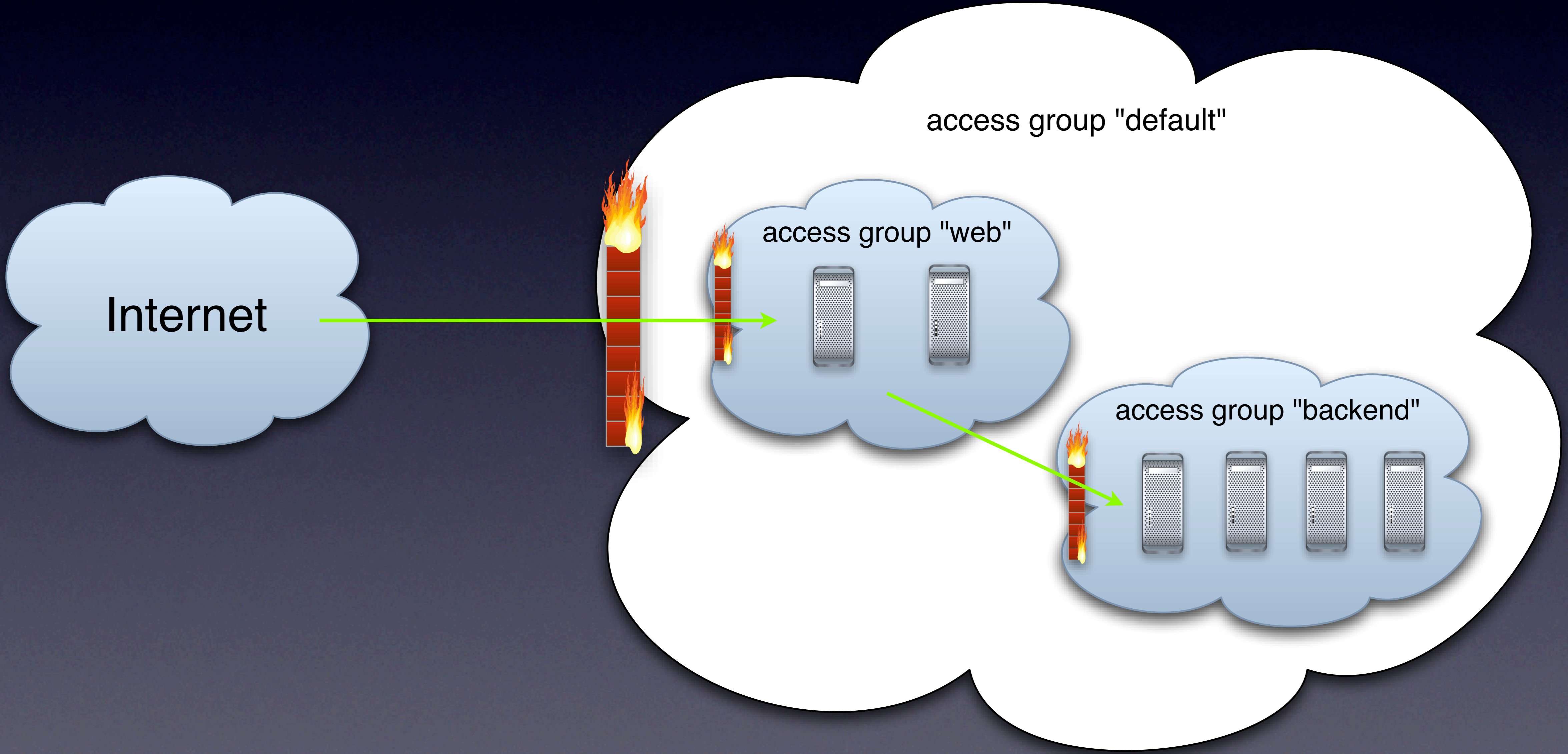
ACTUALLY
A XEN
VIRTUAL
INSTANCE

Amazon EC2 Common Terms

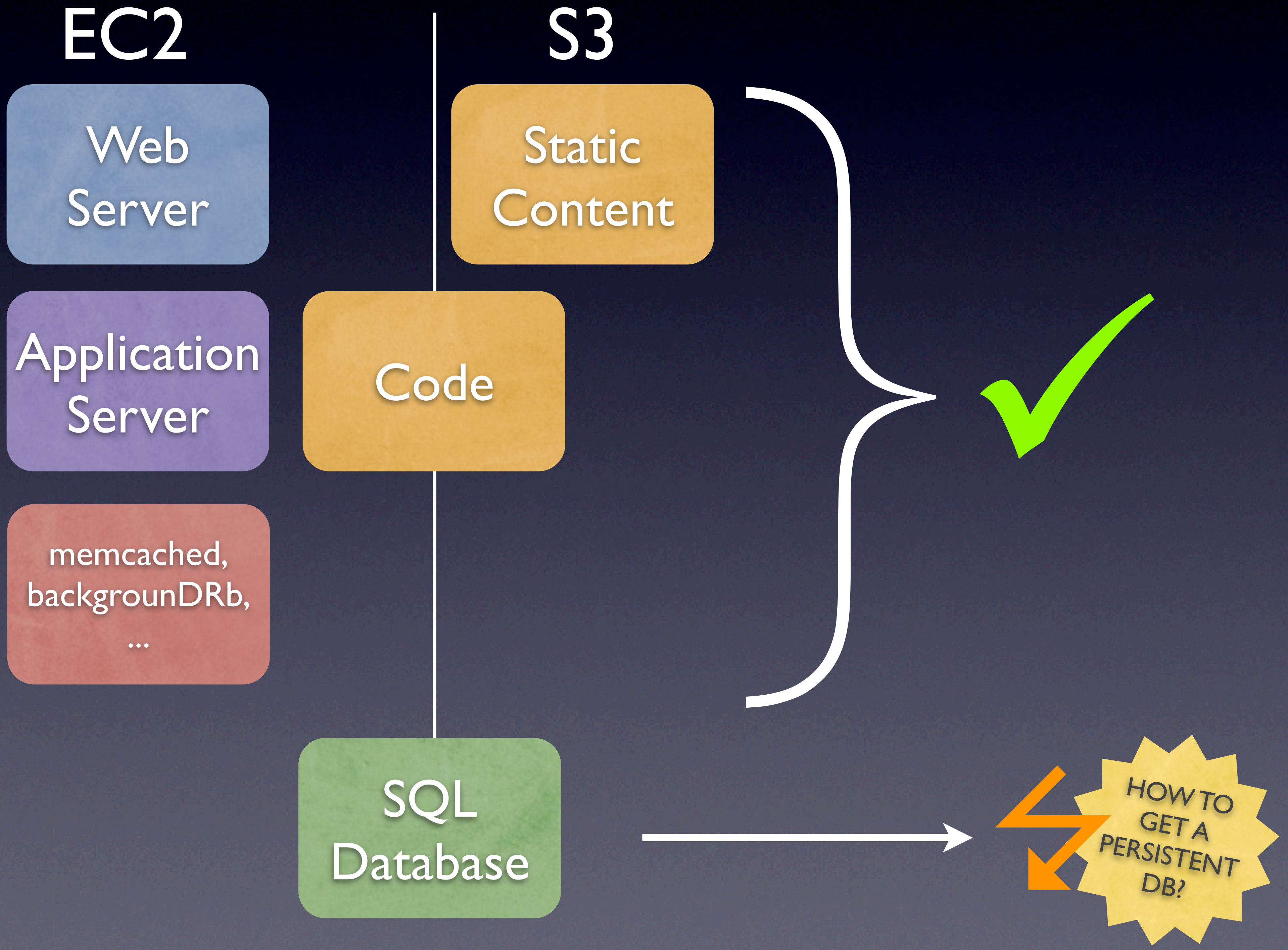
- images:
  named OS images stored in S3: „AMI“
- instances:
  virtual maschines running an AMI
- bundling:
  saving customized images back to S3
- non-persistence:
  local disk storage will not survive instance shutdown or failure

BUG OR FEATURE?

Amazon EC2 Network Security



Amazon EC2
Rails Scenario



EC2

S3

Web Server

Static Content

Application Server

Code

✓

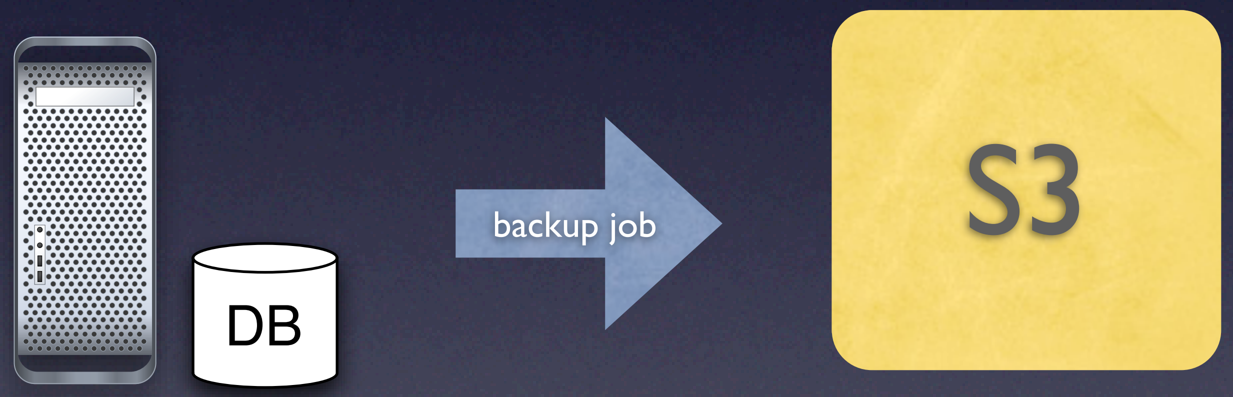
memcached, backgrounDRb, ...

SQL Database

HOW TO GET A PERSISTENT DB?

Amazon EC2
Database Persistence

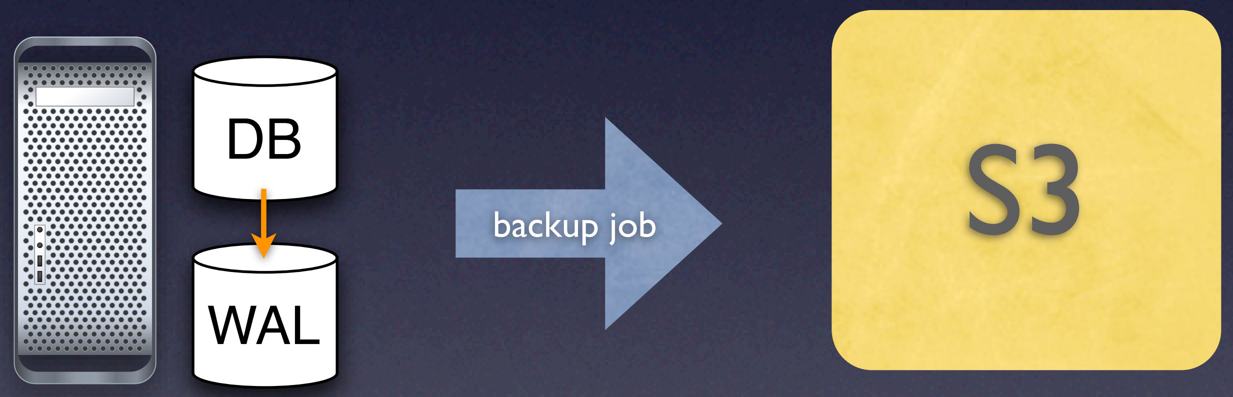
Flavor A:
Frequent backup to S3



- on instance failure you will lose all changes since last backup
- backup using a lot of resources
- no automatic failover

Amazon EC2
Database Persistence

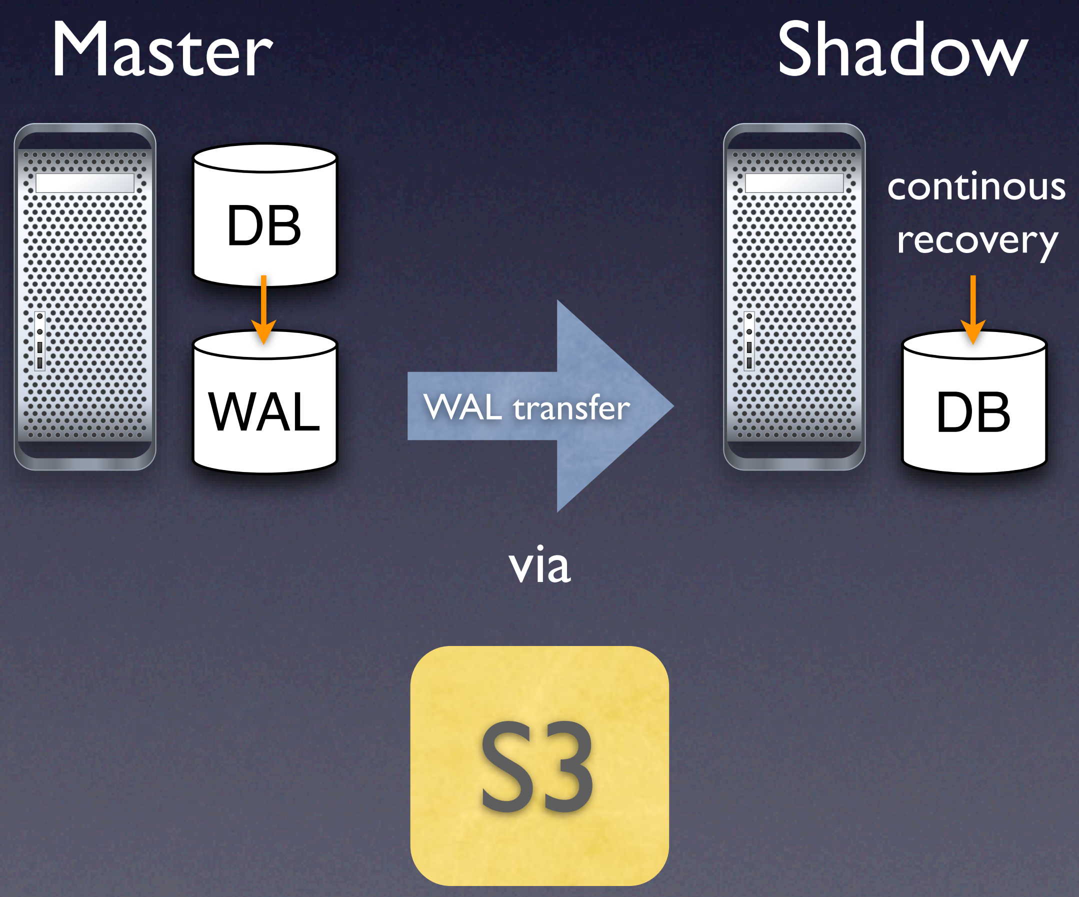
Flavor B:
Backup write ahead logs to S3



- on instance failure you will lose all changes since last log switch
- backup is fast, but recovery will take longer
- still no automatic failover

Amazon EC2 Database Persistence

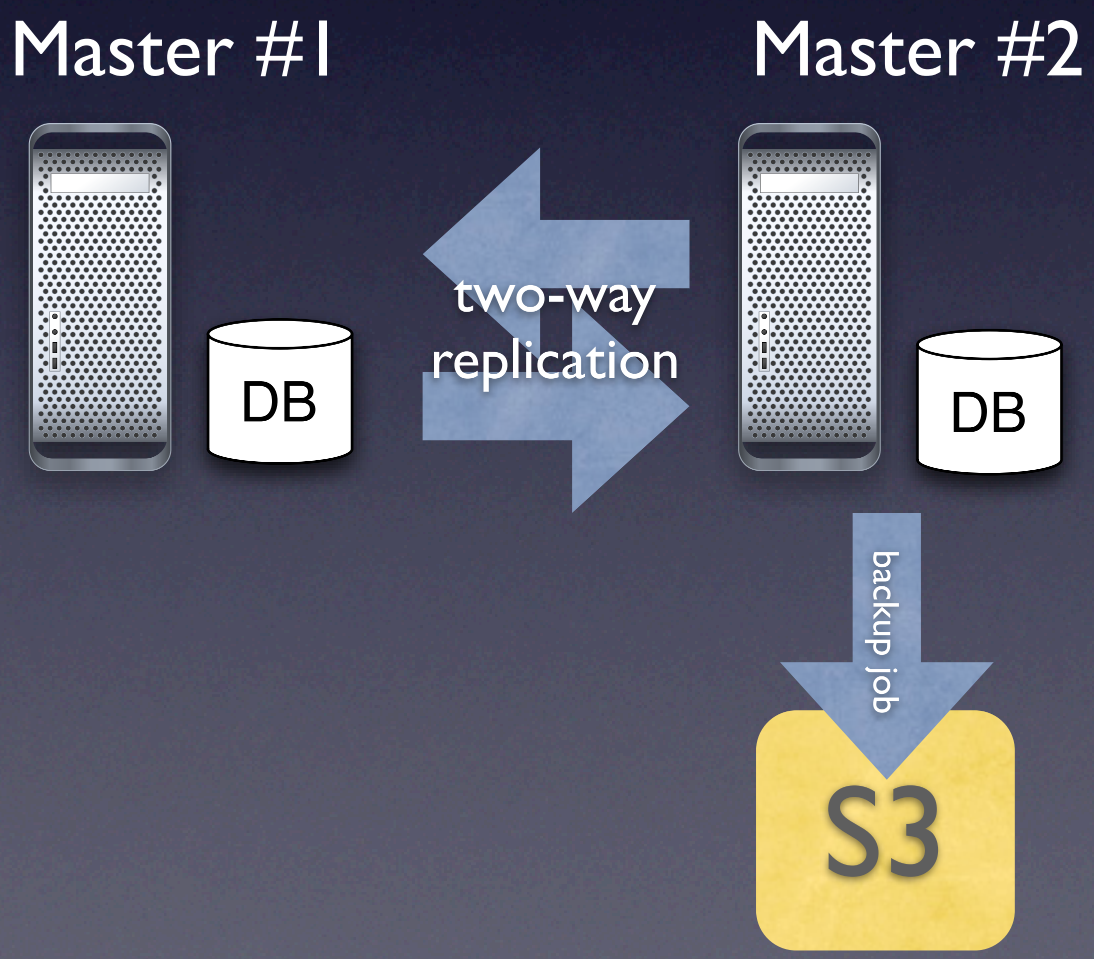
Flavor C: Shadow database



- you might still lose all changes since last log switch
- backup is fast, recovery is usually not neccessary (only if master and slave should fail at the same time)
- no load balancing between master and slave
- automatic failover can be achieved

Amazon EC2 Database Persistence

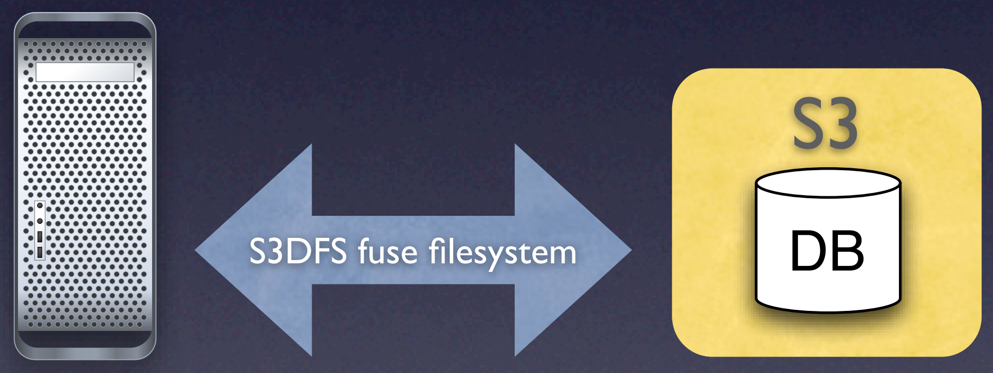
Flavor D: (Multi-Master-)Replication



- data loss only on failure of all instances
- reduced write performance
- sophisticated configuration → can be tricky
- should be combined with flavor A or B for backup
- load balancing can be achieved
- automatic failover can be achieved

Amazon EC2 Database Persistence

Flavor E (highly Experimental): DB files on S3DFS



- unless caching is used there should be no data loss
- (very?) reduced performance
- reliability of S3DFS yet to be proven
- can be combined with flavors A or B for backup
- can be combined with flavors C or D for failover and load balancing (flavor D only)

Resources

- Amazon EC2 / S3
  aws.amazon.com/ec2 / aws.amazon.com/s3
- Rails & EC2 & Capistrano tasks
  http://niblets.wordpress.com/2007/02/12/capistrano-ec2-sitting-in-a-tree-k-i-s-s-i-n-g/
- Amazon Web Services Ruby Gem (aws/s3)
  http://amazon.rubyforge.org/
- S3DFS filesystem driver
  http://www.openfount.com/blog/s3dfs-for-ec2
- Discussion on persistence with EC2
  http://blog.awswebshop.com/2007/01/07/thoughts-on-current-functionality-requests-for-future-functionality/
- Postgres WAL / continuous archiving
  http://www.postgresql.org/docs/8.2/static/wal-intro.html / http://www.postgresql.org/docs/8.2/static/continuous-archiving.html
- MySQL multi-master replication
  http://capttofu.livejournal.com/1752.html

Q & A

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