Amazon

A pioneer in deploying cloud solutions

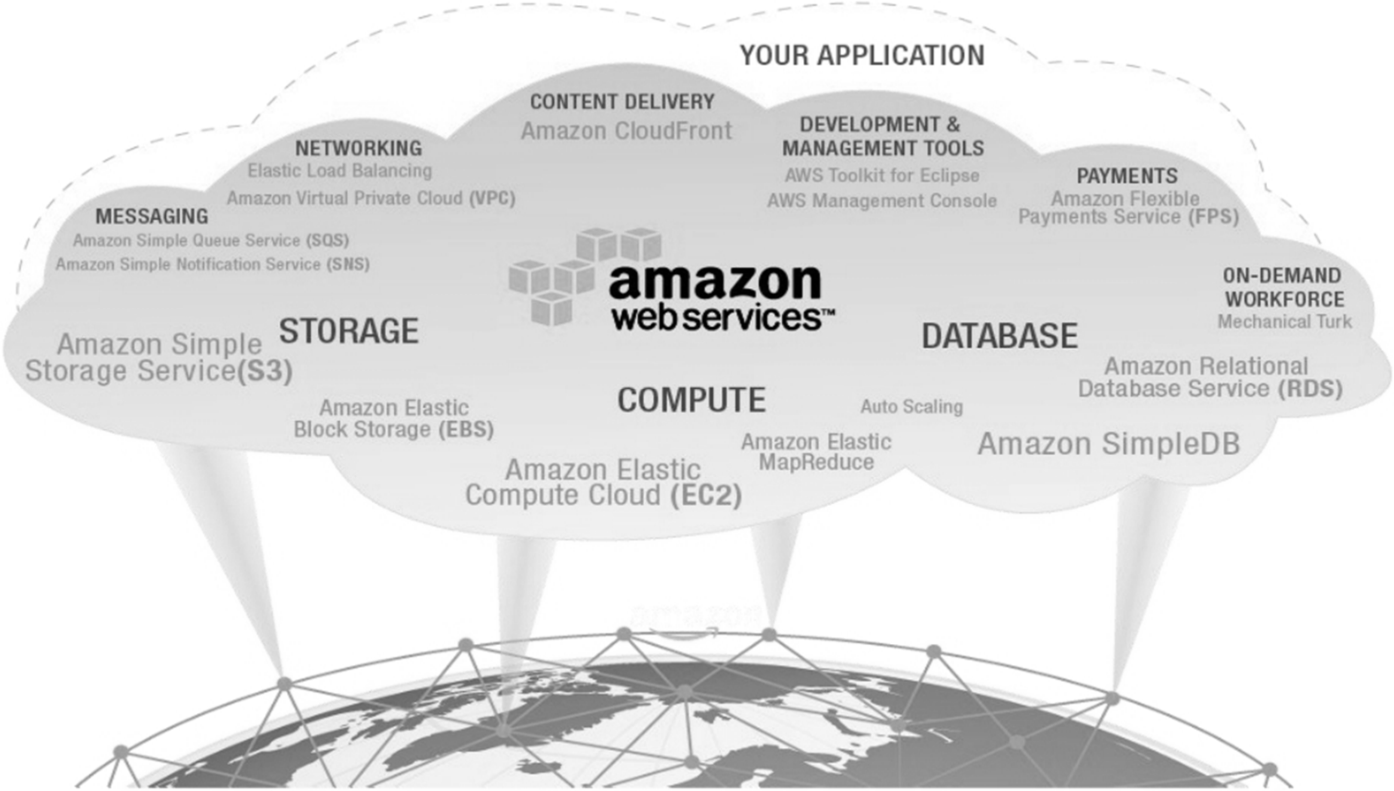
Prof. Tahar Kechadi

School of Computer Science & Informatics

Outline

- Amazon Web Services (http://aws.amazon.com)

Amazon Web Services (AWS)


YOUR APPLICATION
CONTENT DELIVERY
Amazon CloudFront
DEVELOPMENT & MANAGEMENT TOOLS
AWS Toolkit for Eclipse
AWS Management Console
NETWORKING
Elastic Load Balancing
Amazon Virtual Private Cloud (VPC)
PAYMENTS
Amazon Flexible Payments Service (FPS)
MESSAGING
Amazon Simple Queue Service (SQS)
Amazon Simple Notification Service (SNS)
amazon web services™
ON-DEMAND WORKFORCE
Mechanical Turk
STORAGE
Amazon Simple Storage Service (S3)
Amazon Elastic Block Storage (EBS)
DATABASE
Amazon Relational Database Service (RDS)
Amazon SimpleDB
COMPUTE
Auto Scaling
Amazon Elastic MapReduce
Amazon Elastic Compute Cloud (EC2)

Amazon Web Services (AWS)

Amazon.com is the World’s largest Cloud provider and online retailer

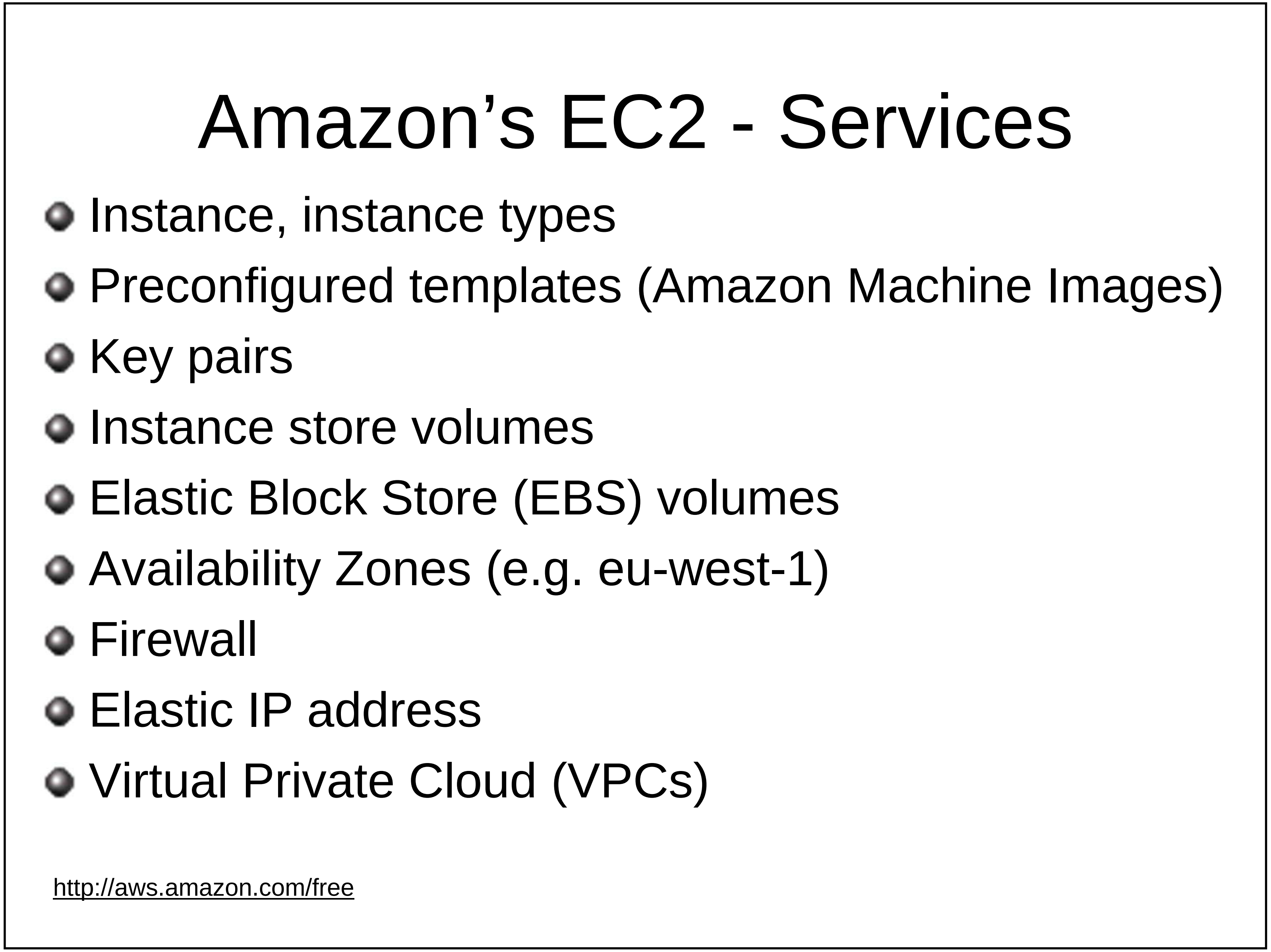
AWS are a set of business models and APIs which give access to Amazon’s cloud offerings and content, including:

- Amazon Elastic Compute Cloud (EC2)
- Amazon Simple Storage Service (S3)
- Amazon Simple Queue Service (SQS)
- Amazon Elastic MapReduce
- Amazon SimpleDB
- Amazon Relational Database Service (RDS)
- Amazon CloudFront
- Amazon DevPay
- Amazon Mechanical Turk
- ….

Amazon’s EC2

- Amazon EC2 provides resizable compute capacity in the cloud. The user defines the virtual Amazon EC2 environment with the OS, services, databases, and application platform stack required for the application
  - Existing pre-configured, template images
  - Create your own Amazon Machine Image (AMI) containing your applications, libraries, data, and associated configuration settings, including security and network access
  - Variety of instance types, multiple locations, management tools and API services provided
  - Persistent storage

http://aws.amazon.com/free



Amazon’s EC2 - Services

- Instance, instance types
- Preconfigured templates (Amazon Machine Images)
- Key pairs
- Instance store volumes
- Elastic Block Store (EBS) volumes
- Availability Zones (e.g. eu-west-1)
- Firewall
- Elastic IP address
- Virtual Private Cloud (VPCs)

http://aws.amazon.com/free

Amazon’s EC2 – Getting Start

- Sign up
- Access Amazon EC2 console
- Create a Key Pair
- Set Security group
- Create an instance
- Launching, connecting and using an instance.

http://aws.amazon.com/free

Amazon’s S3

- Amazon S3 provides a simple web services interface to store and retrieve data, at any time, from anywhere on the web. Amazon S3 duplicates the data
  - No setup fee, no monthly minimum
  - Each object is stored and retrieved via a unique key, assigned by the developer/user
  - Authentication mechanisms
  - Pricing of storage and transfer varies depending on the usage
  - Private and public storage
  - Each object up to 5GB in size, unlimited amount of objects
  - Location can be chosen

S3 - Components

- *Objects* are the fundamental storage entities in S3. They are composed of object data and metadata
- *A bucket* is a container for objects. Every object is contained within a bucket
- *A key* is a unique identifier for an object within a bucket. Every object has exactly one key

S3 – Components (cont.)

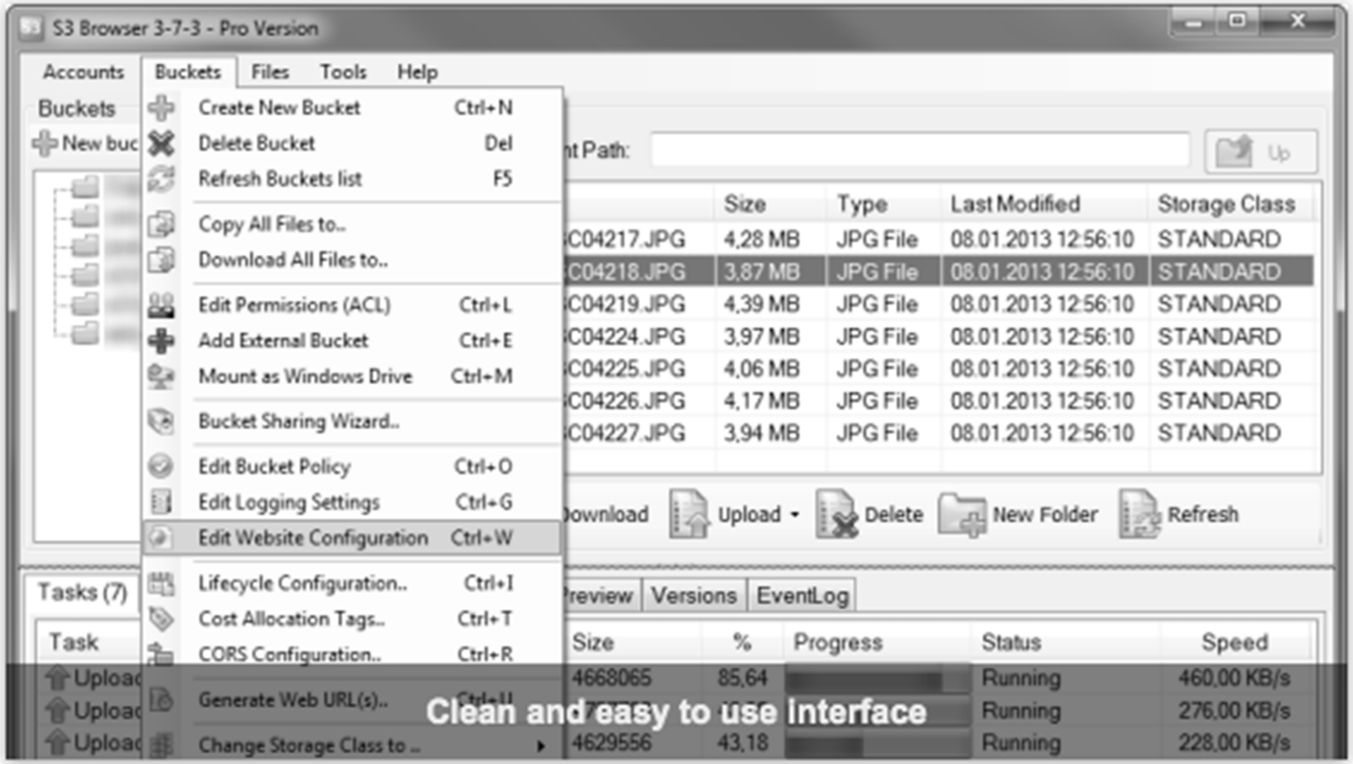
- The bucket name + key uniquely identify each object
- Requests to S3 require authentication, unless the owner of an object has specifically granted anonymous access to an object or bucket
- AWS Access Key required by S3

Amazon’s S3 - Operations

- Common operations:
  - Create a bucket (CreateBucket)
  - Write an object (PutObjectInline)
  - Read an object (GetObject)
  - Deleting an object (DeleteObject)
  - Listing keys (ListBucket)
  - Etc.

  - API operations & Examples of use with respect to service, bucket, object etc.:
    - http://docs.amazonwebservices.com/AmazonS3/latest/API/

S3 Browser

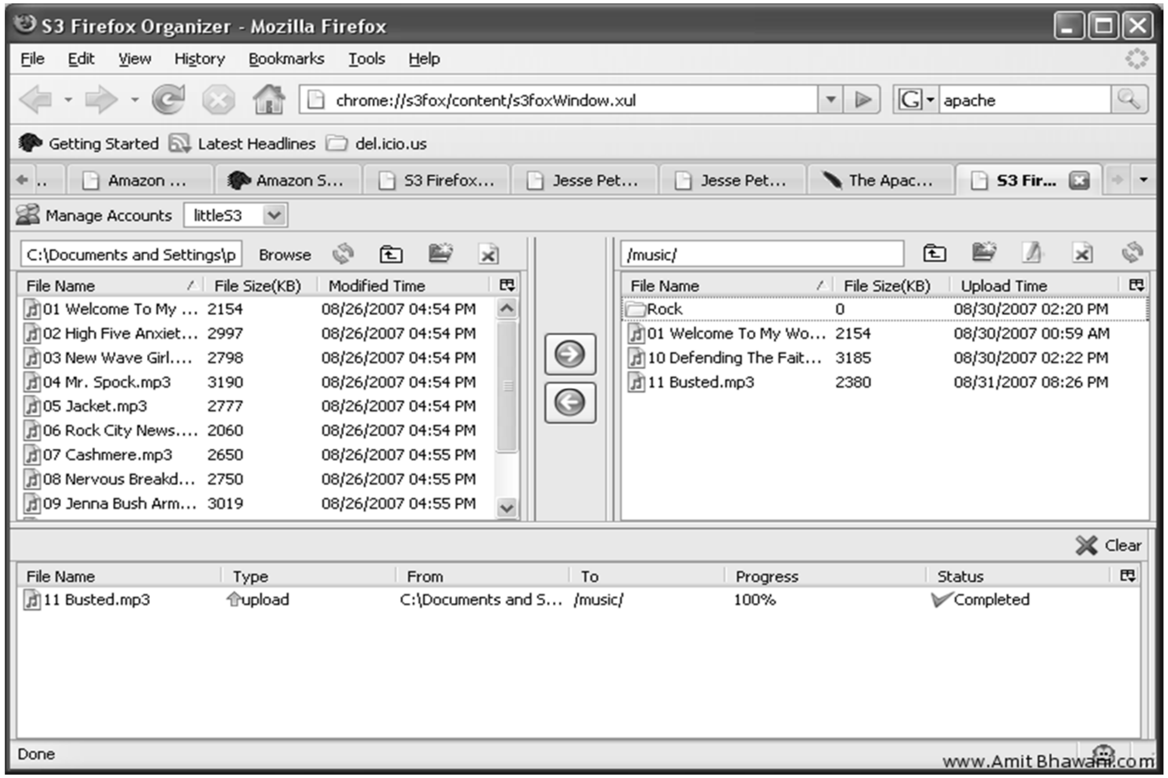

S3 Browser 3-7-3 - Pro Version
Accounts
Buckets
Files
Tools
Help
Buckets
New buc
Create New Bucket Ctrl+N
Delete Bucket Del
Refresh Buckets list F5
Copy All Files to..
Download All Files to..
Edit Permissions (ACL) Ctrl+L
Add External Bucket Ctrl+E
Mount as Windows Drive Ctrl+M
Bucket Sharing Wizard..
Edit Bucket Policy Ctrl+O
Edit Logging Settings Ctrl+G
Edit Website Configuration Ctrl+W
Lifecycle Configuration.. Ctrl+I
Cost Allocation Tags.. Ctrl+T
CORS Configuration.. Ctrl+R
Generate Web URL(s).. Ctrl+U
Change Storage Class to ..
nt Path:
Up
ownload
Upload
Delete
New Folder
Refresh
Tasks (7)
review
Versions
EventLog

	Size	Type	Last Modified	Storage Class
C04217.JPG	4,28 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04218.JPG	3,87 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04219.JPG	4,39 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04224.JPG	3,97 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04225.JPG	4,06 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04226.JPG	4,17 MB	JPG File	08.01.2013 12:56:10	STANDARD
C04227.JPG	3,94 MB	JPG File	08.01.2013 12:56:10	STANDARD

Task	Size	%	Progress	Status	Speed
Upload	4668065	85,64		Running	460,00 KB/s
Upload	[illegible]	[illegible]		Running	276,00 KB/s
Upload	4629556	43,18		Running	228,00 KB/s

Clean and easy to use Interface

Firefox Organiser



File Name	File Size(KB)	Modified Time
01 Welcome To My ...	2154	08/26/2007 04:54 PM
02 High Five Anxiet...	2997	08/26/2007 04:54 PM
03 New Wave Girl....	2798	08/26/2007 04:54 PM
04 Mr. Spock.mp3	3190	08/26/2007 04:54 PM
05 Jacket.mp3	2777	08/26/2007 04:54 PM
06 Rock City News....	2060	08/26/2007 04:54 PM
07 Cashmere.mp3	2650	08/26/2007 04:55 PM
08 Nervous Breakd...	2750	08/26/2007 04:55 PM
09 Jenna Bush Arm...	3019	08/26/2007 04:55 PM

File Name	File Size(KB)	Upload Time
Rock	0	08/30/2007 02:20 PM
01 Welcome To My Wo...	2154	08/30/2007 00:59 AM
10 Defending The Fait...	3185	08/30/2007 02:22 PM
11 Busted.mp3	2380	08/31/2007 08:26 PM

File Name	Type	From	To	Progress	Status
11 Busted.mp3	upload	C:\Documents and S...	/music/	100%	Completed

S3 Firefox Organiser (https://addons.mozilla.org/en-US/firefox/addon/amazon-s3-organizers3fox/)

Amazon’s SimpleDB

- Amazon SimpleDB is a non-relational data store. It provides the core database functions of data indexing and querying non-relational DB
  - No need to pre-define schema
  - Store and retrieve structured data
  - Optional consistent reads
  - No transactions, conditional put/delete

Relational databases vs. Non-relational databases (cont.)

- Relational Database
  - Tables, Key
  - Integrity Rules (distinct, not be repeating, primary key, etc.)
  - Database Normalisation
  - Consistency
  - SQL
  - RDBMS
- Big Data
  - Volume
  - Velocity -> all data needs processing
  - Variety
  - Concurrency
  - Exponential growth

Relational databases vs. Non-relational databases (cont.)

- Issues with Relational Database
  - Lots of data
  - Distribution
  - Not scalable
  - …
- CAP theorem (Eric Brewer, 2000)
  - Consistency
  - Availability
  - Partition-tolerance

Relational databases vs. Non-relational databases (cont.)

- New kinds of DBMS: non-relational
  - BigTable
  - Hbase
  - Dynamo
  - MongoDB
- Pros:
  - Scalable
  - Fast
  - Highly available, dencentralised, fault-tolerant
  - Parallel processing
  - …

Amazon’s SimpleDB

- Domains
  - Containers to store and query structured data (similar to spreadsheet)
  - No cross domain querying
- Items
  - Individual objects within domains (similar to a row in worksheet)
- Attributes
  - Categories of data that can be assigned to items
- Values
  - Instances of attributes for items. An attribute can have multiple values.

Amazon’s SimpleDB

- Operations include:
  - CreateDomain, DeleteDomain, ListDomains
  - PutAttributes
  - BatchPutAttributes
  - DeleteAttributes
  - GetAttributes
  - Select, etc.
    - ➢ http://docs.aws.amazon.com/AmazonSimpleDB/latest/DeveloperGuide/Welcome.html

Amazon’s RDS

- Amazon RDS provides an environment to set up, operate, and scale relational databases in the cloud. It provides resizable database capacity while managing time-consuming database administration tasks
  - Full capabilities of MySQL/Oracle/SQL Server databases
  - Automated backups
  - DB snapshots
  - Multi-Availability Zone deployments
    - Enhanced availability though multiple availability zones

Amazon’s RDS

- Easy deployment, managed, secure, scalable, and reliable. Simple Steps:
    - Use AWS Management Console/API to launch a database instance (DB Instance)
    - Connect to DB Instance with any MySQL supported tool
    - As the other services, easily monitored through Amazon CloudWatch
- Some commonly used API operations:
    - CreateDBInstance
    - ModifyDBInstance
    - CreateDBSnapshot, etc.
        - http://docs.aws.amazon.com/AmazonRDS/latest/APIReference/Welcome.html

RDS vs. SimpleDB

- SimpleDB
  - Scales up/down automatically
  - Highly available (no downtime)
  - No joins, no transactions, more flexible
- RDS
  - Existing applications that require relational database
  - Need to decide the scaling decisions
    - How much storage, what size instance, etc.

Amazon’s DevPay

- Amazon DevPay is an online billing and account management service for applications that are built in, or run on top of, AWS Services
  - Applications or AMI can be registered with DevPay providing the product description and pricing
  - Easily embedded into the purchase workflow
  - Integrates authentication mechanism
  - Monitoring through the activity page