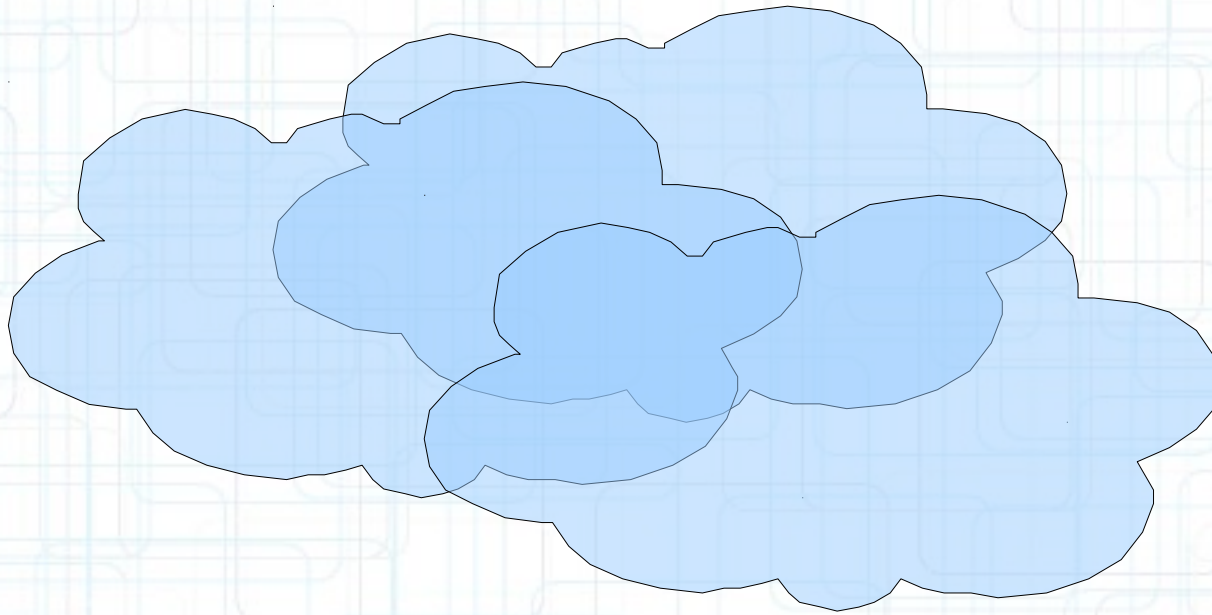


# MATHRICE / mars 2010

Cloud { Computing, Storage }



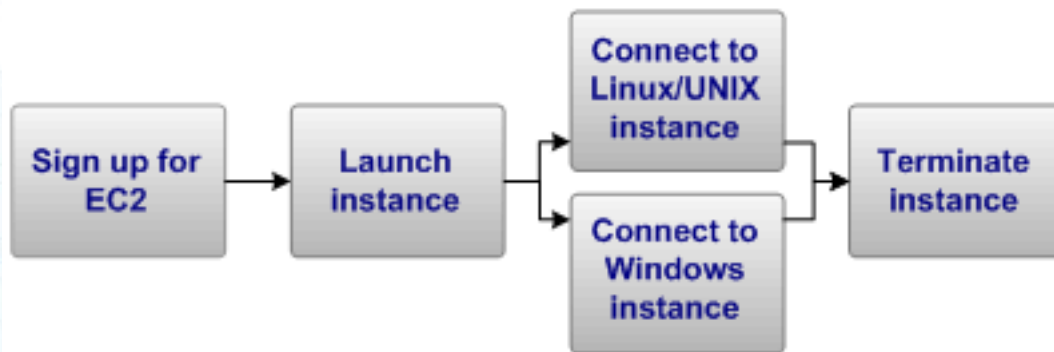
David Delavennat / CGM - CNRS

# Qu'est ce que c'est?

Mode de commercialisation de ressources informatiques :

- CPU
- DISK
- SGBD
- logiciels
- 
- **Software as a Service** : abonnement à un logiciel plutôt que l'achat d'une licence
- **Platform as a Service**
- **Infrastructure as a Service**

# Exemple : Amazon Web Services



# Amazon EC2 (Elastic Compute Cloud)

- fournitures de ressources sur lesquelles faire tourner ses propres applications.
  - facturation à l'heure d'activité, d'où la terminologie «Elastic»
- permet de consommer juste les ressources nécessaires
- accessible au travers d'un service web sécurisé
  - permet le lancement d'«Amazon Machine Images»
  - une AMI active est une instance
  - une instance permet d'héberger toutes les applications usuelles
- création, lancement, arrêt d'une instance à la demande
- possibilité de géolocaliser les instances
  - redondance géographique
  - optimisation de la latence

Cf [http://en.wikipedia.org/wiki/Amazon\\_Elastic\\_Compute\\_Cloud](http://en.wikipedia.org/wiki/Amazon_Elastic_Compute_Cloud)

# Exemple : Amazon Web Services

## AWS Management Console

### A Web-based Interface to Manage Your Services

Access and manage Amazon's growing suite of infrastructure web services through our new point-and-click, web-based user interface. The AWS Management Console gives you a quick, global picture of your cloud computing environment so that you can see what resources you're operating and conveniently manage those resources.

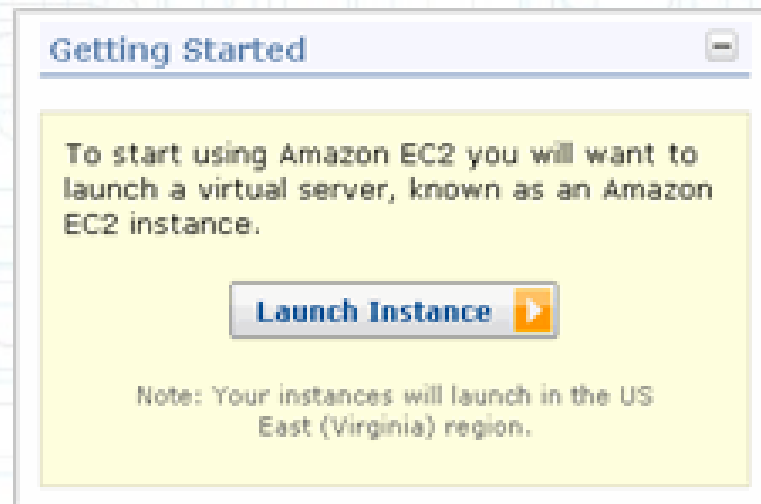
**Already have an AWS account?**  
Sign in to get started.

[Sign in to the AWS Console](#)

EC2

Save this as your default console

# Exemple : Amazon Web Services



The image shows a screenshot of a 'Getting Started' dialog box. The title bar reads 'Getting Started'. The main text says: 'To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.' Below this text is a button labeled 'Launch Instance' with a right-pointing arrow. At the bottom, a note states: 'Note: Your instances will launch in the US East (Virginia) region.'

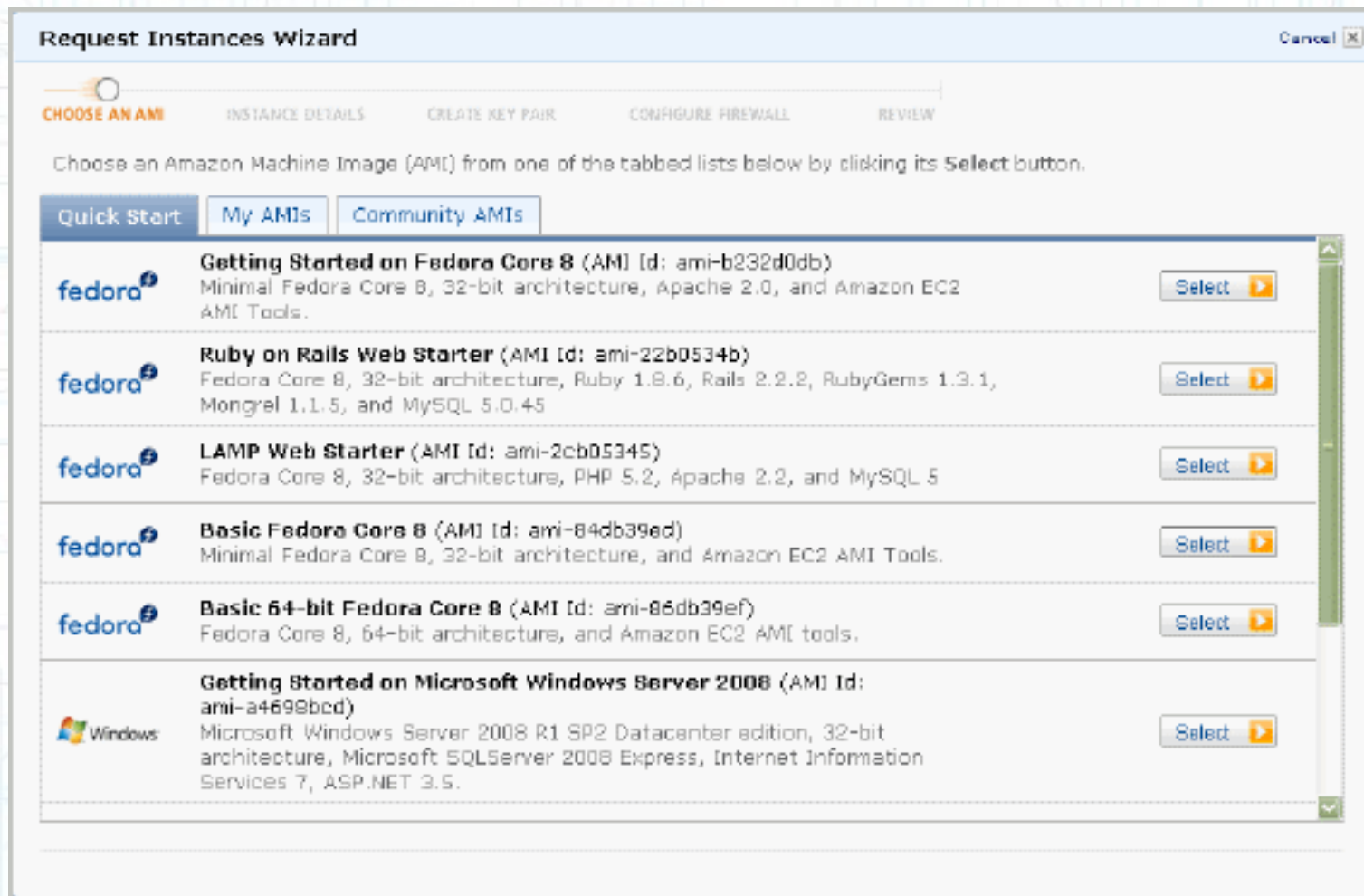
**Getting Started**

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

**Launch Instance** ▶

Note: Your instances will launch in the US East (Virginia) region.

# Exemple : Amazon Web Services















**Request Instances Wizard** Cancel X

CHOOSE AN AMI    INSTANCE DETAILS    CREATE KEY PAIR    CONFIGURE FIREWALL    REVIEW

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Quick start    My AMIs    Community AMIs

	<b>Getting Started on Fedora Core 8 (AMI Id: ami-b232d0db)</b> Minimal Fedora Core 8, 32-bit architecture, Apache 2.0, and Amazon EC2 AMI Tools.	Select 
	<b>Ruby on Rails Web Starter (AMI Id: ami-22b0534b)</b> Fedora Core 8, 32-bit architecture, Ruby 1.8.6, Rails 2.2.2, RubyGems 1.3.1, Mongrel 1.1.5, and MySQL 5.0.45	Select 
	<b>LAMP Web Starter (AMI Id: ami-2cb05345)</b> Fedora Core 8, 32-bit architecture, PHP 5.2, Apache 2.2, and MySQL 5	Select 
	<b>Basic Fedora Core 8 (AMI Id: ami-84db39ed)</b> Minimal Fedora Core 8, 32-bit architecture, and Amazon EC2 AMI Tools.	Select 
	<b>Basic 64-bit Fedora Core 8 (AMI Id: ami-86db39ef)</b> Fedora Core 8, 64-bit architecture, and Amazon EC2 AMI tools.	Select 
	<b>Getting Started on Microsoft Windows Server 2008 (AMI Id: ami-a4698bcd)</b> Microsoft Windows Server 2008 R1 SP2 Datacenter edition, 32-bit architecture, Microsoft SQLServer 2008 Express, Internet Information Services 7, ASP.NET 3.5.	Select 

# Example : Amazon Web Services

### Request Instances Wizard Cancel X

CHOOSE AN AMI    INSTANCE DETAILS    **CREATE KEY PAIR**    CONFIGURE FIREWALL    REVIEW


Public/private key pairs allow you to securely connect to your instance after it launches. To create a key pair, enter a name and click **Create & Download your Key Pair**. You will then be prompted to save the private key to your computer. Note, you only need to generate a key pair once - not each time you want to deploy an Amazon EC2 instance.


Choose from your existing Key Pairs

Create a new Key Pair

1. Enter a name for your key pair: \*  (e.g., jdoekey)

2. Click to create your key pair: \*

 **Create & Download your Key Pair**

 Save this file in a place you will remember. You can use this key pair to launch other instances in the future or visit the Key Pairs page to create or manage existing ones.

Proceed without a Key Pair

[< Back](#)    [Continue >](#)



# Example : Amazon Web Services

### Request Instances Wizard

Cancel X

CHOOSE AN AMI | INSTANCE DETAILS | CREATE KEY PAIR | **CONFIGURE FIREWALL** | REVIEW

Security groups determine whether a network port is open or blocked on your instances. You may use an existing security group, or we can help you create a new security group to allow access to your instances using the suggested ports below. Add additional ports now or update your security group anytime using the Security Groups page. All changes take effect immediately.

Choose one or more of your existing Security Groups

Create a new Security Group

1. Name your Security Group

2. Describe your Security Group

3. Define allowed Connections

Application	Transport	Port	Source Network (IPv4 CIDR)	Actions
SSH	tcp	22	All Internet	<input type="button" value="Remove"/>
HTTP	tcp	80	All Internet	<input type="button" value="Remove"/>
Select...	-	-	All Internet Change	<input type="button" value="Add Rule"/>

[< Back](#)

# Example : Amazon Web Services

### Request Instances Wizard

Cancel X

CHOOSE AN AMI    INSTANCE DETAILS    CREATE KEY PAIR    **CONFIGURE FIREWALL**    REVIEW

Security groups determine whether a network port is open or blocked on your instances. You may use an existing security group, or we can help you create a new security group to allow access to your instances using the suggested ports below. Add additional ports now or update your security group anytime using the Security Groups page. All changes take effect immediately.

Choose one or more of your existing Security Groups

Create a new Security Group

1. Name your Security Group


2. Describe your Security Group

3. Define allowed Connections

Application	Transport	Port	Source Network (IPv4 CIDR)	Actions
RDP	tcp	3389	All Internet	<input type="button" value="Remove"/>
MS SQL Server	tcp	1433	All Internet	<input type="button" value="Remove"/>
HTTP	tcp	80	All Internet	<input type="button" value="Remove"/>
<input type="text" value="Select..."/>	-	-	All Internet Change	<input type="button" value="Add Rule"/>

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# Exemple : Amazon Web Services

Instance	AMI ID	Root Device Type	Type	Status	Lifecycle	Public DNS
  i-b58ed1dd	ami-b232d0db	ebs	m1.small	 pending	normal	

Instance	AMI ID	Root Device Type	Type	Status	Lifecycle	Public DNS
<input type="checkbox"/>  i-b59ed1dd	ami-b232d0db	ebs	m1.small	 running	normal	ec2-174-129-128

# Amazon S3 (Simple Storage Service)

- stockage virtuellement illimité
- accès au travers d'un service web
- disponibilité :
  - au États-Unis depuis mars 2006
  - en Europe depuis novembre 2007
- facturation :
  - au départ :
    - 0.15\$US / Go / mois
    - coût additionnels pour la bande passante
    - coût par requête PUT/GET
  - depuis novembre 2008 :
    - pris de gros pour plus de 50To

# Amazon S3 (Simple Storage Service)

- volumétrie:
  - au 1er mars 2008 Amazon S3 stockait 29 milliards d'objets
  - au 1er mars 2009 Amazon S3 stockait 54 milliards d'objets
  - au 1er mars 2010 Amazon S3 stockerait plus de 102 milliards d'objets
- usage:
  - hébergement web
  - hébergement d'images
  - systèmes de backup
- disponibilité garantie:
  - 99.9% / mois

Cf [http://en.wikipedia.org/wiki/Amazon\\_Simple\\_Storage\\_Service](http://en.wikipedia.org/wiki/Amazon_Simple_Storage_Service)

# Amazon EBS (Elastic Block Store)

- volumes de stockage en mode bloc
- accessible depuis une instance EC2
- volume persistant indépendamment du cycle de vie d'une instance
- haute disponibilité
- vu comme un device par une instance
- application :
  - base de données
  - système de fichiers
  - stockage RAW

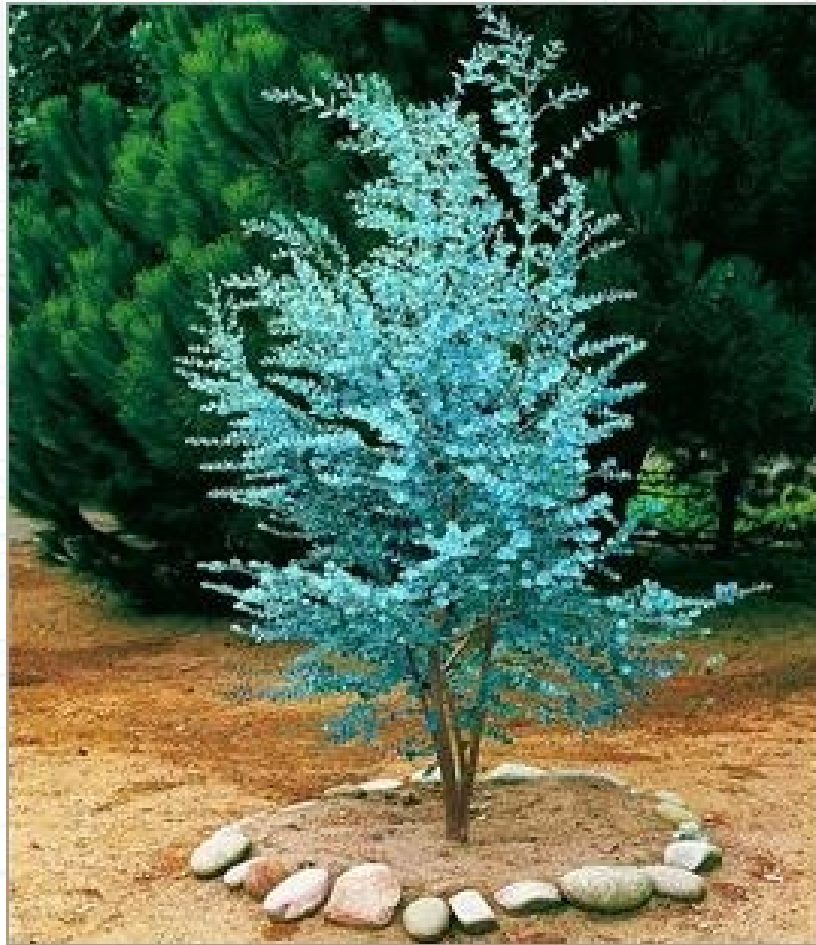
# Amazon SimpleDB

- base de donnée distribuée développée en Erlang par Amazon.com
- accessible au travers d'un service web
- annoncé en décembre 2007
  
- facturation :
  - volume
  - IO
  - bande passante

Les interactions avec les autres Services Web d'Amazon sont exemptes de coût additionnel

Cf [http://en.wikipedia.org/wiki/Amazon\\_Simple\\_Storage\\_Service](http://en.wikipedia.org/wiki/Amazon_Simple_Storage_Service)

# Framework open-source





# Eucalyptus

- **Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems**
- projet de recherche du « Computer Science Department at the University of California, Santa Barbara »
- infrastructure open-source permettant la mise en œuvre de « cloud computing » sur des clusters d'ordinateurs
- compatible avec les Amazon Web Services
- disponible aux formats
  - source
  - RPM
  - image disque ROCKS Cluster
  - intégré à ubuntu (depuis 9.04)

Cf [http://en.wikipedia.org/wiki/Eucalyptus\\_%28computing%29](http://en.wikipedia.org/wiki/Eucalyptus_%28computing%29)

Cf <http://open.eucalyptus.com/about/story>

# Interface de programmation

- <http://docs.amazonwebservices.com/AWSImportExport/latest/API/>
- Interface Ruby d'accès à simple-db : aws-sdb
- Interface Ruby d'accès à S3 : aws-s3

```
require 'aws/s3'
```

```
AWS::S3::Base.establish_connection!(  
  :access_key_id    => 'key goes here',  
  :secret_access_key => 'secret goes here'  
)
```

```
S3Object.store(  
  'name of object',  
  File.open('large-picture.jpg'),  
  'name of bucket',  
  :content_type => 'image/jpeg'  
)
```