

CLOUD COMPUTING AND M4D

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MOOC4D

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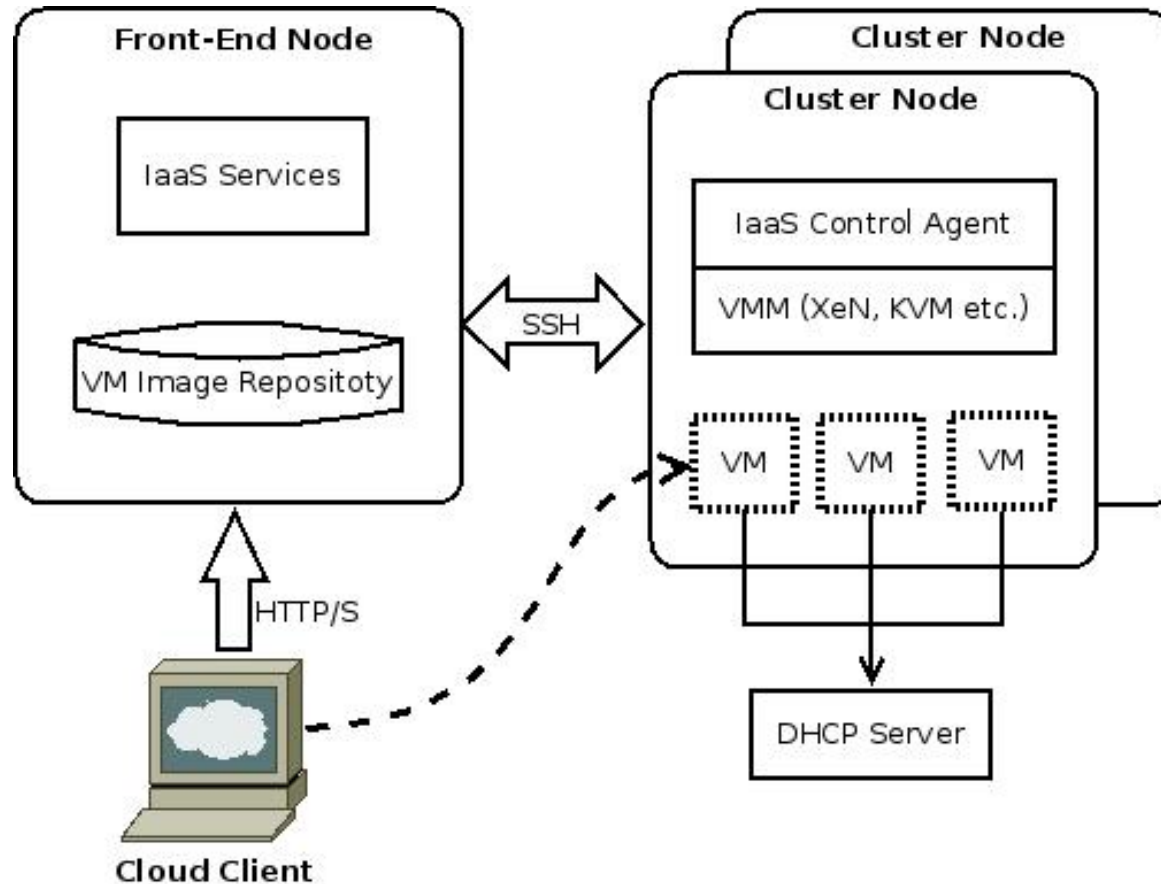
Infrastructure as a Service Cloud

A SERVICE MODEL BASED VARIANT

Infrastructure as a Service (IaaS)

- Provides fundamental computing resources
 - Processing
 - Storage
 - Networks
 - Etc.
- User can deploy and run arbitrary software
 - E.g. operating systems and applications
- No control of underlying hardware
 - Can allow limited control of networking components
 - Full control of OS
- Typically, enabled via virtualization technologies
 - VM is a common deployment unit
 - E.g. AWS EC2

IaaS Architecture



IaaS Cloud Characteristics

- Provides bare-bones computing infrastructure
 - Storage, compute networking etc., often via a VM
- Cloud user responsible for installing/managing all software on VM
- Allows resource utilization monitoring and reacting to events
 - Responsibility again lies with the user application
- Limited control on networking components, e.g. host firewalls
- By far the most flexible cloud variant
 - User can configure/control the VM and software stack
 - This also means more effort from the cloud user

Vendor Example | Amazon Web Services

- A leading public IaaS cloud provider
- Offers wide variety of services
 - Compute (EC2)
 - Storage (S3)
 - Databases (RDS, SimpleDB etc.)
 - DNS system (Route 53)
- Easy to sign-up for an account
 - Requires account verification (usually via phone)

Amazon Web Services (AWS)

The screenshot shows the Amazon EC2 Console Dashboard for the US West (Oregon) region. The browser address bar displays `https://console.aws.amazon.com/ec2/home?region=us-west-2#`. The navigation pane on the left includes sections for EC2 Dashboard, INSTANCES, NETWORK & SECURITY, and VOLUMES & SNAPSHOTS. The main content area is titled "Amazon EC2 Console Dashboard" and contains several panels: "Getting Started" with a "Launch Instance" button, "My Resources" showing 1 Running Instance, 1 EBS Volume, 1 Key Pair, and 2 Security Groups, "Service Health" showing Amazon EC2 (US West - Oregon) as operating normally, and "Events" showing no events for the region. Two callout boxes are present: one pointing to the "Region:" dropdown menu with the text "Select hosting region", and another pointing to the "Launch Instance" button with the text "Click here to start VM creation wizard".

Select hosting region

Click here to start VM creation wizard

Region: US West (Oregon)

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 West (Oregon) region.

My Resources

You are using the following Amazon EC2 resources in the US West (Oregon) region:

- 1 Running Instance
- 0 Elastic IPs
- 1 EBS Volume
- 0 EBS Snapshots
- 1 Key Pair
- 0 Load Balancers
- 0 Placement Groups
- 2 Security Groups

Service Health

Service Status

Current Status	Details
Amazon EC2 (US West - Oregon)	Service is operating normally

[View complete service health details](#)

Events

US West (Oregon): No events

Related Links

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Select Machine Image

Request Instances Wizard Cancel

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

	LAMP Web Starter (AMI Id: ami-2cb05345) Fedora Core 8, 32-bit architecture, PHP 5.2, Apache 2.2, and MySQL 5	Select
	Basic Fedora Core 8 (AMI Id: ami-84db39ed) Minimal Fedora Core 8, 32-bit architecture, and Amazon EC2 AMI Tools.	Select
	Basic 64-bit Fedora Core 8 (AMI Id: ami-86db39ef) Fedora Core 8, 64-bit architecture, and Amazon EC2 AMI tools.	Select
	Getting Started on Microsoft Windows Server 2008 (AMI Id: ami-c5e40dac) Microsoft Windows Server 2008 R1 SP2 Datacenter edition, 32-bit architecture, Microsoft SQLServer 2008 Express, Internet Information Services 7, ASP.NET 3.5.	Select
	Basic Microsoft Windows Server 2008 (AMI Id: ami-c3e40daa) Microsoft Windows 2008 R1 SP2 Datacenter edition and 32-bit architecture.	Select
	Basic 64-bit Microsoft Windows Server 2008 (AMI Id: ami-d9e40db0) Microsoft Windows 2008 R1 SP2 Datacenter edition and 64-bit architecture.	Select

Select Machine Type

Request Instances Wizard

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

Provide the details for your instance(s). You may also decide whether you want to launch your instances as "on-demand" or "spot" instances.

Number of Instances: Availability Zone:

Instance Type:

Type	CPU Units	CPU Cores	Memory
Micro (t1.micro)	Up to 2 ECUs	1 Core	613 MB
Large (m1.large)	4 ECUs	2 Cores	7.5 GB
Extra Large (m1.xlarge)	8 ECUs	4 Cores	15 GB
High-Memory Extra Large (m2.xlarge)	6.5 ECUs	2 Cores	17.1 GB
High-Memory Double Extra Large (m2.2xlarge)	13 ECUs		
High-Memory Quadruple Extra Large (m2.4xlarge)	26 ECUs		
High-CPU Extra Large (c1.xlarge)	20 ECUs		

**Pick the resources you need for VM.
Cost varies with instance type *:
Small (Default): \$0.080/Hour
Medium: \$0.160/Hour
Large: \$0.320/Hour
Extra Large: \$0.640/Hour**

< Back | Continue >

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* Costs shown for Linux instances as on 25-Oct-2012
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Configure Network Access

Request Instances Wizard

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"/>
Select...	-	-	All Internet Change	<input type="button" value="Add Rule"/>

Back

To allow us to SSH into this VM

We Have Our Machine Running!

The screenshot shows the AWS Management Console interface for the 'My Instances' page. The region is set to 'US West (Oregon)'. A table lists the instances, with one instance selected: 'LMS Server' (Instance ID: i-914cd9a2, AMI ID: ami-4438b474, Type: m1.medium, State: running). Below the table, the details for the selected instance are shown, including the DNS name: 'ec2-54-245-0-9.us-west-2.compute.amazonaws.com'. Two callout boxes with arrows point to the instance name and the DNS name.

Name	Instance	AMI ID	Root Device	Type	State	Status Checks	Alarm Status	Mo
✓ LMS Server	i-914cd9a2	ami-4438b474	ebs	m1.medium	running	2/2 checks p	none	

1 EC2 Instance selected.

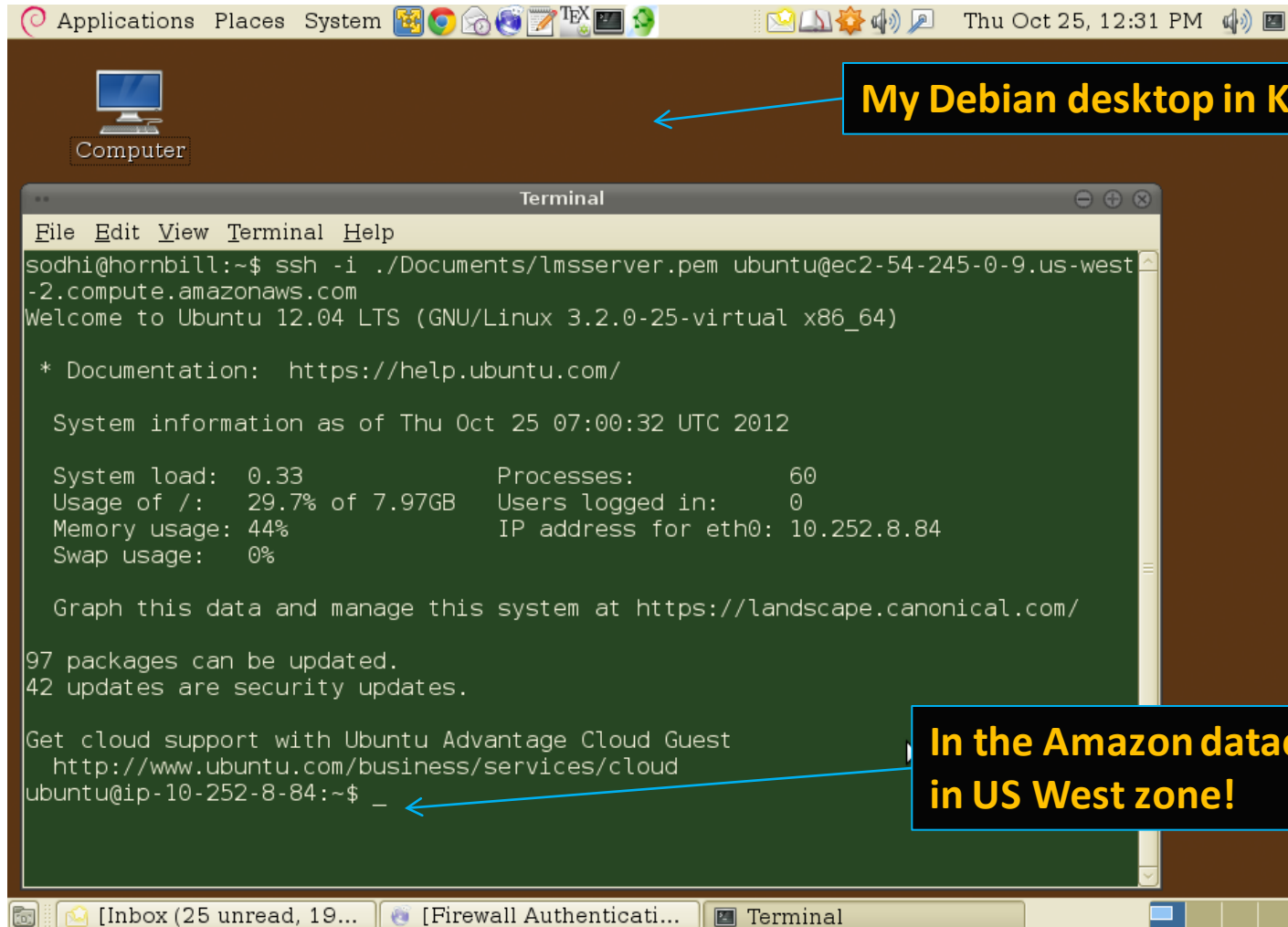
EC2 Instance: LMS Server (i-914cd9a2)
ec2-54-245-0-9.us-west-2.compute.amazonaws.com

Description | Status Checks | Monitoring | Tags

AMI: ubuntu/images/ebs/ubuntu-precise-12.04-amd64-server-20120616 (ami-4438b474)
Zone: us-west-2a
Type: m1.medium
Scheduled Events: No scheduled events
VPC ID: -

Alarm Status: none
Security Groups: quicklaunch-1. view rules
State: running
Owner: 713326102970
Subnet ID: -

SSH Into Our VM



My Debian desktop in Kanpur

In the Amazon datacenter in US West zone!

Real-time Billing Details

Details			
Expand All Services Collapse All Services			Printer Friendly Version
AWS Service Charges			\$92.72
Amazon Elastic Compute Cloud Download Usage Report >>			\$92.72
US West (Oregon) Region			
Amazon EC2 running Linux/UNIX			
\$0.160 per Medium Instance (m1.medium) instance-hour (or partial hour)	575 Hrs		92.00
Amazon EC2 EBS			
\$0.10 per GB-month of provisioned storage	6,161 GB-Mo		0.62
\$0.10 per 1 million I/O requests	1,006,423 IOs		0.10
Amazon Data Transfer (excluding Amazon CloudFront)			\$0.00
\$0.000 per GB - data transfer in per month	0.023 GB		0.00
\$0.000 per GB - first 1 GB of data transferred out per month	0.032 GB		0.00
VAT to be collected			\$0.00
† Usage and recurring charges for this statement period will be charged on your next billing date, November 1, 2012. Estimated charges shown			

Summary

- Provides basic computing resources as a service
 - Compute, storage, networking etc.
 - Typically as a VM running a vanilla OS
- Consumer responsible for installing/managing the OS and any S/W he/she installs on top of it
- Providers provide some add-on services
 - Auto-scaling rules
 - Load-balancing and replication etc.

Homework

- Most IaaS cloud services such as AWS or Google Compute offer reasonable quotas for free. You should try to register for one of those IaaS services and try launching VMs there. You can try installing and running your personal website from there by installing a web server on the VM that you launch. Observe how long it takes from registering to creating the VM to finally logging into the VM.

THANK YOU



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