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A graphic featuring a blue sky with white clouds, a globe, and a circular pattern of binary code (0s and 1s). The words "Cloud Computing" are written in a cursive, golden-brown font across the center.

**Servicii/Furnizori de
servicii in Cloud**

Cuprins

- PaaS
- PaaS – proprietati si caracteristici
- Furnizori de servicii Cloud (IaaS si/sau PaaS si/sau SaaS)
 - Amazon
 - Microsoft
 - Google
 - OpenStack
- Alti furnizori de servicii cloud (Joyent, Rackspace, GoGrid, Elastic Hosts, SymetriQ, AT&T, Heroku, Aptana, EngineYard , Salesforce.com, NetSuite, Intacct, Appistry)

Cloud Computing

Intrebare: te muti intr-un oras si cauti solutii pentru a locui?

- Construiești o noua casa?



- Cumperi o casa “la rosu”?



- Locuiesti intr-un hotel?



Cloud Computing

Intrebare: Vrei sa construiesti un department IT?

– Apelezi la IaaS (Infrastructure as a Service) – **Curs Anterior**

- Inchirierea de infrastructura virtualizata si construirea unui sistem IT, pe care il poti controla in totalitate



– Apelezi la PaaS (Platform as a Service)

- Se dezvoltă sistemul IT pe o platformă cloud existentă, fără grija managementului resurselor la nivel inferior



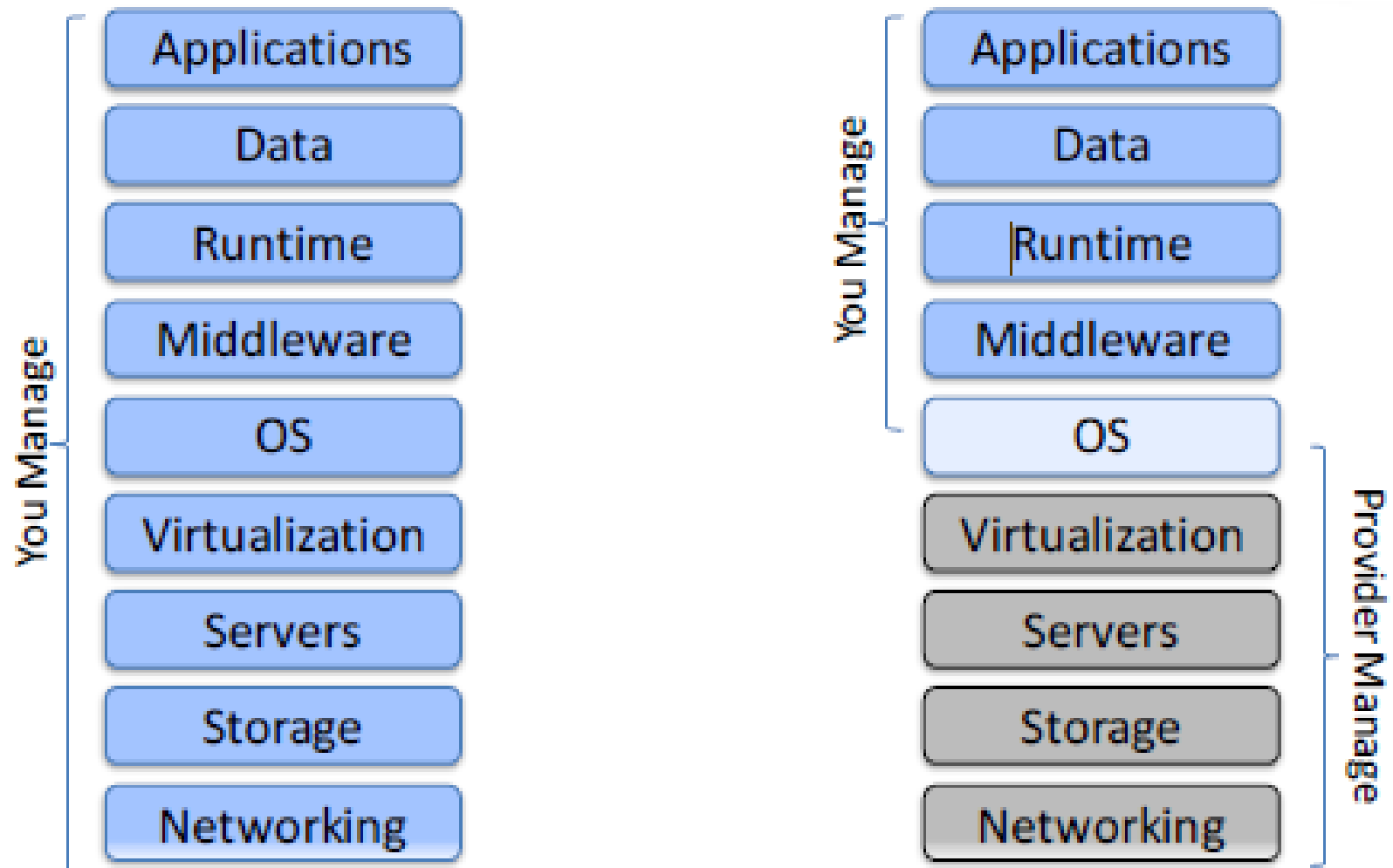
– Apelezi la SaaS (Software as a Service)

- Se folosesc sisteme IT existente, furnizate de un furnizor de cloud, fără cunoasterea detaliilor tehnice



Cloud Computing

Modelul Traditional (*on-premise*) versus IaaS



Cloud Computing

Consumatorii pot:

- Avea nevoie de un mediu de dezvoltare sau de testare pentru aplicatiile sau serviciile dezvoltate
- Au nevoie sa apeleze la un mecanism automat de distribuire si management al job-urilor
- Au nevoie de un mecanism de control al accesului si de autentificare
- Au nevoie de cantitati mari de resurse (in functie de necesitati)
-

=>

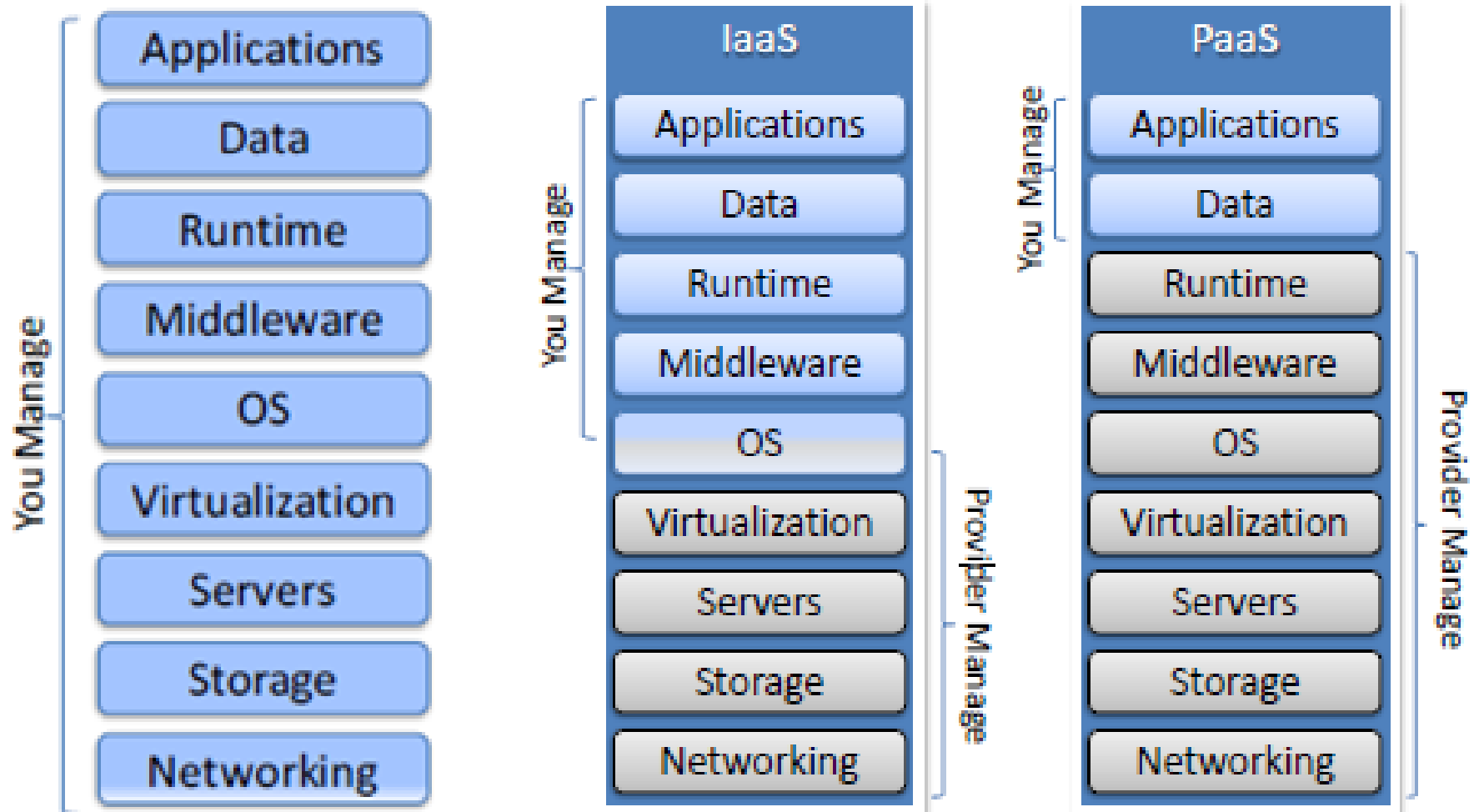
- PaaS furnizeaza proprietati care sa satisfaca cererile clientilor
- PaaS garanteaza calitatea in ceea ce priveste utilizarea resurselor, serviciilor si aplicatiilor

Cloud Computing

Modelul Traditional /On-premise

IaaS

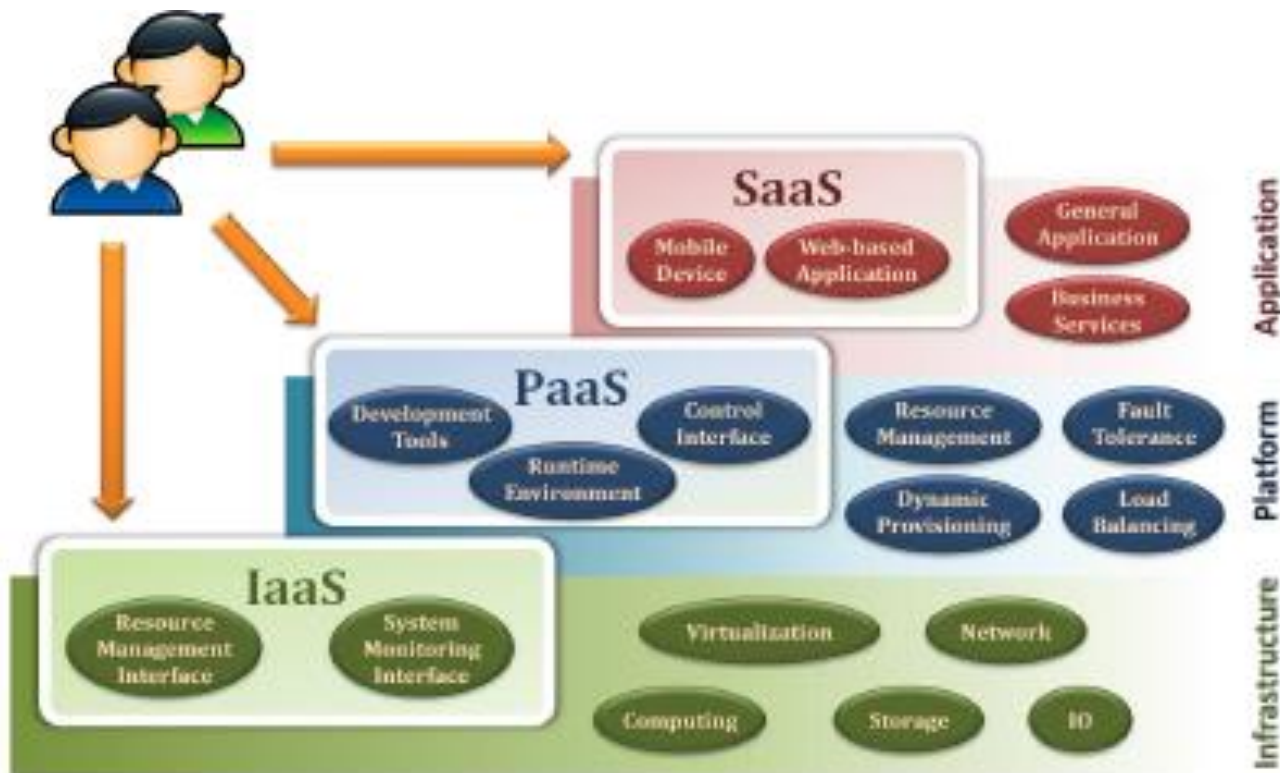
PaaS



PaaS

PaaS (Platform as a Service)

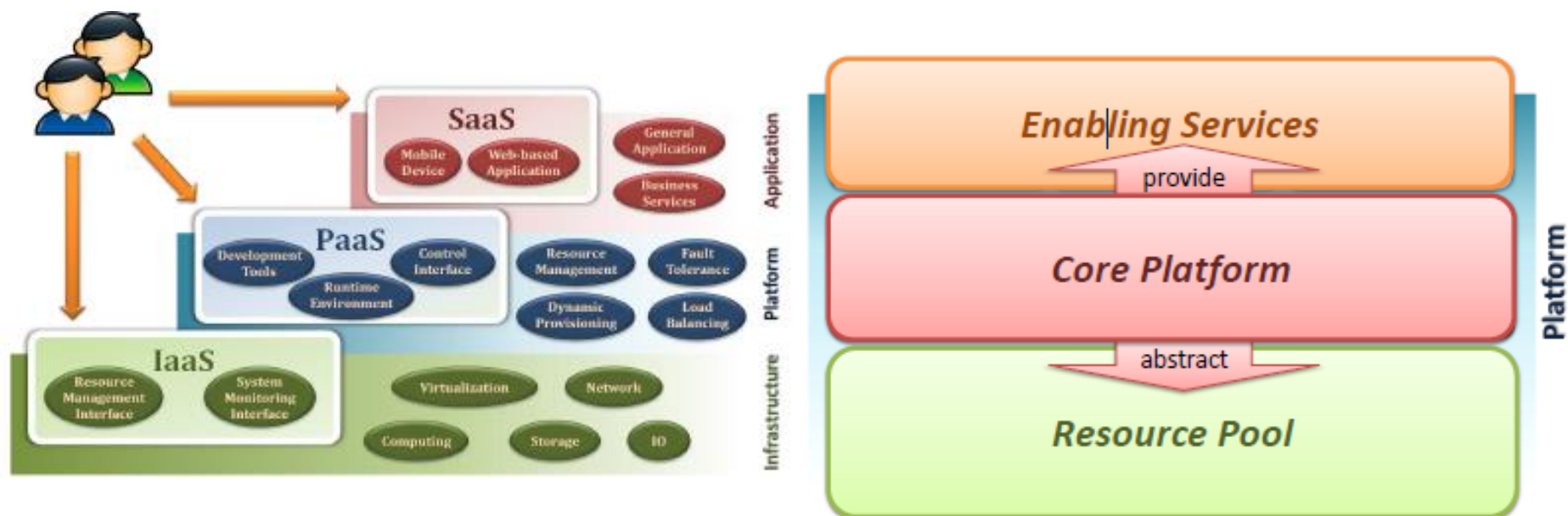
- este o platforma de calcul care asigura abstractizarea infrastructurii, OS si a middleware-ului, oferind suport pentru cresterea productivitatii dezvoltatorilor



PaaS

PaaS (Platform as a Service)

- Furnizeaza platforma ca un serviciu
 - Dezvoltarea de aplicatii folosind limbaje si instrumente oferite de furnizorul de PaaS
 - Rularea de aplicatii care ruleaza in infrastructura de tip cloud

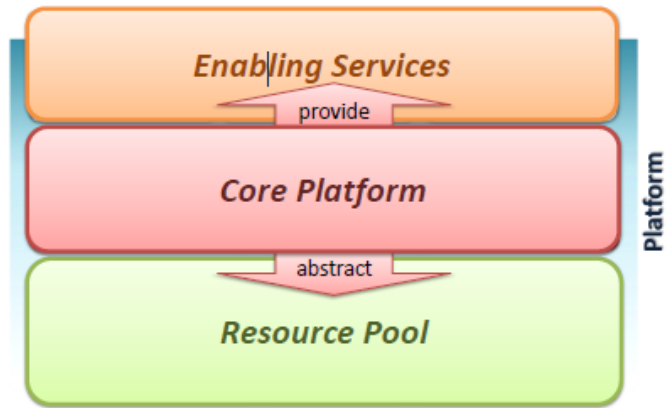


PaaS

PaaS – structura:

- **Resource Pool**

- Oferă abilitatea de a abstractiza și de a controla resursele
- Consumatorii pot obține sau elibera resurse la cerere în mod automat
- Reduce complexitatea managementului resurselor din infrastructura cloud
- Furnizorii de cloud stabilesc ce înseamnă *“smalles unit of resource”*
 - 1GB pentru stocare sau 1MB memorie sau 1GHz CPU
- Consumatorii nu sunt conștienți dacă resursele folosite sunt dedicate sau partajate

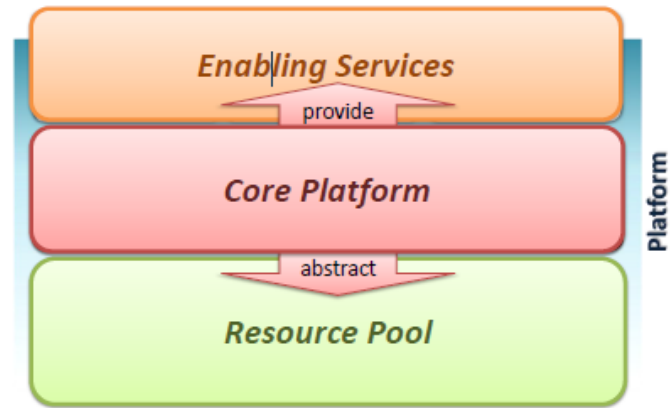


PaaS

PaaS – structura:

- ***Core Platform***

- Oferă un mediu sigur pentru rularea aplicațiilor și serviciilor
- Furnizează funcționalitățile de bază oferite de un mediu PaaS
 - => reduce responsabilitățile privind mediul de rulare (configurare, management,...)
- Acționează ca o punte între consumator și nivelul hardware
- Mediul este controlat în mod automat, a.i. dezvoltatorii se pot concentra pe serviciile furnizate
 - *Dynamic provisioning*
 - La cerere
 - *Load balancing*
 - Distribuirea încărcării
 - *Fault tolerance*
 - Operarea chiar și în caz de erori
 - *System monitoring*
 - Monitorizarea sistemului și măsurarea utilizării resurselor

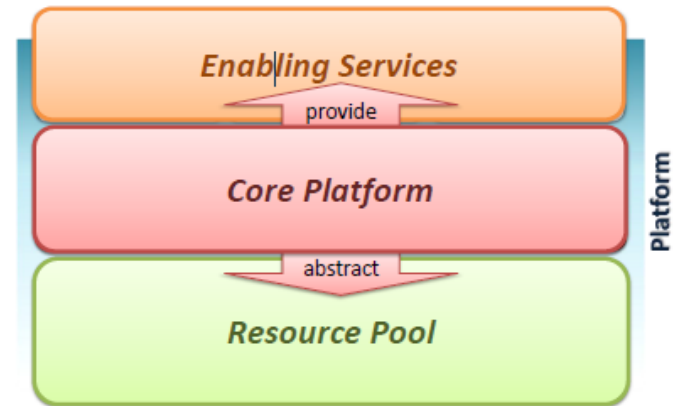


PaaS

PaaS – structura:

- *Enabling Services*

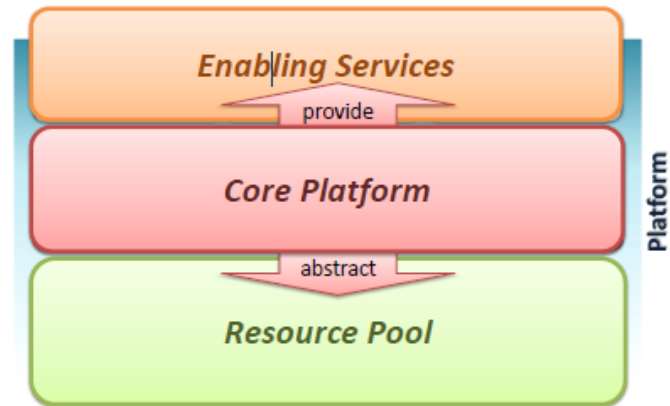
- Reprezinta nivelul de interes maxim al dezvoltatorilor
- Furnizeaza interfete si servicii care sunt necesare in procesul de dezvoltare
 - *Programming IDE*
 - Integreaza toate functionalitatile suportate de mediul de rulare
 - Furnizeaza instrumente pentru dezvoltatori (debugger, mediu de testare,...)
 - *System Control Interfaces*
 - Asigura luarea de decizii conform unor principii sau cerinte
 - Descrie fluxul instalarii si al configurarii resurselor



PaaS

PaaS – proprietati si caracteristici

- *Scalability*
- *Availability*
- *Manageability*
- *Performance*
- *Accessibility*



Cloud Computing

Proprietati:

Scalability Elasticity

- Dynamic provision
- Multi-tenant design

- **Scalabilitate** (*Scalability*)
 - PaaS ofera resurse in mod dinamic
 - PaaS ofera o abstractizare a infrastructurii cloud si management dinamic

Availability Reliability

- Fault tolerance
- System resilience
- System security

- **Disponibilitatea** (*Availability*)
 - PaaS ofera rezistenta la erori a.i. sistemul sa nu esueze
 - PaaS asigura si *resilience* prin replicarea aplicatiilor si serviciilor
 - Backup automat si recuperarea in caz de dezastre naturale
 - Cand o resursa esuieaza, PaaS va porni resursa de rezerva
 - Cand apare o eroare la o aplicatie, PaaS va migra serviciile la o alta instanta replicata

There is no error

Cloud Computing

Proprietati:

Manageability Interoperability

- Control automation
- System monitoring
- Billing system

- *Manageability*
 - PaaS ofera mecanisme automate de control al utilizarii resurselor
 - PaaS furnizeaza servicii de monitorizare care stau la baza abilitatii de management, analiza si management al job-urilor
 - Consumatorii platesc ceea ce utilizeaza (latime de banda, CPU, spatiu de stocare, migrarea datelor)

Performance Optimization

- Parallel processing
- Load balancing
- Job scheduling

- Performanta
 - PaaS asigura distribuirea job-urilor resurselor neutilizate si echilibrarea incarcarii



Cloud Computing

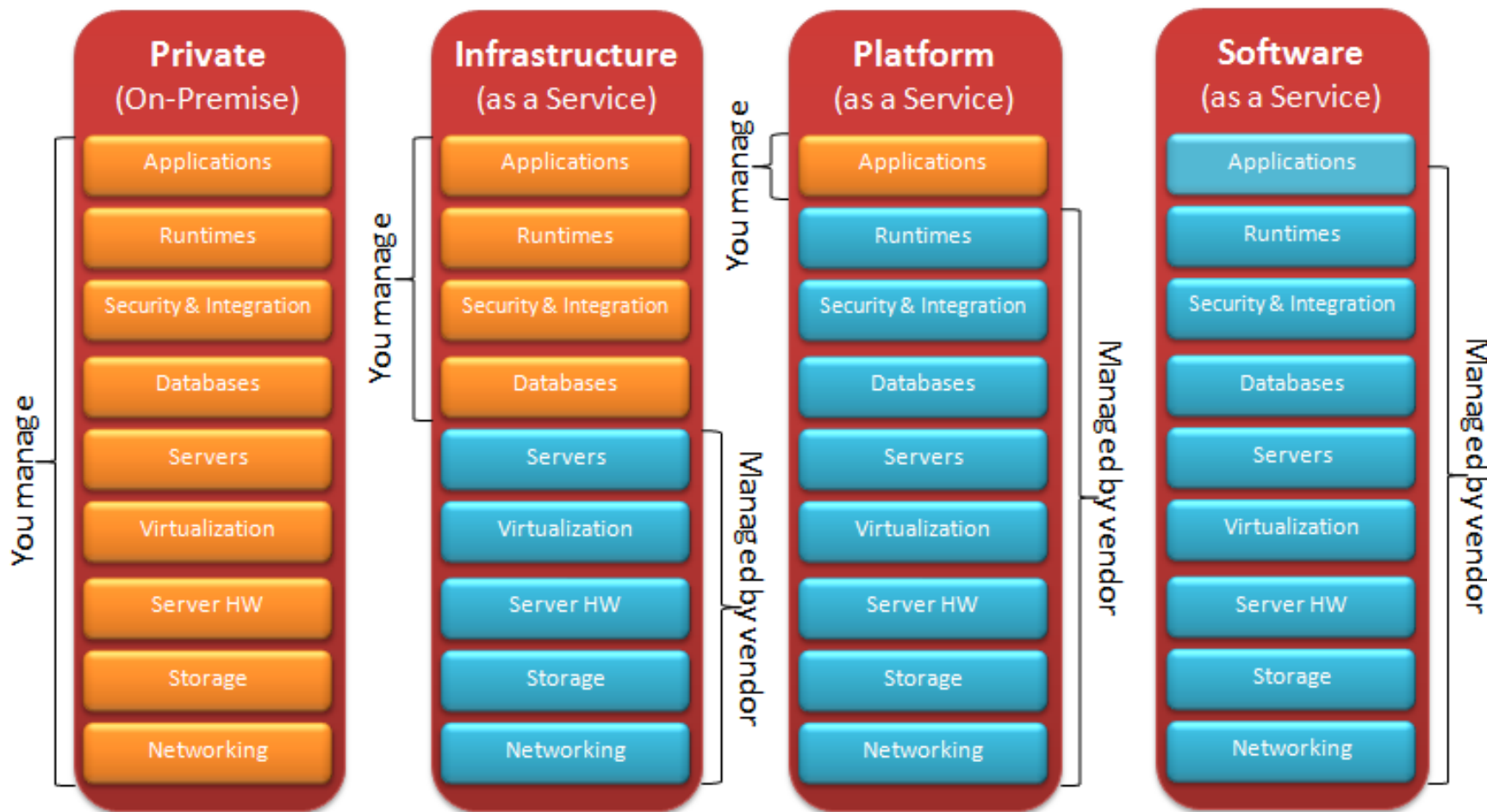
Proprietati:

- *Securitatea*
 - PaaS ofera servicii de autentificare si autorizare pentru a diferentia drepturile de acces
- *Accesibilitatea*
 - Dezvoltatorii pot dezvolta si testa aplicatiilor lor via browsere web sau diversi *thin clients*



=> “*PaaS is a magic box ...*”

Furnizori de servicii Cloud (IaaS si/sau PaaS si/sau SaaS)



[Microsoft]

Magic Quadrant

Figure 1. Magic Quadrant for Cloud Infrastructure as a Service, Worldwide



Source: Gartner (August 2016)

Magic Quadrant

Figure 1. Magic Quadrant for Enterprise Application Platform as a Service, Worldwide



Source: Gartner (March 2016)

Cloud Computing

Amazon

<http://aws.amazon.com/>

The screenshot shows the AWS website homepage. The browser's address bar displays <https://aws.amazon.com>. The navigation bar includes a menu icon, the Amazon Web Services logo, and links for Products, Solutions, Pricing, and More. It also features a language selector set to English, a My Account dropdown, and a prominent yellow button to 'Create an AWS Account'.

The main content area has a blue and green geometric background with the headline 'Start Building on AWS Today'. Below this, a paragraph states: 'Whether you're looking for compute power, database storage, content delivery or other functionality, AWS has the services to help you build sophisticated applications with increased flexibility, scalability'.

Three promotional boxes are highlighted with colored borders:

- Left Box (Green Border):** Titled 'Get Started with AWS for Free', it contains a 'Create a Free Account' button and details for 'Amazon S3' (5GB storage, 20k Get requests and 2k Put requests). A link to 'View AWS Free Tier Details »' is at the bottom.
- Center Box (White Border):** Features a 'CREATE A FREE ACCOUNT' button with a cube icon and a link to 'View AWS Free Tier Details »'.
- Right Box (Blue Border):** Titled 'Get Started with AWS for Free', it contains a 'Create a Free Account' button and details for 'Amazon RDS' (750 Hours of micro instance usage and 20GB of DB Storage). A link to 'View AWS Free Tier Details »' is at the bottom.

At the bottom, there are three sections: 'Broad & Deep Platform' (AWS has more than 70 services), 'Security' (Satisfy demanding security and compliance), and 'Customers' (Explore how millions of active customers use AWS).

Cloud Computing

Amazon

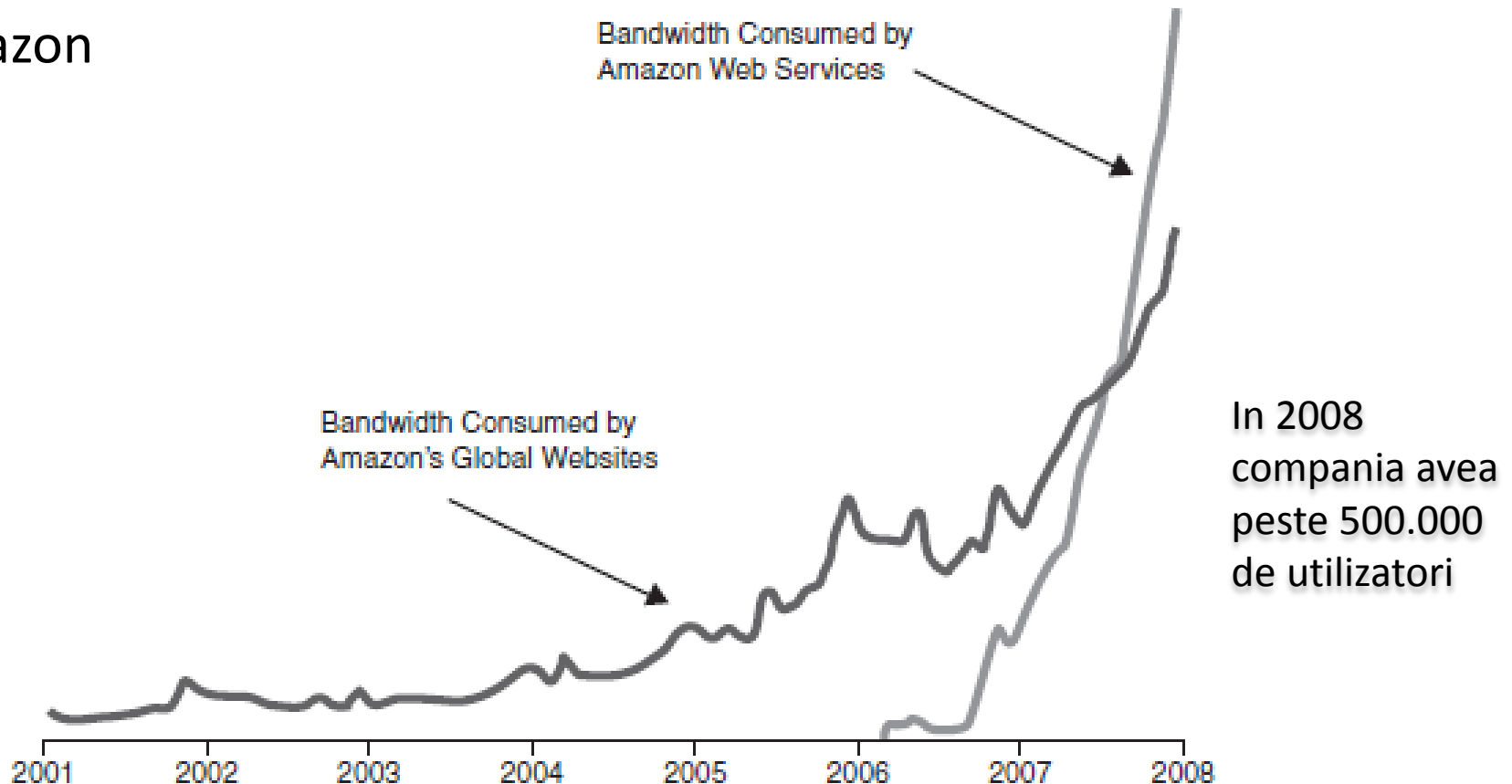


Figure 1.1 Amazon originally deployed a large IT infrastructure to support its global e-commerce platform. In less than 18 months after making the platform available as a cloud service to external users, its usage, as measured by amount of bandwidth consumed, outstripped bandwidth used internally.

[The Cloud at Your Service,
Jothy Rosenberg ,
Arthur Mateos,]

Cloud Computing

Amazon EC2: IaaS

- Oferă suport pentru scalare automată și tratarea erorilor (acestea sunt programate via un API) versus PaaS care suportă scalare automată și invizibilă
- Oferă posibilitatea utilizării oricărui limbaj de programare, și oferă control complet asupra IaaS
- O configurație comună la început pentru EC2: *LAMP stack*

L	Linux	Operating system
A	Apache	Web server
M	MySQL	Relational database
P	PHP	Server side of website


- Utilizează o versiune modificată a hypervizorului XEN, folosind avantajul paravirtualizării => Amazon rulează OS portate și testate de către furnizorii originali
- Exemplu de creare a unui AMI:

<http://aws.amazon.com/getting-started/>

http://aws.amazon.com/articles/938?_encoding=UTF8&jiveRedirect=1

Cloud Computing

aws.amazon.com/developertools/

 [Sign Up](#) [My Account / Console](#) [English](#)

[AWS Products & Solutions](#) [Developer Tools](#) [Developers](#) [Support](#)

Browse By Category

- Amazon CloudFront
- Amazon Elastic Compute Cloud
- Amazon Elastic MapReduce
- Amazon Fulfillment Web Service
- Amazon Relational Database Service
- Amazon Route 53
- Amazon SimpleDB
- Amazon Simple Email Service
- Amazon Simple Queue Service
- Amazon Simple Storage Service
- AWS CloudFormation

Developer Tools

Developer Tools help developers create and manage applications built on AWS. Both Amazon and the AWS developer community have produced a large number of tools to assist developers optimize their productivity by making good use of AWS. You can browse through these tools here.

AWS Management Console

Access and manage Amazon's growing suite of infrastructure web services through a simple and intuitive, web-based user interface. The AWS Management Console provides convenient management of your compute storage, and other cloud resources through an easy-to-use graphical user interface.

AWS Toolkit for Eclipse

The AWS Toolkit for Eclipse is a plug-in for the Eclipse Java IDE that makes it easier to develop, deploy, and debug Java applications using Amazon Web Services. The AWS Toolkit for Eclipse includes the AWS Explorer which enables you to interact with many AWS services from inside the Eclipse IDE. The toolkit has integrated support for AWS Elastic Beanstalk which makes it easy for you to deploy your Java application to AWS. The toolkit includes the latest version of the AWS SDK for Java.

AWS Toolkit for Microsoft Visual Studio

The AWS Toolkit for Microsoft Visual Studio is a plug-in for the Visual Studio IDE that makes it easier to develop and deploy .NET applications that use Amazon Web Services. The AWS Toolkit for Visual Studio includes the AWS Explorer which enables you to interact with many AWS services from inside the Visual Studio IDE. The toolkit's support for CloudFormation makes it easy for you to deploy your .NET Framework application to AWS. The toolkit includes the latest version of the AWS SDK for .NET.

Cloud Computing

Serviciu	Descriere
Simple Storage Service (S3)	<ul style="list-style-type: none">-Folosit pentru stocare si regasire de date printr-un API-Este integrat cu EC2: AMI-urile sunt stocate in S3, si datele transferate de la S3 la EC2 nu implica costuri aditionale
DynamoDB http://aws.amazon.com/dynamodb/	<ul style="list-style-type: none">-serviciu de BD NoSQL cu performante mari privind scalabilitatea si performanta accesului, performantele fiind predictibile• Se folosesc solid state disks (SSDs) pentru raspunsuri rapide si nu exista limite pentru dimensiunea unei tabele• Datele si cererile sunt impartite la servere mutiple
SimpleDB http://aws.amazon.com/simpliedb/	<ul style="list-style-type: none">-limitari ale dimensiunii la 10 GB + limitari la numarul de cereri (~25 de scrieri/secunda)- Scalarea implica mangement manual (e.g. repartitionarea tabelor)

Cloud Computing

Amazon – <http://aws.amazon.com/>

Serviciu	Descriere
Amazon EBS (Elastic Block Store)	- Se recomanda a fi folosit ca storage primar pentru un sistem de fisiere sau pentru aplicatii care necesita accesarea de date neformatate (multe citiri /scrieri random)
Amazon Redshift	-Serviciu warehouse ce permite <i>petabyte-scale data</i> => utilizarea de instrumente proprii de <i>business intelligence</i> asupra datelor proprii - Costuri: minim \$0.25/pe ora http://aws.amazon.com/redshift/
Amazon RDS (Relational Database Service)	- Oferă acces la engine-uri SQL cum ar fi: MySQL, Oracle, Microsoft SQL Server, PostgreSQL - Oferă suport pentru scalabilitate “AWS Free Tier includes 750hrs of Micro DB Instance each month for one year, 20GB of Storage , and 20GB for Backups with Amazon Relational Database Service (RDS).”

Cloud Computing

Amazon – <http://aws.amazon.com/>

Serviciu	Descriere
Amazon Cloud Watch	<i>AWS Free Tier includes 10 Metrics, 10 Alarms, and 1,000,000 API requests with Amazon Cloudwatch.</i>
AWS IAM (Identity and Access Management)	- Permite accesul securizat a utilizatorilor asupra serviciilor si resurselor
CloudFront CDN	-serviciu distribuit pentru livrarea continutului la viteze foarte mari (concurrent pentru Akamai) -modelul pay-as-you-go
Simple Queue Service (SQS)	- Sistem de management al mesajelor trimise intre computere => ajuta la crearea de workflow-uri automate intr-un sistem distribuit

Obs. ! Community Contributed Software...

PRODUCTS & SERVICES

[Amazon EC2 Spot Instances](#) >

[Product Details](#) >

[Pricing](#) >

[Getting Started](#) >

[Spot Bid Advisor](#) >

[FAQs](#) >

[Testimonials](#) >

RELATED LINKS

[Amazon EC2](#)

[Amazon EC2 Purchasing Options](#)

[AWS Documentation - Spot Instances](#)

Get Started with AWS for Free

[Create Free Account](#)

Amazon EC2 Spot Instances

Amazon EC2 Spot instances allow you to bid on spare Amazon EC2 computing capacity. Since Spot instances are often available at a discount compared to On-Demand pricing, you can significantly reduce the cost of running your applications, grow your application's compute capacity and throughput for the same budget, and enable new types of cloud computing applications.

Introduction to Amazon EC2 Spot Instances



Launch an Amazon EC2 Instance for Free

[Try Amazon EC2 for Free](#)

AWS Free Tier includes 750 hours of Linux and Windows t2.micro instances each month for one year. To stay within the Free Tier, use only EC2 Micro instances.

[View AWS Free Tier Details »](#)

<https://aws.amazon.com/ec2/spot/>

Cloud Computing

Cloud-ul Amazon este recomandat daca:

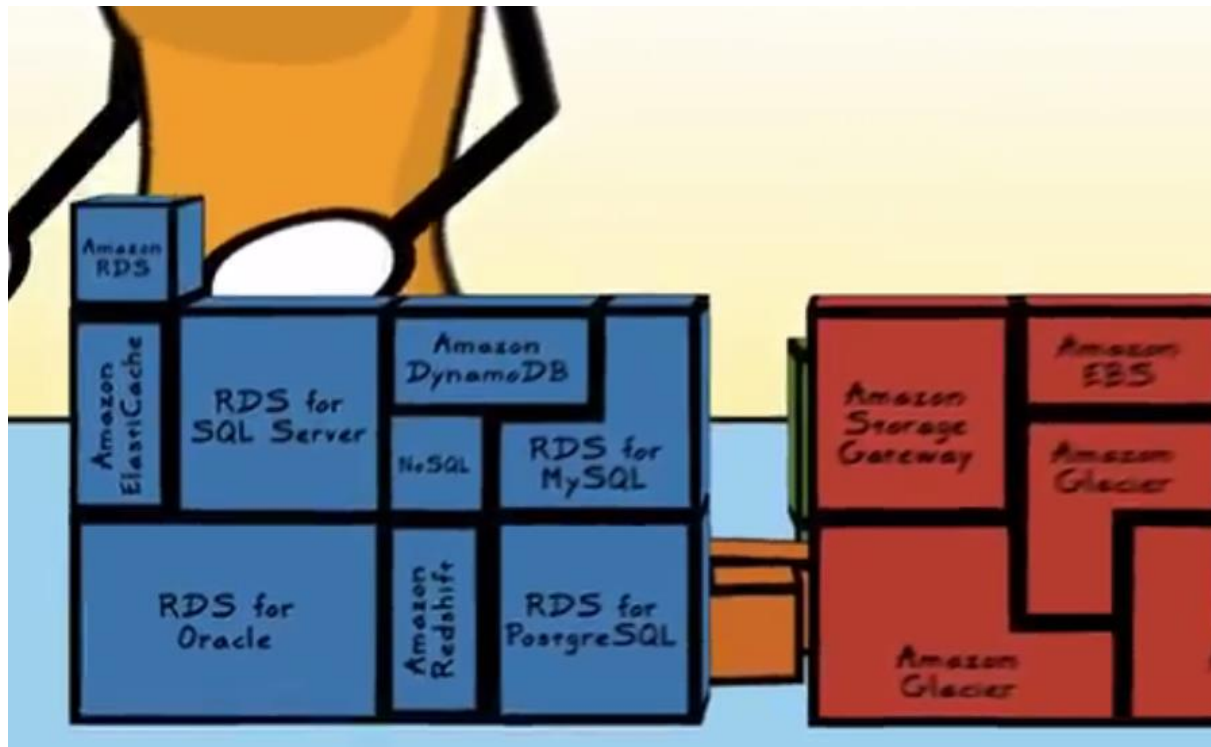
- Se doreste utilizarea de soft open-source de la un alt furnizor
- Se dispune de un cod existent
- Se doreste transferul aplicatiei web pe masina proprie mai incolo (aprox. *~zero lock-in*)
- Portarea codului in alt limbaj
- Se doreste control complet
- Se doresc teste de stres/incarcare (e.g. 1000 de instante)

[<https://www.youtube.com/user/AmazonWebServices/videos>]

Cloud Computing

Amazon – Imagine de ansamblu

http://www.youtube.com/watch?v=mZ5H8sn_2ZI#t=142

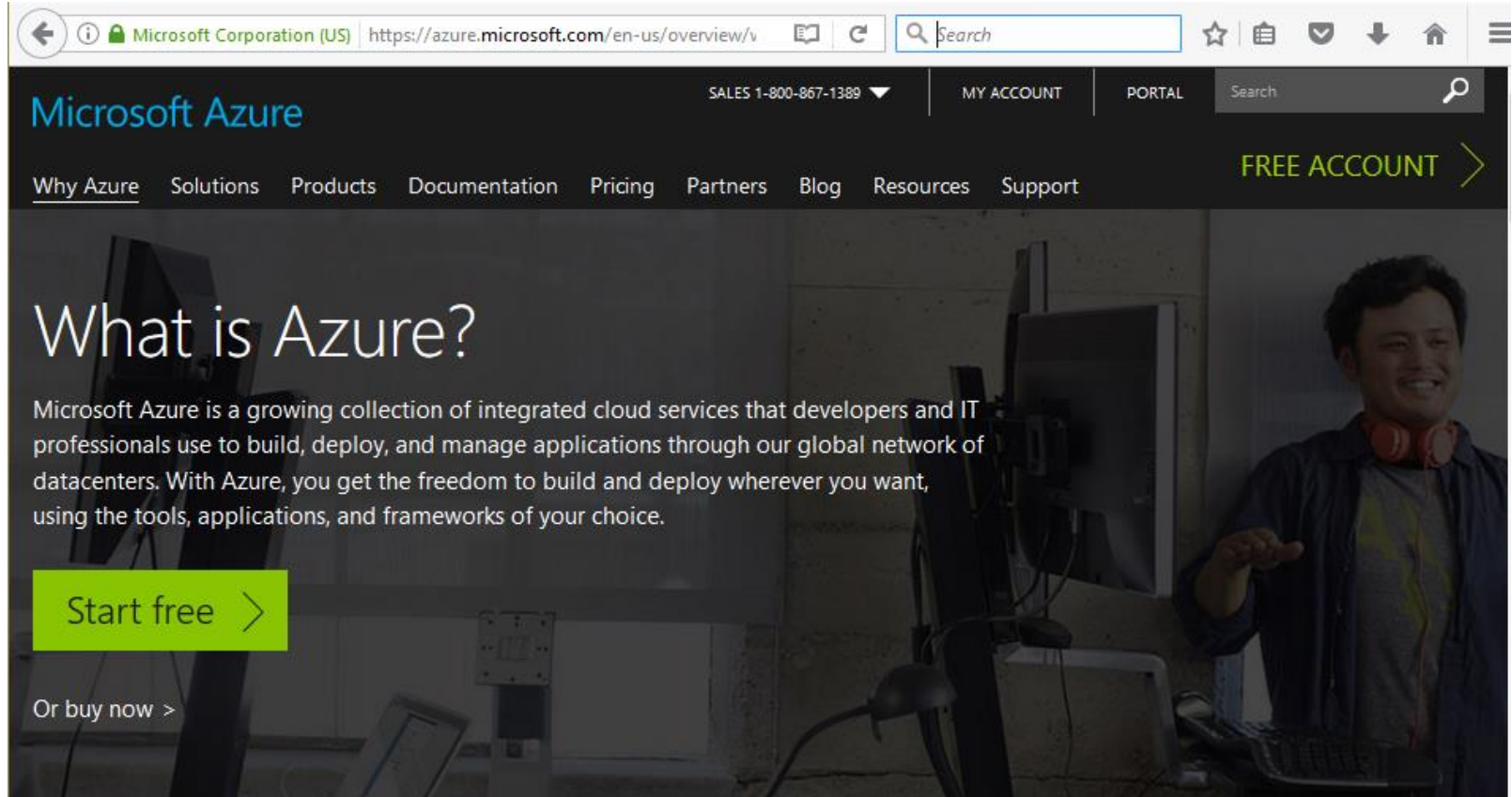


Cloud Computing

Windows

Azure

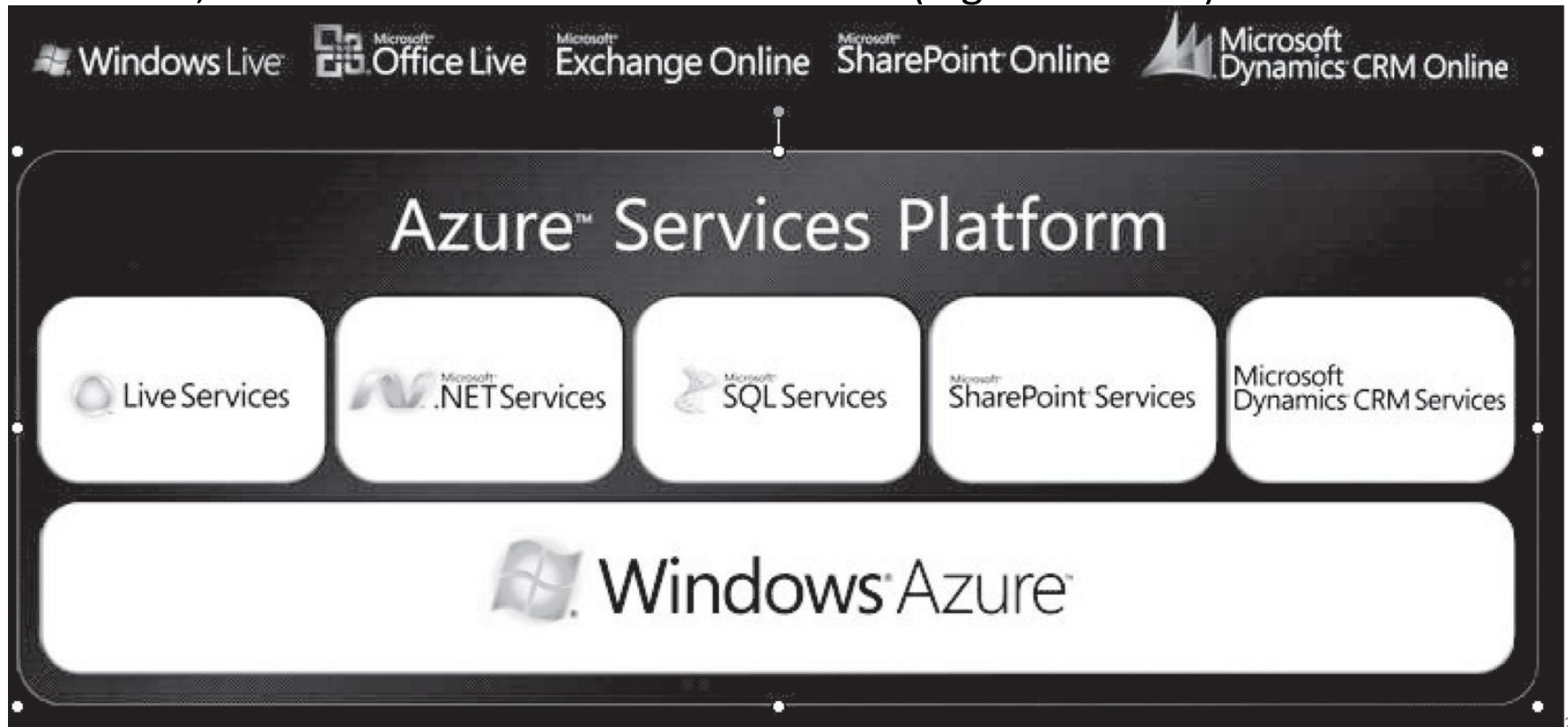
<https://www.windowsazure.com/>



Cloud Computing

Windows Azure

- Oferă și servicii IaaS similar cu Amazon, dar oferă multe servicii la nivel PaaS
- multiple aplicații end-user Microsoft au fost modificate pentru a rula în cloud; Obs. Platforma oferă și servicii SaaS (e.g. Office 365)



Cloud Computing

Windows Azure: IaaS

- Windows Azure ruleaza in mediul virtualizat creat de Microsoft Hypervisor (... *running on bare hardware* ...curs anterior)
- Nivelul OS (derivat din Windows Server 2008) furnizeaza servicii de: stocare, *fabric controller*, *virtualized computation*, mediu de dezvoltare (permite emularea Windows Azure pe desktopul propriu, conectarea la Visula Studio, Eclipse pentru dezvoltarea de aplicatii)
- Windows Azure API
 - Un API REST bazat pe certificate X.509 pentru autentificare
 - Setul initial de servicii (vazute ca servicii de nivel jos, fara elemente de user-interface): Live Services, SQL Services, .Net Services, SharePoint Services, CRM Services

Cloud Computing

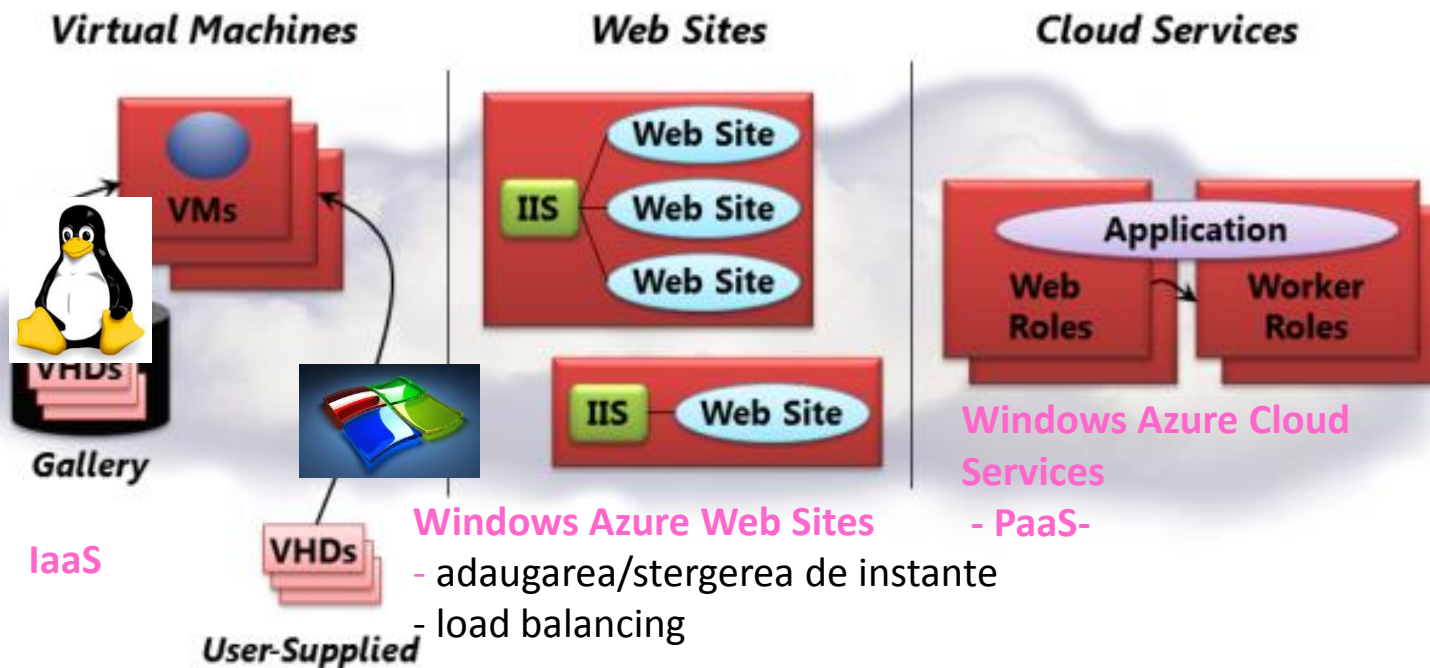
Execution Models	Virtual Machines	Web Sites	Cloud Services	Mobile Services		
Data Management	SQL Database	Tables	Blobs			
Networking	Virtual Network	Traffic Manager				
Business Analytics	Data Reporting	HDInsight				
Messaging	Queues	Service Bus				
Caching	Caching	CDN				
Identity	Windows Azure Active Directory					
Media	Media Services					
Commerce	Marketplace	Store				
Big Compute	HPC Scheduler					
SDKs	.NET	Java	PHP	Python	Node.js	Ruby

[<http://www.windowsazure.com/en-us/develop/net/fundamentals/intro-to-windows-azure/>]

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Windows Azure

Modele de executie



Windows Azure Mobile Services

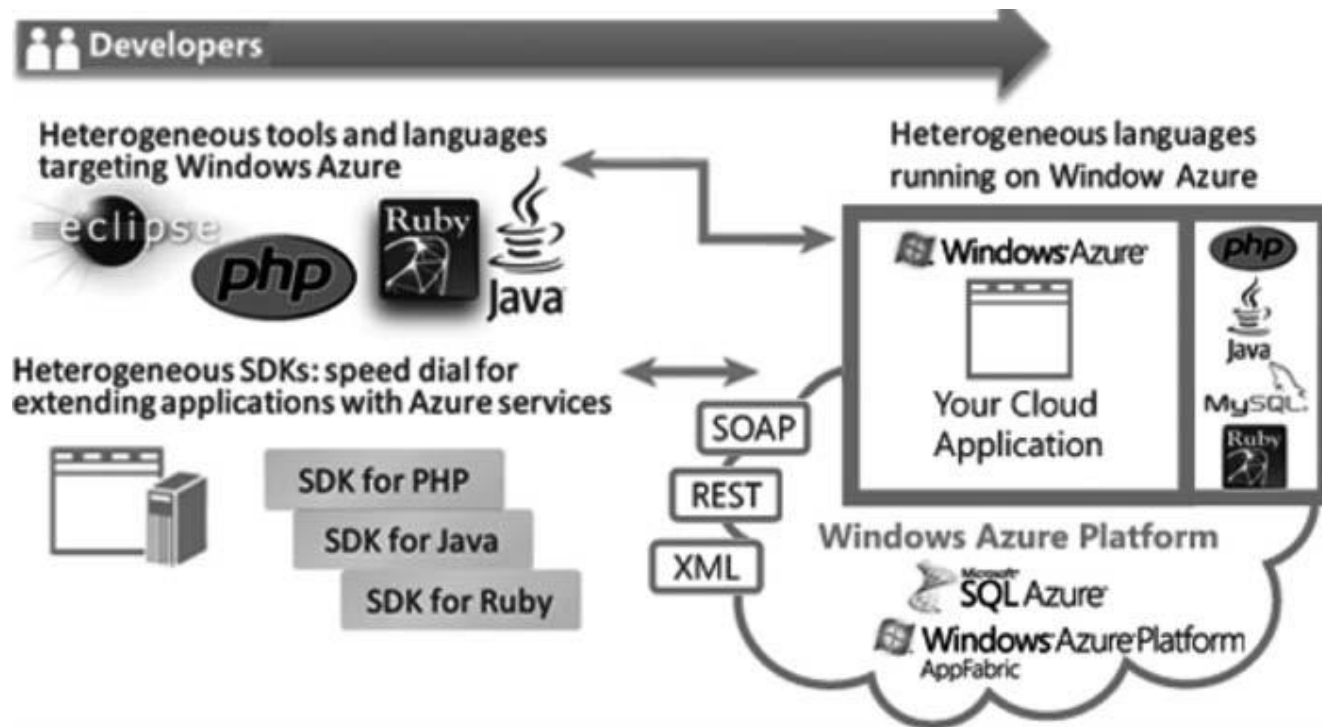
- Suport pentru stocare de date in cloud, autentificare, *push notifications*
- Biblioteci pentru Android, iOS, HTML/javaScript. Windows Phone, Windows Store

Cloud Computing

Windows Azure

Obs. Multe aplicatii sunt/era dezvoltate pentru o platforma LAMP

Azure ofera Windows Azure SDK pentru node.js, php, java, ruby,... => eterogenitate de instrumente



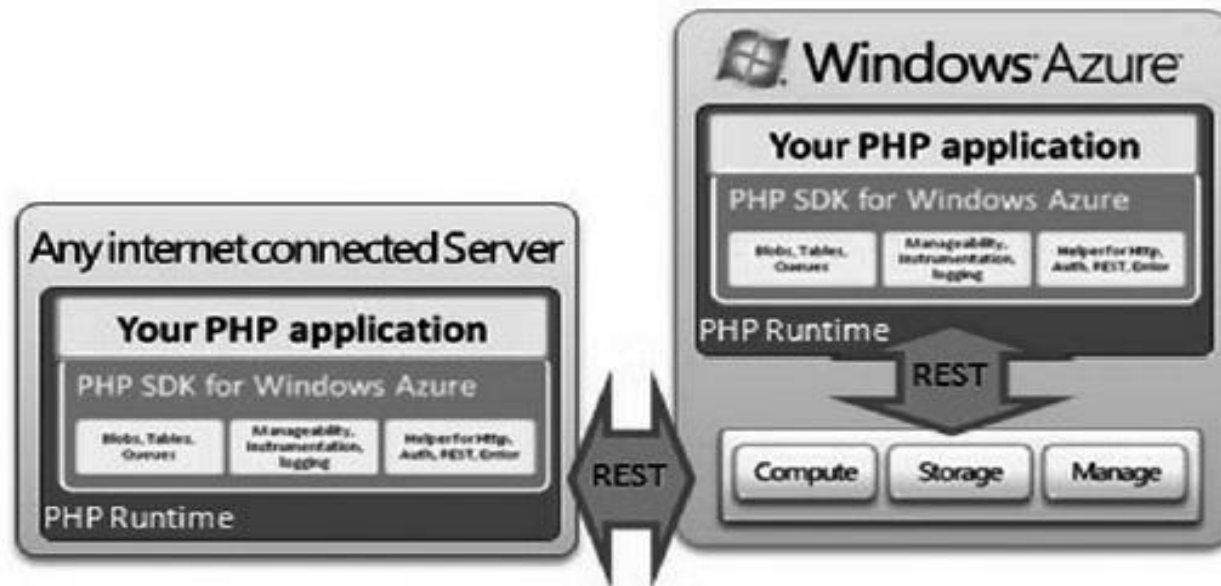
[Implementing and Developing Cloud Computing Applications, David E.Y. Sarna]

Cloud Computing

Windows Azure

Orice server cu acces la Internet poate comunica cu Windows Azure

O aplicatie construita folosind Windows Azure SDK (php,...) poate accesa serviciile Windows Azure indiferent de locul gazduirii: platforma Azure sau un server *Web on-premise*



[Implementing and Developing Cloud Computing Applications, David E.Y. Sarna]

Cloud Computing

Windows Azure - este recomandat daca:

- Utilizezi .Net si SQL Server (parti din stiva Microsoft)
- Echipele de programatori dezvolta aplicatii folosind Visual Studio
- Se doreste combinarea dezvoltarii desktop si cloud
 - Aplicatiile se pot dezvolta local si apoi integrate in cloud; Obs. Se recomanda ca UI si logica privind extragerea datelor sa fie rescrise pentru a putea face fata conexiunilor internet slabe;
- Nu este nici o problema privind “lock-in” in Microsoft



- Obs. Elemente din nucleul Windows Azure sunt bazate pe binecunoscutele Sql Server, IIS, .Net framework, care ar putea fi furnizate intr-o platforma cloud de o alta companie

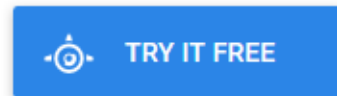
Cloud Computing

Google App Engine

<http://code.google.com/appengine/>

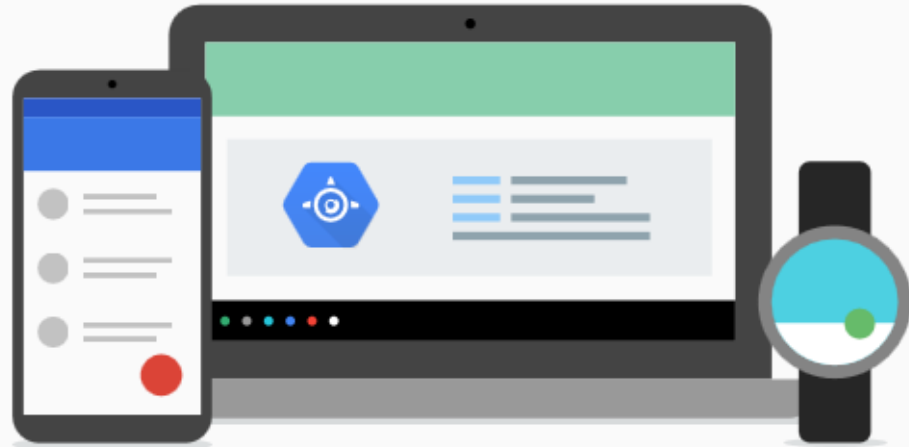
GOOGLE APP ENGINE

Build scalable web and mobile backends in any language on Google's infrastructure



App Engine for All

Build modern web and mobile applications on an open cloud platform: bring your own language runtimes, frameworks, and third party libraries. Google



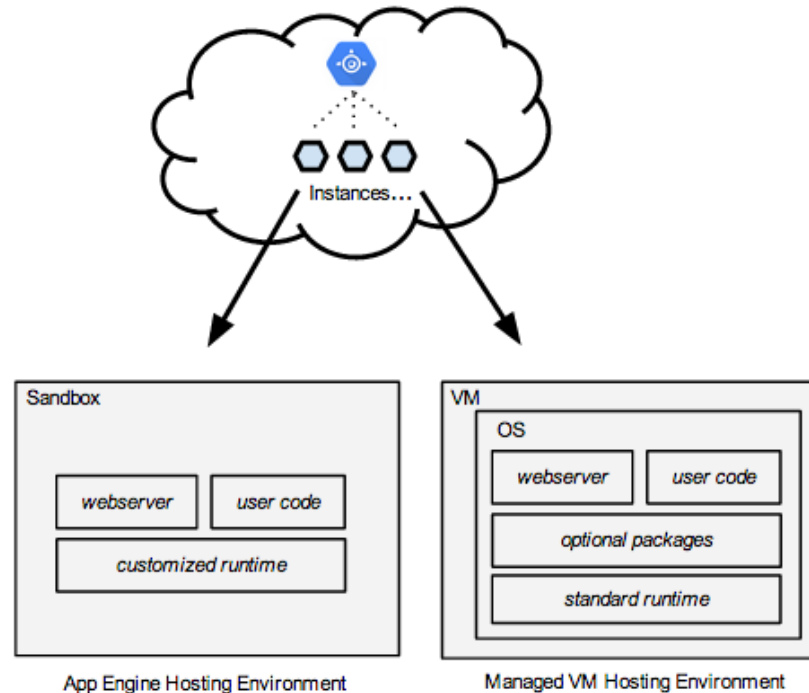
Cloud Computing

Google App Engine: PaaS

- Elemente ca virtualizarea si elasticitatea care sunt vizibile in IaaS , sunt aproape invizibile la acest nivel; la acest nivel intilnim *automatic elasticity*
- Mediul de dezvoltare App Engine ofera:
 - *Sandbox* – aplicatiile ruleaza intr-un mediu securizat, izolat de nivelul hardware, sistemul de operare si localizarea fizica a serverului
 - Aceasta limitare permite distribuirea cererilor web la mai multe servere web (pornirea/oprirea lor) in functie de cresterea/scaderea cererilor
 - Google Compute Engine (ex. *Managed VMs (beta)*) – “delivers virtual machines running in Google's innovative data centers and worldwide fiber network.”
- O aplicatie poate contine module care ruleaza in medii de gazduire diferite e.g se poate folosi pentru frontend *sandbox* si pentru procesare sa se foloseasca *managed VM*

Cloud Computing

Google App Engine: PaaS



Feature	App Engine sandbox	Managed VM
Instance startup time	Milliseconds	Minutes
Maximum Request Timeout	60 seconds	24 hours
Background threads	Yes, with restrictions	Yes
Background processes	No	Yes
SSH debugging	No	Yes

Cloud Computing

Google App Engine: PaaS

Download the Google App Engine SDK

By downloading, you agree to be bound by the [Terms](#) that govern use of the App Engine SDK.

Google App Engine SDK for PHP

Google App Engine SDK for Python

Google App Engine SDK for Java

Google App Engine SDK for Go

**-[https://cloud.google.com/solutions/nodejs/](https://cloud.google.com/solutions/nodejs/Quickstart)
Quickstart**

[Introduction](#) [Install Dependencies](#) [Auth and Configure](#) ["Hello World" Source](#) [Run Locally](#) [Deploy](#)

Deploy "Hello World" on Managed VMs!

This tutorial shows you how to deploy a simple Node.js application to [Google App Engine Managed VMs](#).

After configuring your project, you'll be able to deploy your app with just one command:

```
$ gcloud preview app deploy .
```

Next

Cloud Computing

Google App Engine PaaS - *Sandbox* environment - este recomandat daca:

- Nu exista un cod pre-existent
- Se construiesc aplicatii de tip *mushup* sau aplicatii de tip cerere-raspuns
- Intrare pe piata in mod rapid e cel mai important aspect
- Nu sunt necesare instalari software
- Nu e o problema aspectul de “*lock-in*” in Google

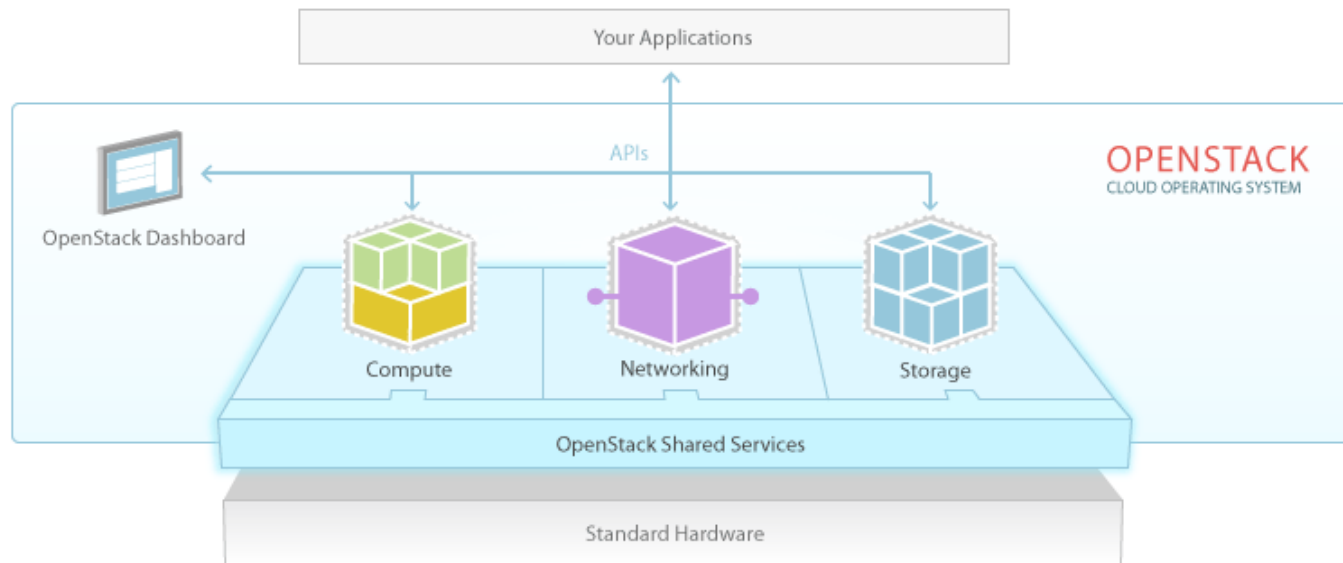
Obs. Este greu de imaginat sisteme compatibile furnizate de o alta companie; tehnologiile sunt proprietare...

Cloud Computing

Open Stack - <http://docs.openstack.org>

- Furnizor de IaaS

OpenStack: The Open Source Cloud Operating System

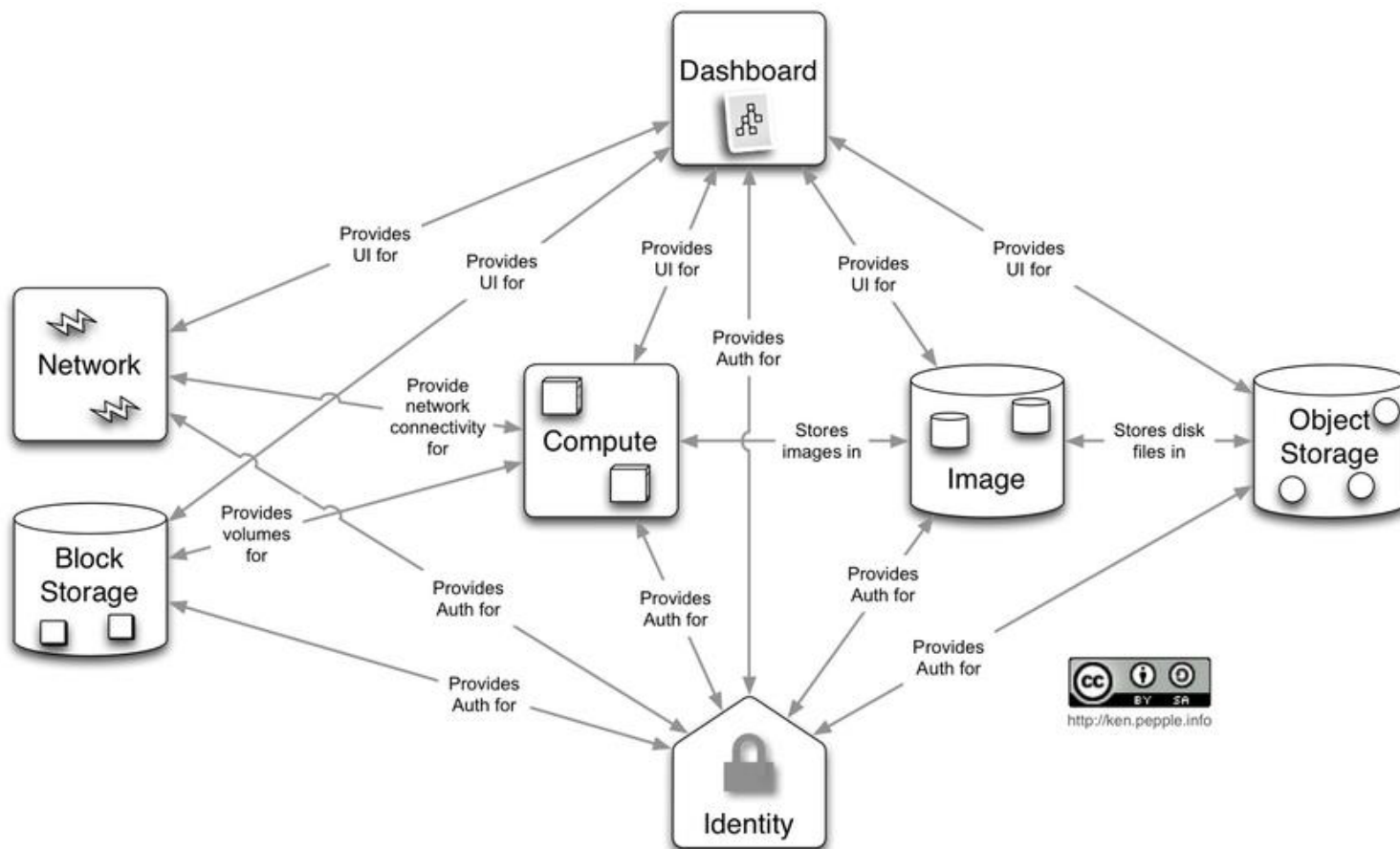


“OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a datacenter, all managed through a dashboard that gives administrators control while empowering their users to provision resources through a web interface.” (<http://www.openstack.org>)

Cloud Computing

Open Stack

- <http://docs.openstack.org>
- Furnizor de IaaS



[<http://docs.openstack.org/trunk/openstack-compute/admin/content/conceptual-architecture.html>]

Cloud Computing

Open Stack

- Dashboard (“Horizon”) – front-end pentru servicii OpenStack
- Compute (“Nova”) – stocheaza si recupereaza disk-urile virtuale (“images”) si metadata asociate in Image
 - Rackspace si HP furnizeaza servicii comerciale bazate pe Nova
 - Este folosit ca nucleu al infrastructurii in Mercado Libre (peste 6000 de servere virtuale) sau NASA (sursa de origine)
- Network (“Quantum”) – furnizeaza retea virtuala pentru Compute
- Block Storage (“Cinder”) furnizeaza mecanism de stocare persistent pentru Compute
- Image (“Glance”) – permite stocarea imaginilor diskurilor virtuale in Object Store
- Object Store (“Swift”) – permite stocarea si regasirea de fisiere
- Identity (“Keystone”) – asigura autentificarea tuturor serviciilor

[<http://docs.openstack.org/trunk/openstack-compute/admin/content/conceptual-architecture.html>]

Open Stack - arhitectura

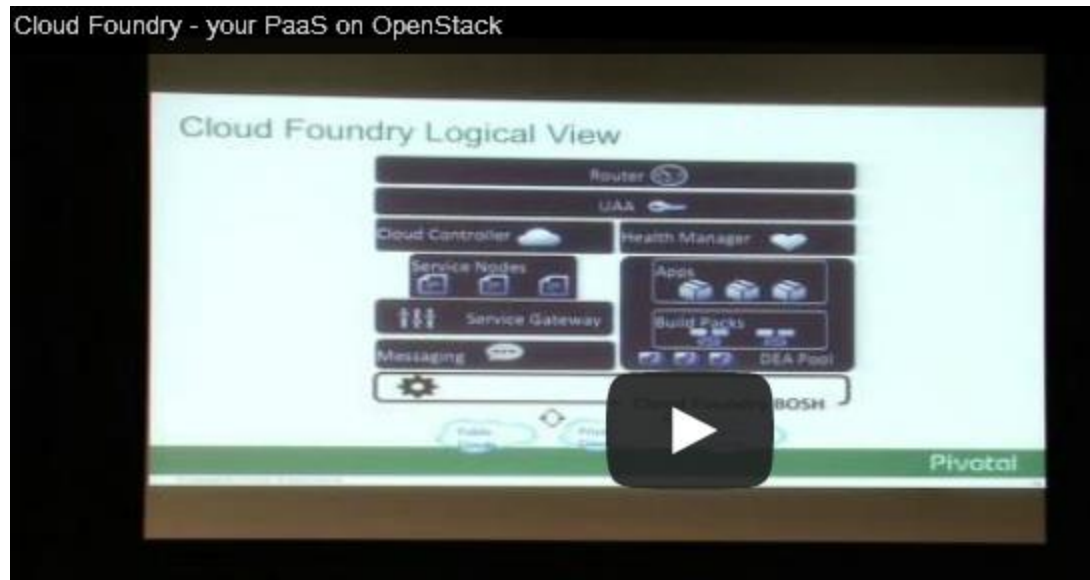
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Cloud Computing

Open Stack -> PaaS

- Solum - <https://wiki.openstack.org/wiki/Solum>
- Cloud Foundry – PaaS peste OpenStack

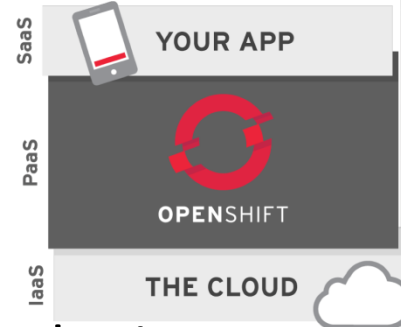


[<https://www.openstack.org/summit/portland-2013/session-videos/presentation/cloud-foundry-your-paas-on-openstack>]

Cloud Computing

Open Shift

- Furnizor de PaaS
- Asigura serviciile pentru deploy si rulare a unei aplicatii de tip LAMP



The screenshot shows the OpenShift website homepage. At the top is the OpenShift logo and navigation links: PRODUCTS, PRICING, DEVELOPERS, QUICKSTARTS, and SUPPORT. The main heading is 'DEVELOP, HOST, AND SCALE YOUR APPS IN THE CLOUD' with the subtitle 'The Open Hybrid Cloud Application Platform by Red Hat'. Below this are three main sections: 'ONLINE' (Public PaaS), 'ENTERPRISE' (Private PaaS), and 'ORIGIN' (Community PaaS). Each section has a description, a 'Learn more' link, and a call-to-action button. At the bottom, there is a section titled 'YOUR CODE. YOUR CHOICE.' with a list of supported technologies: Java, PHP, Ruby, Node.js, Python, Perl, MySQL, MongoDB, PostgreSQL, and Jenkins.

ONLINE
Public PaaS

Host your applications in the public cloud. OpenShift Online automates the provisioning, management and scaling of applications so that you can focus on development and creativity.

[Learn more](#)

SIGN UP FOR FREE

ENTERPRISE
Private PaaS

Accelerate your IT service delivery and streamline application development by leveraging PaaS in your own datacenters or private cloud.

[Learn more](#)

REQUEST EVALUATION

ORIGIN
Community PaaS

Explore the community-driven open source upstream of OpenShift. Download the bits, join the growing community, and help extend the functionality of OpenShift.

[Learn more](#)

JOIN THE COMMUNITY

YOUR CODE. YOUR CHOICE.

Java PHP Ruby Node.js Python Perl MySQL MongoDB PostgreSQL Jenkins

Cloud Computing

Open Shift

- <https://www.openshift.com>



Cloud Computing

Furnizori de PaaS



Key Features:	Dedicated instances with no multi-tenancy at the virtual machine level. More control over your virtual machine instances than other PaaS providers. Integration with both public and private Git repositories.
Limitations:	Supported languages are limited to Ruby, JRuby, REE, Rubiniu, Node.js, and PHP.
Pricing:	Based on a "pay as you go" model with standard and premium support options. Prices range from \$0.05/hour per instance to \$2.19/hour per instance, depending on your configuration.

Heroku

- **Suporta** Ruby, Python, Java, Scala, Cloture si Node.js
- **Dynos** = Mediul abstract de rulare = Containere virtualizate care ruleaza procese in medii izolate

Key Fetures:	One of the early Pass providers, Heroku is ideal for quick deployments and fits a wide range of distributed applications.
Limitations:	Cost of addons vary and estimating costs can be challenging as the number of addons increase and loads vary across application components.
Pricing:	Based on the number and size of dynos deployed (\$0.05/hour - \$0.10/hour), the size of the Postgres database and addons used.
Bonus:	Starter databases with up to 10,000 rows are free.

[<http://www.tomsitpro.com/articles/paas-providers,1-1517.html>]

Cloud Computing

Alti furnizori de cloud:

Ruby on Rails in cloud: PaaS

- Ruby on Rails (RoR)
 - Framework open-source pentru Ruby
 - Limbajul Ruby combina: eleganta conceptuala a Smalltalk, usurinta invatarii din Python si pragmatismul Perl
 - Este foarte rapid in dezvoltarea de aplicatii Web
 - Companii: **Heroku**, **Aptana**, **EngineYard** ofera stiva RoR in mediul cloud Amazon EC2

Salesforce.com - Force.com

- Salesforce.com – s-a impus printr-o aplicatie enterprise SaaS de succes (CRM)
- Force.com – e PaaS, gazduit in infrastructura Salesforce, in care dezvoltatorii folosesc limbajul de programare Apex
- Exista o integrarea intre Google si Salesforce.com, a.i. o aplicatie dezvoltata in GAE poate avea acces la depozitul de stocare din Salesforce

Cloud Computing

Furnizori de PaaS

Appian

- Furnizor de servicii BPM (business process management)
- Suport facil pentru dezvoltare de aplicatii printr-o paleta larga de instrumente oferite
- Suport pentru integrare (*Records*) – orchestrare
- Solutiile dezvoltate nu sunt portabile

MIOSoft

STRENGTHS

- MIOsoft's strategic investment in big data management, data integration, business analytics and machine learning distinguishes it from most aPaaS competitors. Its platform can accommodate petabytes of data, and it supports parallel and hybrid transactional/analytical processing (HTAP).
- Flexible deployment options enable customers to choose between public, virtual private and managed private cloud services, as well as on-premises software. Cloud services can be deployed in MIOsoft data centers or on AWS and other IaaS platforms.

CAUTIONS

- MIOsoft's focus on NoSQL/Hadoop analytical data models makes its platform less suitable for simple transactional applications using a basic relational data model. The platform is not suitable for migrating existing enterprise applications to the cloud.
- MIOsoft has minimal brand recognition, which reflects its limited marketing ability.

Cloud Computing

Furnizori de PaaS

Cybozu(kintone)

STRENGTHS

- Kintone has more than 3,000 companies as subscribed clients and in excess of 100,000 end users globally, and this number is rapidly increasing.
- Kintone offers citizen developers a high-productivity graphical drag-and-drop application development capability, the ability to incorporate Microsoft Excel spreadsheets into forms with prefilled data, and more than 50 prebuilt applications to download and customize.
- Cybozu has more than 150 official system integrator partners for kintone, and a very active developer network. It holds more than 50 developer events a year.
- Cybozu is expanding the kintone ecosystem by exploiting new scenarios — such as Internet of Things (IoT) control and machine-learning-based real-time prediction — by integrating AWS IoT, AWS Lambda and Amazon API Gateway technologies.

CAUTIONS

- Kintone does not support any high-control capability. Nor does it support on-premises deployment, although applications are customizable with JavaScript/REST APIs.
- Kintone users surveyed by Gartner consider its functionality to be relatively weak around service-oriented architecture (SOA), integration capabilities and product technical support.
- Cybozu has traditionally had little presence and few customers outside Japan, although it does have partners in Hong Kong, Taiwan, Thailand, Singapore and Vietnam, and opened a regional kintone office in the U.S. during 2014.
- Small or midsize businesses, rather than large enterprises, are the main buyers of kintone — in line with its focus on citizen developers.

[<https://www.gartner.com/doc/reprints?id=1-2C8JHBP&ct=150325&st=sb>]

Cloud Computing

Top furnizori de PaaS

Caspio

- Nu este un PaaS in totalitate; folosit pentru crearea de baze de date, furnizarea de formuri si generare de rapoarte
- Foloseste AWS



Key Features:	Easy to use graphical user interface and wizard driven development environment lower the barriers to entry in application development in the cloud.
Limitations:	Caspio is not a true PaaS; application integration with existing software could become complex and it is best suited for small businesses with limited development resources.
Pricing:	Monthly subscription plan with unlimited users, apps, and storage is \$249/month plus \$30GB data transfer over 1GB/month. A custom plan, which starts at \$19/month, is also available.
Bonus:	Free 14-day trial is available to new users.

mBaaS

- Platforma backend pentru dezvoltarea aplicatiilor mobile
- Este un PaaS specializat care ofera API-ri pentru managmentul utilizatorilor, push notifications, integrare cu retele sociale



[<http://www.tomsitpro.com/articles/paas-providers,1-1517.html>] ⁵⁴

Cloud Computing

Alti furnizori de IaaS, PaaS, SaaS

Furnizori de IaaS

- **Joyent**
 - Parteneriat cu Dell
 - Furnizeaza servicii de hosting catre dezvoltatorii Facebook – free
 - Oferă servicii de cloud public concurind cu Amazon EC2, precum si cloud privat in parteneriat cu Dell
 - www.joyent.com
- **Rackspace**
 - Peste 99.000 clienti
 - 2900 de angajati
 - Furnizeaza Rackspace Cloud
 - www.rackspacecloud.com/cloud_hosting_products

Cloud Computing

Alti furnizori de cloud:

Furnizori de IaaS

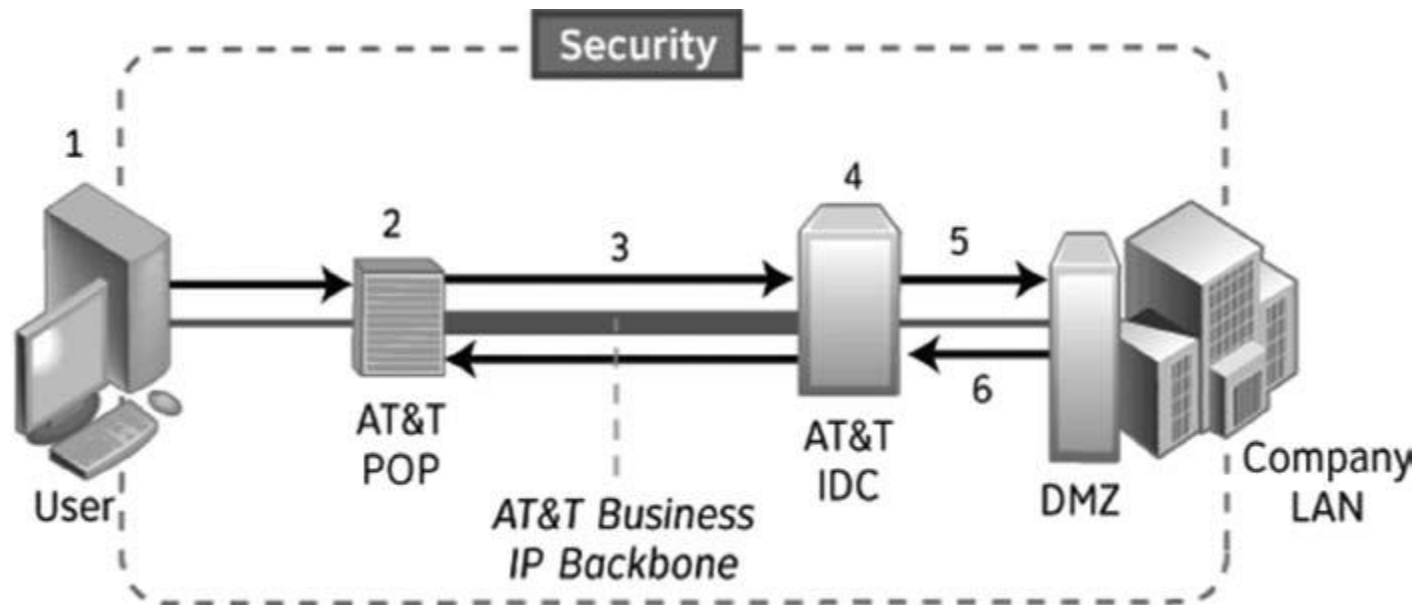
- **GoGrid**
 - Oferă o mare varietate de servere cloud suportând Windows și Linux
 - Are cel mai bun SLA: 24/7 – 100%
- **Elastic Hosts**
 - Furnizează servere virtuale având la bază Linux KVM și care rulează în propria fermă de servere (trei centre – pe două continente)
 - www.elastichosts.com
- **SymetriQ**
 - Construirea unei imagini virtuale se realizează printr-o simplă operație de drag-and-drop
 - www.symetriq.com
- **Bluelock** – oferă IaaS și servicii de încredere recunoscute care se bazează pe soluțiile VMware
 - Soluții de integrare între centre de date multiple

Cloud Computing

Alti furnizori de cloud:

Furnizori de PaaS

- AT&T
 - Are si caracteristici de furnizor de servicii IaaS prin coalocare



[Implementing and Developing Cloud Computing Applications, David E.Y. Sarna]

Cloud Computing

Alti furnizori de cloud:

Furnizori de SaaS

- **NetSuite**
 - este un lider in furnizarea de software business CRM, ERP , e-commerce
 - www.netsuite.com/portal/home.shtml
- **Intacct**
 - Aplicatii pentru management financiar
 - Asigura interoperabilitatea cu alte aplicatii de tip business: Salesforces CRM, Avalara, Avectora

Furnizori de Cloud specializati

- **Appistry**
 - Furnizeaza infrastructura Cloud, pentru organizatii de tip armata, dar si ISV (Independent Software Vendor)
 - Clienti: Guvernul US, Sprint, FedEx
 - www.appistry.com

Cloud Computing

Cloud-uri private: DaaS (Datacenter as a Service)

- Consideratii
 - Cloud-urile private sunt de dimensiuni mici
 - *Legacy application* – sunt greu de trecut la o arhitectura specifica unui cloud
 - *On-premises* – nu implica neaparat mai multa securitate
 - *Do what you do best* 😊
- Amazon VPC (Amazon Virtual Private Cloud)
 - Oferă o punte de legatura (via VPN) intre infrastructura IT existenta si cloud-ul Amazon => un model hibrid

Cloud Computing

Cele mai bune servicii Cloud in 2017 [conform <http://cloud-services-review.toptenreviews.com/>]

The Best Cloud Services of 2017

STORE AND ACCESS YOUR DATA ANYWHERE

Top Ten Reviews / Services / Web Hosting / Cloud Services Review

[Introduction](#) [Best for Personal Use](#) [Best for Small Business](#) [Best for Editing](#) [Best for Storage](#) [Best for Free Space](#) [Best for Mac](#)

THE PRODUCTS YOU'LL SEE THROUGHOUT OUR BUYING GUIDE



Amazon Cloud Drive

[See Details](#)



Box

[See Details](#)



Dropbox

[See Details](#)



Egnyte

[See Details](#)



G Suite

[See Details](#)



iCloud

[See Details](#)



iDrive

[See Details](#)



Microsoft OneDrive

[See Details](#)



OpenDrive

[See Details](#)



SugarSync

[See Details](#)

Cloud Computing

Top Servicii – Personal Use 2017 [conform <http://cloud-services-review.toptenreviews.com/>]

More than 50 million Americans subscribe to Amazon Prime. That's a huge number of people who get free access to Amazon Cloud Drive for their photos. A Prime member gets 5GB of space for photos, videos and music at no extra cost.

If you need more space and want to store data other than just family photos, you can subscribe to Amazon Cloud Drive for less than \$5 per month – and its unlimited storage space. The only caveat is that it's for personal use only.



Amazon Cloud Drive

Amazon Cloud Drive

Amazon Drive touts itself as your personal hard drive in the cloud. While its basic functionality is virtually identical to other cloud services, Amazon distinguishes itself from

Top Servicii – Small Business

Out of the gate, you get 5GB of storage space free. For less than \$2 per month, you can sign up for the basic plan that nets you 50GB of storage. Business plans start at \$5 per month for 1TB of cloud storage per user. If you're willing to pay double – \$10 per month per user – you can get 5TB of storage for each employee, but you need at least five users to be eligible.



Microsoft OneDrive

Microsoft OneDrive

If you already use Windows 10, you probably already also use OneDrive, Microsoft's well-integrated cloud service. It was previously known as SkyDrive, and it works well for

Cloud Computing

Top Servicii – Editing on the Fly 2017 [conform <http://cloud-services-review.toptenreviews.com/>]

The best cloud service for editing files is G Suite by Google Cloud, previously known as Google Apps. If you're familiar with Google Docs, or Google Drive, you'll easily pick up on G Suite. Using a Chrome extension, you can quickly open a Microsoft Office file, edit it and the changes are saved automatically. You can also set permissions on files that allow others to edit, comment or access certain files.



Google introduced its cloud computing service solution as Google Apps, and now it's known as G Suite by Google Cloud. This cloud-based service can be tailored for both individual users and businesses of any size. There's no single cloud cupboard or online space where

Top Servicii – Storage

Whether you're in the market for home cloud storage or cloud services for your business, if you have a variety of large and small files, you need a solution that won't limit you. Egnyte lets you store all types of files, from email and contacts to documents, music and video files. There's also no cap on the file size, so you can upload large files, which many cloud services won't allow. Not only do you have limitless storage capabilities with Egnyte – if you're willing to pay for more allotment – you can also share files or folders with others. You set permissions for specific files or folders, and you can decide whether a user can simply view files or have the ability to edit or delete them.



Rezumat

- PaaS
- PaaS – proprietati si caracteristici
- Furnizori de servicii Cloud (IaaS si/sau PaaS si/sau SaaS)
 - Amazon
 - Microsoft
 - Google
 - OpenStack
- Alti furnizori de servicii cloud (Joyent, Rackspace, GoGrid, Elastic Hosts, SymetriQ, AT&T, Heroku, Aptana, EngineYard , Salesforce.com, NetSuite, Intacct, Appistry,...)

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- <https://www.gartner.com/doc/reprints?id=1-2G2O5FC&ct=150519>

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Întrebări?

