



## ITU Regional Forum on New Technologies for Development

Cloud Computing Technology to improve Education in Arab countries

# Cloud based education-ESPRIT

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# Outline



- 1** Using Cloud in Education
- 2** Presentation of ESPRIT
- 3** The Cloud of ESPRIT
- 4** Return-on-experience

# ▶ Using Cloud in Education



	Large business	Higher education	Small business	Federal government	K-12	Medium business	Healthcare
							
Percentage of organizations implementing or maintaining cloud computing <b>2012:</b>	44%	43%	42%	42%	42%	40%	35%
Percentage of organizations implementing or maintaining cloud computing <b>2011:</b>	37%	34%	21%	29%	27%	21%	30%

# ▶ Using Cloud in Education

- Used Cloud services:
  - E-learning (moodle, MOOC... )
  - Unified communication tools
  - Collaboration tools
  - Storage solutions

➔ In the **field of education**, **Software-as-a-Service** is a more preferred model.

Services

e-LEARNING





# Using Cloud in Education

## Deployment models

- First approach: The use of public Cloud
  - Benefits:
    - ➕ Reduce CAPEX
    - ➕ Elasticity
    - ➕ Risk and management outsourcing
  - Limits:
    - ➖ Poor control level
    - ➖ Data ownership
    - ➖ No services specific for education



# Using Cloud in Education

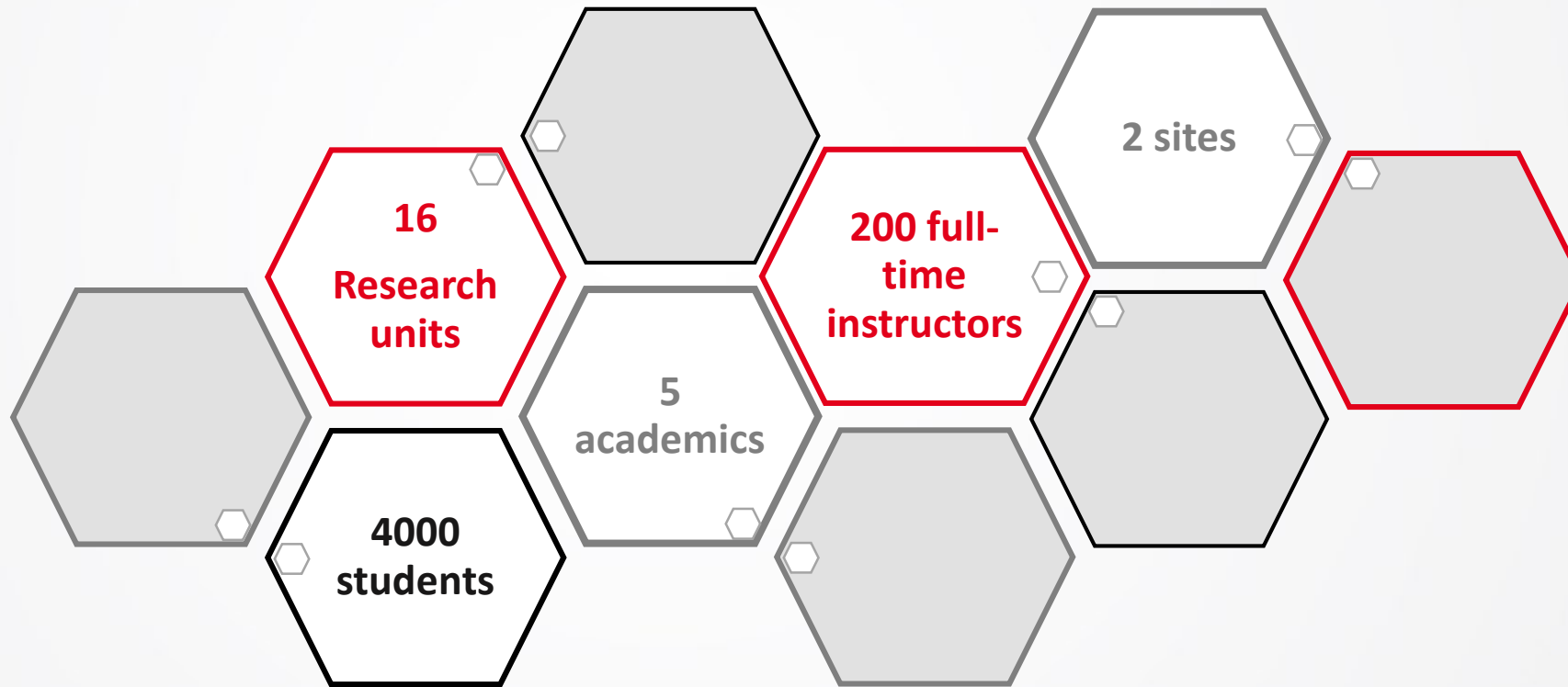
## Deployment models



- Second approach: The use of private Cloud
  - Benefits:
    - ➕ High control level
    - ➕ Data ownership
    - ➕ Specific services
  - Limites:
    - ➖ High CAPEX
    - ➖ Limited elasticity
    - ➖ Complex administration and management tasks



# Presentation of ESPRIT






# Presentation of ESPRIT: Needs



**Production**



**Pedagogy**



**Research and development**

**Machines, simulators, storage space**

**Different software solutions**

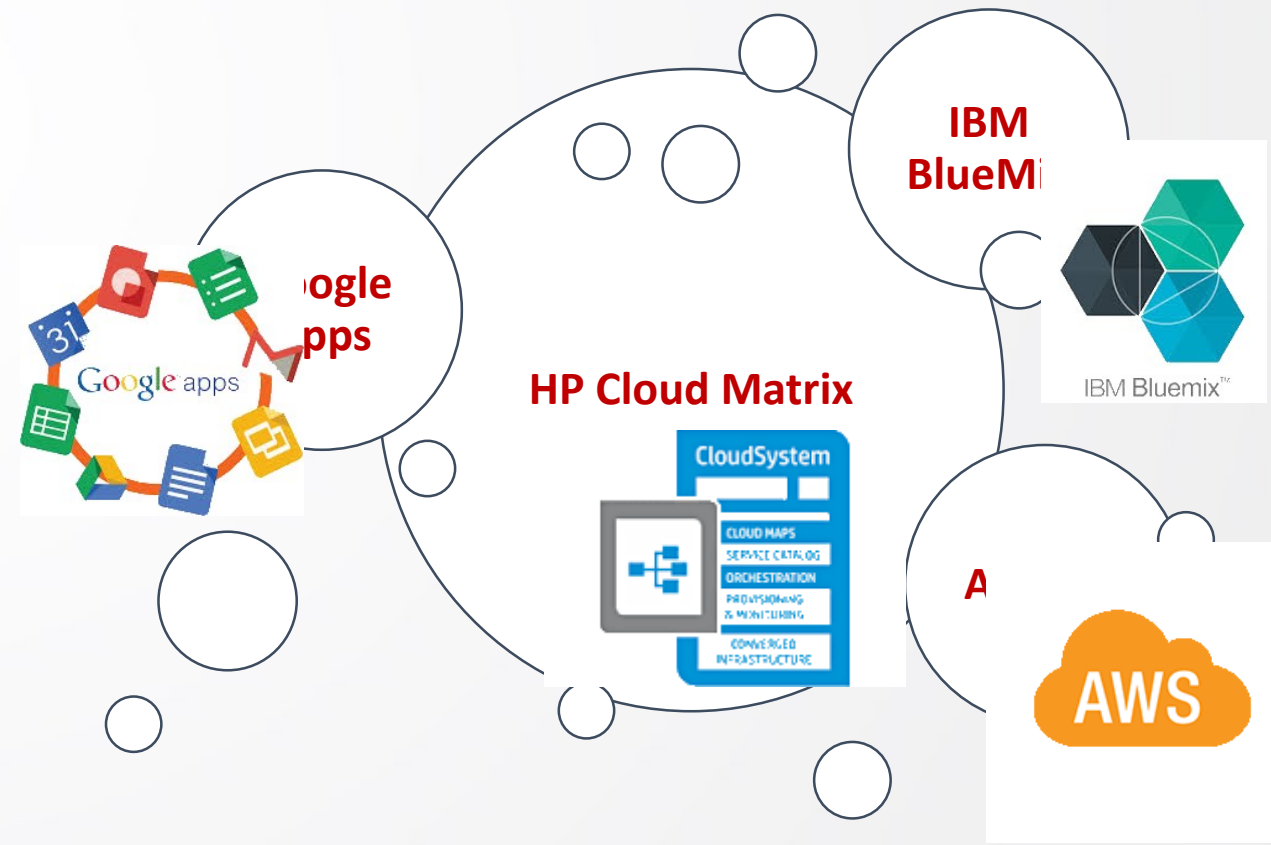
**Deployment, development and test environment**



# ▶ The Cloud of ESPRIT



- An hybrid Cloud composed by:
  - Private Cloud: HP Cloud Matrix deployed at the Data Center of ESPRIT
  - Public Clouds:
    - Google
    - IBM Bluemix
    - AWS Educate program



# The Cloud of ESPRIT

## The Data Center: Hardware Configuration



- 4 Blades BL460c
- 64 cores (Xeon E5-2650 8 cores each)
- 672 Go RAM



- 48 SAS disks
- 900 Go each
- SAN storage
- 8 Gb/s FC

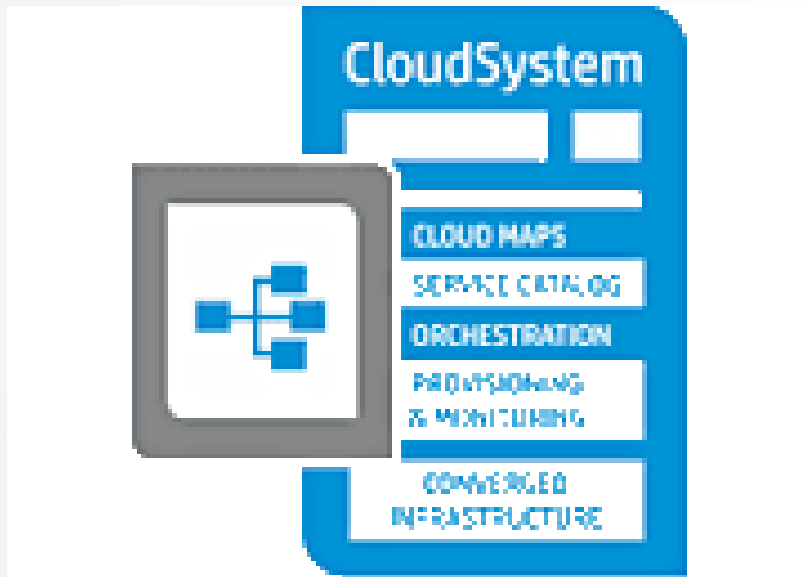


# The Cloud of ESPRIT

## The Data Center: Cloud System



### HP CLOUD MATRIX



**Private IaaS provider**

**WorkFlow management**

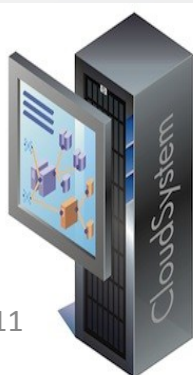
**Automatic Provisioning**

**Online Template**

**Support of many hypervisors**

**Metering and Billing**

**Easy management and deployment**






# The Cloud of ESPRIT Private Services




  
**SaaS**

- Moodle
- MS Lync
- SeaFile

  
**PaaS**

- **Development and deployment (Compass)**
- **Framework**

  
**IaaS**

- VMs ( Practical works, Projects)
- Information system
- Storage spaces
- Infrastructures Cloud ( OpenStack)



# The Cloud of ESPRIT Public Services



**Google**

il

- Collaboration Services
- Google Drive
- Directory Service



IBM Bluemix™

**IBM BlueMix**

- Development and deployment environment
- Simulators
- E-learning Platform ( IBM accademy)



**AWS Educate program**

- cloud-related learning
- AWS technology
- Community resources

# Return on Experience

## Before

Distributed Infrastructure

Manual and slow provisioning

Not optimal utilization

Human interaction

Footprint

Capex ↘ Opex ↗

Abstract skills

## After

Centralized Infrastructure

Rapid, dynamic and smart provisioning

Resources Consolidation

Self Service On Demand

Reduced Impact

Capex ↗ Opex ↘

Real and mature environment

# Return on Experience

